ABSTRACT—Piaget’s theory is no longer the dominant approach to cognitive development. Instead, many leading theorists now embrace some version of nativism. There are several alternatives to nativism, however. This article argues that neoconstructivism is an umbrella term that covers these alternatives. It delineates the essential elements of this style of thinking and outlines some key differences among neoconstructivist theories.

KEYWORDS—developmental theory; cognitive development; nativism; empiricism; Piaget

Piaget was supposed to have solved the problem of the origins of knowledge, to have bridged the nativist–empiricist split. This was one of his goals in beginning to study children’s cognitive development, and at the end of his life, he regarded this goal as accomplished (for an overview, see Chapman, 1988). Yet, even before his death, criticisms of Piaget were mounting (for an overview, see Gelman & Baillargeon, 1983). They now form a familiar litany: no clear evidence for stages and structuralism, insufficient attention to the gradualisms and localisms of cognitive progress, excessive emphasis on verbal justifications of judgments. Among these limitations, two issues stand out: an overly lean delineation of the starting points for cognitive development and a description of the mechanism of cognitive change that was little more than a renaming of the phenomenon as accommodation.

So, how do we characterize starting points and developmental change? These two questions were addressed in a bold way by the resurgence of nativism, which came roaring back on the intellectual scene in the 1950s with Chomsky’s (1959) critique of Skinner and, by 1980 or so, had become the dominant paradigm for thinking about the origins of knowledge. Nativism solves the first of Piaget’s problems by definition—by postulating the richest starting points imaginable, ones that encompass all the “core knowledge” required to understand the world. An important addition to this philosophically classic position, appearing in force in Fodor (1983), was the idea that the mind, or brain, is organized into modules that are not only neurally specialized and present from the beginning but also do not accept information from each other. Indeed, nativists have argued that evolution could not work to create human intelligence without such modular organization—there must be some THING for evolution to select or weed out (Cosmides & Tooby, 1994). And nativism solved the second of Piaget’s main problems (one that had shrunk to minuscule size by the hypothesized existence of so much innate knowledge) essentially by fiat—by postulating simple “triggers” that led children to select parameters or fill content into slots. More recently, nativists have added the hypothesis that change occurs when human language bridges the gap across modules of core knowledge (Spelke, 2003) or that change occurs when other elements of core knowledge combine (Spelke, Lee, & Izard, 2010).

None of these postulates of nativism are, however, supported by the evidence. Starting points are strong, but infants are not tiny adults with insufficient control over their arms and legs. There is much more conceptual change than nativists envision and strong evidence that environmental input is integral to cognitive development in complex ways that go far beyond triggering (Newcombe, 2002). There is also good reason to think that language, while helpful to human thought, is not the sine qua non of cognitive flexibility (Newcombe & Ratliff, 2007). So, what is the alternative to nativism? Information-processing theorists of the 1970s and 1980s retained lean starting points and used production-system modeling to address the problem of change (Klahr & Wallace, 1976). However, there seems to be more initial competence than most such modelers were willing to contemplate. In addition, these modeling efforts, like the connectionist modeling that succeeded production systems, have often failed to use
empirical information about the kind and sequence of environmental information to constrain the models (Newcombe, 1998). Vygotsky has sometimes been presented as an alternative to Piaget, but his work concentrates too exclusively on social and cultural interaction to seem to provide a satisfying overall framework for many aspects of cognitive development. For example, in the spatial domain, Vygotsky’s thinking is very relevant to studying the development of map use, but it seems less helpful when considering basic spatial processes such as categorical bias in memories for spatial location (Newcombe & Huttenlocher, 2000).

The need for new approaches to cognitive development became increasingly evident by 1990, and several books began to fill the need for non-nativist approaches to cognitive development: Elman et al. (1996), Gopnik and Meltzoff (1997), Karmiloff-Smith (1992), Siegler (1996), and Thelen and Smith (1994). However, each of these approaches also has some limitations, for example, of scope or specificity. In addition, they competed with each other, so that, for example, proponents of connectionism and dynamic systems theory spent much time debating whether their efforts were similar or different (Spencer, Thomas, & McClelland, 2009). The end result is that there is not, as yet, a dominant theoretical framework within which to situate the large volume of exciting recent empirical work on cognitive development—research that sometimes seems to define theory better than debate that is self-consciously theoretical (Oakes, Newcombe, & Plumert, 2009). Research on cognitive development has gained steadily in interest for several reasons—better techniques and methods, established phenomena with richly detailed data that allow for finely tuned competing explanations to be pitted against each other, and better and better contact with insights and methods from cognitive science, neuroscience, computer science, and comparative psychology. But it is missing an “ism” to define it.

An emerging movement in this intellectual ferment is an approach that can be called neoconstructivism, which returns us to consider Piaget in a new light. Perhaps his life work did, after all, come close to his goal of reconciling nativism and empiricism. He was wrong about many things—the viability of structuralism, the leanness of starting points, the lack of a need for close study of input and mechanism. He was also living at a time when he could not follow up thoroughly on his nods to social interaction, or to what might have been his fascination with the architecture and processes in the physical substrate (the brain that is the mind). Nevertheless, his fundamental idea seems now to have been absolutely right: that a biologically prepared mind interacts in biologically evolved ways with an expectable environment that nevertheless includes significant variation. Here are some tenets that seem to unite the neoconstructivist approach.

1. Everyone is a Darwinist. That is, all theorizing in cognitive development is situated in a context in which we must consider the adaptive value of thinking and how it developed over evolutionary as well as developmental time. There is no need to cede the Darwinian high ground to the modularity theorists or to the nativists in general.

2. Experience expectancy is a key concept. Keeping this valuable concept (delineated by Greenough, Black, & Wallace, 1987) firmly in mind, we can see how nature’s solution to the problem of the construction of knowledge could as easily—arguably more easily—have been the selection of neural abilities that will inevitably learn from their expectable input what needs to be learned. There is no a priori need for specific content to be wired in—although, of course, some may be.

3. The world is richly structured and well equipped with perceptual redundancies and correlations that support experience-expectant learning (Bahrick, Lickliter, & Flom, 2004). This idea is a fundamentally Gibsonian one, although it acquires new resonance in contemporary theorizing, in which we can specify how the information is “picked up” rather than simply asserting that it is.

4. Humans (and perhaps other species as well) bring to the task of learning about their world a rich endowment in computing probabilities. This idea lies at the heart of work on statistical learning (Saffran, Aslin, & Newport, 1996) and of Bayesian approaches to cognition and its development (Gopnik & Tenenbaum, 2007). These abilities go a long way to solve the problem of profligate association that nativism is fond of using to attack more balanced approaches that include empiricist elements.

5. A richly structured world and a strong capacity for probabilistic reasoning interact, within the experience-expectancy framework, to select among and/or to integrate the multiple cues typically available to draw conclusions about various matters, for example, about causality, or about spatial location.

6. Action plays a key role in learning and development, just as Piaget thought, not only because it creates the occasion for experiment but also because it allows for situations that are more replete with information than observation (Sommerville, Woodward, & Needham, 2005).

7. Development and learning are closely intertwined concepts but not quite the same. Development is learning as the learner changes. For example, the learner acquires a shape bias (Landau, Smith, & Jones, 1988) or gets the idea that words are reliable cues to categories (Golinkoff, Mervis, & Hirsh-Pasek, 1994). As another and different example, perceptual tuning, especially in the 1st year of life, works by pruning capacities, not by adding to them, to create a fundamentally altered word learner (Werker & Yung, 2005).

8. Developmental change can be quantitative, qualitative, or both at the same time, depending on the granularity of observation. The oft-cited dichotomy between quantitative and qualitative change that is supposed to distinguish theories of development should be consigned to the dustbin of history;
see Thelen and Smith’s (1994) elegant discussion of the “view from above” and the “view from below.”

9. Analyses of the causes and mechanisms of developmental change need to proceed on all four of Aristotle’s fronts, looking for formal, material, final, and efficient causes. Formal cause is analogous to developmental description (and “thick” description—see Geertz, 1973—comes close to being a cause), material cause is analogous to the neural substrate, final cause is analogous to putting development in an evolutionary and adaptive context, and efficient cause is analogous to an analysis of the interactions of input with the neural substrate and the current cognitive state of the learner.

So much, I think, characterizes neoconstructivist theorizing across a wide range of specific endeavors. However, within the species of neoconstructivists, there are also dimensions of variation, just as there are among cats in their markings, eye color, or even in the possession or absence of a tail. The two most important differences involve the following questions:

1. How strongly domain-general are human cognition and cognitive development? Some investigators in the neoconstructivist tradition embrace domain generality, whereas others clearly work within a domain-specific framework. Note, however, that, importantly, domain specificity does not entail either nativism or modularity.

2. How bottom-up versus top-down are human cognition and cognitive development? Some investigators in the neoconstructivist tradition seem to think that bottom-up approaches are necessary to avoid the extremes of nativism, whereas others are more comfortable with top-down influences—recognizing that those influences may themselves be constructed.

Going back to the issue of a new “ism” to replace nativism as the framework for thinking about cognitive development—is neoconstructivism just one more “ism” that can be added to the list of contenders for a contemporary alternative? Does it vie with connectionism, or dynamic systems thinking, or emergentism, or overlapping wave theory, or small-p piagetianism, or other terms or schools of thought? I think the simple answer is, very importantly, No. The eight tenets listed above establish a neoconstructivist big tent that can cover all of the specific schools of thought mentioned above and more. What can then ensue is the sorting out of the specific issues in empirical description, theory making, and modeling that are the normal business of a mature science. Piaget’s biggest idea, if not his many smaller ones, has turned out to be right after all.

REFERENCES


