

TOOC illustrate the interdependence of the projects of explaining the origin of concepts and understanding what concepts are.

Open Peer Commentary

You can't get there from here: Foundationalism and development

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Jedediah W. P. Allen^a and Mark H. Bickhard^b

Departments of Psychology^a and Philosophy,^b Lehigh University, Bethlehem, PA 18015.

jwa204@lehigh.edu mhb0@lehigh.edu

Abstract: The thesis of our commentary is that the framework used to address what are taken by Carey to be the open issues is highly problematic. The presumed necessity of an innate stock of representational primitives fails to account for the emergence of representation out of a nonrepresentational base. This failure manifests itself in problematic ways throughout Carey's book.

We are in agreement with Carey's proposal that there must be a way to generate new representational "primitives," and that the idea of implicit definition, which underlies her model of Quinian bootstrapping, is, in general, the correct approach to address this problem (Carey 2009). However, the overall model encounters serious troubles beyond those points. (Implicit definition can be a complex topic in model theory, but the central idea is that a [formal] system implicitly defines the class of all of its satisfiers or models; Bickhard & Terveen 1995; Bickhard 2009.)

Carey says that Quinian bootstrapping requires language, but gives no reason why such implicit definitions couldn't be constructed out of *internal* computational "empty symbols" – for example, perhaps via some version of conceptual role implicit definition. (To the extent that Quinian bootstrapping generates representational content via conceptual or inferential role, it is roughly a version of implicit definition. To the extent that phenomena such as analogy are considered to be *necessary* to Quinian bootstrapping for the generation of content, then it is no longer modeling a form of emergent representation – "primitives" – but relies on earlier representation in order to construct "new" representation.)

Clearly, evolution had some way to create emergent new representations out of non-representational phenomena, and not by using language. But, if implicit definition could work computationally (without language), why couldn't it work for infants and toddlers? That is, the success of Quinian bootstrapping in terms of implicit definition would obviate an innate representational base.

More generally, *whatever* the process was by which evolution supposedly created emergent representation – implicit definition or not – why couldn't that same or similar process be functioning for infants and toddlers? Why, in other words, are innate representations needed at all? Carey's position depends on Fodor's argument for the assumption of a necessary (though not full lexical-level) nativism, but she contradicts Fodor with her notion of the Quinian bootstrapping construction of "primitives" – and Fodor *also* has no answer to the question of why learning and development cannot make use of whatever process was involved in the evolutionary emergence of representation.

On the other hand, if representation is constituted as information semantics has it, then the generation of new

"representation" – of new covariations – should be in-principle trivial. Almost any input processing will generate covariations, which, by this model, should constitute representations of whatever the covariations are with. Many such covariations will probably not be useful, but there is no problem learning or developing more.

If generating new covariations is so easy, why does Fodor postulate nativism at all? Because covariation cannot by itself constitute *content*, and, as Fodor points out, we have no model of learning that can account for new content (Piattelli-Palmarini 1980, cf. p. 269). Carey proposes a way to generate emergent content – bootstrapping – but does not seem to see that any such model invalidates the basic arguments for nativism with which the whole approach begins.

Carey's reliance on an information semantic framework for her discussion of the many early development studies is not only contradicted by the possibility of something like "computational bootstrapping," it also generates problems of its own. In particular, within an information semantic framework, Carey's distinction between perceptual and conceptual representation is questionable. No input processing system is necessarily restricted to pure combinations of whatever "vocabulary" the basic transducers generate (e.g., a connectionist input processor is not, even though we would not argue that connectionist models are adequate). But it is solely in terms of such restrictions to "perceptual vocabularies" that she differentiates conceptual from perceptual. On her account, conceptual input processors are still just input processors, but are not restricted to combinatorics of perceptual "vocabularies." But, if no input processor is so restricted, then what happens to the distinction? Still further, the very intuition of a perceptual base is put into question by models such as Gibson's (1979), and such possibilities are not addressed.

We argue, then, that the framework within which these many studies have been done, and within which Carey interprets them, is itself flawed, and, therefore, does not support rigorous analysis and methodological design: Perceptual nativism and conceptual nativism are not the only alternatives, even for early development. Among other problems, there is an intrinsic and therefore systematic neglect of possibilities of developmental constructions of *emergent* representation in the methodological designs of these foundationalist studies (Allen & Bickhard, in preparation) – such emergentist possibilities do not exist in the conceptual framework being used, and, therefore, do not occur to researchers working within that framework in their designs.

In this regard, it is worth pointing out that Piaget had a model of emergent constructivism of representation (though not one that we fully endorse; Bickhard & Campbell 1989), but that Carey systematically mischaracterizes Piaget's model as an "empiricism" based on "sensorimotor representations." He had no such model, and, in fact, argued consistently against such approaches, seeking what he called a "third way" that would transcend both empiricism and rationalism (Müller et al. 2009). For one contemporary instance of a model of action-based emergent representation, see Bickhard (2009).

The basic problem here is that, aside from the bootstrapping model, Carey's discussion presupposes a foundationalism of representation – representation constructed solely in terms of an innate foundation of representational primitives. A foundationalism cannot account for its own foundations, and shifting the burden to evolution does not solve the problem; it only presupposes (without argument) that evolution can engage in processes generating emergent representation that learning and development cannot engage in. Quinian bootstrapping contradicts foundationalism, and thereby contradicts the framework for the "perceptual nativism" versus "conceptual nativism" debate, but this is not recognized, because of the assumption that implicit definition requires language (but, if so, then the *evolutionary* emergence of representation again becomes inexplicable).

So, foundationalism simply refuses to address questions of the origins of representation, and, thus, cannot be a successful

framework for understanding either cognition or cognitive development. If those are your goals, you can't get there from here.

Border crossings: Perceptual and post-perceptual object representation

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Tyler Burge

Department of Philosophy, University of California, Los Angeles, Los Angeles, CA 90095.

burge@ucla.edu

Abstract: Carey's claim that no object representations are perceptual rests on a faulty view of perception. To delineate origins of post-perceptual ("conceptual" or "core cognitive") representation, we need a more accurate view of perceptual representation.

In *The Origin of Concepts*, Susan Carey argues that object representations are exclusively nonperceptual (Carey 2009). I believe that this view is mistaken. There are object perceptions – what I call "perceptual attributives as of objects" – at least in the visual and tactile perceptual modalities of a wide range of animals. There are, of course, also nonperceptual object representations. Some of these might be termed "concepts." But perceptual object representations are not concepts. Carey's fine book describes important aspects of object representation. However, there is a need to evaluate which of the phenomena that she discusses are postperceptual and which have origins already in perceptual systems.

Carey claims, "representations of object cannot be stated in the vocabulary of perception" (Carey 2009, p. 63). She cites Piaget and Quine, with approval, as predecessors in denying that object representations are perceptual. Piaget is credited with the claim that object representations are nonperceptual because they are multimodal (Carey 2009, p. 34) (Piaget, 1954). Piaget does not show that all object representations are multimodal, only that some are. (There is evidence that visual object representations do not require intermodal experience.) Visual-perceptual object representations can underlie multimodal object representations.

Carey associates Quine (Quine 1960) with this further argument:

If perceptual representations are limited to what currently experienced entities look like... objects cannot be represented as individuals that persist through time, independently of the observer....As Quine pointed out, a perceptual vocabulary does not include fundamental quantificational devices. The child could not represent a given object as the same one as one seen earlier, for sensory representations do not provide criteria for numerical identity. (Carey 2009, p. 34; see also pp. 40, 63, 94–6)

Carey adds, seemingly in her own voice:

The criteria for individuation and numerical identity for ordinary objects go beyond perceptual primitives....Although perceptual primitives can specify a currently perceived, bounded entity and its current path of motion, they do not specify that the entity continues to exist when we lose perceptual contact with it. (Carey 2009, p. 36)

It is a mistake to require of a system that has object representations that it have quantificational devices, or representations of criteria for numerical identity, or *specifications* of continuity under loss of perceptual contact (using that "vocabulary"). Nor need object *perception* represent particulars *as* persisting, or *as* independent of an observer, or *as* unperceived, in order to perceptually represent something as an object or body. A perception as of objects need not represent persistence, observers, perceptual contact, or independence from observers. Such requirements confuse principles according to which perception operates with representations that occur in perceptual object representation.

It is enough that a perceptual system operate under principles that require of the perceiver a capacity to track objects perceptually – where tracking requires coordination of perception with perceptual memory and perceptual anticipation. Therefore, Carey's remarks about quantification, criteria, and the inability of perceptions to specify continuity under loss of perceptual contact, are irrelevant to whether perceptual representations can represent entities as objects or bodies. (I discuss the points of the last two paragraphs in Burge 2010, Ch. 7, 9, and 10, especially the section "Body Representation as Originating in Perception." There I criticize arguments of Carey's colleague, Elizabeth Spelke, that no object representations are perceptual.)

No serious empirical account of perception takes its representations to depend for their content entirely on what happens at a given moment. Interrelations between perceptual systems, perceptual memory, and perceptual anticipation are common even in the simplest perceptual systems. Exercises of perceptual shape constancy or color constancy over time require coordination of current perception with perceptual memory and perceptual anticipation. Such coordinative capacities are present in insects and other relatively simple animals that may not have object perception, and plausibly lack "concepts." Perception of motion and change are standard topics of vision research.

Object or *body* perception is constitutively dependent on coordination between the perceptual system and perceptual anticipations of persistence over time; commonly in motion and commonly behind barriers. Therefore, to be a perception as of a body, a representation must be associated with a tendency to perceptually anticipate certain types of continuity. A perceptual representation can present something as looking like a body in *current* experience, as long as the "look" is associated with perceptual anticipations of certain types of continuity.

If Carey and Quine assume that perceptual representation excludes connection to perceptual anticipation and perceptual memory in the individuation of perceptual representation, they have a mistaken view of perception. Apart from this assumption, and apart from the error of requiring that the perceiver must *have* quantification, or criteria, in order to perceive something as an object or body, the quoted arguments have no force against the view that perceptual representations include object (body) perceptions.

There is substantial evidence that perceptual body representations occur in the visual systems of many mammals and some birds. Anticipations of continuities that are relevant to perceiving entities as bodies are associated with very early vision. The anticipations are not matters of conception or prediction. (Peterson 2001; Wexler & Held 2005.) Steps have been taken toward localizing the physical basis for object determination in areas of the human brain specialized for vision. (Grill-Spector et al. 2001; Kourtzi et al. 2003; Nielsen et al. 2006.) The idea that body representation does not occur in visual (or tactile) perception simply does not accord with research in perceptual psychology. Carey gives no good reason to reject this research.

A deficient view of *perception* therefore underlies Carey's account of "conceptual" object representation. It is not clear which phenomena that she discusses are postperceptual, perceptual, or both. Most of her characterizations of object "concepts" apply equally to object perceptions (Carey 2009, pp. 67–68). The key to the distinction must lie in better characterization of "central inferential processes," including richer distinctions between the ways postperceptual and perceptual object representations relate to other processes and representations. The deficiency in drawing the perceptual/post-perceptual distinction may hamper Carey's accounts of the other representations of attributes that she discusses: representations of quantity, agency, and cause. Unquestionably, human children and higher animals do have postperceptual representations of these three attributes, as well as the attribute of objecthood. A more accurate view of perceptual representation is needed to delineate origins of postperceptual representation.