Abstract

Several approaches have taken affordances as a basis for explaining cognitive processes beyond perception and action, such as language, imagination, and social practices. Another critical aspect of our mental life that can be explained from an affordance-based perspective is the origins of concepts. The perceptual basis of concepts is a traditional theme in the history of philosophy, one that has been approached from either a nativist or an empiricist perspective. Here, we seek to explain the natural origins of concepts from an affordance-based perspective that overcomes the traditional nativist versus empiricist debate. We argue that affordances are key to make sense of our experience and our concepts, as they provide the materials from which we can build them up. We sketch a positive, constructive story that explains the origins of concepts starting from experience. We propose the idea of implicit or embodied concepts as a non-discursive link between basic and discursive cognition. These embodied concepts are bodily know-how through which we patternize the world. This bodily know-how is formed, thanks to the experience we gain from perceiving and acting upon affordances. Thus, embodied concepts can be considered affordance-based states that are the missing link between experience and discursive or explicit conceptual content.

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An Affordance-Based Approach to the Origins of Concepts

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Explaining the origins of concepts has been a challenging problem in the philosophy of mind since at least the origins of British empiricism. John Locke talked extensively about this issue in his famous *An Essay Concerning Human Understanding* (Locke, 1948) and established the Modern version of the problem. Since then, many authors have dealt with this problem. Since we do not aim to enumerate all approaches, we must summarize the current state of the art as follows: there are two main approaches to the problem with critical differences, but also with shared commitments. First, according to the empiricist approach to the origins of concepts, our minds use the information gathered by perceptual states processed and enriched to build up concepts about ordinary things in the world. Under this view, concepts are built upon the sensations and perceptual states that come from experience as they undergo different processes in which the percepts are refined and enriched to form concepts. This perspective emphasizes the richness of stimuli and how the materials we gather from experience determine the kind of concepts can have in mind. Authors in the Empiricist tradition include Locke, David Hume, and contemporary authors like Burrhus F. Skinner, Lawrence W. Barsalou, William James, and Wolfgang Prinz. Second, according to the nativist approach, mechanisms, capacities, and contents in mind allow us to have concepts about the world with minimal contribution from our experience. This perspective emphasizes the cognitive equipment we have as humans and how it determines how we think regardless of having different experiences. Authors in the nativist tradition do not restrict to Plato, René

Descartes, or Gottfried W. Leibniz; influential thinkers nowadays like Noam Chomsky, Jerry A. Fodor, and Steven Pinker have also endorsed some version of nativism.

According to some authors (Fodor, 2004; Prinz, 2005), there are differences between empiricists and nativists regarding a concept and its origins. For nativists, concepts are like words—they are used to think about the world in terms of representations. In this sense, a concept is like a symbol. Furthermore, few objectives can be accomplished with symbols other than communicating. On the contrary, the so-called empiricist view on concepts conceives them as an ability or capacity by which we produce an internal model of an entity, allowing us to categorize that entity to interact with it. However, there is a critical aspect that the empiricist nativist views have in common. As Prinz wrote:

> [R]ationalists say that concepts are primarily in the business of representing, and opponents of rationalism say that concepts are primarily in the business of doing. This distinction should not be regarded as a disjoint dichotomy. Empiricists do not deny that concepts represent. Rather, they claim that concepts have other equally important functions. Empiricists claim that concepts must be able to represent things in a way that facilitates interaction with those things. Representing must be in the service of doing.
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> —Prinz (2005, p. 681)

Despite the differences in focus between empiricism and nativism regarding the central role of concepts, both claim that concepts have a representational nature, although they understand the function of those representations differently. Nativists claim that concepts are symbols that represent the world, whereas empiricists claim that they are representations of entities that allow us to interact with them. They also agree that perception and action are also based on representational states.

What Do We Understand by the Term "Affordance"?

Introducing Affordances as a Bedrock for Cognition

Here we sketch the main features or requirements needed to build a non-representational, experience-based approach to the origins of concepts. The best way to avoid the problems that a representational

approach to the origins of concepts has to face is to start from a non-representational approach to perception and action, such as ecological psychology, according to which, perception is primarily of affordances. So, if we defend that experience is formed, thanks to the ecological approach to perception and action, it is not necessary to postulate representations to explain how perception and action work.

Ecological psychology was born between the 1950s and the 1980s, thanks to James J. Gibson and Eleanor J. Gibson, and some colleagues and students who further developed this approach. Ecological psychology is based on some key ideas: (i) the main unit of analysis for explaining cognition is neither the brain nor the organism, but the organism-environment system; (ii) perception and action are two sides of the same continuous process; (iii) perception is direct, which means that it is based on the pick-up of perceptual information without appealing to inner processing or representations; and (iv) perception is of affordances (Chemero, 2009; Heras-Escribano, 2019; Richardson et al., 2008).

Affordances are the main objects of perception for ecological psychologists. They are the directly perceived opportunities for acting in the environment—for instance, doors are directly perceived as pass-through-able, doorknobs are directly perceived as graspable, and stairs are directly perceived as step-on-able. We find affordances as a suitable starting point to explain the origins of concepts.

The following section summarizes the main aspects of both the nativist and the empiricist views on the origins of concepts. We then discuss how to build an affordance-based approach to the origins of concepts. We introduce embodied concepts, specifically bodily skillful and non-discursive ways to patternize the world that works as a missing link between basic and discursive cognitive states. In this sense, we develop an affordance-based and non-representational way to form embodied concepts, which in turn become the bedrock to build regular concepts.

Two Past Theories for the Origins of Concepts: An Ecological Assessment

The Nativist Approach

Nativists claim that concepts are like words or symbols: they represent the world. According to Fodor (2004), concepts represent certain objects if they are reliably activated after being presented with the kind of object they are supposed to represent. In this sense, a concept X reliably activates when a worldly item x is presented before us. How can we explain that concepts activate in the presence of certain items? Fodor postulates an asymmetric dependency: concept X sometimes activates in the presence of y because it normally and reliably activates under the presence of x (and not the other way round). As such, the concept X contains key features that represent the item x in a general way, just like words represent things in the world. The difference is that concepts represent the things they stand for not in a natural language but in the language of thought. In this sense, there is a causal linkage for explaining this connection, but there is little elaboration regarding the sensory origins of concepts in this view (Prinz, 2005).

The Empiricist Approach

As we have seen, the nativist view is based on the idea that concepts have fixed features, and they activate before the presence of objects that have certain features connected to the ones of concepts via some kind of causal linkage or dependence. In the empiricist view of concepts, there is no set of fixed features that activate every time we encounter an item x. Prinz (2005) claims that there is empirical evidence gathered by Barsalou (1987) that concepts are variable constructions in our working memory built-in context-sensitive ways from our long-term memory. In this sense, two worldly items x that are sufficiently different would activate the same concept X not because they share the same fixed patterns but because they represent the same category in different ways, regarding different contexts, and having different goals in every situation. Prinz completes this view by saying that concepts are perceptually based in that they are "made up from representations that are indigenous to the senses" (Prinz, 2005, p. 686). And these representations include the features of every sense modality through which we form such a representation. Prinz calls this the modal specificity hypothesis and claims it is based on the empiricist (in particular, Humean) claim that all our ideas are copies of our impressions.

The empiricist view accepts two main ideas of nativism: first, concepts have a representational nature; second, concepts are reliably or normally caused by the category they represent. The main

difference is how these categories are formed, which is when the modal specificity hypothesis comes into play. We have seen that, for nativism, there is a series of fixed features that reliably activate before certain items appear. But, according to empiricism, those features are formed by particular perceptual modalities. In this sense, "[i]f perceptual states are essential for getting concepts to represent, we can simply hypothesize that concepts are copies of those perceptual states" (Prinz, 2005, p. 687). So the features change depending on the modality through which the item is represented or categorized. As such, we categorize what we have before us as having different perceptual features as basic materials and use previous modality-dependent representations to activate the concepts.

So, in this sense, the empiricist view retains the explanatory power of the nativist approach postulated with the causal linkage and the representational nature of concepts but adds the modal specificity hypothesis, which places the origins of concepts not in innate and amodal symbols in our minds but in our sense modalities. A minor change that has strong consequences regarding the origins of concepts, one of them being that it is more parsimonious. This is why Prinz concludes that "[i]f concepts are associated with perceptual representations, perhaps that's all we need. Postulating a further class of representations (amodal symbols) is unnecessary" (Prinz, 2005, p. 688). Thus, empiricism agrees with nativism in that concepts are mechanisms by which we categorize the world by representing it. However, whereas nativism claims that this categorization occurs in a symbolic way (not emphasizing the causal, sensory basis), empiricism claims that this categorization occurs via specific modality, emphasizing the role of the sensory systems in the origins of concepts.

What Role Does Affordance Play in Perception? Is It the Entity Organisms Perceive or the Means Through Which Organisms Perceive? Are Affordances the Only Perceptual Dependent Variables?

We perceive affordances or opportunities for action since these opportunities are related to our bodily skills: things are graspable if we have opposable thumbs and the ability to grasp, and steps are climbable if we have big enough legs and the ability to walk. According to ecological psychology, we

do not need to postulate representations to explain how we directly perceive affordances. Instead, we perceive affordances simply by picking up the informational variables available in the environment that specify them. A wide variety of experimental data gathered for more than five decades strongly support this claim (see, e.g., the summary and analysis of the results in Chemero, 2009; Richardson et al., 2008; Segundo-Ortin et al., 2019). In this sense, ecological psychology offers a variety of "do not need" arguments regarding empirically supported and evidence-based representations.

Why Is Affordance Any Better Than Stimulus? What Does a Theory of Affordance Suggest That Stimuli Cannot; How Has It Moved the Needle Past Gibson 1960's Recognition of How Little We Can Define Stimuli?

The Importance of Ecological Information for the Origins of Concepts

Ecological psychologists are skeptics regarding the modal specificity hypothesis in the case of affordance perception. According to ecological psychology, perceptual information is amodal: it can be detected by different perceptual systems and allows for the same behavioral responses. This view is supported by experimental evidence gathered by studies in ecological sensory substitution, which show that participants pick up the same ecological information through vision and touch for doing the same task, and they elicit the same behavioral response of distally attributing the same environmental objects, surfaces, et cetera (Travieso et al., 2015). Also, similar experimental studies in ecological sensory substitution have proven that typical features of a sense modality, like visual expansions in vision, can be translated into vibration patterns, and participants can discriminate them as such with the same efficiency as in the visual modality (Cancar et al., 2013; Lobo et al., 2018). Ecological psychologists accept that there are specific features of different perceptual systems, but at the same time, ecological information for affordances is amodal (which is sufficient to counter the modal

specificity hypothesis according to which every modality has different features and there are no shared amodal features across sensory modalities).

Building a story of the origins of concepts from an ecological or affordance-based approach does not need to appeal to symbols that work like words in a language of thought. Concepts, then, should help us to interact with the world just like affordances do, so the primary function of concepts should be that of helping us engage with the environment. We disagree with the shared commitment of both views that representations are needed to explain the origins of concepts. Regarding nativism, we disagree that concepts always have a symbolic, discursive-like nature. Regarding empiricism, we disagree with the modal specificity hypothesis and support that we interact with the world via concepts.

In sum, we offer a third way beyond nativism and empiricism to explain the origins of concepts. In this view, perception of affordances is the starting point, so concepts from an ecological perspective are in continuity with perception and action. The next section describes the story of the origins of concepts from an ecological standpoint.

An Ecological Perspective to the Origins of Concepts

We agree with empiricists that concepts derive from experience, but we have different ideas regarding what we understand by "experience." We think neither that perception is passive nor that sensations constitute representations and, with them, concepts; although we agree with empiricists that concepts facilitate interactions with objects and events.

An Ecological Starting Point

Ecological psychology relies on an affordance-based approach to perception and action. We propose to scale up this approach to the problem of the origins of concepts. In this view, perception and action are continuous and cyclic, and experience is not the passive sensory reception of worldly impingements but the implicit, tacit embodied knowledge that comes from a history of interactions with the environment. As we act in the world to perceive and act, we learn to perceive more efficiently and improve our mastery of perceiving affordances.

In this sense, it is not only the ecological information available in the environment that helps us modulate our actions but also our experience, our implicit, tacit, embodied knowledge of what happens when we perceive and act upon affordances. Experience, from this perspective, is an embodied and situated know-how that serves the purpose of navigating the environment skillfully and is the product of our developmental history of interactions with the environment. Both actual information and experience, understood as know-how, are essential for explaining how we take affordances.

Organisms with a previous experience based on a history of interactions have a sense of anticipation. This sense of anticipation is provided by the very structure of ecological information available in the environment for perceiving affordances, thanks to the lawful relationship between the organism's movements and the structure of the energy array of ecological information. This lawful regularity is established by specificity because a given variable lawfully or regularly leads to another moment or state if all other things remain unchanged. As we can see, the upcoming state is triggered by the very structure of the present state as discrete moments within a dynamic, continuous perceptual experience. This sense of anticipation generated by the very structure of information has been defined as a "current future," and it is the capacity to anticipate the next perceptual state from the present one. This is how organisms can face new situations and perceive and act upon new affordances.

What Is the Connection Between Affordances, Behavioral Scale, and Intention? How Distant or Reluctant Can a Perceiving-Acting System Be Before Affordances Come Into Play? Do Affordances Exert Their Role Only When the System Is Close or Willing Enough?

From Affordances to Experience

The Role of Experience and Tacit, Bodily Knowledge in Perception

We cannot leave aside that organisms do not perceive and act upon new affordances all the time: they often navigate familiar places. In this sense, when we perceive and take affordances, we also do that

based on our previous experiences with similar affordances in different contexts. Thus, in our everyday dealing with the world, thanks to the perception and taking of affordances, we establish a history of interactions from which derives implicit know-how of the consequences of taking an affordance. And part of that tacit, implicit knowledge includes what we can expect and what can result from the perception and taking of affordances. For example, after turning a doorknob for the first time, you know that there is a range of consequences (mainly that the door either opens forward or backward), so you can also anticipate the upcoming state partially based on your history of interactions with doorknobs.

This should not be controversial, as ecological perceptual learning implicitly requires this embodied, tacit knowledge since we attribute expertise based on a previous experience of interactions in which novices learn to detect the most specific informational variable. So, once we perceive and take a specific affordance for the first time, it is natural that the next time we will expect what will happen; this is, we expect that our action will have this or that consequence. If this happens for every affordance we take, it is reasonable to conclude that we develop an implicit bodily knowledge of the repertoire of consequences derived from taking different affordances in different contexts. Since we deal with entrances and apertures in different contexts and with different affordances, we have in mind a repertoire of what to expect when dealing with one of them: they can have either doorknobs or simply need to be pushed, they can be pushed or pulled, there are also sliding doors, etc. But usually, in familiar contexts, no doors fall under the ground, hide under the ceiling when pushing them, or simply disappear when we touch them. The range of consequences is somehow limited in our environments, which helps us establish something like a repertoire of consequences of what will happen. When confronting doors, we have a more or less general idea of the possibilities regarding how to interact with them because we know the consequences of dealing with doors. This range of consequences helps us build some expectations regarding what we will find, so consequences and expectations are tightly linked.

A Dispositional Basis of Experience

As such, this repertoire of different consequences allows us to develop different dispositions when we take affordances. We have seen that when we perceive and take affordances, we must consider both the ecological information available in the environment and the previous experience that we have in the form of tacit, implicit, or bodily knowledge. This knowledge has been established, thanks to the history of interactions with previous affordances, from which we have learned a range of consequences that occur when taking them, and that helps us have different expectations regarding what will happen when we take them. In this sense, if we focus on the kind of knowledge we develop based on expectations and consequences, it is easy to think that both aspects allow us to develop certain behavioral tendencies or dispositions toward certain affordances. So, if we know how to make affordances and what will happen, expecting that a range of particular situations will take place when I take an affordance means developing a certain tendency toward some opportunity for action.

Dispositions are conceived as how our experience is embodied in us. Just like there is a range of consequences when taking an affordance, there is also a range of dispositions toward those affordances. Returning to the example of doorknobs, if we want to go to a place where doors are covering the apertures, we tend to have this or that bodily movement for opening the door depending on whether it has doorknobs or not; it is a sliding door or not, etc. This experiential knowledge is bodily, as these tendencies are purely corporal: they are not abstractly thought and then applied mechanically without considering the environment's particularities. This implicit bodily knowledge in the form of dispositions includes a wide range of postures, orientations, and the like that serve the purpose of taking certain affordances, depending on our goals. Thus, we have an implicit, embodied corpus of tendencies or dispositions to act when we perceive and take affordances, which can be understood as the basis for certain habits in a Deweyan sense (Segundo-Ortin & Heras-Escribano, 2021).

How Do Systems Engage With Affordances as They Move Among Tasks and Intentions?

Habits and Experience

The notion of habit has a significant place in Dewey's thought, from his critique of the concept of the reflex arc in psychology to his work on *Human Nature and Conduct*. In the latter work, he did not make this claim explicitly but proposed a new ontology of the mind based on habits that could overcome the traditional one based on states, events, and representations. Dewey defined individuals as complex systems of habits: that is, as an embodied set of complex ways of feeling, thinking, and acting.

But what are the main aspects of habits? First, habits are functional relations with the environment: "habits are life functions in many respects . . . especially in requiring the cooperation of organism and environment" (Dewey, 1922, p. 14). This idea is well developed in Dewey's critique of the reflex arc in psychology (Dewey, 1896). In his view, stimuli are not pre-given objects or events that trigger automatic responses, as Watsonian behaviorism claimed. In Dewey's view, both stimulus and response are a temporal and functional distinction within a continuous sequence of acts that are built by the organism with regard to its previous experience and goals: "In calling one stimulus, another response, we mean nothing more than that such an orderly sequence of acts is taking place" (Dewey, 1896, p. 366). This view implies that stimulus and response cannot be ontologically distinguished, as a response shapes the stimuli just as the stimuli enable a response. "The so-called response is not merely to the stimulus; it is into it" (Dewey, 1896, p. 359). Stimulus and response affect each other in the continuous development of the perception-action cycle. This continuity of perception and action and the rejection of the stimulus-response scheme are entirely in line with the ideas of ecological psychology. Following this reasoning, a habit might be defined as a particular and well-established type of functional, dispositional relation between an organism and an object or event, serving as the basis to establish new functional relationships between organism and environment. This view is also shared by ecological psychology, as it focuses not on the organism alone but on the organism-environment (functional) system.

Second, habits provide continuity and consistency to organismal action, without which the organism cannot adapt to the environment. In this sense, there is routinization of habits and automaticity, but it is the automaticity derived from organismal learning, flexibility, and efficiency, not the automaticity derived from rigid and mechanical behavior. As Dewey wrote, "[H]abits involve mechanization . . . but mechanization is not of necessity all there is to habit" (Dewey, 1922, p. 42). So,

habits provide stable patterns of actions based on dispositions that become the main features of an organism. Moreover, these habits shape the organism's personality, providing it with a framework for acting depending on circumstances. In conclusion, organisms are not discoordinated bundles of habits but agents whose actions are well-structured and coordinated, thanks to habits.

Finally, these habits are the basis for explaining intentional, purposeful actions in organisms. If habits are embodied and pre-reflective coordinative structures, they can be understood as "active means, means that project themselves, energetic and dominant acts of acting" (Dewey, 1922, p. 25). Dewey claimed an instrumental nature in which habits and their projective nature are means to achieve ends, as when we develop a habit of smiling in certain situations.

Taking habits as instrumental allows Dewey to introduce one of its two most important properties: consciousness and intelligent thinking. In Dewey's view, consciousness and habits go hand in hand because the former arises when the latter meets certain obstacles. In a Heideggerian way, as long as there is a smooth organism-environment coupling or adjustment, no consciousness or reflection upon our actions is required. However, when disadjustments enter the scene, intelligent thinking intervenes:

> [T]he work of intelligence in observing consequences and in revising and readjusting habits, even the best of good habits, can never be foregone. Consequences reveal unexpected potentialities in our habits whenever these habits are exercised in a different environment from that in which they were formed.
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> (Dewey, 1922, p. 51)

In the example of grasping the doorknob, one has the habit of opening doors, including a general way of dealing with doorknobs and their affordances consistently. This consistency includes an expectation of what will happen based on one's experience. Hence, when we grasp and turn a doorknob, we expect that the door will exert a yaw rotation instead of a pitch or roll rotation. However, if, for some strange reason, someday we will face the strange case of a door that rotates around its transverse or longitudinal axes instead of its vertical axis, then we will have to intelligently revise or readjust our habits regarding opening doors (Figure 5.1).

[Insert 15032-6624–005_Figure_001 Here]

Figure 5.1 Example of how experience and habits interrelate. Courtesy of Cato Benschop.

There is something that should be emphasized: in the example of turning the doorknob, there is no ecological information available about how the door is going to rotate, yet we have a certain expectation regarding how it is going to rotate, and our bodies are disposed of in a certain way regarding that expectation. In this sense, there is no need to invoke mental representations to explain this expectation when we can simply appeal to the idea of habit, as these coordinative structures allow us to pattern the world.

Introducing Embodied Concepts

As we have seen, the habits we form through interaction with affordances include an implicit, embodied knowledge of what we can do and expect. This knowledge is embodied and pre-reflective, including the postures, orientations, and movements that the body enacts when the organism has a certain goal or experience, and it is confronted with particular affordances whose taking will satisfy its goals. For example, organisms that perceive affordances of graspability know what to expect and how to move and orient when grasping something, and they know what actions can and cannot be done after grasping something (e.g., they know that they can throw the object, and they know that if they open their hands, the object will fall). This repertoire of consequences is well-known, the organism anticipates it, and it is used to satisfy the agents' goals with certain habits. In this sense, we can claim that knowing how to behave when taking affordances (in an implicit, embodied way) includes knowing a repertoire of possible consequences, which in turn implies that organisms can have a general idea of what to expect when dealing with certain objects and situations: that it can be delimited, somehow, a certain range of outcomes that derive from their actions. This knowledge of certain consequences that regularly happen and that is expected on the basis of previous experience implies that some regular pattern or general feature has been identified in every context in which an affordance has been taken. Such a pattern is anticipated, meaning it is identified and discriminated against even before it occurs. It is a regular pattern identified and anticipated from a limited number of particular situations, just like

concepts are generalizations from particular cases. For this reason, we think it is reasonable to postulate the existence of embodied concepts,[1] or a set or repertoire of consequences or patterns that can be expected or anticipated from the active dealing with a certain object or situation in terms of taking available affordances.

Embodied concepts are not linguistic, discursive, or explicit. This means that discursive features are not applied to them. For example, they are not conceptually articulated propositional contents. At the same time, what they have in common with linguistic concepts is that they are generalizations from particular cases and help us deal with the world more efficiently. What's their importance, then, and what do we gain by postulating their existence? As we see it, embodied concepts are important because, in the literature, we usually find a story in which we move from contentless states in basic cognition to contentful cognitive states filled with concepts, as in an all-or-nothing explanation in which we move from nothing (contentless states with reactive and mechanical responses) to everything (conceptually articulated propositional states). But we think it is easier to postulate intermediate states in which there is something in the middle, between mere contentless reaction and pure conceptual abstraction, that makes this transition between both kinds of states gentle and not abrupt. In this sense, embodied concepts are the implicit, pre-discursive, bodily knowledge of certain causal patterns in the world, formed by the set of known consequences and expectations of what we can do when taking the affordances of particular things and environments. Knowing these regularities is more than merely reacting in a mechanical, uncoordinated, and disembodied way because the organism is precisely aware of what will happen due to the previously mentioned experience that allows it to have expectations and anticipation. Acting in a purely reactive and mechanical way implies that the organism has no experience, no previous history of interactions in which some kind of embodied, pre-reflective, pre-discursive knowledge has not been achieved. But we know that even the simplest organisms learn through perception, that there is flexibility and adaptivity regarding what information we have to detect when learning to take affordances efficiently, and that this knowledge, just like Dreyfus claimed, is "stored," not as representations in mind, but as dispositions to respond to the solicitations of situations in the world" (Dreyfus, 2002, p. 367). It is not discursive or explicit knowledge but an implicit bodily know-how related to the expectations and anticipations of patterned situations and the postures,

movements, and orientations our bodies develop when confronted with those expectations. In this sense, infants and some animals with enough memory and learning capacities have those embodied concepts, too, as these creatures implicitly know what to expect from certain situations and enact a repertoire of movements in such contexts. It is a kind of bodily knowledge that includes the awareness of certain patterns due to learning through their particular history of interactions with the world.

So, in this sense, embodied concepts are the products of our experience: the products of developing certain habits that coordinate our activity, thanks to our history of interactions with the environment. These interactions with affordances allow us to discover some patterns in the environment that, in turn, help us to develop some expectations, then some dispositions, and then some habits that skillfully coordinate our activity. In this sense, pre-discursive and embodied concepts are the missing link between basic contentless states and discursive, propositionally contentful contents.

Understanding embodied concepts as representations would be an error when there is no need to postulate such entities. Here we appeal to the work of Eleanor Gibson on perceptual learning and the notion of the education of attention. For example, Gibson and Pick (2000, p. 158) stated,

> Perceptual learning is not an association of elementary processes nor is it a construction from elements of any kind nor the formation of a representation. It is a process of differentiation resulting in specification of information for an affordance, a relation of an animal and its environment.

The structure of the light in a room can ideally specify that an object is approaching us, so we start the movement to avoid a collision before that collision happens. It is necessary to perceive that information specific to the event of a collision to do appropriate actions on time, like moving away from the object's trajectory, catching it, or hitting it. Moreover, even if there is a component of a future situation, this is not a case in which we need to form a representation of that future event because the ambient energy array is rich enough for us to pick a specific variable that guides our performance (Turvey, 2018). In our understanding, the expectations and anticipation that emerge from embodied concepts are based on the same ecological principles and not on cognitivist or representational ones. If someone tries to postulate representational inferences in the case of Figure 5.1, it is due to the widespread cognitivist

assumption that the (bodily) knowledge of what to expect must be stored as a representation in our heads. Nevertheless, anticipation and expectations are fundamental in our everyday perception and performance. This knowledge related to perceptual learning is better understood as a case of differentiation than a case of enrichment or representational inference of the available information in the organism-environment system.

Embodied Concepts as Interfaces Between Experience and Discursivity

We have seen that the gap between contentless, basic cognitive states, and contentful discursive states can be elegantly filled in with the postulation of embodied, pre-discursive concepts. In this sense, the elements present at one stage are the materials from which we can build the next stage. First, when perceiving an affordance for the first time, the detection of information and the taking of an affordance serve as the basis of the canon for learning how to do it more efficiently the next time. The next time we have some expectation that is the product of a previous interaction with the environment. After taking the same affordance several times, consequences are stable, and expectations are established, allowing us to develop certain dispositions. The stable consequences or range of possible consequences allow us to pattern the environment (present and future) in specific ways. Once we have patterned the consequences, we can pattern the anticipations, so we start developing dispositions toward the affordances of particular objects and events. With time and routine, these dispositions become habits that coordinate our ways of achieving specific goals, enacting routinary movements and orientations depending on our goals, experience, and available affordances. Thus, when we have developed some habits that coordinate our behavior depending on specific patterns in the world that generally appear when taking particular affordances, we can claim that we can form some embodied concepts that help us deal with the world more efficiently. At the same time, embodied concepts are the materials for forming traditional, discursive concepts once language enters the scene and critical changes are produced in our cognitive world. In this sense, embodied concepts are the interfaces between action-perception processes and conceptual, discursive articulation.

Conclusion

Our proposal offers a third way for explaining the origins of concepts beyond nativism and empiricism. We have seen that nativism and empiricism share several aspects: the representational nature of concepts and the causal origins of concepts. The main difference is that while nativism claims that concepts are symbolic amodal structures, empiricism claims that features of sense modalities form them. Also, nativism claims that the main function of concepts is to represent worldly items just like words do, while empiricism claims that the main function is to coordinate with the world via some representational structure. Our proposal rejects the representational nature of concepts and aims to offer a non-representational approach to their origins based on the main aspects of ecological psychology, which is the same as saying that it is an affordance-based approach to concepts. We did not aim to offer a full-blown account of concepts but to illuminate the previous steps for building an affordance-based or ecological approach to their origins. Some steps should be taken first, which is what we have done in Section 3 of this chapter. We have sketched a journey from how we perceive and take affordances from an ecological perspective to the formation of experience understood as bodily know-how that comes from the history of interactions with the environment. This experience allows us to have certain expectations of the consequences of our activity, which in turn allows us to develop certain dispositions, which are, in turn, the basis of habits. Habits and their experience allow us to pattern the world, and these patterns are derived from a limited number of particular situations, just like concepts are generalizations from particular cases. For this reason, we postulate the existence of embodied concepts, which are non-representational ways in which we pattern the world based on our habits and worldly consequences. These embodied concepts would be the interfaces or links between mere perception and action processes on the one side and full-blown conceptuality and abstract thinking on the other.

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Note

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[1] We know that the term "embodied concept" has been introduced in the literature before us (see, e.g., Shapiro, 2019, Chapter 4, for a wonderful update on the issue). However, whereas this term has been used to explain how the cognitivist approach to concepts is rooted in embodied aspects, here we propose a different way of understanding the term that is not related to cognitivism.