Dissociations, Developmental Psychology, and Pedagogical Design

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Although dissociations in children’s responses are sometimes about “getting it right” for an experimenter, they might also often reflect differences between conscious and subconscious processing that are not geared to correct performance. Research with adults also reveals many cases of dissociation, and adults can more easily be subjected to neuroimaging methods that might help shed light on dissociation. Finally, much of the research on dissociations shows that human cognition is optimized in some contexts over others. School environments often correspond to less optimizing contexts. Research on dissociation could be used to inform pedagogical design.

Woolley’s (2006) wide-ranging and thought-provoking article does a tremendous service in pointing out the interest of and exploring reasons for several cases of dissociation in children’s responses to experimental tasks. She covers cases of verbal–behavioral dissociation in the realms of fantasy, false belief, mathematical reasoning, and conservation, and she proposes that considering children’s goals in each situation may shed light on the phenomenon: one response might reflect the child’s goal of “getting the right answer” while another response reflects a different goal (or no goal at all). In her examples, typically the child’s goal for the (often) less-apt answer is to convey knowledge to an experimenter—except when it is to help someone (and they get it right, as in Garnham & Perner, 2001; Woolley & Phelps, 1994). Although a goal of “getting it right” can make sense of dissociations in these tasks, it does not explain some other known dissociations, described below.

Dissociations deserve close study because they have the potential to reveal a great deal about the human mind. In this commentary I first consider dissociations in terms of the historical context of our view of mind, and point out their relation to research in embodied cognition. I then point out some additional dissociations and suggest looking for similarities in the adult literature as an additional avenue for understanding what dissociations reveal about the human mind. Finally I consider the implications of these discoveries for the environments and methods used in education.

Unconscious Processing

Tim Wilson has noted that “Consciousness is a limited capacity system, and to survive in the world people must be able to process a good deal of information outside of conscious awareness” (Wilson, 2002, p. 8). He cites estimates that our sensory systems take in 11 million bits of information per second and yet conscious awareness processes only about 40 of them! The child’s brain is developing to do this, and our analysis of dissociation errors is much expanded if we also consider how unconscious processing might be guiding the child’s behavior, and either gradually becoming conscious (development) or exerting its effects in parallel with those of conscious processing. Piaget (1930), of course, foreshadowed this with a discussion of sensorimotor intelligence, which can become conscious and operational (Lucienne opening and closing his mouth, then realizing he could manually open the matchbox to retrieve the chain), or can simply exist in parallel to operational intelligence.

Dissociations direct us to attend much more to the importance of the body to the mind, to the cumulative effects of those 11 million bits of information taken in through the body and not necessarily entering consciousness. Considering the history of ideas in broad strokes, one can say that Western thought did not pursue this angle; Eastern thought, in contrast, with Tai Chi, meditation, yoga, and a holistic, contextual approach founded its philosophical traditions on the entwining of body and mind (for an interesting discussion, see Nisbett, 2003). Western thought has held the body and mind much more separate, early on in the oral methods of schooling, using speaking rather than doing—the Socratic tradition of argument, the recitations of the

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monks—and finally in Descartes’ famous assertion that conscious thought (rather than say intentional movement) is the proof of existence (Descartes, 1641/1993). This was referred to by Damasio (1994) as Descartes’ “error” because of its ignoring of the body; instead, Damasio stated, “Nature appears to have built the apparatus of rationality not just on top of the apparatus of biological regulations, but also from it and with it” (p. 128). With some notable exceptions (e.g., Lakoff & Johnson, 1999), the Western theory-of-mind ensconced in psychology and philosophy literature has tended to follow Descartes, largely ignoring the body and the context (Lillard, 1998).

It is ironic that behaviorism was for a time a dominant sequel to Descartes’ disembodied view of mind. When members of the European psychophysic- physics laboratories of the late 1800s gave responses on introspective tasks about their perceptions that suggested they were unduly influenced by their laborato- ratories’ different theories, behaviorists responded that we should ignore minds, and focus only on objectively measurable behaviors (Watson, 1913). A focus on behaviors could have led to attention on the body, and then directly to an embodied view of cognition, but instead minds and their interpretive capacities were purposely overlooked by behaviorists. Behaviors were studied out of natural contexts and with imposed consequences: Skinner boxes, shocking mazes. When the mind was brought back into psychology, in the late 1950s, it was in part through showing that contexts matter (The New Look, Bruner, 1957), but not with attention to the role of bodies. The wave of research on conservation in the 1970s was very much about contexts, showing disso- ciation within a verbal form: when one asked a conservation question one way, one got one answer, and when one asked in another context, one got a different answer. Context is still working its way into psychology, for example in attention to how, over- development, culture becomes ingrained in thought (Shweder et al., 1998).

Yet another new New Look in psychology today is at the body’s role in the mind’s processes (Barsalou, Simmons, Barbey, & Wilson, 2003; Diamond, 2000; Glenberg, 1999; Lakoff & Johnson, 1999; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Proffitt, 2006), highlighting that minds evolved to serve bodies (Witt & Proffitt, 2005). The role of the body in our thinking processes is clear in studies that show dissociations that hinge on people’s different bodily states. When wearing a heavy backpack, undergraduates say a hill is steeper than when they are not wearing one (Bhalla & Proffitt, 1999). When holding a stick that could retrieve an object, the ob-
What the child does in getting the answer wrong manually might be analogous to what makes adults get the answer right in sequence learning tasks. Adults are often not conscious that they are learning the rules of a particular motor sequence, but their behaviors show that they are (Curran, 1998). One difference across the child and adult tasks is that reality was switched on the child—the adult’s performance is correct because reality does not change, and the child’s is incorrect because it does. When the motor element of reaching to get the object is removed in Baillargeon’s visual task, we learn that the child’s visual system correctly takes the changed world into account; only the child’s body lives in a previous world. Our ability to learn sequences and to detect patterns leads to the incorrect motor response when the world changes, resulting in the dissociation. Diamond has found that prefrontal changes appear to govern responses to the A-not-B task (Diamond & Doar, 1989), whereas the adult sequence learning literature has looked to both prefrontal function and the basal ganglia (Middleton & Strick, 2000). Both the adult and child literatures suggest that the motor system has its own representation of the world, which may or may not be filtered through conscious awareness. A closer look at sequence learning in adults might shed further light on these dissociations in children.

The phenomenon of choking under pressure (Beilock & Carr, 2005), observed in golf, responding to rapid-fire math questions, and so on, seems similar to a dissociation in understanding pretending observed in my laboratory (Ma & Lillard, in press). When 2-year-olds watch someone pretend to eat alongside another person who really eats (but whose food is not visible to the infant), infants’ implicit responses suggest that they know which one is pretending: when watching the real but not the pretend eater, they are apt to smack their lips, swallow, and reach out. However, when asked to “get the real grapes,” 2-year-olds respond at chance. By 2 1/2 or 3, children correctly reach for the covered bowl containing real grapes on the first trial, but not on later ones. This suggests that short-term memory reserves (keeping track of which bowl is which) are taxed after the initial trial for children; research also suggests that the choking phenomena in adults stems from taxation of short-term memory (Beilock & Carr, 2005). As research with adults regarding these phenomena increasingly capitalizes on neuroimaging methods, it might assist in understanding such dissociations in children too.

When children go from one- to two-word speech, many go through a phase when they can give the second word in gesture, and this predicts when they will be able to use two actual words (Iverson & Goldin-Meadow, 2005). This seems similar to descriptions of high-level physicists using gesture while struggling to understand particularly difficult concepts as they explain new hypotheses (Ochs, Gonzales, & Jacoby, 1996). In fact, when their gestures are redundant with speech (conveying the same information), adult speakers remember more (Wagner, Nusbaum, & Goldin-Meadow, 2004). This is a dissociation between knowledge revealed by talk alone versus what is revealed by talk and gesture, and gesture is thought to assist by helping people offload some of the cognitive work to the motor realm (Goldin-Meadow, 2006). Again, neuroimaging might be very helpful in understanding how gesture serves cognition in adults, and such findings might shed light on the process in children. The dissociation between gesture and speech frequently observed in Goldin-Meadow’s research is important in helping bring attention to the relation between movement and thought, which has profound implications for how the mind functions and, consequently, for education.

**Implications for Education**

The movement in psychology from a disembodied mind, to a mind with context (observed in cultural psychology), to a mind that is also closely connected to a body and serves that body has very important implications for the environments and methods by which we educate children. Our educational system was designed for a different sort of organism than which we educate children. Our educational system is a case of very poor youth have in our society bespeak those issues—as Eccles has put it, schools are a case of very poor person-environment fit (Eccles et al., 1993). But whereas Eccles focuses on poor fit at adolescence, after the transition from small, neighborhood elementary to larger middle or junior high schools, a poor fit to the workings of the human mind might actually be a problem all along. Schools were designed for a model of the child appropriate to the psychology of the early 1900s, rather than for the model of the child that psychology research evokes today (Lillard, 2005). Perhaps middle or junior high is when things go so badly for so many children because the cumulative effects of what children face before then come to fruition as one sheds the stability of one’s middle childhood self to begin to become an adult. Consider here just the implications of disembodiment, and the contingent dissociations seen in that realm.

We know that people generally think better when their movements are aligned with their thinking, and
yet we have a school system that typically has children learn while seated at desks. They listen to the teacher, and occasionally they write something or say something. This made good sense to Thorndike (Jonich, 1962), because he was interested in what he termed “connectionism”: getting the child to form connections between entities like “dime” and “10 cents.” Rewarding the child (with candy or nice looks) when the connection was properly made was one of the teacher’s main functions. This could occur perfectly well while the child was seated, listening to the teacher, and reciting information orally or on tests. Thorndike was a major force in the design of the schools that we basically still have today.

Yet if we take seriously the finding that we learn best when our bodies reflect what we are learning through movement, children should learn by carrying out actions with dimes, trading them for 10 pennies and for the goods they might buy. Children should be learning with materials that bring their bodies in line with their minds. In addition, if learning is to involve the body interacting with materials, to keep focus on the materials (rather than the teacher), children must go at their own pace. Dissociations show this by revealing that people have different modes of cognition.

Dissociations also point to the need to take seriously the notion of context and cognition in schooling, because dissociation occurs not only across tasks that involve the body more and less, but also across tasks that have a meaningful context or do not. School tasks, as currently implemented, often lack meaningful contexts. One learns the Pythagorean theorem, but not who Pythagoras was, how he derived this theorem, what the theorem applies to in the real world, and so on. Yet we know that knowledge is often best accessed in meaningful contexts: that American housewives can perform mathematical calculations when considering sales in grocery stores that they cannot do with pencil and paper (Lave, 1988), for example, and that nursing students learn probability best when the examples come from medicine (Ross, 1983). Our traditional schools are not designed to provide contexts that support cognition, although the best teachers try to. There are alternative school systems, like Montessori, that are constructed from the ground up in ways that appear to better support children’s social and academic development (Lillard & Else-Quest, 2006).

Conclusions

We can capitalize on dissociations for what they can teach us about how the human mind works. Seeking and attending to parallel dissociations in adults and children can further this effort because of the relatively easier task of using neuroimaging techniques with adult subjects. In line with Woolley’s (in press) suggestions, developmentalists should use more multimethod approaches to shed more light on functioning of the mind via dissociations. Dissociations also point quite importantly to the need to consider the body–mind relationship more in psychology, a task recently advancing under the rubric of embodied cognition. Much of human thinking is in response to stimuli of which we might not even be consciously aware, and developmentalists need to consider this large swathe of underground thinking when studying children’s responses to tasks. Finally, the schools we have were designed in response to a model of the child’s mind that we now know—partly through work showing dissociations—is not apt. Developmental psychologists should go further in considering how their findings suggest different—even radically different—models of schooling that are better suited to children than is the model bequeathed to us by behaviorism.

References


