

The Notion of Embodied Knowledge and its Range

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ABSTRACT

This article discusses the notion of embodied knowledge, which is derived from the phenomenology of Maurice Merleau-Ponty. Embodied knowledge is a type of knowledge in which the body knows how to act, such as how to ride a bicycle. One of the important features of this knowledge is that the lived body is the knowing subject, whereas in the Cartesian/modern view of knowledge, the mind is conceived of as such. By revisiting the Merleau-Pontian notion of the body schema, I give an account of embodied knowledge. The body schema tacitly coordinates the movements of body parts into a unified action that corresponds to a given situation. It is experienced as a prereflective correspondence between body and world, without being mediated by mental representations. This theoretical foundation leads us to a further exploration of embodied knowledge in three directions: 1) skill acquisition, 2) sense of space and place, 3) social understanding.

Keywords: Embodied Knowledge – Lived Body – Prereflective – Body Schema – Merleau-Ponty

La nozione di embodied knowledge e la sua portata

Questo articolo discute la nozione di embodied knowledge, così come derivata dalla fenomenologia di Maurice Merleau-Ponty. Embodied knowledge è un tipo di conoscenza in cui il corpo “sa” come agire, come nell’esempio dell’andare in bicicletta. Una delle caratteristiche importanti di questo tipo di conoscenza è che il corpo vissuto è considerato il soggetto conoscente, mentre nella visione moderna e cartesiana della conoscenza, è la mente ad essere concepita come tale. Rivisitando il concetto Merleau-Pontiano di schema corporeo, io offro una specifica definizione di embodied knowledge. Lo schema corporeo tacitamente coordina i movimenti delle parti del corpo in un’azione unitaria che corrisponde ad una determinata situazione. Va concepito come una corrispondenza preriflessiva tra corpo e mondo, senza la mediazione delle rappresentazioni mentali. Questo fondamento teorico ci conduce ad un approfondimento

dell'embodied knowledge in tre direzioni: 1) acquisizione di abilità, 2) senso dello spazio e del luogo, 3) comprensione sociale.

Parole chiave: *Embodied knowledge – Corpo vissuto – Preriflessivo – Schema corporeo – Merleau-Ponty*

Knowledge Belonging to the Body

Embodied knowledge is a type of knowledge in which the *body* knows how to act. A simple and general example is riding a bicycle. Most of us know how to ride a bicycle, and we can do so without any deliberation. There is no need to verbalize or represent in the mind all the procedures required. The knowledge of how to ride a bicycle seems to be imprinted in one's body and just lived through it, without being consciously represented. Thus, the knowing subject here is not the mind but the body. In phenomenology, this knowing subject is more precisely termed the lived body, which is not separated from the mind.

The idea of embodied knowledge is originally derived from the phenomenology of Maurice Merleau-Ponty, and Tanaka (2011a) developed it as a new notion. In his main work, *Phenomenology of Perception* (1945/2012), Merleau-Ponty described the example of knowing how to touch type as follows:

[O]ne can know how to type without knowing how to indicate where on the keyboard the letters that compose the words are located. Knowing how to type, then, is not the same as knowing the location of each letter on the keyboard, nor even having acquired a conditioned reflex for each letter that is triggered upon seeing it. ... It is a question of a *knowledge in our hands*, which is only given through a bodily effort and cannot be translated by an objective designation. The subject knows where the letters are on the keyboard just as we know where one of our limbs is – a *knowledge of familiarity* that does not provide us with a position in objective space. (Merleau-Ponty, 2012, p. 145, emphasis added)

What Merleau-Ponty described as “knowledge in our hands” is a particular type of knowledge that is not a reflex but rather comes about through repeated bodily practice. It is not distinctly explicit or conscious, and hence we cannot articulate it as an objective designation. The knowledge of typing is deeply embodied to the extent that it is converted into “knowledge

of familiarity (*savoir de familiarité*)” that even provides us with the tacit spatial cognition for smooth actions. This is the original textual source of embodied knowledge.

As phenomena of our everyday life, the ordinary seems to be embodied knowledge. We know how to walk, ride a bicycle, touch type, swim, talk in our mother tongue, communicate with others, and so forth. However, in contrast to the Cartesian view of knowledge, the concept of embodied knowledge is still radically important. As is well known, Descartes (1642/1992), with his methodological skepticism, rejected any knowledge that could be doubted, and with the same skepticism, he separated the mind from the body. Thus, in the Cartesian worldview, the mind is the knowing subject, to which certain knowledge belongs. Descartes (1637/1985) stressed that this worldview should “include nothing more in my judgments than what presented itself to my *mind* so clearly and so distinctly that I had no occasion to doubt it” (p. 120, emphasis added). In other words, one’s body is a mere known object, and there is no such place for “embodied” knowledge.

However, the problem here is not confined only to Descartes. As we see below, the modern view of knowledge in general, which is typically represented in the Cartesian worldview, is what should be questioned and reframed today.

Constellation of Ideas

There are several notions that can be situated around embodied knowledge in terms of their ideas on knowledge and knowing. I hope to clarify the similarities and differences between these notions and mine.

Procedural Knowledge (Procedural Memory)

This is a kind of long-term memory for the skills involved in particular tasks (APA, 2007, p. 735). In contrast to declarative knowledge, which can be consciously recalled and articulated, procedural knowledge can be better presented through performance (e.g., the procedure of swimming). As a matter of course, embodied knowledge, which I discuss here, contains the procedures involved in certain actions. However, in the standard view of psychology and cognitive science, which deal with procedural knowledge, it is presumed that the procedures are stored in the *mind* or *brain* as long-term

memory (see Stillings et al., 1995, for example). As Gibbs (2006) pointed out, mind-body dualism and the reduction of mind to brain, which is historically derived from it, is still dominant in mainline cognitive science. Thus, procedural knowledge is also presumed to be a type that belongs to the mind, and its *embodied* nature is overlooked. My framework is different in dealing with similar phenomena.

Knowing How

Ryle (1949) rejected the Cartesian view of mind by describing it as “the ghost in the machine” and tried to redefine the concept of mind. In the process, he focused on “knowing how” instead of “knowing that.” Both types of knowing belong to human intelligence, which constitutes one of the core concepts of mind. However, the former (knowing how) was ignored in past philosophy because it did not suit “the ghost in the machine” dogma. Knowing that is information-based knowledge that can be asked and answered whether one knows it or not: it is represented as a proposition. Knowing how is training-based knowledge (e.g., how to play chess, fish, speak grammatically) that cannot be reduced to a set of propositions: it is realized as a certain disposition for performance and is expressed through skillful actions. Knowing that and knowing how together constitute our intelligent behaviors, as is seen in the case of a good surgeon (Ryle, 1949, p. 49). In these behaviors, one’s mind and body function in unity at the same time and place, utilizing both types of knowledge. There is no hidden mind (“the ghost”) that guides our body (“the machine”) toward intelligent behaviors based on deliberation. In accordance with our view, Ryle proposed the *embodied view of mind* by focusing on knowing how.

Tacit Knowledge

Embodied knowledge has a common feature with tacit knowledge (Polanyi, 1966) in that we have a type of knowledge that we cannot explicitly explain or verbalize. Polanyi (1966) showed various instances of this by asserting that “we can know more than we can tell” (p. 4): identifying one person among many people, identifying a disease on the basis of the symptoms, knowing how to coordinate body parts in performing skills, and so forth. What is common among all these examples is that we tacitly know something more comprehensive by paying attention to the particulars of the facts. According to Polanyi, the former is the first term (“proximal term”)

and the latter is the second term (“distal term”) of tacit knowing. Moreover, establishing the relationship between these two terms enables us to know “more than we can tell,” for example, we recognize an acquaintance by paying attention to his or her facial parts. It is remarkable that Polanyi (1966) stated that “our body is the ultimate instrument of all our external knowledge, whether intellectual or practical” (p. 15). In other words, we need to dwell in this world through our body in order to acquire certain knowledge about it. Polanyi, as well as Merleau-Ponty, acknowledged the importance of embodiment in knowing, although he did not consider the body as the *subject* but as the *instrument* in knowing.

Embodied Cognition

In cognitive science, there is an expanding movement called embodied cognition, which challenges the standard view of cognitivism or computationalism, based on the embodied view of mind. Important studies related to this movement include those by Clark (2008), Lakoff and Johnson (1999), Pfeifer and Bongard (2007), and Varela, Thompson, and Rosch (1991). Shapiro (2011) reviewed these studies and classified the prominent research into three categories: conceptualization, replacement, and constitution. *Conceptualization* seeks to show that an organism’s understanding of the world depends on the properties of the body (e.g., color perception, language comprehension). *Replacement* is oriented to replace the computational or representational tools that have been dominant in standard cognitive science (e.g., replacing symbol computation with dynamical systems theory). *Constitution* is “a commitment to the idea that the constituents of the mind might comprise objects and properties apart from those found in the head” (Shapiro, 2011, p. 68). The concept of mind should be extended to the outer world, including computers, books, pens, and papers, as well as to the body (see also Clark, 2008; Clark & Chalmers, 1998). Needless to say, the notion of embodied knowledge is inspired by the movement of embodied cognition, and it is also true that some parts of embodied cognition research originally started under the influence of Merleau-Ponty’s work (Tauber, 2008). However, my idea stresses the performative aspect of our knowledge rather than the cognitive aspect. I must restate that the body knows how to *act*. It is a kind of intelligence that dwells within the body in action. Let me explain.

The Lived Knowledge

Embodied knowledge encompasses a broad range of actions that we practice daily in the lifeworld. They include:

- basic bodily movements (how to walk, run, breathe, stand up, jump, maintain one's posture, etc.)
- tool use (how to touch type, eat with a knife and fork, throw a ball, hit a ball with a racket, play the piano, etc.)
- spatial behaviors (how to differentiate the directions of front-back/right-left/up-down, orient oneself and move from one point to the other, utilize what the surrounding environments afford, etc.)
- nonverbal behaviors (how to use one's gaze in conversation, express emotions through facial expressions, maintain an appropriate distance from others, mesh utterances and silence with a partner, etc.)

These actions are not apparent as knowledge because they are not clearly represented; nevertheless, we experience them with certainty through our own bodies. They are not necessarily experienced in a conscious way, but are practiced in a prereflective way. In other words, embodied knowledge is lived knowledge rather than scientific knowledge that is explicitly objectified. This contrast parallels Husserl's argument on the lifeworld and modern science (Husserl, 1954/1970). Implicit-lived knowledge tends to be masked and hidden by explicit-scientific knowledge (Tanaka, 2005).

What the body knows becomes clear when the body does not function in an ordinary way or in an expected way. Consider the following example. Ramachandran and Blakeslee (1998) recounted the story of a patient named Tom who lost his left arm in a car accident. He suffers from a phantom limb syndrome:¹

[H]e could wiggle each "finger", "reach out" and "grab" objects that were within arm's reach. Indeed, his phantom arm seemed to be able to do anything that the real arm would have done automatically, such as warding off blows, breaking falls or patting his little brother on the back. Since Tom had been left-handed, his phantom would reach for the receiver whenever the telephone rang. (pp. 21-22)

Apparently the patient's body still reacted to situations in a habitual manner. Whenever the telephone rang, his entire body was led to answer it as he

used to, and this action involved movement of his missing left hand. The kinesthetic sensation of the missing limb seems to occur as part of a habitual action that had been established between his body and a certain situation. Tom does not need to represent the missing part of the body in his mind, but may feel it immediately as an embodied action. Phantom limb syndrome is a problem for the lived body as well as for the body representation in the somatosensory cortex.

According to Merleau-Ponty (1945/2012), the lived body is composed of two layers: one is the habitual body (*le corps habituel*) and the other is the actual body (*le corps actuel*). The habitual body, comprising a complex of various patterns of habitual actions, responds skillfully to the present situation through the actual body. What appears as a phantom limb is the unchanged patterns of action, which are deeply embodied in the layer of the habitual body and are still performed through the actual body without any intention of action. Ironically, in the case of phantom limb syndrome, the body knows how to cope with a situation skillfully even when it lacks the necessary part.

We experience this type of discrepancy between the habitual body and the actual body when we put ourselves in a new or unusual environment: We confuse pushing with pulling to open the door when we move to a new house; we make mistakes in typing when we start to use a new keyboard with buttons of different pitches; we almost stumble forward when we step onto an escalator that is stopped; we are unable to breathe appropriately when we travel to a city situated at a high altitude with less oxygen and so forth. All these examples indicate that embodied knowledge is the *knowledge of familiarity*, as Merleau-Ponty stated in the passage quoted above.

In general, the more ordinary and trivial an action, the more deeply embodied is the knowledge of how to perform it. Embodied knowledge has the property of “doing without representing”: It is what we do without trying to do or what we know before trying to know. Thus, to understand embodied knowledge is to rediscover what we are living immediately without reflection and to explore the meaning of it. This agenda corresponds exactly to the practice of phenomenological research. Following Merleau-Ponty, van Manen (1990) also stated the following:

[p]receding or even apart from the reflective act, there reigns an implicit, non-thematic, non-reflective type of consciousness in our daily life, which consists in

a simple presence to what I am doing. ... phenomenology is that kind of human science research that must seize this life and give reflective expression to it. (p. 38)

“I think” and “I can”

Merleau-Ponty (1945/2012) stressed the view that we are bodily beings or embodied beings as opposed to Descartes, for whom the essence of humanity was the mind, which is different in principle from the body. Descartes found the mind in the consciousness of “I think (*je pense, cogito*),” but Merleau-Ponty saw the origin of consciousness as “I can (*je peux*)” following Husserl’s argument.

By stating “I can (*Ich kann*)”, Husserl (1952/1989) originally described one of the characteristics of our body. Different from other material objects, our body is “an organ of the will, the one and only Object which, for the will of my pure Ego, is moveable immediately and spontaneously” (p. 159). For Husserl, “I can” meant my capacity of controlling the bodily movements on the basis of my free will. As is written in the passage cited above, the body is still considered as an “Object”.

For Merleau-Ponty (1945/2012), however, “I can” has a more fundamental meaning. He writes, “Consciousness is originally not an ‘I think that’, but rather an ‘I can’ ” (p. 139). “I can” does not mean the conscious control of bodily movements, rather a prereflective, and therefore just-lived consciousness that accompanies each bodily movement. It is also termed as “motor intentionality,” which is “indissolubly movement and consciousness of movement” (p. 113) at the same time. Here, the body is not an object for consciousness any more.

Embodied knowledge is the “I can” type of knowledge. As embodied beings, we are situated in this world (“being-in-the-world”) and are always engaged in concrete action: walking on the street, eating food in a restaurant, driving a car on a highway, swimming in a pool, talking in a cafeteria, and so forth. All of these actions have their own know-how to be embodied, and once embodied, we practice them without deliberating on the procedures or sometimes even without thematizing the action itself. It is obvious that this is not the “I think” type of knowledge.

For most ordinary behaviors in everyday life, we do not think to move our bodies nor do we control them consciously. Consider again, how we ride a bicycle. We just move the body as the situation demands, although

we remain aware of behavioral goals in the background. The body is always embedded in a particular situation, and the surrounding objects and environment induce the body to move appropriately.

It would be appropriate to refer to the notion of affordance here (Gibson, 1979). There is a physical property of the environment that offers (i.e., affords) an individual the opportunity for certain actions. For instance, a firm and level ground affords an individual the chance to stand on it, to walk around on it, or to lie down on it. Gibson (1979) named these action possibilities that are latent in the environment as “affordances” (pp. 127ff).

In our context, we can also give numerous examples: An empty chair affords us to sit down on it, a mug filled with coffee affords us to grab it and drink coffee, a sudden noise affords us to listen to it carefully, a friend’s smile affords us the chance to smile back, an approaching stranger affords us to keep a certain distance from that person, and so on. The body, as a subject, moves spontaneously by simply following the affordances provided by the surrounding situation. There is a prereflective correspondence between the body and situation, and thus the body moves by itself and takes an appropriate action toward the situation without conscious control. Again, the body knows how to act.

It is important to note, however, that this correspondence is not a matter of reflex. The body often moves outside of awareness, but it does so in conformity with the intention of action. For example, when I reach for the knob to open the door, the entire movement is in accordance with my intention of opening it, while my hand and arm move in a way that is close to automatic. This is the way in which motor intentionality functions.

In contrast to our view, an agent’s cognition and behavior in the traditional cognitivist approach are explained on the basis of the standard information-processing model, which has a “Sense-Think-Act” cycle (Pfeifer & Scheier, 1999; Pfeifer & Bongard, 2007). In this model, first, the mind is supposed to represent the situation on the basis of perception (“Sense”), then compute the most adaptive behavior (“Think”), and finally move the body toward the calculated goal (“Act”). There are three clearly divided stages of cognition and behavior: input, inner computation process, and output.

This means two things. First, the mind controls the body toward a certain behavior on the basis of a deliberate action plan made in advance. Second, the mind is something separate from the world and merely oper-

ates on representations of it. Ontologically speaking, the mind is not only separate from the body but also situated out of the world. In this sense, the current cognitivist paradigm is still based on the Cartesian worldview of subject-object dualism, regardless of whether the mind is reduced to the brain or not (see also Gibbs, 2006). There can only be the “I think” type of knowledge in this paradigm. Knowledge is an object for “I think”, and it must be represented in the propositional form. This is the cognitivist view of knowledge.

As some researchers have pointed out (Dreyfus, 2005; Dreyfus & Dreyfus, 1999; Varela, Thompson, & Rosch, 1991), we can find a prototype of noncognitivist and nonrepresentationalist views of cognitive science in the work of Merleau-Ponty (1945/2012). Now we can expand this view to knowledge as well. He stated:

[T]he motor experience of our body is not a particular case of knowledge; rather, it offers us a manner of reaching the world and the object, a “praktognosia,” that must be recognized as original (*originale*), and perhaps as originary (*originaire*). (p. 141, original French words added)

According to Merleau-Ponty, the “I can” type of knowledge is more primary than the knowledge represented by “I think”. The motor experience provides us with practical knowledge (“praktognosia”), which enables us to deal with the world and the object without mental representation. When “I can” touch type, for instance, I do not need to represent each letter on the keys in the mind nor compute the movement of each finger before typing. Probably the keyboard itself is the “representation” that guides the finger movements. As Dreyfus (2005) wrote, “the best ‘representation’ of our practical understanding of the world turns out to be the world itself” (p. 132).

Merleau-Pontian Notion of the Body Schema

Embodied knowledge is found in the prereflective correspondence between the body and situation. Thus, we can redefine it as the prereflective correspondence between the body and the world. “I can” implies that the body knows how to respond to “calls” from the environment. Merleau-Ponty (1945/2012) also explained, “to move one’s body is to aim at things

through it, or to allow one's body to respond to their solicitation, which is exerted upon the body without any representation" (p. 140). The motor intentionality of "I can" is different from the intentionality of "I think", which reflectively objectifies the world and ignores the correspondence between the body and the world.

Giving an account to this correspondence, Merleau-Ponty introduced the notion of the body schema (*le schéma corporel*). In current neurocognitive science, the body schema is explained as the neural representation of one's own body, the visual image of the body, or the awareness of the body, and is often used interchangeably with the "body image"² (Tanaka, 2011b). However, in its historical origin, the body schema was considered as an implicit frame of the entire body to which we refer in order to recognize our present posture and spatial positions of the body parts and regulate bodily movements (Head & Holmes, 1911; Schilder, 1935; Tanaka, 2009). In the present research, most of these functions are understood and explained in relation to neural processes in the parietal lobe (Sakata, 2006).

However, instead of reducing the body schema to brain function, Merleau-Ponty (1945/2012) developed the notion from the philosophical viewpoint of "being-in-the-world", which he inherited from Heidegger (1927/1962). He acknowledged that the body schema is a sort of subjective awareness of the body; it is, however, an indirect awareness that is felt through an ongoing task. For example, when we move to sit down on a chair, we are aware of the waist, the hips, and the legs, and their spatial relation with each other (otherwise, it would be impossible to sit down). But these parts of the body come into the internal senses only insofar as is necessary to accomplish the task of sitting down on the chair. The body schema enables body awareness relative to the context of action, but the major part of it remains tacit and unfocused (see also Gallagher, 2005, pp. 25ff).

Thus, rather than the awareness of the body, the body schema coordinates the body parts into action toward the environment by utilizing that awareness as a regulator for action; It is when we need to consciously control the movement that we become aware of the body (e.g., we are strongly aware of our fingers when we start to learn how to play the piano). The main function of the body schema is to coordinate the body parts and organize the action toward the world. Merleau-Ponty (1945/2012) stated, "the body schema is neither the simple copy, nor even the global awareness of the existing part of the body; rather, it actively integrates the parts ac-

ording to their value for the organism's projects" (p. 102, underlined part modified by the author according to original French text).

This is the key to "doing without representing". Each action that the lived body performs is tacitly organized by the body schema, which is outside our conscious control. We do not need to represent the procedures or be aware of internal processes as far as we can execute the smooth action ("I can"). The more skilled or the more habitualized the action is, the less aware we become of it ("knowledge of familiarity"). The body knows how to act, and the very fact that the body is the knowing subject is underpinned by the function of the body schema.

Based on this argument, it is possible to add the following three points regarding the notion of the body schema (Tanaka, 2011a). First, the body schema does not only coordinate the body parts into action but also converts the perception into the organized action. Skillful coping with the situation is made possible when a direct circuit is established between perception of an environment and appropriate action toward it. The perceptual appearance of a situation *immediately* solicits a particular action, and then the situational change brought by the action will create a new perceptual appearance, which solicits a subsequent action. "I can" is based on the conversion of perception into action without being mediated by "I think". As we have already seen, this is a prereflective correspondence that differs from conditioned reflex in terms of intention. Merleau-Ponty (1945/2012) thus used the term "intentional arc" instead of "reflex arc" (pp. 137ff). Where there is a prereflective correspondence between the body and the world, the perception of the environment is already a potential action that we can take toward it (see also Noë, 2004). Different from reflexes, intentions of possible actions precede the reception of stimuli.

Second, the body schema provides the body with the possible emergence of new actions. As we have seen, when facing a new or unfamiliar situation, we experience the discrepancy between the habitual body and the actual body for a while. However, new actions emerge through interaction with the environment. Although we are asked to deliberate on the needed movement to a certain extent, we determine how to act purposively through contingency. Consider the first moment in which one learns to ride a bicycle. After a number of trials and errors, the body suddenly finds out how to coordinate its parts and newly organizes the riding action. Merleau-Ponty (1945/2012) described this moment when

one acquires a new skill or habit as “the motor grasping of a motor signification” (p. 144). In more popular language, we find the knack of a new action through repeated movements. In this sense, the body schema is a self-organizing system of actions that is open to situational changes. The body schema, through rearranging and renewing itself, creates new adaptive actions toward the environment.

Third, it is obvious that the body schema is not equivalent to the physical body (Tanaka, 2009). As was shown in the case of phantom limbs, the patient has proprioceptive or kinesthetic sensations in an empty space. This point is in agreement with the fact that the body schema extends our bodily feelings and body awareness beyond the skin. When we drive a car, we have extended feelings from fender to fender as if the car were a natural part of our body. According to research in neuroscience, this kind of extension is caused by tool use based on the function of bimodal neurons (Iriki, 2004; Maravita & Iriki, 2004). However, we should be careful about the extent to which the function of the body schema can be reduced to the subpersonal processes in the brain.³

Expanding the Embodied View of Knowing

It goes without saying that the modern view of knowledge has been heavily oriented toward the natural sciences. This history itself is not the problem that I question here. Instead, I would like to question our view of knowledge and knowing in modern society.

As Husserl (1954/1970) clarified, by examining the mathematics-based methodology of Galilei, it was possible to see that what was forgotten and masked under the influence of modern science is the lifeworld. Thus, authentic knowledge and knowing (remember that *science* meant *knowledge* in its Latin etymology) in modern society have also been detached from our immediate experience in the lifeworld. Moreover, the knowing subject that is presupposed here is the mind of “I think”. In short, as in the case of cognitive science, the representationalist view of knowledge has prevailed until recently.

In this context, phenomenologists’ maxim of “back to the things themselves” should be rephrased as “back to the lifeworld itself”. As we have already seen, the original process of knowing in the lifeworld involves embodiment without exception. We have to rediscover the prereflectively lived

knowledge and give explicit descriptions to it. This is a task of phenomenology in the contemporary postmodern world.

In order to do so, it is important to get rid of our prejudice that the process of knowing means stocking the propositional knowledge as declarative memories or obtaining new results by applying ready-made theories to reality. This is a typical view of the “I think” type of knowledge. The “intellectual” functions of the mind, such as memory, thinking, and judgment, tend to be stressed more than perception and action, which are carried out through the body. If these prejudices exist in our society, they might be a popularized version of mind-body dualism.

From the Merleau-Pontian perspective, knowledge and knowing should be based on what “I can”. However, let me add that this does not mean that “I think” is reduced to “I can”. As Ryle (1949) also stated, knowing that and knowing how together constitute our intelligence; “I think” and “I can” work together in our experiences as a matter of fact. We can discover “I can” in “I think,” and conversely “I think” in “I can”. In my view, the former (discovering “I can” in “I think”) is the endeavor of embodied cognition,⁴ and the latter is that of embodied knowledge. Exploring embodied knowledge means bringing what we experience prereflectively in the lifeworld into reflection. If the term “reflection” does not seem appropriate here, we can choose the term “awareness” or “mindfulness” according to Varela, Thompson, and Rosch (1991).

Instead of offering a clear conclusion to this article, I would like to present three directions for further exploration of embodied knowledge.

Skill Acquisition

The process of skill acquisition through which the body becomes the knowing subject, that is, the formation process of embodied knowledge, must be understood. After acquiring a certain skill, the body knows how to act and cope with a situation. As an example, Tanaka and Ogawara (2010) examined this process by conducting a learning experiment with ball juggling. Interestingly, all the participants emphasized the importance of refraining from thinking during the trials in their interviews. Juggling is so fast moving that there is not enough time to deliberate on the next step and adjust the movement. Thus, the moments when jugglers improve their skill are subjectively experienced as an emergence of new action. During the trials, there happened to be an occasional correspondence between intention

and action (“the motor grasping of motor signification”). A discontinuous change, in which the body parts start to coordinate differently from before (i.e., rearrangement of the body schema), occurs through the process of learning. In these moments of emergence, the mind is no longer the “control tower” that functions as “I think”, and the body is no longer the “instrument” to be controlled. Through the learning process, the duality of mind and body is dissolved, and thus the lived body as a whole becomes the knowing subject. Acquiring new embodied knowledge leads to the achievement of mind-body unity at a higher level than before.

Sense of Space and Place

What we know through our body during interaction with environment must be described. The function of the body schema is not bounded by the physical body, but rather constitutes our perceptions and actions toward the environment. If skill acquisition corresponds to the part of action toward the environment, we should give descriptions to the part of perception as well. However, what we should describe is the perception *toward* the environment and not the perception as a passive information-receiving process. The sense of space and place is what I mean here.⁵ In numerous ways, we relate our body in the spatial world and there occurs a corresponding sense of space and place: here-there, near-far, centered-decentered, in-out, front-back, right-left, up-down, open-close, interior-exterior, large-small, wide-narrow, bright-dark, comfort-discomfort, safe-dangerous, familiar-unfamiliar, hidden-revealed, crowded-empty, private-public, and so on. Applying the enactive perspective (Noë, 2004) to this issue, our perception toward space is characterized by the potential action that we are able to take. “The body is not in space, it inhabits space” (Merleau-Ponty, 1945/2012, p. 140). From this viewpoint, phenomenological descriptions of the lived space (*l'espace vécu*) are needed (Tanaka, 2011c).

Social Understanding

The body interacting with the environment is also interacting with that of others. As a part of social skill, the body knows how to act in social situations, that is, the body knows how to *inter-act* with others. Merleau-Ponty (1951/1964, 1960/1964) tried to develop the notion of the body schema toward the domain of intersubjectivity and left some fragmentary texts on intercorporeality (*intercorporéité*). The notion of intercorporeality focuses

on the embodied interaction between two persons: the reciprocal relation between one's body and that of another, which appears as a perception-action loop between self and others (Tanaka, 2013). Contagious yawning is a popular example. Sometimes it happens that we cannot help yawning when we see someone else yawn. Here, perceiving the other's action creates the intention of the same action in the self, and vice versa potentially. As research on mirror neurons has shown, this reciprocal and mirroring relation between self and others underpins our basic social cognition, such as understanding the intention of others' actions (Rizzolatti & Craighero, 2004) and empathizing with others (Gallese, 2001). However, what is important to note here is not the functions of mirror neurons, but that our capacity of social understanding is primarily based on the embodied interactions. The notion of intercorporeality opens up the possibility of social understanding without appealing to the theory of mind (Tanaka & Tamachi, 2013). For phenomenology, it is an attempt to *embody* the intersubjectivity.

As seen above, an exploration of embodied knowledge will bring us action sensitive knowledge, which has been forgotten under the modern view of knowledge. This not only reconfirms the embodied view of mind but also sheds new light on our view of space/place and sociality.

Notes

¹ A phantom limb is the feeling that an amputated limb is still present. The individual may feel that the missing limb is still attached to the body and moves with other body parts (see also Berlucchi & Aglioti, 1997; Melzack, 1990).

² All of these confusing usages are found in many related articles. For example, see those involved in the book edited by Cash and Pruzinsky (2002).

³ Legrand (2010) pointed out that there are four bodily dimensions that are not irreducible to each other: the experiential, anatomical, sensorimotor, and neuronal. According to her argument, the function of the body schema might not be reduced to the neuronal processes.

⁴ The best example is the work of Lakoff and Johnson (1999). They found that the function of the image schema, which originally derives from the bodily experiences, is the realm of higher cognition of thinking, imagination, and reason.

⁵ On the sense of space and place, see the pioneering works by Bollnow (1963) and Tuan (1977) for a review.

References

- American Psychological Association. (2007). *APA Dictionary of Psychology*. Washington, DC: American Psychological Association.
- Berlucchi, G., & Aglioti, S. (1997). The body in the brain: Neural basis of corporeal awareness. *Trends in Neurosciences*, 20, 560-564.
- Bollnow, O.F. (1963). *Mensch und Raum*. Stuttgart: Kohlhammer.
- Cash, T., & Pruzinsky, T. (2002). *Body image: A handbook of theory, research, and clinical practice*. New York: Guilford Press.
- Clark, A. (2008). *Supersizing the mind: Embodiment, action, and cognitive extension*. Oxford: Oxford University Press.
- Clark, A., & Chalmers, D. (1998). The extended mind. *Analysis*, 58, 10-23.
- Descartes, R. (1637/1985). Discours de la méthode. (R. Stoothoff, Trans.) Discourse on the method. In *The philosophical writings of Descartes*. Cambridge: Cambridge University Press.
- Descartes, R. (1642/1992). *Méditations métaphysiques*. Paris: Flammarion.
- Dreyfus, H.L. (2005). Merleau-Ponty and recent cognitive science. In T. Carman & M.B.N. Hansen (Eds.), *The Cambridge companion to Merleau-Ponty*. Cambridge: Cambridge University Press.
- Dreyfus, H.L., & Dreyfus, S.E. (1999). The challenge of Merleau-Ponty's phenomenology of embodiment for cognitive science. In G. Weiss & H.F. Haber (Eds.), *Perspectives on embodiment: The intersection of nature and culture*. New York: Routledge.
- Gallese, V. (2001). The "shared manifold" hypothesis: From mirror neurons to empathy. *Journal of Consciousness Studies*, 8, 33-50.
- Gibbs, R. W. (2006). *Embodiment and cognitive science*. Cambridge: Cambridge University Press.
- Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Head, H., & Holmes, G. (1911). Sensory disturbances from cerebral lesions. *Brain*, 34, 102-254.
- Heidegger, M. (1927/1962). *Sein und Zeit*. Halle: Niemeyer. (J. Macquarrie and E. Robinson, Trans.) *Being and time*. New York: Harper & Row.
- Husserl, E. (1952/1989). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie. Zweites Buch*. Hague: Martinus Nijhoff. (R. Rojcewicz and A. Schuwer, Trans.) *Ideas pertaining to a pure phenom-*

- enology and to a phenomenological philosophy, Second book.* Dordrecht: Kluwer Academic.
- Husserl, E. (1954/1970). *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie.* Haag: Martinus Nijhoff. (D. Carr, Trans.) *The crisis of European sciences and transcendental phenomenology.* Evanston: Northwestern University Press.
- Iriki, A. (2004). *Homo faber.* Tokyo: Igaku Shoin. (Japanese)
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought.* New York: Basic Books.
- Legrand, D. (2010). Myself with No Body? Body, bodily consciousness and self-consciousness. in S. Gallagher and D. Schmicking (Eds.), *Handbook of Phenomenology and Cognitive Science* (pp. 181-200). Dordrecht: Springer.
- Maravita, A., & Iriki, A. (2004). Tools for the body (schema). *Trends in Cognitive Sciences*, 8, 79-86.
- Melzack, R. (1990). Phantom limbs and the concept of a neuromatrix. *Trends in Neurosciences*, 13, 88-92.
- Merleau-Ponty, M. (1945/2012). *Phénoménologie de la perception.* Paris: Gallimard. (D. A. Landes, Trans.) *Phenomenology of perception.* New York: Routledge.
- Merleau-Ponty, M. (1951/1964). Les relations avec autrui chez l'enfant. (W. Cobb, Trans.) The child's relations with others. In *The primacy of perception.* Evanston: Northwestern University Press.
- Merleau-Ponty, M. (1960/1964). Le philosophe et son ombre. (R.C. McCleary, Trans.) The philosopher and his shadow. In *Signs.* Evanston: Northwestern University Press.
- Noë, A. (2004). *Action in perception.* Cambridge, Mass.: MIT Press.
- Pfeifer, R., & Bongard, J. (2007). *How the body shapes the way we think: A new view of intelligence.* Cambridge, Mass.: MIT Press.
- Pfeifer, R., & Scheier, C. (1999). *Understanding intelligence.* Cambridge, Mass.: MIT Press.
- Polanyi, M. (1966). *The tacit dimension.* London: Routledge & Kegan Paul.
- Ramachandran, V. S., & Blakeslee, S. (1998). *Phantoms in the brain: Probing the mysteries of the human mind.* New York: William Morrow.
- Rizzolatti, G., & Craighero, L. (2004). The mirror-neuron system. *Annual Review of Neuroscience*, 27, 169-192.
- Ryle, G. (1949). *The concept of mind.* London: Hutchinson.

- Sakata, H. (2006). *The parietal lobe*. Tokyo: Igaku Shoin. (Japanese)
- Schilder, P. (1935). *The image and appearance of the human body: Studies in the constructive energies of the psyche*. New York: International University Press.
- Shapiro, L. (2011). *Embodied cognition*. London: Routledge.
- Stillings, N.A., Weisler, S.E., Chase, C.H., Feinstein, M.H., Garfield, J.L., & Rissland, E.L. (1995). *Cognitive science: An introduction* (2nd ed.). Cambridge, Mass.: MIT Press.
- Tanaka, S. (2005). Problematic nature of scientific worldview: A consideration based on Husserlian phenomenology. *The Bulletin of School of High-Technology for Human Welfare, Tokai University*, 15, 7-14. (Japanese)
- Tanaka, S. (2009). Psychological body and the embodied knowledge: Re-examination of the body schema. *Journal of Mind-Body Science*, 18, 1-12. (Japanese)
- Tanaka, S. (2011a). The notion of embodied knowledge. In P. Stenner, et al. (Eds.), *Theoretical psychology: Global transformations and challenges* (pp. 149-157). Concord: Captus University Publications.
- Tanaka, S. (2011b). A philosophy of body image. *Clinical Neuroscience*, 29(8), 868-871. (Japanese)
- Tanaka, S. (2011c). Lived space: A methodological viewpoint to consider the space. *Study of the School Space*, 3, 6-12. (Japanese)
- Tanaka, S. (2013). The notion of intercorporeality and its psychology. *The Bulletin of Liberal Arts Education Center, Tokai University*, 33, 91-98.
- Tanaka, S., & Ogawara, K. (2010). Formation of embodied knowledge: An analysis of the learning process in ball juggling. *Journal of Mind-Body Science*, 19, 69-82. (Japanese)
- Tanaka, S., & Tamachi, M. (2013). A phenomenological view of the theory of mind. *The Bulletin of Liberal Arts Education Center, Tokai University*, 33, 99-108.
- Tauber, J. (2008). *Invitations: Merleau-Ponty, cognitive science and phenomenology*. Saarbrücken: VDM Verlag.
- Tuan, Y. (1977). *Space and place: the perspective of experience*. Minneapolis: University of Minnesota Press.
- van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. Albany: State University of New York Press.
- Varela, F., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive science and human experience*. Cambridge, Mass.: MIT Press.

Acknowledgement

This work was supported by the JSPS (Japan Society for the Promotion of Science) KAKENHI (grant number: 24500709) and by the Tokai University General Research Organization.

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