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Situated Cognition

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Situated cognition examines how the human mind is affected by being in a physical body and a natural and sociomaterial environment, influencing how a person perceives, learns, knows, reasons, decides, and acts. Within the generic term “situated cognition” are various distinctions in which cognition is embodied, embedded, extended, distributed, dynamical, or enactive. In this entry, these views of cognition are explored through influential works in anthropology, philosophy, and cognitive science.

Situated cognition is the idea that the human mind involves more than just the neural activity inside the brain and is influenced, or perhaps even constituted, by things external to the brain, such as the body and/or the physical world (for a useful primer, see Wilson and Clark 2009). The cognitive processes of interest in situated cognition are integral to the processes that form individuals, societies, and sociomaterial culture, as well as the relations and interactions between them, and include such matters as perceiving, learning, knowing, reasoning, deciding, and acting. How cognition is situated can be examined from a variety of positions. First, when the mind is influenced or constituted by the resources and processes of the body, cognition is said to be “embodied” (respectively, influence and constitution are weaker and stronger forms of the embodiment claim; for an exploration of embodied cognition, see Chemero 2009). Second, when the mind is influenced by the resources and processes of the natural and/or sociomaterial environment, cognition is said to be “embedded”; similarly, when it is constituted by them, cognition is “extended” (Andy Clark and David J. Chalmers’s 1998 article “The Extended Mind” is a foundational work in extended cognition). Finally, when the mind is considered to be part of a network of interacting agents, cognition is said to be “distributed” (Edwin Hutchins’s 1995 book *Cognition in the Wild* is an influential examination of cognitive distribution).

Views of cognition as embodied, embedded, extended, or distributed, as well as other positions such as the idea that cognition is dynamical (i.e., cognition understood and analyzed as a complex dynamical system) or enactive (where cognition arises through the dynamic interaction of brain, body, and the material environment), are differentiated by complex, often technical philosophical arguments and definitions (not reviewed here) that broadly relate to two key inquiries: what cognition is and what elements, functions, and processes participate in it (respectively, cognition’s nature and boundaries). For example, there is an ongoing debate regarding whether extracranial resources are integral components of cognition (i.e., constitutive of it) or merely causally linked to it through causes and effects that are external to cognition. Another issue concerns whether the mind represents (or re-creates internally) the external world; this position, known as “representationalism,” has been an implicit part of traditional cognitive models. Since the 1990s, new research trends in artificial intelligence have suggested that representational cognition would involve massive computational effort and would be correspondingly slow, perhaps to the point of dysfunctionality and evolutionary unsustainability. Internal representations might not even be required, as the external world may hold within it all the information needed by an organism, such that an organism need merely interact with the world to obtain the information it needs. Whether

internal representations are required is explored in the various positions of situated cognition, with some arguing in favor of retaining the representational model and others strongly rejecting it. The idea that cognition can be nonrepresentational is presented by Rodney A. Brooks's "Intelligence without Representation" (1991).

Concerns with definitions, boundaries, and roles are common to anthropological inquiries into what makes us human. Many of the positions are complementary, so it is possible to hold that cognition is both embodied and embedded, or that it is both enactive and extended as well as embodied and embedded (the latter is sometimes referred to as "4E cognition"). As a consequence, the boundaries delimiting the various positions are somewhat tangled and complex (if not unclear). If anthropology as a discipline has become sensitized against wholesale applications of psychological or cognitive approaches to culture (see, for example, Maurice Bloch's critique in *Anthropology and the Cognitive Challenge*, 2012), it has nonetheless widely embraced the intuitively plausible notion that cognitive constructions such as the self and social knowledge are affected by being in a human body and located in particular sociomaterial contexts. Within anthropology, the idea that cognition is situated can be seen especially in the work of Gregory Bateson, Edwin Hutchins, and Tim Ingold.

A pioneer in situated approaches to anthropology, Bateson (1972), focused on the ways in which social knowledge is instantiated, patterned, and made available by forms of mediated action. Anthropologists have also examined how sociomaterial environments influence knowledge acquisition, cultural transmission, and learning across a range of contexts, including everyday contexts, formal classroom instruction, observational learning, apprenticeship, and the acquisition of performative skills. An example is the work in situated mathematics of Jean Lave (1988). Lave took the view that mathematical knowledge is socially constructed, and she analyzed everyday mathematical skills as formed and shaped by the interactions between an enculturated individual and the sociomaterial context. In this same vein, much of Ingold's work has been focused on how the relations between individuals, societies, environments, and cultural resources affect the transmission of knowledge and skills within particular developmental contexts. Drawing on the fields of ecological psychology and phenomenology, Ingold argues that it is necessary to adopt an agent-in-environment position, rather than adhering to the unhelpful distinction between mind and environment. Ingold's central line of argument (see especially *The Perception of the Environment*, 2000) has been to challenge this dualist view by putting forward the notion of the "dwelling perspective," according to which processes such as thinking, perceiving, remembering, and learning must all be studied and understood within ecological and environmental contexts. Finally, the work of Constance Classen (*Worlds of Sense*, 1993) has recognized that sensory perception is not merely a physical phenomenon but a cultural one as well (i.e., perception is embodied and embedded) and constitutes both a means of environmental interaction and a method of cultural transmission through forms such as ideas, values, aesthetics, visual art, music, and language.

When cognition is *embodied*, the extracranial body is recognized as having a role in how the mind functions, since the anatomic make-up, physiological capacities, and sensorimotor capabilities of the human body directly inform the experience of negotiating the natural and sociomaterial environment. The embodiment hypothesis recognizes that individuals adaptively respond to their environmental conditions, with cognitive processes constituting an evolved capacity for environmental response. Within embodied cognition, a specific area of interest for anthropologists is how the body affects the formation of mental constructs, such as concepts of spatiality and mathematics that are rooted in bodily experience. For example, spatial terms such as

“front” and “back” are understood as referring to specific parts of the human anatomy, while terms such as “up” and “down” relate to the body’s experience of a gravity-bound environment. The work of George Lakoff and colleagues (particularly Lakoff and Johnson’s *Philosophy in the Flesh*, 1999) has examined how linguistic metaphors are often grounded in embodied experience, as in comparing the feeling of happiness to the relative direction “up” or describing the idea of the mathematical number line through the lived experience of walking in a straight line. Other areas of anthropological interest include the use of the body and embodied behaviors (e.g., gesture, facial expressions, and bodily postures) during social interactions of communication and learning, emotional display, autonomy and dominance, and symbolic or cultural representation.

The *embedded* view holds that human cognitive processes are influenced by aspects of the natural and sociomaterial environment, properties that enable, shape, and constrain the range of possible behavioral and psychological responses that an individual or society can make when they interact with and within it. Franz Boas conducted early work in an embedded approach to anthropology, examining how different environments affect matters including the ways in which the human mind conceptualizes the world, how aspects of the world (such as color) are categorized by the mind and expressed in language, and how environmental change affects the body’s morphological development. Similarly focused on color categorization and linguistic expression, Brent Berlin and Paul Kay (1969) proposed that characteristics of human visual perception (i.e., the interaction of primate trichromatic color vision with optical phenomena to create color foci) inform cross-cultural regularities in the emergence of linguistic terms for color. Building on this line of inquiry, from a distributed cognition perspective, the anthropologist Charles Goodwin (1997) situated color categorization within particular communities of practice and examined how new members become enculturated and competent in group practices through embodied apprenticeship.

The view of cognition as *extended* is a stronger form of the embedded view that takes the resources and processes of the physical world (including the body) to be integral components of cognition, rather than limiting their role to one of causal influence. Extended cognition sees the mind as externalizing many of its functions by recruiting and incorporating extracranial resources and processes. For example, functional limitations in the way human memory works (e.g., its capacity, perishability, and privacy) have motivated the use of physical artifacts to accumulate, store, and share its contents. Another classic example of extended cognition is the blind man’s stick (addressed in the works of philosopher Maurice Merleau-Ponty [2012], anthropologist Gregory Bateson [1972], and cognitive archaeologist Lambros Malafouris [2013]), which can be said to function as an integral part of the perceptual system (and, hence, as an integral part of cognition) because it extends the user’s sense of touch to its tip. A related and rapidly growing line of inquiry is the anthropology of technology (or digital anthropology), which examines the issues inherent in the relations and interactions between individuals and technologies as they form increasingly complex systems and networks. The work of Lucy Suchman (2007) explores the idea of agency at the interface between humans and machines: who has agency, how agency is constituted, and how agency changes through creative and interactive processes. Similarly, the anthropology of technology investigates the ways in which minds and bodies change when they incorporate devices or technical processes that enhance the psychological abilities and physical capacities of mind and body.

Distributed cognition views the mind and knowledge as involving resources and processes in networks of interacting agents and objects whose collaboration produces results beyond what

any one individual could realize alone. Rather than being viewed as an individual property, cognition is approached as a social phenomenon that is situated in practices of knowledge and problem solving and that leverages social and material resources as mechanisms for sharing knowledge, collaborating and coordinating effort, and task decomposition and decentralization. Distributed cognition is perhaps best known through the work of Hutchins (1995). His close observation, analysis, and description of modern Western navigational practices demonstrated that sociomaterial mechanisms can distribute cognitive effort across geographic space, while social knowledge encoded in the forms of artifacts can distribute cognitive effort across time. Spatially distributive sociomaterial mechanisms identified by Hutchins include organization and authority, the decomposition of tasks to multiple skill levels to enable participation by both experts and novices, and the use of communication methods and media that have been standardized and practiced toward realizing maximal efficiency and effectiveness. Temporally distributive artifactual mechanisms identified by Hutchins included devices such as charts, sextants, and other instruments used to identify, measure, and record navigational data related to a ship's position, direction, and speed; such devices represent and make available social knowledge that has been accumulated and refined over time, perhaps over multiple generations.

The *dynamical* view of cognition sees it as a complex system whose properties and outcomes cannot be explained by solely examining its components, whether they are isolated from each other or interacting in simple combinations. In other words, the dynamical view sees the whole of cognition as characterized by emergent properties and outcomes that exceed the total of those of its components. For example, the act of walking through an environment involves the management and coordination of sensorimotor functions (e.g., vision, spatiality, and balance; gait patterns and respiration) with changing environmental conditions (e.g., differences in terrain, weather, and lighting as well as resources and threats) and whatever other activity may be occurring in the mind (e.g., attention, goals, and memories; conversations with social others; and multitasking). Bateson (1972) was an influential proponent of the systems theory approach to understanding human societies, which he viewed as complex dynamical systems composed of numerous closely intertwined variables that interact on multiple levels.

In comparison, the *enactive* view of cognition sees it as a phenomenon that emerges from the dynamic interactivity between the brain, body, and sociomaterial environment (see Daniel D. Hutto and Erik Myin's *Radicalizing Enactivism*, 2013). Organisms do not simply receive information from their environment, a view of cognition in which perception is characterized as a passive process. Rather, how organisms act determines what they experience and what it means. Enactivism is a more radical view of cognition because it answers the questions about cognition's boundaries and nature not only by redrawing the boundaries to include the body and sociomaterial environment as constitutive elements but also by asserting that cognition is interactivity. That is, thinking and doing cannot be separated; they are the same phenomenon.

Selectively drawing on these theoretical paradigms, the "material engagement theory" of cognitive archaeologist Lambros Malafouris (*How Things Shape the Mind*, 2013) has been particularly influential because of Malafouris's unique emphasis on the material component of cognition. Material engagement theory views cognition through three central tenets. First, cognition is recognized as being embodied, embedded, extended, and enactive, which positions brain, body, and materiality as equal components of cognition (though these components contribute to cognition in different ways) and defines cognition as the dynamic interactivity between them. Second, materiality has agency that shapes and constrains human behavioral and psychological responses.

This tenet draws upon psychologist James J. Gibson's (1977, 1979) notion of affordances, which are relational properties between an agent's abilities and its environmental resources. Third, materiality has a semiotic function (i.e., it is an enactive sign). The "enactive sign hypothesis" asserts that material signs play a constitutive role in the emergence of meaning and therefore *bring forth* meaning, rather than simply representing meanings as signifiers of a signified. These three tenets can be illuminated through the process of making a clay pot on a potter's wheel. The shape that is ultimately achieved does not result from an idea in the potter's mind that is imposed on the clay. On the contrary, the shape takes its form through an inseparable negotiation between the material characteristics of the clay (e.g., its malleability and texture), its motion on the wheel, and the movements and pressure of the potter's hands as guided by what the potter feels and sees from moment to moment. What the clay is at every moment exerts as much influence on what the potter does as what the potter does on what the clay becomes. Agency thus lies somewhere between the interacting processes and characteristics of the participating brain, body, and materiality, and cognition consists of their interactivity.

Critical to material engagement theory is the idea of metaplasticity, in which the neural plasticity of the brain and the plasticity of cultural forms exist in a dynamic interrelationship of constant and inseparable interaction and change. The process of human becoming, in other words, is not solely a matter of, and thus cannot simply be ascribed to, change in either genetic or cultural factors alone. Rather, human becoming is the product of both genetic and cultural factors, as the two are enmeshed in an inextricable synergy. Human becoming can be considered a process of creative evolution in which material forms act as an ecology for the mind: in other words, humans rearrange the world so that it can make sense to them in a way that differs from the way it did or may have done a split second, a generation, or a century ago, creating in the process novel stimuli with the potential to change their behavioral and psychological outcomes, especially when considered over cultural and evolutionary spans of time. Another important concept is the brain–artifact interface, a term that recognizes the structure and functions of the human brain as being constructed and remodeled by behavioral interactions with material structures, processes, and practices, affording opportunities for metaplastic alignment. Brain–artifact interfaces also help to bridge the different temporalities over which neural and material construction and remodeling can occur, which consist of fractions of seconds up to lifetimes for neurons but which can span centuries to millennia or longer for materiality.

Since it gained momentum in the 1990s, the situated approach to cognition has remained an interdisciplinary endeavor. It has encompassed philosophy (particularly philosophy of mind), psychology, and artificial intelligence and robotics, where it has challenged classic models of cognition that posit the brain as the unit of analysis and that compare its functionality to that of a computer. Focusing more or less exclusively on the brain has more recently been deemed "neurocentrism," while modeling cognition as a relatively mechanical matter of sensory–perceptual inputs, motor–behavioral outputs, and some kind of information-processing activity in between the two has yielded to newer models that seek to integrate cognitive processes with their contexts. For example, in ecological perspectives on perception, the role of perception in guiding action is recognized, as is the role of action in obtaining perceptual input. Perception is reconsidered as an active process. Similarly, in learning and knowing, there is more occurring than simply storing (or memorizing) and recalling information that has been stored, which corresponds to the classic information-processing model of cognition. In contrast, when cognitive processes are recognized as situated, they become inextricably bound to social, cultural, linguistic, and material contexts. In this view, an individual's acquisition of knowledge becomes a matter of

contextualized activity, while learning is a matter of increasingly fluid performance of contextualized activity.

In anthropology, the situated approach to cognition is implicit in cognitive approaches to linguistics, ethnography, and archaeology, though it is by no means limited to them, since understanding the mind as situated is crucial to the full range of anthropological inquiry. For example, aspects of situated cognition applicable to linguists include linguistic relativity; conceptual organization, metaphor, and blending; and gesture and sign language. In ethnography, situated cognition provides a framework for studying cultural phenomena such as creativity, innovation, and the ways in which knowledge is constructed, shared, and reproduced in informal and formal settings. Cognitive archaeology, in seeking to understand past ways of thinking, views material culture as providing insight into human becoming through its characteristics of agency and semiotic function, as well as the behavioral traces and environmental responses that it preserves. Biological anthropology, for its part, recognizes that human behavior and psychological processing are influenced by anatomical characteristics and physiological capacities, as well as the environmental situation and its social manipulation (particularly in the form of resourcing adaptations and strategies).

Though it is relatively easy to recognize situational influences on cognition, measuring psychological reactions in the real world is difficult to accomplish, for a variety of reasons that includes achieving the same degree of control that is implicit to experimental designs and that licenses conclusions about causal relations. Theoretical paradigms need to work through how to identify the extracranial resources that participate in cognition and ascribe functional roles to how they participate (i.e., whether extracranial resources are causally linked to or constitutive of cognition). Research technologies and techniques need to be developed to collect in situ data on the cognitive system, including the activity of the brain as a critical node. Current brain-imaging technologies and techniques are highly sensitive to disruption by bodily movement, not easily deployed outside the laboratory, and unable to differentiate responses to specific stimuli during highly stimulating conditions (i.e., typically those beyond the laboratory, where stimuli cannot be controlled); these factors inhibit the ability to field these data-collection capabilities in ecologically valid ways. Finally, temporal differences between psychological, cultural (including material culture), and evolutionary change make it difficult to reconcile interdisciplinary theories, methodologies, and data. The participation of anthropology, a discipline whose research goals and methods are constantly concerned with ecological and observational validity in field research, will be important in resolving these theoretical and methodological issues, though anthropology may find itself challenged by an increasing requirement to embrace interdisciplinary perspectives and methodologies, such as those in cognitive science.

In addition to the challenges inherent in situating cognition theoretically and methodologically, the degree to which cognition is influenced or constituted by being embodied, embedded, extended, distributed, dynamical, and enactive will likely remain a matter of continuing debate and empirical investigation for some time. However, redrawing the boundaries of cognition to include extracranial resources has demonstrated significant potential for yielding novel insights into the processes and relations of interactivity between individuals, societies, and environments. Considering cognition as situated thus provides anthropologists with new perspectives for thinking about what it means to be human.

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