

Embodied Cognition and Naturalized Perspectivism: Cognitive Science Returns to Phenomenology

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Abstract

This paper draws together interdisciplinary support for a recently popular trend in cognitive science known as embodiment theory. In addition, it forwards an argument for a phenomenological approach to cognitive science that understands the perceiving subject as essentially embodied and thus calls for the development of a more holistic methodology for the scientific study of cognition. I critically investigate embodiment theory as it pertains to Cartesian dualism, behavioral psychology, artificial intelligence, Merleau-Pontian phenomenology, and, finally a Wittgensteinian critique of phenomenological language. My analysis argues that embodied cognitive science should adopt the stance of what I call, “naturalized perspectivism.” As opposed to a representationalist approach to cognition, this stance rejects the conception of the perceiving subject as an organism that acts by following internalized rules and perceives using mental representations of an objective, external world. Instead, by taking the naturalized perspectivism stance towards embodiment theory, I posit that human organisms have evolved to see the “natural world” in similar, objective ways only insofar as we share similar bodies and particular evolutionary-friendly embodied goals. That is, during the process of perception and learning, an organism’s cognitive system cuts across brain-body-world divisions by constantly reconstituting the “sensory world” as it offloads its dispositions into sensory objects themselves for its own embodied, evolutionary purposes.

This paper draws together interdisciplinary support for a recently popular trend in cognitive science known as embodiment theory. In addition, it forwards an argument for a phenomenological approach to cognitive science that understands the perceiving subject as essentially embodied and thus calls for the development of a more holistic methodology for the scientific study of cognition. I critically investigate embodiment theory as it pertains to Cartesian dualism, behavioral psychology, artificial intelligence, Merleau-Pontian phenomenology, a Wittgensteinian critique of phenomenological language and, finally, contemporary experimental neuroscience. My analysis argues that embodied cognitive science should adopt the stance of what I call, “naturalized perspectivism.” As opposed to a representationalist approach to cognition, this stance rejects the conception of the perceiving subject as an organism that acts by following internalized rules and perceives using mental

representations of an objective, external world. Instead, by taking the naturalized perspectivist stance towards embodiment theory, I posit that human organisms have evolved to see the “natural world” in similar, objective ways only insofar as we share similar bodies and particular evolutionary-friendly embodied goals. That is, during the process of perception and learning, an organism’s cognitive system cuts across brain-body-world divisions by constantly reconstituting the “sensory world” as it offloads its dispositions into sensory objects themselves for its own embodied purposes. To ward off charges of relativism, I argue that naturalized perspectivism and embodiment theory together are fully grounded in evolution insofar as they understand the body, and the similarities between bodies by virtue of our shared evolution, to be the fundamental source of the behavior and development of the organism’s cognitive system. By understanding embodiment in this way, phenomenological accounts of perception, such as Merleau-Ponty’s, are open to evolutionary and biological forms of explanation. Furthermore, the viability of naturalized perspectivism is further supported by Wittgenstein’s critique of rule following and his private language argument.

As a scientific account, embodiment theory provides a powerful explanatory model of mental functioning on both theoretical and practical levels. On the *theoretical* level, it avoids conceptual problems common to other approaches: the problem of mind-body interaction for Cartesianism, the problem of learning without mental states for behavioral psychology, and the frame problem of computation-based artificial intelligence. Furthermore, an embodied approach to cognition starts by viewing the brain as a device for helping to determine actions that allow the organism to survive in challenging and rapidly changing environments over the course of its life. In this way, it is a theory that foregrounds the *practical* dimensions of mind in such a way as to make them more open to evolutionary forms of explanation. Such an account supports how the evolutionary process has constrained the development and function of the nervous system. In this regard, embodiment theory argues that the mechanisms of perception have developed according to one of nature’s overriding rules: that natural selection promotes brain-body-world interactions that constitute the most efficient and adaptable ways of responding to threats and rewards in the organism’s environment.

To showcase these virtues, it is useful to explain how embodiment theory would respond to three problematic theories of the past, the first being Cartesian dualism. Descartes divides the world into two distinct kinds of metaphysical substances, minds and bodies, which have categorically different essences, thought and extension respectively. Descartes recognizes, however, that mind and body appear to be causally connected; when I think in my mind, “raise my arm,” my body begins to move. One way Descartes attempts to explain mind-body interaction is with his representational theory of perception that holds that the mind makes internal *mental representations* of the external world. To support this representational model of perception, Descartes needs to address the question concerning precisely how the mind and body, as metaphysically separated, interact to form these mental representations. In an attempt to solve this problem, Descartes argues for the existence of God, who would ensure that external objects are represented in the mind in a non-deceptive, non-transformative manner. Operating under the dualist conception of a “thinking self” faced with the task of establishing the existence and authenticity of “external, bodily

objects,” Descartes is forced to invoke a non-deceiving God who guarantees that our minds (when functioning properly) accurately represent bodies. Such a God thereby warrants the legitimate causal connection between mental representations and extended substance. Thus, unless invoking an omniscient God can be considered an explanation, Cartesian dualism cannot explain in concrete terms how the mind as thinking substance and the body as an extended “space occupier” actually interact to form mental representations. Descartes’ dilemma faces any representationalist view of cognition, such as emergence theories and other contemporary dualisms.

Embodiment theory avoids the Cartesian problem of mind-body interaction by understanding the mind as extended or essentially “embodied” in its immediate environment. From the start, embodiment theorists examine the mind not as composed of metaphysically distinct thoughts, but instead as the mental operations of bodies affording particular actions in particular situations. As opposed to Cartesianism, embodiment theory holds that knowledge of the “external world” cannot be warranted exclusively by God because, if that were the case, then *subject*-sensitive influences, such as action goals and embodied skills, could not effect perception, when in fact they do in a very important way. As a demonstration of this fact, Andy Clark provides an insightful example of how a baby learns about slopes. He cites a longitudinal study that investigates an infant’s knowledge regarding maneuvering about inclines during its transition from crawling to walking. Understandably, as the crawlers increase in experience, they gradually begin to avoid or learn how to maneuver about the steeper slopes. Remarkably, even after receiving extensive training crawling up an incline, once infants learn how to *walk* they must entirely re-learn information about steep slopes (Clark, 1997, p37). Essentially, the first time infants walk up the very same slope they once so cleverly navigated on all fours, they demonstrate a lack of information as if they were exploring the area for the first time. Thus, it appears that knowledge and perception are action-specific on a foundational level. If stored mental representations were the medium for knowledge and perception, then the infants would be able to use at least a portion of what they learned from crawling when they started to walk. That is, an infant would be internally representing features of the slope *itself*, independent of its current embodied projects in the “external world.” Instead, the subject learns about slopes only by virtue of how he or she can respond in a given situation, or, as Clark puts it, “how slopes figure in specific contexts involving action” (37). Whereas Cartesianism holds that we acquire knowledge of, and perform actions in, the world of bodily substance via constant recourse to mental representations, embodiment theory recognizes that our bodily engagement with our current environment shapes our knowledge and perception to begin with. Accordingly, our sensory perceptions consist exclusively of action-laden content because, from the start, they depend on how our bodies are currently behaving towards particular sensory objects in a way that affords skillful, coordinated action towards them. Thus, without any mention of mental representations, embodiment theory recognizes that mental knowledge and “external” bodily features of the world interact coextensively.

A viable model for the specific mechanism underlying this embodied approach to cognition and knowledge acquisition can be found in “reflex circuit” proposed by John Dewey. As an early proponent of embodiment theory, Dewey explains how an embodied

approach addresses shortcomings associated with behavioral psychology, a second problematic theory of perception. Dewey describes the stimulus-response model of behaviorism as “sensation-followed-by-idea-followed-by-movement” (358). This is to say that, according to the behaviorist, stimuli are first given as self-contained objects in the environment, which are then passively collected by sensory organs, and then responded to according to learned stimulus-response patterns. As the basis of this model, behaviorism holds that only observable bodily action (i.e., not mental states) should be the focus of objective, scientific inquiry. But, if sensory objects are self-contained, external objects, and if we do not have mental states, how then does the perceiving subject determine relevant similarities between their current sensory experience and their past stimulus-response pairings? Furthermore, how are the stimulus-response histories stored without memories (i.e., mental states)? Dewey avoids this problem by replacing the linear, mechanistic stimulus-response model with a multi-directional circuit.

According to Dewey, at the “first” stage of perception, *sensation*, behaviorism falsely posits that stimulus and response operate as independent, self-constituted entities. Alternatively, Dewey recognizes that stimulus and response are members of one fluid, coordinated exercise, what he calls the “reflex circuit.” To explain this model, Dewey discusses the famous example of the child and the flame. While a child reaches for a flame, the act of seeing constantly interacts with the act of reaching. According to Dewey, in an account of action, stimulus and response have determinate content only insofar as they coordinate with each other to carry out a unified function. Dewey describes this when he writes, “[i]f the light did not inhibit as well as excite the reaching, the latter would be purely indeterminate, it would be for anything or nothing, not for the particular object seen” (1896, p358). Here, Dewey makes clear that for the flame to be a stimulus –for it to enter the reflex circuit as the beginning of an action– it must *already* be engaged with the motor system. In this sense, stimulus and response feed into each other during the process of both perception and learning. Clearly, then, sensory stimulus and motor response cannot be distinct, self-contained entities because, if that were the case, stimuli would be inconsequential for the respective motor action. For the act of reaching, the multi-directional feedback dynamics between eye, hand, body and world guide the motor response and, at the same time, the processing of sensory stimuli. By recognizing that the feedback loop of the sensory-motor system itself guides action, without the need for constant recourse to mental representations, embodiment theory endorses what Clark calls “soft assembly,” where an equal-patterns approach of a multitude of local, constantly-adapting interactions between motor and sensory systems leads to emergent features such as coordinated movement. In this way embodiment theory provides a much more efficient and adaptable stimulus-response model: as Clark articulates, “multi-factor, decentralized approaches [...] yield robust, contextual adaptation as a cost-free side effect” (1997, p43). Thus, stimulus-response dynamics constantly guide and adjust the organism’s processing of sensory stimuli –a readily adaptable and highly efficient model that does not require mental states and can better account for immediate learning, unlike the behaviorist model.

Dewey also challenges the behaviorist model in terms of the “second” stage of action, *the response*. When the child is burned, he genuinely experiences the response sensation

only by virtue of the previous eye-arm-hand coordination, *not* as an entirely new experience. Learning occurs “only because the heat-pain quale enters into the same circuit of experience with the optical-ocular and muscular quales” (Dewey, 358). As the response occurs, the stimulus is reconstituted to be “seeing-of-a-light-that-means-pain-when-contact occurs” (Dewey, 359). Behaviorists would claim that the response was an essentially new experience, arguing that the continual pairing of two, essentially distinct experiences (e.g., touching and burning) would mediate learning and response via classical conditioning. However, Dewey recognizes that, because stimulus and response are part of one fluid exercise, real learning (i.e., learning that has consequences for future action) occurs precisely at the point when the sensory stimuli are reconstituted and reorganized within the overall sensory-motor system. Hence, for a *response* to have real consequences for learning, it must be integrated with the stimulus: “the so-called response is not merely to the stimulus; it is, so to speak, *into* it. The burn is the original seeing” (Dewey, 1896, p359). Essentially, we learn to view the sensory object in a way that immediately elicits and affords an intelligent response (e.g., avoidance behavior by seeing the flame as “pain-when-touched”). In learning, the subject constantly offloads his or her “memory” into the sensory stimuli themselves, and thus uses the world as its own best representation. In other words, the embodied subject feeds back what he or she has learned into the way the world shows up in the next circumstance. As the mind extends into the world in this way, there is no need for mental representation or internal world maps.

Understanding learning as stimulus reconstitution affords embodiment theory an evolution-friendly account for how our sensory-motor system has evolved to use *instincts* as a cost-effective tool for efficiently avoiding harmful stimuli. For example, when we view a pile of spoiled food, we instinctually and immediately begin to feel nauseated; the stimulus (i.e., the food) itself is reconstituted to be “stomach-nausea-when-viewed.” Without the need for recourse to repeated stimulus-response conditioning, embodiment theory ensures that as few as one response can reconstitute the sensory object to entail immediate and long-term leaning. Furthermore, because sensory stimuli are constantly changing in this way, embodiment theory accounts for how each stimulus-response experience is radically unique as it is phenomenologically experienced. Whereas behaviorism struggles to account for how the subject notices similarities between his current context-situated stimulus perception and abstracted stimulus-response pairs from his past (without recourse to internally stored memory), embodiment theory realizes that the organism’s phenomenological engagement with the world immediately provides these connections and similarities. That is, by offloading “memory” into the phenomenal objects themselves, these objects elicit an intelligent response as soon as they enter the reflex circuit. Generally speaking, the perceiving subject constantly uses the world as a backdrop, storing (i.e., embodying) his or her dispositions and past experiences into the world itself. In this way, the organism uses the world itself as its map (i.e., its own best representation) without the mediation of internal representation.

Thus, the reflex circuit of embodiment theory takes stimuli and responses as not self-contained items, but instead as mutually-constituted components of their overall circuit from the onset of their involvement in action and perception. For a stimulus to register –the very

fact *that* it is a stimulus for a subsequent response— requires it to be interpreted as something that has importance for coordinated action. The “Gestalt effect” has particular relevance here. When a group of individuals view a Gestalt image, such as a necker cube, an “identical” picture will be perceived differently between subjects as one of two forms (e.g., a cube facing inwards *or* outwards, a young lady *or* an old lady). This demonstrates that we do not view objects



atomistically, but instead, from the start, as action-relevant, holistic forms; to borrow a phrase from Wittgenstein, all seeing is seeing *as*. It is not that we interpret or infer form and meaning from the “identical set of lines that comprise the picture,” but rather the reverse: we are presented with a meaning-laden, already-formed Gestalt image and only then do we decompose the image into smaller, formless segments from which we infer its atomistic make-up. For example, when viewing the old-young lady image, the horizontal line towards the center gains its meaning as it functions in the overall image: as either the mouth of the drooping face of the old woman, or the necklace of a young lady. In this way, the Gestalt effect also reveals how embodiment theory understands stimulus and response as components that obtain their respective meanings top-down via the overall function of the reflex circuit to which they belong. In one reflex circuit, the stimulus of a flame’s light can excite neurons in the brain that elicit the arm as a response action, whereas simultaneously, in another reflex circuit, pain in the very same sensory-motor areas of the arm can be the stimulus for the response of withdrawing the arm. Such an account provides the organism with an adaptable and efficient mechanism for learning in a dynamic environment without the need for mental representation.

In addition to its theoretical and practical virtues compared to behaviorism, embodiment theory also provides a viable alternative to another recent model of perception, computation-based artificial intelligence (AI). This view of cognition, known as “computationalism,” attempts to model the human mind using computations within a computer’s internal representations, symbol circuits and world maps. Researchers in this field designed the CYC computer, one of the largest AI projects to date, which consists of a vast bank of internally stored “information units” that serve as a detailed encyclopedia of explicit facts, maps and rules about the world. To operate in the world, the computer uses these explicit facts and internal world models as a knowledge base from which to calculate an intelligent response.

As a result of this set-up, embodiment theory finds computationalism to be “dualistic” in two regards. First, although the CYC computer’s symbol manipulation circuits are physical, they are not embodied. That is, even though they do not belong to a distinct, non-physical substance (i.e., Cartesian dualism), central preprocessing still operates via abstract, encoded symbols, which are *disembodied* in that they are not comprised of features of actual bodies in actual situation in the world, but instead abstract variables and symbols used for a multitude of sensory inputs. The second way computationalism is “dualistic” is that it *abstracts* away from the local environment. That is to say, the CYC computer gathers sensory input and then computes abstract, representational models of the world for centralized symbolic processing. For example, when directing a robot arm, the program

directs movement by adjusting the position via constant reference to an internally represented world model and intended position for the arm. On the spot, local dynamics between the device's motor system and the sensory environment do not "soft-assemble" coordination, nor can they re-organize or change the CYC perceptual inputs, as with stimulus reconstitution in the reflex circuit. Instead, sensory stimuli are cognized via permanent physical circuits.

These two "dualisms" give rise to the *frame problem*. According to Daniel Dennett, an early commentator on the problem's relevance to AI, computation-based AI must face the insurmountable problem of how to successfully infer the effects of an action without *explicitly* calculating every one of its action's non-effects. Dennett explains this predicament with an example of a robot designed to remove from a room an object resting on a wagon. As with any centralized, disembodied device, the robot determines how to act based on explicitly calculating what it should do via symbol manipulation and internal world models. In Dennett's example, the robot fails in its task because it cannot predict the consequences of its actions: pulling the wagon out also brought with it a time bomb sitting next to the object. Although it knew the bomb was on the wagon, this brave artificial creature did not *explicitly* predict that the action of pulling out the wagon would also bring with it the bomb. Hence, a second version, the "robot-deducer," is designed to calculate *all* the outcomes of its actions before doing anything. This unfortunate robot gets blown up as it sits deducing one-by-one every single consequence of pulling the wagon out of the room no matter how irrelevant (e.g., will removing the wagon change the color of the walls?). Thus, the designers program a third robot capable of differentiating between relevant and irrelevant implications of its actions. Still, however, the time bomb eventually explodes as the robot sits explicitly ignoring the thousands of implications it has determined to be irrelevant (Dennett, 1984, p2).

In total, Dennett's example demonstrates that in order to have the most basic form of adaptive intelligence, computation-based AI must explicitly rule out *every* obvious irrelevant consequence of its actions before acting in the world. In the robot's language of "mathematical logic" it is necessary to make explicit not just the changes brought about by its actions but also all those features of the environment that do not change. Before conducting any response, the CYC computer must make explicit all the minor features about the world that we as humans assume but wouldn't bother to overtly say or predict. Any and all commonsense facts about the world must be either stored or calculated one by one. Adding more and more data to the CYC's knowledge bank will not solve the frame problem. Thus, computationalism is both a terribly inefficient model of cognition. Without any potential for adaptation when faced by a dynamic environment computationalist artificial creatures are fatally flawed.

Embodied AI uses a decentralized, layer-based architecture to provide a better chance of avoiding the frame problem. Clark cites research done by Rodney Brooks at MIT's AI lab, where a robot is built with several activity-based "layers" (1997, p12). These robots are composed of a collection of *embodied*, non-centralized subsystems, each of which consists of a complete behavior-determining, input-to-action description. For example, one layer could be "stop if an object is directly ahead." As learning takes places (and as the robot "evolves"), more and more layers are added incrementally, each stage creating a functional whole. One of Brook's layer-based robots, Herbert, can successfully navigate a dynamic environment and

collect soda cans. By virtue of his layered architecture, the robot can readily adapt and respond to obstacles in its path. There is no central processing or internal mapping, but simply a collection of competing layers that are selected according to sensory inputs. In this way, the environment via the robot's sensory-motor mechanisms guides the creature along by activating layers that automatically focus on the particular *relevant* features (to the layer) and naturally assume that certain other unexamined features remain present in the background. As with the reflex circuit, these embodied layers process stimuli, from the start, as components of coordinated action. For example, if we are to apply this model to the child maneuvering about a slope, one could imagine the infant adding, deactivating, and switching between cognitive "layers" as they are elicited by its moment-to-moment bodily engagement with the slope. Particular features of the slope are not processed as mental representations of self-contained, external bits of data, but rather components that afford particular actions according to the overall dynamics of the current reflex circuit (or layer) that is activated. In this way, Hubert's intelligent behavior is soft-assembled via constant local, dynamic interaction between the environment and a multitude of competing and subsuming layers. If one layer is damaged, for example, the system compensates automatically and carries on acting –what Clark refers to as a "robust" solution (1997, p43). Because of this adaptive strategy, an embodied approach to AI enables the subject to act and survive in a dynamic world by replacing computation-based "mathematical logic" with de-centralized engagement with the real world.

Thus, when compared to Cartesian dualism, behaviorism and computationalism, embodiment theory presents itself as a model better prepared to avoid theoretical problems and to provide practical solutions. In total, an embodied approach asserts that perception and learning are a matter of reconstituting elements of the natural world according to subject-sensitive embodied projects (e.g., crawling, walking, reaching for a flame, etc.). As Clark writes, "Intelligence and understanding are rooted [...] in something more earthly: the tuning of basic responses to a real world that enables an embodied organism to sense, act and survive" (1997, p4). On this view, it seems that embodiment theory posits that an organism's sensory-motor reflex circuits *afford* a world that "enables [it] to sense, act and survive" (Ibid.). To this effect, embodiment theory insists that stimulus reconstitution does not occur via mental representations (or "interpretations"), but *in* the world itself as it is lived and phenomenologically experienced by the organism. Embodiment theory urges cognitive science to revise traditional dualistic conceptions that understand the natural world as an external and pre-given substrate from which we contemplate, conceptualize or infer conscious representations. Alternatively, according to an embodied approach, the world is to be understood (under a monist framework) as enacted and afforded continuously by the subject's embodied relation towards it. In order for cognitive science to provide the most accurate, objective understanding of the organism's cognitive system, it must take into account the fact that the world exists as phenomenologically distinct and perspective-laden for each embodied subject. That is, as the organism learns and perceives, he or she does *not* reconstitute a pre-established world (i.e., start from scratch, so to speak), but instead reorganizes his or her most recent enacted perception of it. In this way, the world always

exists as an action-laden perspective from an embodied subject. Learning (i.e., stimulus-response patterning) is continuously phenomenologically offloaded into the world itself.

Because this readjustment does not function in a separate realm of mental representation, embodiment theory is committed to the notion that a subject's perspective can have important influences on the natural world (qua phenomenology) insofar as embodiment theory maintains its monistic conception. As Merleau-Ponty puts it, "the subject does not live in a world of states of consciousness or representations from which he would believe himself able to act on and know external things by a sort of miracle" (2002, p189). Thus, for cognitive science to remain progressive and accurate, it must include first-person phenomenological reports within the data of science. One of the first advocates of embodiment theory, Maurice Merleau-Ponty, provides an analysis of such data.

At the beginning of his book, *Phenomenology of Perception*, Merleau-Ponty asks us to reexamine our understanding of the term "sensation." For Merleau-Ponty, the Cartesian notion that we experience the world as internal representations of the external, bodily world in fact "corresponds to nothing in our experience" (1964, p3). Whereas Descartes investigates how a "thinking subject" relates to his "external world," Merleau-Ponty starts his investigation by taking the relation to be direct, immediate and embodied. He rejects mind-body and subject-object dualisms in favor of understanding the mind and perception as essentially embodied from the start. Merleau-Ponty argues that ordinary phenomenal experience presents us *immediately* with a world of "external objects" –not separate, self-contained internal representations or sensations from which we infer the object. Moreover, and central to Merleau-Ponty's theory of perception, we experience the object *through our bodies*; our physicality influences what we see and is the necessary and permanent condition of experience. In this way, sensory perceptions are not mental states or intentional representations, but instead ways that our conscious intentional body comports itself to objects in our situated experience. Merleau-Ponty references various Gestalt images and perceptual illusions, which demonstrate how we always view objects as meaningful holistic forms with distinctive foregrounds and backgrounds. If our phenomenal scene was atomistically built, then "[w]e ought, then, to perceive a segment of the world precisely delimited, surrounded by a zone of blackness" (2002, p54).

According to Merleau-Ponty, in the process of perception the human organism is always faced with the task of orienting its body so as to achieve its best relation with perceptual objects –what he describes as its "maximal grip." In this way, an accurate sensory perception is nothing more than a skilful bodily engagement with an object, or as he writes "an optimal body-environment relationship that relieves the 'tension'" (as cited in Dreyfus, 138). In other words, the coherence of images emerges when the body properly adjusts itself so that it can act on the object. Likewise, for an individual walking about in museum, for example, Merleau-Ponty asserts that it is just a natural fact that our body, even without our conscious, explicit violation, will want to move to the ideal viewing angle to see the paintings with maximal clarity of detail and overall form. Oscillation towards equilibrium occurs as if we were riding a bike. Thus, the dynamic relationship between objects and our bodies is normative in that it adjusts to arrive at better or more correct bodily engagement with the object.

As an extension of maximal grip, Merleau-Ponty's account of learning has many similarities with the reflex circuit of embodiment theory. According to Merleau-Ponty, at the first stage of learning, we act like centralized computers: we deal with the world (poorly) by decomposing it into context-free, often quantitative discriminations (e.g., driver noting his speed be consistently looking at the speedometer), and then act according to a list of rules that address these features (e.g., shift once every 15mph). However, as the beginner learns, he or she starts to notice additional aspects of the situation and becomes more closely engaged with it. For example, whereas a novice driver approaching a dangerous curve at a high speed will proceed to explicitly consider the angle, speed and outside conditions, the expert drive will *feel* that he is going too fast and then decide to ease the break. The expert driver has a vast repertoire of situational discriminations that allow him to make subtle, refined discrimination in his environment. Merleau-Ponty argues that it is precisely *not* a matter of collecting more and more "stored" rules via mental representations for one to follow. Instead, skill acquisition occurs when *new dispositions* emerge in response to the situation. Thus, intelligent behavior is when subject's dispositions ensure that in the phenomenal experience the relevant similarities show up that elicit a natural coordinated response. As a way of addressing the frame problem head-on, Merleau-Ponty recognizes that the ability to restrict perceptual intake to the relevant features for action and response is an essential part of learning. In his words, a "person's projects polarize the world, bring magically to view a host of signs which guide action" (as cited in Dreyfus, 2005, p132). These "signs which guide action," that show up in the objects themselves are very similar to the offloaded "memories" inserted during stimulus reconstitution in Dewey's model. Situation-focused dispositions, as with layers and reflex circuits, warrant that the embodied subject naturally focus on relevant features and inexplicitly assume that certain other non-effects remain in the background. Thus, learning for Merleau-Ponty and Dewey is the gradual replacement of reasoned, rule-following responses with intuitive reactions where the subject uses the world itself as a means to elicit a response without having to mentally represent the world. It is important to take note that "learning" understand as such remains distinct from very basic forms of learning (such as simple rule following), which indeed occurs frequently in life. A model example is muscle memory where an individual skillfully performs tasks without the intermediary conscious reference to rules. As with the reflex circuit, Merleau-Ponty's phenomenological account posits that the organism uses the world itself (as it is experienced) as its own map and best "representation."

The later philosophy of Ludwig Wittgenstein supports the viability of naturalized perspectivism. In particular, Merleau-Ponty's account of perception and skill acquisition lends itself very closely Wittgenstein's insights on rule following. Generally speaking, Wittgenstein argues that "no course of action could be determined by a rule, because every course of action can be made out to accord with the rule" (1958, p201). To explain this, he provides the example of an individual (presumably) following the rule "plus 2" while actually adding increments of +4 after he or she passes 1000 (1958, p185). Wittgenstein's point is that we successfully operate not by explicitly following a rule. To understand correctness of use, there is no recourse to some internal authority beyond the actual application in use of "the rule." This is because there is no fact of the matter that determines

the correct application of some internal rule. Rather, skillful and intelligent behavior is revealed in use via community assent. Wittgenstein describes our participation in a community with pre-established criteria for correctness as the “form of life” that we adopt in language and action. Thus, this general characterization of Wittgenstein supports embodiment theory insofar as it understands human action not to be a process of following and applying internal rules, but rather as a means of engaging in the world.

Wittgenstein extends his discussion on forms of life in his critique of a private language, which suggests the presence and viability of embodiment theory in language. Here, Wittgenstein’s conception of how a child learns language offers particular support for the approach of naturalized perspectivism. In Wittgenstein’s account, we learn phenomenological (i.e., sensation) language by participating in a pre-established form of life, or “system of reference by means of which we interpret an unknown language” (1958, p206). That is, when a child is hurt, he is trained to use words to express his pain instead of crying. In this way, the child learns psychological vocabulary through public training in which non-verbal pain behavior is gradually replaced by verbal pain behavior. In Wittgenstein’s words, “the verbal expression of pain replaces crying and does not describe it” (*PI* 244). Hence, when a child articulates pain behavior, he or she does not introspect or “describe it” (i.e., concentrate on what is occurring in some ‘inner realm’ and then ostensibly name it), but instead chooses to express pain behavior in another form (i.e., verbal pain behavior). The stage is already set in that, as we learn language, we enter into a pre-established relationship between verbal pain-expressions and pain-behavior expressed in the bodily actions of other speakers. As children, we learn sensation words, and are understood communally, insofar as we have the “right,” not the “justification,” to use certain expressions (1958, p289). Wittgenstein stresses this distinction to illustrate how a child learns the proper use of words: by participating in the sensation language game and being positively reinforced if other participants understand, not according to conditioning based on whether our “mental representations” matches our verbal expressions. In total, Wittgenstein’s critique demonstrates that phenomenological language has no purchase on the subject’s radically singular phenomenological experience. Because language is naturalized by the body and the community, we can meaningfully operate within the sensation language game.

Remarkably, Wittgenstein’s private language argument also explicitly advocates for an embodied approach to proper linguistic conception of the mind and body. He argues that if we conceptually divide the psychological and physical realms, then certain absurd examples of language in everyday use seem possible. The fact that “I can have your pain” is semantic nonsense, and not some empirical inaccuracy, shows that such a claim is grammatically illegitimate in our sensation talk. Commenting on the referential conception of language, Wittgenstein writes, “this picture with its ramifications stands in the way of our seeing the use of the word as it is” (*PI* 305). Thus, meaning exists insofar as we decide to adopt the established grammar –and with it the proper conceptual distinctions— of a particular language-game. The proper conceptual distinction acquired by children is not between inner and outer, but instead between two types of outer. That is, the only way to communally understand the use of sensation language rests on how the child learns the distinction between two types of *body*: those resembling living things and those that do not. This

connection arises from how a child is conditioned to use the sensation language-game where sensation terms are tied to their expression through their parent's *living* body. Under this framework, statements like "that rock has pain" properly do not hold meaning. A child verbalizes behavior by replacing bodily actions (i.e. crying) with the articulation, "I am in pain." Generally put, we are trained not to identify mental events with sensation terms, but to participate in an established way that living things act. Thus, Wittgenstein provides an account of language use and acquisitions that is against representationalist rule-following and in favor of an embodied approach. Moreover, he provides a theory of phenomenological language that allows each individual to have a radically unique, phenomenological sensation, while at the same time to be able to successfully communicate his or her perspective in a meaningful way.

In total, as a scientific, phenomenological and linguistic account, embodiment theory takes a perspectivist stance on the mind. Because the perceiving subject enacts the natural world relative to his or her embodied projects and histories, the perceptual experience is significantly different for each subject. By taking a perspectivist stance on the study of cognition, embodiment theory opens itself to charges of "anything-goes" relativism. Such accusations, however, ignore the fact that although subject-sensitive influences effect perception, they do so in a very naturalistic, evolutionarily-determined way. That is, human organisms have evolved as a species that share a basic bodily structure and evolution-friendly drives. We perceive a similar world insofar as we share certain bodily features that afford particular bodily compartments to sensory objects as they are phenomenologically experienced. As Merleau-Ponty demonstrates, bodily experience is a prerequisite for any form of perception. Thus, naturalized perspectivism, properly conceived, defends itself from charges of relativism by anchoring the plurality of our phenomenological experiences (i.e., different stimulus reconstitution between individuals) to a general, biologically-shared world.

Summarizing, it thus becomes clear that, embodiment theory, with the support of Merleau-Ponty and Wittgenstein, presents a viable model of perception. An embodied approach to cognition argues that the motor system engages with the world via a multitude of competing and subsuming reflex arcs. Learning occurs as we offload "memory" into the world and in turn create new layers and new situation-specific discriminations. Such a model lends itself nicely to evolution's tendency to build intelligent creatures circuit-by-circuit (or layer-by-layer) in functional wholes that can most efficiently and adaptively respond to the dangers and rewards in one's dynamic environment. By realizing that our cognitive architecture naturally restricts perceptual intake to relevant features, phenomenology appears to be an influential aspect of perception and thus an important subject for cognitive science. To this effect, the stance of naturalized perspectivism accounts for how a subject's embodied dispositions create for it a world where it can most efficiently operate and socially interact as a biological organism. If it is to incorporate these insights, cognitive science must take the world not as an objective, universal substrate, but as importantly different according to features of each organism's body. Overall, the interdisciplinary support gathered in this paper encourages researchers to begin to recognize the deeply interconnected nature of the mind and body.

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