Published in final edited form as:
Child Dev Perspect. 2011 September 1; 5(3): 166–168. doi:10.1111/j.1750-8606.2011.00183.x.

Finding a way out: Why developmental science does not need another "ism"

John P. Spencer and **Aaron T. Buss**
University of Iowa

Abstract

Neoconstructivism is a new approach in developmental science that sheds light on the processes underlying change over time. The present commentary evaluates this new approach in the context of existing theories of development and nine central tenets of neoconstructivism proposed by Newcombe (2011). For inspiration, Hull's evaluation of psychological theory in 1935 is discussed. Hull noted a proliferation of theories that he attributed to poorly specified concepts and a lack of rigorous theoretical work. Noting a similar proliferation of "isms" in developmental science, the commentary concludes that existing theories have much to offer and suggests that what is needed is not a new "ism" but a rigorous evaluation and integration of modern developmental concepts.

In her article "What Is Neoconstructivism?" (2011), Nora Newcombe provides an overview of a new movement in developmental science crystallized in an edited volume by Scott Johnson (Johnson, 2009). Newcombe traces the historical roots of this new approach and lays out nine central tenets. Here, we evaluate what neoconstructivism has to offer and place this approach within the context of modern theories in developmental science.

We begin with a question: Why do we need a new "ism" in developmental science? What motivates this new approach? According to Scott Johnson, the new approach is motivated by a limitation in the developmental literature. Johnson argues that the literature is riddled with demonstrations--demonstrations that infants are smart; demonstrations that children show surprising behaviors under specific task conditions. Although such demonstrations can be provocative, they do not stand alone--demonstrations must be followed up by systematic science on *developmental process* and must be grounded in clearly defined theoretical concepts. The goal of the edited volume was to highlight examples that have revealed insights into the processes and mechanisms that move development forward.

Newcombe begins her article from a different starting point--the nativist-empiricist debate. In her mind, modern theories have not successfully put this issue to rest. Piaget, information processing, and connectionism, for example, offered "starting points" that are "too lean" for data showing that infants possess many abilities at birth or soon thereafter. Moreover, modern theories have not been sufficiently grounded in empirical data. Neoconstructivism is appealing from her perspective because it is built on a strong empirical foundation.

In summary, then, neoconstructivism emerged from several tension points: a tension between demonstration-based science and systematic science on developmental process; a tension between current theories of development and historical debates; a tension between theoretical concepts and their ability to interface with data.

Correspondence concerning this article should addressed to John P. Spencer, 11 Seashore Hall E, Department of Psychology, University of Iowa, Iowa City, IA 52242; Johnspencer@uiowa.edu.

In our view, opening up space for a new "ism" in developmental science should be a serious matter. Thus, before we capitulate, let's consider what alternative theoretical perspectives have to offer. We agree with Newcombe that Piaget's theory and Vygotsky's theory have clear limitations and should no longer be considered "modern" theoretical contenders. We also agree that nativism does not offer a satisfactory account of development. Nativism has been a moving target for the past few decades. New forms of "core knowledge" have been added without clarity regarding what "innate" means, how innate knowledge is realized in a neural system, what a "starting point" is, and how these concepts might relate to processes of learning and development. Moreover, as Newcombe points out, the empirical record on the central concepts of nativism is sparse at best. This is, in part, why we have argued that the nativist-empiricist debate should be put out to pasture (see Spencer et al., 2009).

What alternatives are left? Four theories organize much of the research in modern developmental science: information processing, connectionism, dynamic systems theory, and developmental systems theory. Several other recent theoretical approaches are also mentioned in Newcombe's article and in Johnson's edited volume--for instance, Bayesian approaches (Gopnik & Tenenbaum, 2007) and neuroconstructivism (Mareschal et al., 2005). Newcombe is clearly not satisfied with any of these alternatives. She contends that there is no dominant theoretical framework within which to situate empirical work on cognitive development. Rather, current perspectives are limited in scope or specificity and mired in debates about whether they are the same or different (see Spencer, Thomas, & McClelland, 2009).

We agree that the theoretical landscape in developmental science is in crisis. But we disagree about the way out. In our view, the way out requires theoretical clarity, greater specificity of concepts, and some deep theoretical labor to refine the concepts we use in our science. In this regard, we fear that the nine tenets put forth by Newcombe will only muddy the water. For instance, the first tenet is that "everyone is a Darwinist," meaning that development must be situated in an evolutionary context. We certainly agree that this is the case, but the devil is in the details. Nativist and developmental systems theories both situate development in the context of evolution (see Spelke & Kinzler, 2007; Oyama, Griffiths, & Gray, 2003), but these two approaches could not be farther apart on the theoretical spectrum. If this tenet cannot separate two clearly opposed theoretical perspectives, we question its utility. Similarly, the statement that "developmental change can be quantitative, qualitative, or both at the same time" requires deeper consideration. This distinction was at the heart of Piaget's theory, and modern theoretical approaches have clarified both what these concepts mean (see Spencer & Perone, 2008; Thelen & Smith, 1994) and what constitutes evidence of each (van der Maas & Molenaar, 1992).

Thus, in our view, modern theoretical approaches have much to contribute, and we should not be so cavalier about embracing a new "ism." Rather, we see a need for some challenging theoretical work ahead—we must collectively elevate our theoretical game.

This need is not new. Clark Hull (1935) lamented the state of psychological theory in an elegant essay entitled "The Conflicting Psychologies of Learning—A Way Out." He noted that, at the time, there were 12 theories of learning (this is not so different from the 9 theories of development listed above--10 if we add neoconstructivism.) On one hand, Hull argued, this diversity was cause for optimism--look how creative we are! On the other hand, he noted that this could be terrible news, since only 1 of the 12 can be correct. With these odds, he had little expectation that the last theory standing would be free of faults. Hull concluded that the proliferation of theories is not a problem per se but is a symptom of poorly specified concepts and a lack of rigorous theoretical work.

Hull proposed that the way out is to do the job of theorists like Newton, Einstein, Bohr, Rutherford, Heisenberg, Schrodinger, Dirac, and others—to take existing concepts and fashion them into a sound scientific theory. This requires the theorist to do four things: (1) state definitions and postulates of the scientific system in a clear and unambiguous manner; (2) perform the labor of deducing implications of postulates of the system with meticulous care; (3) make specific statements regarding the outcome of concrete experiments or observations, including experiments already performed and ones not yet performed or even planned; and (4) conduct the critical experiments.

Put in a modern context, this means that modern-day theorists must clarify the concepts (step 1) of connectionism, dynamic systems theory, developmental systems theory, and so on, and deduce the implications of each theoretical view (step 2). This was one goal of the recent edited volume by Spencer, Thomas, and McClelland (2009). Newcombe viewed this book in an unfavorable light: from her vantage point, it reflects competition between two modern theoretical camps. But our goal was more mundane: rather than doing battle to declare a winner, we simply wanted to specify the details of these theories to understand whether they are the same or different. The conclusion: There is more similarity than dissimilarity, and these theoretical perspectives will be most complete when fully integrated. This conclusion was reached after much effort, and we contend that the effort should not stop there. For instance, an evaluation of how dynamic systems theory and connectionism relate to developmental systems theory would be useful. All of these approaches offer emergentist views of development, but work needs to be done to clarify exactly what these theories claim, what they don't claim, and whether synthesis is possible. Sadly, such work is not rewarded in our science--we rarely get whole communities together to specify and evaluate concepts at a detailed level.

And, of course, this is only just the beginning of Hull's "way out." Steps 3 and 4 require a tight interface with empirical data. In this regard, we agree with Newcombe: it is absolutely fundamental that theory and data move forward hand-in-hand (see Simmering et al., in press). There are certainly examples in the literature where this has not happened. Nevertheless, there are myriad examples where it has (e.g., French et al., 2004; Schutte & Spencer, 2009; Schutte, Spencer, & Schöner, 2003; Smith et al., 1999), to the credit of both theoreticians and experimentalists.

So where does this leave us? In our view, Scott Johnson has done yeoman's work putting together an outstanding edited volume on developmental process; however, we don't think this volume warrants another "ism." Indeed, we'll go one step further and propose a "new rule" in the spirit of Bill Maher: no more "isms" until we eliminate one. This will keep us honest. It will help us elevate our theoretical game. We need to do better as a science. We need to find a way out of our theoretical morass. Fortunately, Hull has provided a road map. Perhaps after 80 years, at least one psychological science will follow his lead.

Acknowledgments

We would like to thank Dan Brooks for sharing Hull's illuminating article with us, as well as members of the Delta Center for stimulating discussions of bold assertions. Preparation of this manuscript was supported by National Institutes of Health (R01-MH062480) awarded to J.P.S.

References

French RM, Mareschal D, Mermillod M, Quinn PC. The role of bottom-up processing in perceptual categorization by 3- to 4-month-old infants: Simulations and data. Journal of Experimental Psychology. 2004; 133:382–397. [PubMed: 15355145]

Gopnik A, Tenenbaum JB. Bayesian networks, Bayesian learning and cognitive development. Developmental Science. 2007; 10:281–287. [PubMed: 17444969]

Hull CL. The conflicting psychologies of learning—a way out. Psychological Review. 1935; 42(6): 491–516.

Johnson, SP., editor. Neoconstructivism: The New Science of Cognitive Development. New York: Oxford University Press; 2009.

Mareschal, D.; Johnson, MH.; Sirois, S.; Spratling, M.; Thomas, MSC.; Westermann, G., editors. Neuroconstructivism, Vol. 1: How the Brain Constructs Cognition. Oxford, UK: Oxford University Press; 2005.

Newcombe N. What is neoconstructivism? Child Development Perspectives. 2011 XX, XX.

Oyama, S.; Griffiths, P.; Gray, R., editors. Cycles of contingency: Developmental systems and evolution. Cambridge, MA: MIT Press; 2001.

Schutte AR, Spencer JP. Tests of the dynamic field theory and the spatial precision hypothesis: Capturing a qualitative developmental transition in spatial working memory. Journal of Experimental Psychology: Human Perception and Performance. 2009; 35:1698–1725. [PubMed: 19968430]

Schutte AR, Spencer JP, Schöner G. Testing the dynamic neural field theory: working memory for locations becomes more spatially precise over development. Child Development. 2003; 74(5):1393–1417. [PubMed: 14552405]

Simmering VR, Triesch J, Deák GO, Spencer JP. To model or not to model? A dialogue on the role of computational modeling in developmental science. Child Development Perspectives. 2010; 4:152–158. [PubMed: 21625352]

Smith LB, Thelen E, Titzer R, McLin D. Knowing in the context of acting: The task dynamics of the A-not-B error. Psychological Review. 1999; 106:235–260. [PubMed: 10378013]

Spelke ES, Kinzler KD. Core knowledge. Developmental Science. 2007; 10:89–96. [PubMed: 17181705]

Spencer JP, Blumberg MS, McMurray B, Robinson SR, Samuelson LK, Tomblin JB. Short arms and talking eggs: Why we should no longer abide the nativist-empiricist debate. Child Development Perspectives. 2009; 3:79–87. [PubMed: 19784383]

Spencer JP, Perone S. Defending qualitative change: the view from dynamic systems theory. Child Development. 2008; 79(6):1639–1647. [PubMed: 19037938]

Spencer, JP.; Thomas, MSC.; McClelland, JL., editors. Toward a unified theory of development: Connectionism and dynamic re-considered. New systems theory York: Oxford University Press; 2009.

Thelen, E.; Smith, LB. A dynamic systems approach to the development of cognition and action. Cambridge, MA: MIT Press; 1994.

van der Maas H, Molenaar P. A catastrophe-theoretical approach to cognitive development. Psychological Review. 1992; 99:395–417. [PubMed: 1502272]