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# Grounded Cognition and Social Interaction

This entry explains novel approaches of grounded cognition and mental representation where sensorimotor simulation is central, as well as how these relate to accounts of *social interaction* in which embodied cognition of higher social concepts or the grounded nature of affect and emotion are vital themes. An introduction to grounded cognition is followed by a discussion of social interaction informed by grounded cognition approaches.

## Grounded Cognition

Cognition is the ability to mentally represent the world and to manipulate those representations in order to understand, remember, use language, plan actions, and reason.

### Sensorimotor Simulation

Whereas more traditional theories in cognitive science assumed that such mental representations consisted of abstract symbols, the psychologist Lawrence Barsalou, building on prior philosophical ideas, proposed that representations consist of sensorimotor simulations. On this account, the *perceptual symbols theory*, cognition shares processing mechanisms and neural systems with perception and action.

During an experience, neural patterns are activated in modality-specific areas for sensory and motor processing. Higher-level association areas (*convergence zones* in Antonio Damasio's words) capture these activation patterns at different levels. Association areas in modality-specific areas capture activation patterns within modalities, and higher-level areas integrate patterns from different modalities.

Representation is essentially the reenactment of previous experiences. Higher-level association patterns activate lower-level association areas, which activate patterns in sensorimotor areas. Rather than an exact replica of experiences, however, these patterns are distorted and represent only partial experiences. In Barsalou's theory, simulators capture patterns of activation for a particular category of experiences. As a result, they represent a distributed pattern of experiences with a concept such as *chair* or *apple*. Simulation of experiences is dynamic and flexible and can even represent imaginary events.

Research has shown that representations are organized along sensorimotor modalities and contain modality-specific information. Representation and perception share processing mechanisms and have been shown to support or interfere with each other. For example, (a) after a shift in sensory modality, similar costs in processing occur between and within perceptual processing and mental representations, and (b) people recognize object pictures faster when their orientation, shape, or motion matches the values implied by language. Neuroscientific studies have indicated that overlapping brain areas are involved in representation and sensorimotor processing.

### Cognition for Action

A related but slightly different view, proposed by Arthur Glenberg, is that cognition is for action. On this account, the function of memory is to support actions. This is achieved by *meshing*, a process that integrates properties of the environment, embodied memories, and properties of the body into potential action patterns. The meshing process serves both to understand the current environment and to mentally represent situations.

## Social Interaction

Research on social interaction has long assumed that the body, and its mental representation, is closely tied to the processing of social and emotional information. In fact, the central concept in social psychology—attitude—has been thought more than a century ago as grounded in motor dispositions. Thus, Charles Darwin proposed that attitudes are collections of motor behaviors, and Francis Galton thought that attitudes consist of *body* inclinations. Research on the role of the body flourished since then, with researchers showing, for example, that (a) nodding the head, as in agreement, while listening to persuasive messages leads to more positive attitudes toward the message than shaking the head, as in disagreement, and (b) objects associated with approach actions (e.g., arm flexion) are subsequently evaluated better than objects associated with avoidance actions (e.g., arm extension). Such phenomena fit the grounded cognition framework, which assumes that bottom-up bodily states are an intrinsic component of social information processing.

### *Embodiment of Higher-Order Social Concepts*

Crucially, the grounded cognition framework goes beyond simple concepts and holds that high-order mental processes operate on perceptual symbols. Thus, even complex concepts involve partial reactivations of the sensorimotor states that occur during an individual's original experience with the world, as well as simulation of new sensorimotor experiences. Evidence that such processing occurs for complex social concepts has been obtained in several domains. For example, (a) making a fist influences people's processing of words related to the concept of power and (b) washing hands changes people's perception of moral responsibility or luck.

### *Simulating Affect/Emotion*

The grounded cognition approach naturally applies in the domain of affect and emotion, where it is straightforward to conceive of emotion knowledge as a process of internal simulation of an emotional experience. Clearly, these simulations may not constitute full-blown emotions, must not simulate every aspect of emotion, and may not even be conscious. Nevertheless, such simulations can generate enough sensorimotor information to support conceptual processing. Evidence for simulation of emotion knowledge ranges from (a) activity of similar brain networks when people experience actual disgust and when people simply think about disgust, even in its abstract moral form, to (b) facial muscular activity when people abstractly think about concepts such as anger and happiness, to (c) activation of general introspective processes after people have been focused to think about abstract emotional concepts from an experiential perspective. Again, these mind-to-body findings are consistent with body-to-mind evidence that manipulating the motor processes can change the experience of the emotion, as well as its perception. Thus, people in a slumped posture feel less proud than people in an upright posture, and blocking expressions of happiness interferes with recognition of that emotion.

### *Imitation*

A classic finding is that people imitate emotional expressions, gestures, and mannerisms even when not encouraged to do so. This phenomenon of spontaneous imitation can be understood by theories of grounded cognition, which view it as part of the bodily reenactment of the experience of the other's state. In fact, there is evidence that the lack of imitation may cause problems with social interaction.

## Conclusion

The grounded cognition framework, with its proposal that mental processing is simulated experience, provides an essential theoretical account for understanding the mind. On this account, social interactions are supported by simulations of emotions, motor actions, and other people's states. Thus, social behavior is grounded in the body.

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*See also* Concepts; Embodied Cognition; Emotions; Joint Attention and Social Cognition; Situated Cognition; Social Cognition; Social Neuroscience; Social Perception

### Further Readings

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