3

The Embodied and Metaphorical View of Cognition

The methods teachers use to create efficient learning environments in management education (and elsewhere) are based on what we know about how human cognition works. When Duolingo, an app for learning languages, gives you rewards for completing lessons and extra rewards for completing lessons seven days in a row, it is because of what we have learned from behaviorist experiments about reinforcing behavior (Watson 1913). When teachers combine auditory and visual teaching material, it is due to what we know from cognitivist experiments about attention retention and about the limits of information a human can receive through each sensory channel (ears and eyes) (Mayer 2001). When MBA programs use case-based learning or role-play, it is due to what we know from constructivist experiments about how individuals construct their knowledge from personal experience (Piaget and Inhelder 1969; Dewey 1938). Unfortunately, as we saw in Chap. 2, it remains a significant challenge for educators involved with management education to create learning environments which efficiently and reliably produce double-loop learning and through this increase managerial efficiency. However, recent discoveries in cognitive science suggest that focusing our inquiry on the sensorimotor experiences which managers use to metaphorically

C. Springborg, *Sensory Templates and Manager Cognition*,
Palgrave Studies in Business, Arts and Humanities,
https://doi.org/10.1007/978-3-319-71794-4_3

represent various organizational phenomena offers a new approach to facilitate double-loop learning, which bypasses much of the resistance often encountered when attempting to engage in double-loop learning.

One of the most exciting developments in cognitive science in recent years is the discovery that cognition is embodied (Barsalou 2008; Wilson 2002; Johnson and Rohrer 2007; Johnson 2007) and metaphorical (Lakoff and Johnson 1980; Lakoff and Johnson 1999; Lakoff 2012; Grady 1997; Grady 2005). An important consequence of this is that humans represent abstract concepts such as "power", "importance", "decision-making", "job satisfaction", and so on through analogous (metaphorical) sensorimotor experiences (embodied). The abstract concept of "importance" could, for example, be represented as analogous to the sensorimotor experience of physical weight or the sensorimotor experience of physical size or closeness to a physical center. The abstract concept of "power" could, for example, be represented as analogous to the sensorimotor experience of physically grabbing and moving objects or the sensorimotor experience of resisting being moved by external forces or simply by the experience of stillness. Because humans represent abstract concepts through sensorimotor experience, we may say that cognition is "embodied". Because humans represent abstract concepts through analogies, we may say that cognition is metaphorical. That humans thus represent abstract concepts through sensorimotor analogies makes it possible to ask whether some analogies are better than others at guiding actions related to the abstract concepts they are used to represent. For example, it is possible to ask whether managers deal better with power when they see power as analogous to the physical capacity to move objects or when they see it as analogous to the physical capacity to resist being moved or when they see it as analogous to the experience of stillness.

That cognition is embodied and metaphorical is important for management education because assuming that a particular abstract concept is analogous to a particular sensorimotor experience is already a theory-in-use, and as such it will guide managers' decision-making, planning, problem-solving, reasoning, and other actions. In short, the sets of actions a manager can imagine when interacting with an abstract phenomenon will correspond to the sets of actions embedded in the sensorimotor experience she uses to represent this phenomenon. For example, if a manager

sees motivation as analogous to pushing objects in a desired direction, then any act of motivating employees (or herself) will be an abstract form of pushing. If, on the other hand, she sees motivation as analogous to the inherent force by which a river runs, then any act of motivating employees (or herself) will be an abstract form of removing rocks that may block the flow of the river. In the following, I will refer to this class of theories-in-use as "sensory templates".

Like any theory-in-use, sensory templates form in our minds through associative and social learning. Like any theory-in-use, sensory templates shape our experience in ways that can reinforce the theory, making it seem self-evident. Like any theory-in-use, sensory templates can make managers efficient by highlighting sets of actions that efficiently address the situations the managers need to deal with, or they can make managers inefficient if they highlight courses of action that are not efficient in the situations the managers need to deal with. Thus, like any theories-in-use, it is useful for managers to become aware of and evaluate the sensory templates they use. In particular, in situations where the ways of acting that seem appropriate and obvious to the manager do not bring satisfactory results. However, unlike other theories-in-use, sensory templates are less burdened by social value judgments. Discovering that one seeks unilateral control may be more disturbing and more at odds with a manager's self-image than discovering that one sees control as analogous to pushing or to some other sensorimotor experience.

In this chapter, I describe the research in cognitive science underpinning the embodied and metaphorical view of cognition. In the following chapter, I show how this knowledge offers a novel approach to solving seemingly unsolvable managerial problems through surfacing and evaluating the class of theories-in-use I have called sensory templates.

3.1 The Development of Cognitive Science

To understand the embodied and metaphorical view of cognition, it is instructive to begin by looking at the history of cognitive science and, in particular, at the symbolic view of cognition, which developed at the

birth of this field of research and which the embodied and metaphorical view challenges.

The modern study of cognition, cognitive science, gained momentum in the 1950s through George Miller's work on short-term memory (Miller 1956), John McCarthy's work on artificial intelligence (McCarthy 1959), and Noam Chomsky's work on generative grammar and his criticism (Chomsky 1959) of Skinner's idea of language as a learned habit (Skinner 1957). Thus, from the outset, this intellectual movement was an interdisciplinary movement including experimental psychology (the kind of experiments described in the previous chapter), artificial intelligence, and linguistics. The term "cognitive science" was coined in 1973 by Christopher Longuet-Higgins. In 1976 the journal *Cognitive Science* began publishing. In 1979, the Cognitive Science Society was founded, and since that year this society has organized a yearly conference where researchers from different fields of study with a common interest in understanding how the mind works meet and exchange research findings. Today, many universities worldwide have established cognitive science departments and offer cognitive science programs.

Cognitive science is concerned with understanding the mind and how it functions. This includes understanding phenomena such as perception, memory, language, attention, reasoning, and emotions. Given the phenomena of interest to cognitive science, it brings together researchers from many areas of study, including philosophy of mind, linguistics, anthropology, neuroscience, artificial intelligence, psychology, and education. This provides cognitive science with a multitude of methods and theoretical lenses through which a given phenomenon of interest can be explored. Ideally, this can lead to a fuller understanding of this phenomenon. For example, a psychologist can test individuals' ability to memorize strings of nonsense syllables to find out what factors enhance or limit this ability. By contrast, a neuroscientist may use imaging techniques to explore which areas of the brain are active when a person is engaged in remembering strings of nonsense syllables. Comparing the results of different experiments can lead to a fuller understanding of the process of memory. In this way, Donald O. Hebb (1949) produced a highly influential theoretical contribution by comparing and linking what at the time was known about associative learning and neurophysiology. Today the discovery of mirror neurons,

that is, neurons that are active both when an individual performs an act and when the individual sees someone else performing this same act, throws new light on social learning. Scientists are still working on unpacking this link.

Cognitive science is unified by its central hypothesis, that cognition can be understood in terms of symbolic representations and processes for manipulating such symbolic representations. Whereas this hypothesis is generally agreed upon, there are debates in the field about the nature of the symbolic representations and the processes used to manipulate these.

The work of Chris Argyris and Donald Schön on theories of action and double-loop learning can be seen as a rigorous application of state-of-the-art theories in cognitive science at the time to the field of management education. Therefore, it is particularly interesting to explore the consequences for managerial education of recent developments in cognitive science about the nature of symbolic representations.

The embodied and the metaphorical view of cognition emerged independently of each other, but have in recent years merged to some extent (Lakoff 2012). In the following, I will describe these two views in turn, followed by a few comments on how they are currently merging.

3.2 The Embodied View of Cognition and How It Differs from the Symbolic View

When modern cognitive science was founded, computers were recently new, and scientists proposed that human cognition worked in much the same way as computers. Thus, it was assumed that human cognition could best be understood in terms of symbolic representations and processes for manipulating such symbolic representations—analogous to the processes used in computers. However, using the computer as guiding metaphor led to two assumptions, both of which have been challenged by the embodied view of cognition.

The first assumption is that the symbolic representations used in cognitive processes are similar to words or (more precisely) to the strings of

ones and zeros used as representational symbols in computers. In particular, they do not share physical properties with the objects they represent. The word "chair" does not share any physical properties with an actual chair. The word does not have four legs and a back, and it is not made of wood or metal and so on. Similarly, any data that comes into a computer is translated (encoded) into strings of ones and zeros. These strings *represent* data such as sounds or images even though they do not share any physical properties with the sounds and images they represent. From the strings of ones and zeros, the computer can reproduce these sounds and images through the process of decoding. The computer can also perform a number of operations on these strings of ones and zeros such as adding them or combining parts of them with each other and so on. Through such processes, the computer can create new strings of ones and zeros that, when decoded, produce altered versions of the original sounds and images. Symbolic representations, which do not share physical properties with the things they represent, are called "amodal symbols". Strictly speaking, words are not always amodal. For example, onomatopoetic words like splash, murmur, thumb, swoosh, or meow do, in fact, mimic the sounds they represent. However, language is largely a system of amodal symbolic representation and the system of symbolic representation used in cognitive processes was assumed to be entirely amodal.

The second assumption is that cognitive processes are largely independent of input and output channels. Once data coming in through various input channels, such as punched cards, keyboards, cameras, and microphones, has been translated into symbolic representations used in the computer, the computer can perform operations on this data without any further reference to the input channels through which the data was collected. Similarly, the operations performed on the data by the computer are also independent of the computer's output channels, such as screens, lights, motors, and speakers. When using the computer metaphor to understand human cognition, this translates into the assumption that cognitive processes operate independently of input channels (sensory organs and sensory centers in the brain) and output channels (muscles and brain centers dedicated to motor functions). Whereas input and output channels are important for connecting humans

with the environment, the cognitive processes can, according to the symbolic view of cognition, be studied without paying attention to sensorimotor functions—at least in principle.

These two assumptions have been challenged by the embodied view of cognition. Empirical evidence shows that cognitive, affective, and bodily processes are interlinked to the point of being inseparable (Barsalou 2008; Johnson 2007; Svensson et al. 2007; Ziemke et al. 2007). In particular, there is evidence that the symbolic representations used in cognitive processes are not separate from the neurological states related to perception and motor action. Thus, there is no clear distinction between the neurons responsible for bodily input-output mechanisms, like perception and motor control, and the neurons responsible for cognitive processes. Based on this evidence, it has been proposed that the symbolic representations used in cognitive processes are partial reactivations in the sensorimotor centers of the brain—mini-experiences of that which the symbols represent, so to speak. Such reactivations in the sensorimotor centers are often referred to as "simulations" (Barsalou 2008, 2010). Thus, the symbolic representations *do* share sensory properties with that which is represented, and the sensorimotor systems play a *central* role in cognitive processes.

Before expanding on what this means for management education, it is instructive to look at some of the research that has led to the formation of this embodied view of cognition. Since the 1990s empirical studies have provided ample evidence for the interlinked and overlapping nature of cognitive, affective, and sensorimotor functions. Furthermore, these studies tell us a lot about the way in which these functions are interlinked. Below, I present a fairly large number of research findings. I do this to give an impression of how substantial the empirical support for the embodied view of cognition is. I also do this to provide a good starting point for practitioners and scholars interested in exploring what these findings imply for management education. In particular, it has been found that emotional states are represented through somatic states, that the meaning of words is represented through activity in sensorimotor neurons, that mental tasks utilize the same neurological circuits that are used for sensorimotor functions, and that concrete and abstract concepts alike are represented through simulations in the sensorimotor centers of the brain.

3.2.1 Affective Concepts Are Represented Through Somatic States

An older strand of research providing evidence for the embodied view of cognition is concerned with the links between affective and somatic states. These experiments show that somatic and affective states are closely linked, and that manipulation of somatic states can influence affective states.

First, research has shown that different affective states generate different bodily states. That affects are visible in our bodies hardly comes as a surprise. For example, most people are able to recognize facial expressions and body postures as indications of a range of pleasant or unpleasant emotions. However, Cacioppo et al. (1986) did a study where they presented 28 individuals with pictures that would evoke either positive or negative emotions of varying strength. Electromyographic (EMG) activity of facial muscles was measured. Through these measurements, the researchers could determine both whether the affective response to the pictures was pleasant or unpleasant and the strength of the affective response—even when the activity of facial muscles was so subtle that it could not be observed visually. The study shows that different bodily states are related to different affective states. However, it does not show whether the bodily states are mere epiphenomena or more fundamental to the experience of positive and negative affects.

However, it has since been shown that just as affective states are visible in the body, bodily states can influence affective states. A famous piece of research showed that assuming power poses (e.g., standing tall with legs spread, hands on hips, and chest up and open) decreased the stress hormone cortisol and generated a sense of power and increased tolerance of risk (Carney et al. 2010). This research has since been criticized due to methodological issues and failure to replicate the results (Credé and Phillips 2017; Ranehill et al. 2015; Garrison et al. 2016). However, other pieces of research show that bodily states do in fact influence our affective states—even when these bodily states are not obviously related to particular affective states. In other words, even if the test subjects do not consciously associate a bodily pose with a particular affective state (as

would be the case with power poses), the bodily pose can still bring forth this affective state. This suggests that the connection between bodily states and affects is deeper than mere conscious association and that bodily states are not epiphenomena of affective states.

Duclos et al. (1989) showed that adopting postures or facial expressions related to sadness, anger, disgust, and fear in non-obvious ways modulated the research participants' experienced affect accordingly. This supports that facial expressions and body postures may indeed be used to represent affective states. Schubert (2004) showed that making a fist influenced how test subjects processed words related to the concept of "power" and the way they estimated possibilities of being in control and of making friendly connections to others in various situations depicted in drawings. This supports that a clenched fist represents affective states related to power in the participants' cognitive processes. Cacioppo et al. (1993) showed that non-Chinese test subjects looking at Chinese ideographs while pushing up/down on a table, and thus activating arm flexion/arm extension muscles, were more/less likely to *like* the ideographs they watched. This experiment supports the hypothesis that the affective state of aversion is represented through the somatic state of arm extension and the affective state of liking through the somatic state of arm flexion. Tom et al. (1991) asked participants to listen to music in headphones while either nodding or shaking their head. They told the participants that the purpose was to test whether the headphones would stay comfortably on the ears while moving the head. After the process, the participants who had been nodding their head were more likely to accept a pen that had been lying in front of them during the process as a gift. This supports that nodding/shaking the head influenced the research participants' affectionate attitude toward the pen. Stepper and Strack (1993) asked participants to hold a pen between their lips or teeth while watching cartoons. These two actions were a way to unobtrusively activate or hinder the smiling reflex. After the process, the participants holding the pen with the teeth (facilitating smiling) judged the cartoons as funnier than the participants holding the pen with their lips (hindering smiling). This supports that the muscles used for smiling are used to represent the affective states of humor.

Proponents of the embodied view of cognition take these research results as support for the claim that affective states and attitudes are represented through somatic states, and that when humans activate specific somatic states, this also activates the affective states and attitudes these somatic states are used to represent. Concepts of "sadness", "anger", "disgust", and "fear" can be represented through activity in the same neurons which are responsible for facial expressions. Concepts of "like" and "dislike" can be represented through activity in the motor centers responsible for arm flexion and arm extension. Concepts of "accepting" and "rejecting" can be represented through somatic states of "nodding" and "shaking the head" (this may well be culture-specific). And the concept of "funny"can be represented through the somatic state of smiling.

3.2.2 Concepts of Actions Are Represented by Neurons Responsible for Performing These Actions

Further evidence of the interlinked and overlapping nature of cognitive, affective, and sensorimotor functions comes from research on the effects of category activation on judgments and behavior. These experiments have shown that if people are exposed to words (or other representations) relating to a particular trait or stereotype in one situation, it influences the way they judge other people (cognition) and makes them more likely to behave in ways consistent with this trait or stereotype (behavior) in an unrelated situation immediately following this activation.

For example, John A. Bargh (Bargh et al. 1996) and his colleagues showed that people who were primed with a rude stereotype would, immediately after this priming, be more likely to interrupt a conversation and would do so faster than people who were primed with a polite stereotype or were not primed with any stereotype. Similarly, they showed that people who were primed with an elderly stereotype would, immediately after this priming, walk slower than people who were not primed in this way. The priming was done by letting test subjects complete a scrambled sentence test. The scrambled sentence test consisted of 30 collections of five words from which it was possible to construct four-word sentences (e.g., he, it,

hides, find, instantly). The research participants were initially told that the test was a language ability test and were asked to complete it as quickly as possible. Some participants were given tests containing 15 words relating to rude behavior (aggressively, bold, rude, bother, disturb, intrude, annoyingly, interrupt, audaciously, brazen, impolitely, infringe, obnoxious, aggravating, and bluntly), while others received tests containing 15 polite words relating to polite behavior (respect, honor, considerate, appreciate, patiently, cordially, yield, polite, cautiously, courteous, graciously, sensitively, discreetly, behaved, and unobtrusively) (Bargh et al. 1996, 234). After completing the test, the research participants were told to go to another room to be given a second test. In this room, they would find the researcher engaged in conversation with what appeared to be another research participant, who did not understand the scrambled word test. It was then measured how long the research participants would wait before they interrupted the conversation and asked to be given the second task. The ones who had completed the test with rude words were more likely to interrupt and would do so faster than the other research participants. In a second experiment, some research participants were given a scrambled word test containing words relating to old age (worried, Florida, old, lonely, gray, selfishly, careful, sentimental, wise, stubborn, courteous, bingo, withdraw, forgetful, retired, wrinkle, rigid, traditional, bitter, obedient, conservative, knits, dependent, ancient, helpless, gullible, cautious, and alone). Other participants were given tests with neutral words. After completing the test, it was measured how long it took the participants to walk the length of a hallway from the room where they had taken the test to the elevator. Participants who had taken the test with words relating to old age walked slower than those who had taken a test with neutral words. In both experiments, participants were given a fake debriefing (before the real debriefing) to test whether the participants believed the cover story that the test had been about language abilities. All participants believed this and were unaware that the tests had contained groups of words relating to particular stereotypes. Bargh and colleagues conclude that "the activation of a trait construct or a stereotype in one context resulted in behavior consistent with it in a subsequent unrelated context" (Bargh et al. 1996, 239). Similarly, Aarts and Dijksterhuis (2002) showed that using scrambled sentence tests to prime research participants with the categories of fast or slow

animals affected the way people judged the walking speed of others and the speed with which they themselves walked.

Proponents of embodied cognition interpret the result of these experiments by stating that words related to specific traits or stereotypes activate simulations in the sensorimotor systems in the brain and that the effects on judgment and behavior are due to these activations. This interpretation is supported by experiments where researchers have used various methods for monitoring neural activity in the brain to show that humans use the same neurons to perform actions themselves *and* to represent the meaning of words referring to such actions.

Friedemann Pulvermüller and his team (Pulvermüller et al. 2001) explored word processing in the brain. Research participants were presented with a sequence of words on a computer screen. Some of these were actual words, and some were nonsense words. Research participants were asked to press a button as quickly as possible whenever they saw actual words on the screen—but not when they saw nonsense words. The participants' brain activity was recorded using high-resolution EEG recordings. The real words used in the experiment fell into three categories. One-third were related to face and mouth activities, for example, moan, bite, blow, sing, suck, kiss, and chew. One-third were related to arm or hand activity, for example, seize, lift, applaud, scratch, steer, grab, and stroke. And the last third were related to leg and foot activity, for example, run away, walk, limp, kick, jump, stand, and stamp. The research showed that the motor cortices in the brain were activated during this task, even though only minimal motor action was required to push the button. What was particularly interesting was that the motor cortices were activated differently by the three categories of words. Words relating to face/mouth, arm/hand, and leg/foot activity activated parts of the motor cortices used to control these different body parts. This experiment indicates that "words are cortically represented by cell assemblies whose topographies reflect the words' lexical meanings" (Pulvermüller et al. 2001, 163). In another experiment, Tettamanti and his team (Tettamanti et al. 2005) had research participants listen passively to a number of recorded sentences while monitoring their brain activity with an fMRI scanner. Thus, in this experiment, no motor action was required from the

participants. The sentences were describing face/mouth, arm/hand, or leg/foot activity. Furthermore, a number of abstract sentences were used as control. This research showed that the sentences describing face/mouth, arm/hand, or leg/foot activity activated brain areas involved in planning and executing actions using the corresponding body parts. Like the previous experiment, this experiment also indicated that language relating to action is represented by activity in the neurons used for carrying out the particular action referred to.

These results further support the embodied view of cognition insofar as they show that humans use the same neurons to plan and execute actions and to understand words referring to such action. Finally, the claim that concepts of actions are represented through activity in the neurons responsible for carrying out action is corroborated by the discovery of mirror neurons.

In the 1990s, a group of researchers in Palma, Italy, discovered the so-called mirror neurons while studying the premotor cortex in monkeys (Rizzolatti et al. 1996). They were interested in studying the monkeys' coordination of hand to mouth movements. They were doing so by inserting highly sensitive sensors into the brain of the monkeys which were capable of detecting when a single neuron was firing. These sensors were linked to a computer—and to a speaker. This allowed the researchers to hear every time specific neurons used to coordinate hand to mouth movements were firing. One day, during a break, one of the researchers came into the lab eating an ice cream. He suddenly heard the sound that meant that the monkey's neurons were firing, but when he looked at the monkey it was watching him without moving itself. This showed that there are neurons in the monkey's brain which fire both when the monkey performs a hand to mouth coordination task *and* when it sees other monkeys, or in this case the researchers, perform such tasks. The researchers named these neurons "mirror neurons". Similar mirror neurons have since been found in humans.

The discovery of mirror neurons provides further evidence for the embodied view of cognition, in that the very definition of these neurons is that they are used both for performing actions and for representing these actions during the cognitive process of recognizing when others engage in these actions (Rizzolatti et al. 1996).

3.2.3 Mental Tasks Utilize Same Neurological Circuits That Are Used for Sensorimotor Actions

The embodied view of cognition emerged as a way of interpreting the kind of research results mentioned above. A typical procedure for testing the merit of new scientific theories is to derive predictions from these theories which differ from what older theories would predict, and to test these predictions experimentally. One prediction that can be derived from the embodied view that differs from what the symbolic view predicts relates to reaction times when humans are asked to simultaneously carry out a sensorimotor task and a cognitive task. If humans use the *same* neurological circuits for both sensorimotor tasks and cognitive tasks, as suggested by the embodied view of cognition, then asking them to simultaneously perform a sensorimotor task and a cognitive task where these circuits would have to be used in incongruent ways should result in increased processing time. If, on the other hand, humans use different neurological circuits for sensorimotor and cognitive tasks, as suggested by the symbolic view of cognition, it should not have any influence on reaction times, whether the sensorimotor task and the cognitive task relate to congruent or incongruent sensory experiences. The result of such research has, so far, confirmed the prediction made by the embodied view of cognition.

Chen and Bargh (1999) asked their research participants to classify words as either good or bad as fast as they could. The participants were divided into two groups. One group was asked to indicate their classifications by pulling a lever toward them when they thought a word was good and pushing it when they thought a word was bad. The other group was instructed to use the lever in the opposite manner (pull for bad and push for good). The second group was significantly slower in reaction time than the first. This result indicates that humans use the same neurological systems for the cognitive task of judging something as good/bad and for the motor task of pulling/pushing a lever. Thus, the two tasks can be performed faster when they use the neurological systems in congruent ways (e.g., pulling something toward oneself and judging it is good), and slower when used in incongruent ways (e.g., pulling something toward oneself and judging it as bad).

Glenberg and Kaschak (2002) gave their research participants a box with three buttons. Pressing the middle button would make a sentence appear on a screen. The participants were asked to determine as quickly as possible whether sentences made sense. The "yes" button was placed further away from the participant's body than the middle button and the "no" button closer. Halfway through the experiment, this was reversed. There were 160 sentences in total, half of which were intended to make sense and half not to make sense. The sentences that made sense either indicated a direction toward or away from the body. For example, "close the drawer" indicated a movement away from the body, whereas "open the drawer" indicated a movement toward the body. The research showed that participants reacted more slowly when the direction implied in a sentence that made sense was opposite to the direction of the "yes" button. This confirms the prediction of embodied cognition: If the cognitive task of understanding a sentence draws on the same neurological circuits involved in motor action, then understanding a sentence involving a movement should interfere with carrying out a movement incongruent with that indicated by the sentence.

The sentences used in the experiment included imperative (open the drawer), concrete transfers between people ("Courtney handed you the notebook/you handed Courtney the notebook"), and abstract forms of transfer ("Liz told you the story/you told Liz the story") (Glenberg and Kaschak 2002, 560). That the effect could be seen for the abstract sentences rules out the possibility that the observed delay in response time is due to action sentences activating the motor system *after* they are understood, rather than as part of the process of understanding the sentence.

3.2.4 Simulations Representing Concrete and Abstract Concepts

The above experiments deal mainly with more concrete phenomena, for example, graspable household objects, concrete affects, and concrete actions carried out with face, mouth, arm, hand, leg, or feet. It may not be too difficult to accept that humans use sensorimotor activations (simulations) to represent such concrete phenomena in their cognitive

processes. For example, it is easy to imagine that the concept of "chair" could be represented through mini-activations of the sensations of sitting in a chair, looking at a chair, lifting a chair, and so on. Similarly, it is easy to imagine that the concept of "running" could be represented through mini-activations of the sensations of how the muscles work in our legs or the rhythmical sensation of feet hitting the ground while running or the visual impressions related to watching others run.

However, many of the concepts that are core to managerial work are abstract. For example, "management", "equality", "power", "vision", "value", "mission", "ethics", "control", "motivation", "collaboration", "competition", "negotiation", "communication", "visibility in leadership", "innovation", and "inclusion" (we may distinguish between concrete and abstract concepts in that concrete concepts refer to phenomena that are confined to limited regions of physical space and time, whereas abstract concepts refer to phenomena that are not confined to limited regions of space and time). For abstract concepts, it is less obvious which sensorimotor activations individuals would use as means of representation. Furthermore, different people may well use different sensorimotor activations to represent the same abstract concept. To understand the implications of the embodied view of cognition for managerial education, we need practical ways of knowing and working with the sensorimotor activations managers use to represent abstract concepts.

For this purpose, we now turn to the metaphorical view of cognition as it is presented in Cognitive Metaphor Theory. In short, this theory holds that humans understand more abstract concepts in terms of more concrete concepts and that peoples' language can reveal which concrete concept they use to understand a specific abstract concept (in Chap. 5, we will see that gestures and in particular creation of various forms of art objects can also shed light on what concrete experiences individuals use to represent abstract concepts). Merging the metaphorical view with the embodied view will thus suggest that abstract concepts can be represented through sensorimotor activations similar to those used to represent the concrete concepts in which the abstract concepts are grounded. For example, the abstract concept of "understanding" can be understood in terms of the more concrete concept of "physically grasping an object". Therefore, the abstract concept of "understanding" may well be

represented through activity in the neurons responsible for executing the physical act of grasping objects. Let's look at this in more detail.

3.3 The Metaphorical View of Cognition

Cognitive Metaphor Theory got its modern expression in 1980 when George Lakoff and Mark Johnson published their book *Metaphors We Live By*. The central argument in this book is that our cognition is largely metaphorical in nature. In short, they proposed that individuals use structure from their experience in one domain to establish their understanding of another domain. Lakoff and Johnson found support for this proposition in the analysis of so-called dead metaphors found in all natural languages.

A metaphor can be defined as the use of one domain of experience, called the source domain, to describe another domain of experience, called the target domain. One can find many original and inspiring metaphors in literature, some of which have become famous, like Shakespeare's "All the world's a stage, and all the men and women merely players: They have their exits and their entrances; and one man in his time plays many parts, his acts being seven ages" (*As You Like It*, Act 2, Scene 7). Here Shakespeare describes the life and the world (the target domain) in terms of theater (the source domain).

Our everyday language contains many metaphorical expressions. However, these expressions are used so frequently that most people no longer think about them as metaphors. Whenever you speak about "love" as a "journey" or a "fire" or a "battlefield", you are using a metaphor, since you are describing the target domain "love" by using the source domains of "journey", "fire", or "battlefield". The metaphorical expressions found in everyday language are called dead metaphors. One can say that the words from the source domain in dead metaphors through repeated use acquire new literal meaning relating to the target domain. For example, when someone says they "shot down someone else's argument", we understand that they provided a very good counterargument which forced their interlocutor to give up or thoroughly revise his initial position. We understand that there was no actual "shooting" involved. The word "shot" has

simply expanded its meaning through the metaphorical use. Similarly, a manager may after a presentation exclaim that the presenter "nailed it". Again, we understand that there were (probably) no actual hammers and nails involved in the presentation. Rather to "nail it" in this context means that the presentation was persuasive and to the point. We probably do not think of this expression as a metaphor. The word "nailed" has simply expanded its meaning through metaphorical use.

The main insight presented by Lakoff and Johnson in *Metaphors We Live By* is that it is possible to find groups of dead metaphors which all draw on the same source domain to describe the same target domain. Lakoff and Johnson take this as evidence that dead metaphors are not merely a matter of adornments or making the language we use more colorful. Rather, it is a sign that human cognition is fundamentally metaphorical in nature. It is a sign that we use our understanding and experience in one domain to *generate* a structure we can use to understand another domain. Lakoff and Johnson therefore propose the existence of what they call "cognitive metaphors". Cognitive metaphors are the systematic use of experience from one domain to understand and engage with another domain.

One example of a cognitive metaphor is seeing argumentation as a form of warfare. When we speak about argumentation, we use many metaphorical expressions which include words from the domain of warfare. We can say things like "he *shot down* my argument", "she *defended* her position", "he *won/lost* the argument", "she delivered severe *attacks* on the argument", "the *opponents* of this argument contend that …", and "her criticism was right on *target*". Shooting down, defending, winning, losing, attacking, opponents, and being on target are all words borrowed from the domain of warfare (or other kinds of fighting). Lakoff and Johnson argue that the fact that we use so many expressions which include words from the domain of warfare when speaking about argumentation is evidence that we not only *speak* but also *think* about argumentation as an abstract form of warfare. Another example of a cognitive metaphor is "life is a journey". When speaking about life, one can say that "he has no *direction* in life", "she is at a *crossroads* in her life", "don't let anyone *get in the way* of how you live your life", and "she's *gone through* a lot in life".

The words "direction", "crossroads", "get in the way", and "gone through" all refer to journeys (or more basically, to the act of moving from one place to another). A third example is the cognitive metaphor "theories are buildings". When speaking about theories, one may say "this theory has a *solid foundation*", "her theory was *building* on an older theory", or "he has *constructed* a theory based on the empirical evidence". Here "foundation", "building", and "constructed" are words borrowed from the domain of buildings.

Since 1980, Cognitive Metaphor Theory has been developed by a number of scholars. In the following three sections, I will first show how cognitive metaphors can be seen as a type of theories-in-use, second, show how cognitive metaphors can help solve the problem of what simulations abstract concepts are grounded in, and third, as usual, describe some of the empirical research done to test Cognitive Metaphor Theory.

3.3.1 Cognitive Metaphors and Theories-in-Use

Cognitive metaphors can be seen as a way of describing the cognitive structure underpinning theories-in-use. Thus, changing theories-in-use would be a matter of changing cognitive metaphors. That cognitive metaphors are, in fact, the cognitive structure underpinning theories-in-use is supported by two observations. First, cognitive metaphors operate in the same way as theories-in-use. Second, Argyris and Schön's descriptions of the model I and model II theories-in-use can be derived from two competing cognitive metaphors for management inquiry. Similarly, one can show that different approaches to managing organizations can be categorized according to which cognitive metaphor they build upon.

If we compare how cognitive metaphors and theories-in-use operate, we see that they function in the much same way. Like theories-in-use, cognitive metaphors offer the individual a range of possible interactions with a phenomenon and a way of looking at this phenomenon which supports these actions. Like theories-in-use, cognitive metaphors support specific ways of interacting with the environment by selecting which aspects of the environment and ourselves we pay attention to and how we interpret these aspects. In doing so, cognitive metaphors, like theories-in-use, also

hide aspects of the environment that are not important to be aware of during these interactions. Because cognitive metaphors modulate our perception of the environment, they can, like theories-in-use, be self-confirming and self-concealing.

For example, when a manager discusses organizational strategies with her colleagues she may see this as a form of warfare. This cognitive metaphor will support the manager in actions aimed at *winning* such discussions, since "winning" is a type of action afforded by this cognitive metaphor. Furthermore, the means of winning in war include deception, threats, and overt violence. Thus, the manager using this cognitive metaphor is likely to use any strategy necessary to secure victory including deception, providing false information, and various forms of violence from sarcasm, personal slander, intimidation, or lying to criminal activity. The metaphor will support the actions aimed at winning by highlighting relevant aspects of the manager's experience, like competitiveness and possibilities for immediate personal gain/loss, and by providing interpretations of various events that support the actions aimed at winning, such as seeing the event of having to change one's view due to good arguments from another as defeat. By selecting which aspects of experience the individual will pay attention to, and by offering interpretations of these events, the cognitive metaphor will also hide other aspects of experience and other possible interpretations, such as the collaborative aspects of discussing organizational strategies. If, on the other hand, a manager sees discussion of organizational strategies as a form of collaborative inquiry, rather than war, he will use a different set of actions, since the situation is no longer about winning or losing. Instead, the discussion is a matter of two (or more) people assisting each other in producing valid information. This manager will have no problem with having to change his position, since he will not perceive the event as a form of defeat, but instead as a welcomed move toward valid information. Perceiving the event of having to leave one's position as a defeat comes out of using the war metaphor—not from the situation itself. Thus, different cognitive metaphors make different courses of action seem like the right thing to do. Different cognitive metaphors highlight and hide different aspects of experience. And different cognitive metaphors provide interpretations of events which are in accordance with the metaphor itself.

The above example shows how Argyris and Schön's model I and model II can be seen as descriptions of two different cognitive metaphors through which managers can understand the target domain of discussing organizational strategies. Managers operating from model I emphasize winning and not losing, protecting self and associates, gaining unilateral control of environment and tasks, and so on. Such beliefs can be seen as emerging from the cognitive metaphor: managerial work is war. Managers operating from model II emphasize valid information, shared control, surfacing and testing different views, and so on. Such beliefs can be seen as pointing to the cognitive metaphor: managerial work is collaboration.

Thus, to change one's mode of operating from model I to model II can be seen as a matter of changing the conceptual metaphor through which one perceives managerial work.

One of the best-known explorations of cognitive metaphors underpinning approaches to management is found in the book *Images of Organizations* by Gareth Morgan (2006). In this book, Morgan explores how theories of organizations used to guide the actions of practitioners can be categorized according to which cognitive metaphor they build upon. Morgan explores eight cognitive metaphors underlying a broad range of organizational theories. In the following, I will briefly go through the first four of these. I do so to further illustrate how cognitive metaphors underpin theories of action, how they highlight and hide aspects of reality, and how there are situations in which any of these cognitive metaphors can lead managers to act in ways that are detrimental to their organization, that is, where the cognitive metaphor may appear to be good guidance for action but in fact is the opposite.

Organizations are machines: Possibly one of the most common conceptual metaphors is to think about organizations in terms of a machine. During the industrial revolution, engineers had constructed machines which impressed the world and opened new possibilities. In this context, it is not surprising that some of the first organizational theorists like Fredrick Winslow Taylor and Henri Fayol, both engineers, used their experience with engineering and constructing machines to understand how to construct efficient organizations. Engineers construct machines by defining what the machines should be able to do, breaking the overall

task into its constituent components, creating blueprints for the most efficient way of carrying out these tasks, designing good components able to carry out each separate task, and implementing monitoring systems. Thus, seeing organizations as machines highlights the task of defining goals and objectives, division of labor, planning efficient workflows, training workers to carry out each of their highly specialized tasks, and implementing systems to control performance. This approach to organizing is epitomized in the assembly line. The advantage of using this metaphor is that it allows managers to achieve speed, efficiency, regularity, precision, and predictability. Increasing production efficiency helped workers whose wages were linked to how much they produce, and it helped to lower the prices of goods, making them available to more people and raising the general standard of living.

However, seeing organizations as machines also hides aspects which in some contexts are extremely important for managers to be aware of. First, when using this metaphor, managers risk relating to humans as if they were mere components of a machine. This leads to dehumanization where employees' value is reduced to their ability to perform a highly specified task with speed and precision. It leads to unquestioning rule following, which in the worst case results in putting rules over common and/or ethical sense. It erodes the creativity of employees and can lead managers to ignore innovation arising from the lower levels in the organizational hierarchy. This makes organizations rigid and unable to adapt to change. Thus, thinking about organizations as machines can lead to dissatisfaction among employees and to losing the best employees who are able to find work elsewhere. Thinking about organizations as machines can also lead managers to ignore danger signs that are picked up by the employees "on the floor" who are often more likely to pick up changes in the environment.

Organizations are organisms: Another common conceptual metaphor is thinking about organizations in terms of living organisms. Using the organism metaphor highlights that organizations are open systems and thus that success and survival come from adapting well to the organization's external and internal environment, that is, to cultural peculiarities, customers' needs and preferences, technological

and market conditions, and employees' needs and preferences. Adapting to the organization's internal environment means fulfilling the needs of both the organization *and* the individuals working in the organization. The Hawthorne Studies conducted by Elton Mayo and Fritz Roethlisberger in the 1920s showed that monetary incentives meant less for improving productivity than did the employees' sense of belonging to a group and having the possibility to influence decision-making processes. In 1943 Abraham Maslow published his famous paper "A Theory of Human Motivation" in which he proposed a hierarchy of human needs which motivate individuals. These needs included physiological needs and the need for safety plus the needs for love/belonging, esteem, and self-actualization or personal growth. Integrating such human needs with the technical and business needs of an organization stands out as one of the core adaptation tasks of the organizational organism when managers think about organizations as organisms.

Using the organism metaphor makes it natural for managers to give employees autonomy, responsibility, recognition, and opportunities to use their creativity. It makes it natural to create more democratic organizations and to focus on finding good fits between organizational and individual needs. When the organization meets a fuller range of the employees' needs, and not only their economical need, absenteeism and turnover rates fall. This in turn supports the organization in reaching its goals. It renders the idea of "one best way of doing the job" (which makes sense from the organizations as machines perspective) nonsensical since the best way to work depends on the environment, which may change. Thus, using the organization as organism metaphor makes it natural for managers to operate in ways which are contrary to the ways of operating that appear natural when using the organizations as machines metaphor.

Using the organization as organism metaphor, like any metaphor, also blinds managers in specific ways. Focusing too much on ensuring survival through adaptation to the environment may blind managers to the way in which their efforts to adapt are shaping both their external and internal environments. For example, a manager of a dance school may choose a strategy of discouraging their students from going to social events

organized by other dance schools in an attempt at securing a vital resource (students) for themselves. The manager may be unaware of how this choice is harmful to the social dance scene in the city in a way which makes fewer people interested in social dancing, thus *creating* the very shortage of students the manager thought she was merely responding to. The organism metaphor can lead to ideology, reproduction of social conditions which are challenging to the organization, and self-fulfilling prophecies.

Organizations are brains: A third conceptual metaphor is thinking about organizations as brains with the ability to reflect and learn. Using this metaphor highlights how successful organizations are able to process information efficiently in ways that allow organizations to discover changes in the environment and to adjust their organizational strategy accordingly. It highlights organizations' ability to innovate, to be flexible, and to reinvent themselves. What we know about how the brain works offers guidelines for how to design and manage organizations.

Using this metaphor, managers are encouraged to design organizational processes which systematically encourage reflection and learning. It makes it natural to encourage employees to make mistakes since we learn as much, or even more, from finding out what doesn't work as we do from doing what works. It makes it natural to design organizations consisting of self-organizing teams since this allows new products, services, workflows, and the like to emerge. Managers can manage by setting clear overall directions and leaving it to self-organizing teams to find out how they can best move in that direction. Managers will take a facilitating role and work to enable employees to follow the path they choose. Managers could, for example, focus on using information technology to make information available to employees. Like the organizations as organisms metaphor, the organizations as brains metaphor makes it natural for managers to operate in ways which are very different from the planning and controlling encouraged by the organizations as machines metaphor.

However, the organizations as brains metaphor can give managers overconfidence in learning and blind them to the way assumptions and beliefs resist change. As we explored in Chap. 2, learning may happen while assumptions which make people act in ways that are detrimental to the organization remain untouched by reflection. Similarly, seeing organizations as brains may blind managers to the real conflicts between

self-organizing and learning on the one hand and power and control on the other. Some measure of centralized power and control seems necessary to preserve the coherence of the organization and secure its success.

Organizations are cultures: A fourth conceptual metaphor for organizations is the organization as a mini-society, complete with its own particular culture consisting of beliefs, rituals, norms, customs, dominant ideologies, subcultures with conflicting ideologies, values, and so on. Some organizational cultures may be more focused on individuality and competition (e.g., stereotypical American culture), while others may be more focused on service and collaboration (e.g., stereotypical Japanese culture). Some cultures may be more uniform and others more diverse. Some may be more focused on goal-driven rationality, while others are more focused on networks, community building, and creation of webs of inclusion. This metaphor highlights how all employees are actively participating in enacting the shared meaning and the social reality they live in through their everyday routines. Routines, rituals, workflows, architecture, artifacts, and so on are used to reify shared meaning. And this shared meaning in turn supports the naturalness of such routines, rituals, workflows, architectural arrangements, and use of particular artifacts. The organizations as cultures metaphor shows how managers' success hinges on their ability to influence the processes through which shared meaning is created.

When thinking about and acting from this metaphor, it becomes natural for managers to manage by influencing culture and shared meaning in ways which mobilize individuals to achieve the organizational objectives. Thus, managers will work with rituals, language, interior design, architecture, workflows, and so on to influence the process through which the social world is constructed. With the machine metaphor, workflows and interior designs of the organization were evaluated for their efficiency in terms of fast and reliable production of goods. With the organism metaphor this was still the case, but with the addition that to achieve fast and reliable production of goods, one had to fulfill the higher needs of employees. With the brain metaphor, workflows and organizational designs had to support reflection and learning and be open to change when change was needed. With the culture metaphor, managers may implement workflows

and interior designs which are neither the most efficient nor the best at supporting learning, if such workflows and interior designs are thought to influence the shared meaning in ways which mobilize employees to pursue the organizational objectives.

The drawback of the culture metaphor is that it can make culture appear more manageable than it really is. It is very difficult to predict how a group of individuals will make sense of managerial initiatives. The culture metaphor may also blind managers to managerial practices turning into ideological manipulation and control. Managers may attempt to manipulate and control the culture with the best intentions, but the mere fact that they think they can stand outside the culture and shape it to their liking may create a manipulating and politicizing culture which may end up undermining the coherence of the organizational culture the manager wished to achieve.

These four examples show that (1) different cognitive metaphors afford different sets of actions through which managers can manage the organization; (2) different cognitive metaphors make managers aware of different aspects of their experience and give these aspects different interpretations; (3) due to this manipulation of the manager's awareness of the organizational environment, the sets of action provided by the metaphor appear natural and reasonable; and (4) each metaphor blinds managers to important aspects of organizational reality, potentially leading them to inadvertently act in ways detrimental to the organization. This is true for the way managers think and act not just in relation to organizations in general, but also in relation to individual challenges they encounter in their work as managers. It is particularly important to note that different metaphors enable and support different sets of actions while hiding others. *Thus, when managers find themselves in situations they cannot solve, it may well be because they understand the situations through cognitive metaphors which hide the kinds of actions which would be efficient in dealing with the situation.* Just like a manager operating from model I will find it close to impossible to engage in double-loop learning, so managers may sometimes find it impossible to solve a particular problem because they are unknowingly operating from a cognitive metaphor which does not provide good guidance in the given situation. We will return to this in Chap. 4.

3.3.2 Primary Cognitive Metaphors: Merging the Embodied and Metaphorical Views of Cognition

The link between the embodied and the metaphorical view of cognition can be arrived at by considering the following: If we use our understanding of one domain of experience as a source to generate understanding of another target domain, then how did we generate understanding of the source domain in the first place? If we understand "organizations" by drawing on our understanding of "machines", "organisms", "brains", or "cultures", then how did we develop our understanding of machines, organisms, brains, or cultures in the first place? Cognitive Metaphor Theory would suggest that we generated our understanding of these four domains by seeing them in terms of yet another domain of experience. However, this leads to the question of where this chain of cognitive metaphors ends. Is there a domain of experience that is the ultimate ground which is expanded metaphorically to all other domains of experience?

In *Metaphors We Live By*, Lakoff and Johnson give some consideration to this question. They suggest that the first domain of experience is our sensorimotor experience of being a body in a three-dimensional space. Having the bodies we do, Lakoff and Johnson argue that we naturally have experiential dimensions, such as front side vs. backside, up vs. down, and center vs. periphery, and that these fundamental experiential dimensions are what we ultimately use to ground our understanding of all other domains. One could add that we have experiential dimensions of being able to grasp things or push them away; of being able to see things, hear things, or sense things; of supporting weight or having our own weight supported; of standing or falling; and so on.

The idea that our understanding of more abstract concepts is ultimately grounded in basic sensorimotor experiences inherent in human experience has since been elaborated in the work on primary metaphors—a concept introduced by Joseph Grady (1997). Primary metaphors are a kind of cognitive metaphor where the source domains are aspects of basic sensorimotor experiences that all humans have. Primary metaphors are, with a few exceptions, characterized by existing universally across cultures

and languages. For example, in English, describing one's relationship with another person as "cold" or "warm" indicates that the relationship is hostile or friendly, respectively. However, this is not unique to the English language. This very same metaphorical use of "cold" and "warm" to describe relationships between people is found across languages and cultures worldwide. This remarkable fact led Grady to suggest that primary metaphors are universal because they reflect universal correlations in human experience. For example, when a parent is friendly toward a child, they are more likely to hold them close. In this situation, the child will feel the parent's body heat. Inversely, when a parent is hostile to a child, they are more likely to keep the child at a distance. In this situation, the child will feel colder than when he is held close. Repeated experiences of the correlation between friendliness/hostility and warmth/cold are, according to Grady, the origin of the primary cognitive metaphor: Affection is warmth. The same situation can also be used to explain the primary cognitive metaphor where friendliness/hostility is represented through distance: Friendly is close, hostile is distant. Other examples of primary cognitive metaphors include:

- Affection is warmth (He gave her a cold shoulder. She gave him a warm smile)
- More is up (Prices are rising)
- Knowing is seeing (You see what I mean? I can't see your point)
- Understanding is grasping (This idea is difficult to grasp)
- Causes are physical forces (She pushed the board to approve the project. He was driven by his ambition)
- Happy is up (She's feeling down today. A party will cheer him up)
- Difficulties are burdens (My problem is weighing me down)
- Purpose is movement toward a destination (He quickly arrived at his goal. She chose a difficult path for the organization)

Ample linguistic evidence has been found supporting the claim that primary metaphors are, in fact, fundamental human cognitive structures. Whereas more complex metaphors, such as "organizations are machines" or "argumentation is war", can vary from individual to individual and

from culture to culture, primary metaphors are remarkably similar across cultures and languages.

3.3.3 Empirical Evidence for the Existence of Primary Cognitive Metaphors

Above we saw how activation of specific muscles would influence individuals' experienced affects. As mentioned, proponents of embodied cognition take this as evidence that the cognitive processes relating to affects, judgments, and social attitudes use the same neurons for symbolic representations and for executing motor activity in these muscles. For example, the neurons responsible for pushing things away by stretching the arm are used to represent the concept of "aversion", the neurons responsible for bringing things closer through arm flexion are used to represent the concept of "liking", the neurons responsible for various facial expressions are used to represent concepts of "sadness", "anger", "disgust", "fear", and "funny". We also saw that concepts of various forms of motor actions are likely to be represented by activity in the neurons responsible for executing these motor actions. For example, individuals use the neurons responsible for executing motor action to process words representing such motor actions, and mirror neurons are used both for executing motor actions and when observing someone else performing these motor actions. Finally, we saw that words representing concepts of stereotypes such as "fast", "slow", "old", "rude", and "polite" affected somatic and social behavior in subsequent situations. This suggests that these concepts of stereotypes are, at least in part, represented through somatic states.

Since all of the above concepts are, at least to some degree, directly related to somatic states, it is easy to guess which somatic states may represent these concepts and to design experiments to test this. However, the discovery of primary metaphors makes it possible to design experiments that can test whether abstract concepts with less obvious links to somatic states are also represented through somatic states as claimed by embodied cognition. Joshua M. Ackerman, Christopher C. Nocera, and John A. Bargh have carried out a series of experiments testing such predictions (Ackerman et al. 2010).

Cognitive Metaphor Theory predicts that concepts of "seriousness" and "importance" are represented through weight. This is visible in expressions such as "*heavy* thoughts", "he provided *heavy* arguments for his case", and "the book deals with *heavy* issues". In one experiment, 54 random people were asked to evaluate a job candidate by reading his resume on either a heavy or a light clipboard. Those who read the resume on a heavy clipboard judged the candidate to be overall more qualified and more seriously interested in the position than those reading the resume on a light clipboard. They also rated their own accuracy as more important than did the participants with the light clipboard. These results support the claim that humans use the sensation of heaviness to represent concepts of "seriousness" and "importance".

Cognitive Metaphor Theory predicts that the concepts of "difficulty" and "harshness" are represented through sensory experiences of rough or coarse textures. This is visible in expressions such as "speaking *coarsely*" and "going through a *rough* year". In another study, 64 random people were asked to complete a five-piece puzzle. Some were given puzzle pieces covered with sandpaper, while others were given normal smooth pieces. Afterwards, the participants were asked to read a story about an ambiguously valenced social interaction. The subjects who had assembled the sandpaper puzzle rated the situation as more rough and difficult than the others. This result supports the claim that humans use the sensation of rough or coarse textures to represent the concepts of "difficult" and "harsh" social interactions.

Lastly, Cognitive Metaphor Theory predicts that concepts of "stability", "rigidity", and "strictness" are represented through sensory experiences of physical hardness. This is visible in expressions, such as "she is the pillar of the organization", "she is hard as a rock", and "unbending will". In a third study, 86 participants were asked to sit in either a hard, wooden chair or a soft, cushioned chair. They were then asked to complete an impression formation task (rating the personality of a person in a story) and a negotiation task (putting in two bids for buying a car imagining that their first bid was rejected). In the impression formation task, people sitting in the hard chair judged the person in the story as more stable and less emotional. In the negotiation task, people sitting in the hard chair changed their bids less when their first bid

was rejected. These results support the claim that concepts of "stability", "rigidity", and "strictness" are in fact represented through sensory experiences of physical hardness.

Ackerman et al. conclude that "Basic tactile sensations are thus shown to influence higher social cognitive processing in dimension-specific and metaphor-specific ways" (Ackerman et al. 2010, 1712).

3.3.4 Sensory Templates and a New Approach to Double-Loop Learning

In this chapter, we have seen that human cognition is embodied and metaphorical. Abstract concepts are represented through somatic states to which they are metaphorically linked. We have also seen how we can get a sense of which sensorimotor experiences individuals use to represent abstract concepts by listening to how they speak about these abstract concepts. Together this provides us with a new approach to double-loop learning which bypasses many of the problems often encountered when attempting to engage in double-loop learning.

In Chap. 2, we saw four obstacles to double-loop learning. Argyris and Schön state that one of the main obstacles to double-loop learning is managers' wish to avoid threats and embarrassment. Through a discussion of various learning theories, I added that theories-in-use are formed largely through unconscious, automatic, and unintentional processing of experience, that theories-in-use are self-fulfilling and self-reinforcing, and that humans seek to create coherence between their beliefs and actions through rationalizations.

That theories-in-use are unconscious and self-reinforcing may obscure them, but it does not prevent us from detecting them. It simply necessitates that we follow Argyris and Schön's proposal and deduce these theories-in-use from analyzing managers' concrete behavior. The more severe problem arises when a manager rejects or rationalizes away what the analysis of his behavior shows about his theories-in-use because it is incongruent with his self-concept.

However, this resistance is not simply due to managers not having learned to operate from model II, as Argyris and Schön suggest. It is

also created by the approach to double-loop learning they suggest. In particular, it arises from the language they use to describe theories-in-use. When Argyris and Schön speak about theories-in-use, they use descriptors which are laden with social judgment. Such descriptors will often activate resistance, simply because nobody likes to be attributed negative qualities, such as defensive, controlling, and manipulative. If accepting such negatively laden self-concepts is a prerequisite to engage in double-loop learning, not many managers will be truly interested. And for good reasons—not merely out of vanity. The problem is not that these descriptions are altogether wrong. In many cases managers' actions can be rightly described as defensive, controlling, and manipulative. The problem is that these descriptions are both value-laden and reductionist. They are value-laden insofar as defensive, controlling, and manipulative are understood as negative personality traits. They are reductionist insofar as they hide the deeper motivations behind the managers' actions and insofar as they imply they are more real descriptions of the managers because they are descriptions of how the manager acts rather than how he believes he acts (and would like to act). For example, a manager may state that she values flexibility (her espoused theory), while her actions show that she is rigid and controlling (her theory-in-use). It is problematic to state that theories-in-use somehow show the true person and that the manager is therefore wrong when she says she values flexibility. Even though her concrete behavior shows that she acts in ways that are rigid and controlling, it may still be completely true that she values flexibility and strives to be flexible. It is therefore more appropriate to state that *both* theories-in-use and espoused theories show something true about the manager.

Cognitive Metaphor Theory offers a different way of exploring and speaking about theories-in-use which sidesteps the value-laden and reductionist discourse embedded in the concepts of model I vs. model II. From the viewpoint of Cognitive Metaphor Theory, we can explore and describe our theories-in-use in terms of which sensorimotor experiences a manager uses to represent various organizational phenomena. If we keep our exploration of theories-in-use at the fundamental level of what sensorimotor experiences managers use to represent various organizational phenomena and what sort of interactions these ways of representing

organizational phenomena support, then we engage in double-loop learning without getting entangled in and blocked by issues around social value judgments and having to see espoused theories as false. Espousing theories will simply be yet another type of action which are borne out of the specific cognitive metaphors managers use to represent the situation in which they are interviewed about their theories of action.

The main purpose of my doctoral research project, in which 60 managers participated, was to test the hypothesis that double-loop learning can be facilitated by making managers aware of which sensorimotor experiences they use to represent problematic situations and assisting them in trying out alternatives.

In the following chapter, I relate a number of stories from the research which illustrate this process.

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