Masaryk University

BECOMING A TEACHER:
The Dance Between Tacit and Explicit Knowledge

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This book is dedicated to David Grove, Francisco Varela and Eva Vyskočilová.

Many authors (and many tacit processes) have contributed to the creation of this book. It is, therefore, a reflection of individual author diversity, but seen through the prism of three major themes which represent a "dance" between tacit and explicit knowledge, metaphors and Clean Language Interviewing.

Clean Language Interviewing was not only an important stimulus and guide for our research but a process of sensitization for us, to the nature of communication and the importance of the language choices we all make. We hope that this book will serve as a guide for those who, otherwise, might never take the Clean Language journey.

We would like to thank our reviewers, Professor Bronislava Kasačova and Associate Professor Vladimir Chrz. We also want to thank James Lawley and Penny Tompkins, who fully supported us throughout our journey to using Clean Language in research. This book could not have been written without the support of Caitlin Walker, whose enthusiasm enabled us to surmount all obstacles, and Judy Rees, who first introduced us to Clean Language. We would like to give special thanks to Jakub Lanc for sharing his expertise in psycho-phenomenology.

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Introduction

Radim Šíp, Jan Slavík

Early and late modernity: Compositions of thought and action

At the beginning of our project (i.e. in 2012 while preparing materials for our grant application) we decided to focus on the research of tacit knowledge, which is formed, shaped, applied and shared as part of the professional experience of student teachers1 during their teaching practice or subsequent reflection. What we did not realise, however, was that this topic would lead us to address a significant number of other issues, including what we consider is quite wrongly dubbed "scientific research paradigm". A brief analysis of the word "paradigm"—currently a somewhat overused word—reveals how many definitions it has. Some of them contradict each another, others overlap to some degree, while others are borderline obscure. Even the Kuhnian use of the word is of little help in our study. The term itself embodies a fundamental problem.

What we define as a paradigm goes beyond any one particular discipline of Science (e.g. Physics or Sociology), or even science as a whole. Science evolves along with the theory of science, epistemology and methodology in the broad context of other cultural traditions and undergoes slow yet constant transformation. Statements such as, 'Unlike natural sciences, social sciences are multi-paradigmatic' make little sense. By default, social sciences are as multi- or uni-paradigmatic as natural sciences. They are, however, harder to idealise (i.e. reduce the initial quality of their input data), than some of the natural sciences. For this reason, it might be argued that, if anything, natural sciences lean more towards being uni-paradigmatic than social sciences. However, the reason 'paradigms' can exist and transform, or why they are even possible at all, is different (see below). This becomes much clearer if we reject the idealised history of scientific research and look into the real living history of research traditions and its heresies (cf. Feyerabend, 1993; Latour & Woolgar, 1986).

In order to avoid any misunderstanding, we introduce a new term: *composition of thought and action* (discussed in sub-chapter 1.2).[2] There is purpose behind choosing the word *composition*. We took inspiration from History and the theory of Art in which the term composition (or style) refers to a property of human activity and its expression of meaning. On the one hand it denotes the tendency to repeat certain ways of

[1] The text occasionally uses the word *student* in reference to *student teachers* and *pupil* for *primary school learners*.

[2] A more detailed, sixty-page description can be found in a monograph currently being prepared: Šíp, R. *Pedagogika v době proměny slohu myšlení a jednání: filozofická analýza.* [Education During the Transition Between Two Compositions of Thought and Action: A philosophical analysis] It is expected to be published in 2017.

thinking and acting, the inner logic of which shapes certain types of human artefacts. On the other, it suggests a continuous transformation of this logic. The composition of thought and action is a broader expression of this very principle—a principle of repetition and continuous transformation. Because of this, *composition* transforms the current tradition, but it draws upon its elements as well. In this way, one composition (or art, or style) gradually gives way to another, as exemplified, for instance, in the Renaissance being replaced by the Baroque. Although no precise border can be seen, we are still able to discern certain tendencies in period artefacts that distinguish the 17th century Baroque period from the Renaissance of the 15th century, while still recognising similarities between the two. At the same time, we can see that some features of compositions (e.g. an emphasis on orderly organisation of things) have been repeated throughout history (repetition of previous patterns). This is a general requirement for understanding the past from a contemporary perspective, and coming to terms with it.

We must therefore recognise 'compositions of thinking and action' as well as 'compositions of art' as Weberian *ideal types* (Weber, 1949, p. 50–112). A composition of thinking and action, similar to an artistic style, cannot be found in any strictly defined period. It is only a tendency of thought and action which gradually becomes successful, until it almost dominates most areas of human activity, only to eventually grow weaker and slowly disappear completely. The early modern composition of thinking and action began gaining momentum during the 15th and 16th centuries. In the 17th century it became ostensibly distinct from the previous period until its peak in the 18th and 19th centuries. Since then it has been growing weaker. The time of its peak was also when most pre-understandings of contemporary theory of science originated, and these have not yet seen proper critical reflection. For example, the pre-understanding that science can be simply divided into 'hard' and 'soft' fields, that this division characterises 'reliable' and 'less reliable' scientific knowledge and that this is linked to the distinction between quantitative (more reliable) and qualitative (less reliable) methodology.

Such anachronistic ideas are also the reason for the ongoing discussion about multi- and uni-paradigmatic fields. Whether a field is multi- or uni-paradigmatic is not a quality of the field itself but rather depends on the stage of transition from one composition to another. When one composition dominates the cultural imagination of societies, we have a tendency to perceive scientific disciplines as uni-paradigmatic. Once the consequences of the gradual changes become more concentrated, as awareness of the transition rises, uni-paradigmatism begins to crumble. The 'hard' sciences are no exception to this. This can be seen today in the transformations taking place in Biology and Cognitive Science. Amidst the traditional orthodoxy, competing theories have emerged and are internally challenging the logic of interpretation. For instance, the neo-Darwinist orthodoxy, which itself suffers from an internal split, is now seeing competition from theories that outrun the scope of neo-Darwinism—e.g. the phenotypic plasticity theory, extended synthesis or the general biosemantic approach. Apart from the Cartesianism of first-generation cognitive sciences, represented for example

by Fodor or the Churchlands, there is also a 'second generation'[3] in which anti-Cartesian ideas are being fully formulated, giving rise to theories such as the extended mind, embodied mind, enacted mind or the ecological self. This split and fragmentation demonstrates the intensity of the transition from the early-modern composition towards the late modern one.

These transformations are evident during development of the conception of knowledge as well as in the conception of the history of science. They manifest themselves in other traditions of human activity as well, such as art, clothing and leisure activities. Transformations in these as well as other areas are taking place together with transformations in the scientific tradition. They are interconnected—a transformation in one tradition (e.g. the scientific tradition) takes place in correlation with transformations in other traditions. This correlation is determined by the fact that these traditions are initiated, developed and carried on by the same beings—the people living in a given period. Since this monograph focuses on human cognition, namely on knowledge and tacit knowledge, we focus mainly on this area in connection with the transition from the early modern to the late modern period.

What we understand under the phrase 'composition of thinking and action' is a historical a priori, during which the style of our thinking is formed, as are the ways in which we legitimise the outcomes of our cognition. The a priori can be imagined as a pre-established mesh through which individuals sift their experience and thus arrive at structured experience, i.e. knowledge. These a priori are 'historical' because the characteristics are undergoing constant transformation and after some time, once they have gained intensity, one epoch gives way to another. Retrospectively, this transformation may look like a breaking point, but it is in fact just as continuous as the human life. The transformation of the composition of thinking and action resembles the transformation of a person who continues their life, does not stop to think about changes, ageing and eventual demise, and yet this person cannot help but pause over a twenty-year-old photograph and is shocked to realise that he or she has aged and that in twenty years' time may not be among the living anymore. Similarly, the early modern composition is growing quietly and continuously weaker until it slowly gives way to the composition of the late modern times. We now find ourselves in a period of transition between two compositions.

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[3] For a differentiation between first- and second-generation cognitive sciences and for an argument why the first generation was held back by its Cartesianism, see Lakoff and Johnson *Philosophy in the flesh* (1999, pp. 71–74).

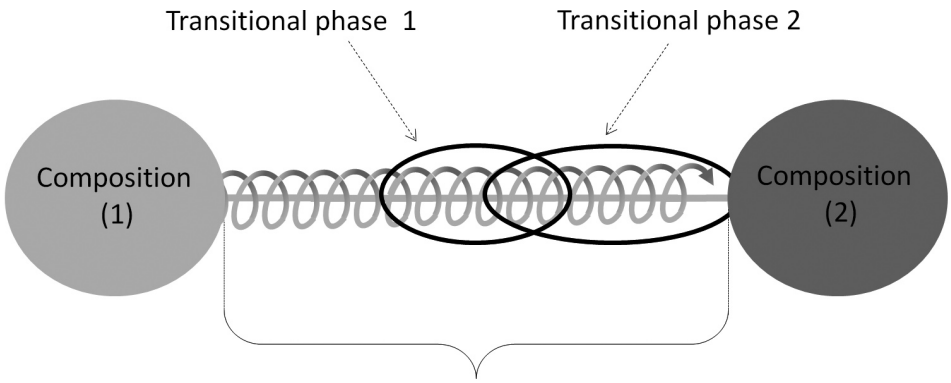

Figure 1. Transition from early modernity to late modernity and transitional phases on which this monograph is based.

This process is illustrated in Figure 1 which shows two counter-poles—on the left is the early-modern composition (1) and on the right the late-modern composition (2). Between them are two transitional phases. They are transitional in the sense that their representatives reject the early-modern habits of thought and action, yet some of their ideas and habits remain in early modernity. A phase of transition from one composition of art into another produces works of art which contain features of both. For example, *Don Quixote* can hardly be classified as a purely Renaissance or a purely Baroque work. It accurately illustrates what we mean by transitional phases and how these phases carry a sense of inner tension between the old and the new.

The two transitional phases shown in Figure 1 are rather important for this monograph. They both outline positions on which their supporters base their definitions of cognition, knowledge, tacit knowledge and figurative language. The diagram shows position 1 precisely halfway between the two compositions and in the first (theoretical) chapter is characterised by one of the very inspirational books to be recently published in the Czech scientific milieu: *Creating as a Way of Gaining Knowledge* [Czech: *Tvorba jako způsob poznávání*] (Slavík, J., Chrz, V., Štech, S., Nohavová, A., Klumparová, Š., Hník, O., … & Valenta, J., 2013; henceforth *Creating*). The book's main cornerstones, i.e. the emphasis on the structure of the content of experience, its intersubjective negotiation and the concept of metaphor as a signature (which, paradoxically, carries no meaning—see above—1.3.4), are based mainly on the ideas of post-analytic philosophers, most notably Donald Davidson, Willard V.O. Quine, Jaroslav Peregrin and Nelson Goodman.[4] Transitional position 2 is our position. Distinguishing between the

[4] Because there is currently no English version of *Creating*, we cite those authors whose work is available in English.

two phases and their positions helps us articulate precisely where our characterisation of knowledge, tacit knowledge and figurative language had to deviate away from the position of transitional phase 1 and towards the late modern composition in order to make our research in tacit knowledge meaningful. Without leaving the confines of epistemological and methodological acceptability, we stretched the borders closer towards the ideal type of late modernity. The inner tension in the two positions also enables them to support one another. While the first position can better construct the common professional vocabulary of educators, the second position is better suited for structuring experience—i.e. the process of gaining knowledge—during its ascent and continuous formation.

Transitional phase positions

Our thinking and corresponding actions are in a continuous process of change, in a similar way to our physical self. Although a person's appearance and opinions may seem to remain unchanged, both registers are constantly developing. Only when we look back do we become aware of the time that has passed, and realise that our opinions are significantly different. Such reminiscences carry most of the cognitive content. They have us compare two idealised, "frozen" forms. This is a common and effective approach; however, if we wish to study tacit knowledge formed, shaped, applied and shared during our students' teaching practice (or when reflecting on it) we need to find tools which emphasise the continuity of change rather than comparing two 'frozen' stages of this process. Tacit knowledge is so named because it is not yet possible to position it in a temporarily 'frozen' structure, because, in the case of tacit knowledge, this structure is undergoing constant formation. The authors of *Creating* operate with static structures and then compare them; however, what we emphasise is constant structural reconfiguration. Nevertheless, this opposition between their and our position is purely didactic. We understand both approaches as complementary positions, which in fact need this complementation or even inspiration arising from an awareness of differences between the two.

The position of the authors of *Creating* involves an effort to shape teachers' language so that teachers and their mentors can temporarily capture the terminology they need to understand each other. Our research team positions itself around continuity. Constructing professional language must be based on idealisation, which begins with a temporary halt in the flow of continuity and then compares its two forms and identifies the similarities and differences with the knowledge of "the same thing in another". For instance, if you compare your face in two photographs which are twenty years apart, the similarities enable you to create a certain identity relationship between your contemporary face and your face in the past. This position gives rise to identity within reflection and conscious awareness of the parts creating a whole. The position of the authors of *Creating* thus provides an approach for constructing contextual frames for common terminology.

On the other hand, the position taken in this study is more accepting of process; and makes it possible to be present during the formation of experience. This requires *an extending of the present*. However, since we have escaped the idealising and fragmenting nature of literal language, identity can only be perceived as a continuity. In this position, figuratively speaking, the identity of one face, the two likenesses of which are twenty years apart, cannot be drawn from two fixed states (as though we did not have the two photographs available), but from experiencing the continuity of the "old" and "new" face within the stream of living without thematising what parts of the old remain in the present. This does, however, have it limits, since we still do not have accurate language available which would capture this continuity, would be precise and yet would not "freeze" what is being communicated into more or less limited forms. Returning to our photograph analogy, this language would have to be able to express the process of the lived context, which connects the old face with its doppelganger twenty years younger without any need to compare them. No such language exists yet. For this reason, the two positions necessarily complement each another. Our position of *extending the present* is complemented by the position also held by the authors of *Creating,* Slavik et al. These authors have the tools for constructing and sharing professional language and we have the means of studying cognition while it is in motion.

In the first chapter we show that we understand knowledge as a complex dynamic structure (the late-modern view). We try to apply this concept of knowledge in the empirical chapters as well. The work with data in each of the research investigations shows aspects which are reminiscent of the thinking and action of the early modern composition as well as aspects characteristic of late-modern action and thought. The researchers had no easy task reorienting to late-modern thought and action. Understanding knowledge as a complex dynamic structure was a somewhat unfinished and ongoing process rather than promptly completed task. We ourselves felt how very slow the transformation of the initial assumptions is (and is in fact still continuing). The empirical chapters capture moments which reflect some stage of this process in which the researchers found themselves at that time. These stages are distributed across the transformation continuum of the composition of thought and action in the second transitional position (see Figure 1).

Generally speaking, despite the fact that we became aware (with increasing urgency) of the necessity not to focus our research attention only on the cognitive level of knowledge, the empirical chapters demonstrate that we took into account other levels of knowledge (bodily, interactional and external) albeit in a somewhat supplementary way. Similarly, working with metaphors was not as conclusive for data analysis and interpretation as we would have liked.[5] On the other hand, we were successful

[5] On the other hand, strict adherence to distinguishing between the literal and figurative would be characteristic of early modern thought, which is what we are trying to avoid. It would suppress continuity and the gradual transformation of one thing into another while favouring clear boundaries and discontinuity. This is addressed in more detail in *Continuity between metaphorical expression and literal description* in this *Introduction* as well as in section 1.3.4.

in approximating the late modern composition during our work. This is well demonstrated in Chapters 7 and 9. In Chapter 7 the analysis focuses on the very effort of capturing knowledge as a complex dynamic structure where tacit and explicit knowledge are two interacting counterpoles of a single continuum. In Chapter 9 we demonstrate, among other things, that the trigger of unexpected situations (in which tacit knowledge manifests itself) is the *interaction* of external conditions (conditions determined by the environment in which a student teacher is performing his or her practice) and the internal conditions (conditions connected with the student's person). The structure of the empirical part of this book is discussed in detailed in the chapter on methodology (Chapter 4).

Early and late modernity: Metaphors that shape the understanding of knowledge

In the previous paragraphs there are many 'figures of speech' that shape what is being said so as to convey those structures of meaning we need to communicate. Figurative language has been used throughout history; examples being the old Cartesian metaphor of the body-machine or Comenius' simile of school as a workshop of humanity. The very approach to cognition and knowledge is also shaped by metaphors which influence what we imagine 'behind' those words *cognition* and *knowledge*. The early-modern composition built cognition around the metaphors of seeing and grasping. Cognition is thus seen as an intellectual view of the nature of a thing. The term 'theory' (*theoria*) has its origins in the words *thea*—what can be seen (a view) and *horan*—to see. The ancient concept of theory and thus also the concept of cognition (whether in Plato, Aristotle or Democritus) is based on visual metaphors. Early modernity adopted these metaphors, by converting the rational soul into the modern human mind, in which these forms can be located as reflections of the external world inside the knower's internal space (this is the main image that makes up the Cartesian tradition).

A comparison of our position with that of the authors of *Creating* reveals a difference in the key metaphor that is used to capture the process of cognition. *Creating* uses the metaphor of construction or configuration, i.e. the organisation of components into a whole. The metaphor is used to capture the process of creating which results in a material artefact. Its content can be re-constructed and interpreted during reflection since a creation is the result of the tension between what the author or artist knows from an earlier time and what new aspects he or she introduces and overcomes during the creative process. Cognition is thus "embodied" in artefacts, which function as tools of intersubjective cooperation and communication, and is motivated by the goal of achieving mutual understanding. This approach is loosely related to the relativist position of Goodman's 'worldmaking' and indirectly follows the social constructivist tradition. This requires limiting the fleetingness of the cognitive process through *temporary fixation*: the materialisation of the cognitive process via creative work, which enables people to concentrate discourse by comparing artefacts and to maintain dialogue about different versions of "the same".

The creation of an artefact can be expressed by the metaphor of grasping: in an artefact (e.g. a sentence, painting, thermometer or GPS), the cognitive process is "offered for grasping". The cognitive act can be described using an analogy: one's intellect grasps notions, hypotheses and theories like the hand grasps objects. However, *knowledge* itself could be understood in this way as wel—as a firm grasp on a definite mental object, a 'substance' that the intellect can 'perceive' and hold. Yet, contrary to the *material* form of an artefact, the metaphor of grasping is ill-suited for working with *knowledge*.

People who use artefacts to understand something in depth often find that their effort to communicate with others about what is 'grasped' (contained in the artefact) is hindered by more or less irreconcilable intersubjective differences. These differences provoke discussion, new investigation and repeated explanation, which often shows that what has so far been considered satisfactory must be adjusted, changed and replaced. This brings *the apparent permanence of knowledge into question*.

This is even more evident when viewed from a broader historical perspective. The history of science is well aware that at some point a certain concept of cognition was abandoned and replaced or at least expanded and critically developed by other approaches. The metaphor of knowledge based on the 'firm grasp of an idea' is no longer very functional. It appears that knowledge needs to be approached using other, more fitting metaphors.

John Dewey was one of the authors who analysed the philosophical foundations of modern science, and this led him to believe that visual and tactile metaphors do not correspond to the true nature of scientific inquiry. He attempted to subvert the logic these metaphors embody. In order to do this, he needed to invent a new metaphor and he chose the metaphor of unlocking and opening a door. Cognition is a process in which our thoughts fit the external world like a key fits a lock and, as long as it does so, it unlocks a door that opens a new horizon. Knowledge is thus not only a mental object, but a lock and a fitting key—in other words a process of unification, equilibration of the external and internal environment and a unification and equilibration of thoughts and the outer world which then results in goal-achieving action. Knowledge is the unification of a knowledge field. The reaching of a goal is always relative to our needs.

Dewey's metaphor of a key fitting a lock helps us articulate the transition from early modernity (which has been too heavily influenced by the medieval idea of grasping the essence of what is being known) towards late modernity (which is gradually liberating itself from this idea). Knowledge is no longer understood as a clear and conscious manipulation of the objects of cognition but as an ability to reach goals by means of *skilful action* in which, along with conscious decisions, the tacit dimension of action plays a part. Science which has developed during early modern times arose from the nature of human cognitive activity while reinforcing and schematising those of its elements which enable a person to reach goals. Therefore, it escaped the medieval concept of knowledge as grasping of the essence of things, which had emerged during Plato's time with his emphasis on *eidos*. In spite of this, the dominant theoretical

reflection of science still preferred the idea of grasping essences—in contemporary terminology: the idea of getting a grasp on the objective structures of the world. Yet, the epistemological reflection of the modern (and post-modern) age reinforces the principle on which early-modern science (in contrast to the early-modern theory of science) was built—it reinforces the awareness that the goal of science is intelligent control over an environment.

Continuity between metaphorical expression and literal description

Intelligent control over the environment is not based on an objective mirroring of reality but on effective schematisation. It is this reduction which a late-modern scientist must master, since he or she cannot, by principle of the functioning of science itself, create an objective image of how the world is, but rather gives instructions as to how to reach goals. This is why science cannot be understood as attaining unshakable certainty but as a disciplined tool which helps us to control the world around us; and, we might add, to control ourselves as a part of the world. The role of scientists is changing. They cease to be small gods, harbingers of immutable truth, and become cautious technicians whose suggestions must comply with ethical criteria, and their consequences must be considered in thorough detail.[6]

The consequences brought by non-critical reproduction of the metaphor of seeing and grasping underline the role that metaphors play in our lives. When a 'living' metaphor 'dies'[7], we are scarcely aware of it. What seems like a literal description is simply one of the possible interpretations offered by the metaphor. When we use metaphors, we are unaware that we are influenced by their figurative perspective. This is why we lack the tools for taking a different view of such figuratively processed reality.

The reader may be surprised by some of the approaches and findings of our research and may ask: why is the first chapter so concerned with metaphors, their origin, their ability to split reference and create figurative landscapes. Why are metaphors so important if a substantial part of the research is empirical, focussing on literal description and using traditional techniques of analysis? Research into the tacit dimension of knowledge, manifested in the actions and thinking of our students, led us to an understanding that this seemingly literal language is a linguistic habit which greatly influences how students think about their experience. This habit is based on images—as we incidentally saw in the above-mentioned metaphors of *seeing* and *grasping*—which

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[6] This shift is associated with the distinction between *objectivist realism* and *experientialist realism* (see Lakoff, 1990, pp. XI–XVIII; Lakoff & Johnson, 2003, pp. 161–189). Lakoff and Johnson aim to save realism by cleansing it of the notion of 'objective truth', which is a remnant of the medieval notion of cognition as capturing the essences of things being known. Experientialist realism is Lakoff's and Johnson's term for the ontology and theory of cognition, which is in essence identical to ours.

[7] Ricoeur's book, on which we draw, was originally titled *La métaphore vive—The Living Metaphor.* In its English translation it was titled *The Rule of Metaphor.*

are entirely metaphorical. However, since students are not aware of the metaphorical nature of images, they mistake some world understandings for "objective" images, for a realistic portrayal of the world, even though this 'objective' image may often make little sense to them.

Mistaking an originally metaphorical interpretation for a literal description means that students are unaware of the structuring process of their own experience. The theoretical knowledge they have learned cannot then integrate the knowledge which is currently being acquired during teacher training, and therefore no dialogue between theory and practice takes place. It is as if they are wearing the proverbial Wittgenstein's spectacles, which allow them to see only certain images, which can be expressed only in certain ways. This way of seeing is not, in fact, rooted in theory, and is often undermined/shaken in the chaos of actual experience. By considering literal language as figurative, we lead our students towards a new point of view, so they can break free of those learned patterns in which metaphors are seen as immutable truth.

Shortcomings of the traditional conception of tacit knowledge

Over the past few decades there has been an increased interest in research into the tacit dimension of knowledge and action.[8] It is undoubtedly one of the many symptoms of the slow transition from the early-modern to the late-modern composition of thought and action. Tacit knowledge (henceforth TK) has recently been discussed mainly in connection with management studies, but it has also made its way to medicine and education—i.e. into professions which require interaction and in which agents are faced with very complex phenomena with complex dynamics. Many facets of daily life involve highly complex phenomena. However, humans have become adept at 'idealising' or 'reducing' areas of science and technology, which we perceive as somehow not strictly 'human'. This idealisation or detachment enables us to more easily and effectively handle outcomes or results. It is precisely this detachment that lies behind the enormous success of modern science. However, this 'idealised' aspect of modern science can lead scientific researchers to accept and apply incorrect results. This can mean losing the real sense of the phenomenon being studied.[9]

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[8] This is addressed in Chapter 6 and is also discussed in previous publications. (see Šíp & Švec, 2013).

[9] For more information, see e.g. Rockwell's thought experiment in which he characterises and mocks the design of research into the functioning of the amygdala in higher non-human primates—performed on animals in cages. The primates were kept in conditions which ipso facto compromised any research into the functions of the amygdala (despite the fact that the primates had electrodes implanted directly in their brains in order to record activity). In early-modern scientific terms, this is a completely acceptable form of research. The reality was normalised enough to allow researchers to make clear causal connections between activity in the amygdala and its assumed functions. However, the research produced no conclusive results because in higher primates the amygdala is mainly an 'organ' of neuro-hormonal social coordination, which was excluded by the very setup of the experiment (cf. Rockwell, 2005, pp 107–109).

The situational complexity and dynamics often require us to act before we are able to consciously grasp the events and reflect upon them. Awareness and reflection only come after many unconscious cognitive processes (pre-conscious or entirely unaware). In early modern thinking, even partly unaware and inexplicable thoughts and actions can be explained solely on the basis of negative definitions of how TK manifests itself. If these manifestations are registered, it is assumed that TK is present during the given events. Such research is clearly circular, which is, in a way, understandable because in this frame of thought researchers can only access TK via consciousness. *In this frame of thought knowledge is pre-understood as an explicable entity.*

The authors of a recent Czech monograph dealing with the research of this phenomenon (Matošková et al., 2014) operationalise TK as follows: "spontaneous action without conscious thinking", "inability to describe how an activity is performed", "intuitive understanding of what to do in a given situation", "appropriate skill" (cf. ibid, p. 54). These manifestations then serve to identify TK in the descriptions given by students. These descriptions are then considered indicative of how tacit knowledge influences learning outcomes, and give rise to speculation on how this TK can be developed further (cf. pp. 58–64). These four manifestations first appeared in varying forms (beginning with Michael Polanyi), in the 1950s and 1960s and have been repeated since then. (cf. 1959, 1983, 1998)[10], However, nobody, except for the critics of research in TK, is asking the question: how can we be sure that these really are manifestations of TK? Why is the inability to describe why someone did something a manifestation of TK? How can we tell whether intuitive understanding of what is to be done in a situation is or is not indicative of TK at work? How can we tell whether it is real understanding? What determines the appropriateness of a skill? It seems likely that these questions are not being asked because early-modern thinking does not provide grounds for giving an intelligent answer.

As noted earlier, these manifestations of TK are identified by means of 'negative definitions', i.e. a definition that fails to define because we cannot know whether a manifestation of lack of consciousness is (or is not) a manifestation of TK. If early modernity defines knowledge as conscious and explicable (able to be articulated), then manifestations of TK must be unconscious or only partly conscious and only articulable with difficulty, if at all. This is why research design such as Matošková's (2014) research only intuitively assumes that a low degree of awareness and associated lack of articulability are manifestations of TK.

We too consider *the degree of awareness* and *the degree of articulability* to be the main indicator of TK involvement, but we also offer something more. *We offer an alternative framework of understanding of what knowledge is.* The alternative framework explains what remains unexplained in the traditional style of thinking—how 'appropriateness' or

[10] The publication dates of these books refer to later editions, but the books were being written during the period referred to.

'suitability' of action is established without the person being aware of where their actions are leading them, and why—without being able to fully articulate the goal and progress of their action. *This focus on action is important since skilful action which is evidenced by the reaching of a goal indicates that a person possesses knowledge.* This knowledge can be tested during reflection, interpreted, and its context explained during dialogue.

In spite of the genius of Polanyi's seminal texts, they still bear traces of early modernity. Polanyi based his definitions on the belief that tacit knowledge is personal—in fact, he titled his best known book *Personal Knowledge* (1998). Polanyi may not consider "the knower's *personal participation* in all acts of understanding" as something that makes understanding subjective (cf. 1998 p. iv), but he still does not fully explain how skilful knowing and doing is formed. As a result, his followers tended towards subjectivisation of tacit knowledge—they began reading the word *personal* as *subjective*. This brought them back into the positivist Cartesian framework which is built on the subject-object figure.[11]

Polanyi provided admirable insight into the cognitive act, which is interlaced with the knower's action, with human tools (e.g. mathematical calculus or a microscope) and with the 'objective' world (cf. 1998, p. 2–68). He underlined the highly interactive relationship and inseparability of the knowing organism from the environment. The act of knowing is again rooted in action and action has thus become a continuity that transcends both the individual and entire situations. However, Polanyi did not formulate his ideas to the full extent of their consequences—he put too much emphasis on the *personal*, which was detrimental to the historical and communal dimension of human thought and action. This obscures the rational origin of acts of which one is not fully aware and which cannot be fully articulated.

Polanyi faces similar criticism from Gascoigne and Thornton, who emphasise the sedimentation of criteria through doing—criteria which determine whether an action is appropriate or skilful (cf. Gascoigne & Thornton, 2003, pp. 13–49). The outcome of criterion sedimentation has the features of a *dynamic structure*—a structure which undergoes constant change but, thanks to its continuous character, maintains the authority to decide whether or not an act is appropriate. This dynamic structure is not owned by anybody; it is part of the knowledge network rationality and is transferred via both genes and culture. It is the role of the biological and social historicity and communality of knowledge which we address in the first chapter because it explains why even unconscious action can be rational, how the structure of rationality has sedimented, and how it gives sense to action and determines its skilfulness.

This means that our expected outcome (which we offer as a contribution to the present discourse in the sciences of education) can be most accurately described by the abovementioned notion of interconnectedness of the biological and social *historicity* with

[11] See Šíp & Švec (2013, pp. 666–669).

the *communality* of knowing and knowledge. We consider it a challenge for discussion not only in epistemological or ontological terms but also from the point of view of ethics. The reason for this is because a special consideration for historicity as well as communality should be linked with a general requirement of *responsibility* towards the world, of which we are a part and not absolute rulers.

Chapter structure and content

The ideas outlined in the previous sections of the *Introduction* are discussed in greater detail in Chapter 1 (Šíp). Chapter 1 formulates the foundation for research described later in the empirical chapters and presents the result of its author's theoretical research.

Chapter 2 (Lawley) examines the connection between metaphors and the phenomenon of embodiment and embodied knowledge. In reference to Lakoff, Johnson and other authors of this tradition, this chapter introduces various forms of embodied metaphor. Later, the author discusses how the consequences of these forms impact on human activity, on four levels: linguistic, mental, physiological and material. On each level Lawley demonstrates that metaphor helps us to better understand how other people view and structure the world and themselves, and how embodied metaphors help us to grasp the structural nature of experience. He concludes the chapter by raising points about the importance of metaphor for tacit learning.

Chapter 3 (Lawley) focuses on Clean Language interviewing as a tool of qualitative research. The author points out the importance of deliberate reflection on the way an interviewer asks questions during a research interview. It presents the Clean Language method as one of the forms of systematic interviewing in qualitative research and as a way of fostering sensitivity when reflecting on research interviews. The chapter also proposes evaluation criteria for this method of interviewing. These criteria are drawn on later, in Chapter 5.

The complete research methodology is described in Chapter 4 (Svojanovský & Nehyba). This chapter describes two basic elements which unify all the empirical chapters. The first comprises the defining features of tacit knowledge identified as the degree of awareness and the degree of articulability, which can help identify where along the "tacit—explicit" continuum a particular piece of knowledge lies. The second element represents the shared data which the researchers studied and the method of collection.

Chapter 5 (Nehyba & Svojanovský) explains and evaluates how the method known as "Clean Language" (described in Chapter 3) was implemented in the research. It is a new way of educational research interviewing which helped us obtain first-person data, by which we mean data obtained from the interviewees' world, which is the least influenced by the interviewer's perspective. The authors base their claims on the assumption that, if tacit knowledge is by definition unaware and difficult to articulate, it is necessary to conduct interviews in such a way that the structuring of such

knowledge comes from the interviewees. The analysis of our Clean Language research is both qualitative and quantitative. During the process of coding, the analysis identified two basic categories of all phrases that the researchers used during interviews with students—questions and comments. Both questions and comments were divided into four sub-categories based on their "cleanness". One of the important outcomes of the investigation is that the quality of interviewing (and thus also the expected quality of data) is determined by the interviewer's skill and experience using Clean Language.

The tacit knowledge of student teachers has been the object of previous research as well. Primarily this concerned the research of trainee teachers' practical knowledge, the concept of which can be considered almost equivalent to that of tacit knowledge. The goal of Chapter 6 (Minaříková & Švec) is to answer the question of how to approach tacit (or implicit, practical) knowledge in empirical research—how this concept is defined, operationalised and examined and what findings this research presents. The research data comprised a set of texts consisting of ten papers written in English between 2000 and 2015 and submitted to the Web of Science database. This was the full array of sources available during this time. The analysis showed that even though tacit (practical) knowledge is the subject of empirical research, its definition and operationalisation is not always clear. Studying this concept prompts further qualitative research. The research findings then provide information on the various aspects of tacit (practical) knowledge, its development and influencing factors. They are also an inspiration for teacher educators as well as for student teachers during their studies and future education.

Chapter 7 (Svojanovský & Nehyba) presents knowledge as a complex dynamic structure in which tacit and explicit knowledge are two interacting extremes of a single continuum. This interactivity is captured in the analysis and interpretation of the process of making tacit knowledge explicit, and is illustrated in specific empirical material. The phases identified within this process are rooted in the concepts of *literalising metaphorisation* and *backward metaphorisation* which constitute the foundations of the philosophical basis of this book (Chapter 1).

One of the variables that enter the formation process of student teachers' tacit knowledge is their concept of teaching. Chapter 8 (Minaříková & Pravdová) presents an analysis of lessons with first-year students in a teacher training Master's study programme—students who are yet to do their first teaching practice. The analysis focuses mainly on the student teachers' view of pupils, goals and syllabus, on identifying which topics are common to them and which challenges are connected with their view of teaching. A total of four Clean-Language interviews were analysed (with students Alena, Beáta, Cyril and Karel). The analysis results indicate a great variety of differences in their view of pupils and in how they regard them during lessons. A common theme among the students is motivation but its concept is different in each student in terms of how elaborate it is and in its apparent source. The analysis of each challenge

showed that these challenges were located in a continuum ranging from focus on the pupil to focus on the lesson content and to the tacit—explicit continuum in terms of how students speak but also think about each challenge.

Chapter 9 (Nehyba & Šimůnková) discusses theoretical and empirical insight into unexpected situations. The authors consider unexpected situations to be those in which there is a discord between expectation and reality, i.e. what evokes surprise in an individual. The goal of the empirical research was to create a typology of unexpected situations and discover what strategies students employed to deal with them. Student interview transcripts were repeatedly read and themes that the students described in the context of unexpected situations were selected. The authors analysed the themes and sought cross-case correlations. The result is a typology of unexpected situations compiled on the basis of four features: pleasantness, impact, gravity and suddenness or gradualness of their occurrence. When dealing with unexpected situations, students employed four strategies: return to flow, attack, enduring and retreat. The students were not fully aware of their own concept of unexpected situations and resolution strategies, which indicates that this knowledge or awareness is (partly) tacit.

Two case studies were written addressing the question of how student teachers' tacit knowledge is formed and how they share it with their mentors. The author (Švec) of the first study (Chapter 10) points out all the factors in play when the student teacher Jaroslava gains experience through resolving a variety of situations occurring in chemistry and biology lessons over the course of two teaching practice segments. Švec opted for *qualitative research design* built on the following methods: observation of Jaroslava's actions in lessons; in-depth interviews with Jaroslava; simulated recollection of situations by Jaroslava with the use of a video-recording of her lesson.

It was found that Jaroslava's tacit knowledge slowly crystallised during her teaching practice. It had its source mainly in unexpected situations which Jaroslava often handled intuitively. In her reflection, Jaroslava realised that she dealt with situations intuitively, and she also determined the effectiveness of the various strategies she used.

The second case study (Chapter 11, Švec) probes the communication between a student (Milada) and her mentor. The focus of the communication is sharing tacit and explicit knowledge. The research design was qualitative based around (a) observing the discussion between Milada and her mentor—this discussion was a follow-up to Milada's lesson where the mentor and researcher were present as observers and (b) an in-depth interview between the researcher and Milada. The discussion between Milada and her mentor (after she had observed Milada's lesson) saw the sharing of the mentor's tacit knowledge expressed in explicit language. The explicit expression enabled (a) the mentor to detect problems in Milada's lesson; (b) Milada to ask questions concerning her teaching experience. The mentor's explicit expression of tacit knowledge took the form of methodological recommendations for Milada's future teaching.

PHILOSOPHICAL FOUNDATIONS OF RESEARCH IN TACIT KNOWLEDGE: KNOWLEDGE, FIGURATIVE LANGUAGE AND METAPHOR[12]

Radim Šíp

The structure of this chapter is complicated and has a challenging argument. It deals with epistemological assumptions which still constitute the background of contemporary scientific research and, through its critique, arrives at a somewhat different understanding of knowledge, the nature of language and metaphor. As mentioned in the introduction, this takes us away from the early-modern tradition and brings us towards late modernity. For easier navigation and better communication of the argument, there is a brief summary of the whole chapter, followed by individual subchapters and their parts which provide detailed analysis and present the structure of the argument.

1.1 Summary of Chapter 1

Methodology of the theoretical chapter (1.2)

This theoretical chapter reflects the fact that we are observing a transition from early modernity to late modernity. This transition takes place via a so-called *transitional phase.* Early modernity, much like late modernity, should be understood as *an ideal type* (Weber), because what we are presented with are in fact multiple variants of early modern thought and multiple variants of late modern thought. The transitional phase exhibits a number of features of transition, uncharacteristic of the early modern composition of thought, though they still maintain some of its elements. In this first chapter we introduce the transitional phase through an analysis of the monograph *Creating as a Way of Gaining Knowledge* [Czech: *Tvorba jako způsob poznávání*] (Slavík, Chrz, Štech et al., 2013) which we consider a detailed and well-argumented initiative for us to expand beyond the confines of early modernity.

[12] This is a text compiled from a far broader piece of analytical writing. It is the result of several years' worth of analysis of knowledge and cognition. Some of the deeper analyses will be published elsewhere. Here we only present a summary, which does not encumber the monograph by broadening its scope further than it does now, but still would, though briefly, convey to the readers the shift in the framework of thinking which we need in order to study tacit knowledge in the first place.

The approaches of the transitional phase allow us to analyse many questions related to our research project, but not all. Our definition of the nature of knowledge, tacit knowledge, the importance of figurative language and metaphor needs to advance beyond the transitional phase and closer to the systemic thought of late modernity. This is why the following text will discuss knowledge from the perspective of three stages—the early modern approach (1.3.1), the transitional phase approach (1.3.2) and the late modern approach (1.3.3). Our examination of the role of figurative language and metaphor (1.3.4 and 1.3.5) is not conducted separately in terms of these two compositions and the transitional phase between them, although we do take a stance against the transitional phase in order to underline the relatively new concept of metaphor as the main tool for attributing meaning to pre-structured experience and as a means of expressing some of its parts.

Knowledge and the role of figurative language in its explication (1.3)

Knowledge as information (1.3.1)

The traditional approach to knowledge is built on the assumption that knowledge is composed of our theories and beliefs as *internal representations of the external reality*. We then compare these representations with the world. If a *correspondence* between a representation and a particular part of reality is found, we have gained possession of a piece of true information (knowledge). However, this study uses several examples to demonstrate that such a belief is undermined by several assumptions which are fundamentally flawed. The most important among these assumptions is that the world, much like our language, consists of 'atoms'—not physical atoms but atoms of meaning (atoms because further deconstruction no longer yields any discrete units) while it is further assumed that there is evident correspondence between a linguistic atom and an 'atom' (i.e. a part) of the world. Another flawed assumption is that these meaning atoms can be made into more complex structures of information (knowledge). However, an analysis of more complex ideas will reveal that the following do not conform to such structuring:

a) the conceptualisation of *phenomenally complex events,* since conceptualisation is always connected with social constructivism (e.g. the statement, 'The earth orbits the sun.')
b) *ontological relativity*, i.e. the connections between facts and posits, or between systems of empirical findings and theoretical assumptions (e.g. the statement: 'The reason for the refugee panic in the Czech Republic in 2015 is the fact that Czech society has been unnaturally homogenised for half a century, during which time it did not encounter different ethnic groups.')

Knowledge as information gained during intersubjective negotiation and knowledge structure sharing (1.3.2)

In this section we appreciate how far the authors of *Creating* advanced in crossing the boundaries of early modern thought. The way they notice the *interactive nature of knowledge*—namely its *intersubjectivity*—is key to our next explanation. They consider knowledge (information) an intersubjective agreement on the content of structured experience or artefact expressing the experience. We notice they use terms which support this communality of knowledge—*tradition, cultural field, conceptual space*—and terms which structure the process of knowledge construction and enable its intersubjective negotiation and sharing—*mentalisation, separated model, synthesis of separated moments, universal generic model.* The authors connect universal models with *abstract objects,* using mental objects that are intellectualised, thus enabling each mental subjective model to be subject to a *common rule*, thereby making the intersubjective agreement 'objective'.

While we appreciate that (Slavík, Chrz, Štech et al., 2013) view the cognitive process through its interactive nature—of which intersubjectivity is an important part—we consider that the transitional phase still has one foot in early modernity. We demonstrate this using the authors' own approach which, based on their reference to Peregrin (2000), Quine (1969), Davidson (2004, 2006) and N. Goodman (1978), we shall call *post-analytic structuralism.* In critical moments of agreement between subjective beliefs (or artefacts), *post-analytic structuralism* places *content structure* above *the structuring process (re/configuration).* The transitional phase considers the cognitive process a form of insight—in the case of Slavík, Chrz, Štech et al. an insight into the agreement between the content structures of the experience of two or more knowers. This approach leads its advocates to a revival of epistemological atomism because in their view the structure must consist of parts which must be linked to one another in a specific way. For a proper grasp of TK and an analysis of how it is gained, manifested, shared and made explicit, it is necessary to abandon the notion of evidence or the notion of studying structure and view things in systemic and activity-related terms.

Knowledge as the unifying of a knowledge field and tacit knowledge (1.3.3)

In this section we complete our critique of the transitional phase approach to knowledge by noting the confidence of its supporters in the notion of 'the directly given' which, according to them, is manifested in simple responses. We outline how the authors view this immediacy, projected into simple language responses, on the level of *observation sentences* ('This is a chair.'). It is worth noting here that our knowledge of the complexities of reality does not revolve around making compilations from information pieces contained in observation sentences and that simple observation sentences do not facilitate an immediate transition from a stimulus (I see a chair) to an appropriate reaction (sitting down) or to a fitting observation sentence ('This is a chair.'). Even in such seemingly straightforward situations the world presents itself

in a complex way and 'an appropriate transition' is a matter of constructing the sense of the reaction or sentence. Knowledge atoms are always a kind of epistemic construction and their meaning is always determined by the goal towards which the whole cognitive process is moving. It is this epistemological atomism that must be abandoned if we wish to understand the functioning of continuous gaining, manifesting and sharing of tacit knowledge or the process of making it explicit.
Since Dewey was in fact the first to introduce his holistic view into modern epistemology and cognitive theory, we use his philosophy and cognitive theory as our starting point. Dewey was of the mind that the world presents itself to us in complexes. This is why he defined the concept of *situation as an existential quantum in which objects and their relations make up a contextual whole*. This 'whole' (the situation) is primary. Only in the next step do we develop the complexity into an abstraction of objects and their relations. However, this abstraction is always motivated by something, which is why the objects and relations are not knowledge atoms directly corresponding to constituents of the world, and why the belief that 'parts fit together in a specific way' cannot form a basis for our 'objective' knowledge of a situation. Motivation is always determined by our need to solve a problem which is presented by the situation.

Situation as such is permeated by a *quality* that defines it and that determines its character. In order for *a situation* to be analysed and for the abstraction of objects and their relations to take place, we must grasp the *quality* of the situation holistically through *intuition*. At this point in our discussion, for the first time, we draw on the most recent findings from neurophysiology and cognitive science to demonstrate which processes constitute what Dewey, in his time, dubbed "intuition". In our explanation we make use of research in mirror neurons (MN), Damasio's concept of emotions, sensorimotor coordination of perception and action. We also point out the convergence of previously distinct theories (*the affordance theory, extended mind theory, enacted mind theory, embodied mind theory and the ecological self theory*), which today provide ground for a new conception of cognition and knowledge. This ground is *organism-environment coupling*. In connection with this we note how late phenomenology arrived at a similar understanding to that of contemporary cognitive sciences by bringing Husserl's original work to a full conclusion and then continuing beyond it. This has allowed us to anchor intuition in the findings of contemporary science as well as in the increasing importance of the body in late phenomenology. We define it as *a unifying expression of a material-physiological-psychological complex of organism-environment interaction, which holds the wholeness of a given situation.*
This new platform has led us to define cognition (inquiry) as a transformation of an indeterminate situation into a determinate one; i.e. a situation we know how to deal with. Quoting Dewey, we define "*inquiry [as a] controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole*". This unification enables us to deal with situations and attain a temporary equilibrium between ourselves and the environment. The product of a successfully handled situation and achieved equilibrium is knowledge.

Before we present our definition of knowledge, we need to point out the similarity between an indeterminate *situation* (i.e. a situation which we, according to Dewey, cannot deal with, consider problematic and need to re-articulate, thereby transforming it into a determinate one) and an *unexpected situation*, i.e. a type of indeterminate situation. This enables us to connect our cognitive theory to one of the basic categories of our research and to explain why dealing with an unexpected situation makes room for extensive application and manifestation of TK. TK uses its network character and is better at grasping changes in the quality of unexpected situations. However, this property comes at the expense of it being more difficult to consciously manipulate and articulate in linear linguistic propositions.

To place emphasis on attaining a unified whole is to characterise knowledge as *a unification of the knowledge field into a complex, dynamic structure which forms knowledge only after its unification is complete*. For didactic purposes and with respect to the need of future operationalisation of our research, we split the knowledge field into four levels: (a) *interaction level;* (b) *body level;* (c) *external world level;* (d) *mind level (information level).*

The unification of the knowledge field is demonstrated using a 'Palaeolithic example', i.e. the discovery of the bow and arrow, which shows that knowledge is fundamentally a matter of action—it begins with the manipulation of material objects and bodily action, continues through the mind which it reconstitutes, and results in action which then reaches a goal. All these events are interactional and the whole process unifies all four levels by transforming them, thereby bringing them into a temporary equilibrium. We note the fact that the whole of early modernity defined knowledge only in terms of the mind and thus considered information synonymous to knowledge. We are strict in distinguishing *information* from *knowledge* and define the level of information as one of the four levels of knowledge. We highlight this distinction between information and knowledge in terms of the interactivity of gaining knowledge. The transitional phase, on the one hand, strengthens interaction within a 'community of minds', on the other hand, it undervalues the external component of knowledge and knowledge embodied in organisms. Consequently gaining knowledge still remains closed in minds. This has two important consequences.

a) In the transitional phase knowledge is a temporarily closed structure upon which the mind community agrees during its dominantly verbal communication. Knowledge is reduced to information, though the information is intersubjectively negotiated.
b) In the transitional phase language is privileged and action is neglected which requires the advocates of the transitional phase to define a border between 'conceptual' and 'non-conceptual' responses. This severely impacts on their approach to language and metaphor. For example, metaphors are understood as 'imprinting a signature' (see 1.3.4).

A new definition of knowledge enables us to better understand the essence of TK, which we define as *relatively successful unification of the knowledge field initiated and directed by the present interactions determined by the state of the external environment and by the limitations of bodily action; a relatively successful unification which is not yet accompanied by due reconstruction of the information level.* TK thus defined is not limited to information only (mind level) and can be used to explain why we achieve goals, make decisions, master techniques and internalise skills without being able to intelligently articulate or indeed be fully aware of how.

Figurative language and metaphor: Their role in the explication process of intuition (1.3.4)

In this section we return to the authors of *Creating* and highlight how 'transitional' their phase is. Being well versed in Art, they do not underestimate 'non-conceptual responses', yet in key parts of their theory they still favour language. They stress that steps in logical sequences are carried out using 'conceptual responses'. We, however, with reference to the literature (Dewey, lw.1, lw.12; Lakoff Johnson, 1991; Galles, Lakoff, 2005; Lakoff, Nunez, 2000; Gibbs, 2005; and others), assert that grouping responses into conceptual and non-conceptual is unsustainable because concepts are already formed on the level of sensorimotor coordination. This position requires us to re-define the relationship between literal and figurative language. Because the authors of *Creating* draw a thick line between conceptual and non-conceptual responses, they look to Davidson for inspiration on a figurative language and claim, as he does, that a metaphor carries no meaning, it only makes us aware of something. If metaphor carried any meaning, it would erase the divide between the two types of response.

However, we show that metaphor (in a broad sense of the word—see 1.3.4) draws meaning from structured experience, although it is a meaning which we have not needed so far or been unable to consciously make sense of. We define metaphor based on Ricoeur's and Kohák's approach combined with findings from neurophysiology and second-generation cognitive science. Ricoeur argues that language is created through happenings that enter our consciousness via symbolic structuring of experience as something ungraspable, and that metaphor is a means of carrying new meaning from symbolic action across to language. Symbolic action is connected with the history of the cosmos and life. To understand this relationship we present it on a more concrete and scientifically sound level, (drawing on the work of Lakoff Johnson, 1991; Galles, Lakoff, 2005; Lakoff, Nunez, 2000; Gibbs, 2005). Based on recent research in neurophysiology, these works document the concurrence of the most basic levels of action and situation appraisals. These appraisals form the basis of a concept long before it can surface in verbal articulation or some other symbolic order. The appraisal is made possible through embodied structures which constitute our body. Once again we point out the function of mirror neurons, emotional evaluation and other sense-constituting processes located in the deep unconscious. Embodied, embedded, extended and enacted dynamic structures link an organism (a person) not only to the history of the

species and the history of environmental changes the species has passed through, but also to the history of life as a whole. In this very tactile and material way, the history of the cosmos enters the most intimate life of individuals.

The above-mentioned authors also show how we advance from the level of sensorimotor reaction clusters (which spawn concrete concepts) to even more abstract levels of human life via conceptual metaphors and their combinations. This presents several important and stark contrasts with early-modern thought.

a) Literal language is not language of direct or indirect ostension (extension). Literal language tranquillises metaphoric production, yet it does not do so to describe the world but to achieve certain action through certain schematisation.
b) There is deep-rooted continuity between literal and figurative language.
c) 'Dead' (literalised) and 'living' (non-conventional) metaphors intimately link us with our lived body and through it with life as such.
d) Abstract thoughts and objects are nothing but traces of an organism's action continuity as a member of its species.
e) Even the most abstract of systems, e.g. mathematics, have their root in the body and are sedimented into their ideal shapes by metaphoric ascents that have once proven useful to people.

This has serious implications for our research. We have no direct access to tacit knowledge because by nature it operates within the unconscious. In spite of this, any thought, even the most abstract, is rooted in the bodily order and it surfaces at a conscious and linguistic level through metaphoric structures. This is why the body and metaphor are central to our research. However, it must be noted that even so-called literal language is carried by an originally metaphorical working of language, which means that even 'literal' language is connected with the body and metaphors. Thus, when examining 'literal' language, we study its metaphorical and structuring character as well.

Because of this interconnection of metaphor and the body with the symbolic order of life in the cosmos, we define metaphor much more broadly. The way metaphors are understood in works of literary science, linguistics and traditional philosophy is determined by the assumption that metaphor is primarily a matter of linguistics. We reject this assumption altogether. We connect metaphor with intuition (as defined above) and consider it *a complex means of lifting and expressing the quality of a situation which has principally cognitive character that relieves us of our previous description of reality and adds a reality-altering element* (Ricoeur's *reference splitting*). *It structures our world understanding in a new way.*

In the final paragraphs of this section we show how metaphor causes this *split reference* and emphasise the complexity of changes ensuing from metaphor both in terms of our world understanding and language.

Metaphorisation, phenomenological analysis and development of the metaphorical landscape (1.2.5)

This final part of the second sub-chapter is devoted to the process of *metaphorisation*. We distinguish two types: *literalising metaphorisation* and *backward metaphorisation* The first is a process in which a change caused by metaphoric shift (*split reference*) is raised to consciousness by literalising a new understanding of a situation via a conceptual metaphor before containing it in literal (*distinct*) concepts. Literal concepts relatively clearly describe the external reality but in fact do so only by losing their systemic character and thus also the contact with lived experience, becoming confined solely to language, where syntagmatic (horizontal) linguistic relations are dominant.

Backward metaphorisation is the opposite process where we move from literal concepts via conceptual metaphors to the continuity anchored in structured bodily experience. The level of metaphors and conceptual metaphors allows us to enter a psycho-active state in which we are able to connect what is being said or written with what is being experienced and thus enrich previously disembodied concepts by the logic of the individual dynamic experience structures. This process is suitable in situations where an interviewee is making descriptions on the abstract, atomised level. In this study it is the level of mechanically learned terminology and theories which students are unable to connect with their own lived experience, and thus are unable to enter a process of analysing their actions or identifying the strong and weak points therein. Backward metaphorisation often results in clarifying one's own experience and grasping the present situation intuitively, which in most cases can be expressed primarily by metaphors. Intuition, TK and metaphor are pivots around which trainee teachers' experience revolves—in general the experience of people who are not yet able to navigate their present situations, yet are relatively successful in reaching some of their goals. Metaphor expresses intuition which then helps schematise the situation, not in terms of passive memory of terminology and theories but in terms of their own experience. If we elicit and support the metaphorisation process, we help students to deepen and intensify their reflection.

We support metaphorical expressions through a technique known as *Clean Language*. This is not a technique per se but rather an analytical approach. We consider Clean Language as one of the methods of phenomenological analysis, the strength of which is in the ability to simply and elegantly facilitate *phenomenological reduction* very early in the research, i.e. during data collection. This makes it easier to enter the student's experiential world while keeping his or her description safe from the intrusion of our theoretical assumptions and expectations (an ideal state for the interviewer). By relinquishing our right to enter the description, we allow the student to approximate the logical structure of his or her experience as closely as possible. This approximation in turn enables the students to analyse the situation with greater ease and to seek alternative solutions which respect the uniqueness of the situations as well as the students' own predispositions and previous experience (while staying faithful to the ontically constraining structure of inherited meanings).

As researchers, we are concerned with exploring how tacit knowledge is gained and shared and how it operates, may only observe this goal indirectly. We are developing the *metaphorical landscape* (ML) of our interviewees. Firstly, the sense structure of experience is too voluminous for us to consciously contain and verbally articulate, and secondly, it is dynamic—it is undergoing smaller or bigger changes at every moment. For this reason it is important to find a tool with which to grasp the logic of a given structure by a means different than literal language and do so while preventing this language grasp from being too rigid. ML is a system of metaphors and their relations. These relations are not accidental; they have their inherent logic which springs from the dynamic structure of experience. It is as a result of this logic that we gain a reference object to indicate whether a student's actions were motivated by a further unspecified unconscious goal and, if yes, whether the student has made progress towards reaching this goal or not. If progress was made, then tacit knowledge was involved in the student's actions and appropriately, i.e. skilfully guided them. Further reflection of the ML can provide a better and more accurate articulation of the elements of experience, which enables us to grasp TK and make it explicit.

1.2 Methodology of the theoretical chapter: Ideal type and compositions of thought and action

By *modernity* we mean the long period stretching from the beginning of modern history to the present day. We adopt the idea formulated by both Dewey (since 1920s to 1930s) and Latour (1980s), though probably independently of each other. This is the idea that there is a divide in modern thought because, after the long period of scholasticism, it inherited the belief that cognition is a capturing of the essence of things. Both authors argue[13] that we are not entirely modern because we are subject to certain constraints of faith on the theoretical level, which fall out of line with the real practice of science, i.e. with what effectively privileges science over other types of thought. We project this fact into the distinction between *early* and *late modernity*. By early we mean the part of modernity that remains as yet "unfinished" since it still contains features of medieval thought—features which are not compatible with what makes science *modern*. Late modernity attempts to complete the transition through the reflection of science. A part of this emancipation is the abandoning of modern scientific ideology, which is based on objectivism and the correspondence theory of truth and cognition.[14]

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[13] Dewey (2012) in an analysis of the philosophical premises of modern science; Latour (1993; Latour & Woolgar (1986) in an analysis of real scientific research processes.

[14] For a detailed distinction between objectivist realism and experientialist (experiential) realism, see Lakoff (2006, s. 11–16) a Lakoff & Johnson (2002, s. 172–201). See footnote 6 above.

The early-modern view of the world had been stabilising for two centuries (17th and 18th) but since the 19th century its hegemony has been slowly decomposing. This explains why the reality around us exhibits various stages or forms of the early-modern way of thinking along with various stages or forms of the late-modern way of thinking, but we find no pure form in any of them. In the following pages we deal with the spectrum of forms of early- and late-modern approaches to cognition and knowledge, first by defining the ideal-type starting phase of the early-modern approach, then the transitional phase and finally the equally ideally-typical late-modern phase.

The concept of *ideal type* is a reference to Max Weber who defined the ideal type as a research tool of social sciences. Similar to studying social, political or economical processes, our investigation into the transitions between frameworks of thought (between the early- and late-modern framework) brings us into a situation where the 'reality' of the phenomenon being examined (i.e. *cognitive theory*) gradually transforms and the reference conditions and the definition of knowledge, language and metaphor transform as well. While in the 18th century it not was necessary to consider the correspondence between mental representations and parts of reality in relation to time and development (this was before the Hegelian and Darwinist turn), in the 19th century the situation changed radically. (However, no radical change took place in cognitive theory and, for another century, *correspondence theory* remained dominant. Darwinism was slow to take root. Only today can we say that the evolutionary view is finding acceptance even in cognitive sciences.) Alternative theories did exist, e.g. the redundancy, minimalist, coherence, semantic theory (cf. Kolář, 2002, pp. 57–120).[15] However, each of them addressed some weak point of *correspondence theory*, but none was compelling enough to stand as a comprehensive whole. This is partly due to the fact that *correspondence theory* best fitted the thought composition of early modernity in which the central part was played by the internal representation of the external (objective) world.

This gave rise to numerous intermediate steps and additions that were to fix the idea of correspondence between a belief or theory and a corresponding part of the objective world. Only difficulties and obstacles which arose later made some philosophers, epistemologists and scientists consider an entirely different approach to cognition and knowledge. Sometimes independently (Dewey, Vygotsky, Piaget), sometimes via more or less direct dependence (James, Husserl, Weber, Schütz, Berger and Luckmann), new theories began to emerge and challenge the foundations of the early-modern concept

[15] We exclude the pragmatist theory of truth from Kolář's list of competing truth theories. He defines it, drawing on early C. S. Pierce without taking into account that Pierce later changed and refined his concept (for more details on the differences between the two definitions, see Hroch, Šíp, Madzia, & Funda (2010, pp. 49–58)) and based it on James' theory of truth (Kolář, 2002, pp. 91–99). He makes some simplification in both cases, which are typical for analytical philosophy. Furthermore, he does not concern himself with Dewey's theory, which is far more complex and is a more accurate reflection of late-modern thought. For this reason he becomes the main point of our discussion in 1.3.3.

of cognition. This created a continuity of alterations in which varieties of one thinking composition appeared, only to be morphed into a different composition at some point, while the originally rejected alternatives slowly gained strength and assumed the position of a promising generator of competitive theories.

This is similar to the process of one Art movement making room for another—e.g. the Renaissance giving way to the Baroque. It is impossible to identify a clear boundary between the two. Some authors consider *The Ingenious Gentleman Don Quixote de La Mancha* an early work of Baroque literature (Zdeněk Kalista), others would place it at the peak of the Renaissance (Václav Černý).[16] A transition from the Renaissance to the Baroque, as well as the existence of either Art, is nevertheless indisputable. However, when the story of *Don Quixote* is compared with criteria defined by the word Renaissance or Baroque, it resists clear categorisation in either one. We are encountering a crucial phenomenon of the world around us. Not only social sciences, as Weber originally believed, but science in general sees transformations of theories and even whole thought and action compositions, and it is in such moments that understanding (*Verstehen*) precedes explanation (*Erklären*). By *ideal type* Weber meant a structure arising from the "accentuation of certain elements of reality", a structure which "is no 'hypothesis' but it offers guidance to the construction of hypotheses". *It is not a depiction of reality;* "it aims to give unambiguous means of expression to such a description" (Weber, 1949, p. 90). The early-modern composition of thought and action is not restricted to a specific period. This is only a tendency in thinking, which is successful for a certain time until it almost dominates most areas of human activity, only to eventually grow weaker and slowly disappear completely. Much like the remains of Thomistic (Aristotelian) thought during the 18th century, which represented the scholastic composition and which was slowly overshadowed by early-modern theories. In order to be able to say anything about one composition giving way to another, we must define composition as an ideal type, similar to how the history and theory of Art operates with its ideal types of Art.

The following parts of the subchapter on knowledge and tacit knowledge (1.3.1–1.3.3) are constructed in the following way: first we determine the ideal type of the early-modern concept of knowledge, then we outline the transitional phase where the two types—early- and late-modern—interlock, compete and sometimes even blend (this is the period we are in now) and finally we formulate the ideal type of late modernity. Approaches to knowledge, which we believe are unsustainable, are now evident in an area between the ideal type of early modernity and the transitional phase. The transitional phase is an important moment in the history of thought because it contains a number of 'epicycles' and 'deferents' which ease the tension between early and late

[16] For details, see a section in Petr Vopěnka's book *Podivuhodný květ českého baroka* [The Peculiar Blossom of the Czech Baroque] (2012, pp. 52–59).

modernity in such a way that this phase can satisfy most of our current needs, without accepting that in epistemological terms the correspondence theory of truth and cognition and the definition of 'objectivity' have been invalidated.[17]

However, a problem arises when we address topics that cannot be fully developed in the early modern thought composition or in the transitional phase. These topics require us to leave the transitional phase and turn towards the ideal type of late modernity. One such topic is tacit knowledge. It is in this area between the transitional phase and the ideal type of late modernity that our research in tacit knowledge is situated. This range between the transitional phase and the horizon of the late-modern ideal type also explains why we can develop some of our research topics in the context of the transitional phase and why some topics need a context which lies beyond the transitional phase. The transitional phase is in reasonable agreement with the majority opinion on methodology and means of proving scientific "facts" because scientific journal Boards and reviewers have become accustomed to the complexity of the transitional phase.

However, when we wish to address new issues we are compelled to reposition our standpoint closer to the ideal type of the late-modern composition of thought. In such cases we must admit (uncomfortable though it is, given the prevailing opinion among the members of the scientific community) that knowledge is not personal knowledge, or a piece of information (early modernity), nor is it even definable as a fact confirmed by intersubjective validation and sharing (transitional phase). We find ourselves in a similar situation as early-modern astronomers who had to accept at a certain point that the orbit of planets is not perfectly circular, ultimately paving the path towards a new model of the universe.

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[17] Our mention of epicycles and deferents refers to a similar process of the transitional phase, this time from the Aristotelianism of late scholastics and early modernity. During this period, 16th and 17th century scholars adhered to the Copernican system of planetary motion with its epicycles and deferents, because it was still able to give answers to the most pressing questions of the day and, at the same time, it could claim (or pretend to claim) that the Copernican view of the cosmos is a mere mathematical model, which says nothing about whether the Sun truly is the centre of the universe. However, at that time there was already a transition towards a new concept of the universe at work, which became dominant after the discovery of the elliptic orbit of planets and classical mechanics of solid bodies. In this context of inter-composition transition, we should even consider Descartes' *Meditations on First Philosophy* as a kind of "propaganda", which, as he himself writes in a letter to Mersenne, was to bring the reader step by step towards accepting its physics without realising that they will eventually assume a stance void of the Aristotelian view of the world and accept a mechanical worldview (paraphrased from Chomsky, 1996, pp. 18–19).

1.3 Knowledge and the role of figurative language in its explication

1.3.1 Knowledge as information

The early-modern ideal-type approach to knowledge revolves around the idea that knowledge is formed, and can only be formed, in the human mind. Descartes is a model example. As one of the most influential scholars of the 17th century, Descartes was in contact with the greatest minds of his generation. He knew people who performed experiments and research, compared his opinions and theories with the results of these experiments, thereby constructing his theories on empirical findings generated by the community. However, *he still defined cognition as something taking place within the confines of one's mind.* He had his reasons for doing this.

Descartes wanted to break free from tradition and authority, had begun to lose status by the beginning of the 17th century. The centuries-old confidence was beginning to weaken. As the heliocentric view of the world gained ground, so did the fear that the earth may not be the centre of the universe.[18] The loss of the central position of the earth was not limited to astronomy; it impacted anthropology and theology as well. The basic certainty of the greatness of humanity, thus far guaranteed by the highest authority (the Church), was being symbolically challenged. Furthermore, the Thirty Years' War, which had been fuelled by religious disagreements and had considerably destabilised Europe, had just ended. It seemed that the authority which had suffered a historic embarrassment needed to be replaced by something solid, and the candidate deemed most suitable at the time was Reason. This inward turn can be observed in the 17th century's cultural return to the 'Paradise of the heart' where one encounters the real God (cf. Comenius' *Labyrinth of the World and Paradise of the Heart*) as well as in the early-modern belief that one can only find epistemic certainty inside oneself. This is the origin of the paradox of early modernity, which seeks information about the external world inside an individual.

The beginning of the 17th century thus gave rise to the idea of an inner space (see for example Descartes, 2006, pp. 13–19, 40–50), which became known first as the 'soul' and later the 'mind'. Since then the external world has been largely the product of the soul/mind whose cognitive abilities enable it to reproduce the external world, i.e. to create representations. This idea was limited by the doubt as to whether a piece of information created internally can be objective. In the 19th and 20th century there were efforts to solve this problem. For example, positivism focused on sensory information positively manifested in evidence but this approach was not primarily

[18] This before the hermeneutic turn in Bible reading in the 19th century when discrepancies between literal meanings in Bible and reality or modern scientific explanations became a subject of debate. From 19th century—thanks to the hermeneutic style of interpretation—people began to interpret the Bible symbolically which enabled them to reconcile or 'harmonize' the discrepancies, for example between modern physics and the book of Genesis.

concerned with defining what a positive fact actually is. This remained a task for phenomenology, whose advocataes criticised this problem ignored by positivism and tried to find a transcendental level, i.e. to attribute meaning to sensory information. Husserl believed that phenomenology lays the foundations of true science because, unlike positivism, psychologism and physicalism, it builds on the only thing that is given—our experience. In other texts we demonstrate how Husserl eventually broke away from the confines of early modernity and the part phenomenology plays in the transformation of the late-modern cognitive theory (cf. Šíp, 2015, pp. 684–692).[19] We now focus on a description of the presumptions and implications brought into the concept of knowledge by early modernity.

The real world lies outside the knower. The world contains objects and objective structures that the knower must gain a grasp of in order to know. However, objective structures cannot be known from their material features alone, because the nature of every object may not be physically apparent. In spite of this, it is the surface properties that convey information. The sun has its external appearance, it shines, the human eye registers the shape and light and processes them into complex visual information which is later unified in the mind. This visual information is supplemented by other information channels, e.g. our skin receptors registering heat. All this information is compiled into a whole in an inner space, forming a mental information structure that can be articulated as, *The sun is shining*. However, only the current surface properties are being processed in this way. This invites a secondary note on the unreliability of the observed.

The complexity of the world requires that information (as described above) is understood *according to relatively flexible rules*, immediately coupled with other determined properties. We observe the east-to-west course of the sun in the sky and create the mental image, *The sun orbits the earth. The sun rises in the east. The sun sets in the west.* However, the situation becomes much more complicated once the heliocentric view of the world is confirmed. It is not the sun that orbits the earth but rather it is the rotation of the earth that creates the impression of the sun's orbit. The above statements, *The sun orbits..., rises..., sets...* have become a matter of folklore; but the real descriptions are different. Already, at this point, representations are being complicated by the fact that what the knower is observing (experiencing) is the surface. However, cognitive acts themselves contain numerous processes that determine how and why the knower is to observe and gain knowledge of something. Controlling these processes requires some

[19] However, even Husserl's early work is influenced by early-modern thought because he maintained the superiority of the reflective appearance of things in consciousness. He thus accentuated the essence of things as invariable, while undervaluing the dynamic aspects of the phenomenological constitution of the world. Only in the 1920s when he took intention as a primary dynamic unity (which in reflection then breaks down into *noema* and *noesis*), did Husserl break free from early-modern thinking (cf. critique of Husserl in Barbaras, 2005; Merleau-Ponty, 2005). When his followers developed on this, phenomenology ceased to be dependent on the subject-object figure of thinking, and new room was made for 'a-subjective' thinking and for the idea that experience itself is originally a-subjective and outside the subject-object categories (cf. Patočka, 2003, Kohák, 1993, pp. 76–89).

skill. A layman's untrained eye sees nothing when glancing into a microscope. Every new tool of learning broadens the area in which one needs to be trained. This too is a consequence of the fact that one only has the surface to observe, that cognition essentially involves handling and manipulating things and that this can be facilitated by technology, arduously won through transformation of the human habitat and within its current constraints.

What is taking place in a knower's mind during cognition? What is it to gain knowledge of the sun? It is traditionally thought that the knower creates an idea, the structure of which reflects the structure of the object being known; that isomorphy is found between the idea and the external object. During the processing of an information cluster into an idea, a structure is modelled which is isomorphic (structurally identical) to the given part of the external world. Our idea that the sun is a light-emitting object makes possible the idea of 'a shining body' and enables this to be articulated in the proposition, *The sun is shining.* The idea is anchored deeply enough in the proposition that it has clear borders and thus stamps a clear impression of the situation being observed. This is how the situation is known. It is not the real world that contains a shining object; it is our mind that holds a mental object surrounded by mental radiance and what the proposition does is capture the object via the concepts of *the sun* and *shining*. The isomorphy is easily evidenced and as long as the sun is truly shining in a given place and at a given time, the proposition *corresponds to* the external state of the world. Both the proposition and the idea are true. We have gained knowledge of the situation.

However, all this becomes complicated once we realise that the situation with the shining object called the sun is simply too trivial. We only begin to discover whether this idea and proposition are true if we encounter a psychotic person, who claims that the sun is not shining even though the rest of us agree that it is. And, if we as much as focus on the fact that the earth orbits the sun, all the phenomena involved become far more difficult to process (even though this information is a matter of natural science). It is not something we see. It is not directly inferred from our phenomenal experience. The simple processing of the information into an idea, and the articulation of a proposition, takes place indirectly via a discovery made by astronomers and via numerous other factual involvements of this information in social life. This is, in fact, largely a social construct even though our best knowledge of nature says that the earth's movement truly creates the impression that the sun orbits the earth.

This is not an arbitrary construct; it is based on the coherence of empirical findings, on our needs and mental manipulation of concepts. All this comprises an alternative idea, which explains many additional phenomena that could not be explained by the geocentric view. This whole process also determines a certain system of concept usage that we must observe if we are to create an appropriate idea and proposition—*The sun is orbited by the earth.* The conceptualisation of our cognition can (and often must) reverse our everyday phenomenal perception of the state of things in order to arrive at

what tradition forces us to call 'a true fact'.[20] Thence ensues the important lesson that social constructivism should not be, and mostly is not, in disagreement with the world around us. True constructivism is a tool of proper conceptualisation of the complexities of reality.[21]

A much more intricate situation arises with a proposition uttered in political discourse, for example *The reason for the refugee panic in the Czech Republic in 2015 is the fact that Czech society has been unnaturally homogenised for half a century, during which time it did not have an opportunity to encounter a different ethnic groups*. The idea this proposition expresses is so complex that we can no longer create a simple image. The previous sentence, *The sun is orbited by the earth*, allows us to construct such an idea and even do so in stark incongruity with our phenomenal experience. However, if we imagined a sequence of linked and interdetermined notions of 'homogenous society', 'the Czech Republic in 2015', 'refugee panic', we would not arrive at anything we could easily compare with reality.

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[20] For more, see Slavík, Chrz, Štech et al. (2013, pp. 39–40). The authors of *Creating* refer to the geocentric system example as well as another very interesting one. They refer to Vygotsky's analysis of Pavlov's concept of reflex. Empirical data could not have led Pavlov to define the two basic conditions by which he defined reflex: that it is something that separates humans from animals (humans do not act exclusively upon reflexes) and that it not something controllable, deliberate, intelligent. He could not have arrived at them because he defined these 'conditions' together with the definition of reflex. J. Friedrich pondered what would happen if Pavlov had used the term 'pre-reflection intellect' instead of 'reflex'. We find this very interesting. Given the current advancements in neurobiology and neurophysiology, as well as what we have described above, it can be said that in such a situation physiological development would not be hindered by the whole conceptual complex which (almost up to the end of the 20th century) prevented seeing the continuous potential of intellect in pre-reflective unconscious processings. It would likely accelerate the understanding of neurobiological and neurophysiological phenomena as a foundation for rational control over the environment and intelligent decision-making. However, Pavlov's decision was not arbitrary, as the authors of *Creating* might have us believe. It was made in perfect accordance with the early-modern thought composition, which superimposes the conscious and the explicable over all that is pre-conscious and pre-reflective, and which categorically separates humans from 'mere' animals on the basis of prior tradition and its essentially religious ethics.

[21] In order to protect this realist feature of constructivism, L. Kvasz (2016) defined its six principles and named the constructivism thus defined 'genetic constructivism'. The reason for this is that he draws on the findings arrived at by cognitive scientists and psychologists (Piaget, Vygotsky, Lakoff, Johnson, Nunez), which state that people are faster and more efficient in their re/construction of information if they are following a process that the human species followed during its phylogenesis or during cultural development.

The concept of correspondence is becoming strongly relativised. The common practice was that we deconstruct such complicated propositions into atoms: 'refugee panic', 'panic in the Czech Republic', 'in the Czech Republic in 2015', etc.; and then separately compare each individual atom with reality and if all its parts turn out to be true, then this complex proposition will be true as well.[22] However, we overlook two important facts:

a) The atoms of the propositions consist of words and these words gain their meaning only in relation to hundreds of other sentences, because language is a holistic tool.
b) The concepts of *panic*, *the Czech Republic*, *2015*, will have slightly different meaning in the atoms of the proposition (e.g. *panic in the Czech Republic* or *encounter an ethnic group*) than in the complex proposition as a whole, because the broader context specifies their meaning.

Deconstructing and constructing propositions appears to be an utterly misleading notion. This is because it assumes that language can be taken apart like a watch, down to the smallest component. In this view the more or less fixed content of concepts can be separated. (We return to this in section 1.3.4 where we explore language and metaphor).

Eventually, analytic philosophy also arrived at the conclusion that deconstructing and constructing propositions is not possible. In his analyses of the relationship between language, its meanings and truth, Davidson concludes that a single concept or a single belief cannot be compared to a corresponding part of reality because the meanings of the parts of reality are given in a prior unit of meaning determined by our world-understanding tradition. "No such confrontation makes sense—for of course we can't get outside our skin to find out what is causing the internal happening of which we are aware." (Davidson, 2001a, p. 144) Likewise Quine in his text *Ontological Relativity* proves that reference as such (i.e. a clear reference to a part of the world) is behaviourally non-definable (cf. Quine, 1969, p. 35). The concept-thing link itself reveals nothing or very little about the meaning of the thing. Not even the concept of 'the sun' would make sense to us in the way it does if we did not live in a society that permits us to solidify the meaning of a concept we connect with an object. Society does this by speaking about the complex of reality—causing complexes of the meaning of interdependent concepts to crystallise inside us. Thus we should not imagine meanings as solitary, separate, self-sufficient atoms, but more akin to nodes of intersecting

[22] The reason for the tainted reputation of the Social Sciences was that such atomisation was always rather suspicious and it often resulted in findings with no real applicability. It later appeared that segmenting complex phenomena into atomic ones, and studying them separately, is a simplification for natural sciences as well. We are often unable to discern facts from theoretical posits, which is why the meanings of concepts are pre-determined by sub-theories used by researchers. This is manifested on the higher level of overarching theories in their *ontological relativity.* For details on ontological relativity, see Quine (1969) and for the consequences that can be drawn from Quine's relativity, see Rorty (1980, pp. 192–209).

meaning-functions of language in which there is tension between constant change and a need to be comprehensible. Nodes are interlinked and meaning is limited by our ability to control our environment.

These observations seriously undermine the ideal-type foundations of early-modern thought. It is worth noting one important point here. Our representations— whether ideas or propositions—are formed not only together with how things in our environment appear to us, and not only together with the whole society in which we become acquainted with the basic structure of world understanding, but also hand in hand with how this society is able to manipulate concepts in such a way as to understand the world better. Without construction, which may take place in dependence on empirical observation, albeit only indirectly through operating with concepts (we call this construction *conceptualisation* and *reconceptualisation*), we could not understand anything that appears different to our senses. Not even such banal phenomena as a stick that appears bent when half-submerged in water.

A substantial contribution of the transitional phase is how it emphasises in different ways the communality of knowledge, its intersubjective sharing and partly even the circularity of the cognitive act, i.e. that we begin with a pre-understanding and arrive at new information which is then integrated into our pre-understanding. As a result of this critique of the transitional phase the relatively simple image of mirroring (representation) and comparison (correspondence) is, on the one hand, given the ability to predicate things more complicated than sentences such as *The sun is shining*. On the other, the image becomes more complicated because, in this transitional phase, we still cling onto some concepts and beliefs influenced by early modernity. Despite this, there is significant progress that enables us to break free from some early-modern myths and flexibly work with problems we need to solve.

1.3.2 Knowledge as learning from intersubjective negotiation and sharing of knowledge structure

As noted earlier, we reconstruct the transitional phase using, as an example, the book *Creating as a Way of Gaining Knowledge* [Czech: *Tvorba jako způsob poznávání*] (Slavík, Chrz, Štech et al., 2013). This monograph is exceptional in Czech epistemology, didactics and aesthetics. It presents cognition as an 'elementary creative act' in which what is perceived triggers a reaction that shapes the content of subjective experience in an expression of a structure (cf. ibid. pp. 94–110). In spite of all the complexity and nuances of the process (see ibid. and the following sections) the main message is that creating "*externalises and conveys content from person to person*" (p. 97). Cognition thus appears to be a communal, social affair which makes it possible to "*assess and find better alternatives to an artefact within an array of currently available choices*" which is "*the unifying feature for creating and cognition*" (ibid. original in italics).

Clearly, this approach to knowledge has little in common with the ideal-type view of knowledge as correspondence. Knowing is not tracing objective features of reality but a meaningful reaction[23] leading towards the expression of information. This expression can be communally judged, evaluated and an alternative may be suggested when necessary. Here, cognition is understood as action. As a result of this, knowledge can be understood as tension between *a reproduction extreme* (by the repetition of what is known) and *an innovation extreme.* An *innovation extreme* adds a new element to the knowledge structure with the goal that the new piece of information contributes to creating a generally more suitable system compared with the previous one (cf. ibid. 151–170).

The communality of cognition is crucial. Communality guarantees freedom from the content of subjective experience. Cognition is therefore not limited to mechanical extra-personal comparison of information with the original object, i.e. an objective structure of the world. The authors of *Creating* proffer an opinion which could be considered epistemologically imperfect from the point of view of early-modern thought. Cognition is largely determined and shaped by *a society of minds*.[24] Donald Davidson, the originator of this concept, maintains that communication and learning about other minds is *the basis of our concept of objectivity that is by definition dependent on intersubjectivity.* This does not mean that the structures of the world around us are determined by our agreement. A society of minds can be a society of minds only as long as it (to a certain extent) follows the features of the world. If it were not so, people would find themselves without devices to make sense of their own world, and all communication as well as the society of minds would collapse. Reference to an external reality solidifies the meanings of human language (cf. Davidson, 2001c).

In the communication process the original element of 'objectivity' is hidden in the necessity to refer to the external world, and to create coherent relations between words, meanings and action (otherwise an epistemological collapse would occur). Here we can see that the communication field completely redefines the meaning of the words 'subjective', 'intersubjective' and 'objective'. Their meanings overlap and one cannot be identified without the other. There is no area of solely 'subjective' events just as there is no area of completely private language.

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[23] The more meaningful it is the more appropriate information it leads to.

[24] While reading *Creating,* the reader finds a number of clues that this communality is crucial to the structure of the book's argument. The specific reference to Davidson's *society of minds* is only the tip of the iceberg.

To the extent that we understand something, on some level, (even if it is that we do not know what sentences mean), it can be said that we some of the speaker's perceptions or even beliefs (cf. Davidson, 2006a)[25]. Similarly, there is nothing 'objectively' fully independent of the speaker because 'objectivity' must be found and agreed upon strictly through intersubjective sharing of meanings (ideas) that takes place in a society of minds. However, a belief intersubjectively shared, which confirms objectivity, is always open to revision; it is not 'objective' in terms of objectivist realism.[26] This fact is of further importance when defining the late-modern composition of thought.

Emphasis on the communality of a society of minds is manifested in the transitional phase in various ways—typically in highlighting the intersubjectively negotiated content of an idea or proposition. However, this negotiation takes place in conjunction with numerous beliefs and notions, the truth of which we have not yet had reason to question and which provide the society of minds with a common basis without which there would be no negotiation at all. There are many names for this, for example "tradition", "cultural field", "conceptual space", "mental space" or "schemas" (cf. Slavík, Chrz, Štech et al., 2013, 68–69). These "traditions" or "conceptual spaces", etc. become the stuff of the context formed in relation to given content. A complex of corresponding cultural fields, conceptual spaces, etc. forms the dynamic structure of context. It consists of a "semantic network" and "logical inference structure of content units", which develop as a whole, but still provide a "reference framework for successful or satisfactory explanation, argumentation and substantiation" (cf. ibid. pp. 117–118).

The authors of *Creativity* believe that in the space of socially shared meanings, subjective mental space is forcefully conceptualised, which results in *consensual meaning analysis*. Consensual analysis determines the relationship between schemas (traditions, cultural fields, etc.) and *the practice of argumentation*. At this point the authors refer to those in a society who exercise the practice of argumentation—these are "competent communicators" whose awareness of their competence (i.e. knowing that both sides are familiar with the issue) allows them to manipulate empirical content during their conversation in such a way as to arrive at structured content of knowledge (cf. ibid. pp. 70–71).

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[25] This is to be understood in the context of the debate about different conceptual schemes. According to Davidson, if we are in a state of communication, even though it is unsuccessful, we share some ideas. That explains why there is no unsurpassable difference between two conceptual schemes. Imagine that aliens visit from outer. Although we cannot communicate with them, if we identify them as creatures that can communicate, we share the concepts of creature, communication, meaning and so on.

[26] Some of Davidson's important texts could be considered the same type of reorienting (propagandist) literature, as were *Meditations* by Descartes. Perhaps without admitting it, Davidson also leads the readers step by step towards accepting a new ontology, which they do not realise until they are quite convinced, renouncing the dominant early-modern world view and accepting a whole new one. See footnote 17 above.

The authors of *Creating* call this process *mentalisation*, and its purpose is to move through the specific occurrences of an experience to the level of *an abstract object*. This takes place through *selective synthesis of separated moments of experience*. For instance, we draw lines *a* and *b* using a ruler. It is important to us that this activity is firmly linked with the cultural field of geometry—i.e. from the very start there is the shaping factor of dynamic socio-cultural tradition (context) that directs our activity. Placing these moments in subordination to an abstract object (in this case the subordination of lines to the abstract object of *direction*) causes the structure of experience to be shaped by conceptual models; first as *a separated model* in the case of the specific lines *a* and *b,* then later as *a universal generic model*, which structures the direction of any line on the abstract level (cf. ibid., pp. 72–75).

Mentalisation is based on the recognition and reconstruction of structures from which individual cases are generalised into *rules* (just like lines *a*, *b* and all other lines belong under the generic model). The rule allows for the creation of a system of *concepts*—line, plane, direction are discursively joined into one whole in which a plane may contain countless differently oriented lines; however, there is only one abstract object of 'direction'. The content and meanings are determined by a combination of our life experience *and biological* predispositions related to communication in a particular cultural field: if two cultural populations are different, their meaning-determining conditions will likewise be different. (conf. ibid., p. 75)

The authors of *Creating* accept the traditional distinction between *mental objects* and *abstract objects*. This allows them to maintain the belief that "an idea, its expression and intersubjective sharing can have common content or meaning" (ibid., p. 86), because this sharing takes place in the following way: the structure of a subjective idea together with the structure of an abstract entity is unified with an idea that corresponds to an agreed upon content of an artefact/object. This is how abstract objects enter an individual's experience and create a calibration network. They attribute meaning to events being experienced. A rule, by which we can subordinate something under an abstract object, requires a system that in some way creates abstractions of what is being experienced so that it can be placed under a specific rule. When working with lines, we need to be able to understand them regardless of whether they are drawn on paper, a whiteboard or simply imagined in space. In the case of horses, it is necessary to disregard specific colour, height, etc. According to the ideal type of early modernity, this moment should be fixed and unchanging, but in the transitional phase it begins to exhibit motion. A defence of the principle of an abstract ascent is always relative to something. Upon seeing an animal, we may in one case identify it as a horse, in another case as an animal. This always happens in direct relation to the intention behind our thought process—are we expecting the creature to move, flee or eat, or do we wish to ride it, harness it, or are we zoologists and our aim is to place it in a specific category? We create orders of meaning indistinctness, which depends on the function, i.e. on our expectations of the meaning (cf. ibid., pp. 100–110). By overlooking certain features of things we are able to construct overarching concepts representative of our needs.

The meaning of an idea or information is formed when a subjective experience is mentalised into intersubjectively shared content. The adequacy of the content is determined by the degree of overlap between the structure of the subjective idea and the structure intersubjectively shared by the society of minds. Mentalisation operates by subordinating the occurrences of experience under abstract objects that facilitate the structuring of meaning—by placing a straight pencil stroke drawn in a notebook under the abstract object 'line', we are attributing characteristics to it that may not be apparent during subjective observation. Mentalisation liberates a particular experience from the uniqueness of occurrence and provides it with meaning.

It is interesting how abstract objects oscillate between the early-modern approach, which understands them as expressing the essence of objective structures in the world, and the late-modern approach, which understands them as our tools for making experience meaningful. The truth value of the sentence: "Line *b* and line *a* have a direction," cannot be determined by locating a correspondence between it and an associated part of reality—what part is it and how would one look for any correspondence?[27]—but by our ability to understand this sentence within a specific cultural-epistemological context. This context is determined by the overall sense of the cultural field, in this case the cultural field of geometry, which lends objectivity to abstract entities constructed within it. In spite of its idealising function, a cultural field is of great practical importance to human life. Objectivised though they may be, two lines drawn on a blackboard are open in meaning (regardless of abstract entities) because in reality they could have been drawn by a small child completely unaware of geometry, lines and directions. This openness of meaning is what constitutes the core of human environmental adaptability.

However, in some cases the transitional phase is not sufficient for the research of tacit knowledge. The reason is the emphasis this phase puts on finite forms, verbal expressions and logic, which is (we believe mistakenly) attributed only to the propositional character of sentences. This issue is addressed below; at this point we wish only to underline how this emphasis clouds the nature of tacit knowledge and even knowledge in general.

In connection with the meaning of expression, the authors of *Creating* stress that *construction* or *configuration* must be distinguished from *structure*. Structure is 'timeless' in a certain respect. Structure enables repetition; construction or configuration is only the realisation of structure (cf. ibid., pp. 60–64). It is not our aim to question the meaning of structures for human cognition—if drawing a line on paper is understood as the construction of the structure 'line', this can be considerably meaningful for future human action, for example, when a line is projected into a material space and becomes

[27] It was the need for a world of abstract entities to which our true ideas and theories could correspond that lead Bolzano and later Frege to the notion of "the realm of propositions in itself" or "third realm"—a realm of abstract entities.

a tool for describing this space in terms of geometrical idealisation, and prepares it for use. *Our criticism of the position taken by the authors of Creating is that they approach the entire issue from a structuralist standpoint*. In other words, the standpoint of those who already know what a *structure* is and what a *non-structure* is.

One of the last important remnants of the *early-modern cognitive theory* is the structuralist approach which considers *prior knowledge* (knowledge of a structure) to be at the core of cognition. This is reminiscent of the *correspondence theory*, which assumed (always implicitly and without giving reasons) that objective structures in the world must be known beforehand if we are to be able to confirm or reject a correspondence of our ideas and theories with a given part of the objective structure in the world. In the case of the transitional phase we must know what this 'timeless' structure is. The emphasis on structure in post-analytical literature *overshadows the cognitive process itself, including what is being continuously formed in it*.

Post-analytical structuralism presents us with a striking dissonance that the authors of *Creating* do not address. On the one hand, an element or feature of a transitional phase is an awareness that cognition is not static; that it is a constant reconstruction, verification and negotiation (ibid., p. 56). However, the transitional phase also builds on the belief that "meaning is what is determined by structure, while false belief is what explains some specific deviation from this structure" (ibid., p. 56; originally in Peregrin, 2000).[28] Yet, the question remains: How do we know that what we have is a proper structure that we can use to identify 'deviations' that define 'false beliefs'. We cannot claim that meaning or a structure that carries this meaning is negotiated, constructed and formed during expression, and at the same time believe that this structure is unchanging. This would constitute a return to the premise of early modernity, replacing discourse on objective structures in the world with discourse on structures. Despite all the admirable effort at transition, a fundamental flaw remains that stretches across the whole of modern cognitive theory. We could describe it with a question: How is it that the process of modern scientific inquiry seeks new information to explain phenomena around us but, at the same time, the theory of science remains based on revealing a finite, predetermined structure?

Perhaps we are not far from the truth when we conclude, based on Dewey's analysis of Western thought (cf. Dewey, 1992, lw.1: 69–131)[29], that we have inherited, from the Plato-Aristotelian tradition, the instinct to favour the static over the developing. We do not dispute the fact that a cornerstone of human epistemic orientation is the

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[28] Peregrin's book, to which the authors of *Creating* refer at this key point, is aptly titled *Meaning and Structure* (2000). It considers the meaning of concepts—a structure made temporarily stationary. The alternative concept of meaning (see 1.3.3 and 1.3.4 below) must deviate from this.

[29] This is a standard form of referencing *The Collected Works of John Dewey*, where "ew", "mw" and "lw" refer to a work of the early, middle or late period respectively. The number after the point identifies the volume and an interval of numbers after the colon identifies the pages. In the references that follow we do not include Dewey's name and year of publication.

projection of what is known into what is happening. We merely state that we can know whether a pre-known structure is suitable for solving a problem at hand only when the application of this knowledge helps us reach the goals we need to reach. However, how do we properly project this into the cognitive theory? Our response is outlined in the following section in which we move the conception of knowledge even further beyond the transitional phase.

1.3.3 Knowledge as the unifying of a knowledge field and tacit knowledge

Dewey's text *Proposition, warranted assertability, and truth* (lw.14: 168–188)[30] is interesting because it very efficiently explains Dewey's cognitive theory. Dewey operates with metaphor, which becomes crucial later in this chapter. He uses it in context with the situation (implicitly addressed in section 1.3.2) in connection with *Creating*. The authors share Russell's view that we gain some knowledge by acquaintance, and that this is convincing enough to build an epistemic proposition on it with absolute certainty. If we see a red circle, we create the idea of red-circle, which is directly projected into an unambiguous proposition, *Here is a red circle*. These basic and simple observations are transferred into epistemically sound propositions that become a basis from which new propositions are derived through the logical inferences of "knowledge by description".

Dewey criticises positivist efforts to seek simple structured propositions in clusters of sensory data (e.g. red, circle), the truth of which is directly apparent. Even in the transitional phase of post-analytical structuralism it is presumed "that all components are connected by *inference* from the level of so-called *observation sentences* which bear the narrowest possible correspondence to the sensory image of the world" (cf. Slavík, Chrz, Štech, 2013, p. 57).[31] Supervenience and isomorphism complete the connection from the level of observation sentences to more complex levels. The observation sentence level sees[32] "an agreement of belief between different subjects in relation to the same phenomenon or situation" (ibid.). "There are numerous smaller differences

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[30] The work is Dewey's response to Russell's critique of his most influential book on cognition, *Logic: The theory of inquiry* (lw.12).

[31] The authors refer to Peregrin, Brandom and Quine. Even though Quine occasionally quoted Dewey and has himself introduced the idea of ontological relativism into analytic philosophy (see footnote 22 above), he never abandoned the belief that human cognition is constructed from individual observation sentences, the truth of which competent speakers can agree upon as long as they are exposed to the same stimulus. (His last book is *From Stimulus to Science*—1995). The dominance of observation sentences is also visible in the approach of the authors of *Creating*.

[32] The term 'atomic sentences' is sometimes used. For positivism, it is appropriate because positivism is based on epistemological atomism, on observation sentences, which are intended to capture 'atoms' of first-hand information.

among individual approaches, but this changes nothing about the accepted meaning agreement confirmed by a certain common response; most evidently through naming agreement ('this is a table'...)" (ibid.).[33]

Other sections of *Creating* (cf. e.g. ibid., pp. 162–185) suggest that there are no strictly given rules as to how to descend from the complex level of experience to the simple level and vice versa. However, the whole argumentation remains largely constructed on the belief that the bottom level houses an immediate transition from a stimulus to an appropriate reaction, and that the appropriateness of the reaction to a complex stimulus is operated by logic inferred from observation sentences. This would result in the absurd notion that, if our actions and propositions have us agree on the simplest level that, for instance, the object next to us is a chair, that there is something called a skeleton inside our bodies and that there are unit of time that spans a hundred years. We understand the structure of the concepts of 'a chair', 'a skeleton', 'a century', etc. and, as a result, we can also logically infer the structure of a proposition such as, 'Depending on how the human skeleton transforms, chairs in the 28th century will look completely different.'

However, cross-level logical inference, which constructs complex ideas, is not the root of the problem. The bottom level description itself is misleading. This level provides us with epistemically trivial situations in which we need not make the slightest epistemic effort. For this reason it appears that perception is automatically and definitively transformed into a structured idea that is immediately followed by an identically structured proposition—the presence of a chair directly leads to sitting on the said chair or to the utterance *This is a chair*. However, even such banal everyday ideas and propositions are constructed, and they are constructions reconstituted during ontogenesis through our communication with other members of the society of minds. Because we have forgotten the construction and reconstruction processes of the distant past, the structured sensory content of perceptions appears to be readily 'given' in the structure of sensory data, and this content, together with logical inference, appears to be the last and only guarantee of proper knowledge.

Despite the emphasis on the process of knowing, the authors of *Creating* base their views on a number of simple beliefs that have carried over into the transitional phase from the ideal type of early modernity:

a) *Observation sentences are the basic premise of cognition—they are epistemic atoms.* The representatives of the transitional phase may not have observation sentences readily at hand because they are created through intersubjective agreement within the society of minds but, once they have passed beyond the point of intersubjective agreement, they become solid atoms and create a structure with which we can compare deviations (see 1.3.2 above).

[33] Here the authors are referencing Peregrin (2000) and his reference to Quine and Davidson.

b) We can construct larger complexes of information from these atoms using rules of inference. These rules regulate thought and are parallel to our experience—they are what accesses experience from outside (from the domain of reason) and organises it.
c) We are able to achieve complex knowledge within its appropriate structure. The appropriate structure of knowledge is determined by the existence of its atoms and predetermined inferences.

In the transitional phase this early-modern argument is obscured by the fact that each step (*a* through *c*) is in range of intersubjective negotiation. The process of cognition is captured in this negotiation. Still, it is assumed that, even here, atomic states are safest epistemically, as they originate directly from experience and are immediately transformed into structural atomic knowledge expressible in propositions such as *This is a chair*. It is this directness that enables intersubjective agreement. However, this is another flaw of early modernity because the world does not present itself in atomic data but through complexes of experience that we always deconstruct with regard to some necessity. This explains why no two atomic facts are ever the same; their content differs according to need—in one case a chair can be something to sit on, in another it is part of the furnishing of a new living space, or it can be a weapon used to fend off an attacker. If, like phenomenologists, we seek the invariant core of this object (chair) we shall find that this core consists of a network of relations through which it is woven into the lived world via its slightly different meanings. This renders the analogy between complex knowledge and a structure made from knowledge atoms unusable and furthermore, nullifies the idea that it is possible to distinguish structures from the process of their construction and that it is possible to privilege structure over configuration (see 1.3.2 above).

In order to introduce a truly alternative concept of knowledge, without any need for knowledge atoms and knowledge structure, it is necessary to abandon the metaphysical position of knowing the correct structure as a result of views based on knowledge atoms and rules of inference. We must begin with the complexity of our lives and consider the process of deconstruction into atoms as a mere tool—a response to a need that emerges as an integral part of the complexity of the situation at a given time and place. It is these requirements that lead us towards Dewey's cognitive theory.

Dewey does not abandon the idea of correspondence, but he understands it "in the operational sense". Correspondence is not "an alleged relation between 'subject' and 'object'"[34]; rather it involves all cases of "answering". It is at this stage that Dewey uses the metaphor of a key and a lock that is so important for us. This concept of 'answering' is used in the sense that "a key answers to conditions imposed by a lock". Dewey eventually generalises this idea of 'answering' in a formulation that brings us to the core of *the pragmatist cognitive theory*: the cognitive process is seeking "*a solution* [which] answers the requirements of *a problem*" (cf. lw.14: 179). The notion of 'solu-

[34] Dewey uses the words "subject" and "object" in quotation marks.

tion' plays a key part here, much like action in the pragmatist view of the cognitive process. Cognition is not a mere finding of a structure, but action that constructs problem-solving knowledge. In this concept, the relation between re/construction (configuration) and structure is reversed. If there is anything 'timeless' here, it is the process of perpetually transforming configuration. Structure is secondary; it is a mere tool of our reflection.

Dewey's book *Logic: The theory of inquiry* contains the most detailed and comprehensive description of his pragmatist cognitive theory. In it he once again explains a concept he had introduced into his theory earlier—*situation*. Dewey redefined this seemingly ordinary word in a way that made it one of the most important terms of pragmatist ontology and cognitive theory. By *situation* he means *existential quantum*[35], in which objects and inter-object relations are situated *in a contextual whole*. Objects and their relations are *secondary*—they are the result of categorisation and symbolisation. Our understanding of existential quantum is that we live our life in temporally and spatially confined contextual wholes, which make up a continuous chain. These wholes are primary. No object, no event and no relation ever occurs in isolation—all are experienced in a system of the surrounding world and this system takes part in characterising the objects and events.[36] *Situation is this network of relations of associated experience limited to a specific place and time; these limits are determined by a quality that is an inherent part of the situation.* (Cf. lw.12: 72–73.)

The word *quality* is another important concept of Dewey's. *"Situation is a whole in virtue of its immediately pervasive quality"* (lw.12: 72–73.). Quality expresses the unity and unique character of a given situation.[37] Situation must therefore be distinguished from objects, properties or relations. Dewey also introduces the concept of *subject-matter*, which encompasses 1) the unifying feature of a situation, which is 2) endowed with various ways of specifying based on the circumstances and transformations of

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[35] This is our nomenclature—as far as we know, it is not to be found in Dewey's texts.

[36] The ontological character of 'situation' has gained more recognition in modern methodology as well. Situation has become the research focus of *situational analysis*. It is surrounded by an array of analytical tools that describe its dynamic character. It is the detailed description of situation that becomes the objective. The goal is no longer the description of the thoughts and actions of people in a situation because they are being shaped by it, take part in changing it, and influence the future effect of the situation on them. They are not so much in the situation as a part of the situation. Situation becomes the basic analytical unit (cf. Clarke, 2005). Situational analysis was created by transforming the grounded theory by moving closer to the Chicago School of Sociology, which characterised situation on the basis of what consequences it brings (Thomas theorem, in Clarke, 2005, p. 7). The Chicago School was rooted in Chicago pragmatism, the main representative of which was G.H. Mead. Mead was Dewey's main collaborator before Dewey left Chicago. During that time, Dewey, sometimes under Mead's influence, worked on the basics of what would later become his cognitive theory—cf. e.g. his five chapters in *Studies in Logical Theory* (mw.2: 294–384).

[37] Dewey dedicated much writing to the concept of permeating quality, e.g. *Qualitative thought* (lw.5: 243–262) and *Theory of valuation* (lw.13: 189–251).

the situation.[38] Subject-matter determines the situation by its unifying quality, which is how it can contain the unifying principle and yet be articulated in numerous ways. If articulation fails the internal unity principle of subject-matter, a different situation is articulated and thus it is no longer an articulation of the original situation. Also, if a situation is articulated incorrectly, it leads to an existential failure—e.g. failing to solve a problem; an inability to reach a goal.

> "By the term situation in this connection is signified the fact that the subject-matter ultimately referred to in existential propositions39 is a complex existence that is held together in spite of its internal complexity by the fact that it is dominated and characterized throughout by a single quality. By 'object' is meant some element in the complex whole that is defined in abstraction from the whole of which it is a distinction. The special point made is that the selective determination and relation of objects in thought is controlled by reference to a situation-to that which is constituted by a pervasive and internally integrating quality, so that failure to acknowledge the situation leaves, in the end, the logical force of objects and their relations inexplicable." (lw.5: 246)

The logical force of objects and their relations is crucial. Proper situation appraisal results in its subject-matter being articulated according to the internal organising principle. Proper quality appraisal, the unity of which integrates a complex situation, thereby making the situation accessible to reason, is a source of all epistemic constraints. Logical inference does not approach objects from the outside; it is not a formal tool of 'correct' thinking; i.e. a tool detached from existence. It is part of the situation and contributes to identifying objects and their relations in the contextual whole. Identifying objects and relations, as well as logical inferences, constitutes an articulation of situation which is grounded in the appraisal of quality. If we have not correctly appraised a situation (its quality), we fail both to identify objects and to apply logical relations. Appraisal is thus the first stage of any cognitive act.

Quality is experienced via *intuition* (feeling). However, it must be noted that the source of this intuition is not the knower, but the situation as a contextual whole, of which the knower is only one of many parts. The amount of action consistent with the character of the situation is what is projected to intuition, and this manifests itself in the individual and through the individual—however, the individual is not the source of intuition. Dewey therefore agrees with Bergson that "intuition precedes conception and goes deeper" and adds that "reflection and rational elaboration spring from and make explicit a prior intuition" (lw.5: 249).

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[38] Subject matter is a substratum, but it has a quality of its own, which internally controls the property of its transformation into knowledge. That means, among other things, that it includes both the idea of a unifying principle and the fact that subject-matter can be expressed in many ways, e.g. how music or literature express their themes.

[39] By existential propositions Dewey means those statements which give information about experience, express the quality of situation and have a decisive influence over how life is lived and problems solved. What is important about them is the relation to existence, which is manifested in experience.

At several points in his work written in the early 20th century Dewey writes that we do not yet know the "physiological processes" (which decide how the quality of a situation is contained in feeling or intuition) well enough to know how they work. Contemporary research in neurobiology and physiology, as well as in cognitive science, gives us insight into how the complexity of such situations is formed in thousands of neuronal and physiological processes that take place outside of consciousness and only enter it as a dominant feeling which contains the situation as a whole and guides human action. To fully understand that Dewey's concepts of *subject-matter* and *quality* are not pseudo-philosophical non-scientific expressions, we must now become acquainted with the mechanisms that create quality and its subject-matter and gain an intuitive grasp of it[40]. This acquaintance is central not only for the pragmatist approach to cognition and knowledge but also for understanding the role of figurative language, especially metaphor (in a broad sense of the word—see below 1.3.4 and 1.3.5). Figurative language translates this intuitive grasp into human discourse and enables the initiation of the cognitive process as well as interpersonal sharing of both intuition and the cognitive process.

Classical phenomenology was also faced with the complexity of human cognition during its evaluation of positivism. Husserl (1983) began his critique by attempting to be more rigorous than positivists themselves. He understood that the world is conveyed to us strictly through our consciousness. Therefore he introduces an approach which he later describes as *the principle of principles*: *In our cognition we can only work with how everything is "originarily" offered to us—i.e. in our consciousness—"that every originary presentive intuition is a legitimizing source of cognition*" (cf. Husserl, 1983, § 24, p. 44). In order to support this claim methodologically, he introduces phenomenological reduction. Phenomenological reduction separates us from the world around us and lets things 'speak' the way they are perceived in our consciousness. Husserl thus opens a topic that would eventually lead phenomenology far beyond the boundaries of modern epistemology. What reamins after phenomenological reduction is, in essence, neither physical nor mental (cf. Bernet, Kern, & Marbach, 1999, p. 61). At this stage the founding idea of early-modern epistemology is beginning to wane—we can no longer build upon the simplifying dichotomies of internal vs. external, physical vs. mental, body vs. mind. Things present themselves in our consciousness in such a way that only during reflection, and always in a specific context, are we able to distinguish the internal space from the external, physical phenomena from mental, and the body from the mind. Phenomenological reduction subverts our innermost certainties and compels us to face uncomfortable questions: Is it not obvious what is inside of us and what is outside? Is it not true that an object in front of us has physical properties whereas an idea of it is a mental complex?

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[40] Intuition is a complex grasp of many events in our bodies, and in interactions between us and environment. It is not something mysterious.

The premises of contemporary *cognitive sciences* are so different from those of the 1980s' that they have earned the epithet 'second generation'. First-generation cognitive sciences modelled cognition on Cartesian assumptions, believing that the human brain can be considered something like computer hardware, and the mind like software. Aside from other things, this implies that thinking is the processing of information (cf. Johnson, 2008, p. 120). This is merely a modernising of the Cartesian idea of a knower's internal space and of an external space in which the objects of cognition are located and where they function. However, the second-generation researchers began to encounter facts that obliged them to completely transform this image. A simple differentiation between what is inside and outside of the knower's body is rather misleading, as indicated by the discovery of mirror neurons and their research (see Rizzolatti & Sinigaglia, 2008; Iacoboni, 2008), current research in physiology, the function and consequences of emotions (Damasio, 1994, 2010), and the coordination of sensorimotor action in different parts of the brain, which affect the plasticity of brain activity and the formation of complex coordinated action patterns of higher organisms (cf. Johnson, 2008, pp. 117–134)

For example, mirror neurons (MN), located in specific areas of the brain, interpret the behaviour of another person long before either the researcher or research subject are aware of perceiving, or indeed interpreting anything. If conscious interpretation does occur, it is with considerable delay and only if the conscious mind already has some prior interpretation results available, which mirror neurons and other preconscious cognitive processes had prepared previously. The complex of mirror neuron functions can even stimulate us in such a way that we experience another as though the person were really inside us. The only thing that separates us is sensory information from receptors in the skin (cf. Ramachandran, 2013, 0:05:00–0:06:30). The fact that we are capable of coordinating our gestures into producing communication, the fact that we can develop communication into verbal expression, and the fact that we are able to place ourselves in the complex situation of another is because, in a sense, others reside inside us (Iacoboni, 2008, p. 47–157).

This is by no means mysticism. The presence of others inside us is brought about by the specific functions of our neurons (i.e. in general terms by specific functions of our body-mind[41]), which have structured themselves into their specific forms during the

[41] Contemporary cognitive sciences base themselves on viewing 'the mind' and 'the body' as a singular whole, which had been, for historical reasons, severed in the 17th century. The whole reacts to the external environment, and the changes propagating through it affect the physical as well as the mental domain. No change is strictly mental or physical. The modern era gives some thought to the fundamental coupling of the body and the mind through the writing of John Dewey, who names this complexity the *body-mind* (cf. lw.1: 199–225). Dewey took inspiration from the findings of ontogenetic psychology and philosophy of the 1920s and 1930s. Contemporary philosophical reflection on the findings of cognitive science adopts this complexity as a compelling response to the Cartesian thinking of the previous phase of cognitive science, i.e. the first generation.

phylogenesis of all life in general, and humans as a species in particular. The reactions of other people are hard-wired into the functions of our neural network (generally, in the functions of our body-mind).

Research into *primary* and *secondary emotions* invites a similar conclusion. Damasio distinguishes between emotions and feelings. Feelings are a form of feedback of emotional reactions—they are what we feel and are aware of. Emotions as such are built-in action modules, shaped by evolution, and activated on situational assessment by a corresponding part of the brain (cf. Damasio, 2010, pp. 87–89). For instance, we flinch; the feedback of this movement is an unpleasant feeling that makes us survey the situation during which we realise that there is a snake in front of us. This example describes *emotions proper* (or *primary emotions*), i.e. emotions controlled by the limbic system. Already, the distinction inside vs. outside or physical vs. mental is undermined. Evolution has equipped our brain to function on the basis of successful interactions between the internal environment and the external environment (of an organism or species). These interactions have embodied in us those situations in which the members of our species have entered interaction during the evolution history.

Based on these results, emotions have been formed slowly—i.e. in-built, unconscious and preconscious actions. Differentiating between physical and mental happenings is only a kind of schematisation. They both transmute into one another on many levels—physical signals transform into physiological reactions, which trigger certain mental states, which then transform into neurophysiological signals, coordinated by the gradual formation of conscious experience. One morphs into the other in an organic circuit of experience and action. Simple differentiation between them is an oversimplification and over-schematisation actual working of the organism.

The case of secondary emotions is even more complicated, as they originate from more elaborate structures of pre-arranged action, mounted on primary emotions. They are emotions produced by a combination of natural reactions, and social or institutional influence. Although these emotions are produced in the limbic system, they travel through the brain towards the frontal lobes, where prior experience is being processed, and their impact on situations thus evaluated is projected as the automatisation of certain reactions. Instruments of government, discipline within an organisation, ways of schooling, etc. enter directly into the minds of individuals, via secondary emotions, and this again blurs the boundary between internal and external space.[42] Or, perhaps more correctly, it is a process that has never allowed this boundary to become clear. The boundary appears to be a case of epistemological fiction, which early modernity used in order to encourage the transition from scholastic Aristotelianism to the mechanism of modern science.

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[42] This may explain loss or gain in pupils' and students' intrinsic motivation as well as how a change in the teaching regime or even classroom layout may radically transform the character of motivation and gaining knowledge.

We can continue the list of neural, physiological and hormonal processes even further. For example, we can discuss how an organism is fundamentally connected with external situations through which it has passed and which it solved during its phylogenetic development. We can discuss how the results of this process have made, and are still making, their mark in the evolutionary code, through which we can meaningfully experience current situations, act in them and reveal somatised, *embodied meanings* in them (cf. Johnson, 2008, pp. 66–68). We return to details about neurobiology and human cognition when we characterise *metaphor as a tool of life assertion* (1.3.4).

Contemporary literature on the mind, cognition and their roots in the body (part of which we have just introduced) explains how the body of an acting and knowing organism existentially connects it to the environment, and how the organism and the environment make up one indivisible whole. All the above-mentioned processes (neuronal mirroring, emotions, coordination and shaping of sensorimotor information into meaningful action, etc.) are processes, which are *embodied* in the organism's physical constitution; they are recorded in it. The most influential of these records are transferred via the DNA or culture (as part of the socialisation or education process). *In their specific way, they couple the organism with the environment and vice versa.* This coupling is projected into specific forms of cognition.[43] A human has an arm and a hand to pick up objects, lift them up to the mouth or throw them away, make tools and artefacts, express knowledge and emotions in gestures, hug others, etc. A human has a mouth to eat, articulate sounds, express thoughts and emotions, kiss. A human has a brain to scan the internal and external environment, coordinate unconscious reactions, equilibrate the internal and external environment, engage and disengage the hormonal system, achieve consciousness. However, there is no simple one-way causality. We could also say that, during phylogenesis, the hand and the arm have evolved so that they are able to touch, pick up things, throw them, make new ones. The mouth has developed so that it is able to eat, speak, sing, kiss. The brain has evolved to be able to coordinate millions of signals and information, achieve appropriate re/actions, be aware and think consciously. Or more precisely: the hand and its functions (the mouth and its functions, the brain and its functions) have developed (always with a degree of tension) gradually and reciprocally during phylogenesis and in relation to other parts of the human body and the external environment.

With awareness of this network causality, interlacing and mutual influence, the *dynamic system theory* is slowly gaining support (cf. e.g. Thelen & Smith, 1994; Rockwell, 2005; Clark, 2001, pp. 120–139). Its origin is in cybernetics and, in terms of the cognitive theory, it was originally considered one of the alternative theories. However, in terms of second-generation cognitive sciences, we can consider it an overarching

[43] Late modernity considers the action of an organism as the centre of all cognitive activity, hence our use of the word cognitive *activities*. Later, when we write about an arm, mouth and their functions, etc., it is because these functions constitute the forms through which humans learn. This is closely connected with *affordance theory*, which, however, is only one of the articulations of the organism-environment coupling.

cognitive theory of living organisms. It integrates several originally radical, though increasingly more accepted, sub-theories such as *affordance theory, extended mind theory, embodied mind theory, enacted mind theory, ecological self theory*. Their unifying feature is *organism-environment coupling* (cf. Johnson, 2008, pp. 50–51, 117, 276). This coupling is based on deep interaction of all input introduced by the organism as well as the environment. We view the processes (embodying, extending, embedding, enacting) on which the above-mentioned sub-theories have constructed their foundations and authority only as *different expressions of a deeper common feature; as points of view into the dynamic unity between an organism and the environment.*

For now, let us summarise the key points. A strict differentiation between the internal and external space, between physical and mental happenings, and between the knower and object being known is not natural or obvious. It is a construct of early-modern thought. Its troublesome origins lie in a transitional phase, which started in the late Middle Ages and lasted until it stabilised, forming early-modern thought. It is with this relatively unintended idea that we have been brought up and socialised. It took two hundred years for this idea to form (from the16th to 18th century) and, since the beginning of the 19th century, it has been slowly transforming and disintegrating.

Towards the end of his life, Husserl himself was more and more convinced that the transcendental level also has its history (cf. Husserl, 1960, p. 76—for more on the transcendental level see 1.3.1 above). We have connected this history with embodying, extending and enacting (see above). The transcendental level was originally intended to reach beyond any empirical experience and (transcendentally) pre-shape it by giving it sense. It was to be a remedy of the naiveté of the positivist belief that the sense of sensory perception is self-determined. However, the historical and material nature of this transcendental level eventually reached beyond Husserl's Cartesian-Kantian ground (cf. e.g. Patočka, 2003, pp. 53–101). Yet, Husserl did not take the step that late phenomenology later did, eventually freeing itself from the rule of the pre-eminence of consciousness, but without discontinuing the objective of making the structure of sense apparent. It no longer needed its stance towards positivism to be protected by phenomenological reduction because it had become aware of noticed the role that the body plays in conveying "transcendental" meanings (cf. Merleau-Ponty, 1968, 2005).[44]

[44] For details on how Merleau-Ponty developed Husserl's ideas without basing his work on consciousness, see 2010. Some authors discuss the radicalisation of transcendental reduction by seeking its roots in the body and in somatic action, which means that the transcendental level undergoes constant change without losing its role of a pre-formed structure of sense (cf. e.g. Barbaras, 2005, pp. 30–83).

Barbaras, who draws on Merleau-Ponty, describes a 'phenomenological field' as the location where material objects appear, while the perceiving subject[45] is not an absolute Cartesian subject separated from the world, but a constituting component of phenomenality, i.e. how the world presents itself to us (cf. 2005, pp. 109–111). In his exploration of how a subject and the perceived world are constituted in relation to the constitution of the phenomenological field, Barbaras surpasses Merleau-Ponty and takes inspiration from Patočka. He identifies the role that the body and its motor moment play in the constitution of the act of perception (which is a co-condition for appearance). However, motor skill has its own history—the history of living motion. Patočka used the term "fundamental motion" to encompass the modalities of a subject's every movement. Barbaras calls this fundamental motion *desire* and connects it with *life* as a general expression of living beings (cf. Barbaras, 2005, pp. 143–146). Barbaras turns towards genetic phenomenology, which studies how the transcendental level is formed, examining its history and becoming convinced that "the very sense of the transcendental implies it is inscribed into the empirical as life" (cf. ibid. pp. 150–151). It therefore comes as no surprise that Barbaras later analysed texts by '*gestalt*' neurologists (K. Goldstein, V. von Weizsäcker, E. Straus) whose research into the structure and functions of organisms reveals this very commonality between an organism and environment, which, in phenomenological terms, appears as a phenomenological field constituted by life acting in the world. Gestalt neurologists note the curious relationship between an organism as an individual entity and the environment, "... such separation [of a living organism] from the original totality of life, which is at the root of its deepest being, is in fact a correlate of its individuality, i.e. its existence as a living being and therefore by principle inescapable" (ibid., p. 158). In his elaboration on the motion of life Barbaras proceeds to cosmology, in which "original motion, through which the world spawns itself, is realised in life" (ibid. p. 174). This manifests itself on the level of individual life as a continuous search for a form of equilibrium with the environment. However, there is no attaining of long-term balance because separation is a principle of the life of organisms.

Let us now summarise some of the features of late phenomenology cited above. Appearance and intentional relationship is a manifestation of dynamic unity, which transcends the individual in terms of the history of a species (e.g. the human species) as well as any species in relation to life as a whole. This unity is also formed with the world in which an individual acts and which he or she 'knows'. The principle of appearance is constructed on bodily action. The fact that we have a body, somehow situated in an environment where it can somehow move, is a condition for perceiving, and

[45] Even though we have reasons to avoid the word 'subject' in this chapter, we keep it here because it is part of the phenomenological tradition. However, Barbaras himself, as well as Patočka, strives to break free from the subject-object style of thinking. The discussion that follows here, (in which a perceiving subject is recognised as an outcome of the phenomenological field's constitution and at the same time as transcended and determined by the history of the species and life in general), shows that the word 'subject' plays an entirely different role in late phenomenology than in early-modernity.

for how we perceive. Consciousness is made possible by the unconscious processes taking place in our body. It is the pinnacle of individualisation but also something that can separate one from the totality of life. Human fate, much like that of any other being, means that being alive is a constant search for balance, which is disrupted immediately after it is reached. This principle is amplified by consciousness, which on the one hand has its own means of seeking equilibrium, but on the other is inclined towards capturing the movement of life in stationary forms in which it can think. This is why consciousness is constantly being disrupted by life, or by the unconscious. Seeking equilibrium is how an organism achieves cognition. An organism is a record of living; it is inscribed with the history of the struggle for equilibrium (of its own species as well as of all life) and it is a record of the history of gaining knowledge. The body 'embodies' these achievements and they become its specific functions, through which the organism acts within the world and perceives it through specific action. As a result of action and perception, the organism advances in life. The history of achieving equilibrium proceeds at a transcendental level that directs the organism and attributes meaning to its actions. The transcendental level is located in the organism's body and is, in its origin, empirical. However, from the point of view of a single organism it is transcendental—it allows the organism to navigate through the empirical world by directing its action so that its actions have sense. Still, from the point of view of a species and life as a whole, the origin of this level lies in the empirical history of seeking equilibrium.

If we strip these ideas of their specific phenomenological language, we find a surprising match between late phenomenology and the findings of neurobiology, physiology and cognitive sciences. The cognitive unconscious[46] allows us to act rationally on the unconscious level. Functions embodied into a body-mind and the ways the body-mind of a species can react in given environments are precisely what the above-discussed transcendental/empirical level is. This is where the "from within outward" point of view (phenomenology) and the "from the outside" perspective (neurobiology, neurophysiology, cognitive science) shake hands. We return to neurobiology and cognitive sciences later because their current findings enable us to refine the pragmatist concept of knowledge—including tacit knowledge—and because they can help us demonstrate that language and metaphor stem from this level of embodied functions. Late phenomenology can also be used to observe how strikingly close phenomenology and the pragmatist cognitive theory are. Phenomenology, including the concept of the phenomenological field, puts emphasis on a fundamental connection between an individual and the environment, as well as on a continuity of an individual's life and the history of life in general. Given that we define knowledge as 'knowledge field unification', we are simply repeating (in terms of pragmatist cognitive theory) what

[46] Based on research meta-analysis, Lakoff and Johnson (1999) assume that the ratio between the *cognitive unconscious* and *cognitive consciousness* could be up to 95% to 5% (cf. 1999, 21–26). The precise ratio is not important we note only the number of unconscious yet rational processes, and the related meanings we must attribute to them in the late-modern conception of cognition.

late phenomenology discovered in its analysis of intentionality and the phenomenological field. In another paper on phenomenological criticism of positivism we have referred to an emerging structure of sense as the source of gaining knowledge.[47] This is a rephrasing of what Dewey meant when he presents cognition as primarily determined by the quality of situation. This quality is the underlining structure of sense that a knowing organism perceives and which it communicates through the body and its functions.[48]

We can conclude all our previous effort with a description of intuition and how it enters cognitive action. *Intuition is a unifying expression of a material-physiological-psychological complex of organism-environment interactions, which captures the situation as a whole.* This capturing is the first stage of cognitive activity upon which all subsequent stages are yet to develop.

Here we find ourselves at the very core of *alternative cognitive theory*. Pragmatism builds on experiential complexity. However, this complexity is not an undifferentiated unity of all 'beings' (much like in the case of some versions of idealism)[49]; it is formed by sequences of situations. The situations morph into each other; one situation becomes an information basis for the articulation of future situations (an organism finds itself in a situation into which it entered from another situation and, by its resolution or failure to do so, it progresses into yet another situation). Every other specification of the situation by a thought process, in which we break it down into objects and relations between them, is always an abstraction that, in relation to momentary need, takes into account certain features of the situation. This momentary need is not subjective; it does not come from the knower, though it may initially (in the first stage) manifest itself as the knower's intuition or feeling. Intuition is a form of determining quality; it is not primarily a mental or psychological fact (cf. lw.5: 248). The quality of a situation harnesses thousands of physiological-mental processes, the purpose of which is to establish equilibrium between the organism and its environment. These processes are an unconscious or preconscious rational basis for any conscious state or act.

Unlike theories influenced by early modernity, which tend to view cognition as collecting atomised information into larger units (thereby culminating in complex knowledge), pragmatism takes the complexity of the situation and compares all its schematisations, abstractions and articulation with the subject-matter of the situation. Though it may operate with cognitive objects, pragmatism perceives them as tools for

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[47] Cf. Šíp, 2015, pp. 684–692.

[48] Our version of combination of pragmatism and phenomenology has been developed independently of other previous efforts and with different emphasis. These were formerly grouped under the term post-phenomenology (cf. Ihde, 2012; Selinger, 2006). We became aware of this tradition only after the first draft of this chapter had been written. However, Rockwell's (2005) or Dreyfus and Wrathall's (2006, pp. 289–599) texts suggested we are on the right path.

[49] This is an allusion to philosophical idealism of the Hegelian type. Everything is a part of evolving Unity, the Being.

achieving goals.[50] Information organised in propositional inferences is not knowledge in itself since it is always some form of schematisation. Knowledge is *a complex dynamic structure* (see below).

If we accept the complexity of experience as an epistemic and epistemological fact, we are free from the early-modern tendency, which we could call 'pan-cognitivism'. The aim of cognition is not to know everything; i.e. to have our consciousness permeate everything. The aim of cognition is to advance through life and improve it. For this reason the purpose of this pragmatist-phenomenological framework is not to contain everything in information. Awareness and articulation is only necessary once we encounter an obstacle. If we deal with a situation without problems, we have internalised it enough, and our mental models are sufficiently acquainted with it, that we need not reflect on it any further. However, if we encounter difficulties, we begin to experience the situation as *indeterminate*, unclear and threatening. We feel difficulty but initially we are unsure as to how to deal with it. Experiencing difficulty is part of how intuition expresses the quality of the situation. Difficulty prompts us to seek solutions, and inquiry is an action of response. Whether this response is successful or not is determined by whether the problem at the heart of the situation is resolved. "Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations *as to convert the elements of the original situation into a unified whole*" (lw.12: 108, italics added). Therefore gaining knowledge begins at the complexity of the situation and continues, via its articulation, into a form in which we are able to solve the problem. However, this solution again leads to unification—to a complexity with a new quality. What this unification means in actuality is discussed below. Here we make one further note on the characteristics of situation and its use in educational research.

The definition of situation and its consequences are also important for an understanding of *unexpected situations*. These are precisely those situations in which natural course has stopped, our mental models appear to be insufficient to handle them, and our current experience is confronted with reality. We are confused by the quality that permeates and frames the situation. We feel that we cannot progress further. An epistemic conflict has arisen from the transformation of the permeating quality of the situation into something different. One situation with a specific quality has given way to another situation. The change of quality changes our feeling so that, all of a sudden, it does not match how we articulated the situation a moment before. It does not match the plans we had associated with it, whether consciously or not. Often we are not able to analyse the change quickly enough, which is why the original feeling and ensuing articulations conflict with the feeling now in play. We encounter *an unexpected situation*.

[50] We believe that this is precisely the way modern science should also view them.

At such moments we must accelerate the transformation of the mental models we use to direct our actions. To do this, however, we must analyse the situation, and schematise and understand those relations on which we did not reflect in previous models. This epistemic conflict is where tacit knowledge has a strong presence, which is what also makes it easier to detect at this point. This is because TK is based on network causality. The way TK is involved in many relations makes it on the one hand harder for us to be aware of it and articulate it. Any attempt at conscious manipulation is a schematisation or simplification. On the other hand, it is better at reacting to the complexity of situations and to situational appraisals through feeling, which is also the beginning of the process of inquiry. This explains why it emerges more clearly in unexpected situations. The process of applying TK and a new articulation of the given situation eventually leads to a transformation and coordination of our mental models. This enables us to react more fittingly and thus establish a (temporary) equilibrium between our internal and external environment. In other words, complex knowledge is formed.[51]

We can now demonstrate the working of this unexpected situation model in a real situation with one of our students.[52] The student walks into the classroom accompanied by her mentor. She enters "a new world"—a new situation. She immediately takes in her surroundings and feels something. The feeling reflects the change of situation—it copies the transition from one situation into another; i.e. the journey from the staff room, through the corridor and into the classroom. No situation (except for extreme cases) is completely unknown; previous similar situations guide the student as to how to articulate it. This is how she is able to deconstruct the contextual whole of the new situation into objects and their relations: classroom, pupils, desks, blackboard, teacher-pupil relationships, trainee-mentor relationship, teaching expectations, etc. Still, the situation holds much that is unknown. The student does not know the pupils, their family situation, their temperament, their cognitive capacities, current mental state and thousands of other things that immediately take their effect and influence the quality of the situation. Even if the mentor wanted and was able to convey all this information to the student, he would not have time to do it. Moreover, much of this situation is unavailable to the mentor because it is hidden in his unconscious and he has long since stopped articulating it—he only articulates it after he has registered a lack of agreement between the student's action and his intuition (through which he assesses the situation). Moreover, he himself does not have all the information. The student then starts to act; i.e. she starts teaching.

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[51] For more on the complexity of knowledge, see below. For research on unexpected situations, see Chapter 8.

[52] The example was inspired by the experience of one of our research participants—Alena. We learn more about her later, in the section on the metaphorization process.

The situation is so complex that the student has no other option but to rely on the methods and structure of her lesson plan, and to follow the behavioural patterns she has learned in university courses regarding such situations, or to draw on her own previous experience. She follows the lesson plan. The pupils are writing down vocabulary. Next, the trainee wants to play a Christmas song she has found online. She attempts to open the Web browser but there is no internet connection—she has encountered an obstacle. The student continues to 'try' the computer. The pupils notice that something is wrong and disorder ensues—no internet connection, fidgeting pupils, mentor's questioning looks. The trainee is panicking. The entire atmosphere has changed. It is as though the student teacher is in a different classroom, in a different story. The quality of the situation has unpredictably given way to another quality, and the student has entered a new situation. Confusion intensifies; the student feels "frozen" and cannot move or think. She mechanically repeats attempts to connect to the internet and asks the pupils to be quiet. And then, unaccountably, she breaks this loop and abandons the plan. She sets a task and the pupils set about completing it while she walks among the desks, checking progress. Tension is lifted and the trainee is feeling calmer. Even though she is anxiously awaiting the end of the experience, the lesson is gaining momentum. The situation has been, relatively speaking, resolved, the quality of the situation changes and the student teacher, the pupils and the mentor have entered another situation in the sequence.

Let us now revisit the concept of *a unified whole.* A unified whole is the positive conclusion of epistemic action within a situation. A sign of the adequacy of action (of correspondence/appropriateness), also a sign of knowledge and its application, is the fact that the situation has become a unified whole. Relatively speaking, the problem has been solved. However, this solution was conditioned by the whole situation—it was not an outcome of subjective assessment and not even the achieved result was a matter of subjectivity. The student teacher progressed from her state of being 'frozen' and the lesson regained its course and rhythm. However, this was not determined by her feeling or her decision, but by the fact that her action was appropriate in terms of the situation. The conditions necessary to determine whether the inquirer correctly analysed the situation (using observation, conceptualisation, communication and behavioural operations) had already been met by the situation and were manifested by the fact that the action taken solved the problem. What was needed to restore relative equilibrium was done (lw.14: 181–185). The fact that the resolution could have been more elegant and more complete, is a different matter—elegance and efficiency of action are a sign of an experienced teacher's expertise. What matters is that a goal was reached, the situation of being 'frozen' was transformed into a more acceptable one. If relative equilibrium had not been restored, the analyses and action determined by them would have been *inappropriate.*

Situation is a lock which sets the conditions; accumulated personal knowledge (information) is a key that fits the lock and unlocks the door, thereby resolving the situation. The uncertainty, which arose once doubt appeared, was not the subject's doubt. Doubt permeated the entire situation but manifested itself in the individual who reacted to

the complex difficulty of the situation. "The habit of disposing of the doubtful as if it belonged only to us rather than to the existential situation in which we are caught and implicated is an inheritance from subjectivistic psychology" (lw.12: 110). Dewey considered the distinction between subject and object a lazy and meaningless abstraction of a primary epistemic situation in which the key part is played by *asubjective experience*. *Experience is a dynamic structure, which is formed within the situation and by organism-environment interactivities. Their energies collide, entangle and transform one another. This is why this structure permeates both the individual and the environment.* It is these interactivities that determine the limits and the quality of a situation, the possibility of a problem as well as the conditions of its solution (lw.14: 185).

How does *pragmatist cognitive theory*, with its roots in contemporary neurobiology, physiology and cognitive science, impact the perception of knowledge? Supposing the basis of any cognitive act is a field in which the knower and the known operate together, and supposing that a positive result of inquiry is the reaching of a goal (the key fits the lock and unlocks the door), then knowledge itself cannot be defined only in terms of what is contained in a knower's mind nor in what is contained in the society of minds. Knowledge must include a lock (figuratively speaking); i.e. the conditions set by the situation, together with the limitations determined by the process of placing a key in a lock, their mutual compatibility and the act that results in opening the door. In other words, knowledge is a gestalt structure formed by the unification of the knowledge field, while this field:

a) *consists of information that is formed in the minds of individuals,*

b) *is formed by interactive exchange between knowers and their environment—intersubjective negotiation within a society of minds may be an important interaction, but it is still only one among many,*

c) *is formed by our bodies, which convey all interaction to us and evaluate many of those as well, and*

d) *is formed by the environment.*

We do not change the direction in which the representatives of the transitional phase were headed; we merely shift the understanding of knowledge a little further within the logic of their thinking. We put yet greater emphasis on the interactivity and communality of knowledge. If a society of minds needs bodies and the physical world for intersubjective sharing of information and understanding one another (cf. 1.3.2), the bodies and the physical world must be part of a knowledge network. Bodies and the physical world may not be an external 'structure of objects', to which our idea should conform. It is something that we can, to an extent, transform, similar to the way our ideas or information change into more accurate ones. Changes in the mind, body and the external environment are part of the process of acquiring knowledge. For this reason the metaphor of correspondence between information and objective structures of the world is unusable for describing the cognitive process. The late-modern ideal type understands knowledge as a unification of all four dimensions—mind, body, interaction and the world.

For better explanation of this unorthodox idea, let us imagine the following "Palaeolithic" situation: we are a prehistoric hunter tribe capable of hunting large animals in several ways. We are able to coordinate our group in order to drive animals off a cliff, force them in a confined space where we can safely bludgeon them or we can kill them from a distance by throwing spears. Each hunting situation is, in its own way, an application of accumulated information. It appears we have an existing structure of knowledge, though there are always major or minor adjustments to this structure in every real hunting situation. But this is not what is of greatest interest.

What is far more interesting are breakthroughs. One of the hunters accidentally discovers the elastic strength of some types of wood. He experiments with stretching an animal tendon on either end of one such stick and observes how the wood flexes when the tendon is pulled. He feels the force with which the wood acts upon the tendon when it is released. He feels the potential of what he has just experimented with. He does not yet know how to put this to use; at this point it is simply something new and exciting. Then, a tragedy occurs during a hunt. One of the hunters is trying to throw his spear at a bear and comes too close to it. The bear, cornered between narrow rocks, instinctively attacks and dismembers the hunter before the other hunters beat it to death. Our experimenter is distressed by this situation and wonders what can be done so that hunters need not come so close to bears. In his head, a process is starting, which today we call *conceptual integration* or *conceptual blending* (cf. Fauconnier & Turner, 2008).

Conceptual integration, as this example demonstrates, is not a linguistic phenomenon; it can concern even the most tangible things around us. It is one of the most important components of cognition. During this process, a thought suddenly strikes our hunter, which irritates him, but he cannot quite put his finger on what it is. What is stopping him are his existing beliefs about how hunting works and what the 'proper' means of hunting are: coordinated pursuit, cliff, rock trap, throwing rocks, throwing spears, driving prey into a swamp. Suddenly, the idea of the stick strung with a tendon connects in his mind—the odd physical sensation when he releases the drawn tendon, the sound the tendon makes when the stick returns rapidly to its original shape—this, together with a spear in flight. The following day he makes a smaller spear so that the tendon may 'deliver its energy' to it. The others are laughing because he fails and makes a fool of himself. The spear falls desperately short; it plummets almost at the hunter's feet. However, one serious, wise man tells him that the tendon cannot 'deliver its energy' to such a large object. Our hunter looks at the size of the stick with the tendon and the size of the spear. The disproportion is striking—how is it that he did not notice this before? He experiments—on his own, preferably, yet he still seeks the company of the serious old man. They consult on the matter. In the end, he successfully kills a bear and then a deer at a great distance using his 'modified spear'. He is celebrated as a hero.

Obviously, the invention of the bow and arrow may in fact have happened in many different ways. Still, our story carries important information about what knowledge is. It documents the dynamic process of acquiring knowledge. For a better understanding of this process, we divide knowledge into four levels and change their order for reasons we shall soon explain.

1. *Interaction level.* This level is where all the crucial events take place: previous hunting experience and experience hunting technology, working with wood and tendon, being mocked, communication with the old man, working with the larger and smaller spear, killing the bear, eventual appreciation by the tribe—all this is interaction that transforms the entire knowledge field. Mockery, communication and appreciation create a uniquely human type of interaction in the form of a society of minds. This type of interaction adds dynamics to the unification process through deepening and accelerating symbolisation and conceptualisation. It is, however, only one type of interaction among many, and the success of unification depends on a concord of all interactions.[53] A knowledge field is unified on the interaction level as well; this unification is instrumental in achieving the result and its generalisation—the arrow kills the bear and more future kills validate the effectiveness of the new hunting technology.
2. *Body level.* All previous experience with hunts and hunting technology must have been gained within the allowances of the human body—the way it moves, the way it receives information from the outside, the way this information is processed, the kind of reaction this information triggers, etc. Every new hunting technique requires the hunters to adjust the way they use their bodies and reinforce and refine this use—different movements are required for tracking, different ones for pursuing game, for throwing rocks, for throwing a spear, for archery. Their bodies allow communication by means of hand gestures and sounds, produced by controlling breath, phonation and articulation. Their bodies provide a basic assessment of the situation, depending on where the hunters find themselves. They experience different feelings at different stages in a hunt, different ones on making a kill, different ones during respite. The hunter in our story felt different things when working with wood and tendon, when he was being mocked or when he gained respect after he killed the bear. Every feeling makes the hunters act and think differently. Feelings are a form of insight into each situation's permeating quality.
3. *External world level* The world in which our hunters lived had clear boundaries. Hills, valleys, woods, caves, swamps. A variety of specific animals lived in it. The animals could be hunted for food. Each type of animal required a different hunting

[53] Even if it were not so, intersubjective negotiation would lead to a radical relativization of truth. Knowledge would be constructed during communication, independently of the external world. However, such a state is not sustainable and regard for practical results and consequences will inevitably drive us closer to reality. This is the real core of pragmatism and its view of social construction, which are in full accordance with both Lakoff's and Johnson's experientialist realism (see footnote 6 above) and with the principles of Kvasz's *genetic constructivism* (see footnote 21).

technique so it was necessary to take advantage of the landscape in certain ways. Animals needed to be tracked, pursued and killed within the confines of the landscape. As a result of the availability of fire, the tribe members could cook dead animals. All these world properties must become part of the knowledge structure; otherwise the tribesmen are unable to reach their goals. The world appears inert from this perspective. It seems that the hunters must adapt to the physical world. For instance, they cannot assume that an animal comes to them and allows itself to be killed—this is not in keeping with the world as they experience / know it. However, the world is not unchanging either. It undergoes constant geological, ecological and evolutionary changes but also humans, more than other animals and plants, transform the world by the use of technology—obtaining fire, keeping fire, manufacturing tools or weapons. The world becomes 'different' with every novel technology—the discovery of the bow and arrow makes the world different. The world is also 'plastic', and humans take significant part in its plasticity. Humans and other creatures do not respond mindlessly to conditions placed on them by the world, but they themselves actively alter them. In other words, they do not shape only the key (4th level) but the condition-setting lock as well.

4. *Information level (mind level).* This is the level traditionally associated with knowledge, yet we discuss it last to stress the importance of the other levels. In our story, this level was made up of all information the hunters needed to hunt. They needed information about materials to manufacture tools and weapons, about landscape features, about animals being hunted, about hunting techniques with various weapons. The hunter-innovator example follows an interesting process, in which old information is transformed into new. Nowhere in his innovation did the hunter start with nothing. He broadened old information, transformed and reconstructed it. He expanded information about wood and tendon with properties nobody had previously noticed or was able to use until then. He expanded his knowledge of spears by creating 'a small spear'. The ideas of 'delivering energy', which we may now consider animistic and naively dismiss, were enriched by the hunter's practical combination of the strength of a tendon strung on either end of a stick and its ability to propel 'a small spear'. He linked this complex of reconstructed properties with the idea of killing an animal. It is quite likely that when he made his first shot he did not have a clear idea of a 'bow and arrow'. Only with further use would this idea become clearer and more definite. until eventually it made its appearance in language as well—'small spear' became detached from the concept of a spear and a new concept was introduced—'arrow'.

Viewing the event on four levels (interaction, body, world and mind) is, didactically speaking, an appropriate means of explaining the *knowledge field and its unification. Knowledge is not a state of mind or an object contained in it but a unification of a knowledge field. The knowledge field is unified across all four levels:* interactions are affected by the states of the other three levels, but interactions also facilitate changes on these levels. Changes on the levels of body, world and mind in turn shape and determine

future interactions. This is how the dynamic structure of knowledge is formed. The knowledge of how to hunt an animal with a bow and arrow is gained once the capacities of the world and artefacts introduced to it (bow and arrow) are connected with the capacities of the body, its inscribed processes, instincts and habits, as well as with information for understanding why the 'bow and arrow' are constructed in this particular way and how to use them. This structure is dynamic because it is in constant motion—if the behaviour of animals changes (after the discovery of the bow and arrow, animals become more wary of humans), the manufacturing of bow and arrow technology improves. The way the bow and arrow are used improves, the way the body uses this technology changes, as it strives for greater efficiency and elegance. Information about animal behaviour changes as well as information about manufacturing, use and training with the new technology so as to use it as effectively as possible.

It must be noted, however, that the division of the knowledge field into four levels is still not ideal and even, to an extent, misleading. It is inadequate because there is perpetual exchange taking place across all four levels. Each level systemically influences the other three. For example, the sensation of hunger, which we could, for the sake of simplicity, associate with the body level, influences and alters the mapping of the external world, drives interaction modulation and re/formulates information. All these transformations in turn influence bodies. All things considered, however, this didactic differentiation still helps us better understand the nature of *tacit knowledge*.

The idea that a knowledge field is unified into a dynamic structure no longer pertains to some specific mental state or some specific structure of experience content. The unification is manifested by the reaching of a goal. Under certain circumstances we can reach our goal (though not always elegantly or efficiently) without any clear information about the situation and its transformation—and, given the capacity of the human consciousness, these circumstances occur more frequently than not. When the hunter from our story let loose an arrow for the first time, he does not quite know what a bow or arrow is, exactly how it is used or at what distance it is feasible to hit and kill an animal. Yet, unification did occur—after a series of failures, 'a small spear' was shot with a velocity never before observed. Only additional use of the bow and arrow, additional shots, additional experience and its reflection will result in the refining of the information level via the occurrence of more prominent unifications. The case of our trainee teacher is similar: in spite of her 'freezing', the lesson did eventually gain momentum and rhythm and the goal was reached—the lesson resumed a meaningful direction. Only similar future experiences, followed by reflection, will refine the information level; i.e. new—more perfect—unifications will take place.

Because knowledge is a dynamic structure consisting of elements from all four levels, it often happens that the knower is led by external conditions (pupils, classroom, lesson), by bodily signals that precede rational development of the situation (an unpleasant feeling, the need to overcome it, current bodily resources) and by possible interactions that external conditions and bodies offer (abandoning the computer, setting a task,

walking among the pupils). *Tacit knowledge* can thus be defined *as relatively successful unification of the knowledge field initiated and directed by the limitations of the present interactions determined by the state of the external environment and by the limitations of bodily action. It is a relatively successful unification, which is not yet accompanied by due reconstruction of the information level.*

An individual experiences tacit knowledge as intuition, which unaccountably directs him or her somewhere without knowing where or why. The individual sometimes may even act without apparent motive and yet it eventually the action has logic, direction and a goal, which it fulfils. The definition of knowledge as a complex structure of a unified field allows us to break free from the condition of full awareness and full articulability, pursuant to which knowledge was defined in terms of consciousness (early modernity) or in terms of its consequences (transitional phase). And as a result of this even *the actions of an individual, who is unable to express what knowledge directed these actions, can under certain circumstances be considered a manifestation of tacit knowledge.* People possess this knowledge because they meaningfully respond to the external dimension of knowledge dispersed in the external environment. At the same time their actions are directed by the capacities of their body-minds, the structures of which are shaped by embodiment and also, partly, by the thus far imperfectly restructured information level. We can imagine tacit knowledge as a negative shape directing a person—similar to how an artist is led by a real negative shape, thoroughly filling it and thus creating a positively shaped work of art. A positively shaped work of art is a metaphor for thorough reconstruction of the information level.

To complete the picture of the state in which a positive form of the information level is and is not reached, we return to the story of our hunter. The hunter can kill an animal with a bow and arrow, but cannot yet explain why he fails with 'a large spear, but is successful with 'a small spear'; he cannot explain the force that propels a small spear with a greater speed than the human arm; he still lacks words or even concepts for this explanation to be intelligible to others—*his information level is not yet developed enough for him to be aware of the full extent of his invention. Once he is able to explain all this (in relative terms, of course), he has reached a fitting positive form of information.*

However, to avoid falling victim to early-modern dichotomies, we must bear in mind that the states of reaching and not reaching the positive form are again mere didactic simplifications. We can always explain something—any badly articulated piece of information already contains an embryo of positive knowledge. Similarly, no positive form of information is ever fully realised, just as no knowledge is ever completely unified. Were this to be so, the world, our bodies and interactions would never be able to change. However, if they never changed, we would not be learning because changes on all four levels result from our having previously gained relative knowledge. Absolute ignorance as well as absolute knowledge are in fact mere extrapolations of real cognitive processes, but they do not actually exist.

1.3.4 Figurative language and metaphor: Their role in the explication process of intuition[54]

As noted in the previous three subchapters *i)* accumulating knowledge is closely linked with discourse and verbal expression *ii)* difficulties with accumulating knowledge are projected into language and vice versa and *iii)* language is not a tool consisting of separate atoms with which knowledge atoms can be labelled and then reassembled into complex verbal expressions of cohesive knowledge. Much like experience and knowledge, verbal expression is complex. Every word is the outcome of countless previous events. It is a semantic treatment? of a cluster of relations, the meaning of which is constantly open to change. Even the meaning of such a banal and everyday word as 'chair' is constantly subject to alteration—in one case it is a thing to sit on, at another time it is a piece of furniture in a new flat, or it can be an object of self-defence (see above in 1.3.3).

Every concept is open to all the permutations allowed by the relationship of objects to each other, while the meaning of the concept can be qualitatively different with each permutation. Some permutations transform a concept irreversibly. The conceptual transition from 'spear' to 'small spear' to 'arrow', creates a richer meaning unit, both on the level of the material artefact, including associated habitual and mental changes, and on the level of language, the alteration of which is a result of these changes. The entire process of spreading alteration progresses in a complex way. All conceptual changes ripple through the network of concepts and their semantic and syntactic relationships. A pragmatic intervention into the state of language, which is the creation of a new concept during invention (creating), also affects semantics and syntax to a greater or lesser degree. Naturally, these changes have a decisive influence on understanding and cognition and affect the conditions that determine future knowledge field unification.

In many passages of *Creating* there is an apparent emphasis on language and on its dominance in achieving understanding. It sometimes seems that the authors—as post-analytical structuralism dictates—consider language the only means through which proper understanding can be reached. Everything else is considered 'a response.[55] This is why they distinguish between 'conceptual' and 'non-conceptual' content, with conceptual content rooted in the experience of objects that can be "nominally defined as a 'unit' of content"—what, in logical terminology, is referred to

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[54] In the previous sections we steered our discussion on the conception of knowledge and tacit knowledge towards explanations of the early-modern ideal type, the transitional phase and the ideal type of late modernity. However, in the compressed version of this sub-chapter there is little room for this. Therefore, we are going to address language and metaphor only in relation to the ideal type of late modernity and will formulate an argument why the transitional phase is no longer sufficient.

[55] Cf.: "… Meanings are … most apparent in linguistic namings and expressions, but they can also be derived on the basis of different types of *responses, which are not nearly as clear*..." (Slavík, Chrz, Štech et al., 2013, p. 148, italics added).

as *extension* (Slavík, Chrz, Štech et al., 2013, pp. 86–87).[56] The non-conceptual content lacks "inferential common rules", they cannot be "consciously utilised because no tool for their explicit representation (language) is available. Unlike the case of [conceptual content], there is no comparable reason to claim with the same authority that such logical inferences can be applied to the content of *perception* or *ideas* unless they are carried by concepts" (ibid. p. 87).

It is not our intention to debunk the claim that language is in most cases a more effective form of communication than other types of 'responses'. Our objective is to prevent this from obscuring the fact that language is only one of several types of response and that it is essentially only one of the means of completing complex actions. If we accept this view, it follows that logical inferences do not enter human action only through the use of language. This is noted in the previous section (1.3.3) where, in connection with *situation* and *quality*, we stress that logical inference is rooted in situation and carried by action. The result of 'non-conceptual responses' is that language is pre-formed in some way (e.g. it has a subject-predicate structure, so properties can be assigned to objects; there are certain syntactic relations—additive, contrastive, causative; or there are certain semantic relations—synthetic and analytic, etc.) These 'responses'—not as separate entities but as a meaningful whole established through the action of organisms—are where the dynamic structure of sense is manifested and created. This dynamic structure of sense is also a source of logical relationships.

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[56] *Extension* is closely connected with *intension*. These represent two ways in which the meanings of words are linked with reality. *Extension* is understood as the extent of the concept that represents all the things it denominates; i.e. the concept of 'a dog' includes all dogs. An indirect ostensive relationship is an inherent part of this hierarchy. Ostension means that we identify an object about which we speak in the following manner: we point at a dog and say, 'dog', thereby suggesting that the object in front of us belongs to that concept. The indirectness is given by direct ostensive identification hidden behind the abstract function: 'belong to a concept', however, ostension is still at work here. *Intension* means the construction of meaning that identifies things in the world but this relationship is not based on indirect ostension. Intensional denotation of a dog can be constructed by the expression 'the oldest domesticated animal'. This example shows that the relationship with reality is much less strict because it may be that the oldest domesticated animals were cattle, which would make this concept refer to cattle and would indirectly express the meaning of the word 'cattle'. For more details, see *Creating* on the relationship between *extensionality* and *intensionality*. In their discussion the authors lean towards the practice of analytic philosophy, stating that in every new system of meaning there must be a persisting meaning rooted in extension (cf. ibid., p. 173). Pragmatists, experiential realists and constructivists go even further. They notice that ostension, which comes into play in the extensional relationship between meaning and a thing, is in fact only a form of action. This explains why they stress that our language is rooted in the world by means of action, not by the attributing of meaning to things. The consequences of manipulating things, which are only parts of the complexity of action, form our understanding and shape the meaning of things being named. By emphasising action, pragmatists rid us of the dependence on extensional rooting of language which, in spite of being seemingly automatic, is always subject to ontological relativity. For details on ontological relativity, see Quine (1969) and for the consequences that can be drawn from Quine's relativity, see Rorty (1980, pp. 192–209).

What the authors of *Creating* call "non-conceptual" content is not in essence non-conceptual (cf. Johnson, 2008; Lakoff & Johnson, 1999; Lakoff & Núnez, 2000; Lakoff, 1987). It is this simplification that allows them to characterise metaphor as "imprinting a signature" since the structure of a signature can bring the process to an end by introducing a new feature into an assertion, this making it verbally articulable in full, and open to being reflected on as a conceptually finite structure (cf. Slavík, Chrz, Štech et al., 2013, pp. 201–202).[57] This is not problematic, as long as the authors of *Creating* are aware that favouring the finite over that which is still being formed is a considerable simplification of the cognitive process.

In terms of our research aims Slavík et al. are overly radical in setting language apart from the complex processes of human action. In doing this they return to favouring consciousness and separate states, which means favouring finite structures. This detachment of language in turn requires them to employ measures of maintaining a clear boundary between 'the conceptual' and 'the non-conceptual'. For this reason, their view of language, especially metaphor, is limiting because they consider the origin of metaphor to be 'non-conceptual'. Thus, metaphor must also remain 'non-conceptual', otherwise the contrast between language and non-language (a conceptual and non-conceptual 'response) would be blurred. Donald Davidson once again contributed significantly to the development of these ideas, i.e. to how representatives of the transitional phase understand a function and a sense of metaphor.

Davidson's texts on metaphor rank among the most interesting from post-analytical literature. In *What metaphors mean* (2006) Davidson metaphorically characterised metaphor as "the dreamwork of language and, like all dreamwork, its interpretation reflects as much on the interpreter as on the originator" (cf. ibid., p. 209). This view supports our position: if the originator of a metaphor gathers from the interpreter's reactions and responses that he or she has understood the intended message, then there must be some hidden logic that directs the production, reception and interpretation of the metaphor. Moreover, if there is any logic involved, then the metaphor must have meaning. Unfortunately, Davidson's essay is more prosaic and its arguments present the opposite view. It does not take into account Davidson's own claim that in order for a metaphor to be considered a metaphor, the originator and interpreter must share the sense of their dreamwork of language. In fact, the essay attempts to demonstrate "that metaphors mean what the words, in their most literal interpretation, mean, and nothing more" (ibid., p. 209).

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[57] Regarding the following description of how metaphors pre-form our thinking, we must be more serious about the fact that the metaphor of *imprinting* is a metaphor on which the idea of early-modern representation was built. This metaphor was instrumental in creating conditions for mental cognitive processes to be understood as mental imprints of physical objects, making these imprints mental objects that our consciousness can be aware of (cf. Yolton, 1991). This places us too close to the early modern style of thinking.

This assumption already offers the conclusion, which Davidson later makes, "If a sentence used metaphorically is true or false [i.e. in a conception of truth-conditional semantics], then it is clear that it is usually false" (ibid., p. 218). According to Davidson, a metaphor, similar to a joke, dream, picture or blow to the head, can make us appreciate a specific feature of reality—although not because it means anything or because it conveys information (cf. ibid., pp. 222–223). Davidson believes the role of metaphor is to make us aware of something, not to express or mean anything.[58] In order to understand this unusual approach, it is important to bear in mind that Davidson is part of the analytic tradition—sharing its interesting beliefs, but also burdened by its limits, which confine it to early modernity.

At the end of the text Davidson gives an example of someone who "mentions the beauty and deftness of a line in a Picasso etching", and then asks the rhetorical question, "How many things are drawn to your attention?" He then offers an answer: we could make a long list that would be endless, because here the concept of an *end* lacks all applicability. "What we notice or see is not, in general, propositional in character" (cf. ibid., p. 223).

Davidson does not consider metaphor to be propositional in nature, because it lacks truth conditions. Truth conditions only provide propositions consisting of parts which carry literal meanings. Meaning is thus strictly connected with language in its synchronous form, where meanings are pre-fixed. If a word is used figuratively, the meaning of the metaphorical utterance does not fit the truth conditions, and thus it is false; or rather, there is no incentive to determine whether it is true or not. For example, if we know the truth conditions of the words *sun* and *shine* when used literally, we understand the sentence *The sun is shining,* and we can confirm or reject this statement in a given situation. On the other hand, the metaphorical sentence *He gave us a shining smile* is false; or rather, there is no incentive to ascertain whether it is true or not, because the literal meanings of *smile* and *shine,* determined by the truth conditions, are incompatible—a smile cannot emit light. Nonetheless, Davidson admits, it can make us aware of our perception of the person, which we may not have been aware of previously; e.g. our feeling of being welcome.[59]

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[58] Rorty took inspiration from Davidson when he formulated his philosophy of language. Without being acquainted with texts written by second-generation cognitive scientists, we criticised Rorty's post-analytical approach to language and, after reading Lakoff and Johnson's critiques, arrived at conclusions very similar to those we present here. (cf. Šíp, 2008, pp. 111–116, 175–179).

[59] Regarding Aristotle's example of the *sun sowing the god-created fire*, we demonstrate later that Davidson's approach to language is unsustainable, much like Aristotle's. This is because both base their views on the belief that there is a clear boundary between literal and figurative language. Research findings of evolutionary and cognitive linguistics show that no such boundary can exist because (contrary to Aristotle's and early-modern beliefs) in that case no human cognition would exist either. We shall see that under some real and substantial circumstances, the sun can sow light much like someone's smile can shine.

However, the idea of language in which semantics would be separate from pragmatics is an idealisation and is not consistent with the real functioning of language. This idealisation allows semantics to be understood as a catalogue of finite entities, where meanings are frozen, permanent. Such a catalogue provides literal meanings and truth conditions. If the use of a word is in discord with its semantically frozen form, it is being used figuratively and bears no truth value. This idealisation may not agree with the real functioning of language, but it is acceptable to those socialised in an early-modern mental environment. This is because it enables one to view truth independently of action and consider it essentially semantic, where the meaning of a sentence fits the truth conditions constructed from the literal meanings of its words. This approach completely ignores the fact that our experience is structured by the embodiment of interactions between an organism and its environment, and as such is formed by the dynamic structure of sense. Moreover, it is a structure that undergoes constant change on the level of meaning. The view of language in which semantics are separate from pragmatics seriously restricts the role of metaphor. Metaphor is not seen as having meaning. It is restricted to making us aware of something or turning our attention to something. The authors of *Creating* often show their support for this position when discussing the nature and function of metaphor (see Slavík, Chrz, Štech et al., 2013, pp. 109–110, 181–182, 194).

Slavík et al. believe metaphor "does not express the *objective* state of things", it is not "a proposition derived from external relations", it is "primarily a sign of *subjective* organisation between mental spaces" (ibid., p. 181). "*Subjective* use of metaphor precedes the conceptual use" (ibid., p. 182—italics added).[60] Here, the determining factor is the 'subjective' vs. 'objective' dichotomy, which is constantly reproduced in the monograph. As noted earlier (see 1.3.3—the passage on the neurophysiological origin of intuition) no such dichotomy actually exists. Metaphor is neither 'subjective' nor 'objective'—nor is any linguistic expression. Metaphor is not 'objective', but it is *ontologically constraining, it does not originate arbitrarily*. It is not 'subjective' either; it has so many 'objective' features that others are often able to place it in their framework of understanding and may even begin to use it to describe reality as a novel and more fitting description of something. It is important to be constantly mindful of this if we wish to examine the real functions of metaphor and its part in the articulation of intuition; i.e. articulation of tacit knowledge.

We must now answer questions entirely beyond the scope of early modernity and only partly reflected in the transitional phase: *Why does metaphor exist? What motivates and drives it to enter the order of language and disrupt it? What power is there in a metaphor?* The nature of metaphor, discussed later, causes us to view with a far

[60] All these passages are reference J. Mácha's text (2009) in which the author conveys Davidson's conception of metaphor to the Czech audience, while the last quotation is translated directly from his book (Mácha, 2009, p. 144).

broader perspective than has been usual in works of literary science, linguistics or traditional philosophy of language. *Metaphor is not primarily a matter of linguistics*—but more on that later.

In one respect, our understanding of metaphor draws on Ricoeur, who understands it to be closely related to symbol. We then link his concept with the view of neurobiologists, cognitive scientists and philosophers, who are able to explain how the bond with the symbolic pre-verbal level operates on the level of material-physiological-mental processes. Because of this connection we are able to relate the history of life to the living expression of organisms. This shows that metaphor is an expression of life; it is a way higher organisms adapt to environmental changes.

Ricoeur defines metaphor in terms of surplus of meaning and the inexhaustibility of symbol (cf. Ricoeur, 1976). His understanding of symbol is different from that of objectivist realist theories. Objectivists consider symbol a representation of a real-world object (object, state, relation, etc.) in the order of some symbolic calculus. Ricoeur understands symbol in terms of the phenomenological hermeneutic tradition, as an expression of life (*bios*), which does not fall into the order of language (*logos*). This is because the content of symbol or symbolic action always precedes understanding achieved through language.

At this point it is necessary to distinguish between the system concepts and the language system, which expresses concepts in its order. Concepts and their relations are already being formed in the sensorimotor domain. Language is an order of semantic, syntactic and pragmatic level systems. This facilitates easier manipulation with shared signs, thereby enabling pre-verbal processing to be included in the communication code. Humans (or organisms in general) use this code to boost the coordination of social action.. Language fulfils its purpose (to coordinate social action, the basis of which is the reduction of meaning to an acceptable level; cf. 1.3.5 below) by expressing pre-verbal processing as approximations, reductions—and always with a delay. In this sense, it expresses what has already been structured. However, language on its own is unable to express the variety of pre-verbal processing. Because any happening is structured by symbols in the Ricoeurian sense, this make possible—always 'imperfect'—language coding and articulation of only some parts of meaning.

An example of the uncodifiability of symbols is a religious symbol such as Holy Communion, or respect for the Queen. Even if we are expert and diligent in articulating it, the essence of these symbols cannot be fully conveyed to someone who does not share in the symbolic action. Only symbolic participation in Holy Communion or in showing respect for a certain social role makes it possible to understand the verbal

description. Symbolic action structures our world—it is symbolic action that creates a space where the verbal sharing of meanings can arise and function. This is precisely why it is not possible to articulate it completely with language.[61]

Metaphor retains the surplus of meaning and polysemy of a symbol. However, at the same time it is 'a linguistic level of symbol'. It is capable of refining the inarticulable richness of a symbol and furnishes language with its implicit semantics. However, it views this original richness and interconnectedness from a certain single perspective and with certain intent (cf. ibid., pp. 68–69). Metaphor thus injects language with the power of symbols. This enriches language with entirely different conditions of understanding and causes what we refer to as *reference split*. The power of metaphor stems from the complexity that connects an individual's (or a population's) entire life with the cosmos throughout its development. We cannot sequence this complexity into verbal expression, nor are we able to contain it consciously; still, its workings—often distant and mostly unnoticed—can enter our consciousness through metaphor and transform not only the way we describe the world but also the way we understand it.

Confronted with Ricoeur's ideas, the reader may come to believe that we are now exploring the mystical and the irrational. It may be partly because we do not realise how exactly our body-minds connect us to the whole of life and its history. This can be illustrated in the following example by Derrida (1993, pp. 230–232), where he analyses one of the key passages of Aristotle's writing on metaphor (Aristotle, 1457 b[62]—2007). Derrida criticises Aristotle's traditional definition of metaphor as name transfer from

[61] "We are warned [in Otto's The Idea of the Holy] from a very beginning that we are here crossing the threshold of an experience that does not allow itself to be inscribed within the categories of *logos*… This power as efficacity *par excellence* is what does not pass over completely into articulation of meaning. It is true that the category of hierophany, which Eliade substitutes for the too massive notion numinuous, does imply that manifestation of the Secret have a form or structure, but even then no special privilege is bestowed upon speech… The preverbal character of such an experience is attested to by the very modulations of space and time as sacred space and sacred time, which result and which are inscribed beneath language at the aesthetic level of experience." (Ricoeur, 1976, s. 60–61).

[62] This is a standard international reference to Aristotle's works.

one thing to another (in a later development of the tradition it was the transfer of properties).[63] Ever since Aristotle's time, metaphor has been understood as the transfer of the properties of one thing onto something else.[64]

Derrida scrutinises a passage where Aristotle notices the strange power held by analogy (a type of metaphor). Aristotle explains this power using the metaphor; *The sun is sowing light.*[65] This suggests a relationship between sowing and a sower on the one hand and sunshine and the sun on the other. Aristotle's conception of metaphor is based on the assumption that we identify similarities between objects, which allows us to transfer names (properties). However, there is no *visible* similarity between a sower and the sun. In fact, there is no general, sensorically perceivable relationship between the two. The sun and a sower have different physical-chemical properties and their visual dissimilarity could hardly be more striking.

Even if we accept that there is indeed an identifiable relationship between the sun and the sower, we encounter another puzzling property of metaphor. In order for the sun to sow, several meaning shifts must be made. We must alter our understanding of both the sun and the sower. However, because the sun is co-defined by light and other associated things and relations, and the sower is co-defined by seed and sowing-related things and relations, once the metaphor enters language, the shifts must affect broad areas of meaning. *Since this metaphor exists, there is no simple 'transfer' but complex*

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[63] "Metaphor consists in giving the thing a name that belongs to something else; the transference being either from genus to species, or from species to genus, or from species to species, or on grounds of analogy." (Aristotle 2007).

[64] Traces of this conception can be found in the transitional phase described by the authors of *Creating*, who keep the emphasis on property transfer via expressing "one as the other". However, in our view they do not fully appreciate the emphasis on existential transformation of the understanding of experience. "How does metaphor meaningfully represent reality? An answer could be, 'By conveying it as...' Here it is possible to draw on support from Lakoff and Johnson's definition of metaphor as understanding and experiencing one kind of thing in terms of another kind of thing. This definition can be depsychologised, saying that metaphor 'portrays one in terms of the other' or 'it portrays one as the other'" (Slavík, Chrz, Štech et al., 2013, p. 201) However, by "de-psychologising" Lakoff and Johnson's words, they returned to a place which Lakoff and Johnson made deliberate effort to leave. The moment we use metaphor not as an ornament of discourse but really as a means of splitting reference and describing experience, we do not only *portray*, but especially *gain a new understanding and experience.* It is no psychologism, but an existential step. If we focus on portrayal, we only limit ourselves to the transfer of one thing's properties onto another. *We remain on the level of expression but we have not descended onto the existential level of understanding and experiencing, which is fundamental to expression and gives it sense.* In one of his best poems, Holan did not conjure a primary portrayal a *Cave of Words*, but through it he understood the poet's life, which is a life he lived. The portrayal came later, after a transformation of his consciousness and the way of life as a consequence of a change in understanding and experiencing.

[65] Precise wording: [Sun] sowing god-crafted fire (Aristotle, 2007). Like Derrida, we set aside the divine element and focus on "the sowing of light" or "sowing fire", bearing in mind, however, that our interpretation of deeper connection and the symbolic background of every verbal expression would only amplify the divine.

systemic transformation in understanding. When a metaphor is used, it alters not only the original meaning of an object, and the meaning of the property-transfer recipient object, but all things that co-define the domains of meaning 'the sun and sunshine' and 'farming'. How can such complex transformation occur without any apparent change in the sun or the sower? Was this complex transformation somehow already present in the person who first experienced this metaphor? But how could it have been present if there is no apparent difference in the physical circumstances before and after its application, which would indicate a change in the truth conditions as well? The sun clearly is not a sower, and vice versa.

As we have already noted, Aristotle's definition requires some similarity between one thing and another. In modern terms, there must be an identity theory at work, which would direct our process of becoming aware of similar content in the sower and in the sun. The establishment of identity retains in itself the possibility of transfer between one and the other. This definition allows metaphor to transfer names (properties) from one thing to another only after a resemblance has been established. However, such an identity theory (what the authors of *Creating* call "being subject to a common rule") is of no use. In reality, this theory can only be applied to a minute extent and only to very simple metaphorical shifts. Even the metaphor *The sun is sowing light* does not fit this analytical approach.

Derrida then examines a passage where Aristotle discusses how analogy identifies 'something' using the name of 'something else', in the process of which the object at the centre of the metaphorical shift is denied one of the important identifying features of the original thing: A cup is to Dionysus what a shield is to Ares. These are their attributes. In this metaphoric expression, the originator of the metaphor calls a shield *Ares' cup*. However, in a subsequent metaphorical shift the originator decides to dispense with the name (a cup) of the linking property. The originator no longer calls a shield an Ares' cup but a 'wineless cup' (cf. Aristotle, 2007). Derrida says that this process of transferring names (properties) can continue indefinitely; he discusses "the metaphorisation of metaphor" and "bottomless layers of [metaphor] determination" until he makes the final statement that "in an analogy, all concepts are rooted in a metaphorical relationship" (1993, p. 231).

This complication characterises the nature of metaphor in the general sense—the possibility of metaphorising metaphor is what constitutes the core of metaphor. Traditional canon, which understands metaphor as a form of transfer, is of the opinion that in order to successfully navigate the infinity of metaphorical shift variations, the use of metaphor must be in some way grounded. It seeks this grounding in the distinction between literal and figurative language. Literal language is the language of cognition while figurative language is only an aesthetic device or it draws our attention to something we may have missed previously.[66] If we understand metaphor

[66] For more, cf. sub-chapter *Fear of metaphor* in Lakoff and Johnson's book *Metaphors we live by* (2003, pp. 195–198).

in strictly linguistic terms (early modernity) or as a dream, or a blow on the head, (to alert us to something) but not actually as carrying any meaning (transitional phase), we pull metaphor out of its roots in the body-mind and remove the enormous power of symbol from its feedback loop. However, ther are limits to the breadth and depth of the metaphorisation of metaphors because metaphor is rooted in the order of existence (*bios*). We can illustrate this using the example of the light-sowing sun.

There must have been a connection between the sun and sower before the originator of the metaphor noticed it. This creative multi-relationality, (the "bottomless multiplication of determination layers", which transcends solid forms of being—the Middle Ages, or solid and relatively static essences of things—early modernity) is inexplicable by medieval and early-modern ontology and naturally evokes distrust. However, if we accept the ontology of mutually influencing networks, as late modernity does, it becomes much more acceptable. The connection between the sun and the sower had been forming over a long history of agricultural development, during the cycle of seasons and the strength of the sun's rays. All these had an influence on the formation of the sense structure of the sowing process. A specific understanding had thus formed in human experience (cultural-historical *a priori*), which itself was rooted in experiential sedimentation, on the level of phylogenetic inscription into DNA. This 'housed' biological memory (biological-historical *a priori*)—a certain shape of the human body, repeated over generations. Affording an action we collectively dub agriculture, a part of which is *inter alia* the sowing of seeds. These historical *a priori* made it possible for the embodied structure of sense to accommodate the formation of a relationship between the sun and its effect over the course of seasons and agriculture as a whole. This relationship of one kind of thing with another exists independently of any need to seek similarities between the sun and the sower. The relationship was already present in a structure embodied either in biological or in cultural memory, and *lay dormant* until a need arose for it to become apparent.

This point of view, i.e. as 'determination layers', makes no sense to early modernity because early modernity is internally driven by linear causality. Members of the early-modern tradition are unaware (or perhaps unwilling to admit) that this causality is *pragmatic causation*; it is a methodological trivialisation of a complex network of relations into an easy-to-follow pattern of 'cause and effect'. Because it considers linearly causal relations to be the essence of ontological determination,[67] it must seek similarities between the sun and the sower—in appearance, in function, etc. Since there are no such direct similarities, metaphors such as the one of *the light-sowing sun* remain a mystery for Aristotle and early modernists. For Ricoeur, however, they do not. Symbol as a manifestation of symbolic action is a product of our meaningful

[67] For the distinction between *complete cause* and *pragmatic cause* see Rockwell (2005, pp. 51–52). The inability to see purposeful schematisation of reality behind linear causal chains is a distinguishing sign separating the linear-causal thought of early modernity and the systemic thought of late modernity.

existential involvement in the surrounding reality. Metaphor borrows the strength of symbols and enters language, where it alters the way we understand and experience things.

The feedback that keeps symbol and metaphorical transfer in the order of life is determined by the depth of the connection between bodily experience of life and its sense. Even though this connection is not strictly material or physical, it is vitally dependent on its material and bodily substance because it is the concord of all life relations within the cosmos that makes life precious and meaningful. Kohák points this out with compelling elegance in his book *The Embers and the Stars* (1984). He notices that if we wish to move beyond 'facts' and reach their meaning, we must necessarily use metaphorical expression (cf. ibid., pp. 55–56). He illustrates this using the example of the lunar phases (a law of nature), which become a means of understanding the transforming unity of an individual's and a population's life (cf. ibid., pp. 56–57).

Axelsen compares this phenomenological-hermeneutical approach, shared by Kohák and Ricoeur, with the approach of contemporary cognitive science, when she relates it to Lakoff and Johnson's work[68] and traces their inner connections (cf. Axelsen, 2012, pp. 344–348). Concurrence is central to our argument because it shows how the symbolic world is structured and passed on from generation to generation via the body. This also allows us to move from the symbolic level of metaphorical meaning to bodily processes, which articulate that meaning in the life and language of individuals and populations. The way we are connected to this omnipresent living network, and the role metaphor and the body-mind play in it, is addressed in the following paragraphs.

Our concept of metaphor, constructed on Ricoeur's and Kohák's sense of living and projected into language, draws on the approach of second-generation cognitive scientists, pragmatic philosophers and evolutionary linguists—Johnson (2008), Lakoff & Johnson (1999, 2002), Lakoff (1987), Lakoff & Nunez (2000), Galles & Lakoff (2005), Gibbs (2005) and others. In the previous subchapter (1.3.3) we focus in detail on bodily and mental processes because we are aware of the role they play in the body-mind of organisms during the advancement and improvement of their life. The body-mind connects organisms with their environment. The history of an organism as a species and global life-participant relates organism-environment interactions to the complete history of life on earth. Body-minds essentially keep the records of interaction outcomes. They catalogue the historical events of their species in context with the development of the cosmos. Earlier (when discussing Ricoeur) we asked the question 'How is an originator of a metaphor connected with symbols reflecting cosmic complexity?'. It is here that we find our answer. It is the body-mind that ties every organism to the complexity of life. All the above-mentioned authors relate figurative thinking, and metaphor in particular, to bodily cognitive acts. The process

[68] *Metaphors we live by* (2003) and *Philosophy in the flesh* (1999).

of metaphorisation[69] is rooted in *image schemas* (see below) and spreads through all human cognitive-aesthetic behaviour, all the way to those actions, the products of which may in extreme cases be works of art. Johnson's book *The Meaning of the Body* (2008) is a perfect example.

Johnson considers metaphor to be a means of attributing meaning to our experience. Due to metaphor we are able to understand emerging and transforming experience because it is rooted in the embodied dynamic structure of sense. By performing an action we elevate a meaning, or a cluster of meanings, to which metaphor reacts by containing the sense structure segment in an image and including it in verbal expression. Metaphorisation is already at work in *image schemas*, which map sensorimotor processes. Image schemas are produced by what is known as *cross-modal perception* that permeates several fields and thus causes several neural-physiological processes to overlap. The overlap of these processes enables their coordination and consolidates them into a versatile whole (cf. ibid., pp. 135–154).

At first, this gives rise to basal *image schemas* for the basic orientation of the organism. Some of the important schemas are: *container*, *source-path-goal*, *verticality (up-down)*, *centre-periphery*, etc. (cf. Johnson, 2008, pp. 136–145). Schemas provide basic orientation maps, which permeate our lives from birth until death. For example, the *container* scheme structures our experience through a cognitively experiential *gestalt*, which informs us as to whether we (or an object we see) are (or is) inside something or not. Cognitive scientists are able to discern basic logical inferences even on this level; an entity is either inside a 'container' or outside it (either a member of a set or not), but not both at the same time. This existential relationship has other direct implications which form a basic logic. If an entity E is in container C and this container is placed in container D, then the entity E must be in container D, etc. (cf. ibid., pp 179–180). We have pointed out several times that logical inferences are integral to a situation. When quoting Dewey's claim that improper articulation of a situation leads to a state where objects and relations abstracted from it lack 'logical force', we mean precisely this existential dependence of the logical calculus on the most elementary processes of action, which inherently confine the acting organism to the situation and its internal organisation.

Image schemas are the initial mooring points for understanding, and they navigate our action. They enable us to be aware of basic embodied meanings of a given structure of experience. Perception is *multimodal*, it is both the awareness of spatial or movement interaction as well as the selection mechanism of available reactions. In other words, perception and action, as well as perception and concepts *are not primarily distinct*

[69] By this word we mean a process in which we give meaning to our experience via a metaphor or a cluster of metaphors and thus make it verbally expressible. The introduction of metaphor makes language figurative, non-literal. Objectivism views this negatively. However, we, similar to experiential realists, consider non-literality a necessary cognitive tool for expressing new quality.

areas; they emerge during the life of an organism when it interacts with the environment. *Image schemas* can be combined and thus can take part in the more complicated syntactic structure of our experience. Each newly formed layer of meaning is also embodied in automatic processes taking place in the unconscious. For instance, if we become aware that we are in a room, our body has already evaluated this situation and has prepared a portfolio of possible actions. The oneness of perception, action and thought empowers an organism to understand a situation through the simulation of behaviour (cf. ibid. pp. 157–162).

How to imagine such a situation on the unconscious level can be illustrated by the function of mirror neurons (MN); for more information, see above (1.3.3). MN help us evaluate a situation even before we are aware of it. They become active for example in the brain of an experiment subject observing the researcher pick up an object. The MN in the subject's brain activate the same neuronal pathways responsible for doing what the researcher is doing. Because the same centre is activated in a similar way, our neuronal activity assesses the situation, similar to how we would if it were us who picked up the object in the first place (cf. Iacoboni, 2009, pp. 9–11). These unconscious evaluations performed by the subject's MN can have a very complex structure, one roughly corresponding to the semantics and syntax of linguistic evaluation. If an object is picked up in a particular way, a particular set of associated actions will follow. If an object is held in a particular way and in the presence of a desk on which the object can be placed, the agent will most likely place the object there (cf. ibid., pp. 31–35).[70]

Lakoff, Johnson, Gallese and others argue that sensorimotor processes are instrumental in the structuring of organism-environment interactions, by which the array of suitable actions is formed. The concurrence of these processes is the origin of sense in life. Sense on the most basic level is determined by whether a selected action fits the overall sensorimotor situation. The sense in doing an action even of the most abstract nature—e.g. choosing the most rational solution to 'the refugee crisis'—is formed and rooted in bodily experience. This results in the formation of *schemas*, which allow an organism to make complex assessments of similar events and react in a similar

[70] Of course, here, a continuity of simulations is at work. If we learn by imitation, we use the mirror neurons in our brains. When we observe a hunter throw a spear, the way he grips the spear and the subsequent series of movements he makes triggers a reaction in corresponding mirror neurons, which tells us how to pick up a spear and what movements to imitate. Then, other phases of simulation follow. We coordinate bodily sensations, brought about by imitation, with changes in the external environment. On the one hand these changes lend meaning to our action (we can hit the target), on the other, bodily sensations connect this meaning with a new activity and with the structure of our prior habituation within the world. This is how a new coil of the sensorimotor circuit is formed, restructuring the level of meaning.

way.[71] They structure experience on a more general level. *Schemas are the meanings of concrete concepts* that are "realized neuronally as sensorimotor schemas that organised functional neural clusters into meaningful, integrated *gestalts*". (Johnson, 2008, p. 162). The meaning of these *gestalts* modulates the information being processed into a spectrum of possible future activities. This is how *concrete concepts,* such as seeing, gripping, manipulating, repositioning, crystallise on the neuronal level. What matters is that this conception of the unity between sensorimotor actions and specific concepts nulls the traditional early-modern assumption of "two exactly parallel systems in the brain, one for sensorimotor actions and the other for concepts for those sensorimotor actions" (ibid., p. 164). *Structured and coordinated neuronal processes are concepts, which are primarily apparent in the manner of action and its consequence and only secondarily can they be expressed in language by its signs, semantics, syntax and pragmatics.*

Lakoff, Johnson and Gallese consider that abstract concepts are formed by metaphoric meaning transferred from sensorimotor actions onto those directed by different parts of the brain. This abstract ascent is aided by what is known as a *conceptual metaphor*, which directs the transfer of the properties of specific concepts onto other areas responsible for abstract thinking (cf. ibid., pp. 176–179).

> "From a neural perspective, the conceptual metaphor hypothesis states that neural mapping is the basis for conceptual mapping that constitutes conceptual metaphor. Metaphorical mappings are physically realized in the stable neural circuitry linking the sensorimotor system to other brain areas. In other words, if there are conceptual metaphors, then there must exist neural connections between sensorimotor areas of the brain and other areas that are involved in thinking." (Johnson, 2008, p. 167)

Although Johnson admits that this is only a hypothesis, his book provides ample evidence that this hypothesis is gaining support from cognitive science and neuroscience, and is a much more coherent explanation of cognition. In this approach metaphor is the basic generator of meaning. "Contrary to the objectivist theory in the experientialist approach, metaphors are not primarily a matter of language, but a matter of thinking and doing. Only their derivations are manifested in language" (cf. Lakoff & Johnson, 2003, pp. 159–160).

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[71] Mirror neurons also work with these schemas. MN represent only a part of neuronal activity involved in the sensorimotor circuit of action. However, the above-mentioned *multi-modality* can be well illustrated on their function. Not only does this type of neuron become active when a research participant is observing an activity (sensory aspect) but also when he or she is appraising the situation or is preparing a reaction (motor aspect). For instance, if an object is held by *the precision grip*, different types of action are made ready as opposed to a situation when a person in front of us grabs an object by *the whole-hand grip* (cf. Iacoboni, 2009, pp. 22–24).

The way abstract concepts are constructed (in contrast to concrete ones) can be illustrated using the meaning-formation process of the abstract concept of *understanding*. Understanding can originate from sensorimotor activity referred to by the concrete concept of *seeing* or by another sensorimotor activity referred to by the concrete concept of *grasping*. If we consider the process of understanding in terms of the metaphor of *seeing*, then understanding will mean an insight of sorts. As a result of this transfer 1) an idea someone understood can be treated as an object someone has seen, 2) understanding the meaning of the idea can be treated as having clearly seen the object, 3) one who understands can be treated as one who has clearly seen the object, etc. (cf. Johnson, 2008, p. 165). On the other hand, if we structure understanding on the basis of the metaphor of *grasping*, we will understand this concept as a particular type of grasping of something. Again, this will make us 1) consider understanding as the grasping of an object, 2) consider the depth of understanding as the strength of our grip on the object, 3) consider the inability to understand as a state when we are not holding the said object or are unable to grasp it, etc. (cf. ibid., p. 165). The transfer of properties from concrete concepts to abstract actions thus forms the structure of the meaning of abstract concepts and their relations. Similarly, on a higher level, these can intersect, become deeper or more differentiated (see Lakoff & Johnson, 2003, pp. 103–119).

Basic *image schemas* provide not only a basic spatial and temporal orientation but they also substantiate the most abstract of actions (though they become enriched and diversified in later metaphorical ascents). They essentially allow life to be open to something transcendental, which we so proudly believe to be unique to human beings. In her analysis of Lakoff and Johnson's approach to metaphor, and in linking it to that of Kohák, Axelsen shows how image schemas become a ground for a spiritual grounding of life. The schema of a container and its metaphorical ascent into the overall course of life enables the idea of home to be structured (*home is a container*) as a source of emotional and spiritual support, as a source of sense in life (*the home-container is situated in meaningful surroundings*). Such a concept of home can help one "understand one's place in the cosmos" (cf. Axelsen, 2012, pp. 346–347).

It is therefore not surprising that even the most abstract areas of the human cognition are to no small extent rooted in the body, and only through metaphors do they ascend to more abstract levels. Lakoff & Nunez in *Where Mathematics Comes From* (2000) consider the current form of mathematics to be a combination of two aspects of human experience. The first involves the innate ability to use the most elementary procedures of navigating a geometrical space and the most elementary arithmetic procedures (e.g. distinguishing among several small numbers, perceiving several small numbers at once—this is known as subitation). Compared with advanced areas of contemporary mathematics, these innate abilities are modest at most. A different aspect is the ability

to apply conceptual metaphors to them. Their combination produces *new spaces* (or *environments*) *of mathematical thinking*.[72] This combination gave rise to such breakthroughs as calculus or set theory (cf. ibid., pp. 15–103).

The Hejný method of teaching mathematics is founded mainly on the discovery of mathematical spaces using tactile experience and on pupil-pupil and pupil-teacher social collaboration. Social collaboration is not only a means of communication but also a repeated abstract ascent formation, originally caused by a conceptual metaphor (or metaphors). This repeated formation helps the pupils understand the workings of a given mathematical space from within (the method's practitioners use the word 'environment'). Results show that Lakoff and Nunez's hypothesis probably bears more truth than mathematicians have until recently been willing to admit. The pupils arrive at the logic of complex mathematical spaces by developing innate mathematical and geometrical basics through sensorimotor acquaintance of related rules. A complex thus acquired, and grounded in sensorimotor activity, is then developed by the pupils learning to shift between one space (environment) and another. When they are reinforcing the permeability of the spaces, they learn to understand where the spaces are connected—they enter the inner workings of mathematics and geometry. They essentially follow the historical development of mathematical thinking from simple, embodied moments to complex and highly abstract ones.

What matters is that all actions—from concrete to the most abstract—are either directly or indirectly rooted in our body-mind and are coordinated by it. This is a key fact for our research. Later, when we discuss how we lead our students to tactile experience via backward metaphorisation, we draw on the root of abstract thinking in the body-mind, sending the students back to conceptual metaphor and guiding them to the logic of their actions.

Metaphors retain the properties of *gestalt*. It gives them their charm and creative power. No matter how complicated the structure of an effective metaphor, it can always be understood 'at a glance'. This why some metaphors are able to continue pre-forming human thinking for centuries—they are the substrate from which thought and action compositions grow (see 1.2 above). Both ways of structuring the abstract concept of *understanding* (understanding as seeing and as grasping) can be used to illustrate to what degree such structurings can affect our understanding of the world, even though 'in reality' this world has not changed. If *understanding* is structured via the metaphor

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[72] "Consider the metaphor that Numbers Are Points on a Line. Numbers don't have to be conceptualized as points on a line; they are conceptions of number that are not geometric. But the line of numbers is one of the most central concepts in all of mathematics. Analytic geometry would not exist without it, nor would trigonometry. Or take the metaphor that Numbers Are Sets, which is central to the Foundation movement of early-twentieth-century mathematics. We don't have to conceptualize numbers as set. Arithmetics existed over two millennia without this metaphor… But if we do use this metaphor, then the form of reasoning about sets can also apply to numbers." (Lakoff & Nunez, 2000, p. 6).

of *sight* (*seeing*), it has serious consequences for our cognitive theory. In spite of their numerous differences, the dominant medieval cognitive theory (a Thomist variation on Aristotle's idea of taking in a form through the soul's eye) and the early-modern cognitive theory (cognition as a physical object representation register in the mind's internal space) share a whole set of visual metaphors, directed by the basic metaphor of *seeing*. These metaphors eventually cause us to regard cognition as a process, which takes place solely in our minds—whether in the minds of individuals or in a society of minds. In view of the dominance of such visual metaphors it is easy to understand why the result of cognition would be information; i.e. the result of what takes place in the mind and is stored there as a mental object.[73]

Neither the founding metaphor *understanding is seeing* nor the metaphor *understanding is grasping* give any license to the notion that knowledge is the unification of a knowledge field, which is achieved both in the knower's mind and in the outside world. Both metaphors—*understanding is seeing* / *understanding is grasping*—preform knowledge as an object, which is in the first case *seen* by the mind and in the other *grasped* by it. In order to escape the long tradition that both metaphors impose on us, we turn to Dewey's metaphor *understanding is fitting a key in the lock and opening the door*.[74]

Let us summarise the previous paragraphs. In *The Meaning of the Body* (2008, pp. 113–206), Johnson shows how the process of metaphorisation ascends from multimodal image schemas, in which clusters of sensory and motor circuits interconnect. The circuits structure knowledge into *gestalts* of meaning, by doing which they establish concrete concepts. Johnson shows how further metaphorical ascent originates from these concepts and forms *conceptual metaphors*. These metaphorical ascents generate abstract concepts and abstract relations between them. This is how metaphors and clusters of metaphors structure our overall understanding of the world.[75]

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[73] Even when we resist the danger of mental-object psychologism similarly to Bolzano, Frege (see footnote 27 above) or early Husserl (see footnote 19 above), we must invent another world—'a third realm' or 'a transcendental level of meaning' in which there are 'sentences in themselves', meanings, abstract objects and invariants, to which mental objects need to relate in order to be true. *However, this does not transcend the logic of visual metaphor.* We have some *insight* into this realm—whether by the sight of reason (Bolzano, Frege) or via the canvas of our consciousness (Husserl).

[74] Lakoff and Johnson's book *Philosophy in the Flesh* (1999) is dedicated to how Euro-American science and philosophy were derived from these philosophical roots, held captive under the rule of several basic metaphors, preventing us from completing the modern shift and embracing late modernity.

[75] A detailed description of how the unceasing process of metaphorisation structures the world can be found in Lakoff and Johnson's book *Metaphors We Live By* (1980).

Language can be seen as a kind of graveyard for metaphoric meaning[76]. Everyday communication is full of metaphors which are so familiar that we usually fail to notice them. They have lost their non-conventionality. *Conventional metaphors* are metaphors that structure our world without us being aware of their metaphoric origin. We usually do not view them as metaphors, but treat their figurative features as literal denomination. As a result of this invisibility, they deeply affect our understanding of the world by creating the idea that truth conditions are determined by literal language. In fact, it is metaphors that direct the generation of truth conditions as well as the distribution system of resemblances, based on which we can perform metaphorical transfer. Metaphors are rooted in action, below the level of language.

When a non-conventional metaphor enters language, it is because there is a new resemblance system in place, which allows new metaphorisation. This abolishes the original truth condition system and creates a new one. If a figurative reference is registered, it indicates that a non-conventional metaphor has entered the seemingly literal world and stirred up a similar redistribution and made new meaning shifts possible. Most important non-conventional metaphors assume a commonplace position over time and become a part of the everyday metaphorical arsenal through which we understand the world (Lakoff & Johnson, 2003, pp. 153–160).[77] Our understanding of the world is thoroughly metaphorical. The dead metaphors of literal language mark out a field, which a non-conventional metaphor may invade, carrying with it the power of symbol and transforming our understanding of the world.

In the third and last part of *The Meaning of the Body* (2008, pp. 207–283) Johnson proves how abstract thinking, carried and structured by an intricate system of metaphors, participates in the aesthetic grasping of the world, yet how closely this grasping (through metaphor and its dependence on bodily happenings) is confined to the world. The process of metaphorisation is a process of finding the meanings that steer our lives. Johnson uses complex aesthetic forms, such as the most excellent works of poetry, novel writing, painting or music, to actuate his explanation (cf. ibid., p. 209–262). They are plugged into bodily happening and, through it, their subject-matter is determined and later made into a concrete form. Art is only a more refined, more complex and more experienced form of everyday cognitive activity. When Masaryk states that he can tell the character of a nation from its Art (by which he means primarily novels), he is approaching the knowing of such a complex and dynamic phenomenon as a nation in precisely this pragmatist-phenomenological way.

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[76] The idea is that a metaphor enters the system of language and, after some time, it begins to be understood more and more literally. In a sense the metaphor is dying. Language represents "a graveyard" of originally 'live' metaphors.

[77] In Ricoeur's terms such a metaphor undergoes a process of becoming literal. Its status shifts from a 'living metaphor' to a 'dead' one.

The topic of subject-matter and its processing into a concrete form brings us to the relationship between metaphor (figurative thinking, generally) and cognitive activity. *Metaphor is, among other things, a complex means of elevating and expressing the quality of a situation and has principally cognitive character that undoes our previous description of reality and adds an altering element by which it changes the definition of reality (*for more, see below the passage on *reference split).* Metaphor is the expression of intuition, which grasps the quality of a situation and engages cognitive process (concerning the terms situation, quality, intuition, see 1.3.3 above). The main goal of metaphor is to facilitate new understanding of the world around us. This is why we include in it all other figures of speech that bring a polysemous element into the labelling of reality: catachresis, synaesthesia, personification, analogy, synecdoche, antonomasia, hyperbole, litotes, periphrasis, etc. Polysemy is a necessary property for language experimentation and language experimentation is an integral part of introducing new information into an established system of knowledge. Much like conceptual integration, metaphor and polysemy are not primarily a matter of language. When our Palaeolithic inventor of the bow and arrow began using the phrase 'small spear', he shook the semantic stability of the spear and began to practically manipulate the characteristics of his surroundings. The return to the polysemy of signs is a fundamental return to the body, where the sense structure system is formed.

For us, metaphor means elevating and focusing on a certain part of experience, which was not "taken into account" or was not "included in the field of awareness" prior to being introduced to language; however, the situation in which we are finding ourselves requires this process of elevating and focusing. This is why we cannot characterise metaphor as "imprinting a signature" through which a certain structure is transferred (cf. Slavík, Chrz, Štech et al., 2013, pp. 226–230). When a metaphor enters verbal content, it has its motivation—it is determined by its connection to the course of life and its situational needs. However, this motivation does not imply a pre-determined structure to be imprinted. Metaphor elevates the subject-matter of a situation, while a particular expression of the subject-matter is an open-ended affair. We could only view metaphor as 'imprinting a signature' strictly retrospectively. Retrospection views metaphor as a finite structure only once its mission has been concluded, for example, when a metaphor has become a literal part of language and its configuration process has thus ceased, or when we reflectively evaluate the role of a metaphor in terms of the development of an artistic genre (e.g. the narrative structure of a tragedy—cf. ibid., pp. 229–230). According to the authors of *Creating*, the process of using metaphor is subject to a common rule, because the understanding of a metaphorical expression "always requires a certain imaginative procedure to look for said 'common rule'" (cf. ibid. p. 231). However, this common rule is a rule of retrospection. The moment metaphor enters verbal expression there is a change in the rules of determining the meaning of the object, (the properties of which are being transferred), and the meaning of the object receiving these properties; and the common rule is established only after this metaphorisation process has ended.

This is why we propose a metaphor, based on which we should understand *metaphorical understanding. It is the metaphor of a spotlight in a dark space. What is important for this metaphor is a structured space, in which a bright spotlight moves from one part to another, and brings a novel understanding of the space. This new understanding is affected by the movement of the spotlight and by the slowly fading memory of the originally lit part, overlaid by the newly lit part, on which the spotlight has temporarily stopped.*

We move beyond the transitional phase with only a small step, only a small shift in attention, by focusing on the function of language, metaphor, cognition and understanding instead of their structure. Taking this step brings a concentration of consequences resulting in what the dynamic systems theory calls 'leverage effect. Our approach to cognition changes drastically, together with our understanding of how we are involved in the world around us. *This step forces us to understand language as a moving continuity between the literal and poetic mode. The continuity of language is created by the ascent of meanings from bodily actions and processes with their own dynamic regularity. A regularity which may be undergoing constant change, but the very course of this transformation creates an identifying continuity.*

How, then, does metaphor enter language? We are in fact asking about the function of metaphor—what metaphor does with language, what it does with understanding and what it does with our concept of the world. Ricoeur, inspired by Jakobson, answers these questions by naming this function *reference splitting* (cf. Ricoeur, 1977, pp. 259–260). He uses poetry as an example to show the properties of language, which can use metaphor (in a broad sense of the word, as described above) to alter the background on which we unconsciously formulate our order of world understanding. This order influences our conscious grasp of the world. The background determines the area of denotation and determines the definition of entities and their relations. Modelling new entities and relations, or reconstructing old ones, processes complex experience into propositions, and gives the conscious mind the option to consolidate new meanings through changes in language-shared truth conditions.

By 'background' we mean what emerges from the richness of experiential content, which at a given time and under given circumstances favours only some of its potential meanings. We have already made reference to Ricoeur's definition of metaphor in connection with symbol. It is important for both symbol and metaphor that they are carried by surplus of meaning, which by principle cannot be wholly contained in language or consciousness. Both processes (the use of linguistic means for verbal expression and the use of mental means for mental expression) are how a person selectively chooses only some content in a surplus of meanings (cf. Ricoeur, 1997). This is because the conscious mind is far too fragile and unable to operate such bulk of information and relations at once. We noted Lakoff and Johnson's educated guess that the cognitive unconscious may constitute up to 95 % of cognition (cf. Lakoff & Johnson, 1999, pp. 21–26). This is why the dynamic structures of sense enter our consciousness only selectively and always relative to our needs.

The way this happens is by disrupting the synchronicity of the semantic order of language. The splitting process does not sever the reference completely. Reference always denotes something, but the world to which it refers after splitting has a partly *different background* and therefore it is ***partly a different world.*** A *second order denotation*, which has suspended the *first order denotation*, is formed. In other words, metaphorical expression is an actuator, which can suppress the *first order reference*; it is an ability to understand the structure of the situation "in yet another way" than the *first order reference* was permitting so far (cf. Ricoeur, 1977, p. 261).

Ricoeur's book on metaphors presents an idea, which contemporary experts on metaphor accept without difficulty (cf. Faucaunier & Turner, 2008; Kövecses 2010, 2015; Lakoff & Johnson, 2002). However, at the time of the book's first publication (1975, in French), its views on verbal expression and its interpretation created some controversy. For Ricoeur verbal expression and its interpretation are made possible by the fact that they both have an effect on the order of language (i.e. signs that are viewed as synchronous). Verbal expression and its interpretation were also described as having an effect on the discursive act (which uses the order of the language system but, at the same time, alters the conditions of reference because it introduces diachronic motion to the order (i.e. it can split the reference—cf. Ricoeur, 1977, pp. 255–261). Contemporary cognitive linguists refer to 'reference splitting' differently, as *conceptual* integration, at the root of which is *conceptual blending*, etc. (cf. Faucounnier & Turner, 2008; Kövecses, 2010, pp. 269–283; 2015, pp. 16–30). The altered reference conditions are formed by using a metaphor that introduces an element of uncertainty and polysemy into discourse (cf. Zanotto & Palma, 2008, pp. 13–15). An element of polysemy directs our attention towards the basic property of structured experience—towards a surplus of meanings which, in their vastness, cannot be contained by consciousness. We must reduce this oversize content if we wish to consciously describe a given situation, understand it and consciously act in it. Once metaphor and its polysemy enable us to do without literal description, we suddenly have the capacity to understand the world and describe it differently. It is an existential transformation, of which the linguistic garb of metaphor is a mere device.

Ricoeur shows how metaphor *pretends* that it shifts meaning in the *paradigmatic sense* only (i.e. that it changes one predicate value for another, systemically symmetrical one). This *pretence* enables metaphor to enter the order of language. However, after metaphor has entered, it in fact dissolves the background of the description and either puts polysemy in its place or makes room for *reference splitting* (cf. 1977, pp. 76–87). For example, one of our research participants, Alena, began her account of a difficult and unexpected situation like this: "The pupils were…"[78] This kind of sentence

[78] We use this particular example to introduce the metaphorical workings of our students when they are articulating tacit knowledge. Alena is the pseudonym of a student who dealt with disorder in class by fetching the school director. An intervention from outside seemed to be the only possible solution. The student's actions restored the course of the lesson. For the whole process, see Chapter 9.

immediately suggests that the subsequent meaning shift will only take place on the *paradigmatic level*, where the predicate is substituted by another, semiotically equivalent one. For instance, the sentence, *the pupils were well-behaved*, will be replaced by the sentence, *the pupils were distracted*, or the sentence, *the pupils were noisy.* However, when the sentence actually ends with the phrase, 'like a bunch of apes', the whole situation is changed considerably. The complex non-conventional metaphor, *pupils are apes,* effects change on the *syntagmatic level.* This means a level where the conditions of denotation create space for a *reference split*. By identifying humans as animals, the background for the interpretation of the description suddenly changes. Naturally, interpretations may differ according to whether we focus our attention on the meaning of 'noisy', 'distracted', 'disobedient', 'bouncing around', 'undisciplined', etc. However, the metaphor suggests a new, far richer and more complex experience that the sentences *the pupils were distracted* or *the pupils were bouncing around the classroom*, could not give us. The seeking of interpretation does not settle for a one-directional shift from the source domain of the metaphorisation process to the target domain (see below). Pupils (humans) are not commonly identified as apes (animals), and it is therefore necessary to *alternate* between the source and target domain, to and fro, in a cycle inter-domain comparison, until we eventually cull a set of properties, based on which an overall conceptual integration occurs.

Kövecses' well-known example describes a similarly complex process in metaphorical shift in the sentence "this surgeon is a butcher" (cf. 2010, pp. 305–322; 2013). We are going to adapt his explanation to our metaphor, *the pupils are apes*. Kövecses takes inspiration from Fauconnier and Turner (2008) on *conceptual integration* and *mental spaces.* He adds another domain (the *blended domain*) to Lakoff and Johnson's meaning transfer between a *source domain* and *target domain,* and demonstrates its special significance. However, before we move on to the curious process of the blending of meaning (which takes place in all three domains), we must first mention the so-called *generic space*—an overarching space in which we seek the initial similarities, the identification of which begins the metaphorisation process.

The authors of *Creating* also correctly point out that "in order to understand metaphor, it is necessary to acknowledge more complex bundles of meaning" (Slavík, Chrz, Štech et al., 2013, p. 192). One question remains, What internally binds these "bundles of meaning"?. We noted earlier that conventional metaphors direct the determination of truth conditions as well as the distribution of similarities and differences. Similarities then enable metaphorical shifts. As far as conventional metaphors are concerned, metaphorical shifts are no surprise. For example in a poem with the theme of love transforming with advanced age, the last stanza begins, *when again I met her / my head was sprinkled with snow.* The whiteness of snow and the grey hair associated with old age are sometimes metaphorically linked; this is a conventional metaphorical shift, which is why we can read this metaphor with ease—we find it easy to understand. However, the greater the ease of understanding, the more likely we are to read the metaphor superficially. In such cases we focus on the 'intermediary' and on the features that represent it. In this case it is whiteness—of snow and hair.

We analyse the metaphor of *snow-white hair* as the transfer of the property of a season onto a person via the similarity between the whiteness of snow and the whiteness of grey hair. However, if we focus solely on the 'intermediary'; i.e. whiteness, our analysis completely misses the purpose of the metaphor—we do not understand the depth of the reference split and remain solely on the surface. We have adopted the metaphor by way of referencing one of the 'similarities'. However, in a metaphorical shift individual similarities and differences do not matter as much as the whole system that creates these differences and similarities. Moreover, relational nature of the system enables it to transform. This complex process does not depend on one or even a dozen properties, but on a continuum of relationship, allowing specific properties to be selected and emerge as the most prominent in the metaphorical shift. However, behind these most prominent properties lies the whole complex of meaning relations, which cannot be reduced only to the said prominent properties. The first originator of this metaphor blending the whiteness of snow and hair had far deeper and holistic motives. It was essentially a blend of the complex of winter-season properties and the process of ageing, with old age as its outcome.

This complexity was clearer in the above-analysed metaphor *the sun is sowing light*, because we were not limited by a visual similarity; the sun and a sower have no common features, unlike snow and grey hair, where the complexity is represented by the colour white. This is why we could use the metaphor *the sun is sowing light* to illustrate how it sprang from the relation between the meaning domains 'sun and sunshine' and 'farming' and brought a fundamental relationship between these two domains into consciousness. The case of *snow-covered hair* is in fact the same. The key to this is a stage of life in which strength is diminishing and this diminishment shows in the physical property of lacking hair nourishment. The physical aspect corresponds with the mental, as an ageing person is ultimately left with no other choice but accept the loss of strength, embrace the inevitability of eventual demise and the fact that many of the possibilities we had in youth have disappeared forever. They have disappeared like the possibility (which was the theme of the poem) that the protagonist will never have the passionate romantic relationship he longed to have with a certain woman in his youth. On the other hand, advanced age brings other benefits—emotional balance, overview of things, being at peace with life—which are not and cannot be available to a young person, just like they cannot be present in nature concurrent with the budding vitality of its living forces in spring and summertime.

Generic space, where similarities and connections are formed, is vastly broader than the one we have available when we concentrate only on the surface and easily perceptible similarities and differences. Generic space is formed from the complexity of the development of cosmos and its parts—in our case it is determined by the deep-rooted connection between winter and old age. In other above-discussed metaphors this connection is between the slaughter and processing of animals and the practice of surgery

or a similarity between humans and other primates. *Non-conventional metaphor* is always a greater challenge as it forces us to descend much deeper into the complexity of the generic space and transform our existing understanding. Conventional metaphor reassures us and turns our attention to distinct concepts[79] of literal language and their strictly defined meanings. Using these concepts we can easily determine the system of resemblances and differences.

We shall now return to an explanation of metaphorisation in the sentence *The pupils are apes*. A pupil (human) is rarely identified as an ape (animal) even though there are countless close biological and cultural links between human and non-human higher primates. There are shifts taking place in the complexity of these properties. The pupil and ape identities are selectively reduced to such a point that there may be a common area between the two in the blended domain. What matters to us is that this overlap or narrowing down to a few select properties is not at the expense of 'real' properties because *it happens in the creative process of metaphorisation, which determines what is real*. Here, a clear set of similarities would be those features common to humans and other primates alike; e.g. chimpanzees—erect posture, walking on two legs, a special way of grasping objects, a mouth capable of articulating sounds used for communication, etc. Based on these similarities it was possible to relate humans to apes long before any evolutionary relationship has been confirmed by modern biology.

However, the next step of metaphorisation must have been the discovery of some dissimilarity, otherwise the categories of *pupil* and *ape* would be one and thus no metaphoric shift could take place. This dissimilarity is revealed in property comparison, which takes place in the blended domain. Eventually those differences which bear the closest correspondence to the centre of Alena's experience were identified. Alena's account[80] shows that three observations lay at the centre of the metaphoric shift: uncontrolled movement around the classroom (bouncing), yelling and the contrast animal vs. human (portrayed as defenceless *intimidated* by the whole situation—"tiny me"). Let us note that in this case the metaphor, *the pupils are apes*, is structured by another metaphor, *the pupils are wild animals*. It is a complex, double metaphor. The second metaphor (*wild animals*) indicates what negative differences between pupils and apes are metaphorically elevated. The metaphorisation is making use of established and shared ideas that structure the counterpoles animal vs. human, nature vs. culture, instinct vs. self-control, as well as the tactile experience (gained for example during a visit to the zoo or from watching a documentary on chimpanzees) of ape-ish communication through articulated sounds such as yells, shrieks and spontaneous leaps.

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[79] For more on *distinct concepts*, see below.

[80] *... They* [the pupils] *were just all over the place, like apes, they were bouncing up and down and yelling and then there was just a tiny me in the middle of all this, surrounded by these wild animals...* (excerpt from a transcript of Interview #4 with Alena).

The important thing is that the similarities and differences were already present in Alena's consciousness before the metaphorisation began. They were narrowed and identified only during the metaphorisation process. A pre-determined structure of experience suddenly came into contact with Alena's need to express a new experience, This contact and the perception that the literal language was insufficient ('the pupils were all over the place', 'the pupils were bouncing up and down', 'the pupils were yelling') was the reason why metaphorisation was initiated. Because established cultural patterns and pre-knowledge had seeped into the metaphorisation process, the subsequent step involves identification of the difference between us (humans) and them (apes) as the incapability of restraint and rational (i.e. cultivated, coherent, disciplined) speech—see Figure 2 below. This inability is precisely the impulse that determines metaphorical shift of source-domain meanings. Apes are undisciplined, incapable of speech, and they jump around without purpose or coordination. In reality, this is not so—non-human primate communication is substantially articulated and their movements are expressive of needs and thoughts. The incapability thus also transforms the metaphoric shift of meanings in the target area. Real pupils are disciplined, they do not leave their assigned space, they do not move around the classroom without being told to and they can give answers when asked questions or communicate with classmates when instructed. However, even this understanding is not entirely true; a description of this kind is approaching the Herbartian ideal, rather than what constitutes modern teaching. Nevertheless, it is this focus and ascent that enables Alena to articulate her experience, come to terms with her partial failure and consider changes for future action.

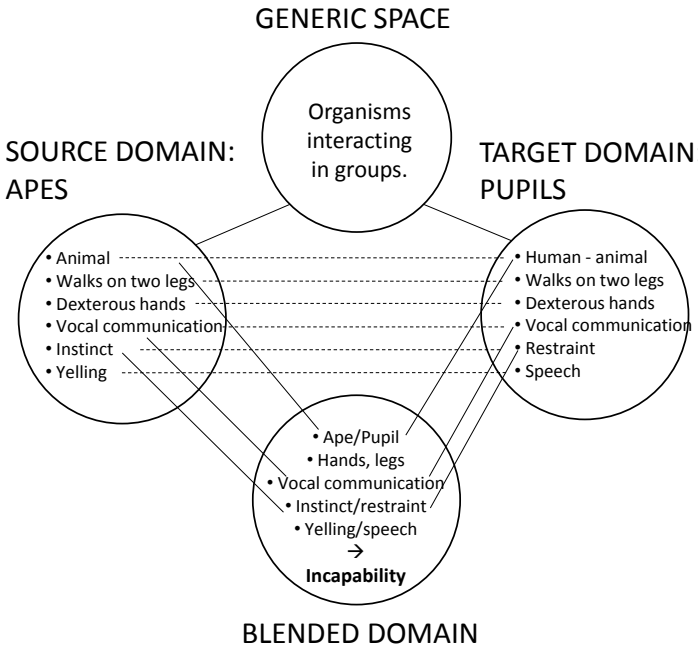

Figure 2. Complexity of transfer between all domains of metaphorisation.

During these steps (identification of resemblance, identification of difference, culturally determined interpretation of resemblances and differences, adjustments of the meaning of the target as well as the source domain)[81] we are constantly alternating between the target and blended domain and between the source and blended domain, while this alternation facilitates the original switching from the source to the target domain and back. During these switches, resemblances and differences are identified and meanings are compared and 'overlaid'.

More than the authors of *Creating* (cf. Slavík, Chrz, Štech et al., 2013, pp. 192–194) we emphasise dynamism and process because metaphorisation is never really completed; every structure is constantly giving way to another, (more or less) different structure. Or in other words, this process never 'freezes' in some finished structure. Structure appears only *ex post* in conscious reflection. Therefore, it is clear that we can no longer simply call areas 'target' or 'source' or 'blended' (this is only a scaffold we use to support our explanation) because their meaning is realised and solidified in mutual relation and tension. When metaphorisation is happening, so does what Ricoeur called "suspending of first-order reference" (cf. Ricoeur, 1977, p. 261). In our case the first order is as follows: there are people/pupils and there are apes. Then, the 'second order reference appears: people/pupils are cultivated, disciplined, they sit in their places and speak well and 'rationally'; apes are savage, undisciplined, their movements make no sense and they yell. The world around us is interpreted precisely in such cascades of reference suspensions and transformations. Thus, we are not presented with a prearranged world with an unchanging structure, which, incidentally, was a necessary existential condition for objectivist realism.

1.3.5 Metaphorisation, phenomenological analysis and development of the metaphorical landscape

By the process of metaphorisation we mean a process enabling complex transformation of understanding (as outlined above). For our theoretical purposes we distinguish two types: *literalising metaphorisation* and *backward metaphorisation*.

Literalising metaphorisation denotes our ability to unconsciously choose the content focus of our experience in relation to our goals and making it clearer by elevating it to our consciousness. This is precisely the moment Dewey had in mind when he defined situation as a clearly-defined complexity, with its own quality. This quality guides the cognitive process of schematisation. The schematisation of a situation marks the beginning of the capturing of our complex experience, while its situation quality is what determines how we are to lead the schematisation process (see 1.3.3 above). Conceptual metaphor can fit the selected content into a word or a phrase and thus transport it to a level where it can be included in verbal expression (1.3.4). Further reduction of the surplus of

[81] This is in fact a simplification in the sense that it does not take place in 'steps' but rather in parallel and very rapid processes, forming the skeleton of the metaphorisation process.

meaning can bring conceptual metaphor to full lateralisation, in which the meanings of words become entirely definite, easily able to be defined and articulated, and they lose direct contact with the rich, embodied origin of the content of experience. In this book we refer to these literalised language units as *distinct concepts.* Distinct concepts are 'distinct' because they have clearly defined boundaries of meaning—Descartes would call them "clear and distinct". In this way we point to their radical separation. The more clearly a concept is defined, the narrower and more distinct its meaning, and the more detached from the complexity of its embodiment it becomes.

We are only able to actualise some of the potential meanings, which we attempt to illustrate in Figure 3.

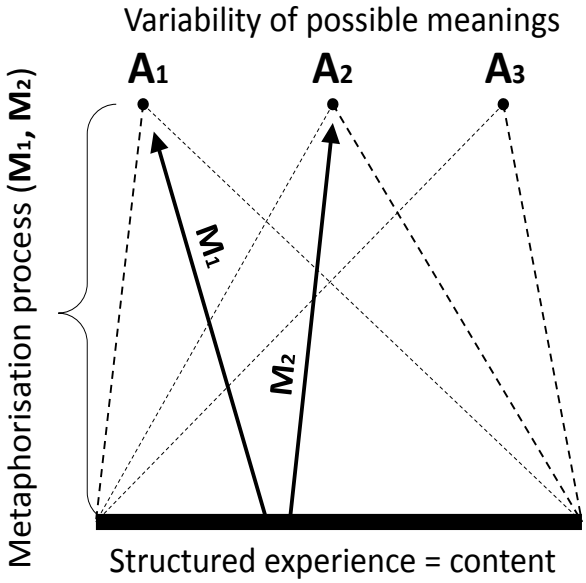

Figure 3. Process of literalising metaphorisation.

The common base of all the triangles represents the content of structured experience. The triangles represent various actualisations of the situation's *subject-matter,* allowed by the given structured experience. The triangular shape suggests the content reduction starting at the base (full content) and via conceptual metaphors moving up to the apexes (A1–A3), which symbolise the literal meanings of distinct concepts. Contrary to their predecessors (conceptual metaphors) literal meanings are not connected with other possible meanings via embodiment. At the end of the literalising metaphorisation process, the apexes of the triangle appear to be completely dissimilar and bear only a vague relation to each other. We demonstrate this with apexes A1 and A2, which originally emerged from the same content of experience, but at the end of metaphorisation M1 and M2 they appear completely unrelated.

This seemingly complete dissimilarity or only loose relationship of literal concepts suggests the idea that language is a system of naming that labels discrete and positively accountable features of reality. This is why we perceive concepts as easily discernible units and assume that the world around us consists of equally discernible units as well. This explains our tendencies to overestimate various expressions of neo-positivism and incline towards atomist thought. We are 'blinding' ourselves to the complexity and continuity of meanings, their connection with bodily experience as well as possible alternatives which offer non-actualised meanings of experience content.

Since we seek meaning in syntagmatic (horizontal) relations of language or symbolic calculi (and we neglect the vertical dimension where meanings emerge from lived experience), we have a tendency to perceive the figurative description of reality as imperfect, requiring rigorous description in the subsequent step. The overvaluation of horizontal relationships also explains why structuralism was the dominant intellectual movement in linguistics, literary science, anthropology or philosophy[82] since mid-19th century until mid- to late 20th century. This systemic tendency towards structuralist thought was the last early-modern response to the 19th century discovery of the significance of time; e.g. in Hegelianism and evolutionism (cf. Foucault, 2000; how the discovery of temporality influenced the dissolution of the idea of representation as a scientific categorising principle).[83] With time, however, the structuralist movement itself started granting recognition to some of its members who, in addition to structure, started to emphasise the history of changes in the said structure (Jacobson, Vygotsky, Piaget, Bachtin, Lacan, Foucault, Derrida, Barthez). Contemporary emphasis on the body and function is another chapter, when a finite structure gives way to a flux line; to a dynamic structure and constant re/configuration of life.

We can rediscover the horizontal level by returning to conceptual metaphors because they bring a particular segment of embodied, structured experience into verbal expression. They are expressible signs (words or phrases), but their definitions are still open enough so that their embodied—tacit—background does not disappear completely. As a result of the link with the tacit bodily background, the users of conceptual metaphors remain in a psychoactive state in which they group together the meanings of concepts with an experiential background; with experience content, including its non-actualised parts. *The experiential background holds the logic of the structure of experience. Because we are not able to consciously grasp the entire experiential background, we must focus only on one part of it, which is relevant for the present situation at the present time.* It is conceptual metaphors that allow us to consciously address

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[82] From Sassure's structuralism, via the structuralism of Russian formalism and the Prague linguistic circle, all the way to the anthropological, religionist and philosophical structuralism of Lévi-Strauss and Dumézil or the linguistic emphasis on the structural approach to teaching foreign languages.

[83] In this context we could understand the origin of post-analytical structuralism as an attempt to preserve the superiority of the permanent over the impermanent.

our experience and speak about it, but it does not limit us to finite and rigid concepts of literal expression. Conceptual metaphor is midway between structured experience (too vast to comprehend) and literal concepts (which lack the internal logic of the complexity of experience). Language order (the organisation of which is determined by a synchronous organisation of signs with relatively stable semantics) intersects on the level of conceptual metaphors with the discursive act (which introduces diachronic events into the structure and semantics of language, and results in reference split; see above passages on Ricoeur's conception of metaphor—1.3.4).

We make use of these conceptual metaphors during the process of the so-called *backward metaphorisation*. The root of the process lies in the use of various techniques—in our case mostly Clean Language—*either only to support or to generate research participants' metaphorical expressions*. It is worth noting here that we cannot concentrate only on non-conventional metaphors, which are surprising and easily noticed. We must also focus on those less obvious, such as *to patch up* (a lesson with something) or *to stuff* (something in the minds of pupils). We must notice also the so-called 'dead metaphors'—i.e. seemingly literal concepts, because even they provide trails and clues as to how experience was structured by the original metaphorical shift, which had transformed (seemingly) into literal description. Backward metaphorisation allows us to abandon the dogma that divides literal and figurative language because it leads us to the metaphorical background on which experience was structured.

Moreover, backward metaphorisation is beneficial especially when students appear to be reflecting upon their activities yet teaching in a superficial way. They often produce empty descriptions using professional vocabulary, which they have learned during lectures on teaching methodology; however, it is completely detached from their professional and personal experience. This prevents them from understanding what was actually happening in the classroom situation they are describing. A lack of understanding then hinders situational analysis and, without analysis, students are unable to seek an alternative solution through means other than trial and error. Supporting or directly generating metaphorical expression guides the students through the reverse process (starting with ineffective literal concepts and descending down the chain of meanings contained in conceptual metaphor), i.e. against the course of the original literalising metaphorisation. Literalising metaphorisation becomes literal language in which they receive instruction during courses and in which terminology is conveyed. The process of backward metaphorisation brings them back from distinct concepts to conceptual metaphors.

This return enables students to connect their reflection with an experience content, on which they are yet to *capitalise*[84] as it is as yet unavailable to literal language. Backward metaphorisation guides them from sharp concepts to conceptual metaphors. Most conceptual metaphors, which were key for our research, are in one way or another related to kinaesthetic experiences—*freeze*, *flow* (of energy). This embodied nature of events is in close relationship with somatic experiences taking place in a given classroom situation.

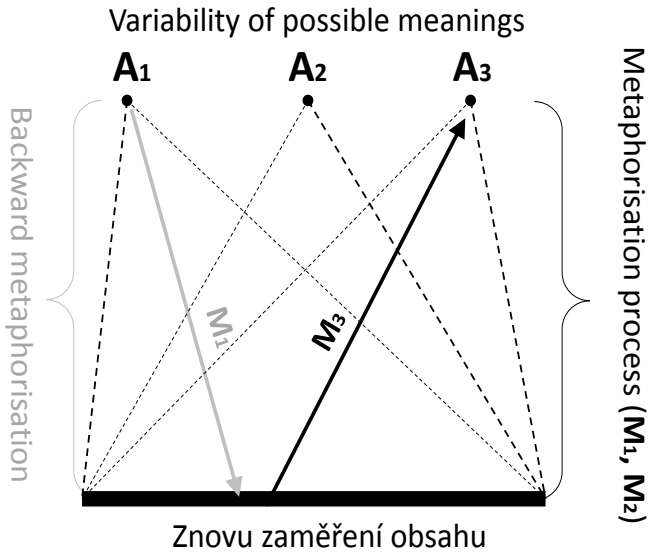

Figure 4. Process of backward metaphorisation.

Figure 4 also with a triangle base, represents experience content and the potential of its meanings. The apexes represent possible distinct concepts with literal meaning. Figure 3 shows the actualisation of the meanings of concepts A1 and A2. Figure 4 confronts us with a situation where the meaning of A1 is part of a superficial description, which is of little use in the student's analysis of a past situation. The process of backward metaphorisation guides the student from literal meaning to conceptual metaphor and deeper (grey arrow M1). In this *environment* of bodily experience, the triangles of possible actualisations overlap. This is a symbolic communication of the fact that the content of experience is a continuous dynamic field where meanings—actual and potential—are

[84] The metaphor of *capitalising* is what Alena used in later interviews when she tried to specify how unexpected situations can be beneficial. *Capitalising* on this experience meant gaining the ability to use the situation for action which was not planned, but it also meant learning how to act in similar moments in the future. She spoke about capitalising during later research when she entered deep self-reflection (partly thanks to reflective interviews), which brought in activity and self-confidence. This is why unexpected situations ceased to be a source of stress and danger for her but became a *capitalisation opportunity* (see Chapter 8).

inherently related, have a certain experiential structure and thereby determine logic. On this level, which conceptual metaphor has *made apparent*, students experience the logic of experience content and are able to *refocus* the experiential content and actualise a different meaning (black arrow M3 pointing to A3). Together with the actualisation of the new meaning, students are becoming aware of the relationship between A1 and A3.

In fact, they do more than that. They experience (though not quite consciously) the relationship among many other actual and potential meanings because the closer they approach the triangle base (embodied background of what is being experienced), the closer they are to the dynamic structure of experience. The content of experience forms a part of this order which is why it is unavailable to the conscious mind. The more clearly students can grasp the meaning of A3 and develop it into a more literal meaning (thereby making the concept with the A3 meaning more distinct from other meanings), the more other parts of the content of their experience *retract inward* and *become invisible* to consciousness. This is because the conscious mind is incapable of containing so much information. This is why concepts become independent and appear only as points (atoms), which represent seemingly equally separate parts of the surrounding reality and their and relationships (also atoms). If we consider this phase the root of cognition, then we completely disregard the dynamic structure of our lives that precedes us and makes our action and thought possible.

Metaphorisation is a complex process. We cannot disassemble metaphor into atoms and then reassemble it part by part, to learn the meaning of the whole. This is another counter-intuitive moment for our early-modern instinct. A dynamic structure can be understood as a finite structure with a clearly defined 'common rule' only when it consists of distinct parts and these parts are distinctly related (cf. e.g. Slavík, Chrz, Štech et al., 2013, pp. 49–50 or 100). However, a dynamic structure can be viewed in this way only through reflection. The idea of 'source' and 'target' domains, (which supposedly provide some structure) are a form of experimental and didactic simplification. The complexity of the relationship between domains does not allow us to understand metaphor as a mere rhetorical figure or as imprinting a signature of a pre-set structure. This is because it permeates the entirety of discourse and more or less transforms the background on the basis of which we define the truth conditions in the area of metaphorical shift, as well as in other parts of discourse. Metaphors change the orders of reference.

This complexity does not allow us to work with metaphor atomistically, i.e. by disassembling it into less complex metaphors (e.g. primary ones) and then compiling an overall description of the complex structure of experience from the meanings of less complex metaphors. If the individual elements of the metaphorisation process (pupils, apes) become part of a complex metaphor (*the pupils are apes*), then the whole meaning of the metaphor splits the reference, changes the rules of denotation and creates a 'different world to which we make reference'. The whole meaning thus redefines the meaning background of the original element. In our example the 'second order of

reference' causes the pupils to be understood *a priori* as cultivated people and any deviation from this becomes a deviation from the definition of the concept of a pupil. This definition is also ontologically constraining. To be a pupil means to be cultivated or to be brought up to be cultivated; to be a teacher means in turn to guide pupils out of the savagery of their animal (ape-ish) state.

In other words, after metaphorical elements have become engaged in a complex metaphor, there is no returning to the original meanings of these elements. It may sound paradoxical but it explains completely common life situations. After a person has first been cheated, the world changes forever—even though the extension of most concepts is unchanged. However, what does change is the intension of the concepts: the world is a place where I can be cheated. Person A is a person who cheated me and can cheat me again, and other people can cheat me just as person A has. It is similar in other situations as well—in a situation where a person has their first sexual experience, when a person first drinks alcohol. It could be a situation in which we stop defining movement through the Aristotelian concept of *entelecheia* (i.e. as the effort to actualise one of the potential options, which pertain to that particular object by nature) and begin understanding it as relationships between differently-sized material objects.[85] These massive shifts in understanding are so common that we do not fully realise their impact and it is also for this reason that they are not given much weight in early-modern cognitive theory and why the transitional phase limits them to 'classification under a common rule' or 'reassembling a whole structure from small parts using a common rule'.

Regarding this topic of the complexity of metaphorical structuring, it might seem that the route to the dynamic structure of experience is sealed away forever. On the one hand, we cannot understand metaphorisation by disassembly into atoms, on the other, we cannot view this dynamic structure as a single whole because the complexity of its content is far beyond the capacities of human consciousness or reflection. The fact that we cannot disassemble it into smaller parts without any loss of meaning also means that we cannot view it as a complete and finite structure. However, the metaphorisation process helps us find more stable logical ties that are mirrored in the individual parts, the so-called *metaphorical landscapes* (ML). In this book we understand metaphorical landscape as the logic present in a segment of a complex dynamic structure, which emerges in the organisation of interconnected metaphors. We can imagine a metaphorical landscape as a dynamic (i.e. perpetually changing) map which shows the structuring of experience.

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[85] In this last case we characterise a precondition for the Newtonian universe. It was made possible by intensional as well as extensional changes. This is because it was limited by the number of things that can move—the fruiting of a flower was not considered motion but a change in quality. However, in a similar case (understanding the process of combustion) the change was strictly extensional. When this process began to be explained as oxidation and not as the assumed presence of a substance called 'phlogiston', this change was strictly intensional. The fact of burning objects remained extensionally the same.

However, we do not base this map on the literal language of distinct concepts, but on a network of inter-metaphor relations that can capture the dynamically developing structure of experience. Because we do not focus on distinct concepts but rather on the relationship between metaphors, we allow the dynamics of structuring to manifest itself. Still, this approach is able to capture *gestalts* of experiences and actions appearing over a long time, which can help us, researchers as well as students, to navigate the experience being examined. During our research we assisted the students with developing ML by stimulated interviewing using the technique known as *Clean Language*. We chose Clean Language mainly because it is not merely an interviewing technique. It is a whole underlying analytical approach which is phenomenological in nature.

As noted above, we cannot access the dynamic structure of experience or tacit knowledge using traditional post-positivist methodology, which is: 1) deconstruction of the complexity of experience into atoms and 2) their idealisation, which transforms the atoms into 'positive' facts. This is also connected with all four levels of the knowledge field—interaction, body, external world and information. These are in constant motion and any change to one of them also transforms the other three. This results in voiding the correspondence theory of truth and cognition.

The method of *Clean Language* is discussed later in Chapter 3. Here, we shall only make a few philosophical and theoretical points about the method so as to connect it with the previous description of knowledge, figurative language and metaphor. Clean Language interviewing is an elegant yet surprisingly efficient way of making the basic step of phenomenological research; i.e. *phenomenological reduction*. Other phenomenological research methods require this reduction to be made only imperfectly via repeated reading and reflection of one's own experience with the topic—e.g. during Interpretative Phenomenological Analysis (IPA—cf. Eatough & Smith, 2009). Or it can be achieved during Meaning Constitution Analysis (MCA) after relatively complicated work with the research text using the software Minerva (cf. Sages, 2003). Unlike other analytical phenomenological approaches, which place phenomenological reduction at the beginning of data analysis, Clean Language does so during data collection. This method achieves phenomenological reduction by way of asking questions. The principle of the method is asking so-called *clean questions*. The goal of such interviewing is to have the interviewer work with words, sentence structures and metaphors used by the interviewee and allow the interviewee to articulate relationships, which represent the logical structure of his or her experience (cf. Tosey, Lawley, & Meese, 2014).

Phenomenological reduction generally removes the crust of traditional interpretation and allows the sense structures of action to become apparent.[86] The initial abandonment of traditional interpretation enables researchers to 'see' how an interviewee's experience is actually structured. If we manage to cleanly induce the process of backward metaphorisation in students, we reach a state where the interviewee's descriptions are not forced by the interviewer's questions and thus the interviewee is able to develop the structure of his or her metaphorical landscape. By developing ML we reactivate the basic elements of the structure of experience and highlight the relationships in it.

Figure 5 illustrates the process of attributing meaning to events and the perpetual structuring of experience. However, we must stress in advance that it is greatly simplified because, in reality, there is no bottom map (experience) and top map (metaphorical landscape and its development). Developing the ML and its explication takes place in the same experience in which we experience the world and form our knowledge. This is why there is a constant hermeneutic circle of interpretation at work between asubjective experience[87] and logic.[88]

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[86] These are not only structures of perception but structures of the sense of action. Naturally, structures of perception are connected with action through the mechanisms of the *cognitive unconscious*—perception was formed in a fundamental relationship with action (for details, see 1.3.4 above). However, the result of action determines whether any perception is appropriate or whether a goal was reached—whether knowledge was gained. Thus, action has a more complex structure and is a condition for gaining knowledge (see 1.3.3 above). Our phenomenological approach has symbolically brought us from Husserl to Merleau-Ponty and Barbaras.

[87] For details on the asubjective nature of experience, see footnote 19.

[88] At this point we must differentiate between two meanings for the word 'interpretation'. Earlier we spoke about "suppressing traditional interpretation". By this we meant interpretations that a researcher could have brought into the research process, while being influenced by traditional notions and thus his or her traditional positivist and post-positivist interpretations could deaden the meaning of the logical structure of ML being developed. Here we discuss interpretation that is taking place constantly in the process of structuring experience, between metaphorically appearing logic and the dynamic structure of experience itself.

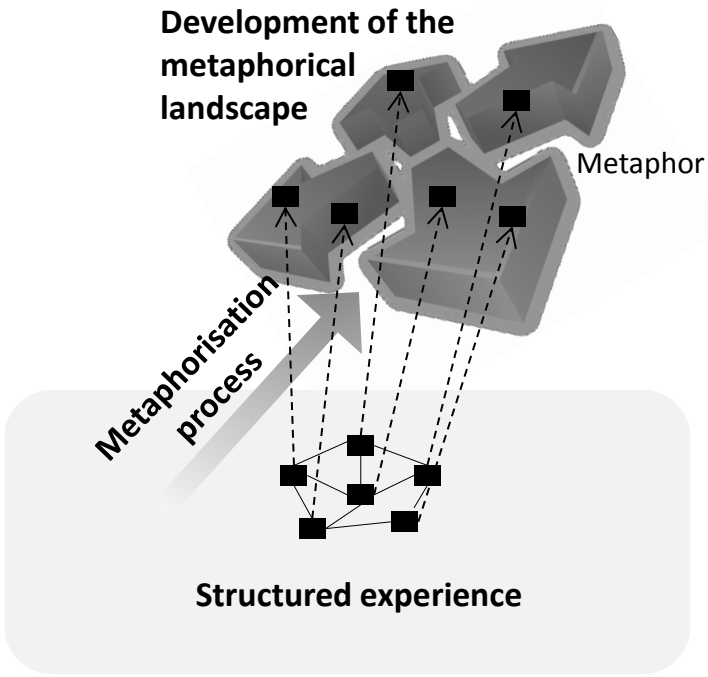

Figure 5. Development of ML and its inherent logical experiential structures.

Figure 5 can be described as follows: the metaphorisation process refocuses the content of experience and newly elevates a different focus, thereby *shedding light* on experience in a way determined by the dominant emotional mapping of the corresponding segment of structured experience in the given situation. This is how a focus is selected, which determines the process of reducing the meanings of a situation, and leads to a certain metaphor or system of metaphors. However, this metaphor (system of metaphors) is formed on a broader background and contains logic of a substantially wider segment of experience than that in the focus of metaphorisation. When ML is developed, so are the logical structures of experience with respect to the perspective of the focus in question. The objects (black rectangles) in the upper part of the diagram (where ML is developed) represent important nodes of experience between which logical relationships appear. Although these nodes are mostly expressed by metaphor as well, their relations are not accidental and they bear clues as to how the part of experience has been structured, how the student accesses it on the tacit level and how it appears in his or her consciousness. The diagrams shows this with arrows which point back into structured experience in which these nodes and their relationships are projected. It is here that we can see the consequence of the didactic simplification of the diagram, because the development of ML and the projection of the logical structure into experience is in fact taking place in experience itself. This has very important consequences, as the clarification of ML logic influences future structurings. We observed this in some of our students—the moment the system of metaphors allowed

them to describe a past situation, they were suddenly able to think about this situation in a more structured way, or (if they were more skilled in self-reflection) were able to begin analysing the situation.

The thick lines between the projected nodes (the black rectangles in the bottom area) represent logical relationships. These lines symbolise the structure being sought. Even though (or rather because) it is not a Classical representation, this structure informs us about the situation and thus about possible action as well. The newly-found structure of the meaning of the situation is dynamic; it changes according to circumstances. We do not use distinct concepts here, but open concepts (i.e. concepts approaching conceptual metaphor), or conceptual metaphors themselves. Because of this we can better react to meaning shifts, refocusings and restructuring of experience. On the other hand, experience is continuous, by principle, and thus the basic relationships do not change, or only in exceptional cases.

The relationships surfacing in ML are not accidental; they have their inherent logic which springs from the structure. It is as a result of this logic that we gain a reference object that can demonstrate whether a student's actions were motivated by a further unspecified, consciously unarticulated goal and if so, whether the student has made progress towards this goal or not. If so, tacit knowledge was involved in the student's actions and appropriately, i.e. skilfully, guided them. Subsequent discussion involving ML and other motivations, of which the student is not fully aware, can make these much more easily and accurately articulable. This brings us to the topic of grasping TK and making it explicit. In an ideal case we could identify TK in a different way than detecting the involvement of TK and its possible accumulation and sharing on the basis of negative definition, i.e. little or no awareness of the situation, inability to articulate the situation. We could detect TK by comparing the inherent logic emerging in a developed ML with the results and consequences of students' actions in a given situation.

1.4 Coda of Chapter 1

In order to be able to study TK at all, we have had to make a major theoretical detour, and we ourselves were dramatically transformed on this journey. If we could have used our new knowledge during the formulation of our research goals, we would not have placed knowledge and tacit knowledge in a dichotomy. There is continuity between knowledge and tacit knowledge, the extremes of which—completely explicit and completely tacit knowledge—do not in fact exist. There is no completely explicit knowledge, because the knowledge field is in perpetual motion, just as there is no wholly tacit knowledge (i.e. knowledge showing no signs of its existence) because, by definition, knowledge leaves traces. Action leads us to our goal and each reaching of a goal, or failing to do so, leaves a trace. These traces become information for future continuation of the cognitive process.

Similarly, there is no completely literal concept because it bears its history of prior non-conventional figurative expression, which today exists as a 'dead' metaphor. There is also no metaphor which would not make use of the system of literal concepts. All these four extremes (absolutely explicit knowledge, absolutely tacit knowledge, absolutely literal concept and absolutely non-literal metaphor) are in fact non-existent extrapolations of intermediate stages of continuous transition. These extrapolations are imposed on us by our language, which has long been under the influence of early modernity—under the influence of its tendency towards epistemological atomism.

This fact had us assume a non-conformist position. When we formulated our grant project, we did not realise how far behind we would have to leave our initial ideas about the nature of knowledge and tacit knowledge. If we now attempt to answer the research questions we formulated at the beginning of the project, and which are an integral part of our project, we often find that we cannot be as thorough in our research as would be fitting. This is why our monograph travels the scale from the transitional phase to the ideal type of late modernity. Still, we consider our work a breakthrough; a gate that provides access to all the areas which are bound to become increasingly more crucial for education and didactics.

It seems appropriate to save the last word for the authors of *Creating*, whose work we critiqued and contrasted with ours, in order to more clearly define the consequences of late-modern thought. Despite our differences, we reach common ground in our mutual interest in students and teachers. We share a common professional goal—to educate excellent teachers. This is what connects and binds us, because *intuitions without shared structures are not communal and structures without experiential motion are dead*.

Second Chapter

METAPHOR, EMBODIMENT AND TACIT LEARNING

James Lawley

This chapter concentrates on a subset of the field of embodied cognition: *embodied metaphor*. It examines a variety of ways metaphors can be embodied and the links with tacit learning.

2.1 What do we mean by embodied?

Embodiment means different things to different people. It can be as general as the Santiago Theory of Cognition which states boldly, 'All knowing is doing' (Maturana & Varela, 1992, p.26) or it can be as specific as the view that the human conceptual system involves sensorimotor simulations in the brain's modality-specific systems (Barsalou, 1999).

Regardless of definition, *embodiment* is based on the notion that the brain, body and environment are dynamically coupled and that they influence each other. In other words, they exhibit self-organisation and emergent processes on multiple levels which involve both upward and downward causation (Thompson & Varela, 2001). This has led to the systematic study of language-mind-body-environment correspondences and in particular how abstract thought is grounded in embodied experience. No one maintains that embodiment is the single foundation for all thought and language; rather, experimental studies increasingly indicate that people's recurring embodied experiences often play a role in how they tacitly make sense of the world (Wilson & Gibbs, 2007).

2.2 What are embodied metaphors?

In 1980 Lakoff and Johnson put forward the then radical view that much of our language and many of our conceptions are fundamentally metaphorical and affect the ways in which we perceive, think and act. Reality itself, is defined by metaphor. Furthermore they state, 'metaphorical thought is unavoidable, ubiquitous, and mostly unconscious' (Lakoff & Johnson, 2003, p. 272).

Although the evidence is mixed, a number of neuroimaging studies have reported somatotopic motor activity associated with action metaphors or idioms. In addition,

> "MRI studies that asked participants to read sentences with tactile metaphors (e.g. she had a rough day) or non-tactile control sentences (e.g. she had a bad day), and taste metaphors (e.g. she looked at him sweetly) or non-gustatory paraphrases (e.g. she looked at him kindly) found that sentences with tactile and taste metaphors elicited more activity in areas of the brain known to be active during tactile and gustatory perception" (Casasanto & Gijssels, 2015, p. 333).

Casasanto and Gijssels' recent review of the neurological evidence concludes,

> "There is strong evidence that people think in mental metaphors, and strong evidence that some of our thinking is embodied. But there is very little evidence that mental metaphors are embodied in [the Barsalou sense of] modality-specific simulations." (2015, p. 334)

This may be because neuroscientists do not yet have the means of making the required distinctions or it may be, as Oliver Sacks points out, that 'there is increasing evidence for the extraordinarily rich interconnectedness and interactions of the sensory areas of the brain, and the difficulty, therefore, of saying that anything is purely visual or purely auditory, or purely anything' (Sacks 2010, pp. 237–8).

Neurological studies may be considered the premier kind of evidence of embodiment but only if neurology is privileged over other forms discussed in this chapter. From a practitioner and qualitative researcher's viewpoint, cognition in general and metaphor in particular can be regarded as embodied in ways other than neurological. When they are, a much richer vista opens up. What follows is a description of four ways metaphors can be considered embodied: linguistically, psychologically, physiologically and materially.

2.3 Language: Metaphors embody the abstract in the physical domain

Lakoff and Johnson's seminal definition, "The essence of metaphor is understanding and experiencing one kind of thing in terms of another" (1980, p.5) wisely does not specify the vehicle by which metaphors are expressed. Commonly the 'one kind of thing' is relatively more abstract than the 'other' (the metaphor). Most metaphors use terms from the physiological-material domain as a source for descriptions and explanations of more abstract ideas. Kovecses (2002) counted the source domains used as the basis for everyday metaphors in metaphor dictionaries and research literature. He found that the most common were:

- The human body (including health and illness).
- Living things (e.g. animals, plants).
- People-made things (e.g. buildings, machines, tools).
- Human activities (e.g. games, sport, war, money, cooking, food).
- The environment (e.g. heat, cold, light, darkness).
- Physics (e.g. space, forces, movement, direction).

Thus, relatively abstract and complex ideas are, by metaphorical extension, typically *embodied* in the words for the experiences we are most familiar with: human and animal bodies, things, the environment, and the ways these operate.

Research in various contexts (psychotherapeutic interviews, essays and TV debates) suggests people commonly use around six metaphors a minute (Tosey, Sullivan & Meyer, 2013). While the speaker, listener, writer or reader will be aware of the words used, much of their metaphorical nature will be out of awareness.

2.4 Psychology: Mental metaphors have form

Although the metaphorical content of language is evident, this does not necessarily mean that 'Metaphors as linguistic expressions are possible precisely because they are metaphors in a person's conceptual system' (Lakoff & Johnson, 1980, p.6). While there is, as ever, some ambiguity interpreting the results, recent empirical evidence by cognitive scientists is seen to largely address this concern. For example:

> "We think about time using spatial linear and three-dimensional representations that linguistic metaphors imply" (Ramscar, Matlock & Boroditsky, 2009).
>
> "When people see words presented closer together in space, they judge them to be 'closer' in meaning" (Casasanto, 2008).
>
> "Experiments based on the metaphor of feeling 'warm' or 'cold' towards someone indicates a systemic interdependence between language, perception and social proximity" (IJzerman & Semin, 2009).

Recent literature reviews suggest there is now abundant evidence that people think in mental metaphors and that metaphors structure our thoughts, feelings and choices (Carpenter, 2010; Casasanto & Gijssels, 2015; Gibbs, Lima & Francozo, 2004).

As noted above, metaphors are typically drawn from our understanding of the world (human and animal bodies, things, the environment) and the way it operates. When we represent these in our mind, the symbols that constitute metaphors have a size, shape, colour, texture, temperature, sensation, behaviour, rhythm, tone, etc. (Gordon, 1978). Counselling psychologist David Grove demonstrated throughout 25 years of clinical work that, when a therapist's metaphors are eliminated by the use of Clean Language, people provide their own rich and idiosyncratic descriptions of their internal experience, using visual, auditory, tactile and proprioceptive metaphors (Grove & Panzer, 1989; Lawley & Tompkins, 2000).

2.5 Physiology: The body can be a metaphor

Research demonstrates that our ability to perceive things and events is closely related to our own tacit movements (Gibbs & de Macedo, 2010). Johnson (1987) suggests our reality is shaped by the patterns of our bodily movements since the mind uses the body to make sense of abstract and complex concepts, and it does so largely through metaphorical projection of 'image schema' such as Containment, Source-Path-Goal, Blockage, Compulsion, Balance.

McNeill (2008) argues that gesture—metaphoric gesture, in particular—is an indispensable part of speech, and that gestures have meanings of their own that do not depend on words: "In a metaphoric gesture, an abstract meaning is presented as form and/or space … The gestures provide imagery for the non-imageable" (McNeil 2008 p. 45). Thus the body itself can be used as a means of metaphoric expression through gestures, posture and proprioception. Nonverbal metaphor is often used concurrently with verbal metaphor but, unlike words, it can provide for multiple simultaneous expressions, sometimes apparently conflicting with what is said (Lawley & Tompkins, 2000).

Carpenter (2010) poses the question, "If bodily states infiltrate cognition so often, why are we so seldom aware of this phenomenon?", to which she answers, "Sometimes our physical sensations and movements are probably too fleeting or trivial for us to notice their effect on our mental lives". 'Too fleeting' maybe, but 'too trivial'? A simpler explanation is that we do not need to be consciously aware; tacit awareness is sufficient in most cases. There is no need to equate lack of awareness with triviality. Except in extreme circumstances, evolution has left us with almost no awareness of the near continuous movement of the soft muscles around our intestines—hardly a trivial matter. A limited attention demands selective noticing.

As Geary (2012) points out, if our bodies were different, our metaphors would be different.

2.6 Material: Metaphors can be physicalised

There are numerous ways in which metaphors can be consciously embodied in the physical world. They may be drawn, painted, written, sculpted, constructed out of Lego and recorded as sounds, to name but a few. Once a material metaphor is created it has an existence separate from its creator. One of the most common material metaphors—so common we are apt to forget it is a metaphor—is the computer *desktop* with its *files*, *folders*, *trash* and so on.

When people are asked to physically represent abstract concepts they often use metaphor since abstractions are formless and disembodied and therefore difficult to depict. When internal representations are externalised the creation of a material metaphor establishes a feedback loop which can aid self-reflection and insight (Lawley & Tompkins, 2000).

Leung and colleagues (2012) conducted five studies to investigate whether embodying creative metaphors both physically and behaviourally could promote creative thinking and problem-solving. One experiment involved a box (built out of PVC and cardboard that could seat an individual) designed to test if 'thinking outside the box' made an appreciable difference. Another experiment tested whether considering a problem 'on one hand, then on the other hand' increased fluency, flexibility and originality of ideas. They concluded, "embodiment can activate cognitive processes conducive for generating previously unknown ideas and connections" (Leung et al., 2012 p. 502).

Making use of embodied metaphors is not a new idea. Carl Jung, the founder of analytical psychology, spent 35 years building and remodelling his house, based on externalising his evolving inner-symbolic world:

> I had to achieve a kind of representation in stone of my innermost thoughts and of the knowledge I had acquired … That was the beginning of the "Tower," the house which I built for myself at Bollingen [which became] a symbol of psychic wholeness (1983, p. 250).

Only recently have these ideas been tested under scientific conditions.

2.7 What difference does it make that metaphor is embodied?

Given that metaphor can support learning, provide novel descriptions and enhance creativity, it is likely that the processes that make use of metaphor are associated with some neuronal reweighing, reconnecting, rewiring and regeneration (Seung, 2012). However, further evidence will need to be forthcoming. In the meantime this chapter will address some of the implications arising from the other forms of embodiment, described above.

2.7.1 Linguistic embodiment

Since most metaphors, in all languages studied, are sourced in the shared experience of space and force (Pinker, 1998) they facilitate communication, understanding and learning of relatively abstract concepts and complex meanings. Moreover, the embodied nature of metaphors helps us to understand *how* someone else makes sense of the world, and it can do the same for self-understanding.

Implicit metaphors are largely ignored in everyday conversation but they provide valuable information about how individuals organise their experience. If a person says 'I bounce back from disappointment in life,' *disappointment* will be the word that likely captures attention. However, the meaning embodied in the action-metaphor, *bounce back* gives much more of a sense of how this person relates to those moments they categorise as disappointing. One way to grasp the value of the embodied metaphor is to notice how different your sense of this person's experience would be if they were instead to say:

I *recover from* disappointment in life.
I *get over* disappointment in life.
I *deal with* disappointment in life.
I *get round* disappointment in life.
I *handle* disappointment in life.
I *push through* disappointment in life.

Each of these metaphors involves a different action which is likely associated with different visual-kinesthetic imagery.

Furthermore, every metaphor comes with *entailments*, e.g. the statement *Don't waste time* 'entails' that time is both a limited and a valuable resource (Lakoff & Johnson, 1980). The importance of maintaining mental coherence means some of the structures and logic of the physical manifestation are carried across into the metaphorical projection. Even when we 'mix' and 'blend' metaphors, we do so in ways that maintain a logical coherence (Fauconnier & Turner, 2008).

2.7.2 Psychological embodiment

Mental metaphors have a form whereas abstract concepts do not. The concept *learning* is formless, spaceless and timeless; whereas the notion of *a sponge soaking up knowledge* may have a size, shape, colour, texture. The sponge image will be different for different people but there will be common sponge-like features and entailments. Also, unlike disembodied concepts, sponges can do things, and they can change over time.

When a person uses an embodied metaphor it contains the structural essence of that person's experience. In therapy or coaching, when the metaphor changes and evolves the person's perception of the issue changes. A school counsellor worked with a child who described his inability to learn Mathematics as, "tangled up spaghetti in my head". After answering some Clean Language questions about the metaphor the boy suddenly exclaimed, "Oh look, the spaghetti has squashed together into one piece. It looks like a piece of paper and I can put my numbers on it!" Over the following months the child became able to learn maths because he now had a place to see the numbers in his mind's eye (Tompkins, Sullivan & Lawley, 2005).

2.7.3 Physiological embodiment

Although Johnson called his book *The Body in the Mind,* he might just as well have called it *The Mind in the Body* since there is a systemic relationship between the two. Research findings support the idea that the "appropriate body action, or even imagined action, enhances people's embodied, metaphorical construal of abstract concepts that are referred to in metaphorical phrases" (Wilson & Gibbs, 2007, p.721).

Nonverbal behaviour, such as gestures, facial expression and posture, is often interpreted as *inter*personal communication, and yet much may be *intra*personal. Using the body metaphorically supports us to think, reason and make decisions about abstract and complex life experiences. When individuals use their bodies to help sort out feelings, keep ideas straight and weigh up situations, they are unconsciously communicating with their inner self. These movements enable a speaker to organise his or her thoughts when speaking and frees up short-term working memory for other tasks (Carpenter, 2010)

Using the body metaphorically is common for people of all cultures. For example, all languages metaphorise time, and the words are often accompanied by gestures that mark out sequences and tenses in mental and physical space. People may have different ways of doing this but the use of spatial marking appears across cultures (Casasanto & Bottini, 2014; Lakoff & Johnson, 1999).

2.7.4 Material embodiment

Creating physical metaphoric representations enables us to see the big picture, look at things from different perspectives, and turn them around. A few examples of recent applications of this idea include:

- Loizos Heracleous and Claus Jacobs (2008) asked business leaders to construct a physical object using small bricks to help make sense of the complexities of business, such as designing strategy.
- Robert Barner (2008) used visual metaphors to facilitate groups of managers to 'give voice' to their emotional reactions to undergoing organisational change.
- Heather Cairns-Lee (2015) used interview and drawing to explore the subjective and symbolic reality of 30 leaders, to discover what they could learn about their leadership and its development from awareness of their own mental models.
- Alke Gröppel-Wegener (2015) involved 165 first-year Art and Design students in a study that asked them to draw and discuss personalised visual metaphors for analysing secondary academic sources.
- Sarah Nixon and Caitlin Walker (2009) facilitated staff in a university department to model the curriculum through verbal and visual metaphors using a process called Metaphors at Work.
- Sabine Harrer (2014) in a PhD project at the Austrian Academy of Sciences, investigated how the experience of loss and mourning could be communicated through digital game design, using the first-hand experience of bereaved mothers' construction of material metaphors.

Approaches like this afford advantages because physical constructions can be touched, moved and examined from various angles, and shown to others. In this way they serve as alternative ways to understand, discuss and make decisions. Physicalising metaphors works both ways. It enables internal experience to be externalised *and* physical metaphorical representations to influence internal processes.

David Grove realised that he could incorporate the fascinating interplay between mind space and physical space into his work. He created a retreat centre with physical places that simulated the common contexts of his clients' metaphors. If a client's metaphor involved a wood, a cave, a hill or an expanse of water, sessions were conducted at real environments that matched the client's imaginative landscape (Lawley, 2006).

2.8 Relationship to tacit learning

Tacit knowledge is often the result of tacit learning—learning that happens with little or no awareness. While our attention is engaged with the explicit, tacit learning takes place in the background and in the implicit.

Metaphors illustrate this point since they convey more than the sum of their parts. They have emergent properties—the meaning cannot be predicted simply by examining the forms used in the expression. Important 'extra' information is acquired tacitly—without us consciously realising it. This applies to all metaphors, including those expressed nonverbally. For example, gestures, gaze and head direction will often be used to point to the location of symbols in the speaker's mental space. The metaphor 'Planning ahead requires openness' might be accompanied by the speaker's arm movements indicating the kind of openness, and by an eye squint that suggests looking into an imaginary mid-distance. This non-linguistic information will likely contribute to the listener-observer's understanding of the metaphor but it is unlikely they will be aware of it.

Physically representing our metaphors can produce some startling realisations and insights. Einstein once said, "My pencil is cleverer than I" (Popper, 1994, p.109). One of the author's coaching clients reported something similar:

> After the session I drew a picture of me with only one arm. My physical body reacted and I felt a pain in my right arm. After dinner I went back to the picture, started to draw and a left arm just came out, and then the fountain became bigger. And I realised when I have not one arm but both arms 'my size' can be bigger and things are reachable without stretching.

There are several clues in this description of things happening without the client consciously intending them to happen: "My body reacted", "a left arm just came out" and "the fountain became bigger". The combined effect was to create the conditions

for a realisation. The client may find it difficult to explain where these visual and kinesthetic symbols came from or why they changed. Much of this learning—about self in this case—implies tacit knowledge and tacit mental processing.

Two new books represent part of a growing awareness of the value of embodied metaphor in teaching and learning. One 'features embodied and analogical approaches' to adult learning, (Taylor & Marienau, 2016), the other concentrates on applying these approaches to teaching young children (McCracken, 2016).

The creation of mental models is primarily a tacit operation. People know they have thoughts, feeling and ways of understanding the world but often they are unaware of how they organise these into a coherent whole (Lakoff & Johnson, 1999). However, the ways individuals make use of space, time, form and hierarchy to organise their experience can become apparent, with deep contemplation often requiring skilful facilitation (Depraz, Varela & Vermesch, 2003; and see Chapter 3 on Clean Language). When they describe this tacit knowledge, they use embodied metaphor.

Third Chapter

CLEAN LANGUAGE INTERVIEWING MAKING QUALITATIVE RESEARCH INTERVIEWS VERIFIABLE

James Lawley

> Interview research in social science has been fraught with a taken-for-granted assumption that interviews straightforwardly provide a resource in relation to participants' experiences, attitudes, beliefs, identities and orientations toward a wide range of social and cultural phenomena. This, in turn, has proliferated uncritical adoption of the interview in various empirical studies and researchers have been overly reliant on a simplistic notion, 'you ask, they answer, and then you will know'.
>
> (Cho, 2014, pp.42-43)

Particularly relevant to Cho's critique above is the role played by the wording of questions in the interview process. Despite considerable evidence from a variety of sources of the potential for unintended interviewer influence (discussed below), little has been written about the potential influence of the researcher's own naturally occurring metaphors (Tosey, 2015) or the effects of presupposition and framing. This is a surprising omission given that questions are the *sine qua non* for conducting interviews, and interviews are probably the most common technique for collecting data in qualitative research (King, 2004).

This chapter examines how an interviewer's use of linguistic structures, such as metaphor, presupposition and framing, can unintentionally influence the content of an interviewee's answers, and how that may compromise the authenticity and trustworthiness of the data collected (Lincoln & Guba, 1985). These concerns are addressed by a description of the Clean Language interview method, and a method for checking the validity of research interviews. Finally, there is a discussion of the relevance of Clean Language interviewing to tacit knowledge research.

3.1 Interviewee biases

A number of *interviewee* biases that can influence the question-response process have been documented by Podsakoff and his colleagues (2003). For example: the *consistency effect* is the tendency to answer in ways that are consistent with the questions; *acquiescence bias* is the tendency not to challenge an assumption implicit in a question; and the *friendliness effect* is the tendency to answer how an interviewee thinks the researcher wants them to answer. In all three cases the interviewee may

(unconsciously) look for cues from the interviewer about how to answer. In this way the interviewee and researcher can unintentionally increase the chances of *priming,* where the exposure to a stimulus influences a later response. Unconscious priming effects can affect word choice long after the words have been consciously forgotten (Tulving et al., 1982).

3.2 Interviewer priming

Text books on interview technique refer to the need to minimise interviewer bias, however, other than the 'open/closed' question distinction there is little about the potential effect of linguistic structures on interviewees. More concerning is that several leading books and papers on qualitative research give examples of interviews replete with interviewer-introduced metaphors, and questions which could 'lead the witness'—without any warning commentary. Below are just two of the dozens of examples I have gathered. The first extract is from a published paper on interview technique (Englander, 2012, pp.31-33 with metaphors underlined):

Interviewer: *How has this memory affected your life? What kind of impact has it had on your life?*
Interviewee: *My dad's girlfriend's apartment or my grandmother? Both?*
Interviewer: *The first memory. How has this impacted, what impact has it had on your life?*
Interviewee: *… it definitely has a very large impact…*

The author of the paper raises some important points about descriptive phenomenological research interviews but does not mention that the interviewer's use of the metaphor impact three times in quick succession may have a priming effect. If there is a possibility that the interviewee's description "it definitely has a very large impact" has been influenced by the interviewer's use of that metaphor three times in the previous two questions, the veracity of any analysis or conclusions drawn from that statement could be compromised.

Another paper, published by the UK's National Institute for Health Research (Lacey & Luff, 2009, p.45) gives sample transcripts of interviews to be analysed. One transcript is of an interview with a secondary school teacher about her experience of returning to work 14 months after a heart attack. The transcript contains the following three questions, asked one after another (metaphors underlined):

Q: *Was it hard to go back then?*
Q: *Do you think it's changed your outlook about the future?*
Q: *So your outlook is different?*

In order to understand these questions, the interviewee must make sense of the metaphors *hard to go back* and *changed outlook,* neither of which had appeared in the transcript previously. Unless the questions are rejected outright, the syntax presupposes that *going back* is *hard* and that her *outlook* is *changed/different*. While the paper explains how to analyse such transcripts, and notes the potential for inquirer biases during the interpretation phase, at no time is the authenticity of the interviewee data called into question. Given the tendency for consistency, acquiescence, friendliness and priming effects to influence the interviewee to answer within the frames presupposed by the questions, concern about the authenticity of the answers would have been justified. Whether this particular interviewee would have given similar or different answers to questions without such framing will remain forever unknown, but doubt remains.

Tosey (2011) gives a different kind of example from a published paper which examines the nature of personal transformations experienced by mature students. The metaphor of an *edge* (e.g. "edge of knowing") is mentioned no fewer than one hundred and four times in the paper, and yet not once does this metaphor appear in the interviewee data cited. It requires a very detailed read of the paper to notice that *edge* is likely to be the author's metaphor and not the interviewee's.

3.3 Why are interviewer-introduced metaphors so important?

Research by Loftus and Palmer (1974) found that the way in which questions were worded altered subjects' memories of events they had witnessed. One experiment showed that changing a single word in a question could change the speed estimations made by observers of a video-recorded accident by up to 27%. More recently, and using very different methods, Thibodeau and Boroditsky (2011) changed a single metaphor in a crime report, crime as a *virus* or crime as a *beast*, and discovered that this was enough to *systemically* influence the way people reasoned about crime. They concluded, 'even the subtlest instantiation of a metaphor (via a single word) can have a powerful influence [and *furthermore*] the influence of the metaphorical framing effect is covert: people do not recognize metaphors as influential'. 'People' in the context of this chapter includes both interviewer and interviewee.

Loftus (1975) also showed that questions which falsely presupposed that an object or event existed in a film, e.g. 'Did the woman who was pushing the carriage cross into the road?' *doubled* the likelihood that the subject would later report having seen that event, compared to if they had been asked 'Did you see a woman pushing a carriage?' and *more than tripled* the likelihood compared to the control group who were not subject to either of the presupposition-laden questions.

3.4 Clean Language

If the inclusion of metaphors and presupposed ways of thinking are unintended and mostly unconscious (Lakoff & Johnson, 1999), is it possible to mitigate the potential to produce data 'contaminated' by the interviewer's linguistic structures? Counselling psychologist David Grove (1989) found a way to keep his metaphors and constructs out of his therapeutic interviews with severely traumatised clients. Grove called his approach Clean Language. Over the last 20 years Clean Language has migrated out of therapy and into the world of business (Doyle, Tosey & Walker, 2010; Martin 1999; Martin & Sullivan, 2007), education (Gröppel-Wegener, 2015; McCracken, 2016; Nixon & Walker 2009; Nixon, 2013), and qualitative research (detailed below).

By paying careful attention to the language they use, researchers can minimise undesired influence and unintended bias during all stages of research—design, data gathering, analysis and reporting (Van Helsdingen & Lawley, 2012). In particular, Clean Language can refine interviewing by minimising the introduction of researchers' metaphors and constructs (Tosey et al., 2014). This is not to suggest that the interviewer who uses Clean Language is not influential. Clean Language aims to minimise the co-construction of the content while at the same time recognising that the interviewer plays a significant role in the co-construction of the process through directing the interviewee's attention to certain aspects of his or her experience (Tosey, 2015).

Owen (1996) was the first to see the value of phenomenological interviewers adopting Grove's questions and since then the technique has been employed in research as varied as:

- Iranian students' metaphors for their teachers (Akbari, 2013)
- Narratives of people who are living with the diagnosis of dementia (Calderwood, 2011)
- A Dutch case study on the role of knowledge in flood protection (Janssen et al., 2014)
- How older workers in the fire and rescue service deal with work-life balance issues as they plan for, approach and transition through retirement (Pickerden, 2013)
- Experiences of members of the Ulster Defence Regiment in Belfast, Northern Ireland (Snoddon, 2005)

3.5 Need for a 'cleanness' rating

> Researchers must demonstrate the quality of their work in ways that are commensurate with their assumptions about their use of interviews.
>
> (Roulston, 2010, p.199)

Even if an interviewer *plans* to closely follow Clean Language protocol, this addresses only half the problem. Given the tendency for interviewer metaphors and constructs to enter the interview *unplanned*, how do we know what actually happens? Current quantitative research papers describe measures that ensure the *analysis* of interview data is robust, but very little is written about applying validity criteria to the interview process itself.

To verify whether interviewers using Clean Language remain faithful to their method, the author has devised a 'cleanness rating' (Lawley, 2010; Lawley & Linder-Pelz, 2016). Every question or statement by the interviewer is allocated to one of five categories:

- *Classically clean*—drawn from the standard Clean Language question set (Lawley & Tompkins, 2000) or repeating only the interviewee's words.[89]
- *Contextually clean*—only introduces 'neutral' words based on the context of the research or logic inherent in the interviewee's information.
- *Mildly leading*—introduces words with the potential to lead but with no discernible effect on the interviewee's answers.
- *Strongly leading*—introduces words, especially metaphors, presuppositions, frames or opinions that could cast doubt on the authorship of interviewee answers.
- *Other*—comments outside of the interview content, e.g., about the process of the interview or answering a practical question from the interviewee.

The results of the line-by-line analysis are tabulated and used to arrive at a summary assessment of the 'cleanness' of each interview. While the goal may be to remain 100% 'clean' in an interview, there are other factors which can make this almost impossible. However, to see what happens in practice the author combined the results from the ratings of 15 interviews (875 interviewer questions/statements) conducted by three interviewers experienced in the use of Clean Language during three separate published research projects. Table 1 shows that *on average*, five (out of 58) of the interviewers' questions or comments were assessed as 'mildly leading' and just one was classified as 'strongly leading'.

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[89] 85% of questions in six Work-Life Balance interviews made use of the following classic Clean Language questions, (Tosey, Lawley & Meese, 2014):

And what kind of ...?	*And where/whereabouts is …*
And is there anything else about …	*And how do you know …*
And that's … like what?	*And when … what happens to …?*
And is there a relationship between … and …	
And is … the same or different as …	
And then what happens?	*And what happens next?*
And where did … come from?	*And what happens just before …*

Note: '…' indicates the interviewee's words.

Table 1
Average cleanness ratings for 15 interviews using Clean Language

Classification of Interviewer questions/statements	Average number of questions/statements per interview	
Classically clean	35	60 %
Contextually clean	15	25 %
Mildly leading	5	9 %
Strongly leading	1	2 %
Other	2	4 %
TOTALS	58	100 %

When there are only one or two strongly leading questions in an interview, it is possible to exclude a portion of the interviewee's answers from the analysis while retaining the majority of the data. As the number of leading questions and statements increases, the fidelity and value of the interview data becomes more and more debatable.

A systematic study of the cleanness of Clean Language interviews compared to traditional interviews is forthcoming. In the meantime, even a cursory review of 'model' interview samples (in text books and academic papers on qualitative research techniques) provides evidence for the hypothesis that traditional interviews are more likely to introduce content and lead by presupposition. Given that, 'the goal of any qualitative research interview is … to see the research topic from the perspective of the interviewee, and to understand how and why they come to have this particular perspective' (King, 2004), the widespread use of unintended leading questions and the imposition of content casts doubts on the validity of results obtained from such interviews.

3.6 Other features of Clean Language interviewing

In addition to the mechanics of minimising the introduction of interviewer metaphors and presupposition, proponents of the Clean Language method maintain that it has two additional features. It is ideal for researching interviewees' metaphors and mental models; and it has the potential to gather *in-depth* data more effectively than traditional methods.

3.6.1 Researching metaphors and mental models

The claim that Clean Language is particularly useful for researching autogenic metaphors and mental models is supported by a number of studies (Cairns-Lee, 2015; Linder-Pelz & Lawley, 2015; Tosey, et. al., 2014).

Tosey (2015, p.203) was impressed by Clean Language's 'potential for research due to its systematic and rigorous way of exploring, and maintaining fidelity to, a person's own inner world'. Since the adherence to Clean Language *prevents* interviewers from introducing their metaphors into the conversation, the data analyst and end user can be assured that all quoted metaphors are generated by the interviewee.

3.6.2 Gather in-depth data

Because a Clean Language interview is centred entirely on the interviewee's descriptions, using only his or her lexicon, the interviewee is more likely to become self-reflective and enquiring of the workings of his or her subjective experience. A study of the metaphors of managers on their perceptions of their 'work-life balance' showed a much richer description of their experience than the conventional 'balance' metaphor might suggest (Tosey et al., 2014):

- *Two halves of a circle.*
- *Going up a mountain dodging boulders.*
- *A split and a switch.*
- *Juggling and a spinning top.*
- *Riding on the crest of a wave.*
- *Physical and mental separation.*
- *A deal with a bit of flex on both sides.*

These metaphors were accompanied by rich and detailed descriptions, both verbal and visual (drawn). Interestingly, four of the six managers could recall their personal metaphors in an informal follow-up *three years* later. (W. Sullivan, personal communication, 2 July 2013).

In another study, Lloyd (2011) compared the number of 'meaning units' provided by the interviewee in interviews using Clean Language and in interviews using a traditional interview technique. Lloyd found the average number of meaning units from a Clean Language question was close to five, while an equivalent traditional-style interview produced fewer than two meaning units per question. While the author acknowledges a number of possible flaws in the data analysis, it does suggest a useful direction for future research**.**

3.7 Tacit knowledge research

Tacit knowledge is by definition hard to access and difficult to articulate. This poses real challenges for an interviewer. Clean Language can assist in this endeavour in several ways. First, it is difficult for an interviewee to access tacit knowledge even under the best circumstances, and the addition of an interviewer's unintended constructs is liable to complicate the situation. Second, almost any attempt by an interviewee to express tacit knowledge will require the use of metaphor (see Chapter 2 on Embodied Metaphor). Third, in struggling to access and articulate their experience, interviewees

may unconsciously look to the interviewer for suggestions and hints, which, if provided, would compromise the authenticity of the account. For these reasons, the use of Clean Language interviewing has the capacity to provide high-quality and verifiable data for qualitative research projects—such as those involving tacit knowledge.

Fourth Chapter

RESEARCH METHODOLOGY

Petr Svojanovský, Jan Nehyba

The following chapters (4 through 11) deal with empirical research. Chapters 7 through 11 use various research questions and methods to examine the same phenomenon: the 'tacit-explicit' continuum of student teacher knowledge. The research design of individual probes is always described in detail and explained. All studies in this research are inter-linked by (i) shared basic defining features of tacit knowledge, and (ii) shared data and methods of collection. These two features, characteristic of all the empirical chapters, are explained in Chapter 4 on methodology.

Chapter 5 evaluates how the method of data collection known as 'Clean Language' was incorporated into the current research. In researching tacit knowledge, this method provided several significant benefits (see Chapter 4.4). It is therefore important to explain how we worked with this method. Chapter 5 presents qualitative and quantitative analyses of selected research interviews.

Chapter 6 is an overview study that complements and, to a degree, expands on the theoretical section. Its goal is to answer the questions: 'How is tacit (or implicit, practical) knowledge approached within empirical research?' 'How is this concept defined, operationalized and examined?' and 'What results are indicated by the research?' The collection of ten analysed texts, from 2000 to 2015, comprises the entire list of journal studies that fit the given criteria—i.e. that they be written in English and included in the database Web of Science. *Due to the given criteria, it was the full selection from this time period.*

4.1 Rudimentary Definition Elements of Tacit Knowledge

In their overview, Haron and Alias (2005) summarize characteristics of tacit knowledge referred to by many authors. Tacit knowledge, for example, is considered personal, context-bound, learned by experience, individual or collective or action-oriented. However, in the process of researching tacit knowledge, it was necessary to limit our enquiry to those characteristics that enabled us to differentiate between tacit and explicit knowledge. In other words, how certain can we be that a piece of knowledge is tacit or explicit? In line with Nonaka and Krogh (2009, p. 636), we view tacit and explicit knowledge as two poles of the same continuum. Two particular attributes of

knowledge can help us broaden the degree to which a certain piece of knowledge can be referred to as tacit or explicit—awareness and articulability of knowledge (cf. Reber, 1989; Eraut, 2000; Polanyi, 2009). With this perspective, it is possible to use awareness and articulability as criteria (definition features) for discerning where on the 'tacit–explicit' continuum a particular piece of knowledge lies. The less conscious and the more difficult to articulate a piece of knowledge, the closer it is to the tacit pole of the continuum and vice versa. Table 2 shows how definitions of knowledge (the first column) correspond with different forms or features of knowledge (the second and third columns). The types of knowledge set out here are considered ideal (Weber, 2009). Ideal types help to differentiate knowledge and thus also to conceptualize it. However, this categorization causes the formation of artificial (sharp) boundaries between individual types which does not reflect the *complex and dynamic structure* of knowledge (see Chapter 1). Consequently, we approach knowledge through the construct of a continuum (Column 4) which makes possible a greater degree of complexity (adjusted from Nehyba & Svojanovský, 2016, p. 60).

Table 2
From ideal types of knowledge to a "tacit–explicit" knowledge continuum

Ideal types of knowledge according to selected authors	Degree of articulability	Degree of awareness	Knowledge of as a continuum
Explicit skills (Ambrosini & Bowman, 2001); *Embrained knowledge* (Lam, 2000)	entirely articulable	entirely conscious	↑
Tacit knowledge—cognitive element (Nonaka, 1994); *Imperfectly articulated tacit skills* (Ambrosini & Bowman, 2001); *Sagacious tacit knowledge* (Castillo, 2002)	difficult to articulate	less conscious	"Tacit–explicit" knowledge continuum
Deeply ingrained tacit skills (Ambrosini & Bowman, 2001); *Nonepistle tacit knowledge* (Castillo, 2002); *Tacit knowledge* (Reber, 1989)	not articulable at all	entirely unconscious	↓

This categorical framework helps to operationalize knowledge, so it is possible to work with it in research without being limited by ideal types. The 'tacit–explicit' continuum is, in essence, based on the assumption that no piece of knowledge can be unambiguously labeled as tacit or explicit. It would probably be more accurate to refer to knowledge 'dimensions' (Šíp & Švec, 2013). From this perspective an exact determination of boundaries between what is and what is not tacit is not considered useful. However, this does not mean abandoning any attempt to distinguish between tacit and explicit knowledge in the research. Rather than searching for the dividing line, the research focuses on the interconnection of both knowledge dimensions. The authors of the

research probes explain what participants said in a relatively explicit manner and at the same time focus their attention on what remains unsaid in the context of what is stated. This is identified with the help of the attributes of awareness and articulability that constitute integral parts of their definition of tacit knowledge.

While approaching knowledge through the 'tacit–explicit' continuum better reflects the complexity of knowledge (than approaching it through ideal types), it is, nonetheless, simply one of many perspectives from which to look at the complexity of knowledge. This book offers yet another perspective on how to approach the complexity and dynamics of knowledge, i.e. on four levels—body, mind, external world and interaction level of previous level (see Section 1.2.3). Although Chapter 1 demonstrates that a complex understanding of the knowledge requires a perspective from all these levels, the data processing is limited primarily to the mind level, from the perspective of an individual, that is from the perspective of the research participant. This epistemological focus served as a shared research framework. A firm grounding in a gradually maturing philosophical base and the flexible nature (circularity) of the qualitative research (cf. Flick, 2009) enabled the researchers to identify the significance of other conceptual levels of knowledge and to include these organically in the analysis. Their thorough exploration, however, remains a challenge for further research.

4.2 Research Participants and Criteria for their Selection

The research sample consisted of nine students and one teacher trainer. The student group included seven female students (in the research probes they are referred to by pseudonyms Alena, Beáta, Dana, Ema, Františka, Jaroslava, Milada) and two male students (with pseudonyms Cyril and Karel). During the research, all nine students were studying the follow-up Master's program in Teacher Training for primary or secondary schools. The teacher trainer accompanied student Milada during her teaching practice at primary school.

Before the research began, students were approached during compulsory seminars aimed at encouraging them to reflect on their own teaching practice. Researchers (in the role of educators here) noticed how students reflected on their teaching during their practice. The main criterion for selecting the students for this research was their capacity for (self)reflection. The selected students demonstrated a highly developed ability to reflect on their activities during the teaching practice. In that way they stood out from other students in the seminar. This is an instance of selecting an extreme case (Maxwell, 2013, p. 98). It was assumed that working with students with a more developed capability for reflective thinking—in combination with the applied way of asking—would increase the potential to discover tacit knowledge during the research interviews.

The researchers distinguished two basic tendencies manifested by participants during their verbal (self)reflection: (a) a tendency to reflect in an analytic way and (b) a tendency to reflect in an 'illustrative' way. Korthagen (1993) refers to these two modes of reflecting. In the first (analytical) mode, reflection mirrors rational processes (the experience is grasped in a differentiated manner). In the second case, reflection serves as a mirror of non-rational processes (the experience is grasped holistically, in gestalts). It can be said that the analytical mode of reflection is bound to literal language while the 'illustrative' mode is bound to figurative language, especially to metaphors (for more detail, see Chapter 1). In the literature (Nonaka, 1991, 1994; Tobin & Tippins, 1996; Moser, 2000), and also in our own empirical study (Nehyba and Svojanovský, 2016), continuity of tacit knowledge and metaphorical language was identified. Although students tended more or less towards one of the modes of reflection, the method used for asking questions (see below) enabled the interviewers to naturally elicit and develop metaphorical expressions in the students' statements. Metaphors have become an integral part of the obtained data, and provide an additional means for researchers to identify / examine tacit knowledge in the course of the data analysis.

The homogeneity of the research sample was balanced by another (supplementary) selection criterion. Potential research participants were selected from students representing a wide range of teaching qualifications. As a result, research participants included students of Humanities (Czech language, Social Sciences), Natural Sciences (Mathematics, Chemistry, Physics), Education (Physical Education, Citizenship Education, Health Education, Music Education) and Language specialization (English, German).

4.3 The Process of Acquiring Data

The main source of data was 44 unstructured, in-depth interviews obtained in research probes. Each interview lasted approximately 60–90 minutes and was recorded on video. Thus the researchers could analyze not only the verbal, but also the non-verbal expressions of the students. A series of five research interviews were conducted with seven informants, carried out between September 2013 and January 2016.

Each interview had a specific thematic focus. Ema and Jaroslava broke off their studies prematurely and, as a result, it was not possible for the interviews to focus on changes in the students' conception(s) of teaching (see below). A total of 33 interviews were conducted with these informants. The remaining 11 interviews were conducted with Alena (5 interviews) and Milada (6 interviews). In the case study of Alena (empirically processed in the text by Nehyba & Svojanovský, 2016), and the case studies of Milada (detailed in Chapter 11) the interviews, in relation to the research questions, took a partially different thematic focus than in the case of the other informants (see Table 3).

Table 3
An overview of thematic orientation of interviews and informants with whom the interviews were conducted

Informants	**Topics of individual interviews (listed chronologically)**				
Ema, Beáta, Karel, Cyril, Dana, Františka, Jaroslava	Subjective conception of teaching (SCT)	Unexpected situations (US)	Didactic transformation of content	Stimulated recall of US after the lesson	Change in SCT
Alena	Subjective conception of teaching	Unexpected situations	Unexpected situations	Metaphors in previous interviews	Metaphors in previous interviews
Milada, the teacher trainer	Problematic situations in the student's lessons	Milada's subjective conception of teaching (2×)	Problematic situations in the student's lessons	Problematic situations in the student's lessons	Selected passages from earlier interviews

Complementary sources of data were active observation (at least twice for each student) and video recordings of teaching (one for each of the seven students with whom stimulated recall was used). In individual chapters, researchers used data materials that corresponded with research questions.[90]

All the data used in the research was obtained exclusively with the (written) consent of the participants. Research participants were informed about the research goal(s) and their role in the research. Written consent for participation in the research was also obtained from parents of pupils who were present when the video recordings of the practicing teacher student were made.

Each interview started with a very general introductory question, designed to focus the student's attention on the component research topic (see Table 3). From there, the interview was conducted primarily using Clean Language interviewing techniques (see below). The extent to which the researchers made use of the Clean Language interviewing method is discussed in Chapter 5.

What follows is a brief explanation of the way the five thematic interviews (that form the core of the collected data) were carried out.

[90] At the same time, researchers shared their findings during analyzing the data and notified each other about relevant data segments. For example, if researchers analyzing interviews about unexpected situations encountered data on potentially important information about the subjective conception of teaching, they passed this on to another colleague who dealt with this topic in their research section.

The topic of the first interview was the student's subjective conception of teaching (Mareš, 2013; Pravdová, 2014). The topic was suitable for the first interview as it provided an umbrella frame for the student's thinking about teaching. The opening question of this interview was: "When I say *you and teaching*, what does this evoke for you, what comes to your mind?" Because tacit knowledge can be activated and manifested in unexpected situations (Evans & Kersh, 2004), the topic of the second interview was unexpected situations that the teacher/student came across during their teaching. The opening question of this interview was: "Did you encounter a situation during the lesson that surprised you or that you didn't expect?" In the third interview, the students' attention was directed to the didactic transformation of content (Janík et al., 2007), that we perceived as the key element in the student's (teacher's) attempt to achieve the educational goals during the lessons. The interview began with the question: "What was your goal in today's lesson?" Before the fourth interview took place, the student was observed teaching a lesson at a primary school. This lesson was video recorded. The fourth interview was carried out on the basis of stimulated recall, for which the video footage was used. The student was asked to watch the video and focus their attention on situations that surprised them (that is unexpected situations) and then talk about them. The initial question was included in the instruction to the student and, as in the second interview, the dialog between the student and the researcher was framed within the topic of unexpected situations. The objective of the fifth interview (similar to the first interview) was to encourage students to think about their own conception of teaching. The student's thoughts were directed to defining a potential change in the subjective conception of teaching since the time the first interview took place. The opening question was: "When I say *you and teaching* after all the practice you completed—what is different now?"

4.4 Methods of Data Collection

Based on a gradually maturing epistemological foundation (see Chapter 1) and not entirely satisfying results from the pilot phase of data collecting[91], the research team began to lead non-structured, in-depth interviews using a specifickind of questioning[92] (*Clean Language interviewing*, see Chapter 3). Using Clean Language during the tacit knowledge research provided three key benefits:

[91] The data from the pilot phase of the research was not included in the analyses that are presented in individual empirical chapters. These were several interviews (lead in the conventional manner), the content of which was analyzed by the research team only for the purposes of establishing how to proceed with future data collection. These can be titled "trial" interviews.

[92] Clean Language and Clean Language interviewing are used as synonyms in this text. The term *Clean Language interviewing* is used more often in connection with the use of Clean Language in this research (cf. Lawley & Linder-Pelz, 2016).

1. It made it possible to use data in the interviews that were as close as possible to a first-person perspective (Varela & Shear, 1999). This approach "does not confer infallibility upon subjects who use them, but does enable subjects to thematize important but otherwise tacit aspects of their experience" (Lutz & Thompson, 2003, s. 39). It is this data that is considered relevant in researching tacit knowledge (for more detail, see Chapter 5).
2. In a facilitatory manner, it encouraged the student to express themselves in metaphorical language (Lawley & Tompkins, 2000). Metaphors have been identified as having strong potential for researching tacit knowledge (Tobin & Tippins, 1996; Nehyba & Svojanovský, 2016).
3. It oriented the participant to examining themicrodynamics and microstructure of their own experience. By analyzing detailed aspects of experience, the potential for defining a pre-reflective ("tacit") dimension of the experience was increased (Petitmengin, 2006, p. 231-234; Lutz & Thompson, 2003, p. 37).

Good quality data was identified as an important starting point when researching tacit knowledge.

Clean Language is, in its fundamentals, close to interviewing methods used in naturalized phenomenology and cognitive science—referred to as methods of assisted introspection. Interacting with another person during this process makes it possible to minimize the 'introspective illusion', that is a distortion of interpretation by one's own experience (cf. Nisbett & Wilson, 1977; Tvrdý, 2016). Examples of assisted introspection include elicitation interviews (Petitmengin, 1999) that are constructed with reference to the neuro-phenomenology of F. Varela, or expositional interviews that constitute an integral part of the descriptive experience sampling method (Hurlburt, 2009, 2011). All of these methods focus on examining how our experience appears in our consciousness. The 'grammar-targeted interview method', which is also comparable with Clean Language interviewing, is used directly for researching tacit knowledge (Grammar-targeted interview method—GIM, Zappavigna, 2013). Although GIM categorizes questions in a different way than Clean Language (it uses categories such as nominalization and generalization), the questions asked are in essence very similar in their form. This method of Clean Language interviewing is described in detail in Chapter 3.

Fifth Chapter

CLEAN LANGUAGE AS A DATA COLLECTION TOOL

Jan Nehyba, Petr Svojanovský

This chapter explains and evaluates how the data collection method entitled *Clean Language* (described in detail in Chapter 3) was implemented in our research. In the context of pedagogical sciences, it is a new way of interviewing, which helps to gather data as closely as possible from first person (Searle, 1992; Varela, 1999). In the context of our research, we assume that the more we obtain data from the position of the first person, the better the quality of data. We understand high-quality data as information collected first hand from the world of the research participants, i.e. information that is affected as little as possible by the researcher's perspective during the interview. In line with the definition, we believe that tacit knowledge is less conscious than other knowledge, and difficult to articulate. It follows that in research interviews, it is important to ensure as far as possible that the structuring of such knowledge comes directly from the informants. In other words, the less the researcher intervenes in the interview, the greater potential for the elicitation of tacit knowledge. Clean language enables informants to explore what Petitmengin (2014) refers to as the microstructure of their experience, thus helping them to grasp what is less conscious and difficult to articulate. Intervention by the researcher in the content of the interview (paraphrasing or interpreting what has been said or introducing completely new topics) can distract the informant from accessing essential details that may contribute to awareness and the 'naming' of less obvious aspects of their own experience.

In this chapter, we explain how we understand the term *Clean Language* and how we interpret it, and then move to the actual analysis of how we used this method in practice, i.e. in conducting the research interviews.

5.1 Conducting interviews using Clean Language

Although the method of Clean Language interviewing is based on several clear ideas (for example, repetition of the participant's verbal and non-verbal expressions, use of 'clean' questions), different aspects of this method can be highlighted; for example, whether emphasis is placed on the natural formulation of questions asked in an interview, or whether more emphasis is placed on the use of strictly 'clean' questions. These differences may appear as subtle nuances but they greatly influence how an interview is conducted. There is a difference between strictly adhering to a list of 'clean' questions

and asking questions guided by the informant's previous answer(s) (although these positions are not necessarily mutually exclusive). Therefore, we consider it important to present how we think our research team understood and applied the Clean Language interviewing method. In the following paragraphs, we present those aspects of Clean Language interviewing we consider important.

The value of 'clean' questions in an interview relies on an *objective concept of clean-ness.* 'Clean' questions have no 'deeper' meaning and do not demonstrate empathy for the interviewee. The assumption is that these very specific questions help to systematically eliminate the interviewer's own assumptions, so that they do not unduly influence the interview. Our use of Clean Language interviewing involved using questions taken from a clean questions list[93]. The belief is that *these specific questions help us systematically eliminate our own assumptions, so that they do not influence us when conducting an interview*. Our view is that Clean Language interviewing helps us, through the use of clean questions, to "minimize" any assumptions within the questions themselves.

Every question has certain assumptions but clean questions are designed to contain as few of these assumptions as possible. For example, the question: "What kind of X is that X?" assumes only some form of existence of X, as opposed to the question: "What do you think about X?", which assumes that the informant has to think, and not, for example, feel, something about X, etc. (X represent a word or a non-verbal gesture of interviewee). "What kind of X is that X?" assumes that since the interviewee has mentioned X, then X will have some qualities which enable the interviewee to distinguish X from not-X.

Although, through their construction, even clean questions influence how the informant approaches their experience, they do this much less than traditional open interview questions (see Chapter 3). As a result, the Clean Language interviewer becomes more self conscious about their own language when conducting a research interview. We see this 'sensitization' as the most important benefit of Clean Language interviewing.

Clean Language also helps researchers to recognize and minimize, rather than eliminate, assumptions in relation to individual interviewees that affect the rapport or the relational level of communication (cf. Hulburt, 2011, Chapter 20). This more *contextual and relational concept of clean-ness in an interview* represents a return to the original idea of the creators of Clean Language, Grove and Panzar "We cannot define in advance the grammar, syntax or vocabulary of a clean question. A 'clean' question is unique to each client. We can give general rules defining clean questions. Nonetheless, we have to discover which questions will fit which client." (1989, p. 23)

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[93] These lists of questions differ from each other (to a greater or lesser extent), both in terms of quantity and quality (inclusion of a different type of questions on the list), depending on the context and practice of each author. For lists of 'clean' questions, see, for example, Lawley and Tompkins (2000); Harland (2012a); Way (2013); Tosey, Lawley, & Meese (2014); McCracken (2016).

In this contextual model of clean-ness, the role of rapport (the relational level of the interview) is crucial for obtaining high-quality content, which for us, is data that is as close as possible to the first-person perspective. In our research, rapport was supported in particular by specific verbal comments. In itself, successful use of exclusively 'clean' questions creates a safe environment in which the informant can concentrate on their own inner world and in this sense supports a certain rapport between the informant and the researcher. Clean Language interviewing aims to maintain the rapport between the informant and their inner world of experience, however, to achieve this, it is necessary also to maintain researcher-informant rapport[94] .

Clean Language interviewing *primarily influences the process of conducting an interview and aims to minimize influencing the informant's experience in terms of content*. We cannot conclude, however, that Clean Language *does not influence the interviewee*. On the contrary from the perspective of social constructionism (Gergen, 1999), the extended mind (Rowlands, 2010) and in reference to neo-pragmatism (Rorty, 1999), this is not even possible. The difference is in *how* Clean Language interviewing influences the informant. It deliberately influences the interviewee so as to keep their attention in their own field of experience[95] to be able to see the phenomenon in question from the closest possible position to their own[96]. We do not influence the content of their attention by adding new topics but influence what part of their field of experience they talk about. Therefore, we can refer to this method as a second person interview, which helps the interviewee come as close to themselves as possible (however, from our perspective, we can never cross this border). Thus, it is about the *degree to which we "come closer", in our interview, to where the interviewee's attention is*. We also perceive it as clean when we come close to where the interviewee's attention is using clean language syntax[97], and then directing their attention to the "edge" of their perception of personal experience (using a clean question). For example, the informant makes the statement: "I see myself connected, how all that pupils' energy is flowing to me." We keep the interviewee's attention on the entire description of their experience by repeating their words, and subsequently, we direct it to the kind of "connection" it is, although the

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[94] We are aware from personal experience that experts in Clean Language are able to establish rapport by using 'clean' questions and by non-verbal expression (mirroring, etc.).

[95] Cf. Urban (2015, p. 44): "Husserl introduced the term *field* ... with a conscious reference to an analogy to common experiential fields such as visual field, tactile field, etc."

[96] This assumes a division between one's own experience and the experience of another, which is our personal construct. Our own experience refers to how I experience writing these lines while the experience of another refers to how someone else experiences writing another chapter of this book. Therefore, I try to access this experience of another, to see what this experience of another looks like. If I wanted to return to my own experience, it would mean that I have to return to how I experience focusing on the experience of another.

[97] Syntax is how a researcher composes a question for the informant. In formalized form, it consists of three parts: (1) … and [client's words]. (2) … and as/when [client's words], (3) [clean question]? However, the researchers did not always exactly observe the three parts; sometimes, they would only use 3. a clean question.

interviewee's attention would originally be directed to, for example, elaboration on the topic of pupils. If our question "hits" where the informant's attention is or where it is directed, we can "immerse" them even more in the "stream" of their own experience. As a result, it can help the informant access even that content that is not obvious to them[98]. However, the aim of the research interview is not only "immersion" but a "balance" of this immersion and finding information in relation to the research question.

In relation to the topic of clean-ness in an interview, it should be noted that the very concept of 'clean-ness' is a metaphor, and some authors even consider it, in the context of experimental research, an embodied metaphor that influences our moral evaluation (Zhong & Liljenquist, 2006; Schnall, Benton, & Harvey, 2008). This is then represented with conceptual metaphors: CLEAN IS GOOD and DIRTY IS BAD. We are aware of this tendency, however, we understand the term 'clean' differently. To conduct an interview in Clean Language does not mean to conduct a good interview but to come as close as possible to the informant's first-person perspective. We emphasize that an interview conducted in clean language is different, not better. It produces a different type of data than interviews conducted in a conventional way (cf. the hermeneutic conception of understanding as 'other', not 'better', Grondin, 2007, p. 174).

5.2 Analysis of conducting research interviews

In this section we first emphasize the selection of interviews analyzed and describe each phase of the analysis. We then move to the findings and, finally, to the discussion of the results.

In total, the research team conducted 44 in-depth, unstructured interviews between September 2013 and January 2016. The interviews were conducted by seven trained researchers. All the researchers had been trained in how to conduct interviews using Clean Language and they consulted with Clean Language experts James Lawley, Penny Tompkins and Caitlin Walker. Three researchers had additional practical experience conducting interviews using 'clean' questions (researchers 1, 2 and 7) because they had attended an official workshop on Clean Language interviewing that included practical training. Four researchers had only received several hours of training (researchers 3, 4, 5 and 6). Researchers 1, 2 and 3 each conducted approximately one-quarter of the total number of interviews, providing approximately three-quarters of the data collected. To evaluate the manner of implementing Clean Language when conducting research interviews, the researchers randomly (by drawing lots) chose one interview each, which was subsequently analyzed (i.e. 3 interviews in total). The last (fourth) interview for analysis was randomly selected from the remaining batch of interviews conducted by one of the remaining researchers (Table 4).

[98] Cf. the use of trance as elicitation of experience (Lifshitz et al., 2013).

Table 4
Basic information about research interviews and their analysis.

	Number of research interviews		Number of analyzed interviews	Topic of the analyzed interview	Informant in the analyzed interview
Researcher 1	10	23%	1	subjective conception of teaching	Karel
Researcher 2	12	27%	1	subjective conception of teaching	Ema
Researcher 3	10	23%	1	didactic transformation of content	Františka
Researcher 4, 5, 6, 7	12	27%	1	didactic transformation of content	Ema
Total	44	100%	4		

5.3 Phases in the analysis

The analysis of interviews was based on the protocol for 'clean-ness' validation when conducting a research interview (Chapter 3.5), which sets out four basic categories evaluating the degree to which the researcher's questions influence the content of the informant's statements: (1) classically clean; (2) contextually clean; (3) mildly/potentially leading; and (4) strongly leading. One trained researcher began (deductively) analyzing the questions in the interviews according to these categories. She categorized all other statements (comments) in the interviews, thus gradually (inductively) creating the typology of the comments. This was the *first reading* of the data conducted by a trained researcher.

The categorization of questions and comments was subjected to re-analysis by two other researchers (authors of this chapter) This was the *second reading*. It became obvious that theoretically designed categories for the evaluation of questions were too vaguely defined, and it was not possible to reliably distinguish in which category each question belonged. Consequently, we started to approach the analysis inductively. As far as the comments were concerned, it became apparent that the researcher influenced participant statements to varying degrees—our hypothesis when we began categorizing the comments according to the degree of influence on the informant.

The originally categorized questions were revised (the *third reading*—again conducted by the researcher based on instruction), and a new typology of questions and new definitions of categories were created containing individual types of questions. The comments were also categorized according to the degree of influence on the participants' statements.

The last phase was the *fourth, final, reading* (by the authors of this chapter) where we examined to what degree our division of individual types of questions and comments into categories of 'clean-ness matched that of the researcher's. The categorizations were amended and the partial definitions finalized.

Lawley's original categories (Chapter 3.5) were adapted to the context of our research based on the iterative process described. First, the adaptation included a different 'understanding' of the scope of each category. We took 'scope' to mean what is logically (and on a regular basis) understood as a summary of objects which fall under a given category (e.g. objects falling under Category 1 defined by us); in other words the scope of a term. Our scope of categories is much broader than Lawley's. Lawley's category of classically clean questions includes only prescribed strictly clean questions, whereas our Category 1 also includes some conversational ways of using clean language. On the one hand this was due to the fact that we are not as experienced in conducting clean language interviews, on the other hand, it was a result of the fact that criteria other than objectivistically defined clean-ness (where clean is defined only as clean questions) were also important to us

The results of the analysis are summarized in the following sections—first a description of the qualitative analysis of questions and comments (types and differences among them) followed by an examination of the quantitative analysis (the percentage of individual categories of questions and comments analyzed in the interviews).

5.4 Qualitative analysis

In this chapter we describe the different categories considered in the analysis. The questions are ordered according to the degree of content-influencing on the participant—from Category 1, which includes the least content-leading questions or comments, to Category 4, which includes the most affecting questions. The manner of categorization is illustrated in specific examples.

5.4.1 Categorization of questions

Category 1: 'Clean' questions—variants[99]

(a) These questions included only the informant's exact words supplemented by some of the clean questions on the list created by Lawley and Tompkins (2000, pp. 282–283). These questions are 'clean' without depending on the context in which they are asked (context-independent).

[99] For each category of questions or comments where different variants are presented (this applies to Categories 1 and 2 for questions and comments), we list the variants that repeatedly occur in the interviews. Those occurring only exceptionally were not included in the list.

Example 1

Participant: *Well, it was a* ***disappointment*** *that the plan, what I had expected, was not fulfilled.*

Researcher: *What kind of* ***disappointment****?* (question *What kind of?* in the list by Lawley and Tompkins)

(b) These questions were variations of the basic question "What kind of X is it?" because they do not contain any topics, opinions, ideas, beliefs, etc. that the researcher would bring into the interview through these questions. This is only a variation of the wording of the questions.

Example 1

Researcher: *What is X about for you?*

Example 2

Researcher: *How would you name X?*

(c) These questions contain words that do not contaminate the informant's statement in terms of content (at the level of the informant's external speech). In essence, they are paraphrases of clean questions in which, however, there is no semantic shift. These are clean questions uttered in one's own words, where these words are commonly shared expressions of communication.

Example 1

Participant: … *When I go into the classsroom, I feel rising tension ... then I go to the teacher's desk and the tension fluctuates … and when I sit in the teacher's chair … it goes away.*

Researcher: *And if everything goes like that, what happens next?* (a paraphrase of the question: *What happen next?* in the list by Lawley and Tompkins).

Category 2: Contextually clean questions—variants

(a) *Verifying questions*—used by the researcher to verify they understand correctly what the informant is saying. In fact, it is a paraphrase to clarify *particular information* in the informant's statement. This is not an attempt to paraphrase the *meaning* of the statement (as is the case in the category of medium-influencing questions).

Example 1

Participant: *The teacher tells me: Could you do this topic and nothing more.*

Researcher: *So the teacher tells you what topic you should do, and it is up to you how many texts, authors, there are?*

Example 2

Participant: *When I am in a lesson and I feel a connection with a pupils.*

Researcher: *And now precisely you're talking about maths or are you talking about...?*

(b) *Introductory questions*—used by researchers to initiate an interview with an informant.

Example 1

Researcher: *When I say "you and teaching", what does it do to you, what could you say in that respect?*

(c) *Questions aimed at the manner of expression*—the purpose of these questions is to invite informants to express themselves using the selected instruction or technique. These questions are not a direct focus on the experience of participants.

Example 1

Participant: *When you think about it, it's like I looked at it from afar.*

Researcher: *Now when you look from a distance and look at that, what it was about, what was created, what's happening inside you?*

Example 2

Participant: *Is it like a sphere with many connections. This is the most concise.*

Researcher: *And can you draw it here?*

Category 3: Medium-influencing questions

These are questions that contain words the informant has not said and that introduce *potentially new topics or links, or a semantic shift* into the interview. These questions contain a *paraphrase* of the student's statement.

Example 1

Participant: *Well I think that for many there is the effect that if they fail three times in a row, there will come this: "I will fail again anyway."*

Researcher: *So the bad marks, the three failures make them give up, saying it doesn't matter anymore?*

The example above contains a paraphrase, potentially bringing in the new topic that the subjects *do not care*. Although this paraphrase may seem to correspond to the student's statement in terms of content, this cannot be said with certainty. The informant could have, in the background of their statement, implicitly perceived a different meaning (a different topic), for example, that the teacher's marking is unfair.

A paraphrase is always an interpretation because the same thing said using other words creates the potential for a semantic shift in these other words. In this respect , it is difficult to distinguish paraphrasing (medium-influencing questions) from interpretation (strongly influencing questions), i.e. the extent to which the meaning of the informant's words was or was not changed, and the degree to which the informant was influenced by the researcher. The inclusion of a question in a given category then depends on the researcher's sensitivity to distinguishing the degree to which the meaning of the informant's statements was changed in the question. Disputable cases (where researchers did not agree on the inclusion of a question in a particular category) were re-discussed among the researchers.

In the following example, the underlined words indicate a potential semantic shift in the researcher's question.

Example 2

Participant: *I have already given up on passing on to them* ***everything I prepare*** *because that has hardly ever worked out. So I rather hope that* ***about a quarter*** *of what I say* ***sticks*** *in their heads ... that maybe in the next class they will be able to repeat or answer a few follow-up questions ...*

Researcher: *So if it* ***sticks, at least that quarter****, that means that you have something to follow up in the next class that they will respond to your questions, that they will actually remember the* ***subject matter****, what you had done*?

The student's wording *everything I prepare* is paraphrased by the researcher as *subject matter*. This represents a semantic reduction, and thus a semantic shift in the statement—everything the student prepares for her class need not, in terms of content, relate to the subject matter. The student's wording *about a quarter sticks* is paraphrased by the researcher as *sticks, at least that quarter*. The paraphrase carries an implicit assumption that if less than a quarter is remembered by pupils, it would be impossible to follow up on the previous lesson in the next one. The researcher thus introduces a potentially new link, a presumption about "if-then" causality.

Category 4: Strongly influencing questions

These questions include words the informant has not said, and explicitly introduce *a completely new topic or link* into the interview. These questions contain an *interpretation* of the student's statement.

In the first example, the informant describes her experience in class where pupils are unable to solve a Math problem without her support (specifically her physical presence and non-verbal signals). The researcher's response was to encourage the informant to think about whether she tried to change, to *eliminate*, this behavior in the pupils in any way. However, such considerations were not present in the informant's statements. By introducing a completely new topic, the researcher heavily influences the content.

Example 1

Participant: … *they are not able to solve the problem without me sitting there with them and nodding yes ... it seems to me a lot of kids have problems with this.*
Researcher: *And do you remove that somehow...?*

A similar situation is also illustrated in the second example. The researcher introduces an explicitly new topic in the interview—taking into account what the kids are like in preparation for classes.

Example 2

Participant: … *I think that I notice that, what the kids are like and what they do in the class. Of course I don't notice all of them in one class ... but I had singled out a few people* [pupils] *I asked* [other teachers] *about...*
Researcher: *And then when you know, or you probably must have known, then what—did you take it into account in preparation or how did you proceed?*

5.4.2 Discussion on the categorization of questions

Variations in 'clean' questions and Categories 1a, 1c and 2a refer to what Lawley and Tompkins (2005) describe as a conversational conception of clean language. 'Clean conversation' (dialogue) differs from the use of clean language in that:

1. in 'clean conversation', the interviewer intends to achieve something (for themselves); in the context of research, the intent of a researcher is to explore the informant's experience in a certain "framework", created by the research question in the interview;
2. it happens in the real world, and therefore it is possible for the interviewer to assume more than in the metaphorical landscape; for example, in clean conversation in the ordinary world we assume that the laws of physics apply, whereas this need not be the case in the interviewee's metaphorical landscape (cf. *law of cartoon physics*, Harland, 2012a, p. 56);

These sub-categories (1b, 1c, 2a) refer to what is called, in the context of exploring experience in exposure interviews (pertaining to methods of examination of experience that is the closest possible to the first-person perspective), the deliberate inconsistency of a question (Hurlburt & Schwitzgebel, 2007, p. 15). However, this idea goes partially against the clean language philosophy. Hurlburt & Schwitzgebel claim that if a certain experience is sufficiently "robust", then asking a question repeatedly and differently (inconsistently) will lead to a sharpening of the meaning of the experience (Hurlburt, 2011, p. 161). From the perspective of clean language, we can agree with this only in relation to the repetition of a question (cf. Harland, 2012b) since, as Hulburt himself says, each of these questions has its advantages and disadvantages and, from the perspective of clean language, the greater the consistency of the question, the more the disadvantages are minimized.

Hurlburt thus assumes that our experience can be "robust" and we can vary questions to describe the experience, and place the emphasis on "playful" phenomenological variations in the questions (cf. Ihde, 2012). This means offering a number of possible questions that enable a deeper exploration of the experience from different angles. By contrast, Clean Language assumes a potential for "fragility and fluidity" in some moments of inner experience, which may fall apart after even the slightest influence on content.

5.4.3 Categorization of comments

Category 1: Positively influencing comments

These are comments that strengthen the relationship with the student and encourage open and detailed exploration of the structure of their own experience. Although these comments usually also include words the informant has not said, they focus on the process of the interview, not the content of the interview.

(a) Showing understanding and personal involvement

The research analysis categorized only the more apparent expressions of active listening. One-or-two-word expressions such as hmm and oh, good were not coded as comments and thus do not influence the overall frequency of the comments in this Category.

Example 1

Participant: *Is like a light bulb … for many people is not clear.*

Researcher: *Clear, clear. Clear, light bulb. Yes, yes, yes.*

Example 2

Participant: *I feel as sun in the middle of classroom.*

Researcher: *Hm, hm, hm, OK, good.*

(b) Stabilization of attention through a literal replica

Example 1

Participant: *Yeah, in physics, the relationship between understanding and learning, I really think it's easy—if there's no understanding, there's no learning I think.*

Researcher: *No understanding, no learning* {nodding}.

(c) Assurance leading to openness

Example 1

Participant: *It's illogical what I say. I know … I should only use the correct term, that we learned in school.*

Researcher: … *it doesn't have to be completely logical ... if something is not right, you maybe correct yourself or don't correct yourself* {gesticulating} … *simply if it isn't exactly as you have it, it's not a problem.*

Category 2: Context-bound comments—neutral

(a) *Pre-framing the interview*—explanation of what the research is about, how the interview will be conducted, etc.

Example 1

Researcher: ... *I will be asking something, you will try to reply, just note that some of the questions may sound a bit strange ... whatever crosses your mind, whether it's a thought, a feeling, some whatever, it belongs here, that's why we're here ...*

(b) Refining the instructions—these comments are the researcher's attempt to direct the participant's attention so that it conforms with the research question. No new content is introduced, only a developing of what has already been said.

Example 1

Researcher: *I would come back to you saying you explain it to them in very simple terms.*

Example 2

Researcher: *Elaborate.*

(c) Comment associated with instruction/technique

Example 1

Researcher: … *we would try automatic writing, which means that on the topic I give … you will write for three minutes without having anything for preparation, and what is important is that your hand must not stop...*

Category 3: Influencing comments

These are comments that contain words the informant has not said and that introduce *potentially new topics or links, or a semantic shift* into the interview. These comments typically contain a *paraphrase* of the student's statement.

Example 1

Participant: *But I know that when I go away, some of them solve the problem, and then I come back and say yes, great, let's go on, or* [I say] *I think we could do it a bit differently, a bit better or it's not supposed to be this way.*

Researcher: Y*eah, yeah, so actually you say it something like you don't say, yeah, this is wrong but let's try it like...*

In this interview, the researcher's paraphrase introduces a potentially new topic into the interview by emphasizing the level of feedback in the student's statement. As is apparent from previous statements, the student particularly emphasizes the influence of her presence next to pupils when they have to solve a mathematical problem: "without attracting attention, I go, for example, to have a sip of water and I try to go away to make them try on their own..., not the way of providing pupils with feedback."

Category 4: Strongly influencing comments

These are comments that contain words the informant had not said and that *explicitly introduce a completely new topic or link* into the interview. These comments contain an *interpretation* of the student's statement. In the first example, the first part of the utterance is a summary of the contents of the informant's statements so far, (this is not influencing because it contained words and semantic links used by the informant. However, in the second part of the utterance, the researcher has interpreted the student's statement. The researcher thus created a new semantic link with an unexpected situation and confirmation of the teacher role.

Example 1

Researcher: *We talked about unexpected situations, about situations which throw you off your teacher role and return you to the other one. Now actually, in turn, again an unexpected situation which reassured you in that role.*

In the second example, it is a form of evaluation of the student's statement and a presentation of the interviewer's own opinion. Both the evaluation and the opinion introduce a new semantic perspective, new links, into the interview.

Example 2

Participant: … *better if they admit they don't understand it, and they do admit that in the seventh grade … then I tried to explain that further or explain it in a different way. Which I think is probably better, but that's the seventh grade, not sixth grade.*

Researcher: *Hmm, never mind, it's in general like that, I think that also in the sixth class, even if this happened, it would probably have the same course.*

5.4.4 Discusion of the categorization of comments

Paradoxically our divergence from the traditional concept of Clean Language interviewing in research, which deliberately does not work with comments, is most evident in the comments. Categories 1a and 1c could seem undesirable from the perspective of traditional Clean Language interviewing, while 1b best corresponds to the philosophy of Clean Language interviewing.

The reason is that Category 1b uses only the first two phases of the syntax of Clean Language interviewing—the third part is not used (for details on syntax see Chapter 5.1 *Conducting interviews using Clean Language*). By including only two phases of syntax, the question is missing and the repetition is only a declarative sentence, i.e. a comment. The comment does not include anything that would appear to contaminate the respondent's statement, but, on the contrary (from our experience), this repetition reinforces the informant's "immersion" in their own experience. This technique is commonly used in other methods of interviewing close to the first-person position (cf. Gendlin, 2004 or Petitmengin & Bitbol, 2009). The purpose of most of the other comments in Categories 1 and 2 is either to reinforce the relationship between the informant and the researcher or to frame or pre-frame the space for the research interview. This contributes to creating an atmosphere of trust and a secure interview environment. Understandably, these comments can be perceived to have a suggestive form but they are suggestive in relation to the process, not the content of the interview. Categories 3 and 4 are comments we can label as undesirable in the context of an interview because they unnecessarily stifle topics brought up by the informant.

In summary, we can say that positively influencing comments help obtain data from a position close to the first person. Neutral comments help maintain the research interview process in desirable dynamics. Influencing and strongly influencing comments are undesirable in an interview because they have the potential to alter the focus of the interview so that it is not in harmony with the informant's previous statement(s).

5.5 Quantitative analysis

In this section we proceed to the quantification of the data analyzed. Researchers 1 and 2 conducted half of the research interviews (22 out of 44) asking on average 82% completely 'clean' questions (Category 1) in a randomly selected interview. Researcher 3 conducted about a quarter of the interviews, but used n only 24% of all questions asked in the interview analyzed were Category 1 'clean' questions. A representative of the researchers who conducted about a quarter of the research interviews combined (Researcher 4) used Category 1 questions in 57% of cases (Table 5, Figure 6). With some degree of bias, it may be deduced that these statistics also represent the level of clean-ness evident in the clean language used in the research interviews that were not analyzed.

Table 5
The frequency of questions in each category of clean-ness in the interviews analyzed (absolute numbers)

Clean-ness rating of questions				
	Interview: researcher 1 + Karel	Interview: researcher 2 + Ema	Interview: researcher 3 + Františka	Interview: researcher 4 + Ema
Category 1: Classically clean	57	65	20	66
Category 2: Contextually clean	11	9	8	8
Category 3: Mildly leading	1	5	22	32
Category 4: Strongly leading	0	1	32	10
Total	69	80	82	116
Interview length	80 minutes	95 minutes	85 minutes	77 minutes

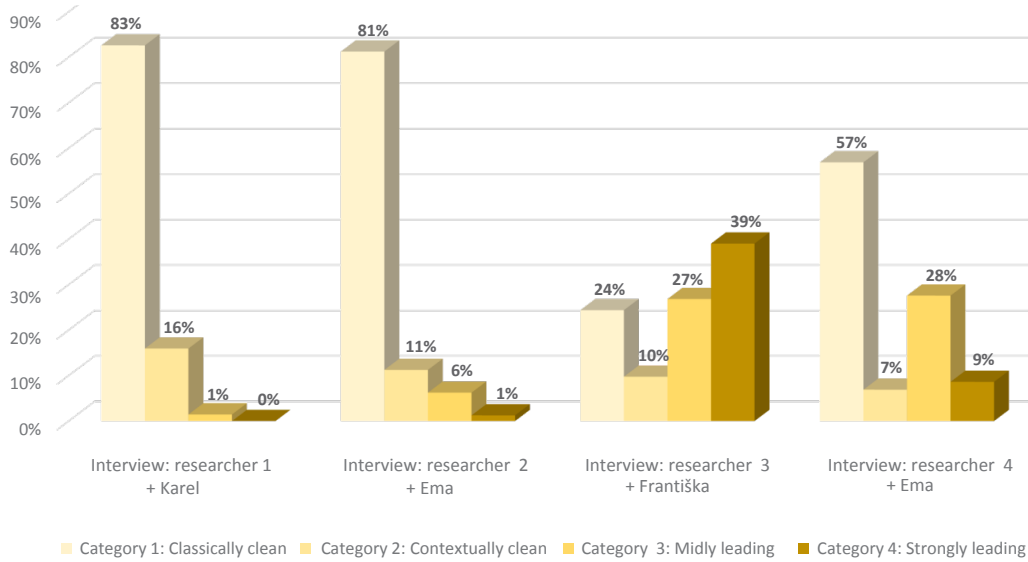

Figure 6. The frequency of questions in each category of clean-ness in the interviews analyzed (percentage)

As far as the analyzed comments are concerned, Table 6 and Figure 7 show that Researcher 3 and Researcher 4 had a higher number of comments in Categories 3 and 4 than the first two researchers, who are more experienced in conducting Clean Language interviewing.

Table 6

The frequency of comments in each category of clean-ness in the interviews analyzed (absolute numbers)

Clean-ness rating of comments				
	Interview: researcher 1 + Karel	Interview: researcher 2 + Ema	Interview: researcher 3 + Františka	Interview: researcher 4 + Ema
Category 1: Positively influencing comments	18	38	26	34
Category 2: Context-bound comments	12	15	8	22
Category 3: Influencing comments	2	0	15	15
Category 4: Strongly influencing comments	0	0	26	15
Total	**32**	53	75	86
Interview length	80 minutes	95 minutes	85 minutes	77 minutes

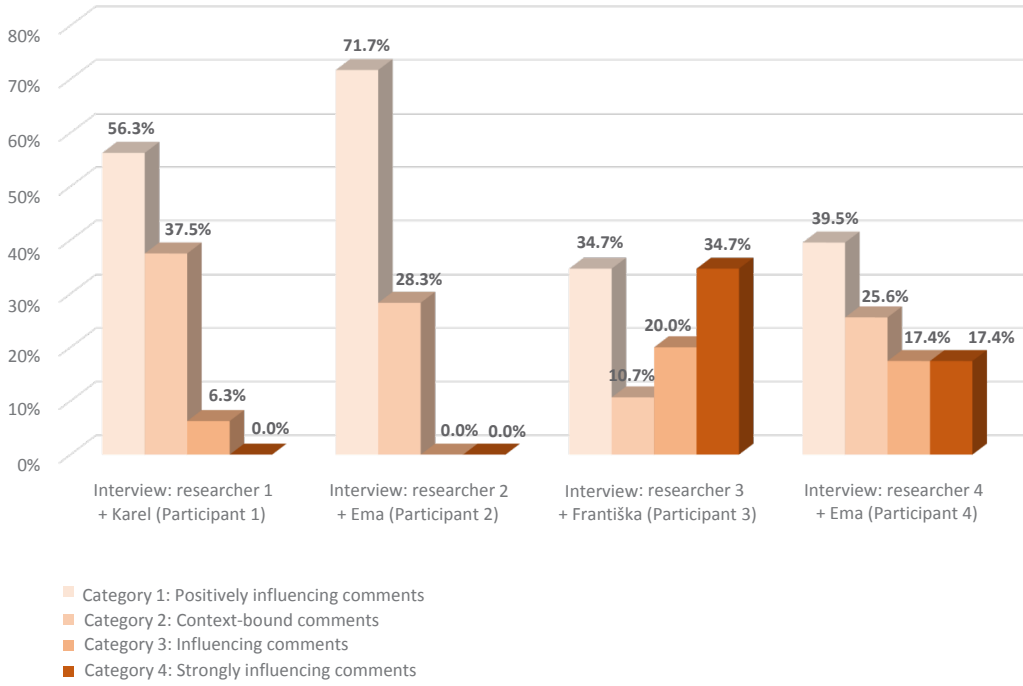

Figure 7. The frequency of comments in each category of clean-ness in the interviews analyzed (percentage)

5.5.1 Discussion of the quantitative analysis

Overall, it can be said that Researchers 1 and 2 not only used more Category 1 questions but also significantly fewer Category 3 and 4 comments. On the contrary, Researchers 3 and 4 used 'clean' questions less and used significantly more Category 3 and 4 comments. We interpret these results in relation to the level of experience of the researchers in applying clean language to interviews. Researchers 1 and 2 have more intensive experience with the use of clean language, not only in research interviews but also in coaching and therapeutic interviews, interviews focused on reflective practice. This leads us to the conclusion that, in order to master the application of clean language in research interviews, training for researchers is necessary. This should include not only developing an understanding how the method works but also repeated practice in asking questions, supported by feedback from a more experienced practitioner. It can be assumed that more intense training will also lead to a reduction in the number of Category 3 and 4 comments. For researchers not sufficiently familiar with a method, it is important to concentrate when conducting interviews on the exact process of asking questions. This may detract the researcher from the interviewee's lived experience and, at the same time, the informant's attention may be detracted from the topic reflected on.

Example 1

So how... I don't know how to articulate this but what does it look like?

Example 2

Well, um, what would that be, um, I don't know what to call it, I don't want to call it indents or something similar, simply what is that you'd like to achieve, like this?

5.6 Conclusion

Overall, there are a number of conclusions that can be drawn from our evaluation of the use of Clean Language interviewing for data collection in research.

- We defined the categories and sub-categories of clean-ness (1 to 4) for the questions asked. Further research would be necessary, which would also proceed inductively, and which could independently identify more categories. Such categories could be subsequently compared, which could lead to a refinement of the categories. The refined categories could then be used for deductive coding of interviews for the purposes of evaluating the interviews conducted.
- We defined the categories and sub-categories of clean-ness (1 to 4) for the comments used.

- We discussed the nature of the categories of questions and comments in relation to other interviewing methods that are also close to the first-person perspective in practice.
- We quantified each category of questions and comments for four interviews to gain an overview of the extent to which we were able to adhere to clean-ness in data collection. When interviewing using clean language, less experienced researchers had not only a lower number of Category 1 clean questions but also a significantly higher number of Category 3 and 4 comments than those researchers who had undergone longer training.
- A seemingly trivial finding, yet important from our perspective, revealed by the quantitative analysis t was that the quality of an interview (and thus also the expected quality of data) depends on the level of experience of the researchers.

A useful extension of the results of the evaluation could be the use of conversational analysis. This could help us find out how questions and comments influence informant statements. For example, we judge from subjective observations that informants are being educated while being interviewed. Researchers repeatedly experienced that, after a certain number of interviews, informants were able to predict what question the researcher would ask. They would often ask and answer the question themselves.

We assume that this experience goes hand in hand with becoming more sensitive to descriptions and the reflection of one's own experience. This could be seen as a natural effect of long-term use of Clean Language interviewing. In the context of the examination of the experience of human consciousness, in some interview methods, for example, descriptive experience sampling (Hulburt, 2011), informants are trained to be able to capture their inner experience. This is an inspirational idea because it not only educates the researcher but also the participant in how to approach their experience. It seems that Clean Language is indirectly responsible for this.

Our experience shows that, at the beginning of an interview, 'clean' questions are perceived as unnatural by the informants (they are puzzled by what they perceive as 'strange' questions). The informants then tend not to focus on the content of their experience but instead comment on the actual question (This often happened with the question "What kind of X is that X?").

However, in our concept of Clean Language interviewing, the clean-ness of a question is not the same as the naturalness of a question. If we equated clean-ness with naturalness, the informant could perceive some questions as 'clean' even though they contain many assumptions. It is not important for a researcher to explain to the informant which question is clean and which is not. In the interview process, the informant gradually (even subconsciously) learns the interviewing logic and becomes more sensitive to their own experience. As discussed above, this also brings us, the researchers, closer to the relational and contextual concept of clean-ness in an interview.

Sixth Chapter

TACIT KNOWLEDGE OF STUDENT TEACHERS AND TEACHERS FROM A RESEARCH PERSPECTIVE: AN OVERVIEW STUDY

Eva Minaříková, Vlastimil Švec

At present, it is clear that when solving practical problems, professionals use not only the external theories and professional literature but also their 'hidden' knowledge acquired through experience and cooperation with colleagues and other professionals. Often the use of this type of knowledge is not conscious. This knowledge is known as tacit knowledge. In this chapter, we focus on approaches to research into the tacit knowledge of student teachers and teachers. First, we discuss the concept of tacit knowledge and refer to various attempts to define it.

6.1 Towards a definition of tacit knowledge

The emergence of the term tacit knowledge is usually associated with the name of Michael Polanyi (1891–1976), who claimed that we know more than we can articulate. For example, we recognize a certain person among many others but we may not be able to say how we recognized that person, we cannot put it into words (Polanyi, 1983, p. 4).[100] Bohm (1992, p. 24) reminds us that no other knowledge would make sense without tacit knowledge:

> *When we talk, most of the meaning is implicit or tacit. In fact, even to talk or to think—although thinking may be explicit as it forms images—the actual activity of thinking is tacit. You cannot say how you do it. If you want to talk across the room, you cannot say how it comes about. It unfolds tacitly.*
>
> (Bohm, 1992, p. 24)

In Schön's (1995) view, we often cannot say what it is that we know. When we try to describe it, we find ourselves at a loss or we produce descriptions that are obviously inappropriate (in Kinsell, 2007 p. 407).

[100] The idea of tacit (hidden) knowledge based on experience is, in fact, much older. Aristotle drew a distinction between theoretical (epistémé, nous, sophia), practical (phronesis), and productive (techne) virtues, which can be understood as a first systematic classification of tacit and explicit forms of knowledge.

Even the concept of tacit knowledge is difficult to define clearly. Sternberg, Grigorenko, Gil & Hedlund (2000, p. 313) state that the concept of tacit knowledge is a natural concept, which differs from nominal concepts. Therefore, they define it by specifying its characteristic features (Sternberg, Grigorenko, Gil & Hedlund, 2000, pp. 314–316), i.e. tacit knowledge:

- is acquired without the support of the environment;
- is procedural;
- is practically useful;
- includes coherent relationships between its previous features.

Sternberg and colleagues arrive at a number of conclusions, some of which are relevant to our current study (Sternberg, 1999, pp. 231–234):

- tacit knowledge is not readily available for introspection;
- tacit knowledge is acquired largely from experience, preferably from the environment where the tacit knowledge will later be needed;
- tacit knowledge is best acquired in an environment that fosters enquiry and that encourages criticism of ideas but respect for the people who have proposed the ideas;
- unusual situations are often better opportunities for acquiring tacit knowledge.

When considering tacit knowledge and its research, it is important to take into account its complementary counterpart—explicit knowledge. Tacit knowledge can be considered a source of individual differences. However, as soon as knowledge is made explicit and even codified, it simply ceases to serve as an equally important source of individual differences (Sternberg, 1999, p. 232). Explicit knowledge has these characteristic features:

- it is acquired with the support of the environment, e.g. using textbooks, professional literature, teacher's instructions;
- it is procedural and, unlike in the case of tacit knowledge, the individual is aware of the procedure;
- it is useful, thus making a purposeful link with tacit knowledge;
- it is acquired by individuals mostly in standard situations.

A number of studies can be found in the literature that compare the characteristics, properties and expressions of tacit and explicit knowledge. For example, Panahiu, Watson and Partridge (2012) compare the features of these kinds of knowledge (see Table 7).

Table 7
Characteristics of tacit and explicit knowledge (Panahiu, Watson, & Partridge, 2012, p. 1096)

Tacit knowledge	Explicit knowledge
• Highly individual and personal. • Learnt through experiences, skills, observation, intuitive feeling, mental modes, beliefs, and values. • Unstructured, difficult to see, codify, estimate, investigate, formalize, write down, capture and communicate accurately. • Unconscious knowledge. • Job specific, context-specific. • Transferred through conversation and narrative (story-telling, discussions, etc.). • Know-how. • Experts' knowledge.	• Articulated, structured and documented. • Learnt through instruction, recitation, or repetition. • Easy to recognize, codify, formalize, store, share, communicate, and use. • Can be found in books, journals, databases, etc. • Consciously accessible. • Know-that, know what. • Academic knowledge.

Sternberg (1999, p. 232) draws attention to the mutual interaction of tacit and explicit knowledge in solving practical situations and problems. For example, a decision whether a certain explicit rule should be applied to a particular situation requires tacit knowledge based on experience of solving profession-related situations. Tacit knowledge may become explicit knowledge depending on the extent to which an individual is aware (e.g. in self-reflection). In this sense, the relationship between tacit and explicit knowledge can be understood as a continuum between the tacit and explicit dimensions of knowledge (cf. Connell, Klein & Powell, 2003; Švec, 2011).

The selected approaches to defining the concept of tacit knowledge listed here were subjected to critical analysis by the research team. The criticism was aimed at the traditional paradigm according to which knowledge is shaped inside the body of a person, specifically in their brain. New findings from cognitive psychology, neuroscience and philosophy of mind, however, point to an alternative paradigm, which, put simply, understands knowledge as a cognitive, dynamic structure that is created in the interaction of the individual with the environment, and is therefore not limited to their head and body (Šíp & Švec, 2013). This paradigm is explained in detail in Chapter 1 of this monograph).

The next section of this chapter provides an overview of selected research studies focused on the tacit knowledge of student teachers and teachers. A number research studies, however, do not use the concept of tacit knowledge but the concept of practical knowledge (of a student teacher and teacher). This concept of practical knowledge quite often appears in studies from the field of teacher education. Based on a number of studies, Meijer, Zanting & Verloop (2002, p. 407) characterize the content of the concept of practical knowledge of a teacher as:

- personal;
- situated (applied in situations);
- based on reflection of experience;
- mainly tacit;
- content-related.

It can be inferred from these characteristics that a teacher's 'practical knowledge' is tacit in nature.

6.2 Reviewing aims and methodology

The objective of this section is to provide an overview of research studies of the tacit and practical knowledge of (student) teachers. The focus is on the following questions:

a) How is tacit knowledge and practical knowledge of (student) teachers conceptualized in research studies?

b) What aims or research questions guide the authors of these studies?

c) What research methods do the authors apply and what research samples do they use?

d) What are the conclusions of these research studies?

To identify relevant studies, we have used the Web of Science database, which contains highly acclaimed international journals. The search was conducted in February 2016 and was limited to the years 2000 to 2015 in order to cover the latest trends in the monitored area. Keywords included tacit/implicit/practical knowledge (or knowing) in combination with the words "teacher" and "research".[101] The search returned 288 'entries' which were then 'sorted' or categorized manually.

Sorting took place in two stages, first on the basis of formal criteria (source, language of the study) and the abstract (27 studies were shortlisted), and subsequently on the basis of reading the full texts of the studies. Only studies that met the following criteria were included in the overview:

- journal study;
- written in English;
- reporting empirical research;
- research explicitly dealt with tacit/implicit/practical knowledge;
- tacit/implicit/practical knowledge of teachers or student teachers.

The 10 studies included in the final analysis are listed in Table 8 at the end of this chapter.

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[101] The exact search was as follows: TS = ("tacit knowledge" OR "tacit knowing" OR "implicit knowledge" OR "implicit knowing" OR "practical knowledge" OR "practical knowing") AND TS = (research) AND TS = (teacher*). TS corresponds to category Topic, which in the Web of Science means search in the name, abstract and keywords.

6.3 Results of the review

6.3.1 How is tacit knowledge and practical knowledge conceptualized?

Seven of the selected studies rely on the concept of practical knowledge. These seven studies all consider the personal involvement of the individual as an important feature of the teacher's practical knowledge. Feryok & Fryde (2012) and Sun (2012) even use this feature in naming the concept itself, i.e. personal practical knowledge.

Practical knowledge involves complex cognitive structures, which are difficult to define. In the study by Clemente and Ramírez (2008), practical knowledge is not defined at all. The authors consider the levels of representation of this knowledge—examples of a rule, practical rules and principles. Other authors define the concept quite broadly. Within this range of views, practical knowledge is understood as:

- teachers' cognitive state, i.e. beliefs, values and motives that guide their actions (Gholami & Husu, 2010, p. 1520);
- two kinds of knowledge—(1) knowledge and beliefs, (2) interactive cognition (Schepens, Aelterman & Keer, 2007, p. 459);
- knowledge which is experiential, embodied, and reconstructed out of the narratives of a teacher's life; this includes, for example, rules, principles, images, metaphors (Sun, 2012, p. 761).

Practical knowledge as conceived by Feryok & Pryde (2012) also has a figurative (narrative) dimension.

Only two studies provide some guidance as to what exactly can be 'classified' as practical knowledge. These studies attempt to operationalize the concept of practical knowledge through its characteristics or sources:

- characteristics: action-oriented, context and person-bound, tacit, integrated, a filter based on which the beliefs of a student teacher operate (Melville, Campbell, Fazio, Stefanie & Tkaczyk, 2014, p. 754),
- sources: situation, personal, social, experiential, and theoretical (Levin & He, 2008, p. 55).

Three studies deal with research into the tacit knowledge of teachers. Two of them are based on Polanyi's metaphor of tacit knowledge, i.e. we know more than we can tell (Brevik, 2014; Rämä & Kontu, 2012). Elliott, Stemler, Sternberg, Grigorenko & Hoffman (2011, p. 85) follow up on Sternberg and define three key characteristics of tacit knowledge: (1) it is acquired without instructions from others, (2) it is procedural in nature, and (3) its utilization is integrally linked to one's own goals.

In the research studies analyzed, defining the concepts of "tacit knowledge" and "practical knowledge" conforms to the traditional paradigm. The authors of these studies agree that the tacit and practical knowledge of teachers (student teachers) is individual, based on their experience and that it involves complex cognitive structures.

6.3.2 What aims or research questions guide the authors of these studies?

The studies we analyzed often focus on the expression, content and character of tacit knowledge. They examine, for example, how teachers express their tacit knowledge (Clemente & Ramirez, 2008) or how key images play a role in the personal practical knowledge of a teacher (Feryok & Pryde, 2012; Sun, 2012). A study of a teacher of autistic children (Rämä & Kontu, 2012) focuses on expressions of tacit knowledge in actions.

Another group of studies consists of those dealing with factors influencing tacit knowledge (e.g. Levin & He, 2008; Melville et al., 2014; Sun, 2012). Changes in tacit knowledge in the context of a certain intervention are addressed by four studies—three in the area of teacher education (Elliott et al., 2011; Melville et al., 2014; Schepens et al., 2007), and one in a professional development programme (Brevik, 2014). These studies deal with topics such as activation of tacit knowledge (Brevik, 2014) or reasoning about practical knowledge (Gholami & Husu, 2010).

As regards the target group of each study, the majority focused on teachers (six cases), less on student teachers (three studies). Only one study focused on the comparison of these two groups (Elliott et al., 2011).

6.3.3 What research methods do the authors apply and what research samples do they use?

In selecting a research approach, eight studies opt for the qualitative approach, one for the quantitative approach, and one for a mixed approach. The sample usually contains only very small numbers of respondents (three studies work with one teacher, two studies with two; one study with 10 and one with 21 participants). An exception is two studies with a large number of respondents (94 and 664 participants, respectively). The number of teachers is not mentioned in one case because the case, and therefore also the unit, was a school (seven took part in the research).

Various methods are used for data collection in line with the focus of the study. Most frequently, they focus on teachers' knowledge and thinking (cognitions) and therefore use interviews (in six cases) and stimulated recall (three cases; either a video or audio recording of teaching together with the researcher's field notes are used for recall), or written statements from the teachers on a given topic. An interesting approach was chosen by Elliott et al. (2011), who used hypothetical vignettes of classroom situations for which various solutions were provided. Respondents were to evaluate each solution on a Likert scale. The results were then evaluated quantitatively.

6.3.4 What are the conclusions of the research studies?

The analyzed studies focused on the tacit (implicit) or practical knowledge of teachers and produced interesting results. It became apparent that expressions of tacit knowledge in the actions of a teacher (specifically in communication with autistic pupils)

are difficult to identify—although they can be partially inferred from non-verbal expressions (Rämä & Account, 2012). By contrast, tacit knowledge can be made more explicit in teachers' expressions, including for the purposes of personal development (Brevik, 2014).

It is worth noting that the practical knowledge of teachers is usually identified on three levels (which, however, make up a continuum). It is the expression of practical knowledge using specific examples (rules, activities, materials, etc.), less specific practical rules or more or less decontextualized principles (Clemente & Ramírez, 2008). Feryok and Pryde (2012) based their research on the assumption that the personal practical knowledge of a teacher is made up of images, which guide actions. They identified three illustrations of such images in a specific example of an English teacher: (1) teacher as a guide for pupils; (2) learners in search of self; and (3) everyday English. Another study (Gholami & Husu, 2010) suggests that teachers justify their practical knowledge with two types of arguments—moral ethos (mainly the idea of care) and the notion of "what works".

As regards factors influencing tacit and practical knowledge of teachers, the studies note in particular an individual's professional biography and professional education (Melville et al., 2014), identity and cultural heritage (Sun, 2012) or K-12 experience (curricular and extracurricular; Levin & He, 2008). The length of practice is also important, as suggested by Elliott et al. (2011). They compared the different ways experienced teachers and student teachers approached the evaluation of model solutions for situations described in the vignettes. These groups did not differ in their evaluations of good solutions, however, they differed significantly in their evaluations of poor solutions. Poor solutions were more difficult for student teachers to identify and were therefore more often evaluated by them as good solutions.

Research studies focusing on student teachers and their practical experience in teacher education confirm that changes occur in their tacit and practical knowledge (e.g. Elliott et al., 2011). The study by Levin and He (2008) highlights the influence of teacher education on the practical personal beliefs of student teachers in general (and thus, by extension, to their practical knowledge). However, we cannot rely solely on the ethos of a Faculty of Education or a Teacher Training Institution to influence student teachers' tacit knowledge. Melville et al. (2014) demonstrated that, even though their students studied and did their practicum in a context that emphasized research-oriented teaching of Science, this was not significantly reflected in the students' actual teaching attempts. As in other studies (Schepens et al., 2007), the authors point out that the practice must be accompanied by reflection and that the mentor's support is crucial in order to influence student teachers' tacit knowledge and beliefs related to teaching in general.

6.4 Discussion and conclusions

The concept of practical knowledge is the one found most frequently in the research studies analyzed. This is knowledge associated with the individuality of a (future) teacher. Some authors (Feryok & Pryde, 2012; Sun, 2012) even refer to the concept itself as 'personal' practical knowledge. However, the authors of the selected studies define both practical knowledge and the concept of tacit knowledge ambiguously. Unclear definitions can make the research of tacit/practical knowledge of student teachers and teachers more difficult. A number of research studies analyzed assume the existence of tacit/practical knowledge without defining these concepts in an operationalized form. Most studies identify signs or manifestations of tacit/practical knowledge but the level of such knowledge is sporadically measured (Elliott et al., 2001). Overall the studies refer almost exclusively to the Polanyi or Sternberg' characteristics of this kind of knowledge.

Most of the selected research studies are based on a qualitative research design; only one is quantitatively oriented using the inventory of tacit knowledge (Elliott et al., 2006) while one other is eclectic or 'mixed' (Melville et al., 2014), combining video recordings of teaching that are analyzed using a categorical system and in-depth interviews. The choice of qualitative design is justified, especially if we accept that tacit/ /practical knowledge is rooted in experience. In other words, we might reasonably assume that statements about experience are a means of tracing manifestations of tacit/ /practical knowledge.

The research studies analyzed are based mainly on interviews and stimulated recall. These are individual interviews (semi-structured and in-depth) and, in one case, a group interview (Brevik, 2014). Three of the research studies analyzed use case studies (Clemente & Ramírez, 2008; Feryok & Pryde, 2012; Sun, 2012) which, as a method for revealing hidden sources of tacit/practical knowledge, appears encouraging.

It is clear from the research studies that shaping and developing the tacit/practical knowledge of teachers is influenced by a number of factors, ranging from the identity and culture of the teacher (and therefore also the culture of the environment in which the teachers live and work) through their professional biography and education to the length of teaching practice. Despite the variability of these factors, we believe that the tacit/practical knowledge of teachers is more stable than the same knowledge in student teachers. Therefore, research findings indicating differences in the levels of tacit/practical knowledge between student teachers and more experienced teachers are not surprising. Of the studies analyzed, one study (Elliott et al., 2011) highlights these differences. It presents an interesting finding: student teachers and experienced teachers did not differ in the tacit knowledge they needed to identify correct (good) solutions to pedagogical situations although they differed in the identification of incorrect ones. These results can be interpreted in the light of the construct of negative

knowledge (e.g. Gartmeier et al., 2008), which refers to knowledge about what not to do, and forms part of effective actions by experts in different domains—allowing them to avoid deadlocks and inappropriate practices.

The tacit/practical knowledge of student teachers is shaped during their teacher education; metaphorically speaking it crystallizes. However, for this to occur, certain favorable conditions are necessary. Two of the studies analyzed showed that these conditions included support by mentors for students' actions in classes (knowledge sharing) and continuous student self-reflection (Schepens et al., 2007; Melville et al., 2014). Student teachers' personal beliefs also play a role in the process of shaping tacit/practical knowledge, as demonstrated in the research results of one study (Levin & He, 2008).

The studies analyzed showed that the concept of practical knowledge of (future) teachers is common in teacher research (although, as yet, it has not been unambiguously defined), whereas the concept of tacit knowledge is only establishing itself in this field, unlike, for example, in the field of knowledge management. This may be because of the smaller number of research studies into tacit knowledge in teachers and in particular student teachers. In the Czech Republic, such research studies, but also theoretical studies, are rare (e.g. Švec, 2005). Šíp (2016, see Chapter 1 in this monograph) considers the vagueness of the very concept of tacit knowledge as one of the causes of this lack of research. However, this situation is beginning to change. The tacit nature of the knowledge of an expert teacher is emphasized in an extensive research publication by Píšová et al., 2013. New approaches (based on Clean Language) to research into the tacit knowledge of student teachers are also the focus of a study by Nehyba and Svojanovský (2016) and of the empirical chapters in this publication (specifically Chapters 7, 8 and 9).

Table 8
An overview of research studies into tacit and practical knowledge of (student) teachers

Authors	Concept	Objective of the study / / Research questions	Research methods; Research sample	Selected results, Conclusions
Gholami & Husu (2010)	Practical knowledge	To explore how teachers justify their practical knowledge	Qualitative research; semi-structured interviews, stimulated recall based on the researcher's notes and audio recordings of classes; 2 experienced primary school teachers.	The teachers justify their practical knowledge using two types of arguments—moral ethos and what works.
Schepens, Aelterman, & Keer (2007)	Practical knowledge	To explore changes in interactive cognition (as part of practical knowledge) in students' teaching practicums	Qualitative research; stimulated recall based on recordings of classes—three times in the course of student teachers' teaching practicums; 10 student teachers	Changes are dependent on the student's individuality; students need the support of a mentor and the continuous reflection of their activities. The general trend of thinking about the subject matter was changed to thinking about pupils, their learning needs and understanding.
Brevik (2014)	Tacit knowledge	To explore whether and how teachers' tacit knowledge about their teaching supporting pupils' reading comprehension is activated (made explicit) over the course of a professional development program	Qualitative research; written narrations concerning successful teaching of reading comprehension, group interviews on the same topic; 21 secondary school teachers who have participated in a professional development program focused on the teaching of reading comprehension	Teachers' tacit knowledge was made explicit through narratives and through growing metacognitive awareness of one's own knowledge.
Clemente & Ramírez (2008)	Practical knowledge	To explore how teachers express their practical knowledge	Qualitative research—multi-case study; in-depth group interview on "how you teach reading"; 7 schools (1 school = 1 case)	Teachers' narratives express three levels of their practical knowledge, which form a continuum based on the degree of specificity and decontextualization: 1. examples of rules applied to teaching, materials and activities, 2. practical rules, 3. principles.

Table 8 (continue)

Authors	Concept	Objective of the study / / Research questions	Research methods; Research sample	Selected results, Conclusions
Elliott, Stemler, Sternberg, Grigorenko, & Hoffman (2011)	Tacit knowledge	To compare tacit knowledge of student teachers and experienced teachers and the influence of one-year training of teacher skills on the level of tacit knowledge	Quantitative research; inventory of tacit knowledge: respondents evaluated the pedagogical situation and proposals for their solution on a Likert scale (good solutions—poor solutions); 501 student teachers and 163 experienced teachers	Student teachers and experienced teachers differed in tacit knowledge, which helps them identify poor solutions of situations. Differences in identifying good solutions were not demonstrated. One year of professional training the students had attended reduced the differences between novice teachers and experienced teachers in identifying poor solutions to situations.
Rämä & Kontu (2012)	Tacit knowledge	To explore how the teacher's pedagogical tacit knowledge manifests itself in the teacher's communication with autistic pupils	Qualitative research; ethno-methodological approach—video recording of teacher's communication with six people with autism in authentic situations, supplemented by interviews with the teacher; 1 teacher	Tacit knowledge of teachers in communication with children with autism is difficult to reveal. It can be deduced from the non-verbal body expressions of the teacher.
Feryok & Pryde (2012)	Personal practical knowledge	Explore the key images that form part of the teacher's personal practical knowledge	Qualitative research—a case study of one of the authors; observation, informal interviews with the teacher, stimulated recall, class blog; data collection took place over one entire school year; 1 teacher of English as a foreign language	Three main images were found in the personal practical knowledge of the teacher: (1) teacher as a guide for students; (2) learners in search of self (in an unfamiliar learning environment); and (3) everyday English. The practical experience of the teacher is essential for the development of personal practical knowledge. However, the teacher also uses theory when learning and applying new principles and methods of teaching.

Table 8 (continue)

Authors	Concept	Objective of the study / / Research questions	Research methods; Research sample	Selected results, Conclusions
Melville, Campbell, Fazio, Stefanile, & Tkaczyk (2014)	Practical knowledge	To explore the influences of pedagogical practicum on the practical knowledge of student teachers of science subjects and the factors that influence integration of their practical knowledge	'Mixed' design; video recordings of teaching analyzed using a categorical system, in-depth interviews; two student teachers of science subjects during their practicums	Integration of practical knowledge is influenced by the context of the practicum (reform of teaching science subjects—emphasis on pupils' research activities), reflection and cooperation with the mentor, student's professional biography, and their science education.
Sun (2012)	Personal practical knowledge	To understand the meaning of the teacher's experience, which provides evidence of the shaping of the teacher's personal practical knowledge	Qualitative research—a case study; interviews, video recording of teaching, field notes, other documents (lesson plans, students' work, etc); a teacher of Chinese—an immigrant from China, a native speaker of Chinese	Formation of the personal practical knowledge of a teacher—an immigrant is significantly influenced by their identity and the culture of their country of origin (China). The teacher's practical knowledge is multifaceted and purposeful, controlled by one dominant image.
Levin & He (2008)	Practical knowledge, practical personal belief	Prerequisite: the practical personal beliefs of student teachers influence the shaping of their practical knowledge. Objective: to identify the practical personal beliefs of student teachers and the sources of these beliefs	Qualitative research: written statement regarding practical personal beliefs (a description of one's own beliefs about teaching, examples illustrating these beliefs, identification of the sources of these beliefs). Data collection took place over three semesters; 94 student teachers enrolled in a three-semester course on communication and class management	Education of future teachers influences the beliefs of student teachers, in particular, their thinking about teaching. The authors consider such education the main source of the practical personal beliefs of future teachers. Other sources listed include, for example, their experience before entering teacher education.

Seventh Chapter

METAPHORIZATION IN THE PROCESS OF MAKING TACIT KNOWLEDGE EXPLICIT

Petr Svojanovský, Jan Nehyba

This chapter demonstrates knowledge as a comprehensive dynamic structure (see Chapter 1) where tacit knowledge and explicit knowledge are interacting poles on one continuum. This interactive nature of knowledge is revealed through analysis and an interpretation of the process of making tacit knowledge explicit (illustrated in selected empirical material). The identified phases of this proces are anchored in the concepts of metaphorization-literalization and backward metaphorization, which are the basic building blocks of the philosophical background of this book (Chapter 1).

Beginning with the specific content of an originally tacit piece of knowledge made explicit this chapter (i) explains several indicators demonstrating the validity of this finding (ii) describes the very process of making knowledge explicit and (iii) demonstrates how the interaction between metaphorization-literalization and backward metaphorization takes place in the process of making tacit knowledge explicit (iv). The data used to illustrate our findings comes from the third interview with the participant Karel, which thematically focuses on the didactic transformation of content (see Chapter 4).

7.1 The content of tacit knowledge made explicit

We understand tacit knowledge to be a less conscious and/or difficult to articulate aspect of experience that can manifest itself in thought, action and experience (Nehyba & Svojanovský, 2016). Making tacit knowledge explicit in the example described below means that student Karel named a piece of knowledge whose content he was not fully aware of and at first was unable to articulate it. Specifically, this is (procedural) knowledge of how Karel communicates the subject matter to his pupils.

In the research interview, Karel explains his ideas on how he communicates the subject matter to his pupils, and schematically writes it on the blackboard. He names pieces of his knowledge: *we start from the assumption that an individual has some idea* (element of his own knowledge 1) then writes the word *idea* on the table. In doing so, Karel articulates an assumption on which his knowledge is based, an assumption *that he has some idea about* the subject matter. When teaching, Karel verifies his pupils' idea(s) with *a yes/no question ... a question through which I found out whether they know or don't know* (element of knowledge 2). This presents two possible options—either the

pupils' idea is correct (element of knowledge 3) or not (element of knowledge 4). In the first case, Karel proceeds to the *expansion* or *deepening of knowledge* (element of knowledge 5) that the pupils already have. In the second case, the pupils' idea is *wrong*. In Karel's view, this is the ideal situation because, if the teacher denies the truthfulness of this idea, pupils are *surprised* (element of knowledge 6) and therefore *intrigued*, i.e. motivated for a further course of teaching. They have *better attention, they will enjoy it more* (element of knowledge 7). As a result of this, Karel's *explanation* can be more effective (element of knowledge 8) i.e. when he corrects the pupil's idea about the subject matter. The explanation of Karel's model at this level of specificity is sufficient to show the content of tacit knowledge made explicit.

It is difficult for Karel to name those elements of knowledge he uses to mediate the subject matter to his pupils. However, becoming aware of his own idea(s) is an important discovery for Karel, and he returns to this at various points throughout the interview. He also expresses his uncertainty several times during the interview, for example: "hard to make some logical meaningful model just like that ... eh, I will go from the beginning ... {holding his head} I don't quite know how to classify it, that attention." Eventually, Karel makes explicit (articulates) originally tacit knowledge, (i.e. less conscious knowledge or specifically its element), which is that his assumption about the existence of the pupils' idea is, in fact, his assumption about what the pupils' idea is: "Eh, I guess I should figure out what there's now in the chart because this is {4 seconds of silence, then a laugh and gesticulation} **my idea about their idea, basically**" (Interview 3).

This is an element in Karel's (procedural) knowledge about how he mediates the subject matter to pupils (Figure 8).

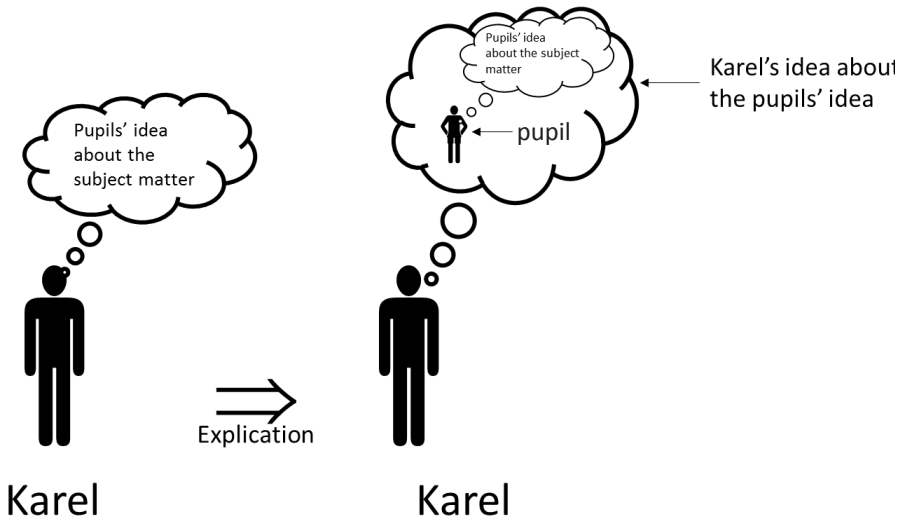

Figure 8. Making explicit the element of Karel's originally tacit knowledge of how he mediates the subject matter to pupils (i.e. how to transform content didactically).

The state when Karel's element of knowledge 1 was not completely conscious (it was tacit) is represented by the person on the left. At the beginning, this element of Karel's knowledge was conscious and articulated only partially—as his pupils' idea about the subject matter. However, Karel later realizes that the defined element of knowledge is inadequate and extends the original definition of this element, thereby making tacit knowledge explicit (naming it). The result of this awareness is represented by the person on the right in the figure. The result of Karel's reflection, which may initially appear unimportant, has significant implications for his success in the teaching profession. Not only can his pupils have correct and incorrect ideas about the subject matter but also the teacher himself can understand correctly or incorrectly what his pupils' initial idea actually is. This multiplies the potential points of failure in the educational process. Even as a teacher, Karel can also fail when his pupils have a correct idea but he diagnoses it as an incorrect one. Similar to the cultivation of tacit knowledge (Nehyba & Svojanovský, 2016), making tacit knowledge explicit also leads to greater, more nuanced understanding of the actual process of teaching and thus, more accurate understanding of what is important for the work of teachers.

7.2 Evidence of making tacit knowledge explicit

Several indicators can be identified, which indicate that Karel actually made tacit knowledge explicit: (1) Karel repeatedly shows he is getting lost in his mental model (he uses the metaphor *entanglement* for this). This points to the fact that he is not fully aware of the exact content of his knowledge, namely the element of knowledge 1 (pupils' idea), which he eventually transforms into his own idea about the pupils' idea. (2) The occasions when Karel made knowledge explicit were immediately preceded by a verbal (laugh) and non-verbal (silence, body language) expressions of the 'aha' moment, that is, realizing something which had been unconscious—see the data fragment above. (3) When the researcher asks for meta-commenting on the conversation, Karel retrospectively describes the actual process of making his tacit knowledge explicit:

Researcher: ***Could you say something about what was happening to you when you were writing that?***

Karel: ... *I have some idea about what they can actually have in their heads, and so there are, there are two confirmations or two rebuttals ... that was actually in which I got entangled in, when I didn't know what idea it actually was. But yes, I think I know now...* (Interview 3)

Researcher**:** ***What was the entanglement actually about?***

Karel**:** ... *the entanglement was about that I realized that actually I didn't know what I was writing ... I probably didn't have sufficient means to express what I really wanted to express. That's why the word 'idea' appeared on the blackboard and I, when*

I returned to it later, to that idea, then in not stress but just that yes, I want to do something, and then I see something different in front of me so I say, what kind of idea is that actually? Mine? Theirs? Where what was written on the table came from, that's what the entanglement was about. (Interview 3)

First, Karel points out that he was not fully aware of the content of knowledge he wanted to express (*I don't know what I'm writing …*), he was not able to *identify*/*articulate* this knowledge at first (*I didn't have sufficient means to …*), but eventually came to a greater realisation (*yes, I think I know now*).

The process of making tacit knowledge explicit

An important element in the process of making tacit knowledge explicit is reverse engineering. Before the process began, the tacit nature of Karel's knowledge manifested itself in his actions (pre-phase of the process). Karel wrote the word *idea* on the blackboard but was not fully aware of the meaning he attributed to this word—*I don't know what I'm writing ... the word 'idea'* ***appeared*** *on the blackboard*. The very process of making his knowledge explicit begins at the moment (first phase) when Karel starts to reflect on the visualization of the element of knowledge 1 (i.e. the pupils' idea). In other words, at the moment when he begins to reflect on the word *idea,* which he has written on the blackboard—*when I returned to it [the word] later, to that idea*. Precisely at this moment, Karel becomes aware of the *discrepancy* between the meaning he originally attributed to the word *idea* and the meaning he intuitively perceives 'behind' this word—"I see something **different** in front of me", i.e. the word has a different meaning than it should.

The next (second) phase of the explicitation process is *entanglement*, which is a metaphor used by Karel to describe his experience of the situation of discrepancy. In this phase, Karel is trying to determine what meaning the word 'idea' actually has for him "... there are two confirmations or two rebuttals ... that was actually what I got entangled in." Finally (phase 3), Karel comes to a *realization*, which dismantles the experienced discrepancy.

Karel: *... it was like an* ***impact*** [when] *their idea became my idea ... the* ***realization*** *that I actually also have some idea about what ideas they have, what they have in their heads about the subject matter...*

Researcher: ***And what kind of realization is that?***

Karel: [break eight seconds] *Sort of vague ... it wasn't anything sharp I'd be looking for or anything like that I'd go for* [break four seconds]. ***I wasn't looking for it, the thing which came to me*** *... I wanted to express that it came somewhat spontaneously.* (Interview 3)

Karel describes his realization using the metaphor of *impact*. In his explanations, he makes use of what Lakoff and Johnson refer to as an "orientational metaphor" (1980, p. 26). The word 'idea' written on the blackboard 'went' from the blackboard to Karel.

An 'impact' occurred at the moment the word reached Karel. This is, therefore, physicalization of the process of realization—when realization is seen as a 3D vector, which culminates in the moment of realization. It is interesting that Karel in thinking about the word 'idea', (which as at the beginning of this proces) Karel questions whether "such a term [is] unscientific {shaking his head}, non-physical". Karel's reflection reveals one of the ways of making tacit knowledge explicit; the process of realization is perceived as an entity, which has a certain force and direction and causes an impact. Kövecec (2003) and Lakoff (1992) point out that the cause of a certain event may be perceived as a force going from somewhere to somewhere else. This is also the case of the described vector which is the cause of realization.

7.3 Interaction between metaphorization-literalization and backward metaphorization in the process of making tacit knowledge explicit

The pre-phase of the process of making tacit knowledge explicit demonstrates acting without thinking; Karel wrote the word 'idea' on the blackboard and only after he had done that did he reflect whether it had meaning corresponding to his pre-reflective experience (Merleu-Ponty, 1962)—in Chapter 1 referred to as structured knowledge. In the pre-phase, Karel unconsciously chose the focus of content on which his attention further focused. In the first phase of the explicitation process, he transfers this focus to his consciousness. The pre-phase and the first phase then correspond to what is defined in Chapter 1 as a process of metaphorization-literalization. The result of this process is that the meaning emerging from the pre-reflective level of experience shifts to the literal level of experience. Karel refers to this meaning as the *pupils' idea about the subject matter,* which he abbreviates on the blackboard with the word *idea*. In Figure 9, the meaning is labeled M1—idea.

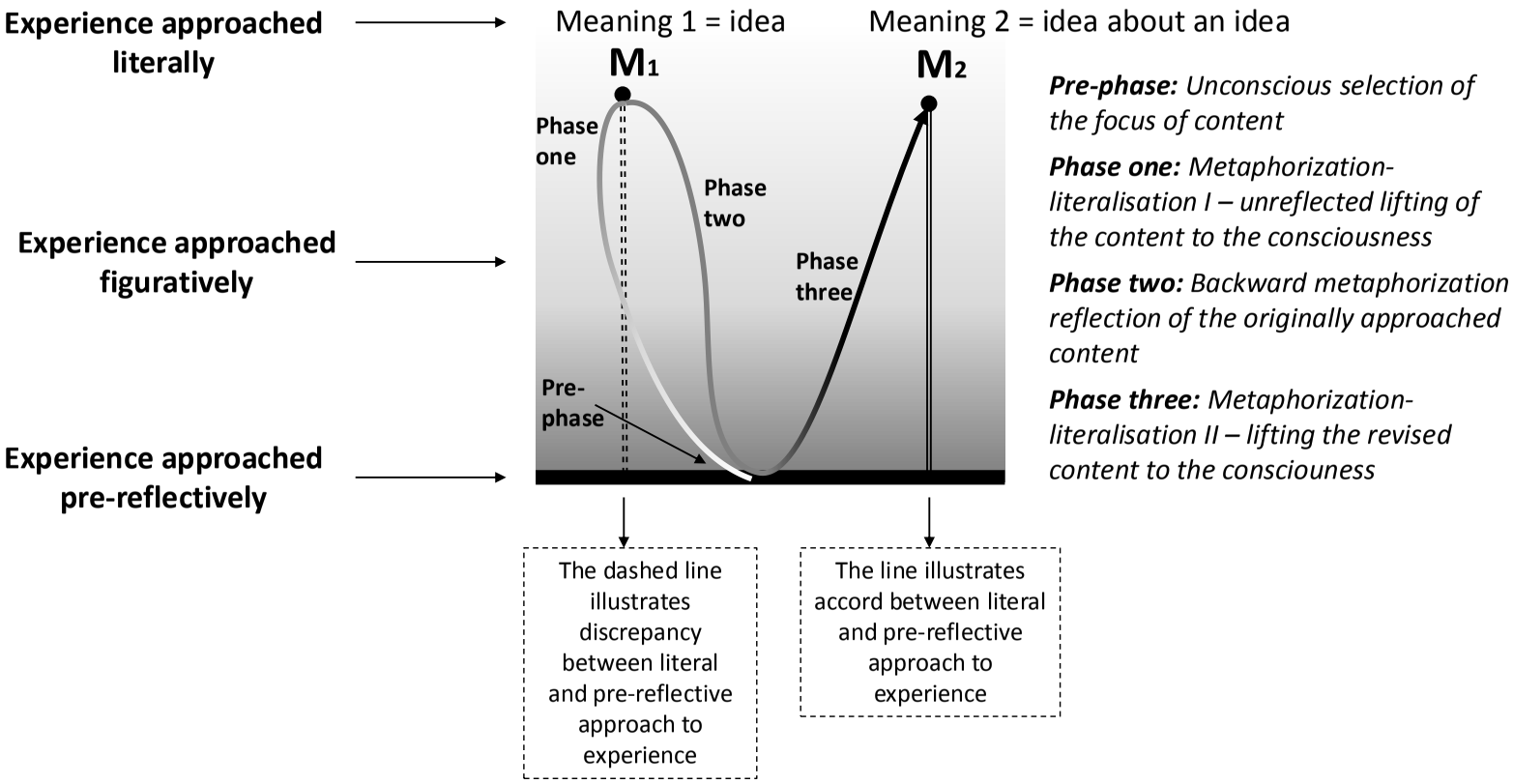

Figure 9. Interaction between metaphorization-literalization and backward metaphorization in the process of making tacit knowledge explicit

As soon as Karel began reverse engineering the meaning he had attributed to the experience, he realized that the literalized term 'idea' did not correspond to his pre-reflective experience. In Figure 9, this discrepancy is shown as a broken line. This is the moment when Karel goes from the first phase of the process of making tacit knowledge explicit to the second phase, that is, transferring non-reflected knowledge to consciousness for its deliberate reflection. This transition is also a transition from the process of metaphorization-literalization to the process of backward metaphorization. Karel uses backward metaphorization to return his attention from the literal level of experience to the selected focus of content in the pre-reflective level of experience. Deliberate re-immersion in the pre-reflective experience takes place through the figurative level, where Karel approaches his difficult-to-articulate experience using metaphors.

Karel refers to this part of the explicitation process with the metaphor of *entanglement,* which corresponds to Phase 2 in Figure 9. In this phase Karel attempts to identify the meaning which would better correspond to his pre-reflective experience. The second phase of the explicitation process culminates in an *impact* (Karel's metaphor to indicate his realization), which marks the transition to the last (third) phase of this process. This transition is also a return from backward metaphorization to metaphorization-literalization, where Karel shifts the revised content to his consciousness. The result of the last phase of the explicitation process is, therefore, an understanding of the revised meaning at the literal level, that is, that the pupils' idea about the subject matter is, in fact, Karel's idea about the pupils' idea (M2 in Figure 9)—an idea of an idea (see also Figure 8). Thus, the literally named (revised) meaning is finally compatible with Karel's pre-reflective experience, shown in Figure 9 as the line from the top of M2. It connects the experience understood literally and pre-reflectively.

7.4 Conclusion

By breaking down the process of making tacit knowledge explicit into several stages we have endeavored to capture the dynamics of interaction between tacit and explicit knowledge. The transitions between the individual stages of the explicitation process and the transitions between the individual levels of experience suggest that knowledge is a comprehensive dynamic structure. Meaning emerges in the interaction of literal language (terms) and the pre-reflective level of experience: "The meaning is formed by interacting with and experiencing something that functions symbolically. Feeling without symbolization is blind; symbolization without feeling is empty" (Gendlin, 1962, p. 5). This is reflected in the analysis of data used in this chapter when Karel links the term *idea* with his pre-reflective experience (the result of metaphorization-literalization) in a non-corresponding manner. In Gendlin's words, the term 'idea' becomes "empty". Only assisted reflection through the process of backward metaphorization leads, through a figurative approach, to experience—

to a more intensive (or more comprehensive) interaction between the literal and pre-reflective level of experience, which then leads to accord between the tacit and explicit dimensions of knowledge.

From this perspective, the explicitation of tacit knowledge does not mean the transfer of the content of tacit knowledge into scientific terms (to the literal level of language) but a *meeting* (interaction) of the pre-reflective level of experience with the literal level of experience: "But experiencing and concepts (or symbols) are surely not two separate things that have to become 'related'. Each is always already implicit in the other. There is no 'unsymbolized experiencing' any more than there is 'pure logic'. Even without explicit words or concepts, experiencing is at least "symbolized" by the interactions and situations in which experiencing happens." (Gendlin, 1962, p. xxii) If we want student teachers to truly acquire pedagogical concepts and theories, there must be interactions between their pre-reflective level of experience and their conscious reflective level of experience (and the language they use to describe it).

Eighth Chapter

THE CONCEPTION OF TEACHING IN STUDENT TEACHERS: COMMON TOPICS AND INDIVIDUAL CHALLENGES

Eva Minaříková, Blanka Pravdová

A teacher's actions in the class are influenced by many variables—these include external factors (broader social context, school climate and culture, particular classes and pupils) but above all, those factors that pertain to the teacher themselves. Authors often speak about teacher's knowledge or knowing (see the theoretical section of this book), professional vision (Minaříková & Janík, 2012) or professional competencies (for a discussion of this notion see, for example, Píšová, 2005, p. 37 et seq.). One area often thematized in teacher research is that of pedagogical opinions, attitudes, value orientation or belief (see Píšová, 2005, s. 26). Although the terminology can be unclear and confusing[102], there is consensus that opinions, attitudes, values and beliefs have a major influence on teachers' behavior. In the Czech environment, the term *teacher's conception of teaching*[103] (Mareš, 2013, p. 455) has been used in this context. If we speak about student teachers, the term *student's conception of teaching* is usually used (Švec, 1999, p. 39). This chapter explores the conception of teaching in student teachers at the beginning of their teaching practice, which is at the end of their follow-up Master's studies[104], particularly in relation to their understanding of aims, subject matter and pupils (cf. Pravdová, 2014, pp. 158–166). We focus on the topics students have in common and the challenges they are currently facing that make them refine and clarify their conception of teaching. An important aspect of our research will be *clarity* and *degree of articulability* of the conception of teaching and, on the other side, its *tacit dimension*.

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[102] For a discussion of the related concepts see Mareš, Slavík, Svatoš & Švec, 1996, pp. 10–11,

[103] This term is used mostly in the Czech educational research (učitelovo pojetí výuky). Its meaning is explained in the subsequent text. It is similar to the term *teachers' beliefs* in that it refers not to knowledge but to "a mental state which has as its content a proposition that is accepted as true by the individual holding it, although the individual might recognize that alternative beliefs may be held by others" (Borg, 2001, p. 186). It is also near the term *subjective theory*, which is defined as "(implicit) personal understandings about various aspects of his/her daily school practice such as: teaching, learning, child development, basic capabilities etc." (Mogliacci, 2015, p. 25).

[104] In the Czech Republic, qualified teachers need a Master's degree in teaching. The studies are usually divided into two stages—Bachelor, which is rather content oriented, and Master, which is more (but not only) pedagogy and practice oriented.

In this chapter, we define the concept of teacher's/student's conception of teaching, and explain our focus on the conception of aims, subject matter and pupils. The data sources and our analytical procedure are explained and, based on the results of the analysis, the research findings are presented.

8.1 Teacher's/student's conception of teaching

> *We understand the teacher's conception of teaching as a complex of pedagogical attitudes and the teacher's arguments justifying it. This creates a complex cognitive and emotional foundation for teacher's thinking on education, for the evaluation of education and the teacher's dealing with all actors involved in the educational process.*
>
> (Mareš, 2013, p. 455)

As Mareš (Mareš et al., 1996, p. 12; Mareš, 2013, p. 456) states, a teacher's concept of teaching serves several purposes—it contributes to *i)* what the teacher wants to do and how, *ii)* what they consider important, *iii)* what decisions they actually make. It is characterized, for example, by its relative stability, oriented-ness (positive, negative or neutral attitudes, evaluations) and subjectivity (different in different teachers). What is essential in terms of our research is the fact that this is an implicit, or tacit and relatively unconscious, construct—it is usually not a set of explicit and deliberately thought through rules (Mareš, 2013, p. 456). However, the degree of pronounced-ness differs in teachers—from vaguely formulated and loosely grouped rules to fixed and clear-cut rules (Mareš, 2013, p. 459).

The conception of teaching is already taking shape prior to the teacher's career, even prior to the beginning of their preservice education. A strong influence is the student's experience from their own experience as a pupil (Borg, 2003, p. 82; Pravdová, 2014, pp. 158–164) that is the so-called apprenticeship of observation (Lortie, 1975). This fact poses a major challenge for teacher educators. The concept of teaching that students bring to the teacher education program has a powerful effect on their development as teachers. Research suggests that preservice teacher education (Debreli, 2016) and teaching practice (Borg, 2003) influence the conception of teaching, but other authors point out that such a conception has to be diagnosed at the very beginning and should be worked with purposefully (e.g. Joram & Gabriele, 1998; Švec, 1995, p. 45). However, this can be difficult in the current context of faculties of education with large numbers of students. Therefore, this text aims to illustrate the diversity in the conception of teaching in students at the same stage of their professional teacher development (i.e. in terms of objective external criteria, such as the semester they are in, the length of practicum they have had, …) and also the topics they have in common.

A teacher's overall conception of teaching encompasses a number of sub-components (Mareš, 2013, p. 457) which all influence teacher behaviour. These include notions and perceptions of teaching and learning aims, the subject matter, organizational

structures, teaching methods and resources, pupils and their learning, the class, the teacher's role, the role of school management, and the role of parent(s). However, teachers attach a different weight to each aspect in each stage of their professional development. According to Fuller and Bown (1975), three stages of focus can be distinguished—first, concerns with self and concerns for survival; second, concerns for the teaching situation; and finally, concerns for pupils. In Berliner's (1995) view, the teacher's concentration gradually moves from the subject matter to the pupil.

In her qualitative research among students in the Faculty of Education, Pravdová (2014, p. 158) identified the following categories as dominant in student concepts of teaching: *conception of the teacher's role, conception of pupils and their assessment, conception of the teaching class,* and *conception of the subject.* Less represented categories were: *conception of the role of pupils' parent(s), conception of the class, conception of teaching and learning aims,* and *conception of the subject matter.*

In our analysis (see below), we focused primarily on those areas that we considered to be problematic and that are only emerging as a subject for research—*students' concept of the subject matter (and aims)* and *of pupils,* and their interdependence. Paying attention to pupils, pupil-oriented teaching and also content focus are central to the quality of teaching (Janík et al., 2013).

In the present analysis, we asked the following questions: *What is each student's current concept of 'pupils'? What topics are common to students when it comes to the concept of pupils, subject matter and aims? How do individual students address these? What do students in the current phase of professional development clarify as their emerging concept of teaching (i.e. of pupils, subject matter and aims), what is this concept based on, and to what extent is their concept tacit?*

8.2 Sources and data analysis

The data source for this chapter was interviews with research participants (conducted at the very beginning of a series of teaching practicums) which focused on student teachers' subjective concept of teaching. These initial interviews started with the question: "When I say *you and teaching*, what does it evoke in you, what comes to your mind in connection with it?" (for details see Chapter 4). The data analyzed in this chapter is taken from interviews with four participants (Alena, Beáta, Cyril and Karel). It should be noted that all the interviews were conducted by researchers very experienced in Clean Language interviewing (see Chapter 3), so the individual interviews generated mutually comparable data.

The interviews were transcribed in Videograph (Rimmele, 2002). The transcript also included participants' non-verbal expressions, which can provide important insights into the tacit dimension. The data obtained was reviewed by two researchers. In the

first stage, places were identified in the interview where participants spoke about pupils, teaching aims or the subject matter. In the next stage, parts of the interview were identified that suggested that the students had reached the boundary of what they were currently able to articulate and/or realize, and they gradually recognized the tacit dimension of their knowledge and their conception of teaching. These were places in the interview where (cf. Nehyba & Svojanovský, 2016, p. 75):

- the participants stated they did not know how to articulate their thoughts;
- in comparison with previous utterances, the participants used strikingly more "filler words" (such, this, etc.);
- in comparison with previous utterances, the participants paused more frequently and for longer periods and used interjections such as ummm or erm more often;
- the participants used meta comments suggesting that they were clarifying the topic or capturing it with words for the first time ("I've never thought of it like that").

This was followed by further intensive and recursive reading (by one researcher) of the elements identified when the student teachers focused on pupils, aims or the subject matter, and a search for the main topic of each interview. Examples from within one interview were studied together. For example, parts of the interview where student teachers talked about their concept of pupils. This might happened three or four times in the interview at different times and we identified all of these parts and analysed them together. The interviews and the topics identified were contrasted with one another in order to answer the research questions. The results of the analysis are presented in the following section in the logic of research questions.

8.3 Results of the analysis

The analyses of the interviews yielded interesting results. From the outside, our research participants are in a similar phase of their professional development—they are just beginning their teaching practice in the first semester of their Master's studies in the same faculty of education, where the practicum is organized in a similar way for all teaching programs. However, their personal and professional biographies differ—some are engaged in leisure-time and educational activities with children and adults (tourist clubs, swimming lessons, teaching at language schools), some have teachers in their families; they have all attended different schools and met different teachers and different classes and classmates. It is, therefore, clear that their conceptions of teaching differ, although they do cover some common ground. We will first explore the topic or area central to our analysis: *the conception of pupils*.

8.3.1 Concept of pupils

Each of our participants thematized pupils in their observations. As our interviews were conducted using the Clean Language method, this topic was not raised by the researcher but by the students themselves. However, their thinking about pupils differed

significantly. A certain *continuum of the conception of pupils* can be identified in our (albeit limited) sample. On one end of the continuum, the conception is non-specific, group-oriented (close to the conception of the class) and almost without expressed relation to teaching, to presentation of the subject matter or motivation. On the other end of the continuum, there is the conception of pupils as individuals, whose individual characteristics influence the formation of the relationship between the teacher and the pupil, the level of student motivation, the presentation of the subject matter, etc.

Student teacher Beáta's conception of pupils, as demonstrated in the research interview, is closer to the first, non-specific, end of the spectrum. In her observations, she talks about the pupils as a group. She mentions them in particular in relation to *i)* the aims of teaching ("I want to teach *them* something", "a comprehensive structure, what the *kids* take away from school", "what *they* can come across in their lives") and *ii)* the content of the lesson ("it will not be full of things *they* enjoy but at the same time it will not put *them* off completely"). These statements imply that pupils have lives outside of school ("what *they* can come across in their lives") and that they enjoy different things. However, Beáta continues to consider pupils as an undifferentiated group and does not think further about how to take into account the fact that pupils have individual differences and each has (and in the future will have) a different life experience. At the end of the interview, she talks about the relationship between the teacher and a pupil:

Researcher: *What is most important to you in the context of your teaching? What is important to you?*

Beáta: {thinking} *Probably to understand these pupils.* (pause) *So that there isn't any tense situation at the beginning. To avoid unnecessary misunderstandings. Sometimes, hm, the teacher for example says something and doesn't mean so. And doesn't realize that it hurts the children somehow, that they are sensitive to it. Actually, the teacher doesn't want to cause this and doesn't want to hurt or devastate. Simply nothing bad. But they simply say something, even with some hidden meaning. And this actually has a different meaning for the teacher and there's misunderstanding, and the kids then treat them dismissively.* (Interview 1)

Beáta expresses her concern not to hurt the pupils, even unintentionally. She continues to consider the pupils as a group, and that they respond as a group. She does not get to the level of individuals even in the area of emotions and working with them. She shows signs of distinguishing pupils based on their age ("it's a bit different to communicate with six-year-old children and with teenagers") but only generally in the area of communication, and superficially. This may be the result of her limited pedagogical practice (piano lessons, swimming lessons), which has not provided her with enough opportunities to think about pupils as individuals. A more pressing challenge that she deals with, and that we will discuss further, is at a more general level and relates to the conception of subject (see Chapter 7.3.3). Based on the discussion in section 2.8, one can assume that her conception of pupils will change in the future (see the shift towards the focus on pupils in teacher's professional development, Fuller & Bown, 1975).

In his interview, Karel goes further in his deliberations and talks predominantly about teaching Physics. He raises the subject of how to connect the pupils' real experience and their world with the subject matter and abstract concepts, and how to use these for teaching (for details see Chapter 7.3.3). His thoughts incline towards pupils, and to an awareness that the pupils' experience is conditioned by / dependent on how the subject matter is presented. In explaining the importance of linking Physics and the real world, Karel uses individual pupils as examples:

> *When you're explaining, for example, heat transfer, then whoever has repaired a car remembers the exhaust and so will understand heat transfer. And whoever likes swimming, then when they jump into cold water, they quickly understand heat transfer. Because they know their body cools down and they are cold.* (Interview 1)

However, the interview does not make clear whether these are particular pupils he knows from his actual teaching practice or imagined pupils he could have in his class and who could hypothetically have such experience. Other examples (related to his practice in teaching Physics in a lower-secondary school) suggest that he conceptualises pupils and their experiences in a broad or general way. Rather than trying to get to know individual pupils and their specific contexts, Karel's approach to individual differences is to teach content through broadly or generally 'appropriate' examples. He appears not to view individual differences among pupils as 'knowledge' possessed by individuals, in individual contexts.

> *But I don't look for any specific... any reality or experience in it, which the given specific pupils have, but I take some... which I think they know...* (Interview 1)

However, this concept conflicts with how Karel speaks about English lessons with just one adult learner.

> *What I do is that I first have to find out what it is [the learner's experience or their interests]. And when I find that out, I take that piece of knowledge and build my teaching on that.* (the example contains long pauses and hesitation; Interview 1)

The different between teaching a large class and an individual student (an adult learner) is reflected here. Karel adapts his teaching to the situation—individual lessons give him space to use his student's real experience as a basis for the learning/teaching. We explore this topic further when describing the current challenges Karel deals with in developing his conception of teaching.

Alena, by contrast, thinks about pupils as individuals with specific social and family backgrounds and specific cultures, which have to be taken into account and which influence, in particular, the teacher and pupil relationship.

Alena: *What else I'd point out, for example specifically at that school they have a pretty real idea about the environment the kids come from, the family, because they are in touch with them, they take that into consideration, so they know what it looks like. They know what problems are dealt with in the family and what the pupil deals with. And it's again about... well, I don't want to say exactly taking into account in the class, but keeping that in mind.* [...] *Taking into account not only the situation at that moment but also the environment from which the pupil comes because it's of course an environment that is less stimulating. For example, to realize that it is necessary to give more stimuli so that the kid likes school at all, so that it sees it as a positive institution*. (Interview 1)

Alena's prevailing conception of pupils as individuals, with individual needs, is continually reflected in her thinking/conversations about teaching. This is evidenced by the following quote from the interview:

Alena: *Focus on the person, the human being, their needs. This is now as if it was a direction the school or the school system is heading. To actually realize the differences, that it's not or doesn't have to be bad, but basically, it's just about being able to adapt things so that the pupil is able to process it at their level after comparison with their needs...*

Researcher: *And if this is the direction, how do you perceive this now in relation to you?*

Alena: *In relation to me? Well, once again it places greater demands on the teacher because they have more work, not only with how to handle the subject matter, but how to handle it the fun way, understandable and at the same time how to interpret it separately for groups of, for example, gifted individuals and, in contrast, for the part that is slower and can handle less. And it would be ideal to have more class preparation sets, which would be influenced by the pupils who are in that school.* (Interview 1)

Even though Alena accepts that teaching should be based on the needs of each pupil, she still refers to pupils at the group level ("the part [of the class] that is slower"; "the part which can handle [the subject matter]"). The last sentence of the extract suggests that Alena might perceive the specifics at the school level rather than at the level of individual classes or pupils. This may be because her teaching practice was done in a school with a strong representation of Roma pupils (see below for more details), which, in Alena's view, influenced the entire operation, climate and culture of the school.

A particular focus on pupils as a group as well as individuals (in relation to the teacher, the subject matter and presentation of the subject matter) is thematized by Cyril—from the very first day of his teaching practice.

Cyril: When I came to practice, I perceived teaching mainly from the teacher's point of view. I paid attention to what they do. And after the first day, I also thought about what the pupil does. That they have to carry a lot of exercise books, requisites, rulers (smile). [...] So I tried to conceive what actually the pupils are to fulfill and what the teacher is to fulfill. And now that I've taught about five classes, I've tried, even when I was doing the preparation or when I was thinking what to do, to make it connected also from my point of view. Like when I present something, I realize that they take notes, where they take notes, and so on. (Interview 1)

Taking pupils into account in particular teaching situations is documented by Cyril in his experience with technical drawing.

Cyril: *Well, when I was, for example, thinking about time, what time I will need, I had to realize that if I draw a square on the blackboard, the children will take twice as long. Someone will take a ruler for that, so until they complete it, it takes a long time. And I can't make them to do it badly, so I have to take into account that they work at a different speed than I do. So if I skipped maybe ten mathematical problems, I know they can only manage three. So I also had to adapt to this.* [...] *I drew a square and when I was moving to a rectangle, I saw that the girls in the first row had trouble understanding what a square was and how to actually draw it. Although they are supposed to know this since the third grade. So I had to slow down and continued with everything at a slower pace.* [...] *I stopped and said they could write that. So they completed the drawing of the square and I again explained the area and volume, or area and circumference* [...] *so that they hear that again. And then I always waited for them to complete the drawing and then with everybody, only when they listened to me, I did what was important, that is the area and surface, and so on. Depending on what it was.* (Interview 1)

This example shows that Cyril learns from his experience and how he is able (in his words) to flexibly respond to the needs of individual pupils. His statements (in which he describes how he learns from his experience) suggest that these same considerations will influence his future practice, will define his ideas about pupils and further link them to other aspects of teaching, and relate them to the manner of presenting the subject matter. This interpretation is supported by other examples from his interview. In the following example, he speaks about teaching the Thales circle and about how to ensure that also those who do not excel in Math and do not remember the subject matter engage in revision. Based on his experience with a particular class in a particular teaching situation, he arrives at the following interpretation, which documents his thinking about the pupils:

Cyril: … *They'd have to be told in advance that it will be taught, so they should look at it. But here with these children this would probably be to no effect, just because of the fact they don't have the exercise books.* (Interview 1)

In Cyril's view, knowledge of pupils is also connected to his efforts to observe students directly in the teaching situation—in his words, whether they pay attention. Specifically, he describes how he monitors the expressions of pupils and draws conclusions from these regarding the pupil(s) (in)attention or (in)comprehension; and how he adapts his teaching to this. These statements suggest that he actively tries to develop his professional vision and perception of teaching situations in which pupils play a pivotal role.

The analysis described in this chapter reveals that the subject of pupils is common to all our participants, although they conceive it differently—based on their experience, personal characteristics and (professional) biography (see the discussion in Chapter 7.1). In the following section we look at more specific topics that appear in interviews with research participants and represent a link between several sub-components of their overall conception of teaching.

8.3.2 Motivation as a common topic

The second research question related to topics that are common to the participants. The analysis shows that, in addition to the most general topics (pupils, subject matter, teacher role), all student teachers deal with *pupils' motivation* and their positive approach to learning. This topic had varying importance for each research participant and was approached differently.

For Beáta, the question of motivation was, at that stage of her teaching, associated with questions about the aims and meaning of teaching Music Education. She states "I have many times thought what to reply when they ask me why I should learn what this and that person composed". She does not address the motivation of *individual* pupils or their positive approach to learning. For her, everything is based on the conception of the subject and its legitimacy in the lower-secondary school curriculum (see below for more detail discussion). Nor does Alena address motivation for learning in its broadest sense. She has instead a rather positive approach—she would like pupils to be "thrilled", "absorbed" and "entertained". It is apparent from her interview—in implication rather than in specific statements—that entertainment and being thrilled or absorbed is not the aim in itself but rather a means to an end, i.e. to develop in pupils a positive approach to learning, and to fulfill the curricular and educational objectives. This idea appeared vague and the conception of motivation not completely clarified.

Karel, on the other hand, puts an emphasis on "making it enjoyable for the kids". He draws inspiration from his teacher trainer and his teaching. A fun approach, however, is not an end in itself for him—he can see its clear influence on pupils' learning:

Karel: *For me the elements I talked about, that the teacher teaches them in a fun way and teaches them a lot are quite... I don't want to say the most important or the most significant because there are for sure a lot of other things—there must be some kind*

of moral education and something like good relations with the teacher. But in terms of that... in terms of that... (rubbing his forehead) *I don't know in terms of what but... it's important for me that the children learn, that the children learn what they are supposed to, and learn it in a way which is fun for them* (nodding). *Or maybe it's because they enjoy it, they're able to learn more. That's more probable. Because if they didn't enjoy it, they will not learn as much.* (Interview 1)

From this we see that Karel does not have the conception of linking entertaining and learning defined clearly in advance. He gradually formulates, refines and articulates his thoughts. We can therefore assume that this aspect of his conception is tacit and gradually becomes explicit during the research interview. This is also evidenced by his progress in the interview. A few minutes earlier in the interview, he states clearly and without thinking:

Karel: [about the teacher trainer] *In my view, he teaches them a lot and he teaches most classes in a way they enjoy. These are for me two... two elements (starts thinking about it) I would like... that are important. I would also like, when I'm teaching, that the kids enjoy it... and pass to them what I think is important.* (Interview 1)

To some extent, the conception of linking entertainment and learning was already evident in Karel's teaching, but the research interview provided him with an opportunity to realize, clarify and formulate these positions more precisely and with greater awareness.

It is interesting that, in his interview, Cyril does not include any references to entertainment or fun in learning. Motivation is a topic for him, but it is not linked to fun or entertaining. For him the experience of success is a major motivational factor in education.

Cyril: [about how pupils in the ninth grade learn equations] *Because they have some letters there and calculate something and they can't see any result. They have a result, but it doesn't mean anything to them. And then there are some word problems and suddenly they see that what they've learned, they can put together somehow. And then they have the result, they already have a better motivation to solve it or to learn the equation.* (Interview 1)

The source of Cyril's approach (positive motivation by mediating the experience of success) can be traced to his experience as a swimming coach.

Cyril: *For example, I also teach swimming. And we were... I always wanted to push them to a competition. They only tried it once, before I was their coach, and they didn't do very well. And now we wanted to go to the same competition... which I dropped in the end. And we went to like an easy competition. So they tried the easy one, were successful, so they were happy. And I could see they worked hard. So that was the procedure. I dropped that difficult competition, where they would have greater... someone would have greater motivation to improve. Because some are much better. But the fact that most of them tried a worse level somewhere outweighs that they are happy they did well. So the same can then also be in the class, for example, when I give them a tough problem, then if the majority don't solve it, it will rather have a bad result because the rest will feel they don't know how to solve it.* (Interview 1)

Cyril has applied this experience from coaching swimming to the teaching of Mathematics. It is interesting that, although his practice in teaching at lower-secondary school is at this stage limited, Cyril is able to connect the conception of motivation with pupils' knowledge, while at the same time taking into account their feelings. This also confirms the conclusion from the previous section regarding his development of his conception of pupils.

The current analysis suggests that motivation and its link to pupils' learning is a major topic for student teachers. In the case of student teacher Ema (who, however, has not been included in this detailed analysis), the topic is so important that it forms the axis of the entire research interview.

The topics we identified as dominant in the research interviews, and the individual challenges the research participants therefore deal with, are addressed in the next chapter.

8.3.3 Individual challenges

One of the benefits of using Clean Language interviewing to collect data is the fact that it minimizes the content brought to the interview by the researcher. One may therefore assume that topics which participants raise in their interviews, and to which they return, are indeed relevant topics for them. One or two topics were identified for each research participant that could be considered most important in the interview. In relation to our focus (pupils, aim and subject matter) students[105] can be positioned along on a continuum, from greater focus on pupils (Alena) to greater focus on aims and subject matter (Beáta). These topics can be seen as challenges that students face in this current phase of their professional development and in which they refine their conception of teaching. For some students, aspects of these topics are very difficult to articulate or are less conscious, and therefore tacit. We will now focus on individual students, their current challenges and the tacit dimension of topics they deal with.

[105] See also Chapter 8.3.1

Alena's current challenge is, in our view, defined by the specific environment of the school where she did her practice. Alena studies German language and Health Education, and she did her teaching practice in a school with a majority of Roma pupils. In her interview, Alena brings up a variety of topics, for example: continuity of the subject matter and the practical nature of information or aim setting using the Bloom taxonomy. However, a focus on pupils and the relationship with them resonates throughout the entire interview. Alena comments on the approach to pupils in the particular school, which takes into account the specifics of the children who attend it. The teachers' approach is, in Alena's opinion, open, friendly, caring and individual, having regard to the needs of individual pupils. The interview shows that Alena is influenced by this approach and it provides food for thought. She often thematizes the relationship between the teacher and the pupil. Her approach is also influenced by her negative experience from the past. This experience underpins her 'unwanted teacher ego' (cf. Pravdová, 2014, pp. 119–135), that is, how she does (not) want to behave in the teacher role: no humiliation, no demonstrations of power, no bias, no showing who's the "boss". On the contrary, she emphasizes aspects such as fairness, rights and obligations of pupils as well as the teacher, empathy, fondness and a human approach (Alena's own words at various points of the interview). Her conception of the relationship between the teacher and the pupil is not only influenced by her previous experience but also by theory:

Alena: *I'm touching upon positive psychology here, so definitely realize the kids' strengths and be able to develop or awaken them in them so that they can compensate the weaknesses. And at the same time I really want to approach it positively.* (Interview 1)

During the interview, it appeared as if Alena had already realized and thought about most of the things discussed. Although they remain a current challenge for her, it is a challenge she explicitly thinks about. Therefore, on the continuum between tacit and explicit, she is closer to the explicit pole. The challenge she talks about is the conscious defining of her relationship to pupils. She feels the need to decide whether to approach them from the position of authority or opt for a partner approach, as is usual in "her" school.

Alena: *I always thought that it was best if the teacher comes over more like an authority to the class, so there is a certain distance between them and the pupils. And now my practicum convinces me there is also another way. The question is, which one is better, or suitable, and if it doesn't depend on the type of those pupils. That actually they work with pupils more based on the relationship teacher–pupil. So we have a common relationship, we have a common task and it's fair play...*

Researcher: *So in other schools it's like this or the way you used to imagine?*

Alena: *Well, it's that, maybe a little out of date way. The teacher comes in their white coat or represents some role and says something from their position to pupils, who are somewhere at the bottom. And here it works in a way... well, not always, of course every teacher is different, but it's not like: I'm here to pass something on to you here. But it doesn't mean that you cannot pass anything on or don't have anything to pass on to me. And that's what it's about, the human aspect.*

Researcher: *And how about you, when you perceive these two things like that?*

Alena: *I am somewhere halfway. I am just finding out it can be different. So how about me? Sincerely, I don't know myself, I haven't decided yet what a better approach is or what will suit me more. I definitely wouldn't be against functioning on the basis of the partner approach, but I don't know. Throughout the practice, I'm probably just trying how to do things and what's too much.* (Interview 1)

It is clear that this is a topic that Alena is currently interested in and that she needs to address. On the other hand, it is also apparent that she deals with it beyond the research interview as well. She appears to pay conscious attention to it because—although her opinions are not clear yet—she can explicitly name the *pros* and *cons*. Her statement "I haven't decided yet" refers to a conscious approach to her individual challenge.

Karel is closer to the subject matter pole on the aforementioned continuum. At the time of data collection, Karel was studying teaching of English and Physics and, at the same time, he was teaching at a language school. His teaching practice, which he thematized in his interviews, related primarily to teaching Physics. Two closely related topics were of primary importance for Karel. He analyses both in depth. *First*, he explores the link between the real experience of pupils and the subject matter (or the contents in the given area), and *second*, he tries to clarify what it actually means 'to learn'.

When speaking about teaching Physics, Karel repeatedly thematizes pupils' real experience with physical phenomena.[106] He also refers to teacher's being equipped with various examples, which can be used to make the pupils more familiar with physical phenomena.

Karel: ... *the teacher must have a wide range of those... um...* (gesticulates) *those... examples from real life. Yes? Like... that concept or that... that experiment or that... some that physical phenomenon, so... when the teacher supports it with something... something the children know, then this linking happens* [...] *of their own experience with some physical stuff.* (Interview 1)

It is evident that Karel (although he had already mentioned similar topics in the interview) explores more deeply and tries to clearly formulate what the link between pupils' experience and "that physical stuff" actually means. His verbal as well as nonverbal

[106] See also examples in Chapter 8.3.1.

expressions (pauses, gesticulation) suggest that he is entering the area of tacit knowledge, or specifically the tacit dimension of his conception of teaching and he makes some of these aspects explicit in the interview. Interestingly, he actually names the pedagogical content knowledge a teacher of Physics needs (cf. e.g. Janík, 2009). Karel also returns to *linking* in the next part of the interview.

Researcher: *Hmm. So this linking of knowledge with experience.*

Karel: *For example, yes.*

Researcher: *And you spoke about some distance. What kind of distance is that?*

Karel: (a pause of about 20 seconds, his eyes wandering in the room) *Maybe... maybe... I don't know. Distance between, between the experience... their own...* (gesticulation) *what they live and between what I should teach them.* [...] *It always crosses my mind that it's physics, that it's some understanding. And... in teaching it's more some... bringing something closer maybe... something.* (Interview 1)

Here Karel touches upon the meaning channel between the pupil and expert experience (cf. Slavík & Janík, 2007, p. 272). At the same time, he defines for himself the conception of Physics, or the learning of Physics. The data analyzed shows that he made this conception more precise and conscious during the interview, evidenced by the following example:

Karel: *But the fact that it is, that it is probably really the most important in physics* [...] *but for that physical...* (half-closes his eyes) *learning the physical, understanding is most important.* (gesticulates) *That's what I've found out now during some, I don't know for how long we've been talking, that it's like that.* [...] *that I had never realized this specifically* [...] *or rather that I had never thought of that like this. Well, I know it's important and I use it but I had never actually said that to myself... so this is most important.* (Interview 1)

Karel is not only a future teacher of Physics but also of English (which he teaches at a language school). During the interview, he gradually discovers differences between both subjects and what matters in them, or how the learning process works in them.

Karel: *In English I think it's something a bit different, because you rarely have to, not understand something, yes, you need to understand something but... but... know that I use this and that tense in these and those situations, then... so... I either learn it or don't learn it. There isn't much to understand. And there I think is the linking to the real* [...] *more like a relationship that will... that... that will... that will support my teaching. My teaching.* (Interview 1)

Here it is evident that he finds a completely different conception of teaching and learning to that in Physics (which is more memory-based learning). However, even here he does not overlook the necessity of linking with the real world, but this linking obtains a new function. It is no longer (at least according to his statements in this interview) a means for *understanding* but a means for *motivation*, "which supports learning".

Karel: [about a language school student he started teaching] *Good, as I've found out, he repairs old cars. Yes? And so... He doesn't speak English at all but when he starts talking about old cars and why he actually repairs them, we actually see that we're talking and we're talking in English. So I'd see... this... some real... as a... means to... teach something.* (Interview 1)

The research interview may have helped Karel deal in part with the challenge of clarifying the conception of learning in various subjects, and the use of pupil experience. During the interview, Karel gradually refines his statements and confirms a more conscious view of teaching and learning. It is also very interesting to watch him gradually find differences between his two subjects (Physics and English) and start reflecting on them explicitly. We can assume that this will have a further impact on his conception of teaching in both subjects, and therefore on his teaching practice.

Topics linking the conception of pupils and the subject matter are also dealt with by Cyril (a student of teaching Mathematics), although he is closer to the subject matter on the pupil–subject matter continuum. He distinctly thematizes the systematic nature of the subject matter, interconnection and determination of the importance of individual content. He does not see continuity and systematic nature only in terms of content (i.e. logically following up on what the pupils have already learned) but also in terms of the process (i.e., "so that "they have it as they are used to"). At the same time, he does not see the systematic nature and continuity only in relation to the previous subject matter (what they already have learned) but also to the future one. The importance he attributes to continuity is also apparent in his description of class preparation. He uses not only the textbook and the workbook, but he also borrowed one pupil's exercise book to "follow the same procedures if possible".

It is important for Cyril that pupils find "it" themselves. He tries to help them 'see' different solutions (for example when learning about fractions) and he often uses questions to that end, which are a topic for a considerable part of the research interview. These questions seem to be natural for him; he does not consider it problematic to ask them or to devise them. However, when he is asked to explain what the questions are based on and how he asks them, he has trouble articulating his thoughts; but it also seems it is difficult for him to make this process conscious:

Cyril: *I usually do not think about the questions, what will be, in advance. Like improvisation.* [...] *Or it seems to me that they come up themselves.* [...] *Or at least I feel it*

that way. [...] *For example, I say what I'd actually do with that.* [...] *Um, I don't know, it's probably intuitive for me.* [...] *So maybe it's already experience. That I know what I'm talking about, how it relates to each other. I am able ask to make them come to what they want. For example, if I was to teach geography* [not his specialization], *I wouldn't be able to ask like that. Simply I wouldn't know.* [...] *If a problem is more difficult, the question should be more specific. Or I should know what the person knows or doesn't know.* (Interview 1)

This example is a cross-section of more than fifteen minutes of the interview, when Cyril was trying to discover the essence of how he asks the questions. The complexity of the process is apparent from the example. During the interview, Cyril realizes part of the procedures and sources of decisions. The last statement related to adapting questions for specific pupils and to what they know and do not know, and can probably be considered the most important. Cyril's approach to positive motivation and his efforts to mediate the experience of success for pupils is relevant here. So, the aim of the questions is not only to encourage pupils to "come up with their own solution and learn it better" but to enable them to answer correctly, and thus experience success.

If we look at the interview with Beáta (student of Music Education and Civics), it is obvious that, on our continuum, her challenge is completely in the area of the aims and subject matter. As indicated above, her conception of pupils and motivation is rather undifferentiated. The central topic she deals with is the conception of the subject (Music Education), its aims and the legitimacy of its inclusion in the lower-secondary school curriculum. This is also a result of Beáta's expressed fear of pupils asking her why they should actually have music lessons. When, in the interview, we discuss what is essential in music education, Beáta encounters difficulties and concludes that what is important is "what they can come across in their lives" and what "they will use in practice", and "general cultural knowledge". Here, it seems apparent that Beáta does not know how to continue. A great part of the follow-up conversation concentrates on culture, cultural knowledge and man as a cultural being. Beáta's reactions show that her conception is vague. And she does not become more explicit or move forward during the interview.

Beáta's vague conception of why Music Education should be taught and "what is important" is in stark contrast with her idea of "crammed" curriculum. When she talks about subject matter, curricula and pace, she uses phrases such as: "we pour a lot of information", subject matter "has to be cut off", "stuff", "skip", "cheat", "additionally explain", "no time", "catch up", "gap", "missing". Her conception of the current design of subject matter and the curriculum is very negative. Although she does not formulate clearly the conception of the subject (Music Education), her approach to the content and its scope is negative. This may be the result of her experience as a pupil, because she is just starting her teaching practice.

In this chapter, we have tried to thematize individual and current challenges faced by the research participants. We interpret the implications of these findings in the following chapter.

8.4 Discussion and conclusions

In this chapter, we have explored the *conception of teaching in student teachers* (mainly in relation to pupils, aims and the subject matter) and its *tacit and explicit dimensions*. Our probe revealed/highlighted some aspects which may be of interest to teacher educators or even to student teachers themselves. Although the students were in the same phase of professional education at the time the interviews analyzed took place (in the first semester of the follow-up Master's studies, at the beginning of continuous teaching practice), their conceptions of teaching differed significantly, both in terms of content and the degree of tacitness/explicitness of each component.

Statements related to the *conception of pupils* were made by all student teachers. All participants talked about pupils but some treated them as a group and did not differentiate individuals. Also, linking ideas about pupils and ideas about the subject matter and its presentation, which is crucial for the work of teachers, was not evident in some participants. However, this finding corresponds with research into the professional development of teachers, which indicates that, initially, novice teachers focus on themselves and their survival and only in later stages do they focus more on pupils and their teaching (Fuller & Bown, 1975).

The fact that all participants thematized pupils was no surprise. However, student teachers also had other topics in common. One example was *motivation for learning* and its conception. Even here, however, there were differences between research participants. In some, the conception of motivation was vague and applied only to entertaining forms of teaching; in others, it was more sophisticated and related to pupils' real experience and their emotions.

The core of the chapter explores challenges that, according to our analysis, student teachers participating in our research found topical and paid attention to. It transpired that each student had a specific topic through which they clarified their own conception of teaching. Two continua arose from the data analyzed on which these challenges are located. The first one is the *continuum of pupil focus and subject-matter focus*. Although it is inherently implied that one cannot be separated from the other, the interviews analyzed show that students in our research sample are inclined to one or the other pole of this continuum.

The second continuum is *tacitness versus explicitness* in relation to thinking about these challenges. From the interview with Alena it appeared that she consciously thinks over the challenge she is facing and tries to deal with it, whereas the interviews with Karel

and Cyril indicated that they gradually made aspects of their challenges conscious during these interviews. In contrast, Beáta's conception of the subject and its aims is so vague and hard for her to articulate that no significant shift was observes, even during an in-depth interview. These results confirm observations by Mareš (2013, p. 459), who refers to differing pronounced-ness of conceptions in individual teachers. Another important finding of the current research was that the degree of pronounced-ness and clarity differed not only among teachers (or student teachers) but also in individual teachers (student teachers) in relation to various topics.

We are aware of the limits of our research probe. It was conducted on a small sample of research participants and only one interview was analyzed for each participant, which took place in the same time period. This choice is explained in the introduction to this chapter.

Clean Language interviewing (a) allowed deepening of the interviews, (b) made students look into their own minds, and (c) provided relevant and interesting data in relation to the tacit dimension of students' conceptions of teaching. Although the topic of conception of teaching (or beliefs and similar concepts) has been dealt with in many empirical studies, our analysis explored, in depth, and compared conceptions of teaching in four students from the same, yet very different contexts. If our chapter helped open the topic of diversity of students of faculties of education (at the same level of undergraduate education), if it made readers think about the diversity of challenges faced by student teachers during their studies (and, more importantly, their teaching practice) and related to shaping and making their conception of teaching (often still tacit) conscious, then it has achieved its goal.

Nineth Chapter

UNEXPECTED SITUATIONS DURING STUDENT TEACHER PRACTICE

Jan Nehyba, Barbora Šimůnková

A class can be considered an open and non-linear social system (Trygestad, 1997; Wang, Zhou, Chen, & Zhan, 2009), in which the teaching process is a highly complex and dynamic phenomenon. This teaching process is rich in unexpected situations or events[107] and dealing with these is a very significant aspect of teaching. If these unexpected situations are reflected on, they become an important source of knowledge about teaching for teachers themselves (Flavell, 1979). This chapter addresses the theoretical assumptions concerning unexpected situations in the lessons, and then individual types of unexpected situations and how student teachers deal with them are illustrated in the empirical data.

In the literature there are some comments on the topic of unexpected situations in the classroom but no deep or systematic insight into the issue[108]. There are general statements, such as Brookfield's claim (2006, p. xii) that teaching is "full of unexpected events, unlooked-for surprises, and unanticipated twists and turns, and that teachers can only expect one thing with certainty, and that is uncertainty." (ibid.).

Unexpected situations are often interconnected with tacit knowledge (Evans & Kersh, 2004; Wilton, 2010). In these situations, learned patterns of behavior and thinking often fail and situations are consequently dealt with based on previous knowledge and experience, which is less conscious and more difficult to articulate at the given moment (it is a specific type of tacit knowledge, cf. Polanyi, 2009; Reber, 1989; Nonaka & Krogh, 2009; Eraut, 2000). A similar term is *an unpredictable, contingent event*, which is often related to unexpected and unplanned reactions from teachers, triggered by students' reactions (Rowland & Zazkis (2013, p. 138–139).

Another related term is *critical incident*. This term was introduced by Flanagan (1954) in his article *The critical incident technique*.

[107] From now on, the term *situation* will be used.

[108] An exception is Foster (2015) mapping unexpected situations in a Mathematics class.

Critical incidents are defined as extreme behavior, either outstandingly effective or ineffective with respect to attaining the general aims of the activity. The procedure has considerable efficiency because of the use of only extreme behavior. It is well known that extreme incidents can be more accurately identified than behavior, which is more average in character. (Flanagan, 1954, p. 338)

Over the past 40 years, the critical incident technique has become a widely used qualitative research method and one of the most cited topics in organization psychology (see Butterfield, Borgen, Amundson, & Malio, 2005, p. 475). In the educational context, a significant paper by Tripp (1993) states:

> ... critical incidents are not things that exist independently of the observer and wait to be discovered; rather, they are created. Incidents happen but critical incidents are produced by the way we look at a situation: a critical incident is an interpretation of the significance of an event. To take something as a critical incident is a value judgment we make, and the basis of the judgment is the significance we attach to the meaning of the incident. (Tripp, 1993, s. 8)

In the Czech context, for example, critical incidents are defined from the perspective of narrative research as "separate inserts (digresses), short stories that divagate from the main story line that depicts the professional development of an expert teacher" (Švaříček 2011, p. 251). These definitions are rather vague in the educational context, and Angelides (2001) proposes a criterion that helps to determine whether something is a critical incident or not. Based on the ideas of Schön (1995) and Schein (1985), Angelides suggests that an important criterion for identifying a critical incident is the phenomenon of 'surprise'. It is a surprising or problematic situation that stimulates reflection or a need to deal with the situation (Angelides, 2001, p. 431). In this way, the concept of critical incidents comes close to the concept of unexpected situations. However, to date, all the research into unexpected situations and similar concepts indicates a lack of regularity in the examination of this phenomenon. For this reason, it is necessary to look at the topic of unexpected situations in more detail and *(a)* find a clearer definition, and *(b)* based on the empirical data, show a typology of unexpected situations during teaching and also the options for dealing with them.

9.1 A preliminary definition: From an episodic situation to an unexpected situation

From the perspective of phenomenological-cognitive science, a situation is the most basic meaningful segment of a lived experience (Havel, 1999); therefore, it is called an episodic situation or experience. Havel (2009) regards as significant the view

of the episodic situation from the *first person perspective*[109], and nominates significant characteristics of these situations as: 1) it can be narrated (it has content), and 2) it is connected to a certain place and has time boundaries (cf. 1.2). Gerstner & Goldberg (1994) and Nagy (2011) also claim that our lived experience is divided into segments (or rhythms), which are structured as three-second-long units. By contrast, the psycho-biologist Trevarthen (2011) states that other segments exist that also categorize human experience into different length cycles. Based on this anchored theory of an episodic situation, the term *unexpected situation* can be defined as a meaningful segment of human experience (surprising for those involved) which can, on principle, be narrated (there is something to talk about) and which has boundaries of place and time. We take 'surprise' to mean that the situation does not correspond with anything similar that the person in question has consciously experienced in the past (Haider & Frensch, 2005, p. 401)[110]. Another characteristic is added by Gallagher (2015, p. 117), who claims that 'wonder' is 'provoked' when we fail to recognise the reason for the situation, and this, in turn, can trigger other emotions such as terror or dread. Wonder is seemingly 'caused' by a lack of cause, but it may, in turn, arouse other emotions such as consternation, veneration, horror, devotion, hatred, and so forth (Gallagher, 2015, p. 117).

Consistency between expected reality (based on personal experience) and actual reality is, therefore, crucial for unexpected situations. Jarvis defines disjuncture as "a complex phenomenon and yet it is best described as the gap between what we expect to perceive when we have an experience of the world as result of our previous learning (and, therefore, our biography) and what we are actually confronted with" (Jarvis 2010, p. 83). Disjuncture occurs when people cannot react to the situation (person, one's own self, thing ...) in the same way they had been doing so far, that they had 'saved' in their experience. Put simply, disjuncture occurs when "there is no taken-for-grantedness between people's past learning experiences and their present situation" (Jarvis, 2004, p. 92). This is very similar to the way Dewey looks at a 'situation' (see Chapter 1.2 Knowledge and the role of figurative language in its explication). Jarvis (1992) explicitly states that, ironically, where there is harmony, there are no situations that could lead to learning. He continues by saying that children come into contact with a situation of disjuncture very early (Jarvis, 2009). Graphically, the concept of disjuncture can be depicted in the following manner.[111]

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[109] In the research, the first-person perspective is associated with the effort to obtain data from the first person position, for example, in the form of the formulation of the subjects themselves about their experiences. According to some researchers (for example, Varela & Shear, 1999b), this nature of the data is not reducible to an objective perspective of an independent subject (a third party).

[110] An event is unexpected when it is not consistent with what the individual experienced in this specific situation in the past.

[111] Partially adapted from Nehyba (2012, p. 39).

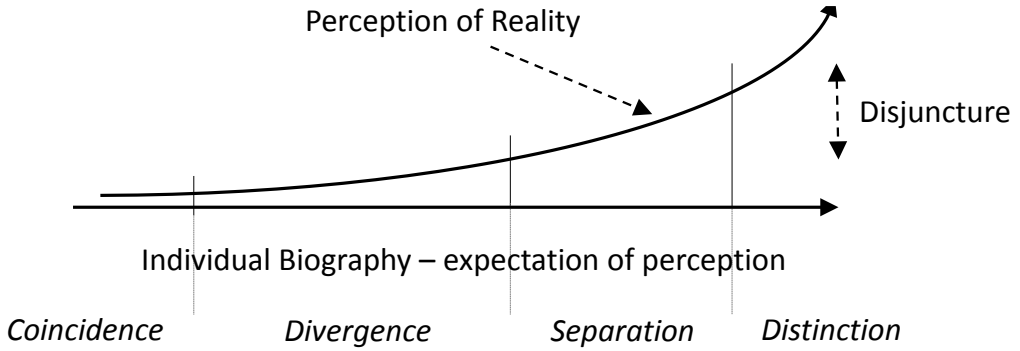

Figure 10. Disjuncture of expectations and reality—adapted from Jarvis (2010, p. 84).

The bottom axis shows the expected perception. This perception is based on previously gained experience and, according to Jarvis, constitutes what he calls total experience (which is a summary of all the experience that a person has gained up to a certain point in life). The upper arrow represents the actual perception of reality. At the beginning, this perception corresponds with the gained experience—Jarvis calls this 'coincidence' (of the currently perceived reality and past experience). 'Divergence' is a slight deviation between these two states. However, at this point, we can adjust our behavior to the situation without changing our understanding of the world, and mostly we do this without being aware of it. 'Separation' occurs when the gap between these two positions is greater and we start to ask ourselves what is going on. According to Jarvis, this stage is the beginning of conscious learning. At this point, disjuncture occurs in the cognitive, emotional and practical areas. 'Distinction' occurs when the gap is so large that we have to make a greater effort to deal with the distinction, for example by studying. Jarvis (2010) states that it might also happen that the gap is so large that we are not able to overcome it by learning. One of the options for dealing with such a situation is, as Mezirow (1990) would likely suggest, changing "meaning schemes and perspectives", i.e. re-defining how the actual process of perceiving reality takes place.

9.2 What happens in the mind during an unexpected situation?

In the context of motor learning, specifically for sequential learning (e.g. learning any serial model or list of numbers, letters), a hypothesis of unexpected situations exists (Frensch, Haider, Rünger, Neugebauer, Voigt, Werg &, 2003). If individuals search for the cause of the deviation (i.e. the difference between what they experience and what they expected), then correct knowledge about the causes of these deviations is acquired. This hypothesis has been supported by several empirical studies (Runger & Frensch, 2008; Haider & Frensch, 2005, 2009). This type of learning "in the non-declarative memory system generates memory codes that directly control individuals'

behavior. … Observation of behavioral changes, in turn, triggers learning in the declarative memory system" (Haider & Frensch, 2005, p. 401). Although it is impossible to perceive a novice teacher as simply learning sequentially, it can be stated that the teacher tries to learn by behaving in a routine way in individual situations, in order for their behavior to become automated. Although teacher behavior is much more complex. We can, nonetheless, claim that observation, or even reflection, (i.e. deliberate thinking about automatic complex processes, such as the process of teaching[112]), leads to the formation of knowledge about these processes and their possible improvement. This is evidenced by the strong presence of reflective practice in the teachers' training (Korthagen, 2001; Dieker & Monda-Amaya, 1997; Henry, 1999; Parkay, 2000; Yost & Sentner, 2000).

Relevant questions to ask at this point are 'What is going on in the mind of a teacher who finds him/her self in an unexpected situation?' and 'How does a teacher decide what to do?' Is the decision based on how the teacher chooses to behave next in the unexpected situation, or is it based on the knowledge that is formed about a possible solution to the unexpected situation? One interpretative framework, which has been empirically proven, can be found in what is referred to as the predictive mind or the principle of *prediction error minimization* (cf. Hohwy, 2013). The central idea is that conceptual, perceptual and cognitive behavior, and even the level of action can be understood through this one principle. At the same time, a prediction error "is always greater than surprise, such that prediction error = surprise + perceptual divergence. It is always greater than surprise because perceptual divergence is non-negative" (Hohwy, 2013, s. 52).

Similarly, Jarvis's definition of disjuncture can only be negative, as shown in Figure 1. This position corresponds with an empirically proven hypothesis (Friston, 2010) that our brain creates hierarchically organized generative models that generate predictions about sensory inputs and their hidden causes. These created models are based on previous sensory data that a person already processes in relation to already existing models. In a 'here-and-now' situation, individuals receive sensory signals. The possible difference from between these sensory signals and our predictions or expectations (based on a general model) must be processed further at a higher level of the model.

The human brain continually generates predictions about the environment based on our learned understanding of how the world works. These predictions actively and effectively facilitate interpretation of the incoming sensory information (cf. Damasio, 2010, p. 93–121). Originally, prediction coding was designed as a model of visual perception (Barlow, 1961). Currently, it plays an important role in the quest to find a unified theory of the brain (Friston, 2010). The central idea is that the responses of some neural circuits do not contain information about the currently perceived stimulus, but rather about the difference between the stimulus and the expected response to

[112]Such automatisms are associated with non-declarative memory

it (Fiorillo, Tobler, & Schultz, 2003; Schultz, Dayan, & Montague 1997; Schultz, 2010). An important objective is to minimize the surprise encountered. In an unexpected situation, the brain—within a particular action—tries to minimize the element of surprise based on the previous experience (Blakemore, Goodbody, & Wolpert, 1998; Bestmann, Harrison, Blankenburg, Mars, Haggard, Friston, & Rothwell, 2008; Franklin & Wolpert, 2011). We use our knowledge from previous experience and create predictions that minimize the moment of surprise (Friston, Kilner, & Harrison, 2006).

From this viewpoint, we can argue that the tacit knowledge that helps us in unexpected situations can also be seen as a type of prediction, based on *previous experience, which* manifests itself in the attempt to minimize a prediction error (i.e. to minimize the error which arises from the surprise and the perceptual divergence). Tacit means that these predictions are less conscious[113] and hard to articulate or completely unconscious and impossible to articulate (see what Helmholtz, 1866/1962, calls—*unconscious inference*). Nevertheless, it seems that tacit knowledge is often 'loaded' with the uncertainty of this concept and various interpretive frameworks that impose certain requirements and expectations on it. As a result, in this chapter, there is minimal use of this term.

It is possible to surmise what kind of processes may occur in the mind of a person in an unexpected situation (see descriptions of interrelations above), however we lack more systematic data or information on what an unexpected situation looks like from the perspective of the student teacher. The remainder of this chapter describes the methodology for research into this area and then presents the results of the research, in answer to two research questions: (a) *what types of unexpected situations do student teachers commonly encounter*; and (b) *how do student teachers experience unexpected situations*?

9.3 Methodology

The initial question posed in the research interviews was: *What comes to mind when you hear the words 'unexpected situation?'*) Ostensibly the interviews focused on the subjective conception of teaching but they also monitored whether informants referred to unexpected situations in their responses.

The method of data collection enabled researchers to obtain highly detailed descriptions of individual unexpected situations and the processes informants used to deal with them (or not). The data was analyzed in the following manner: after transcribing the interview, topics related to unexpected situations were identified. This meant that the focus was primarily on passages where students reflected on situations *i)* that surprised them, *ii)* that they directly referred to as unexpected, or *iii)* that they had

[113]"In addition, the term prediction has a more neutral connotation and can refer to both implicit (unconscious) predictions and explicit, 'intellectual' prediction." (Van de Cruys & Wagemans, 2011, s. 336).

never come across before. As a result, the data included a typology of unexpected situations that the researchers were able to explore in detail, examining the asynchronous and diachronic aspects of these situations (Petitmengin, 2006). In this manner, it was possible to use the text to construct detailed descriptions of unexpected situations and potential ways of dealing with them. The researchers compiled solutions by creating diagrams for individual situations. These are close to the diagrams based on systemic dynamic (Šusta & Kostroň, 2004). As an example, student teacher Karel's map of his process of resolving an unexpected situation is used (see Figure 11).

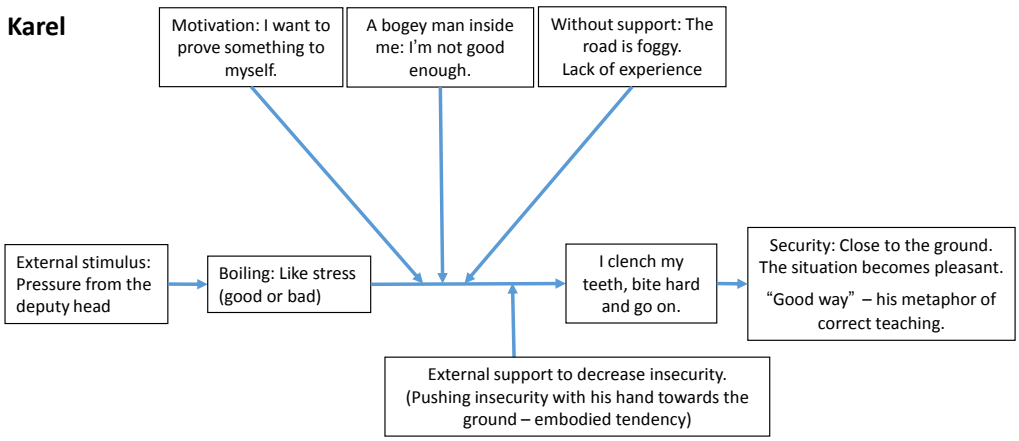

Figure 11. Example of a personal diagram.

The data collection method facilitated analysis of the micro-structure and micro-dynamics of the process for unexpected situations that often occur within a few seconds of each other. This is in line with the way such analysis is viewed by Kimmel (2016) and Gardner (2009, 2011) who focus on the micro-genetic analyses of interaction.

Subsequently, we identified features from the individual processes dealing with unexpected situations in order to reach a general model (see part 8.7). The whole process was interactive. We drew maps of situations and dived into the data again, adjusted the maps again and then chose features from the general model that we again compared to the data and the individual maps of situations. We repeated the process, until we considered the categories fixed and clear enough in relation to the data. From the design perspective, it was a detailed descriptive phenomenologically oriented analysis of a specific situation, with greater reference to psycho-phenomenology (Tosey & Mathison, 2010) than descriptively-oriented phenomenology (Giorgi, 2009). The primary aim of the research goal lay in "describing essential structures of the sensory experience" (Urban, 2015, p. 39).

9.4 Types of unexpected situations

When processing the data, various types of unexpected situations emerged. These were analyzed in more detail and their characteristics identified.[114] The most important characteristics appeared to be those relating to the perception of the situation, the impact (of the situation on the environment) and the gravity of the situation. These three characteristics were both widely reflected and also related to each other in the situations most frequently recounted. For clarity, these unexpected situations, with their characteristics, are shown in Table 9.

Table 9
Explanation of the characteristics of unexpected situations

Pleasantness of the situation	The student perceives the unexpected situation either as pleasant or as unpleasant. It is the degree of pleasantness of the situation for the informant.
Impact of the situation	A category established according to how many people are affected by the unexpected situation.
Gravity of the situation	A category defined by how much the lesson's flow is disrupted (will be explained below).
Sudden-ness or gradualness of the occurrence of the situation	Some unexpected situations occur suddenly while other situations evolve gradually over time and the student can observe their progressive development. The suddenness or gradualness hence represent another category of unexpected situations that appear in the empirical data.

Basic classifying of the unexpected situations was carried out according to whether the situation was perceived by the student as *pleasant* or *unpleasant* (perception of pleasantness). Then it was examined to ascertain whether it affected more people or only the practicing student (impact). In this way, a basic scheme emerged according to which the unexpected situations were categorized step by step.

In the following sections unpleasant situations affecting more than one person are analyzed first. This was the largest group of unexpected situations referred to in the empirical data. Then unpleasant unexpected situations which affected (only) the practicing student are analyzed and, finally, pleasant unexpected situations (3) are discussed.

[114] See Marradi (1990) for the criteria used to sub-divide the unexpected situations.

9.4.1 Unpleasant unexpected situations affecting more people

A key category in categorizing unpleasant unexpected situations affecting more than one person proved to be the *gravity* of the disruption of the lesson flow, which is connected to the *impact* (the number of people affected). The gravity of these unpleasant unexpected situations is relatively easily identified in the empirical data; the concept of flow, which is an *in vivo* code, is used here. This is a metaphorical expression that participants in the research use themselves in their reflections. If their teaching developed according to their expectations (plan), they referred to 'a nice, pleasant or undisturbed' flow. In the current study, this state is referred to as *ideal flow*.

Dana: ... *that nothing happened there, that I would, err, that I would panic or suddenly not know or anything like. I mean, nothing like that happened, and everything had, well, a nice flow.*

Researcher: *So the lesson had a nice flow... Everything went well, the pupils wrote the dictation, filled in the exercise. And what is that—that flow?*

Dana: *That is, that is that nothing happened there, nothing special, I don't know, like no incidents...* (Interview 2)

Researcher: *So when it flows, what kind of flow is it?*

Cyril: *Well, that I can do the teaching the way I wanted to do it, that nothing threw me off there.* (Interview 2)

Two attributes are important for the *ideal flow* of the lesson: *adequate speed* and *reciprocity*. If the speed and reciprocity of the flow are disrupted (by something or someone), unpleasant situations develop. In the empirical data, several types of these situations emerge (discussed below). Speed and reciprocity of the flow are closely linked—if speed is distorted, reciprocity is distorted as well. Interestingly, students mainly reflected on the distortion of speed while the distortion of reciprocity was mentioned less often. This study first examines disruption of speed and then disruption of reciprocity.

The speed of the flow

Student teachers most often recalled unpleasant unexpected situations in which the lesson flow was slowed down or even stopped, so that the practicing student is not able to teach the lesson according to their expectations. Usually, these situations affected more than one person — the student teacher and at least some of the pupils. The degree of *gravity* of these situations is related to their *impact*: the more the flow slows down, the more people are affected by the situations.

In his reflection, student teacher Cyril talks about 'getting stuck', 'jamming' and other terms that evoke preventing physical movement:

Cyril: *... when I make a mistake at home or something, so it's not such a problem, but when, you know, when it's during the training or when I'm teaching, so that—err—first intention is to somehow continue, so that it's not obvious that I got stuck, that something is wrong... But, you know, usually it's really easy to see that the person is stuck.* (Interview 2)

This extract shows that the student teacher perceives the slowing down of the momentum of the lesson as a negative phenomenon, and tries to act in such a manner that the slowing down has the least possible impact. It is also interesting that the respondent switches in his narrative to the third person, which may indicate that the situation is so unpleasant for him that he seeks to exclude himself from it or to generalize it. Based on the empirical data, *the gravity* of unpleasant unexpected situations can be established according to the degree of disruption of the class flow: (a) *moderate slowdown of the flow*; (b) *slowdown of the flow;* (c) *stopping the flow. The suddenness* or *gradualness* of the emerging situation is addressed below.

a) moderate slowdown

The unexpected situation is unpleasant for the student teacher but he/she does not react in that moment but waits for what will happen next (e.g. "it will sort itself out, I will wait"). In a subsequent reflection, student teachers talk about physical movement slowing down and talk about *limits* or *boundaries* of what is still acceptable for them and what not. We can refer to this as *the limit of acceptability*. A situation with a moderate slowdown of the flow is perceived as still acceptable — the limit of acceptability has not been breached. It is very difficult for the students to specify their limit of acceptability. Based on the data, we can conclude that it is highly individual for each student and, in addition, the limits fluctuate (for example, a situation that is accepted in an Art class, would not be accepted in a Czech lesson). In the examined situations, the most reflected situation was one with a clear the link between the limits of acceptability and fulfilling the objectives of the lesson. (If the lesson achieved its purpose according to the student, the situation was still considered acceptable.

Dana: *If I should admonish them or not. At first, I had to evaluate if, err, if it is, you know, the fact that they talk or something, if it is beyond the limit and I should admonish them. So then I either did so or I just let it be.*

Researcher: *So before doing so, you felt, or you asked yourself, if you should admonish them or not. If the situation is already beyond the limit where you should admonish, or if you can still let it be. So what kind of limit is it?*

Dana: (pauses for five seconds) *That maybe someone ... let's say, talks in a low voice and at the same time works and does what they are supposed to, so then maybe I don't admonish them, but when, you know, a pupil talks and doesn't work, then he has to go to the hallway maybe ... before the limit is reached means that it is, err, still useful for the pupil, that the lesson gives him something.* (Interview 2)

Cyril: … *before the limit is reached means that it is, err, still useful for the pupil, that the lesson gives him something.* (Interview 2)

Situations analyzed with a moderate slowdown of movement usually evolved gradually over time (for example, pupils working on a task gradually lost interest and started to chat with each other, while the student teacher was waiting to react). Less often, such a situation emerged suddenly (for example, a tool did not work which, however, did not disrupt the achievement of the aim of the lesson).

b) slowdown of the flow

Unpleasant unexpected situations already *breach the limit of acceptability.* The lesson flow slows down noticeably (it is not possible to realize the plan without modification; the goal of the lesson can no longer be achieved). In the example below, the student teacher Cyril perceives the undesirability of the situation so acutely that he decides to act. In the data analyzed for this study, such situations always *developed gradually* as the impact of the situation (the number of people affected) increased.

Cyril: So, on Monday I wanted to give them a smaller task, they were supposed to swim less, but there was this one weaker pupil who didn't go swimming. And one girl, she had a headache or wasn't completely well ... so that sort of comments ... well, then the whole group reacts to that and suddenly nobody is interested. So, there are some kids who kind of realize that, that it's good, that they can swim that much, and then the rest ... So that was a disappointment that the plan I had wasn't fulfilled ... what I expected them that they would manage. (Interview 2)

The impact of the situation gradually increased until Cyril reached the limit (for him) of acceptability (his intended goal was no longer being fulfilled). He then decided to act and alter his original plans.

c) stopping the flow

The most serious unpleasant unexpected situations bring the flow of the lesson to a complete stop. It is not enough for the student teacher to adjust the plans, rather they have to deal with a new (completely different) situation. Such a situation, which is very intensely perceived as undesirable, and the impact of which is high, usually involves not only the student and the pupils but also other people (parents, other school employees, competition viewers, etc.) The recorded situations most often emerged suddenly and it was usually beyond the student's means to resolve them: "We were doing sprints and in the middle of one race, a boy fell over because he had cramp in his thigh. So I couldn't really do anything and it was an unexpected unknown situation for me" (Beáta, Interview 2).

Only once in the situations analyzed did a situation arise when the flow of the lesson stopped, and it evolved from unpleasant unexpected situations where the flow had slowed down. The situation was not appropriately dealt with in the early stage and it escalated into a situation that was then unresolvable. In this case, the student was only an observer (the situation occurred as she was auditing an interest group).

Jaroslava: *So, I started to notice a group of boys where some kind of conflict started to evolve. One boy, he didn't want to do the role that was assigned to him. The instructor just dealt with it at that moment simply by saying that he would do it and no discussion about that. Well ... the boy had to accept it then, but he wasn't really working much and started to be, you know, more and more aggressive. And instead of doing what he was supposed to, so he started to annoy his classmates, attack them and call them names. The lecturer paid attention to the other children and all the time just overlooked this. And then, he, he realized that there is something going on there, as the other boy, I mean, ... the boy I was first talking about, he was actually attacking and beating his friend. And he started to complain and the instructor simply said: "Come on, guys, stop it, you do this and you do that." And that was it and he continued to pay attention to other groups. And then, basically, it continued and the boy, it was as if he suddenly got into this frenzy, ... and he started to be very, very vulgar ... and he started to beat up even more pupils around him, really, and then the situation ended up, I mean, the instructor stepped in and it was as if the boy really gave it to the instructor. The pupil actually attacked him saying that he would, he would kill him, and was calling him names and told him he would sue him that he somehow attacked him and the instructor was trying to calm him down but it was too late for that. The boy, he was already out of himself and he was simply attacking. The lecturer, er, he gave me this look, as if help me ... But I was already in such a state of shock that, you know, I had no idea what to do at that moment.* (Interview 2)

Reciprocity of the flow

As well as speed, the flow of the lesson also has a certain direction. If pupils cooperate with the student teacher in the expected manner, the student has control over both the direction and speed of the flow. The flow is perceived as *reciprocal*. To this extent the reciprocity of the flow is understood as the state when both parts (the student teacher and the pupils) have common goals and cooperate in their realization. However, the direction of the flow can change. The flow can stop being reciprocal and an unexpected situation emerges:

Alena: *Here, they just weren't interested, more or less. So maybe that's why it wasn't working well since the beginning of the lesson. Here, it was more of a coincidence, somehow, you know, it happens, but this was that sort of aversion against any person that would come there, so that really makes difference.*

Researcher: *And what was the situation like for you?*

Alena: *Hmm, unpleasant? Well, I just didn't believe my eyes, so I was hoping that it will somehow pass, that things would cool down and we would move on, but it didn't happen.* (...)

Alena: *Well, sure, either you just get over it and move on, or nothing really happens, or you just find out that, you know, that things are just going in a different DIRECTION...* (Interview 5)

Losing control over the direction of the flow can result from poor work organization or unclear agreement with the teacher trainer. For example, student teachers may only find out in the classroom that they have prepared study matter which the pupils already know or which the pupils have to give presentations about. Students then often reflect on the unexpected 'problem' for the entire lesson.

Františka: *So I didn't know if I should go through it with them or not, and how I should react, because I really had it all prepared for roughly forty-five minutes, so that it works out well. And then I had this feeling, like, I was telling myself, Jesus, forty-five minutes!* (Interview 2)

The reciprocity of the flow can also be disrupted if the flow speeds up so much that the student teacher has no time left to engage with the pupils. For example, the pupils might be too active and the student teacher then does not manage to work with them from the subject area perspective or from the didactic perspective.

Jaroslava: *And then this thing that happens to me all the time. I mean, those unexpected questions when ... when I simply don't know. So, for example, I catch myself that, err, that I don't know some theoretical information, and the theory is also necessary, but if a kid asks me about it ... I'll give an example now that I know the answer to, but it's better to show it on an example anyways, so let's say if a kid asks me how come that the marsh treader jumps over the water but it doesn't drown. And I react, I mean, I'm taken aback and suddenly I don't know and think, what is it, really? And in the very first lessons I just talked about something else, like started about something completely different and even said to the child: hey, look, you should be doing this and you are not. So quit asking questions and do what you are supposed to.* (Interview 2)

In the empirical data, only a small number of unexpected situations with disrupted reciprocity of the flow were evident. Consequently, they cannot be characterized in as much detail as those situations where the speed of flow was disrupted. There is the interconnection of reciprocity and the speed of the flow which can be expressed graphically.

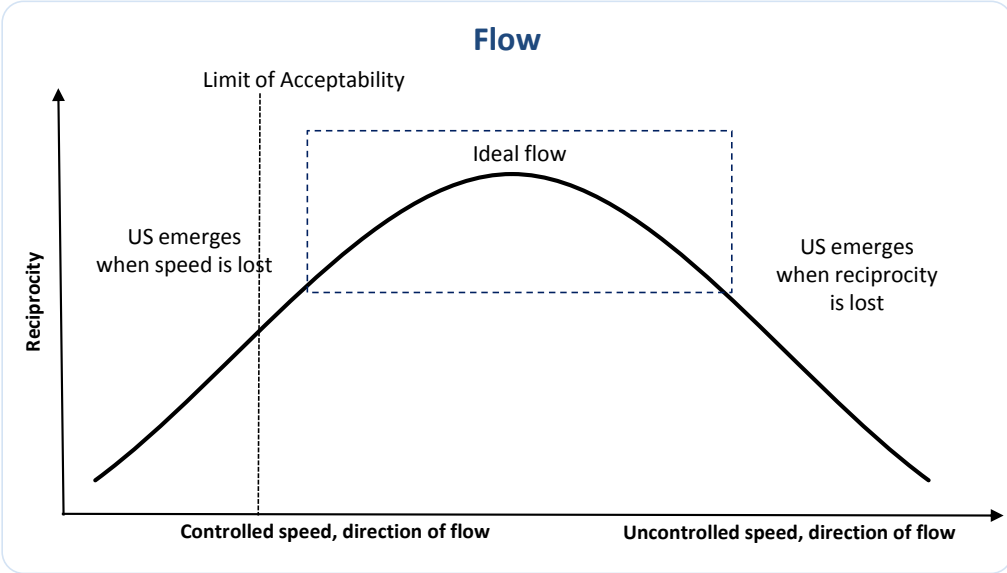

Figure 12. The interconnection of the speed and reciprocity of the flow.

The *lesson flow* is expressed in bold, and has two interconnected characteristics: reciprocity and speed. On the left are situations in which the speed of the lesson flow was under the student teacher's control, but still the flow was slowing down. Together with the speed, the reciprocity was also decreasing. Usually such unexpected situations were identified by the student teacher. More than three different levels are described (from moderate slowdown to actual stopping of the flow). Students also identified a 'limit of acceptability' that divided the less serious types of these situations from the more serious ones. In the middle, a state called *ideal flow* is depicted when the degree of reciprocity and the speed are as the student expected, and the lesson progresses without any issues. The right side of the graph shows unpleasant unexpected situations during which the flow was accelerated and/or its direction shifted beyond the student's control. De-synchronization of the speed and direction of the flow between the student teacher and the pupils led to the reciprocity of the flow being lost.

The empirical data showed that individual informants were aware of only certain parts of this whole pattern of the flow: some perceived only the significance of the 'slowdown' or the fact of 'getting stuck'. Others realized that there was a loss of reciprocity, or referred to these phenomena separately. Student teachers were unable to view this phenomenon holistically, for example, the way it is presented in Figure 12. This leads us to the assumption that the student teachers are aware of only some aspects of this process, but the whole 'pattern' of the flow is more tacit for them.

9.4.2 Unpleasant unexpected situations that affect only the student

A specific group identified within the empirical data was unexpected situations that affected only the practicing student teacher and that the pupils or other people did not perceive. Such situations occurred outside of the main pedagogical activity of the student teacher (outside of the lesson itself), most often before the lesson. For example, the student had to teach a greater number of lessons or a different subject matter than originally planned. It is difficult to find the characteristics in these situations that could determine their level of gravity. It is impossible to talk about the speed or reciprocity of the flow as the situation affected only the student teacher. The intensity (as well as polarity) of the student teacher's perception of such a situation was changeable.

Karel: ... *that I come to school in the morning and I'm supposed to teach one lesson, and it turns out that I'm not teaching one lesson, but four of them. You know, the moment when I know that I'm not prepared, but I have to go and teach the lesson anyway. Or simply go into the classroom to do something, I would say, that for me personally it started as an unpleasant situation ... And then it ended with the unpleasant situations becoming pleasant, because I somehow managed it.* (Interview 2)

Situations of this type appeared only sporadically in the empirical data and all evolved *suddenly*.

9.4.3 Pleasant unexpected situations

Some unexpected situations were evaluated by the students as pleasant. They did not refer to them in much detail, hence it is difficult to produce closer characteristics of such situations. The reflected situations always occurred directly in the lessons. The practicing student was surprised by the flow of the lesson when the speed and reciprocity of the flow were even better than the student originally expected. However, it is not clear if the situation was perceived as unexpected also by the pupils.

Researcher: *Today I'm interested in hearing if you came across something unexpected during your practice.*

Beáta: *The pupils were incredibly nice. They, actually, they were almost only girls, they were really good and I didn't even expect them to be so good. They paid attention all the time and even asked questions and so on.* (Interview 2)

The reflected pleasant unexpected situations developed moderately, over time, according to how the cooperation between the student teacher and the pupils developed.

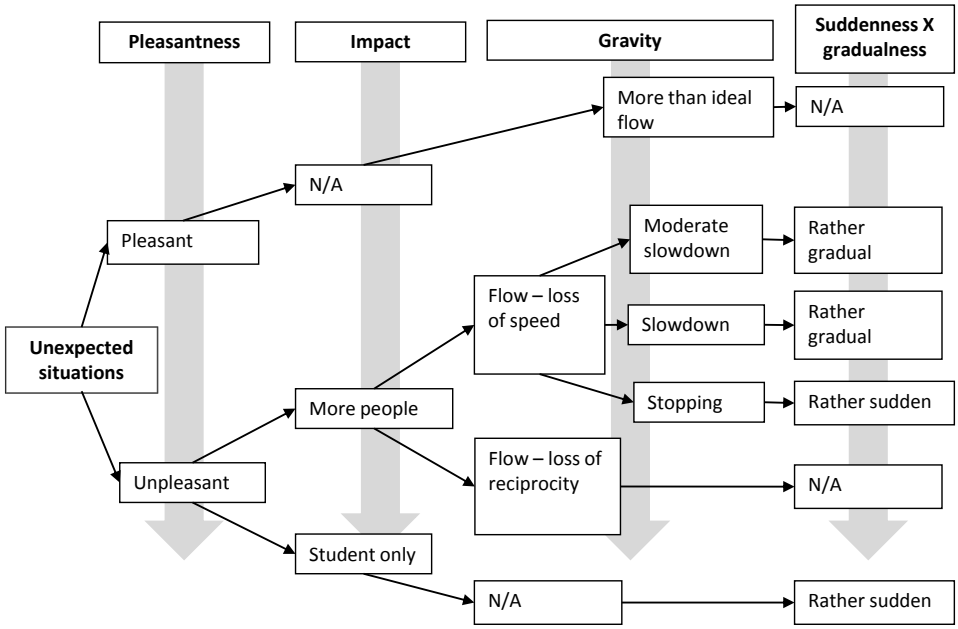

Figure 13. Classification of unexpected situations.

The *pleasantness, impact* and *gravity* of the unexpected situation are mutually interlinked. The students reflected in more detail those situations that were unpleasant, affected more people and during which the speed of the flow decreased. These unexpected situations were those most represented in the empirical data, and it was possible to establish their gravity according to how much the flow slowed down (moderate slowdown, slowdown, stopping the flow). If the impact of these situations was increased, their gravity increased as well. Slowdown, speedup or loss of control over the direction of the lesson flow was connected to the loss of reciprocity of the flow. However, students did not reflect the loss of reciprocity as much as the loss of speed; therefore, it is difficult to characterize reciprocity of the flow in more detail. Similarly, unpleasant unexpected situations that affected only the student arose less often and consequently were not often reflected on. From the collected data, it was also difficult to characterize pleasant unexpected situations, as they appeared only very rarely (or students did not feel inclined to comment on them).

The last of the stated characteristics of unexpected situations was the *suddenness versus gradualness* of their emergence. In reflected situations, little interconnection was detected between suddenness or gradualness and the other three characteristics. It can only be concluded that unpleasant unexpected situations affecting a number of people, and during which the lesson flow slows down, usually develop gradually, while situations when the flow stops completely, more often occur suddenly. Unpleasant unexpected situations affecting only the student teacher are usually sudden, too. On

the other hand, pleasant unexpected situations that were reflected showed a certain gradual development over time, but these were so rare that it is not possible to draw conclusions based on the data.

9.5 Discussion of the typology of unexpected situations

Everyday life is divided between areas that the individual approaches mechanically and areas where the individual encounters a certain kind of problem. Areas about which the individual has deep knowledge are experienced as routine. However, circumstances can force the individual to enter new or problematic areas (Berger & Luckmann, 1999, p. 29–30). Situations that a student teacher encounters during their teaching practice represent this kind of new and unexplored area. The student in the role of the teacher encounters, for the first time, the reality of school and must deal with situations with which they have no previous experience. Based on students' reflections, a typology of unexpected situations was produced, which was not concerned with "objective truth", but rather with student teacher interpretations of their "here and now" experience.

The most significant characteristics of unexpected situations proved to be their *pleasantness, impact* and *gravity.* In the case of unpleasant unexpected situations affecting more than one person gravity increased together with the growing impact, while the degree of gravity was established based on the degree of disruption of the speed and the reciprocity of the flow that the students reflected. The metaphor of the lesson flow is related to the concept of *pacing* (Janík et al., 2013, pp. 110–115).

The term pacing is understood as adequate speed, that is the "[frequency] with which the learning activities of the pupils alternate with the teaching activities of the teacher during the lesson" (Janík et al., 2013, p. 113). Together with the use of time and structuring, pacing is considered one of the important components for establishing the quality of class organization and management (Janík et al., 2013, p. 110). Students 'feel' the importance of this component, or at least perceive it in some way, but they are unable to accurately express it or separate it from other components of class organization and management. This could likely explain why they use the metaphor of the flow which, however, also encompasses the use of time, structuring and probably other components as well, depending on the nature of the specific unexpected situation.

It is also interesting that students use 'a limit of acceptability' to distinguish the gravity of unpleasant unexpected situations (when speed and reciprocity of the flow are still acceptable and when it is no longer the case). The limit of acceptability is difficult for the students to characterize; their descriptions include pauses, circular definitions or metaphorical expressions, which suggest that the limit (and its setting) is intensely tacit.

Unpleasant unexpected situations affecting only the student teacher show no interconnection between impact and gravity, as it was in situations affecting more people. The impact of situations affecting only the student teacher is, ipso facto, low, since there is no effect on others. However, these situations were perceived by the students as changeable. Overall, the student teachers in this study first perceived the situation as intensely negative, then they came to terms with it, and eventually reflected that the situations became pleasant after all. We can hence assume that, since dealing with it depends only on the student teacher, individuals may be able to come to terms with such situations relatively well.

Only minimal correlation was found between this type of unexpected situation and the last characteristic: *suddenness versus gradualness*. Despite the fact that all reflected pleasant unexpected situations emerged based on the excellent cooperation of the pupils, in a more long-term examination, and with more long-term practice with the pupils, pleasant unexpected situations (and their other sub-types) may also emerge suddenly. Interestingly, the most serious unpleasant unexpected situations most often emerged suddenly (a pupil collapsing, a pupil leaving an interest group without the student teacher's knowledge, etc.) and were solved before the lesson flow came to a complete stop. Dealing with unexpected situations is addressed below.

9.6 Dealing with unexpected situations

Encountering an unexpected situation and dealing with it is a process that often occurs extremely quickly, without the participants being aware of all its components. During our retrospective in-depth interviews using Clean Language, we gradually uncovered individual phases in the whole sequence of "what happens when I come across an unexpected situation". In most cases, this led to the research participants becoming aware of some component parts (phases) when dealing with unexpected situations that had been hidden from them before. As a result, a 'colorful' system of various stimuli, reactions and strategies emerges that affects the process of dealing with the situations. After a certain degree of reduction, this system is depicted in Figure 14. In the following sub-chapters, individual parts of the diagram are addressed in more detail.

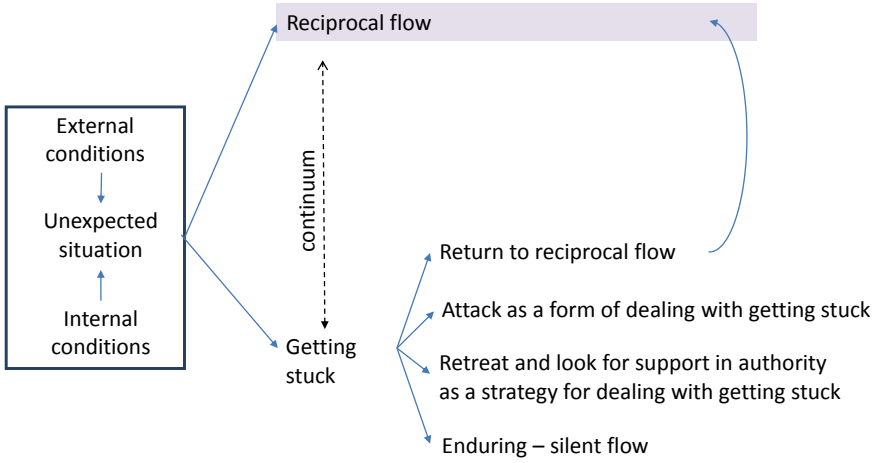

Figure 14. A general diagram for dealing with unexpected situations.

9.7 Circumstances for the emergence of unexpected situations

It might appear that the development of unexpected situations is often partially caused by external or internal conditions that the student teacher does not foresee. *External conditions* can be linked to (a) *a person*: for example pressure from the deputy head (Karel); a pupil threatening another pupil (Jaroslava); an aggressive pupil (Jaroslava); (b) *material circumstances*, for example missing teaching aids (Cyril). In addition, *internal conditions* are also important for the emergence of an unexpected situation, for example, those linked with (a) *expectation* which is not fulfilled: the prepared plan fails (Františka), or related to (b) *lack of knowledge of the teaching matter* (some knowledge is missing) or (c) *lack of knowledge of the didactical transformation of the content* when the student teacher is not familiar with a certain method (Dana). However, unexpected situations are not triggered only by an internal or external impetus but often by *an interaction of external and internal settings,* which then leads the student teacher into an unexpected situation. It is understandable that there might be various levels of involvement of these factors or settings. Unexpected situations in interaction are most obvious in the example where the student teacher does not know the answer to a question (e.g. for Jaroslava). It is the question (from this perspective the metaphorical 'key'—see section 1.2) that "fits the lock" (ibid). It is the question that triggers the realization that (after investigating what I remember) 'I do not know the answer to this question', and this puts the student teacher into an unexpected situation.

Unexpected situations vary considerably. As Alena says: "all situations are unexpected" *but differ in the degree:* "there is a difference when, for example, the technical equipment doesn't work and I cannot really do what I want or when I cannot manage the pupils, and for example, if someone points a gun at me" (Interview 5). These

circumstances have significant effect(s) on the process of teaching—for example the speed of the flow is lost (and the situation of being stuck evolves), or the teaching does not proceed as it should, or the mutual relationship between the student teacher and the pupils is lost, or the student teacher manages to re-establish the reciprocal flow between the pupils and the student teacher.

9.8 Immediate reactions to unexpected situations

If the student teacher is exposed to an unexpected situation, an immediate reaction follows that is often instant and automatic. During an unexpected situation, a reaction to "getting stuck" occurs; if the situation is not unexpected, the situation continues to flow and the informants refer to it as the reciprocal flow (for more detail, see 8.5.1).

Reciprocal flow

If the situation is not serious or is not unexpected, the informants use the metaphor of "flow" or "smooth motion" for this process. This means "that, you know, nothing really happened, nothing special, nothing, no, I don't know, incidents [...] or [...] just that, the pupils, er, [...] were working and doing what they were supposed to, and, and nothing..."(Dana, Interview 2). The topic of the smooth development of the lesson is found in the non-verbal expressions of the student teachers:

Ema: *A typical lesson that goes like this {with her hand shows a quick smooth motion}, yeah, that maybe, I don't know, as if I have the lesson prepared and it goes simply great, and the kids cooperate.* (Interview 3)

Flow is associated with the fact that everything goes as it should and there is no hitch in the lesson that would undermine anything in terms of discipline, content or any other sense.

Cyril presents the lesson flow in a graph based on his own depiction. Individual lines represent the degree of disruption and insecurity in different pupils.

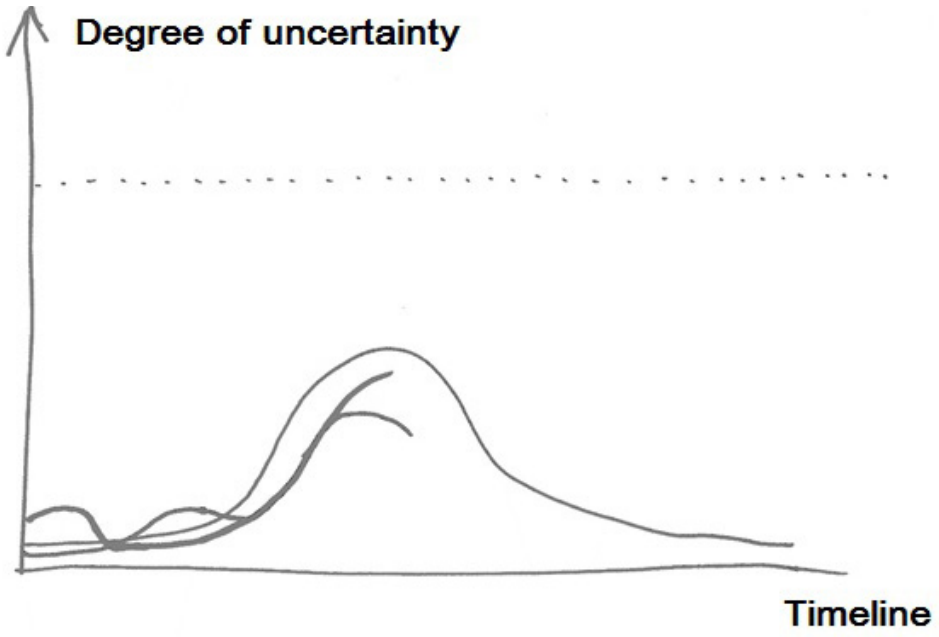

Figure 15. The degree of disruption and insecurity (source: Cyril—Interview 2).

The direction depicted in the graph is interesting. The upward direction represents the increasing disruption of the lesson and the downward direction refers to mitigation of the disruption and calming down. In the same manner, Karel also suggests, non-verbally, that the security is closer to the ground when it becomes an educational situation, which he desires and refers to as 'a good way' (Interview 5). However, most participants are not aware of these 'embodied' aspects of knowledge and we can view them as rather hidden (from their perception).

If the situation became more complicated (i.e. more challenging than the student teacher first imagines) then, as well as the metaphor of 'slowing down', other metaphors are used, associated with increasing or decreasing temperature. Student teachers suggest that if the lesson 'slows down' then an increase or decrease of temperature occurs, for example, in connection with the metaphor 'boiling'.

Karel: *I always stress out in such situations, because ... I like things that are well planned ... when not totally then at least partially, so that ... you know I think that the lesson cannot be planned for that one, for that one, which is also kind of stressful for me, but, but ...* {shrugs} *but I was totally boiling inside, right? I knew I would manage the first lesson anyway, but...*

Researcher: *So what kind of boiling was it?*

Karel: (pauses for four seconds) *That has to do with* ... (pauses for four seconds); {gesticulation} *and now I didn't know if he comes there or not, if ... if we manage to come to some conclusion or not* ... {shrugs}. *I was teaching for the first time, so I had no previous experience ... er, which would have often helped, because, if I show someone that I'm well prepared* ... (Interview 2)

Conversely, the temperature may not be described as increasing, but rather decreasing: "it is that sort of unpleasant freezing... of the spiral [that refers to her cognitive and emotional skills], that it as if maybe slows down a bit and the energy decreases, that it goes in the direction like inside and out again..." (Alena, Interview 5).

These metaphors using temperatures refer, for example, to the traditional conceptual metaphor: "anger as heat" and "fear as freezing" (Aitchison, 2012). Gibbs and Berg (1999) point out that stress is linked with the metaphor of heat. They suggest that anger can be understood through the combination of withholding stress and hence withholding temperature. Withholding is therefore seen as slowing down the teaching process and is associated with temperature. Informants do not explicitly mention anger but rather agitation, and, in a similar manner, freezing is not explicitly connected with fear but, at most, with concern. From this, we can deduce that, if a lesson flows smoothly, it has, metaphorically speaking, 'optimal temperature', when no scalding or freezing takes place. This mechanism is very similar to the mechanism shown in Figure 12. However, if the situation is so unexpected (or gradually becomes unexpected) and so serious that suddenly the gravity surprises (see the *gradually emerging* unexpected situation), the lesson no longer flows and the student becomes stuck (freezing, scalding).

Getting stuck

'Getting stuck' is a central category of an immediate reaction to an unexpected situation. It is an important phenomenological invariant (in the sense of the unchanging basis of an unexpected situation)[115] that is linked with all unexpected situations. The research participants talked about it much more often than, for example, about the category 'surprise'. Hence, if an unexpected situation occurs, the student teacher always experiences, to a lesser or greater extent, some form of getting stuck. It occurs when a certain intensity limit of the unexpected situation is breached and the student reaches a state that they describe as 'getting stuck':

Cyril: *So, er, usually you can see pretty well that the person got stuck somehow, that something threw the person off and the pupils are very eager to act on it when ...*

[115] "Researchers search for essentials, invariant structure (or essence) or the central underlying meaning of the experience and emphasize the intentionality of consciousness where experiences contain both the outward appearance and inward consciousness based on memory, image and meaning" Creswell (1998, p.52).

the teacher becomes insecure or gets into some sort of awkward situation, and they suddenly have a weapon against him. (Interview 2)

Cyril introduces another metaphor here—*a weapon*. This suggests that the whole situation is actually threatening. On the other hand, Beáta associates the process with the slowing down of her teaching: "Because, for example, I like the rest of the song and that is the only moment (her voice is stronger and she gesticulates) when I get stuck there and otherwise I would have played it without problems but here I just get jammed." (Beáta, Interview 4) At this point, getting stuck even refers to the process of losing motion in the given situation. Getting stuck can have other metaphorical forms as well. One of these is, for example, 'freezing':

Alena: *Before the freeze, there is always some sort of stimulus and then the freeze occurs, simply something happens, the stimulus is like a slap in the face, I don't know, something happens and I freeze... and in that moment you think or perceive emotionally what's going on with you and then you wonder: what will I do next?* (Interview 5)

For Alena, the metaphors of freezing and getting stuck are on a similar level: "then when a person is frozen or stuck, then the energy goes more inwards or it, you know, has the tendency to protect oneself or something like that, and doesn't really stand there with open arms any more" (Alena, Interview 5). In the same way, Alena connects getting stuck with the opposite end of the temperature scale, using the metaphor of 'scalding'.

Alena: *In the unexpected situations, there is a difference when, for example, the technical equipment doesn't work and I cannot really do what I want, or when I cannot manage the pupils, and for example, if someone points a gun at me. And actually, it also has some effect. But for sure, there is always some sort of similar mechanism there, like getting stuck, scalded, I don't know, some sort of shock and then fast, how should I react in the situation?* (Interview 5)

Both metaphors refer to the immediate reaction of getting stuck in response to an unexpected situation. Student teachers then finds themselves in a sudden situation when they don't know what to do, they are perplexed and their attention slowly starts to direct itself towards some kind of solution or they remain paralyzed.

9.9 Strategies for dealing with unexpected situations

We have seen that the various strategies for dealing with unexpected situations range between flowing and getting stuck. Generally speaking, the student teachers distinguish ways of dealing with unexpected situations on a scale from passive benign neglect to taking active action. For example, Alena (Interviews 2 and 5) describes

this scale of options in extensive detail when she associates the active state with the metaphor: "to gain something, or if it really becomes better in the end and I gain what I can from the situation," over covering up when there is an attempt to use some sort of last resort, metaphorically referred to as "grasping at straws", to a passive attitude, which is "letting things flow freely." On this scale, four basic strategies are identified that students use when dealing with unexpected situations: 1) *return to the flow;* 2) *attack as a form of dealing with getting stuck;* 3) *retreat and look for support in authority as a strategy for dealing with getting stuck;* 4) *enduring.* The following section discusses these in more detail.

First strategy: Return to the flow

If the situation does not develop beyond a certain level of unexpectedness (yet the students still view it as unexpected) or it is unexpected, but the student manages it well, then the whole process returns to the ideal flow (see Dana, Interview 2; Alena, Interview 2). "I get over the unexpected situations and actually as if nothing happened, it doesn't really have much impact on, on, on the lesson... I simply go on." (Alena, Interview 5)

Alternatively, the lesson is affected by the situations and goes "in a different direction". Alena, for example, redefines the teaching goal of the lesson: "another possibility is that you find out that it won't really go in the way you wanted, but it still goes somewhere, has some sort of dynamic..." (ibid). The student then tries to find other options where the situation can lead, "searches" for them and at the same time "lets it flow freely" (Františka, Interview 2)

'Getting over the situation' can, for example, happen by the student "going in the direction towards the pupils" (Alena, Interview 2). The student teacher is moved to contact the pupils again to find out where they are at that moment and what is happening. This is an attempt, by coming closer, to re-establish the reciprocal flow of the teaching process. Sometimes the student teacher can do this immediately, and sometimes it is necessary to first 'walk it off'. For this, the student mostly uses various somatic techniques like breathing or venting through their voice. Breathing means 'self-control', which leads to calming oneself: "It is calming. It is so when you start breathing deeply and you then calm down, well, someone breathes, someone needs a cigarette and to breathe slowly through the cigarette, or maybe the other way, if you need to hype up and then draw on the cigarette, or things like that" (Alena, Interview 4).

This is a typical example of a stress-management technique. An interpretation suggests itself that if an unexpected situation occurs that 'scalds' then the normal course of breathing is interrupted and after it is solved, the person re-establishes their natural breathing cycle by breathing through the situation. Alternatively, the person uses a technique of venting through their voice: "Well, me, for example, I vent it through my voice in the moment, maybe." In Alena's case, this means raising her voice.

Alena (Interview 5) has the most sophisticated system for using these techniques, but still, there is, according to her, a certain hint (manifestation) of the tacit nature of her knowledge. She uses the techniques based on a certain inner "impulse from her heart" (from the context this means her emotions) or "from her head" (the rational side of her personality). In an ideal case, this happens for both reasons; there is a combination of "yin and yang, both the reason and the heart." For Alena this is her "ideal energy, ideal everything, ideal state of being, upbringing". For her, the current strategy serves to relieve and to make it possible to "re-direct the energy back to the pupils". Whether she can deal with the situation or not depends to the extent to which she can reflect during the action and her stock of possible solutions acquired from past experience (generative models).

Second strategy: Attack as a form of dealing with getting stuck

An attack is a reaction to an unexpected situation that occurs when impulses from another person (such as pupils and/or colleagues) or physical conditions have a combined effect. When the student teacher's energy turns directly to the pupil (without any self-regulating mechanism), it can be classified, metaphorically, as 'an attack'. The idea is that the student teacher's energy has a speed which is too high and is aimed directly against a pupil/pupils:

Jaroslava: *By fair means, it's not possible, so I can't hold myself ... a pupil threatens another, weaker one in the classroom that he would beat him up after school. I yell, I don't plan anything, it's immediate. The child remains in a trance and I have a chance to deal with it ... I react like a time bomb. I keep doing my thing. I see red, the class is quiet so that you could hear a pin drop. The boy has tears in his eyes that he would never do it again, he does not want to feel this way ever again.* (Interview 2)

This immediate reaction of "nothing is planned" is spontaneous. Ema describes a similar situation in a similar manner. She links her reaction directly with her body: "it was my body speaking for me, because out of the blue a boy punched his classmate during the lesson ... because in that moment, I immediately yelled, what that was that supposed to mean" (Interview 3). Jaroslava's "time bomb" corresponds with the context of the "attack" metaphor. It is interesting that with this approach, the unexpected situation is created by the pupil who remains "in a trance", which we could classify as the pupil "getting stuck". From the context of the passage, we could assume that the student teacher is angry at the pupil, and it is interesting that this anger is, according to Cacciari, Massironi, & Corradini (2004), often associated with the red color—'seeing red'.

It is not only unexpected situations that are caused by interactions between pupils, but also in cases when a teacher may feel threatened. For example, if asked questions they are unable to answer, a student teacher may attack because they cannot deal with the situation in any other way — attack presents itself as the first option for dealing with it. Attack is a generative model that the student has at hand from their experience:

Jaroslava: *And ... the kids suddenly started to say how they don't get it and that before I was saying that and now I'm saying this and I reacted to that, err, I mean, I said I told you that but now I'm talking about some exceptions which is more advanced, and I tried to, you know, give them so much information and they, by asking me, that kind of annoyed me* {grabbing her head} *... I mean, they don't get it when I'm telling it so nicely and ... so I became angry, I mean, not extremely angry, but in essence I scolded them for not paying attention properly... and then later in the other lessons I finally realized that the it really was my mistake.* (Interview 2)

Third strategy: Retreat and look for support in authority as a strategy for dealing with getting stuck

By retreating, the student teacher steps into the background and lets the pupils or the external conditions determine the course of the teaching. The student teacher does not go into an immediate conflict (attack) with pupils, but has an immediate reaction of retreating: the student teacher does not feel empowered to change the situation.

Jaroslava: *The teacher, err ... he had the first class with them, biology, and he told them* {gesticulates} *that he didn't do anything with them either. And that, that with me they can maybe go play football. So I was thinking, well, I don't know what they agreed on, so I told them, boys, wait a moment. I'm going to ask him what the deal is. And he told me, well, they, they said they wanted to play football so I'm going to ask the deputy head, err, if they can, if they can go play football. So I just stood there and said, OK, well then. Then he came back that we could go outside and play football and I should watch over them* {gesticulates}. *And I stood there in the hallway and thought, well, great, good that I spent all this time preparing for the lesson. So I also told him that if I had known that, I could have saved myself half a Sunday of working* {gesticulates with hands} ... *Well. Because I was really super disappointed by that, you know, that I was preparing completely needlessly.* (Interview 3)

The retreat may involve simply moving away from someone, but it could involve "retreating to someone'—actually leaving the classroom, looking to find help. The situation becomes so unbearable that the student teacher can think of only one solution: "retreating to the headmaster's office". The student teacher has no power over what is happening in the classroom and uses the only generative model she knows to solve the situation:

Alena: *They* [pupils] *were already out of control, jumping around like monkeys and yelling and then I was just this tiny creature among them, among this herd of wild animals, and I was really trying hard for twenty minutes to do something with it, but when it wasn't really possible ... I simply went to the headmaster ... and then he did a bit of boo, boo, boo at them and then I became more or less quieter.* (Interview 4)

In the taxonomy of situations used in this study, this is a gradually formed unexpected situation: "I was really trying hard for twenty minutes to do something with it", and it culminates with the student teacher leaving the classroom: "I simply went to the headmaster" (ibid). She used what she knew from her own experience of being a pupil at school (appealing to the headmaster).

Fourth strategy: Enduring

In essence, this is a strategy that does not result in a return to the reciprocal flow in the lesson but rather to another type of flow, which is characterized by the dominance of the student teacher and their control over the situation, without the active involvement of the pupils:

Alena: *But here, actually, when all plans fail, then, you know, well, we can let it flow freely and see what happens, but here, here it is different, you know ... Then there is nothing left, but rather, you know, here I had a much greater specific structure of what I wanted to do*. (Interview 5)

For Alena, this free flow is not pleasant and she refers to it as something she has to endure. From her perspective, the pupils have no interest in the reciprocal flow of the teaching process: "that is the last [resort], that in essence, I don't know, but partially you are as if—not really scalded—not anymore, but you simply try to endure it" (ibid). The retreat inwards causes her internal energy to accumulate. She can process this energy or not, but she has to, in her words, "endure" the lesson. "Scalding" is another expression for getting stuck, and for Alena, in this unexpected situation, it becomes an endurance—being stuck for a long time: "I got stuck and told myself 'no' and the whole lesson I was dictating them sentences to translate."

Dictating sentences for translation is a mechanical, or physical activity, which does not require great cognitive involvement. Alena deals with the situation by engaging in an activity which does not require her to expend energy but does require effort from the pupils, hence it is a case of "free flowing".

9.10 Discussion on dealing with unexpected situation strategies

Overall, the description of student teachers' immediate reactions might lead us to think that they are very similar to the basic survival strategies described by Cannon (1915): responses of *fight, flight, freeze*. However, it is necessary to be very careful when making such comparisons. In line with Cannon, we also use these terms metaphorically. For example, the 'freeze response' in Cannon's conception corresponds to what, according to Brach (2004,) psychologists call hypervigilance. From the perspective of Porges (2009), these basic reactions of organisms to excessive stress are organized hierarchically. If everything in the lesson 'flows', communication works well and we

feel safe, then according to Porges (2009), our social engagement system is active (as a result of parasympaticus). If we feel threatened, our system (Porges, ibid) reacts with physical action for which our sympathetic nervous system is responsible (fight or flight). If life is threatened, the parasympathetic nervous system takes over the responsibility again and tonic immobility occurs—which is called freeze response. The system of student teacher reactions is similar, but we must be aware that in both cases the descriptions are metaphorical: the social engagement system is active—return to the flow or reciprocal flow; attack; flight—retreat; getting stuck—enduring.

Getting stuck, which might be viewed as freezing in the sense it is presented by Cannon, represents the central category of an unexpected situation. Getting stuck can provide the student teacher with time to reflect during the actual event, but if emotions block thinking (see the boiling metaphor) and they are not treated, then reflecting during the actual event is not possible. The category referred to as *attack* is, in our interpretation, connected with an immature approach of the teacher to dealing with an unexpected situation in which emotions play a role. The category called flight is one of the most extreme that a teacher might choose when losing power over the class and turning to an external authority to secure the power again.

In the interviews, no verbal indication was found that the student teachers were explicitly aware of the whole structure of the process of dealing with an unexpected situation. This might imply a certain degree of tacit-ness. On the other hand, there are some references to parts of the process that the student is aware of: "yeah, yeah, but that's more the process of [gesticulation] ... that I never really was aware of that, you know." It should be noted that verbal keys like "I'm aware" or "I never thought about it like that" may indicate that the student is aware of this phenomenon only in their "inner speech". In the same way, the students themselves demonstrate that they have difficulties articulating some thoughts and knowledge: "I don't know ... like I could not really say ... those things I do, or why I think something ..." This conforms to the two criteria of tacit knowledge selected for this study: difficulty being aware of and difficulty articulating our own knowledge about the process of dealing with unexpected situations.

9.11 Conclusion

The theoretical section of this chapter analyzed important concepts relating to unexpected situations. It then presented a theoretical definition of an unexpected situation based on the moment of surprise as "for the first person surprised by a meaningful segment of human experience" and pointed out the connection with modern theoretical neuro-science (specifically with the scheme of predicted coding). Analysis of the collected data was guided by this definition, and the researchers produced a typology of unexpected situations based on four basic characteristics (segmentation criteria): *pleasantness, impact, gravity* and *suddenness* or *gradualness* of their emergence.

Within the micro-analysis of the process of dealing with unexpected situations, the study presents a thesis about an interactional emergence of unexpected situations in which external and internal factors are involved. These subsequently lead to the loss of speed or the change in direction of the reciprocal flow of the teaching process between the student teacher and the pupil. As an important phenomenological invariant or essence, the study examined the state that informants metaphorically refer to as "getting stuck" and which is always present in unexpected situations. In addition, four general strategies for solving the situations were identified: *return to flow, attack, enduring* and *retreat*. In summary, different variations and key invariants of experiencing unexpected situations were described in detail.

Tenth Chapter

FORMING TACIT KNOWLEDGE—A STUDENT TEACHER DURING TEACHING PRACTICE

Vlastimil Švec

In the follow-up teacher training Master's program, the student teachers start with teaching practice which constitutes an important stage in developing their pedagogical experience and knowledge. They start with their specific expectations, their own conception of teaching and also with some tacit knowledge. During their teaching practice, their tacit knowledge crystallizes further and new tacit knowledge is formed. This chapter attempts to outline how this happens using the example of a student teacher who will be referred to as Jaroslava. At the time of the research (Fall 2014 till Spring 2015), Jaroslava was in her first year of the follow-up teacher training Master's program in Natural Science and Chemistry. Jaroslava already had pedagogical experience from leading younger pupils in a Natural Science club. When this research started, she stated that she was engaged in this children's pastime activity for the third year.

In this chapter tacit knowledge (hereafter TK) is understood as follows:

a) TK is knowledge formed in the interaction of the student teacher with the environment (e.g. the school environment).

b) TK is part of the dynamic knowledge field in which, from the didactic perspective, four mutually interlinked levels can be identified (see Šíp, Chapter 1):
   - interaction level (e. g. interactions of the student teacher with pupils, the teacher trainer, colleagues),
   - body level (knowledge is not only in the head but also in the body of the learner),
   - physical world level (in which we exist and interact with objects),
   - mind level (information level).

c) TK is less conscious, hence more difficult to articulate (turn into words),[116] than other forms of knowledge.

d) TK is manifested in behavior.

[116] These parameters of TK were taken into account by Nehyba and Svojanovský (2016) who, when researching manifestations of TK, define this knowledge as "a hard to articulate and/ /or less conscious aspect of experience that can be manifested in the explicit level in thinking (e.g. reasoning, judgment, decision-making), but also in Behaving, experiencing and related bodily expressions (e.g. gestures, mimics, spontaneous reactions). (Nehyba & Svojanovský, 2016, s. 62). In this context, a new interesting study should be mentioned: its authors, Adloff, Gerund and Kaldewey (2015) attempt to differentiate distinguish? identify? "diversely strong" tacit knowledge. They refer to a weak form of TK (that can at least be articulated in words) and a strong form of TK (that becomes visible and therefore can be articulated in bodily acts).

TK is formed and utilized in the interaction of the individual (in our case, the student Jaroslava) with the environment; it is stored in the mind as information. TK is formed from experience; it can be viewed as pieces of experience processed by the student with the help of supportive interventions by the teacher trainer. The student processes part of the experience in a hidden, tacit manner. The result of this process is TK.

10.1 Research goals and design

The research probe aimed to establish how the TK of student teacher Jaroslava forms during her teaching practice. This goal was made more specific by these research questions: *How is Jaroslava's conception of teaching reflected in the process of forming her TK? What does Jaroslava's way of solving unexpected pedagogical situation say about her TK?*

A qualitative research design was chosen based on these methods: (a) *observation* of the student Jaroslava's behavior in classes, recording it in a completely free manner (at the researcher's discretion); (b) *in-depth interviews* with Jaroslava; (c) *stimulated recall* by Jaroslava of situations using video recordings of her teaching.

The research with Jaroslava was conducted in the academic year 2014/2015 at the Pedagogical Faculty MU. Four interviews were analyzed.

1. The first interview focused on her conception of teaching Chemistry (2014, Autumn semester).2. The second interview concentrated on how the student dealt with (particularly unexpected) pedagogical situations (2014, Autumn semester).
3. The third interview followed up by observing two lessons she taught—Chemistry and Natural Science (2015, Spring semester).
4. The fourth interview was conducted as the stimulated recall of situations, captured in a video recording (2015, Spring semester).

The interviews (each approximately 90 minutes long) were videoed and transcribed. The process of analyzing the data included:

- repeated reading of interview transcriptions, dividing texts into segments each of which expressed—in correspondence with research questions—a particular meaning[117]
- identifying connections between marked segments (from the perspective of time—Autumn and Spring semester) and content similarity and continuity
- interpretation of these connections[118].

[117] It is in essence a specific form of open coding.

[118] The interpretation uses a combination of inductive and deductive methods. We drew inspiration from the work of Jean-Claude Kaufmann (2010).

10.2 Research results

10.2.1 Jaroslava's conception of teaching in the process of forming her TK

Based on the conception of teacher's teaching (Mareš, 2013), which is defined as the "complex of teaching ideas, teaching positions and teacher's arguments that justify them. This creates a complex cognitive and emotional foundation for teacher's thinking on education, for the evaluation of education and the teacher's meeting with all actors involved in the educational process" (Mareš 2013, p. 456). Mareš states that the teacher's conception of teaching is, among other things, subjective, implicit and relatively unaware. It is apparent that its features are similar to some of the characteristics of tacit knowledge listed above. However, it should be noted that the conception of teaching is not entirely subjective, that is not entirely dependent on the individual, even if it is formed in the individual's unique experience. The experience is, nevertheless, formed in interactions with other people (e.g. pupils, colleagues).

In our research, the student teacher's conception of teaching was investigated during an in-depth interview. The interview opened with the initial question: "In this interview, we should clarify how you view teaching Chemistry. Please write down everything that comes to your mind when you think of you and teaching Chemistry." The student had five minutes to write her thoughts down. Then she began to read aloud what she had written. After that, the first interview started.

It transpired that her core conceptions of teaching were defined in terms of teaching goals, teaching pupils (orientation to pupils) and dealing with pedagogical situations. According to Jaroslava, the goal of teaching Chemistry is "to teach children to make a connection between knowledge and everyday life situations... to teach children through some kind of experience" (Interview 1). This conception of goals develops her concept of teaching: "... so that every pupil can somehow acquire knowledge in their own way" (Interview 1). She emphasizes experiments conducted by pupils (working in groups) that lead to amazement and hence to new knowledge: "pupils are surprised by something and start longing for the information... I then don't need to make so much effort to get their attention, since they want to know by themselves" (Interview 1).

Jaroslava reflects on the amount of information presented to her pupils: "...not flooding them with a huge amount of information... although at the beginning I was inclined to do so, had the ambition to tell them everything, but then I realized after ten minutes that half of the pupils does not listen to me... so I came to realize that we cannot continue like this... but in spite of that I repeated the same mistake when I went to teach without realizing it..." (Interview 1). Her belief that it is not appropriate to overburden pupils with information can be considered correct from the didactical perspective although its realization in the classroom is not so straightforward. It is contrary to her original tendency to tell the pupils as much as possible. The tacit knowledge and hence the ability to choose and dose information has not been fully formed yet.

In the interview, the researcher (author of this chapter) asked Jaroslava the following question:

Researcher: *When did you realize that?*

Jaroslava: *Already in the first lesson... but I let it be for the time being. It took me half a semester, before I somehow reorganized it with myself because I was still struggling with how very little I actually tell the children...* (Interview 1).

It is clear that realizing that a method is inappropriate sometimes does not suffice for the student to change her behavior in the classroom. In order for her to change her conduct after a fairly long time period, she had to "adjust herself" to make the change (*reorganize it with herself*). It seems that the student's belief or knowledge about teaching practice (for example classroom behavior) can linger in a tacit manner. Realizing that something is not correct from the pedagogical point of view (something tacit becoming explicit) does not necessarily lead immediately to a change in behavior. When examining her statements further, we can describe Jaroslava's conduct in the following manner: Already in one of her first lessons, Jaroslava felt that something was not right. It took her some time before she identified this "something" (metaphorically, she let it be). This "letting it be" lasted half a year because she "struggled" (another metaphor) with her "telling the children very little". During this time, she gradually "reorganized it with herself" (another metaphor). In doing so, she withdrew from her thought that "she tells the children very little, was able to stop "struggling" and fully realize what she already felt in her first lesson: that she "tells the children a lot." Crystallization of her TK can be observed here: Jaroslava first felt that something was not right (potentially she knew it). She grasped the situation emotionally, intuitively, but at the same time, she was not able to make it clear enough so that she could really understand it and behave in a more effective manner. Her intuition eventually led to reaching the goal and reorganizing her model of conduct.

An important element in this student's conception of teaching is her attitude to rather difficult and unexpected pedagogical situations. Her concept of dealing with pedagogical situations includes a cognitive aspect as well as an emotional one. Jaroslava ponders over situations that emerge during the class and attempts to *go even deeper.*

Researcher: *What does it mean to go even deeper?*

Jaroslava: … *ehm, returning to those situations and thinking of them differently... For example, I often think that when I dissect the specific situation in my head it doesn't really happen in the end. I only glide on the surface...*

Researcher: *What does that dissecting in your head look like?*

Jaroslava: *Hm, the point is to recall the details... and search... ehm, for the reasons... or the moments when the bad part of the situation came to be.* (Interview 1)

Jaroslava knows that something does not work, tries to find out why and then turns this unclear situation into a clear one. For now, she only glides on the surface although her goal "to change something" (which she is not particularly aware of) leads her to return to the situation and examine it. These moments (in which she deals with unexpected situations that she is aware of only to a limited extent) have a tacit character.

Jaroslava said that "the solution [to the situation] sometimes occurs to her, but sometimes not. ... I'm able to find solutions to situations that I had already experienced, but not when it happened to me for the first time. ... When it clasps together in my head, aha, I've already dealt with this, that's the situation. I had solved this in this manner before, so I will try to apply the same strategy again. But then it might happen that applying it does not really work. But I don't view it as such a tragedy anymore..." (Interview 1).

10.2.2 Forming TK by addressing unexpected situations in communication with pupils

The interviews revealed that in many unexpected situations in class (e.g. indiscipline or aggression of pupils), Jaroslava reacts based on her feelings: "... I react according to how I feel I should in the given moment. I think it's my nature, as I pay attention and notice a lot, even generally, about people around me, what mood they are in... I think that sometimes I have the so-called sixth sense to feel how things are..." (Interview 2).

It appears that the way Jaroslava deals with unexpected situations is based not only on her previous experience of interpersonal communication and tacit knowledge but also on her other, deeply rooted and unconscious dispositions and intuition.

Jaroslava: ... *it is a kind of natural part of myself ... the same way as I breathe and don't think about it, I simply do something in a situation.*[119]

In communication in the classroom, Jaroslava focuses on the pupils: "... I really tend to notice the children in the classroom, look into their faces... as their faces often say a lot about the child's mood, if the kid is tired, interested or not interested [this noticing of children's faces and detection of their inner state happens in a tacit manner], but I really only realized that now that we are talking about it [converting tacit into

[119] This reminds us of Patočka's musing on the difference between understanding and knowledge: "The possibility of knowledge lies in understanding, but it is not identical with it. A person understands as he breathes. When I take a piece of chalk in my hand, there is a certain act of understanding; I understand what it is for. It is not *knowing* about some purpose, but only placing it into some kind of inner context that functions inside of me, that understands it as a piece of chalk for writing. So I primarily understand myself and understand what I am not. So I understand before I know." (Patočka, 1995, p. 76).

explicit]. I don't really do it on purpose, more unintentionally, that I really try to look at those children, I somehow do it perhaps subconsciously or unconsciously, it's not really deliberate... It is as if I'm able to somehow feel into their level" (Interview 2).

When looking into the children's faces, Jaroslava examines their inner state (the face gives evidence of the inner feelings) in the given situation. It helps her *feel into their level* (metaphor). She does it intuitively and only during the interview does she realize (recognize) it.

We assume that during teaching practice, TK is formed slowly. Jaroslava enters unusual pedagogical situations equipped with minimal information and, at first, she handles them based on inner determinants of behavior that cannot even be fully listed. Apparently, these include her conception of teaching, intuition and innate disposition.

The question arises as to the role played by the theory taught at the faculty in dealing with unexpected pedagogical situations. Jaroslava ponders the application of pedagogical and psychological theory and concludes: "... now I'm learning that theoretical knowledge and suddenly I tend to analyze it [the situations]. ... So I say to myself that the procedure here should be this and this [counts out on her fingers] and the situation simply escapes me. ... Now I get all that advice and I cannot decide in my head on how to react - if according to some rules written down by people with more pedagogical experience than me, or if I should react somehow more naturally ... I would like to solve the situation somehow from the pedagogical perspective. And I actually take quite seriously what I'm told here at the faculty" (Interview 2).

It is clear from this passage that, if Jaroslava is in a certain situation and stops handling it as a whole, she then starts consciously searching and applying explicit knowledge. Involving consciousness too strongly can, however, lead to the whole situation "disappearing", curling up. Theoretical knowledge makes it possible to be better oriented in a situation if it has been reflected on previously by the student. Previously prepared knowledge might or might not fit into the context of the given situation. Jaroslava also mentions that theory more helps her like afterwards "when it is already solved and I only need to somehow organize it in my head so I somehow match it [experience from dealing with situations] to some of that theoretical knowledge. Which helps me in learning, but it doesn't help me in that particular situation." (Interview 2).

Significant support when forming TK is evident in reflective seminars about teaching practice (referred to earlier in this chapter). Jaroslava says that "in the seminar, we talk about those things that happen [during practice], and the solution is not based on one of the theories, but rather what we come up with, with all the experience [of the colleagues in the seminar] ... different kinds of experience meet and we try to find some sort of solution. Everybody de facto proposes some sort of their own solution or gives their opinion that leads me to looking at it [the solution to the situation] differently

... but in my opinion is it is not useful for a person until they experience the situation themselves" (Interview 2). It is obvious that TK is formed in pedagogical situations in the student teacher's conduct and experience.

Reflective seminars are based on the experience of students and on TK related to dealing with situations during teaching practice. They help student teachers to describe the experience, realize their key moments and in that way also structure them in a better way. But that, it seems, is not enough. An essential part of the process of forming (and sharing) TK is the dialog with the teacher trainer who watches the lesson conducted by the student and can discuss with the student the various ways of dealing with unexpected pedagogical situations. However, the chemistry teacher trainer does not provide feedback to Jaroslava about her lessons: "... he doesn't really discuss the classes with me. ... He told me, for example, that what I drew on the board, that was perfect, but after that he would explain the things differently" (Interview 3).

At the end of the first semester of teaching practice, Jaroslava began to gain distance, particularly from emotionally difficult unexpected situations: "that distance which I consciously create ... I said to myself that I will try to approach [the situations] with a cooler attitude" (Interview 2).

10.2.3 Didactic situations reflected by the student as the source of her TK

This section is based on observing two consecutive lessons taught by Jaroslava (Chemistry and Natural Science in the 8th grade) and from the third interview that followed these lessons.

a) The chemistry class, 8th grade, 5th lesson, topic: calculating chemical equations.

From the researcher's observation records

Frontal teaching, student projects chemical equations, asks pupils to come to the board to calculate, that is to fill in coefficients of substances entering the reactions and substances resulting from the chemical reaction, for example $2\ H_2 + O_2 \rightarrow 2\ H_2O$.

The student repeatedly asks pupils: *Do you understand? … Who doesn't? … You sure you all understand? … This is math, kids. Do you understand it?* She tries to activate the pupils by assigning tasks of quantifying chemical reactions that they solve in writing in their exercise books. She passes between the benches and if needed helps the pupils solve the equations.

I'm surprised that the pupils do not know the nomenclature of chemical compounds, cannot name substances on either the left or the right side of the equation. It seems to me that they add coefficients mechanically.

Interview after the class

Researcher: *What preceded this subject matter? Nomenclature of chemical compounds?*

Jaroslava: *The pupils still don't know the nomenclature, they can only write down the chemical symbol, but the nomenclature will be done later. ... In chemistry classes they do equations, but only calculations without knowing the nomenclature.*

Researcher: *Oh, but isn't it a bit mechanical?*

Jaroslava: *Well, you know,* [the pupils] *recognize basic elements. They know that Fe stands for iron. But they still make mistakes. They are not really that well acquainted with it.*

Researcher: *To me, it seems a bit illogical from the didactic perspective.*

Jaroslava: *Well, at this school they do it totally differently... they have a completely different order. … I was quite uneasy about it myself because I wanted to start with terminology already. And actually, the teacher told me: no, we have to now go back to those equations. ... I think that they should know the nomenclature before they know the equations, as this way they actually have no idea what goes on there and what is the result... To tell the truth, I was looking for a way out of this. But I was instructed by the teacher that really the principle of it, ehm, the goal of it should be to teach them to calculate* [the chemical equations]. (Interview 3)

Jaroslava herself found a contradiction in the didactic approach to the presentation of the subject matter. She knows how the curriculum should be arranged, but in the school where she does her practice, the teacher trainer has a different opinion. Knowing the arrangement of the subject matter can be considered explicit knowledge. When she presented the subject matter of quantifying chemical equations to the pupils according to the concept of the teacher trainer, Jaroslava was aware that she should proceed otherwise. However, she proceeded according to the rather strict instruction of the teacher trainer.

b) Natural science class, 8th grade (the same class as in chemistry), 6th lesson, topic: brain.

From the researcher's observation records

Frontal teaching. This time there is a different atmosphere (climate?) in the classroom than in the previous chemistry lesson, although it is the same class. The lesson begins by revising the topic of the nervous system. The student teacher asks a number of difficult questions, for example: *What is the nervous system good for? What is the center of the nervous system? What can you see in this picture? What would happen if you had no spinal chord?* ... Students respond in unison.

The new subject matter: the brain. The intuitive interpretation of impact images, an attempt to help revitalize them, the pupils add the names of the parts to the image of the brain in their workbooks. The student teacher goes through the class and looks at the pupils' worksheets (checks their work).

Interview after the class

Researcher: *In the natural science classes, the teacher has a different set of rules...*

Jaroslava: *Yes, exactly. The teacher is my role model in this respect. … She is strict, but also very friendly and kind. ...* [The pupils] *are not afraid of her, but respect her.*

Researcher: *What was your goal in this lesson?*

Jaroslava: … *I wanted to finish off the nervous system, which ends with the topic of the brain.* (3rd interview)

Such a broadly defined goal could present a dilemma for Jaroslava: not to overwhelm the pupils with information, but at the same time to present them with a wide range of interesting pieces of information.

Jaroslava: ... *I prepared the presentation in such a way that I could talk about each slide for 5 or 10 minutes, so I tried to condense it as much as I could. So that I don't overload them ... to point out only what's most important ... And I wanted them to write it down by themselves...*

Researcher: *You mean the copying from the presentation?*

Jaroslava: *Yes ... when I'm given a totally free hand, I never know what's the right amount of writing... If it's too much or too little. ... I'm still playing with it. I'm not completely clear about that yet. ... I still struggle with the fact that I know so much about it that I want to say it all, that it all seems really interesting to me...* (Interview 3)

Jaroslava knows that she must not overload her pupils with information. She pursues this goal deliberately, yet still the adequate knowledge is not completely anchored in her knowledge field (*I'm playing with it*).

The issue of how to select key and interesting pieces of information and how to present them to the pupils in appropriate quantities ("doses") is recognized by Jaroslava; she even explicitly formulates it. Working with time estimates (what, when and how much to present to the pupils) is a recurring challenge for Jaroslava: "I managed to finish the presentation but did not manage to revise it" (Interview 3).

Structuring the lessons from the didactic and time perspective (which Jaroslava learned about in general didactics)[120] is probably related to her attempts to maintain the phases of the lesson: "... I try to keep those lesson phases and that always creates a huge mess in everything for me. I'm not completely familiarized with it.

[120] General didactics—see http://www.wikiteka.co.uk/document/general-didactics-objectives-of-planning/

Then I start concentrating on what I should be doing and completely mess it up. ... I didn't have a good feeling about it at all ... the kids stared at me and made it very obvious that it seems to them somehow unnatural and artificial ..."

Here again, Jaroslava tries to be guided by theoretical knowledge. This prevents her from seeing the situation as a whole, and dealing with the situation is hence not natural. The pupils make this obvious to her.

How did Jaroslava try to cope with it? "This week I dared to return a bit to what somehow seemed more natural to me. So I was intercutting the revision with the new stuff. I was simply switching between both. And did not separate it from each other, I mean, revising and then going through the new stuff. ... It's not completely rooted with me yet..."

Researcher: *What does it mean, rooted?*

Jaroslava: *It's not automated for me.*[121] *… It was one lesson from those nineteen I taught. Well, I would need more time for it ... I would need more practice, I don't know, maybe two weeks in a row.*[122] (Interview 3)

Jaroslava realizes that she needs more practice, particularly continuous practice, so that she can systematize some procedures. In another part of the interview, Jaroslava assesses her current didactic competence with certain insight and grace.

Researcher: *How would you evaluate this lesson? Overall, in retrospect, when you think about it now.*

Jaroslava: *Well,* [she thinks] ... *As I perceive it, I came somehow half way. ... And while it was the best lesson from those I taught so far, it was not how I think it could actually really work. ... I would like to build the lesson more on the pupils working more and being more active and the initiative coming from them ... But I still don't quite know how to do it. Because, it is one thing to lead the leisure-time group, which is all built on the kids working like this from the beginning, and something else is to come to school, where there is some established routine...* (Interview 3)

In this self-assessment (self-reflection), Jaroslava explicitly states that she would like to build a similar lesson (in the future) on a higher level of pupil involvement. But realizing this intention would be based on the premise that by the practical leading of lessons she acquires further necessary (not only) tacit knowledge.

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[121] Routine, to some degree automated procedures, are considered one of the prerequisites for successfully forming TK when addressing more challenging and unexpected situations.

[122] Unfortunately, Jaroslava broke off her studies after the first year and therefore could not participate in the continuous teaching practice in the second year. It was therefore not possible to monitor and research her further progress into the teaching profession.

c) Teaching methods in didactic situations

In the classes she taught, Jaroslava often applied an illustrative presentation and explanation combined with asking pupils questions. She tried to find methods and forms of teaching that would take into account wider perspectives, for example, the teaching objectives, the level of knowledge and experience of the pupils, the time that was available to her. During her practice, she perceived as challenging the period when she first met pupils in a specific class: "The first two lessons, they were really like, they had no idea what they can dare to do ... The time period is too short for me to be able to really work with them ..." (Interview 3).

She looked for methods that would work in the given situations, in her own words she looked for *leverage, methods* that she could use repeatedly. "Either I did or I didn't find some method that works. I [...] never had two lessons that would be the same, I mean, in each lesson I tried something new. ... And I can't really say about any of those methods that I used, at this very moment, that it would be an effective one, really. I don't know, I would have to be teaching there for like two months..." (Interview 3).

Jaroslava again explicitly expresses the need for more continuous practice. She also attempted to put the pupils into groups, although both teachers recommended [that she] not … let them work in groups. "I dared to give it a try. It was that second chemistry lesson that I taught. And it turned out to be a total disaster for me. We didn't really accomplish almost anything in the lesson, as they did what they wanted, and just talked with each other, and before I managed to get them to do what I want them to do ... The lesson didn't really have much of an effect" (Interview 3).

Jaroslava's search for an efficient teaching method during her teaching practice happened at the level of her thoughts as well as her behavior. Although we do not have data about her efficient teaching methods, we assume that Jaroslava was aware of them.

10.2.4 Uncovering elements of TK through stimulated recall

Researcher: *We will discuss your* [Natural Science] *lesson. I'll play the video recording and we'll watch it together. Whenever you tell me I will stop it and you can comment on what was interesting for you at that given moment or what was challenging or what surprised you.*

Situation S1

Jaroslava stands at the front of the classroom, sideways to the projected image of the brain, revises the subject matter with the pupils, asks questions, pupils respond in unison.

Jaroslava: *I'd need to reach the situation that I'm not so focused on the front end ... I'd need to get out there among those kids. I was aware of it even in the classes before. That I was really more focused on what I was saying than on the pupils. If I had been passing among them, they would have shown much more interest...* (Interview 4)

Jaroslava explicitly formulates downsides in her behavior and at the same time suggests how the situation could have been dealt with differently: "Wow, I really didn't even realize it, how much I was clinging to the presentation. ... That really surprises me. ... I always want to pack as much as possible into the lesson, and sometimes less would be better." (Interview 4) The rule Jaroslava is aware of is repeated: "less can be more". At the same time she expresses a moment of surprise: "Wow, I really didn't even realize it."

Situation S2

Frontal revision vs. an attempt at pupils to work independently.

Jaroslava: *Actually, during my whole practice I hardly ever asked them to speak individually ... Whenever only one pupil was supposed to speak, in the end somebody else from the other side of the classroom just said it without being given word. ... Even when I was auditing I noticed that the teachers don't ask them to speak individually at all. ... I tried at least, already in the first lesson with them, to give them a small project where they would come with more things relating to a certain thing. Afterward, one pupil should individually present the work of their group. But they didn't want to.* (Interview 4)

Situation S3

When explaining the subject, Jaroslava gave the pupils a piece of information about the speed of nervous excitement in humans (in km per hour) and instructed them to convert it into a different unit (cm per second). The point was for them to be able to use simple mathematical operations, but the pupils couldn't manage that, so Jaroslava gave them hints (about unit conversions).

Jaroslava: *Well, this was a surprise to me... If they got the same example again, I think they wouldn't be able to solve it again. ...In one natural science class and also in a chemistry lesson, I was trying to get them solve a similar task. They said that it was too difficult for them.* (Interview 4)

Situation S4

A pupil (a Muslim) has his head resting on his desk and does not pay attention to what is happening in the classroom.

Jaroslava: *He has a really problematic personality. When I tried to get him involved, it led to a conflict. ...Not even his teachers have any leverage that would work on him, they simply don't know what to do with him. ... If anything, he respects the class teacher in chemistry ... I was told that he has an issue with female authorities.* (Interview 4)

Situation S5

Group work, pupils form groups of three of their own choice; managing group work is challenging for Jaroslava, although she is very well prepared for the lesson, including tasks for pupils (they are asked to match parts of the human body with their names and functions).

Jaroslava: ... *it really took like ten minutes before I made them change seats. ...I was surprised that suddenly they have issues matching the names. This form of activity was quite new for them, their teacher never did this with them*. (Interview 4)

Situation S6

Jaroslava reflects the entire teaching lesson.

Jaroslava: *For me it's a kind of lesson. Maybe next time I would build the whole lesson around those activities* [group work]... *I've already said that I have tried everything in this class and there were no two lessons that would be the same. But the teacher told me that I tell them too much, that they are considered a bit weaker as a class. But in this respect, I don't quite agree with her. ... That maybe with that approac*h [group work] *it is possible to stir them up a bit.* (Interview 4)

In Situation S1, we observe the formation of TK in Jaroslava that could be referred to as *presenting subject matter to pupils.* An element of choice and the extent of the subject matter for the given lesson were apparent here. This element, however, is not completely well handled by the student teacher. This is also confirmed by Jaroslava's reflection as she realizes that she was *clinging to the presentation* and that she tends to *pack as much as possible into the lesson.*

It is characteristic for her to experiment in the classroom, try out various, often activating teaching methods, for example, mini-projects for pupils (S2) or group work (S5). We consider experimenting an activity of a tacit nature. In this way, Jaroslava gains experience in applying specific methods of teaching. The method of group teaching proved to be rather challenging for Jaroslava: she did not know the class well, the pupils were not used to this method and she had minimal experience with the method herself. We assume that the "outlines" of tacit knowledge of *managing the group work of pupils* were being formed in her. Metaphorically we can refer to this process as "crystallization of TK". That means that elements of this kind of TK might change during the process of gaining more experience with group teaching—it might grow or change in structure.

Jaroslava's behavior in Situation S4 was interesting. One pupil shows a lack of interest and does not cooperate. Jaroslava "leaves him alone", probably guided by the experience (with this pupil) of other teachers teaching this class. However, we consider this situation open, as it probably requires deeper sociological, psychological and pedagogical analysis (maybe even consultation with the school psychologist).

Jaroslava is able to reflect critically on her communication with pupils. She reflects on her activities and suggests possible alterations such as different teaching methods or changes in the structure of the analyzed lesson (S6). We assume that this process also happens in a tacit manner.

10.3 Conclusion

Linking the analysis to the original research questions.

How is Jaroslava's conception of teaching reflected in the process of forming her TK?

As we have already stated, the conception of teaching (of the student teacher or teacher) is usually implicit (tacit). Generally, it is assumed that changing the conception of teaching leads to a change in behavior. This is, however, not unambiguously valid. In Jaroslava's conception of teaching, we focused on the choice and structuring of the subject matter and the approach to dealing with unexpected pedagogical situations that represent the core of her conception of teaching. Initially, during preparation, but also in the realization of the teaching, she was almost convinced that she must "say everything" to the pupils. Based on her actual teaching she quite quickly realized that she presents a rather large amount of information to the pupils, which causes their interest to drop. She changed the conception she had explicitly stated in the interview: "to not overload pupils with information." However, this change, which took place on a mental level, did not lead—as she herself noticed—to a change in her behavior in the lessons. Only repeated reflection (when the pattern of inadequate didactic behavior repeated itself) led to an internal change. Thus, it appears that a change in the conception of teaching that leads to a change in behavior involves three important steps: (a) being aware of the conception, (b) changing it, (c) "resetting" oneself internally for a change in behavior.

Jaroslava's conception of dealing with unusual pedagogical situations did not develop as a result of pedagogical theory. It was formed as she found herself in these situations during her classes and she had to react to them immediately. Jaroslava attempted to become oriented in these situations, returned to them after the lessons, "dissected" them, tried to go deeper and grasp the important moments and causes of these situations. Based on Jaroslava's stated answers (during in-depth interviews), we assume that her "struggling" during unexpected situations was primarily tacit. She was aware that each situation is different and that it is not possible to be universally prepared to deal with them; it is only possible to anticipate certain situations.

What does Jaroslava's way of solving unexpected pedagogical situations say about her TK?

From the previous sub-chapter, it is obvious that Jaroslava's conception of dealing with unexpected situations was only formed by finding herself in these situations and being forced to react. Her concept of how to deal with unexpected situations can be characterized as incomplete and not yet articulated. Gradually, Jaroslava's TK and knowledge of how to behave in certain situations crystallized. Applying the knowledge, however, requires an adjustment to the specifics of the unexpected pedagogical situation. Adjustments happen in a spiral: "behavior—reflection—changed behavior".

In unexpected pedagogical situations, Jaroslava experimented by searching for and trying out various pedagogical methods. Some of them "worked" better than others. She made assumptions about their effectiveness based on the pupils' reaction and also on her own reflection that often began with an intuitive depiction of the situation. However, she had to set aside general pedagogical recommendations in order for her reflection(s) to be useful. General recommendations and knowledge only became a part of her experimenting after a certain time.

Jaroslava sees reflective seminars connected to the teaching practice as a source of inspiration for dealing with similar pedagogical situations. In discussions with colleagues and university teachers that participated in teaching the seminars (usually a pedagogist and a psychologist and/or a departmental didactic), models of dealing with the situation emerged and were explicitly stated. However, a prerequisite for forming one's own tacit knowledge is to "experience" pedagogical situations.

An important role in forming TK is sharing with the teacher trainer (on this subject see Chapter 11 of this monograph). Sharing makes it possible to facilitate the process of forming student teachers' TK. However, in the case of Jaroslava, meaningful sharing of TK or elements of it (mainly in teaching Chemistry) did not take place.

To summarize, it can be concluded that during the teaching practice, Jaroslava's tacit knowledge crystallized. However, it appears that what was observed and heard in the interviews with Jaroslava was "something more" than only a manifestation of TK; almost as if TK is modulated or embedded in "something" that creates a personality core typical for an individual's thinking and behavior. This is more aptly expressed by Minkowski (2011, p. 105): "All our deeds are as if carried by something not tangible, less definite and more general that cannot be disassembled to isolated elements. They are swamped by what the personality radiates as a whole, and the personality cannot distinguish this moment, specify it or even be clearly aware of it."

All empirical study has its limitations. In our research, we consider a methodological limitation the fact that we did not apply Clean Language in the interviews, which is discussed in more detail in other chapters of this monograph. Even if the described

in-depth interviews brought interesting results, we assume that asking questions based on Clean Language techniques would have made it possible to venture deeper into the area of our student teacher's tacit knowledge.

Eleventh Chapter

SHARING TACIT KNOWLEDGE—STUDENT TEACHER AND TEACHER TRAINER

Vlastimil Švec[123]

In recent years, the concept of 'sharing knowledge' has become popular, particularly in the area of knowledge management. Within the field of management, sharing is often understood as a transfer of knowledge (more specifically—information) from one individual to another *(i)* within one organization, *(ii)* within or between different organizations (for example, companies). Sharing knowledge in this concept is increasingly influenced by information and communication technologies that make the transfer of information easier and faster, and also make it possible to transfer information between geographically very distant regions.

In the educational context, however, sharing knowledge is a complex process with certain specific characteristics. In particular these include (Švec, 2009a):

- confrontation of knowledge and information between participants in the educational process,
- joint forming of new knowledge,
- mutual teaching and learning, for example between student teachers, new teachers and experienced teachers.

The level and form of sharing knowledge depends on the level of experience and knowledge of the individuals that enter the process. For example, expert teachers share pedagogical knowledge among themselves more easily than a student teacher does with an experienced teacher. However, it also depends to what extent individuals are aware of their knowledge and to what extent they can articulate it. Explicit knowledge that individuals are aware of and are able to express is shared more easily than tacit knowledge that individuals are only partially aware of.

This chapter focuses on the tacit pedagogical knowledge that a student teacher shares with her teacher trainer during her teaching practice at a primary school. Some theoretical and methodological questions related to sharing tacit knowledge between the teacher trainer and the student teacher are addressed and the process of sharing is examined in more detail.

[123] Materials for the empirical part of the chapter (research data) were prepared by K. Cásková.

11.1 Traineeship as a Way of Sharing Tacit Knowledge

Let us first note the various ways of sharing tacit knowledge. Rintala & Kuronen (2006) attempted to provide an overview of the methods and forms of sharing tacit knowledge. We have chosen the types of sharing that are applicable when educating teachers (Table 10).

Table 10
Ways of sharing tacit knowledge in teacher education (Rintala & Kuronen, 2006; edited, cf. Švec, 2012)

Type of sharing	Method of sharing	Number of persons sharing	Example
1.	Traditional traineeship	2	The student teacher observes an experienced teacher and follows their recommendations; the experienced teacher observes the student teacher and afterwards leads a discussion with the student teacher regarding their teaching.
2.	Team traineeship	group	The new teacher and the experienced teacher observe each other's lessons and discuss the teaching structure, methods and teaching forms.
3.	Mentoring	2	The student teacher and the experienced teacher teach together and fulfill the lesson goals together, the teacher "coaches" the student
4.	Team discussion	group	Experienced teachers (experts) discuss solutions to specific pedagogical problems (situations).
5.	Mutual learning	at least 2	Student teachers learn from each other—they observe each other's teaching and then discuss their methods (e.g. in a reflective seminar)
6.	Story-telling	at least 2	The experienced teacher tells a student teacher or a novice teacher about their own teaching experience—beginnings, communication with problematic pupils, etc.

This section explores more closely the first type of sharing tacit knowledge—traineeship. This is a relationship entered into by a student teacher (or novice teacher) and a teacher trainer (mentor, experienced teacher). This relationship assumes the mutual cooperation of the participants in sharing and is not one-sided. In the process of sharing, the tacit knowledge of the student teacher is shaped while, at the same time, the tacit knowledge of the teacher trainer is strengthened and developed. A traditional traineeship is based on the fact that the experienced teacher demonstrates to the less experienced teacher or student teacher both planned and unplanned teaching activities, and demonstrates how to deal with pedagogical tasks and situations. The traditional traineeship model is based on four basic activities of the teacher and student (cf. Collins, Holum, & Brown, 1991):

- the teacher models an activity while the student observes,
- the student attempts to simulate the activity and fulfills the given tasks while the teacher provides support,
- the level of the teacher's support reduces, as the student teacher assumes greater responsibility,
- the teacher leads the student in the choice of suitable tasks, with recommendations and instructions, provides feedback, encouragement, etc.

A traditional traineeship, where the central role is observing the teacher, is more suitable for acquiring craftsmanship. Pedagogical knowledge and skills, however, are more specific.[124] Collins, Holum & Brown (1991) offer a model of cognitive traineeship that requires the teacher's and student's thinking to be 'visible' so that the tacit processes of both are uncovered. The cognitive traineeship model relies on a variety of methods. Although the titles of some sound similar to traditional traineeship activities, in essence they are slightly different. Collins, Holum & Brown (1991) list the following methods for making tacit processes 'visible':

- *modeling*—the student teacher observes the more experienced teacher and creates a conceptual model of the activities that should be mastered
- *coaching*—the teacher observes the student teacher conducting the task, provides feedback, focuses their attention, chooses other tasks ("tailored" to the student's needs), etc.
- *providing "scaffolding"*—the teacher provides recommendations to the student teacher for their solutions for making tasks more successful, the student provides recommendations to the teacher,
- *articulation*—the student teacher attempts to articulate their knowledge, explain problem-solving, etc.,
- *reflection*—the student teacher compares their solutions (activities) with the solution (activity) of the experienced teacher or their colleague,
- *trying new solutions to tasks*—the teacher encourages the student teacher to find their own, independent solutions to tasks.

The current research was inspired by the cognitive apprenticeship model, described in more detail in the field of teacher education by van Velzen & Volman (2009). This model was extended to become? the collaborative apprenticeship model (Glazer & Hannafin, 2006). The foundations are reciprocal (mutual) interactions in which

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[124] This problem was already pointed out earlier in connection to the role of practicums in teacher training, based on the interview with I. Vyskočil about class inspections. Vyskočil exposed an incorrect assumption that a student teacher without previous teaching knowledge would see and hear "something" during the practice, understand "how something is done" and then imitate this during their own turn; and in doing so would acquire their own experience. In reality, however, it is only an imitation or reproduction of a certain result, that is of something that is "not one's own" (Švec, 2009b, p. 410–411).

individuals help others to maximize their learning potential. It is a particular form of Vygotsky's zone of proximal development (Glazer & Hannafin, 2006, p. 180–181). The collaborative apprenticeship model provides a rather wide range of applications: it can be applied in sharing the student teacher's knowledge with the teacher trainer as well as in cooperation (sharing) with teachers with various degrees of experience in the school teaching community.

The collaborative apprenticeship model inspired van Velzen, Volman, Brekelmans & White (2012), who describe three phases of teaching lessons by the teacher trainer and the student teacher: Phase 1—the class is taught by the teacher trainer; Phase 2—the class is taught by both the teacher trainer and the student teacher; Phase 3—the lesson is taught independently by the student teacher.

McAdam, Mason & McCrory (2007) analyzed multiple studies focused on the characteristic features and manifestations of tacit knowledge. They came to the conclusion, inter alia, that tacit knowledge can be shared through interactive conversation (p. 46). Similarly, Torff (1999, p. 207) recommends that student teachers be guided to become more aware that cooperative learning (with a teacher trainer) is not only a form and method of teaching but also a process in which they can learn from others and construct knowledge together.

11.2 Cornerstones of the research

The term tacit knowledge is difficult to define as its core is hidden from external observation. When observing human behavior, we see only the result of 'applying' tacit knowledge, for example how a student teacher or an experienced teacher communicates with the pupils in a specific lesson. Metaphorically, we can say that we observe a *shell* of tacit knowledge. However, assuming that the student teacher's tacit knowledge is formed based on their experience of dealing with pedagogical (mainly unexpected) situations, *the shell* may be enough for us. Experiential learning has been applied in educating future teachers for many years. However, we are interested in discovering how the teacher trainer's tacit knowledge is shared with the student teacher. Therefore, we need to recognize tacit knowledge and this cannot be done without a clear definition of this key term.

If *(a)* tacit knowledge is knowledge shaped by the interaction of the student teacher (the teacher) with the environment in which they teach, then *(b)* tacit knowledge can be made explicit, to a certain extent. We can argue, for example, that certain pieces of tacit knowledge acquire the form of explicit knowledge through self-reflection or in an interview with the student teacher (or the teacher) about their teaching, using Clean Language. Explicit knowledge and tacit knowledge can then be perceived as two poles of a single continuum.

Nehyba & Svojanovský (2016) define tacit knowledge in contrast to explicit knowledge: (a) the degree of awareness versus (b) the degree of articulability.

By sharing tacit knowledge, we understand the process of interaction between the student teacher and the teacher trainer in which (Cásková, 2014, s. 104–105, edited): (a) the student teacher perceives his/her experience and tacit knowledge in conflict with the teacher trainer's recommendations; (b) the teacher trainer assesses (tacit and explicit) the knowledge of the student teacher that is demonstrated in their behavior and, at the same time, reflects on student teachers' position during their teaching practicum; (c) the student and the trainer attune to each other (respect the opinions and emotional state of the other).

It is assumed that the student teacher and teacher trainer have different levels of experience and tacit teaching knowledge. The student teacher lacks pedagogical experience and new tacit knowledge is gradually formed. It can be assumed that, in the case of the experienced teacher trainer, much tacit knowledge has already been formed and can be considered to be stabilized.

11.3 Research Methodology

The aim of the research was to determine how tacit knowledge is shared between the student teacher Milada and her teacher trainer. This goal was made more specific by two research questions:

1) *How does Milada share tacit knowledge with her teacher trainer?*

2) *What is shared and how? Does anything change when sharing?*

The nature of the research questions implied the choice of qualitative research. The basic methods of data collection were: (a) *interviews* (discussion) with Milada's teacher trainer (recorded on video); the interview followed an *observation* of Milada's lesson (the lesson was observed by both the teacher trainer and the researcher) and where necessary, the discussion was extended by the researcher's questions; (b) an i*n-depth interview* between the researcher and Milada.

The research into sharing tacit knowledge was conducted at a Brno elementary school in the subject of Mathematics during the second and third term of teaching practice in the 2013/2014 Spring semester and the 2014/2015 Autumn semester.[125] For the

[125] The teaching practice takes place over three semesters: in the first (practice 1) and second (practice 2) term, the practice is intermittent; in the third semester (practice 3), there is continuous practice (4 weeks). During the teaching practice, the student teacher undertakes a variety of activities that constitute parts of a teachers' everyday work. However, the student only teaches three lessons by themselves on one subject during the first practice, and ten lessons by themselves on one subject during the second practice. During the third teaching practice, the student teacher teaches twenty lessons on one subject.

follow-up Master's program for teacher training, the student teacher Milada and her teacher trainer participated in the research voluntarily. The teacher trainer graduated in teaching Mathematics and Biology, teaches Mathematics and Biology to sixth to ninth grade pupils at an elementary school and has 27 years pedagogical experience.

Cooperation between the student teacher Milada and the teacher trainer during the teaching practices consisted of mutual observation of teaching (Milada observed classes taught by the teacher trainer and the teacher trainer observed Milada's lessons) and discussions between the teacher trainer and Milada about their teaching.

The research focuses on only one direction of the interaction between the teacher trainer and Milada: observation of Milada's teaching by the teacher trainer and follow-up interviews (discussions) with both participants in the sharing. In total, there were three interviews *between the student and the teacher trainer* (Interview 1—May 2014, Interview 2—November 2014, Interview 3—November 2014). These interviews focused on problematic situations that the teacher trainer identified while observing the student's lesson. More material was provided from two other interviews between the researcher and Milada. One of these interviews (Interview 4—December 2014) concentrated on the change in the subjective conception of teaching, and the analysis itself contains passages from this interview that correspond with the topics shared between the teacher trainer and Milada. The final interview, which took place after completing the practice (Interview 5—May 2015) reviewed Milada's teaching practice and focused on selected topics from the previous interviews.

11.4 Research Results

All interviews were transcribed, and sections relating directly to the research questions were marked using open coding. Research results are presented through selected situations where tacit knowledge was shared between Milada and the teacher trainer. This occurred during teaching practice 2 and teaching practice 3. The situations relate to the following three topics.

Topic 1: Unequal working pace of pupils during the class

The teacher trainer reacted in the interview to a situation observed during Milada's class: pupils complete a task at their desks; some finished before the others so were just sitting and waiting. Milada is by the board and asks one pupil to come and write the solution on the board. She probably assumes that the pupils at their desks check their solutions simultaneously as the pupil is writing his solution on the board. The pupil made a mistake. Milada explains to the pupil what he did wrong.

Teacher Trainer: …*that was a bit of a weak moment, as the kids were not really being useful and involved* [in the process of explaining why the mistake happened]. *It would have helped to nominate assistants by saying something like, "You're fast, come and help so and so to solve it." Besides, it makes them feel important, and although they might say it in a less expert way than we say it, it is sometimes brings the kids closer and it has proved to be quite useful to me. Moreover, the clever ones feel they are being helpful and it is also nice in that it helps the relationships between the kids.* (Interview 2)

Teacher Trainer (comments on her feedback): *I don't know if Milada accepts what I say here; I don't see it as criticism, more as the kind of advice that everybody looks for during their practice, but maybe they are then better prepared for it.* (Interview 2)

Milada: *I think I don't always get everything so it's a good thing that you mention it because those are really just details and if the teacher hadn't mentioned it I would not have even realized it until the problem actually occurred.* (Interview 1)

Teacher trainer [interrupts her]: *I had not realized that before, using the more clever ones* [earlier], *and I constantly had this feeling that I would give them extra work* [to the pupils who finished earlier], *but I kept getting into a situation where it was not sustainable anymore. In the end, I saw how excited they are to walk around the classroom and help and that it really does make a difference. ...And sometimes when I did it they even called* {emphasis} *the person, so that the pupil could not even do it fast enough, errr, that they really wanted the advice and also to discuss it with them, so, it really does have advantages. Of course, you can't do this all the time, we also need to push the more talented ones forward, so every now and then, some extra work or some more complicated task as something special for them, that of course also makes sense, but it is one of the options.* (Interview 1)

Milada: *I have this feeling that some kids, that they have a problem with the teacher as if they were afraid.* (Interview 2)

At the end of this interview, the teacher trainer refers to a situation from the end of the class that she views positively: Milada was explaining something new and the pupils did not understand. One pupil stood up spontaneously in front of the class and started to explain it to them.

Milada [remembers her previous experience]: *I like it when they explain it to each other, I think it's more natural that way, but I also think that some kids that maybe have a problem with a teacher, that they are afraid, so they prefer explaining things among themselves.* [Continues, returns to the situation that the teacher trainer mentioned.]: ... *which is not the case with Class 7B, those kids have no fear. So I liked that one boy stood up and really started explaining it, that he put himself into that situation—that would explain it. And really clearly, simply, he started: "You guys are really stupid, you don't get it." I thought it was kind of nice as I was telling myself, how should I explain it to them, and out of nowhere he just starts off in a way I would never dare to consider saying. I would never say, when explaining something new, you guys are stupid.* (Interview 3)

After a month, the researcher returned to this topic in another interview with Milada.

Researcher: *How do you work with a diverse class?*

Milada: *It depends if it's revising or explaining new stuff.*

Researcher: So let's say explaining something new.

Milada: *I think in this case we can make use of the more talented pupils so that they can explain the new matter to the other kids themselves, and then, for example, I summarize it for the others.* (Interview 4)

The last interview with Milada took place four months later.

Researcher: From what the teacher trainer told you during the practice, what did you agree with?

Milada: … *That would probably be the involvement of the more talented ones so that they help the slower kids.* (Interview 5)

We assume that while the teacher trainer observed Milada in the problematic situation described, her experience and tacit knowledge relating to similar situations became explicit, namely in the form of recommendations or suggestions on how to involve the class more and how to make use of the more talented pupils so that they can help their slower classmates in finding solutions. Significantly, in her comments the teacher trainer points out that during the practice, Milada will herself look for ways to deal with unexpected and difficult situations; however, recommendations can help her to become better oriented in the situation. Afterward, the teacher trainer gives detailed reasons for her recommendation. Milada accepts the recommendation and recognizes that it could help her find alternative solutions to situations. Milada then recalled her previous experience which she describes in detail.

The teacher trainer continues to comment on Milada's lesson and positively assesses a situation when one pupil started explaining the new material to his classmates. Milada returns to her experience of children who are "afraid" of the teacher or, for example, afraid to ask the teacher about something. If that is not the case, she likes it that a pupil explains the new information / content to the others. Apparently, Milada considers this topic rather important as she returns to it during the interviews with the researcher.

Topic 2: Highlighting important information on the board

The teacher trainer noticed that in the observed lesson, Milada does not graphically emphasize headings and important information and does not check how pupils write the information down in their exercise books.

Teacher Trainer: *You should really emphasize the definite answer so that they really write it down. So that when they study at home they really know what was going on in the class. These are sixth graders. There should be some system to it.*

Milada: *Yeah, they are not quite there yet.* (Interview 1)

Teacher trainer [turning as if to pupils]: *gives an illustrative example of her recommendation: Yes, you did great now, but you might not remember how to do this every time, but now you know. Let's go, we'll write it down, and wait, let's make sure this title and the frame are turned into a fact. Take your pencils and let's go...* [returns to evaluating Milada] *... and that kinds of blends in with the rest. And it also happened to you that you wrote the formula there, for the surface, and you just added the formula later while writing down the exercise, but it should really stand out there.*

Milada: *Yeah, that sort of writing things out, I'm still quite struggling with it.* (Interview 2)

The topic is addressed again during Interview 3:

Researcher: *Is anything different now?*

Milada: *Maybe emphasizing the examples, so that the pupils have an idea what is going on. As we discussed before, I mean, to have the stuff more organized on the board, maybe in a more systematic and consistent manner. Writing a specific clear solution, so that they know what it was.*

Teacher Trainer [enters the conversation]: *It's really about, that the less skilled kids are not oriented in the matter and if the teacher writes something difficult and there are too many numbers on the board, it's a problem. ... It's really important to make sure that the kids don't only write what is written in the gaps. So I say, everybody has it and let's wipe the board now, but it also happens to me that I talk and write and then remember and squeeze something in into some corner. The clever kids follow because they pay attention all the time, but some kids might not and then they lift their eyes and have no idea where I'm doing what. It happens, so I also have to keep that in mind and somehow underline or tap the spot on the board where they should be looking.*

In this case, on the basis of observing Milada's lesson, the teacher trainer formulated explicit recommendations based on her experience and probably her tacit knowledge. Milada is aware of the content of this recommendation. This awareness of the situation later increased. Milada's comments caused the teacher trainer to develop her other experience and probably also her tacit knowledge.

Six months later, the topic surfaces again between the researcher and Milada, in Interview 4.

Researcher: *Which situation would you say you learned the most from?*

Milada: *I've probably already mentioned this somewhere. Those exercise book entries, checking the titles, not to take it as a matter of course, that they have some system in it.*

Towards the end of the teaching practice, the researcher videoed Milada's teaching. It was clear that the teacher trainer's recommendation had been incorporated into Milada's behavior. She also confirmed this verbally in the final interview: *I checked the notes and titles, because I had time, but I don't know if I'll do it next time, it's just that we had a chance to do this in the class since there was no other issue with the pupils.*

Milada tried to explain her statement: "That's my problem, because it never bothered me, as I had the same attitude as my teachers, that the whole board was covered in writing, mainly in Maths and Physics [Milada's experience from high school]. You could always just fill in something in some corner. And then you ran out of space and wrote into a different corner and I thought it was creative and fun. If pupils follow the teacher. ... It was really hard for me here at the pedagogical faculty that we were supposed to write neatly. I thought it useless, I thought that pupils, if they want, they take it in. But at the same time, I realized later that if you do this as a teacher, that won't work, as they are still just kids ... If the pupils are really interested, then they are able to follow, but there are all kinds of kids in the classroom, some are dyslectics, so for them, it is useful to have the text. And I think that I realized in the lessons that it won't work, when I see an empty exercise book, that nobody has anything written down, that's not possible." In another part of the interview, Milada added: "It is possible that it may happen, that I'll have other lessons and I won't do it because I have to realize that the kids need it. There may be another problem with the pupils or something else, and I won't have the time. It won't occur to me to do it until it's a rooted procedure for me."

Milada realized that her writing on the board should be neat and clear and that it is advisable to control pupils' notes in their exercise books. However, her experience (secondary school teachers' writing on the board wherever there is space) has carried over, even though she knows that a teacher should not do this. Paradoxically, she admits that it is possible that it may happen to her in some future lessons.

Topic 3: Keeping pupils' attention

Milada: *Klára and Sabina were exchanging written notes and I don't really know how to react, whether to assign an exercise or ask the children to come to the board.*

Teacher trainer [comments on the girls' behavior, pointing out that going through puberty. Then, she continues]: *Or when* [a pupil] *does not listen, I ask, say it again, so I get the attention back and make a note, you didn't know that, it's old stuff... It's complicated because when we stop and say, František, you are not paying attention again and you know you are not the best pupil and later you won't remember it, and that takes half a minute. When you do it three times, then it breaks your thoughts about the lessons and it causes everybody to lose their concentration.* (Interview 1)

Milada thinks about the teacher trainer's words which then resurface in the next interview.

Milada: So it occurred to me, can I even say to a kid that they don't know or can't do something...?

Teacher Trainer: *Well, you know, you can, but you should not completely destroy the kid. Like I say: today I didn't have a good feeling about it, I expected more ... As we discussed, the boy from the sixth grade, that one really needs, like, to be given a 2+ instead of a 1-. He'll have problems getting over it but it will be a challenge for him to be better next time. Even when considering his standing in the group, when he thinks he's perfect, it's really good to show that it's not always the case, it's good for him and for the others as well, because they think that he's the only one who knows stuff and the others can't compare with him.* (Interview 2)

Milada returned to this issue again in the final interview with the researcher after her teaching practice 3: "I remember how the teacher trainer said that we can tell a pupil that he can't do something, if we know the pupils, but I think that I can't really agree with that. ... I think that kids are really perceptive, and I don't know the environment they come from and I think that one of the things that can really touch them and influence them in the future ... I saw it before. Like, I know this guy who graduated with honors […]. A teacher told him at primary school something that affected him and since then he didn't like the subject at all, although he was able to do well and was really talented and everything. But because of this, I feel strongly about it."

Arising from her experience in the lesson, Milada asked the teacher trainer how she should react in a situation where pupils do not pay attention. The question led to the teacher trainer giving her a recommendation (or suggestion), again based on her experience. Milada did not completely accept the recommendation, and it prompted her to ask whether she should tell a pupil that they cannot do something. Milada's question encouraged the teacher trainer to elaborate further on her explanation. However, Milada disagreed, and it can be assumed that Milada will not apply this recommendation from the teacher trainer in her future teaching.

11.5 Outcome Summary and Conclusion

In the course of the teaching practice, Milada and the experienced teacher trainer shared tacit and explicit knowledge. The research focused on sharing aspects of what the teacher trainer observed in Milada's lessons. After observing Milada's teaching, the teacher trainer reacted by commenting on it. She made explicit recommendations for those situations (parts of the lesson) that she viewed as problematic. These recommendations, addressed to Milada, were formulated based on the teacher trainer's extensive, long-time experience. Assuming that experience provides the basis for forming tacit knowledge, we can argue that the explicitly formulated recommendations of the teacher trainer demonstrate her tacit knowledge becoming explicit knowledge. The teacher trainer discussed the recommendations with Milada. During these discussions,

Milada clarified her position concerning these topics, based on her previous experience when she was a pupil at elementary and, more significantly, secondary school, and to some extent her experience from her teaching practice. She also expressed her opinion of the teacher trainer's recommendations.

Linking the analysis to the original research questions

How does Milada share tacit knowledge with her teacher trainer?

Milada and the teacher trainer entered the process of sharing with different levels of tacit knowledge—different in its scope and degree of interconnectedness and stability (Table 11).

Table 11
The presumed starting levels of the tacit knowledge of Milada and the teacher trainer

Tacit knowledge	Scope	Degree of interconnectedness	Degree of stability
Milada	small	low	low, TK is fragile
Teacher trainer	large	high	high

The expected difference in the tacit knowledge of Milada and the teacher trainer led us to choose a model of sharing where the following phases could be distinguished:

a) repeated observations of Milada's teaching practice by the teacher trainer; the aim of the observation was to establish Milada's level of teaching experience and knowledge and to detect those parts of Milada's lessons that the teacher trainer considered problematic or still quite challenging for Milada;
b) turning the teacher trainer's tacit knowledge into explicit knowledge based on the detected problematic points in Milada's lessons, in the form of methodical recommendations;
c) Milada's understanding of the recommendations;
d) Milada's acceptance or non-acceptance of the recommendations;
e) Milada possibly trying to implement the recommendations and incorporating these acquired elements of tacit knowledge into her own knowledge base.

The teacher trainer's tacit knowledge became explicit knowledge when she reacted to and commented on what she saw in Milada's lessons[126]. Milada's queries also led to some tacit knowledge becoming explicit knowledge (in topic 3).

Levels of Milada's acceptance of teacher trainer recommendations are listed in Table 12.

[126] Specific recommendations for change were a significant part of the teacher trainer's feedback on Milada's teaching. It was neither criticism nor strict instructions on how to proceed in the given situation (see Interview 2, the teacher trainer on topic 1).

Table 12
Levels of acceptance of teacher trainer's recommendations

Topic	*Level 1* Milada's understanding of the principle of the teacher trainer's recommendations	*Level 2* Milada realizing the need to apply the recommendations in the lessons	*Level 2* Milada applying the recommendations in her lessons
Topic 1	yes	yes	yes
Topic 2	yes	yes	yes, but probably not always
Topic 3	yes	no	no

Milada was not aware of some aspects of her behavior in the observed lessons (see Interview 1 on topic 1). We assume that if the teacher trainer had not pointed out problematic situations in her lesson to Milada, it is possible that Milada might have acquired less relevant (or less useful) tacit knowledge. Therefore, sharing had both a feedback and preventive function.

What is shared and how? Does anything change when sharing?

The research described in this chapter indicates that pedagogical knowledge, specifically didactical tacit knowledge, is shared. In the process of sharing, the starting point is the teacher trainer's observation of Milada's behavior during her lessons. When the teacher trainer discovers a problematic situation in the class (in accordance with her experience), she points it out to Milada in the follow-up interview and adds a didactical recommendation. The recommendation became the starting point of Milada's reflection on what she had done in the class and how, and also how it could have been done differently. She tested the recommendations, tried to implement them, and then either accepted or dismissed them.

What changed in the course of sharing? This question will only be answered in part, as not all necessary data is available. We observed that during the teaching practice (and also during the research), Milada and the teacher trainer became attuned to each other. This was based on mutual trust and willingness to listen to each other. A deeper mutual understanding developed. Over the course of sharing, during observation and interviews, the teacher trainer got to know Milada better and as a result reacted more sensitively to problematic parts of her lessons as well as to her still formative teaching style.

The qualitative research described only partially revealed some aspects of the student teacher Milada sharing tacit knowledge with the teacher trainer. It identified one side of the sharing: sharing of the teacher trainer's tacit knowledge which was made explicit knowledge as a result of her reaction to Milada's behavior in the observed lessons. The research did not examine the other, no less interesting, side of sharing: the mutual ob-

servations of Milada's and the teacher trainer's teaching, and the follow-up discussions about the observed lessons. That is considered one of the main limitations of the current research.

Conclusion

Vlastimil Švec

This monograph is the result of theoretical and empirical research designed to clarify the concept of tacit knowledge (on the tacit–explicit continuum) and to answer the question of how student teachers move along this continuum when reflecting on their teaching practice. It is clear that any empirical research could begin only after clarifying the key term *tacit knowledge.* This required deeper study not only of pedagogical and psychological resources but also philosophical resources and numerous discussions by the members of the research team—the authors of this monograph. However, this theoretical research continued over the course of the preparation, implementation and evaluation of the results of empirical probes. In this way, the first chapter was gradually formed and, at the same time, the theoretical and methodological cornerstones of the prepared researched were refined. The authors of the empirical chapters also used the first chapter during the data analysis and their interpretation. They read each other's chapters and commented on them.

While the *Introduction* focuses mainly on the theoretical and philosophical ideas related to the research of tacit knowledge, the *Conclusion* outlines various ways of applying the results of the (not only) empirical chapters in practice, that is in educating student teachers (since our theoretical and empirical research is also oriented to the requirement to improve the teaching practice of student teachers).[127] It will not include specific methodological recommendations, but rather thought out incentives for student teachers' educators about how to produce conditions for student teachers' tacit knowledge cultivation during their teaching practice.

Initially, Clean Language interviewing and metaphors will be addressed, as they constitute an important part of the monograph. *Clean Language interviewing* is applicable when researching student's (teacher's) thinking and behavior as well as during teaching practice. It allows the educator to discover the student's to date unrevealed personal dispositions, thinking and circumstances regarding their behavior in the lessons. The Clean Language interviewing technique appears rather simple, but its creative application requires understanding and experience (for more detail see Chapters 3 and 5).

Metaphors constitute a "bridge" that enables interconnection between the tacit and explicit dimensions of knowledge. They often occur in students' (self)reflections and while the students are sharing their experiences with their teacher trainers. They make it possible to develop the students' reflective thinking (Švec, 1999, p. 82). They can be

[127] More details on this (mainly on teaching practice and some views on the factors affecting its effectiveness) are provided in the monograph by Švec, V., Svojanovský, P., & Pravdová, B. (2016). *Determiners of Teaching Practice Effectiveness.* Brno: Masaryk University.

considered as a pre-stage of forming pedagogical concepts. Listening carefully and emphatically to a student's metaphors, can facilitate the assessment of how the student understands their own experience, how they interpret it and refer to it. Metaphorical thinking can complement logical thinking.

This metaphorical thinking is not clean logical thinking, but rather a kind of thinking that is accompanied and enriched by intuitive insights, views and discoveries of similarities which bring invention, have imagination and cognitive value. In other words, a metaphor can have the key from the 'thirteenth chamber' where strict logical thinking is not allowed to enter without company. (Stachová, 1993, p. 301)

Metaphors can make it easier for tacit knowledge to become explicit (see Chapter 7).

One of the important variables in the process of forming tacit knowledge is the *student's conception of teaching*. A conception is in itself tacit. Students enter teaching practice with certain, preconceived ideas (even if these are often not well articulated). Their conception of teaching evolves during their practice. The current research revealed that this gradual change in the student's conception of teaching (or its parts) is usually triggered by repeated reflections on their behavior. The student, as a result of reflection on their own experience, realizes that, for example, their method does not work in the classroom.[128] Therefore, it seems constructive that during the teaching practice, the educator (teacher trainer, pedagogue, psychologist, subject didactics teacher) explores the student's conception of teaching (e.g. via interviews based on Clean Language), and that student teachers become aware of their conception through these interviews and through self-reflection in relation to their behavior. For example, when reflecting on how they repeatedly behave in lessons, the student can ask questions like: "What leads me to this kind of repeated behavior?"

Students also begin their teaching practice with certain pedagogical, psychological and subject-related didactical knowledge. This, often explicit, knowledge provides *informational support* for the student, mainly during the planning and realizing of lessons. In planning it helps when *designing pedagogical situations* to be used in a lesson (e.g. how they will start the lesson, how they will try to motivate the pupils, how they will structure the lesson, which teaching methods they will use.) Realization of the designed situations (which constitute the axis of the student's planning) depends on many factors, including: whether the student knows the class where the teaching will take place, what kind of pedagogical knowledge the student already has, the quality of the communication with the teacher trainer. In an ideal case, the actual realization of

[128] In the monograph, the terms *reflection* and *self-reflection* appear frequently. These terms are often used in pedagogical theory and practice. Therefore, their theoretical background is not addressed in a separate chapter. For more details on this topic, refer to the newer study by Svojanovský (2014).

the lesson may, in many respects, closely follow the student's plan (their idea). In many cases, however, the student has to modify their plan or even change it completely, particularly in unplanned, unexpected situations (for more detail, see Chapter 9).

During teaching practice, students experience *tacit learning*. Tacit learning is learning in which the student learns with less consciousness (or even unconsciously) from their behavior in pedagogical situations that emerge during lessons. It takes place in the dynamic student teacher field—pupils in the classroom. Student teachers experience their own behavior (what they did in the classroom and how the pupils reacted) with a different intensity of emotions, both directly in the classroom as well as after the lesson. It is desirable that the student first reflects on this behavior immediately after the lesson (with the support of the teacher trainer), then after a time interval (in the faculty with an educator—a pedagogue or a psychologist—during seminars that are related to the teaching practice and with their teacher trainer who sees the student in different lessons and can best assess how the student's tacit knowledge develops).

Tacit learning is not a one-time affair (realized, for example, during one lesson); rather, it takes place repeatedly (to varying degrees) on the tacit—explicit continuum. The example of Jaroslava (Chapter 10) shows how one of the key didactic skills is slowly and gradually developed over the course of several lessons (based on her reflections). In Jaroslava's case this was her choice, structuring and "dosing" of subject matter in her communication with pupils.

In some empirical probes, during some of the more challenging and unexpected situations, the students dealt with these by *experimenting*. When experimenting, they did not apply the strategy of "trial and error", but rather tried out new solutions (often directly in the classroom) and then experienced the results. Students then shared these experiences (dealing with unforeseen pedagogical situations) with their teacher trainers.

Sharing tacit and explicit knowledge between the teacher trainer and student teacher can be considered one of the main activities during the teaching practice. One of the research probes (for Jaroslava's example, see Chapter 10) indicated that low-quality (insufficient, superficial) sharing on the teacher trainer's part makes preparation for their lessons and self-reflection of their actions more difficult. The teacher trainer observes the student's lesson, and the student observes the teacher trainer's lesson. What is shared is usually what they observe in each other's lesson(s). Clearly the teacher's experience and tacit knowledge is more mature than the experience of the practicing student, so the purpose of sharing is not only to describe what was happening in the lessons but to explore and explain what lies *behind* the observed behavior.

The research probe in Chapter 11 shows one of the dimensions of sharing—the tracher trainer observing and commenting on the student teacher's lessons. The teacher trainer attempted to analyze the student's teaching techniques from her own perspective, that

is from the perspective of her experience and capabilities. She identified significant key situations that she considered important and that could be improved, for example, issues with organizing pupils' activities, inadequate methods considering the subject matter. Description and analysis of these situations can lead the student teacher to a deeper self-reflection[129] and subsequently better teaching practice.

(Self)reflections play an important role in the process of sharing (not only) tacit knowledge. It can reasonably be assumed that a teacher trainer's recommendations are useful, however, for a student to change behavior it is necessary that the student *consciously and deeply* reflects their behavior to identify what changes they might adopt (Hrbáčková, 2005, p. 67).

[129] *Deeper self-reflection* is understood as reflection during which the student (gradually) becomes aware of more and more circumstances that might have affected their behavior during the lesson, in specific pedagogical situations.

Summary

Eva Minaříková

The book focuses on the issue of tacit knowledge, specifically in connection with student teachers. It summarizes the current view of (tacit) knowledge in philosophy, educational science, and research and challenges our understanding of this complex concept. Drawing on this, a series of research studies exploring the tacit dimension of student teachers' knowledge is presented. These studies tackle various aspects of the tacit dimension of knowledge and together provide a multifaceted view of this concept. The book aims at educational researchers in the field of teacher research as well as teacher educators who are interested in the content and process of creation of student teachers' tacit knowledge. We hope that the book will be of interest to a wider audience, too, as it discusses broader issues of the philosophy of knowledge and research on knowledge.

The theoretical part of the book opens with a detailed analysis of philosophical background of our understanding and study of (tacit) knowledge. (Early) modern paradigm is analysed and contrasted with current findings of neuroscience. Different understandings of the concept of knowledge are introduced, together with their origins and limitations. The first chapter leads us to conceptualizing knowledge not as isolated items in individual minds but as a dynamic interplay between the individual, other individuals and their whole environment (a unified field where perceived borders are no longer relevant or feasible).

Following this understanding of knowledge, the second chapter discusses the embodied nature of knowledge and language—and specifically metaphors. Metaphors are in this book understood as one of the ways of approaching the "tacit". This chapter thus provides a solid theoretical background to understanding metaphors and to their use in research. The third chapter ties to this and introduces a relatively new method of data collection that enables us to uncover people's understanding of the world around them, including their tacit knowledge. "Clean language" as an interview method aims to diminish the influence of the interviewer on the interviewee and helps explore their experience from their perspective—including exploring their metaphors (by avoiding "contamination" by the interviewer's metaphors).

Chapters four and five introduce the actual methodology of the presented research, focussing mainly on the research sample and the data collection that was common for all the studies presented later on. Clean language interview technique is described in detail together with an analysis of the actual interviews conducted as a part of our research, indicating their "cleanness" rating (i.e. how "clean" and (non)leading the interviews were).

The next part of the book opens with an overview of current empirical research on teachers' tacit knowledge. Chapter six reviews such research and summarizes the prevailing conceptualizations of tacit knowledge, research methods used and findings obtained.

Next, an example of the process of a concrete item of tacit knowledge becoming explicit is described. Phases of this process, namely metaphorisation–finding the literal meaning and reverse metaphorisation, are discussed. Following this, individual studies that were a part of the overall research project are introduced, each of them stating their aims and data analysis methods applied.

The first study focuses on student teachers' beliefs about pupils and educational content. Despite the fact that the research sample was homogenous in terms of the students' year of study and amount of compulsory teaching practice, the study shows that both the content of these student teachers' beliefs and their concreteness and explicitness/tacitness are highly individual. Their beliefs and tacit knowledge strongly influence how they behave during teaching practice, and especially in unexpected teaching situations. This is why this context is the focus of the next study. It provides a typology of unexpected situations and, based on our data, discusses how student teachers experience them and react to them. Being in unexpected situations and dealing with them helps student teachers create and develop their tacit knowledge. It is this process of tacit knowledge creation throughout teaching practice that is the main theme in chapter ten. In a case study, specific aspects of a student teacher's tacit knowledge are uncovered together with their origin. The last empirical chapter further develops this theme, this time focussing on the process of sharing tacit knowledge between a student teacher and her mentor during teaching practice. This case study explores both the content and the process of sharing.

The book closes with a synthesis of the theoretical considerations and concrete empirical findings of the research project. Practical implications for teacher education are discussed and critically analysed.

List of Abbreviations

DNA	deoxyribonucleic acid
GIM	Grammar-targeted interview method
GPS	global positioning system
fMRI	functional magnetic resonance imaging
IPA	Interpretative phenomenological analysis
ML	metaphorical landscape
MCA	Meaning constitution analysis
PVC	polyvinyl chloride
SES	Social engagement system
SCT	student's conception of teaching
TK	tacit knowledge
MN	mirror neurons

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BECOMING A TEACHER: THE DANCE BETWEEN TACIT AND EXPLICIT KNOWLEDGE

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