Embodied Simulation as a Theory of Language

Review of *Louder than Words: The New Science of How the Mind Makes Meaning,* by Benjamin K. Bergen, Basic Books, 2012. xi+296 pps.

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When someone hears or reads a sentence, he is likely to visualize the scenario described, and, perhaps more surprisingly, to activate parts of the brain that control muscles associated with actions that are mentioned or implicit in the text. For instance, if you read a description of a polar bear hunting a seal, you are likely to visualize the bear and the seal on an icy seashore. If you read the sentence, "John turned the key in the ignition" or "John screwed off the gas cap", the part of the brain that controls motion of the hand is activated. Remarkably, after reading the first sentence, an experimental subject finds it easier to turn their hand clockwise than counterclockwise; the reverse is true after reading the second sentence. This kind of visualization and activation of motor control is known as "embodied simulation".

In the last two decades, there have been many psychological studies and some neuroscientific studies of embodied simulation, examining many different aspects of the phenomena. For example, if a reader reads a story about someone driving a car, under what circumstances does he visualize the story from the point of view of the driver, looking at the steering wheel, as opposed to visualizing an image of the driver as seen from the side? When do simulations constructed in reaction to hearing a sentence make it easier to do some other task and when do they interfere with the other tasks? What parts of the brain are involved in a simulation? What kinds of individual differences do people exhibit in constructing and using simulation? How detailed and what kinds of details are included in mental images? In one striking experiment, for example, it was found that if an experimental subject first reads the sentence, "Through the clear goggles, the skier could easily identify the moose," and then are shown a picture of a moose, they will recognize it faster if the picture has high-resolution picture than if it has low resolution picture; however, if they first read the sentence, "Through the fogged goggles, the skier could hardly identify the moose," they will recognize a low resolution picture faster than a high-resolution picture. This suggests that the subject is constructing a mental image of what the skier is actually seeing through his goggles.

Benjamin Bergen is a leading young scientist in this area of research, and *Louder than Words* is a popular survey of current research in this area. The book is very readable, clearly written, and entertaining, though Bergen sometimes works too hard at making jokes, or finding pop culture references.

However, the book suffers from two serious flaws. First, Bergen claims that comprehending language consists largely or entirely of constructing an appropriate embodied simulation, rather than involving symbolic representation or "Mentalese". However, Bergen's discussion of the limitations of embodied simulation as a theory of meaning is not at all adequate. He does acknowledge that abstract concepts are problematic, and proposes that these are understood through the medium of physical metaphor (e.g. "he grasped the idea"; "she overflowed with joy"). However there are many common concepts that cannot be visualized in any effective sense and are not associated with visualizable metaphors. One way to illustrate this is by considering pairs of sentences of different meaning; a theory of meaning should explain what is different about them. Consider for instance the sentences "Maria was speaking Ukranian" and "Maria was speaking Czech" as understood by a person who knows neither language. The hearer may be able to visualize a woman speaking some vaguely Slavic-sounding language, but cannot construct different visualizations for the two sentences corresponding to the difference in meaning. Similarly, a hearer can hardly visualize the difference between "Joe arrived a week ago" and "Joe arrived a month ago"; the difference between "One of Joe's cousins is coming to dinner" and "One of Joe's neighbors is coming to dinner"; or the differences between "I should call my aunt on her birthday" and "I might call my aunt", "I could

call my aunt", "I will probably call my aunt", and "I must call my aunt". These examples illustrate that, though creating an embodied simulation may be an aspect of comprehension, it cannot be the whole of comprehension.

The second flaw in Bergen's book is the consistently unfair presentation and facile dismissal of practically all study of language meaning prior to about 1995, and of any and all linguists, psychologists, and philosophers who have not jumped on this particular bandwagon. Bergen tends to write as if he and his friends were the first people to realize that meaning was an important aspect of language: "[S]ome cognitive scientists, like me, have started to turn their attention to meaning." In a section entitled "The Age of Meaning" (viz. the last twelve years) he writes, "[T]he twentieth century was the century of form. ... But this is a new millenium, and the twenty-first century has ushered in renewed attention on not just form but what the form does ... In the study of language and the mind, this translates into not merely studying the forms of language ... but also its meaning." One would never guess, from reading this book, that the meaning and use of language have in fact been one of the major focuses of linguistic study throughout the lifetime of that discipline, and certainly throughout the last hundred years, and that a great deal is known about it. Throwing out the results of a century of research in semantics as hopelessly old hat and misdirected is not the way to make progress in cognitive science; it is the way to ensure that you constantly reinvent the wheel.

The presentation of earlier theories of mind and of language is distorted beyond caricature. This actually begins before Bergen starts writing, in the foreword by George Lakoff. Lakoff writes,

> For centuries, we in the West have thought of ourselves as rational animals whose mental capacities transcend our bodily nature. In this traditional view, our minds are abstract, logical, unemotionally rational, consciously accessible, and, above all, able to directly fit and represent the world. Language has a special place in this view of what a human is — it is a privileged, logical symbol system internal to our minds that transparently expresses abstract concepts that are defined in terms of the external world itself.

Lakoff is simply setting up a straw man, so that he can knock it down with loud self-congratulation. Very few linguists or philosophers of language would endorse that description of language; perhaps Richard Montague. Very few traditional philosophers of mind or psychologists would endorse that description of mind, though there is some very recent work on Bayesian, rationalist models that comes rather close to it.[1] After all, the most influential philosopher of language in the twentieth century was Wittgenstein and the most influential psychologist was Freud.

Bergen's own presentation is equally misleading:

> A Mentalese symbol for dogs isn't the collection of memories you have of interacting with dogs or the breed of puppy you're hoping you'll get for your birthday. Instead, it's just a symbol that points to the range of things in the world that are in fact dogs. That's the thing. Symbols in Mentalese are first and foremost symbols. Meaning is simple, clean, logical, and efficient. As a result, there's no place in this theory of meaning for the details.

This is a deliberate distortion. In a symbolic theory of mind, the Mentalese symbol for dogs is connected to the memories of interacting with dogs, your hopes for puppies, and so on. These connection can include imagistic, tactile, olfactory, and emotional content as well. The symbolic theory of mind does not exclude, and has no difficulty with, these kinds of details.

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[1] See for instance, Griffiths, T. L., and Tenenbaum, J. B. (2006). Optimal predictions in everyday cognition. *Psychological Science*, 17(9), 767-73; or Xu, F. and Kushnir, T. (2013) Infants are rational constructivist learners, *Current Directions in Psychological Science*, 22(1) 28-32.

Bergen's focus on the individual language user also largely ignores the social aspects of language. A significant aspect of the meaning of an utterance is what it communicates to its hearers. This public part of the meaning is necessarily largely connected to general characteristics of dogs, not the individual's experience of dogs. When a speaker uses the word "dog", most of what he intends to communicate is the knowledge of dogs that is common between him and the hearer; he is aware that the hearer does not have access to his memory of his own dog's smell, his hopes for a puppy, and so on. It is not just the mind that makes meaning, it is the whole linguistic community.

All in all, the research described in the book, though interesting and important, is nothing close to a "new science of how the mind makes meaning", as claimed in the subtitle.