



Published in final edited form as:

*Can J Exp Psychol.* 2015 June ; 69(2): 179–180. doi:10.1037/cep0000059.

## Response to Glenberg: Conceptual Content Does Not Constrain the Representational Format of Concepts

Bradford Z. Mahon

University of Rochester

The core issue at stake in the embodied cognition debate is whether the format of thought is amodal or modality-specific. In his paper, Glenberg (2015, p. 169) argues that “embodied systems do just fine accounting for perception, action, concrete cognition, and abstract cognition” and goes on to suggest that “Now the onus is on traditional cognitive scientists, those who wish to maintain a Cartesian distinction between human thought and action, a cherished and seemingly obvious belief, but ultimately, a type of flat-world hypothesis.”

But, is it really a “type of flat-world hypothesis” to maintain that cognitive processes can be amodal in their representational format? I do not believe that it is. There is a reasonable theoretical alternative to the embodied cognition hypothesis that can account for the extant data, and which does not require adopting the view that “cognition is sensorimotor processing.” That theoretical alternative (a) maintains a strict representational distinction between amodal concepts and sensorimotor systems, and (b) argues that sensorimotor activation during conceptual processing reflects the structure and dynamics of connectivity between amodal representations and sensorimotor systems. The types of findings that Glenberg (2015) cites as support for embodied cognition do not distinguish between the embodied cognition hypothesis and this theoretical alternative. Furthermore, neuropsychological data indicate that sensorimotor impairments can occur without concomitant conceptual level deficits. I argued (Mahon, 2015) that these theoretical considerations and empirical findings indicate that the format of concepts is not modality-specific.

The thread that runs through Glenberg’s (2015) argument is that if you see a signature of cognition in sensorimotor systems, or a signature of sensorimotor processing in cognition, then that sanctions the inference that cognition *is* the sensorimotor processing. That is akin to the argument that because you could decode the words I’m thinking from the muscle activity in my fingers as I type, that content must somehow be “in my fingers.” But to argue that the representational format of my thoughts is muscular just because my thoughts can be decoded from muscle activity would be to mistake a *reflection* of cognition for cognition itself.

One of the tactics at play in current discussions of embodiment is to rule out the straw theory that sensorimotor activation during cognition is ancillary or completely irrelevant to cognition; then, having ruled out the hypothesis that sensorimotor activation is irrelevant to cognition, it is concluded that sensorimotor activity must therefore *be* cognition. That argument overlooks the tremendous gulf between those two hypotheses: The idea that sensorimotor activity during conceptual processing is a *reflection* of cognition does not imply that cognition does not care about its reflection. Compare: You look in the mirror and your image is reflected. The mirror doesn't "constitute you" just because it reflects your image. You may even care very much about your reflection in the mirror, and change *because* of that reflection; but you are still not "constituted" by the mirror's reflection of you. The same is the case for cognition: Cognition might look to its reflection in the sensorimotor system, and the state of the sensorimotor system might affect cognition—but that does not sanction the inference that cognition "is made of" those sensorimotor processes.

Glenberg (2015, p. 169) asks, But what would be the function of a system "that does not contribute to perception and action," when after all, we are animals, and as such, the structure of our minds/brains must have been constrained by the exigencies of survival? The tension that generates that question is only apparent, and it arises from a conflation of conceptual content and conceptual format. The representational format of concepts is not determined by what those concepts are about. We can think about very seemingly abstract things (like how to maximize one's tax deductions) or very seemingly concrete things (like how to outwit a saber toothed tiger)—and because cognition is connected up with the sensorimotor systems, thought not only leads to thought: It also leads to action and to predictions about upcoming sensory information. In other words, even independent of the evidence argued to support the embodied cognition hypothesis, the "classic" amodal representation theory already proposes that amodal concepts interact with sensorimotor systems. After all, if cognition were not connected up with perception and action, then our percepts could never affect our thoughts and our thoughts could never affect our actions. This point is important to emphasise, because baked into the motivation for the embodied cognition hypothesis is a caricature of the classic theory as being surprised or embarrassed by sensorimotor activation during conceptual processing.

The flat-earth theory was not only wrong in its ideas about the shape of the earth: More importantly, the flat-earth theory had distorted expectations about what the shape of the earth should look like. The flat-earth theory assumed that if the earth were actually round, then it wouldn't look flat. Similarly, I would argue, the embodied cognition hypothesis is not only wrong in its core commitment that the format of thought is sensorimotor; it assumes that if concepts were amodal in their format, then the sensorimotor systems would not be active during conceptual processing. In contrast, I have argued that concepts are represented in an amodal representational format, and conceptual processing activates sensorimotor systems. If my argument is correct, then we are not in need of a new theory of concepts; we are in need of a new theory of how information is exchanged between amodal representations of concepts and the sensorimotor system. This situation presents a tremendous opportunity to reinterpret a range of findings: That is, the data argued to support

the embodied cognition hypothesis provide important new clues about how cognition and sensorimotor systems interact.

## Acknowledgments

Preparation of this article was supported by NSF Grant 1349042 to BZM. I am grateful to Arthur Glenberg, Steve Lupker, and Michael Masson for their discussion of these issues at the 24th Canadian Society for Brain, Behavior, and Cognitive Science (CSBBCS) and to Steve Lupker for comments on a draft of this article.

## References

- Glenberg AM. Few believe the world is flat: How embodiment is changing the scientific understanding of cognition. *Canadian Journal of Experimental Psychology*. 2015; 69:165–171. [PubMed: 26010024]
- Mahon BZ. The Burden of Embodied Cognition. *Canadian Journal of Experimental Psychology*. 2015; 69:172–178. [PubMed: 26010025]