

CHAPTER 13

The Development of Implicit Social Cognition

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The near-complete helplessness of the human infant is one of the most striking features of our species, clearly differentiating us from most other mammalian species. Compare, for example, a human infant with a horse's foal, up and walking almost immediately after birth. Our total dependence in early life is even more striking when placed alongside the mature human adult, who accomplishes so many cognitive feats otherwise unknown in the animal kingdom. As many have convincingly argued, our eventual cognitive prowess is in large part the result of our unique capacity for social interactions, such as our ability to acquire language rapidly and through language vast amounts of cultural knowledge and normative behavioral repertoires (e.g., Sperber, 1996; Tomasello, 2001). This process of enculturation begins in infancy and continues throughout the life span, but it clearly is at its most dizzyingly rapid during childhood, when children acquire the lion's share of the knowledge and skills necessary to operate in the adult world.

Social psychologists have long studied the mechanisms underlying human social interaction, behavior, and thought, concerning themselves with *why* we do what we do when we do it and how we navigate our rich, multifaceted social worlds. Yet in the context of our opening paragraph a limitation swims into focus: This inquiry has almost exclusively involved the examination of

young adults (i.e., the university undergraduate), despite the fact that the constructs we care about (e.g., attitudes, stereotypes, self-esteem, identity) have their natural genesis in early childhood. Are not these processes, as they manifest themselves in adults, a snapshot in a time course of developmental change? With these questions in mind, we open our contribution to this volume by directly addressing the question of "Why development?"; that is, why should researchers interested primarily in implicit social cognition in adults be interested in the minds of children?

We contend that a developmental approach does not constitute a special interest only relevant to those concerned with children or those with appointments in developmental areas any more than a social neuroscience approach is a special interest only relevant to those concerned with the brain and residing in neuroscience departments. Rather, like neuroscience, it can be considered another valuable method that allows specific types of questions to be addressed in novel ways, providing a perspective that simply cannot be provided by behavioral research with adults alone. Within the broader fabric of social cognition research then, developmentalists are members of the "ingroup," providing data directly relevant to our attempts to delineate all aspects of social functioning. In what follows, we expand on these thoughts in the context of implicit social cognition research.

WHY DEVELOPMENT?

At the most basic level, a developmental approach to the study of implicit social cognition is important because the initial form of a given mental representation and the path it follows after its emergence provide crucial evidence that can be used to adjudicate between alternative construals of that representation in adulthood, ultimately leading to more accurate theories of what we study. To flesh out this rather abstract idea more clearly, we walk through this argument with several examples.

Individual researchers in implicit social cognition have their favorite ways of characterizing their topic of study. For example, influential accounts have made distinctions between control and awareness, associative and rule-based processing, or goal dependence and goal independence (e.g., Bargh, 1994; Moors & De Houwer, 2006; Smith & DeCoster, 2000). Yet the empirical support for any one of these distinctions is not grounded in the psychological investigation of a particular organism, as we might naively assume, but something narrower: a particular organism at a particular stage of development (adulthood, or what usually stands in for it, the university undergraduate). If we are interested only in understanding how this particular creature behaves at this particular stage of development, this limitation is not relevant, and research can continue uninterrupted. On the other hand, if what we are interested in is something broader, for example the characterization of implicit or automatic social processes writ large or the conceptual basis of this very distinction, then this limitation suddenly becomes pertinent, because findings so narrowly situated are a shaky ground on which to base broader conclusions.

Reviewing the implicit social cognition literature, one might be tempted to say that there are two kinds of implicit cognitions. The first, one might suggest, is a class that is intrinsically implicit, a result of a dual-process human representational system. That is, things are implicit because our representational system contains a lower level associative encoding alongside a higher level propositional encoding. Implicit attitudes and stereotypes or implicit goal activation might suggest themselves as examples. One might further argue for a second class of automatic or implicit behaviors that cannot be implicit in this sense; rather, they are implicit because they have been overlearned, automatized (Anderson, 1992; Logan, 1992), or "modularized" (i.e., have, through practice, come to take on the properties of an independent cognitive module;

see Karmiloff-Smith, 1996). In short, we might say that some aspects of cognition are implicit by virtue of their intrinsic representational structure, whereas others are made implicit through sufficient expertise. But how would we decide if there were indeed these two classes of implicit cognitions? How would we decide whether a given cognitive construct is one or the other? We might look at patterns of variability and so conclude that parsing positions on a chessboard or tying shoelaces is of the second sort (after all, some people cannot do it at all and those who can required extensive practice to do so initially), while the ability for statistical learning or covariation detection is of the first sort (after all, everyone has these capabilities irrespective of learning histories). However, as long as we are basing decisions about which types of constructs belong in which category solely on the study of adults, our conclusions are little more than articles of faith. After all, we are ignoring the entire natural history of the organism. Is it not highly plausible that buried in ontogeny are numerous instances of automatization, of explicit becoming implicit? And can we rule out the converse type of change, of initially implicit processes being made explicit as metacognitive control strategies develop and acquire new scope?

Recall that one of the major developmental accomplishments, extended over the first dozen or so years of life (and some would argue continuing into the early 20s; e.g., Shaw et al., 2008), involves the development of the prefrontal cortex and the concomitant rise of executive function and control. To our eyes, this looks like the emergence and development of the explicit system, of a metarepresentational, propositional system for reflecting on and evaluating one's own (and others') mental content. Thus, much that is implicit in the infant is explicit in the toddler, who can report on his or her desires; much more is explicit in the preschooler, who has finally acquired an adult-like theory of mind in which mental states like belief are understood as embedded in one's own (or others') mental space (a so-called representational theory of mind; see Leslie, 1987); and more still is explicit in the elementary school student, who strategically shares (and does not share) his or her own mental state for varied and sundry aims. This is the explicit system laying claim to the "implicit's" territory, exerting increasing control over previously automatic processes. However, this is also very likely the driving force behind the dissociation between implicit and explicit processes, because self-reflection appears to drive the revision

of explicit attitudes to a greater extent than implicit attitudes (e.g., see Rutland, Cameron, Milne, & McGeorge, 2005). Thus, the rise of the meta-cognitive, increasingly "explicit" child is also the rise of the dual-process child.

Furthermore, the child will laboriously acquire new skills and competencies and practice them until they become automatic; highly controlled, conscious processing can guide these repetitive efforts until they become overlearned and thus implicit. Imagine how we would respond if a theorist claimed that the ability to shift gears in a manual transmission was a paradigmatic case of an implicit process (after all, large segments of the population can readily accomplish it without conscious control and with little effort). We would surely respond by pointing out that, although such a skill might well be implicit in some senses, it is the result of a protracted period of extensive practice, that its implicitness, such as it is, is highly contingent. A developmental perspective cautions us to remember that many other seemingly paradigmatic cases of implicit processing in adults could be more like this than we may first realize, the direct result of the child's repetitive learning efforts.

The broader point here is that by examining social cognition throughout the life span we can actually see progress along these different paths: implicit becoming explicit and explicit becoming implicit. These aspects of our social cognition will be crucial to truly understanding the phenomena of interest but can be invisible in adult "end-state" processing. Put another way, at each point in development the implicit-explicit distinction may be drawn differently. Different constructs and different processes will fall on different sides of the divide, and understanding how and when this boundary changes will provide an invaluable resource for theory building, for adequately characterizing precisely what we mean by implicit and explicit in the first place.

In addition to contributing to discussions about the emergence, interplay, and the best conceptual characterization of implicit and explicit processes, a developmental approach to the study of implicit social cognition also allows us to test specific developmental predictions derived from theoretical claims in the literature. Are implicit attitudes slow-learned maps of statistical regularities read off the environment (e.g., Smith & DeCoster, 2000), or are they approach-avoid orientations that, to do their work, must be generated online, even in the absence of a learning history (Duckworth, Bargh, Garcia, & Chaiken, 2002; Dunham,

Baron, & Banaji, 2008)? Enter development; a slow-learning view implies that implicit attitudes ought to emerge gradually, in lockstep with increasing social experience, increasing exposure to the environmental regularities on which they are based. A rapid-emergence view makes a different kind of prediction, instead implying that implicit attitudes might emerge as soon as new social targets are encountered. We return to data bearing on this particular example later, but our point here is simply that developmental inquiry is uniquely positioned to address these sorts of questions, because it provides direct evidence of change (or lack thereof) over time and thus indirect evidence as to the fitness of conflicting theories.

In addition to contributing to current questions and debates, a developmental approach to the study of implicit social cognition will raise new avenues entirely. For example, researchers of implicit social cognition have been interested in how people create new implicit attitudes (e.g., Fazio, Eiser, & Shook, 2004; Sherman, 1996). Presumably, the interest of this work is in large part from its ability to shed light on the origin of implicit social attitudes. Yet many entrenched social attitudes have their actual genesis in early childhood. Can we assume that the way an adult forms new attitudes is identical to the way a child does? This represents an unspoken and unproven hypothesis. Given the considerable amount of brain growth and related cognitive changes during childhood, there is considerable reason to doubt that the mechanisms would *necessarily* be identical. If one were to find that children and adults do not form new attitudes in identical ways, then theories of the formation of social attitudes would need to be revised, and tests of the development of social attitudes in adulthood would need to be understood as merely tests of the emergence of attitudes in adulthood, not as contributing to discussions of the origins of that large class of social attitudes that emerge before the age of 18, when most social attitudes likely emerge.

One final reason for studying development is that young children provide a more unadulterated human mind for investigation. The very complexity of adult knowledge structures works against our goal of understanding strictly how the mind works. Adults are plagued by concerns such as social desirability; they have years of exposure to formal education, religion, media, and social norms; and they have large quantities of experience spent interacting with other, equally complex minds. Of course, some research questions have everything to do with the impact of these forces on implicit

social cognition, but even here an illuminating test will be comparing humans before, after, or at varying levels of exposure to these forces. Yet at the same time, as researchers we are often interested not just in the impact of various factors on implicit social cognition but in the cognition itself: how the mind works. The best subjects to answer our basic questions about social cognition may very well be children.

In summary, adult social cognition is in an important sense “end-state” cognition and thus the result of developmental processes. The same way that comparative research with primates and other species reveals what is provided by our evolutionary endowment and what must be somehow constructed by human-specific capacities and contexts, developmental research can reveal what aspects of our cognitive system are contingent on cultural constructions and what aspects are common across all members of our species.

In writing for an audience that may not be familiar with developmental approaches, we have chosen to begin with the “Why development?” question. Ideally, we would now summarize the ways in which the extant literature illustrates our claims. However, we must (unfortunately) acknowledge that in the area of implicit social cognition the field is only beginning to provide these illustrations. That is, although we argue there are many important theoretical questions one can answer using developmental approaches to implicit social cognition, and that the extant literature has begun to answer some of them, the interface between developmental and social cognitive research is, to risk a bad pun, still in its infancy. “Big picture” theoretical questions are just beginning to come to the forefront, because the majority of what has been done is best considered methodological and conceptual groundwork, which must precede the testing of more specific theoretical hypotheses. Some may find this dissatisfying, and certainly we are sympathetic to such a response. However, we hope we can provide reason to be optimistic about what the developmental approach will contribute in the coming years.

More specifically, the work we review next has largely focused on what kinds of implicit measures are suitable for children and what modifications need to be made; how children’s results compare with their adult counterparts’ at the mean level, in the patterns between groups and across measures; and what role socializing factors such as parents and exposure play in the development of attitudes. We believe there is much of interest here, even if

some of the broader possibilities we outlined previously must remain a promissory note.

THE EXTANT LITERATURE

To date, fewer than 30 published reports have involved a developmental approach (defined loosely as any study with an implicit measure in a population of participants younger than 18) to the study of implicit social cognition. The work that has been conducted has primarily focused on two areas reflecting somewhat the trends in the adult implicit social cognition literature: intergroup attitudes and clinical applications. Next we briefly describe the work to date.

The Development of Implicit Intergroup Attitudes

What Counts as Implicit?

The largest area of developmental implicit social cognition research has focused on children’s intergroup attitudes. These studies have emerged from several labs with a diverse set of goals ranging from assessing the feasibility of implicit measures with children and comparing the levels of implicit attitudes in children and adults to more theoretically oriented questions, such as whether children, like their adult counterparts, show evidence of balanced identity in their implicit evaluations.

Before turning to these studies, however, we must emphasize that definitions of *explicit* and *implicit* have been and can be used in a great variety of ways in the developmental literature. The mappings between these usages and those employed in contemporary social cognition are not always clear, making it difficult to determine which developmental studies are relevant to this chapter. For example, infant work on intergroup preferences presents one potential problem. As we pointed out previously, almost everything infants do is implicit: They are unlikely to be consciously considering any of their attitudes; therefore, we might be tempted to include this work under the title “developmental approaches to the study of implicit social cognition.” Of course, researchers in this area seldom specify these preferences as implicit, probably because that is so obvious. The findings to date in this area are consistent with a claim that infants primarily prefer people who are familiar and secondarily prefer unfamiliar people who look like familiar people. That is, infants prefer their mothers

to unknown other females (Pascalis, de Schonen, Morton, Deruelle, & Fabre-Grenet, 1995), preferentially look toward faces of their caregiver's gender (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002), preferentially look at faces of familiar racial groups (Bar-Haim, Ziv, Lamy, & Hodes, 2006), and look longer at faces of people speaking a familiar language (Kinzler, Dupoux, & Spelke, 2007). Clearly, these preferential looks, observed in infants as young as 3 months, cannot be considered evidence for an *explicit* preference. Yet it is also not clear that this should be interpreted as an implicit preference in the sense that we usually mean. Preferentially looking may, for example, be based on attraction to a small subset of features that do not correspond to an adult conception of race or gender; therefore, these may not be attitudes toward the same categories that we have as adults (to provide an example, infants selectively orient toward and prefer looking at faces from minutes after birth, but careful experimental work has revealed that what constitutes a face for an infant can be as simple as three dots arranged in a two dots over one dot—two eyes over one mouth—configuration; see Pascalis & Slater, 2003). There are additional thorny issues associated with determining whether an actual *attitude* underlies looking time rather than something more basic like perceptual fluency. Establishing that these are indeed indices of implicit attitudes as such would require, among other things, demonstrating substantial category overlap between infants and adults and showing, ideally with a single measure, some continuity of effect through infancy and early childhood. Significant methodological challenges will need to be overcome before this effort can succeed. We thus suggest caution when interpreting findings based on the infant record, although this will undoubtedly be an area of future interest.

During the preschool years, many studies used measures that are not strictly based on self-report and, therefore, might be considered implicit. We call this set of measures *indirect*, rather than *implicit*, largely because the responses are verbal and, therefore, the role of controlled processing could clearly come into play (and probably would in adults), but yet the attitude itself is inferred rather than measured directly. An illustrative example comes from the work of McGlothlin, Killen, and colleagues (McGlothlin & Killen, 2006; McGlothlin, Killen, & Edmonds, 2005), who showed children ambiguous scenes in which one person could be interpreted as, for example, an aggressor or a helper to a second person. Varying the race of the

two characters revealed that, at least in the case of white children in homogenous schools, interpretations of the actions of black characters tended to be more negative than parallel scenes involving white characters (McGlothlin & Killen, 2006). Other examples of indirect measures include memory tasks, in which differential recall of, for example, stereotypically consistent versus inconsistent information is compared (Davis, Leman, & Barrett, 2007; Signorella, Bigler, & Liben, 1997), or drawing tasks, in which children's drawings of ingroup and outgroup targets are coded for stereotypical content (e.g., Teichman, 2001). These tasks may well depend on implicit representations and thus may relate closely to implicit measures as more commonly considered in the adult literature, but that remains an open empirical question. Because this work represents a huge body of research spanning several decades, we do not rehash it here (for reviews, see Aboud, 1988; Bigler & Liben, 2006); instead, we focus on more recent studies that stem more directly from theories and methods derived from adult implicit social cognition research.

In our review we focus on studies using measures that most closely align with those in the literature on adult implicit social cognition, such as the Implicit Association Test (IAT), the Extrinsic Affective Simon Task (EAST), and priming measures. Although there is considerable debate regarding whether these measures and the results of these measures should be termed *implicit* or not (De Houwer, 2006), for sake of simplicity and lack of a clearer term to refer to this subset of research, we identify the measures and the constructs expressed on these measures as implicit. That said, it is important to acknowledge that none of these studies independently assessed criteria identified by researchers as the hallmark of implicit or automatic processing (e.g., John Bargh's, 1994, "four horsemen"). That is, questions of whether children are *aware* of the attitudes or beliefs they are expressing, whether they *intended* to make the responses they made, whether their responses were *efficient*, or whether the participants could exert *control* over their responses have not been directly investigated in children. As we discuss later, it will surely be the case that in children, as in adults, the responses to these measures will turn out to reflect varying degrees of both automatic and controlled influences (e.g., Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005; Payne, 2001; Stahl & Degner, 2007). The degree to which a given response at a given age reflects varying degrees of these influences will be an important topic for future inquiry.

Gender

As with adults, the most commonly used measure of implicit social cognition in children is the IAT (Greenwald, McGhee, & Schwartz, 1998). To date, most of the studies using this measure have focused on assessing mean differences or similarities in the IAT effect across development as well as differences between known groups. The first reported use of the IAT with children comes from an investigation of implicit gender attitudes in fifth-grade children and in adults, which found that both children and adults tended toward implicit pro-female attitudes, with some evidence for increasing female preference with age (Skowronski & Lawrence, 2001). A more recent investigation of children's implicit gender attitudes, which included a broader age range and the revised scoring method for the IAT (Greenwald, Nosek, & Banaji, 2003), found in-gender preference among 6-year-olds, gradually shifting with age in the direction of more pro-female implicit attitudes for both boys and girls (Baron, Dunham, & Banaji, 2009). Thus, convergence on the adult norm of pro-female implicit preferences (Rudman & Goodwin, 2004) appears to happen over a protracted period. More recent work suggests that, in contrast to changes in gender attitudes throughout childhood, there is relative consistency in spontaneous, or what we might think of as implicit, gender stereotyping throughout a similar age range, as measured by a different reaction time measure, the action inference paradigm (Banse, Gawronski, Rebetez, Gutt, & Morton, in press).

Race and Ethnicity

As in the adult literature, perhaps the most prolific area of research has been work on children's implicit racial and ethnic attitudes. The first studies of implicit race attitudes investigated whether children's implicit attitudes differed across development. These studies found similar means on two variations of the IAT across childhood and into adulthood in samples of white British (Rutland et al., 2005) and white American (Baron & Banaji, 2006) children, despite the fact that explicit preference declined during this same period. The study by Rutland and colleagues (2005) also demonstrated that children's explicit but not implicit attitudes are impacted by self-presentation concerns, providing indirect support for the claim that implicit measures may be less controllable in children than explicit measures.

More recently, two studies have contrasted the IAT with evaluative priming (Degner & Wentura, in press; Williams, Steele, & Durante, 2009). Both found that these measures do yield somewhat different results at some ages. For example, white Canadian 6-year-olds showed in-race preference on the both the IAT and evaluative priming, whereas 9-year-olds showed in-race preference only on the IAT (Williams et al., 2009). Examining somewhat older children, Degner and Wentura (in press) found that white German 9-year-olds showed implicit preference for white Germans over Turks on an IAT but not on an evaluative priming measure; ingroup preference on the priming measure emerged only in early adolescence. These findings suggest that these two measures may diverge in interesting ways in childhood, perhaps because the IAT assesses category-level preferences while evaluative priming assesses exemplar-level preferences (e.g., Olson & Fazio, 2003). Still, these two patterns of results are in some tension: Why do younger but not older Canadian children and older but not younger German children show preferences on a priming measure? Additional research will be required to identify the age-related, cultural, or methodological differences driving these results.

As we describe in more depth later, one limitation of the IAT for developmental researchers is that it is simply too difficult for young children to perform. Therefore, Dunham and Banaji (2009) have modified another implicit task (Hugenberg & Bodenhausen, 2004), which has been shown to correlate with IAT performance in adults, for use with children. In this task, individuals as young as age 3 through adulthood were asked to categorize faces as either black or white. The faces were racially ambiguous and were smiling or angry. Past work with adults demonstrated a bias such that faces that are angry are more likely to be seen as black. Dunham and Banaji found that this bias exists in children as young as 3, and that the level of bias was invariant through adulthood, suggesting that children's implicit race bias emerges early and at levels nearly identical to that of adults in the same society.

By establishing when implicit measures can be used, that they yield interpretable patterns of results in children, and by charting population means across ages, these studies of intergroup attitudes have laid the groundwork for additional inquiry. Two studies assessed the role of social status on implicit attitudes while using more diverse samples. In a cross-cultural comparison of whites in the United States and Japanese in Japan, researchers

found that children from both countries showed the same level of implicit ingroup preference, and that the level of ingroup bias was the same irrespective of the status of the outgroup (white/Japanese vs. black), despite the fact that adults in both cultures showed a sensitivity to the outgroup's status on the same implicit measures (Dunham, Baron, & Banaji, 2006). In other words, children's implicit attitudes appeared to reflect a more basic ingroup–outgroup dichotomy rather than the nuanced representation of status of multiple groups that adults demonstrated.

A related study investigated Hispanic children (and adults') implicit attitudes toward white (high-status) and black (low-status) outgroups. When blacks were the outgroup, Hispanic children showed an ingroup preference on the IAT; however, when whites were the outgroup, they demonstrated no overall preference, suggesting that at least some aspects of status sensitivity may emerge earlier in minority compared with majority children (who, as noted previously did not display status sensitivity in their implicit attitudes until sometime after age 10). However, verifying this conclusion will require unconfounding status and familiarity, which are difficult to disentangle in majority–minority interactions in the United States, where it is plausible that children are more familiar with the majority, high-status group than other minority groups. This study additionally assessed implicit ethnic identification and self-esteem; the relationships between these tasks provided some, albeit weak, evidence of balanced identity theory (Greenwald et al., 2002) in children.

Impact of Social Context

A second question addressed by several studies of implicit attitudes in children has been the role of social experiences on implicit attitudes. For example, consistent with intergroup contact theory (Allport, 1954; Pettigrew, 1998), Turner, Hewstone, and Voci (2007) found that increased intergroup contact was related to less implicit ethnic bias in 8- to 11-year-old white children in the United Kingdom. Studies have also assessed the impact of parental attitudes on children's attitudes. Prior research focusing on explicit attitudes has generally failed to find such relationships (e.g., Aboud & Doyle, 1996), but Sinclair, Dunn, and Lowery (2005) found that the implicit attitudes of children were related to parents' (mostly mothers') explicit racial attitudes, but only for those children

who were highly identified with their parents. A similar study (Castelli, Zogmaister, & Tomelleri, 2009) revealed a connection between mothers' implicit race attitudes and preschoolers' explicit race attitudes.

Retrospective Accounts

Finally, although not directly investigating developmental attitudes, retrospective studies with adults also suggest an important role of early experience in affecting implicit attitudes. For example, smokers' implicit attitudes toward smoking were correlated with the valence associated with their earliest smoking-related memories (Rudman & Heppen, 2001), and early (retrospective) attachment to maternal caregivers was associated with more pro-female implicit attitudes (Rudman & Goodwin, 2004). This retrospective approach has shown similar results in the domains of self-esteem, obesity, and dreams (Rudman, 2004; Rudman, Phelan, & Heppen, 2007).

Common Intergroup Findings

The burgeoning study of the development of implicit attitudes is certain to be one of the most exciting topics for study in the development of implicit social cognition, much as the adult study of implicit attitudes has been one of the most productive and prolific areas of research in social cognition as a whole. These initial studies suggest a few very interesting conclusions. First, implicit attitudes appear to emerge early—by age 5 or 6 and perhaps as early as age 3 (Dunham & Banaji, 2009). Second, there is relative stability in the degree of implicit bias from childhood into adulthood (although alternative accounts are possible; see later discussion), in stark contrast to the degree of explicit bias, which undergoes a developmental decline in majority group children (Aboud, 1988). When changes were observed over time, these often involved an indication that what might have initially been a simple ingroup–outgroup distinction differentiated into high- and low-status outgroups over time (Dunham et al., 2006, 2008).

Work in this area is now poised to address several important topics, such as the development of self-presentation concerns and executive control, the ability to inhibit prejudicial responses, and the early origins of intergroup biases more broadly. Thus, it is a safe bet that it will continue to be an active area of research.

Clinical–Developmental Uses of Implicit Social Cognition

The second domain using implicit measures across development has been clinical psychology, in this case to assess mental representations related to mental and physical disorders and conditions. This approach has been most popular within the study of fears, suicidal and self-injurious behavior, and obesity, although a handful of other studies have also used this approach. Across these studies, the IAT has been the most common measure of implicit cognition, although other measures, including the EAST (De Houwer, 2003) and affective priming (Fazio, Sanbonmatsu, Powell, & Kardes, 1986), have been used. We review these studies briefly because the literature on clinical uses of implicit measures is summarized elsewhere in this volume (Teachman, Cody, & Clerkin, Chapter 26).

Fears

A group of researchers have begun to use implicit measures to study fears in childhood. Two studies have been designed to test whether learning information from another person can induce new implicit “fears” (the distinction between fears and what social psychologists would call “attitudes” is ambiguous) in young children and adolescents. Both studies involved an informant telling the child negative, positive, or no information about either a novel animal (Field & Lawson, 2003) or an unusual social situation (Lawson, Banerjee, & Field, 2007). Both studies found that children’s implicit attitudes as assessed by the IAT (Field & Lawson, 2003) or affective priming (Lawson et al., 2007) toward these animals and situations were affected by this learning, in that they preferred the animals and situations associated with positive information and disfavored the animals and situations associated with negative information. The authors argue that these studies are clinically useful because they demonstrate that children can learn fears from information provided by another person (rather than firsthand experience), and that the assessment of these fears via implicit measures is important because it rules out experimental demand (but see De Houwer, Beckers, & Moors, 2007, for work suggesting that implicit measures can be faked).

These findings are also interesting to researchers of implicit social cognition, in that they demonstrate that implicit attitudes toward novel things can be developed in a matter of seconds

and based only on word of mouth (for a related point in adults, see Gregg, Seibt, & Banaji, 2006). As with the broad pattern of developmental stability in children’s implicit attitudes, these findings at least generally favor models of implicit attitude formation that do not rely on a protracted learning history.

Suicide and Self-Injury

A second clinical area benefiting from the use of implicit measures has been the study of suicide and self-injury. The findings in this area are particularly interesting to implicit social cognition researchers because these represent the *only* cases of predictive validity with child participants. Additionally, clinically this is an important domain for studying implicit cognition because people who are suicidal or self-injurious often will not report these tendencies to clinicians, making it difficult for clinicians to distinguish individuals who are ready to be released (no longer suicidal) from those who just *want* to be released (but are still suicidal). Researchers have demonstrated that self-injurers and non-self-injurers (Nock & Banaji, 2007a) as well as nonsuicidal people, suicidal ideators, and recent suicide attemptors (Nock & Banaji, 2007b) are categorically distinguishable using a self-injury IAT (demonstrating known-groups validity). Demonstrating the predictive validity of these measures, implicit attitudes toward self-injury improved the prediction of self-injurious behavior over and above the predictive power of psychiatric and demographic variables. The self-injury IAT significantly predicted suicidal thoughts as well as attempts at the time of the initial study and at a 6-month follow-up and predicted suicide ideation at the follow-up even after controlling for baseline ideation and a range of other demographic and psychiatric factors. Perhaps most provocatively, the self-injury IAT scores of the two individuals who attempted suicide during the 6 months after the study showed significantly higher IAT scores than the rest of the sample, providing a potentially powerful avenue for identifying particularly high-risk patients.

Obesity and Related Phenomena

The third main area in which implicit measures have been applied to clinical questions is in the study of obesity. Mietje Craeynest and colleagues have conducted a series of studies examining implicit and explicit cognition concerning food and exercise in children and adolescents with and

without obesity. Two studies found that obese and nonobese children and adolescents do not differ in their explicit attitudes about fat-free versus fatty foods, yet they do differ in their implicit food-related cognition (Craeynest et al., 2005; Craeynest, Crombez, De Houwer, Deforche, & Bourdeaudhuij, 2006). Using the EAST (De Houwer, 2003), the researchers found that children and adolescents with obesity showed a stronger general preference for food (irrespective of whether it was healthy or unhealthy) than their normal-weight peers (Craeynest et al., 2005). Additionally, children and adolescents without obesity identified themselves with nonfat food on the IAT, whereas obese children and adolescents implicitly identified equally with fat and nonfat foods (Craeynest et al., 2006). Obesity was not associated with differences in implicit or explicit cognitions (attitudes or identification) concerning strenuous or sedentary exercise in either study. In a longitudinal follow-up to their 2005 study, assessing the impact of a residential treatment program on explicit and implicit food and exercise attitudes in children and adolescents with obesity, Craeynest, Crombez, Deforche, Tanghe, and de Bourdeaudhuij (2008) found that increasingly positive implicit attitudes toward healthy food across treatment were associated with losing weight, but they found no relationship between explicit attitudes and weight loss.

Other Clinical Applications

Two other clinically relevant developmental studies have used implicit measures. Rosen, Milich, and Harris (2007) found that more frequent self-reported victimization and self-reported distress in discussing victimization were associated with a stronger implicit association between the self and victimization. Sandstrom and Jordan (2008) demonstrated the use of implicit measures not only as a clinically relevant dependent variable but as an independent variable as well. They investigated whether self-reported high self-esteem included two clinically distinct subtypes—those with “genuine” high self-esteem and those with “defensive” self-esteem—or a tendency to mask low implicit self-esteem with high explicit self-esteem. The authors found that the latter, but not the former, were more likely to be aggressive.

Common Clinical Findings and Open Questions

A few themes emerged from the developmental clinical work on implicit cognition. Perhaps most

importantly, these findings suggested the importance of assessing both implicit and explicit constructs. For example, it was only the union of high explicit self-esteem with low implicit self-esteem that predicted increased aggression in adolescents (Sandstrom & Jordan, 2008), such that only measuring one of these factors would not have predicted aggression at all.

A second theme was the often unique contribution of implicit measures. For example, changes in implicit food attitudes predicted changes in weight loss over time in children with obesity better than explicit food attitudes. Additionally, performance on the self-injury identification IAT predicted self-injurious and suicidal ideation over and above traditional predictors such as psychiatric symptoms and demographics, suggesting that it did not merely replicate other predictors of suicidal ideation.

A final theme is that implicit attitudes can emerge in children quite rapidly, following a single experimental manipulation such as a story about dangerous animals. As noted, this places some limits on theories that characterize implicit attitudes as the result of slow-learned cultural associations culled from environmental regularities.

The Far Side of Development: Older Adults

Although nearly all of the work described so far has concerned implicit attitudes in children, a chapter on development would be remiss if it excluded mention of implicit social cognition in older adults. The work to date with older adults suggests the critical importance of understanding the role of self-regulatory abilities on implicit measures because slowed responding and a reduced ability to control responses can lead to artificially inflated effects.

To our knowledge, three studies have compared the implicit attitudes of younger and older adults. The first (Hummert, Gartska, O'Brien, Greenwald, & Mellott, 2002) examined older and younger adults' age attitudes, identity, and self-esteem as well as attitudes toward age-neutral stimuli, flowers, and insects. The critical contribution of this work was the demonstration that older adults' implicit attitudes, identity, and self-esteem were inflated compared with their younger counterparts, an effect the authors felt was likely due to their lower inhibition abilities. Importantly, Hummert and colleagues suggested that simple statistical corrections (z -score transformation) could result in more interpretable results. The general finding that older adults show an inflated IAT score was

also found by Greenwald and Nosek in an analysis of data collected on the Web (2001).

Advancing on this first investigation, two recent studies provide quantitative evidence that older adults' observed greater automatic race bias (relative to their younger adult counterparts) is the result of their limited ability to regulate automatic associations rather than their actually having stronger race bias. One of these studies (Stewart, von Hippel, & Radvansky, 2009) employed Jacoby's (1991, 1998) process dissociation procedure, which uses error rates to dissociate automatic and controlled responding, and concluded that, although underlying associations did not appear to increase in strength with age, control did decline with age, thus leading to larger IAT scores in elderly adults. In a similar vein, the second study in this area (Gonsalkorale, Sherman, & Klauer, 2009) used the quadruple process model (Conrey et al., 2005) to assess independently several hypothesized automatic and controlled components of IAT responding. This procedure also revealed that the primary age-related change driving higher increased IAT scores was the ability to overcome or regulate bias, not the strength of underlying associations. Taken together, these new analytic techniques offer exciting possibilities for developmental research, a topic to which we return later.

LESSONS IN PROGRESS

Can Effects across Age Be Compared?

As we have suggested throughout this chapter, one primary concern, and one echoed by the older adult work, is what we can conclude from previous findings of age invariance in these implicit measures across development. There is reason to believe that children, like older adults, have more difficulty inhibiting responses and, therefore, that their implicit effects could possibly be significantly inflated. Consider that children undergo considerable change with respect to inhibitory control and task-switching ability (e.g., Dibbets & Jolles, 2006; Zelazo, 2000), skills that are directly involved in most methods of implicit measurement. There are at least a few ways to address this potential problem. A stop-gap strategy is to attempt to statistically correct for differential response latencies or error rates that may be associated with age (as Hummert et al., 2002, did). However, a better strategy would likely involve modeling the relative contributions of automatic and controlled processes using a strategy such as process dissociation (Jacoby 1991, 1998; Payne, 2001) or the quad model

(Conrey et al., 2005), which can provide independent estimates of the contribution of automatic and controlled components of responding. Efforts to reanalyze existing developmental data to model these processes are currently under way (Dunham, Skorek, & Sherman, 2009).

Methods

To make implicit measures possible for use with child participants, many methodological innovations have been used. Here we primarily discuss changes that have been made to the IAT to make it more child friendly, because the vast majority of work with children has involved that measure.

Perhaps the problem that emerges first in attempting to conduct research with young children is their varying levels of literacy. Because most implicit measures involve reading and categorizing words, this introduces the possibility that a generally unmeasured variable (reading ability) would influence reaction times. To deal with this problem, a few approaches have been developed, including the audio presentation of stimuli words and the pictorial presentation of category words (e.g., Baron & Banaji, 2006) and an all-pictorial presentation of stimuli (e.g., Rutland et al., 2005; Williams et al., 2009). The latter has been used in cross-cultural studies in which not all participants are literate or have the same native language (Olson, Shutts, Spelke, & Banaji, 2008). To date, no studies have directly compared these procedures or attempted to assess which method is superior. Decisions regarding stimulus modality have important consequences for data analysis. Because there are different processing speeds associated with visual and auditory stimuli, the data from each modality essentially create two overlapping distributions of response latencies. The data analytic strategy used with these data has involved computing and averaging two effect sizes, one for auditory stimuli and one for visual stimuli (Baron & Banaji, 2006; Dunham et al., 2006; Dunham, Baron, & Banaji, 2007). The potential disadvantage of additional statistical complexity should be considered alongside the potentially greater flexibility of the auditory approach for measuring more diverse constructs. For example, it is not obvious what pictorial stimuli can represent the self-other words in a self-esteem or identity IAT; aural presentation can easily accommodate the standard stimuli in these tests. Still, it is clear that additional work is needed to evaluate the psychometric properties following from these methodological decisions.

Another question that is often raised when converting the IAT to a more developmentally appropriate measure concerns the number of trials one should use with children. Initial intuitions suggested that children would need more trials because their data are likely to be noisier. However, children also have difficulty with sustained attention tasks, providing some reason to believe that fewer trials will result in a more accurate IAT effect. That said, in the literature, it is most common for researchers to use the typical adult-length IAT, although some efforts are underway in our labs to develop a shorter IAT modeled after the shorter adult procedure (Sriram & Greenwald, 2009). Here, too, what we would really want is careful work comparing different methodological decisions with specific criteria to more definitively establish evidence for or against different IAT and other implicit measure variants.

Perhaps the largest methodological problem, and one that remains unsolved, concerns the development of measures for children younger than 5 or 6 years. If the studies to date have taught us one thing, it is that attitudes develop early. Across many studies in many different populations, researchers observed that by age 5 or 6 children already had clear implicit attitudes, often as strong and in the same direction as adults in their populations. This indicates that attitudes emerge before this age, yet because of cognitive and executive function limitations children younger than this age cannot perform the typical measures we have relied on in adult implicit social cognition research (e.g., the IAT). Therefore, if we are ever to answer questions about when attitudes, stereotypes, and other social cognitive constructs emerge in the natural development of children, one of the first agenda items must be to develop better measures. Some attempts toward this end are in progress (i.e., the ambiguous-race face task described previously; Dunham & Banaji, 2009), but more stringent tests will need to be conducted to assess whether these measures and others that will be developed meet the necessary criteria of reliability and validity.

Finally, different research teams have tried different response options. For example, Rutland and colleagues (2005) have used a design in which children move a mouse forward and backward to assign stimuli to categories, while Baron, Dunham, and colleagues (e.g., Baron & Banaji, 2006; Dunham et al., 2007) have had children use large colored buttons to respond. These colored buttons correspond to colored columns on the two sides of the screen within which the category labels reside. Finally, one of the authors has found that simply

putting a sticker on two keys of a regular laptop keyboard as reminders of which keys to press works well with children as young as 5 years (as well as with nonliterate adults and adults and children with limited or no exposure to computers; Olson et al., 2008). Again, the differences between these methods have not been empirically examined.

Reliability and Validity

As we previously alluded to, one question that has barely been discussed in the developmental literature concerns reliability and validity of implicit measures in children. Although the IAT in adults has been shown to exhibit moderate test-retest reliability (Bosson, Swann, & Pennebaker, 2000), acceptable convergent and discriminant validity (Banse, Seise, & Zerbes, 2001), high internal consistency (Steffens, 2005), and significant predictive validity (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), it cannot be assumed that there would be similar rates of reliability and validity in these measures with children. Indeed, most measures rely on reaction time as well as some degree of response inhibition (e.g., to "unlearn" a response-key pairing in the second critical block in the IAT). Also as alluded to, we have every reason to believe these processes undergo substantial developmental change (Levin et al., 1991), raising the specter of a potential confound in developmental research. The only studies relevant to reliability and validity include the self-injury IAT's predictive validity described previously (Nock & Banaji, 2007a, 2007b) and an (as yet) unpublished study demonstrating a test-retest reliability of $r = .42$ and an internal consistency estimate of $r = .74$ on a child all-picture IAT (Williams & Steele, 2009). Until more studies exploring this issue are completed, pressing questions will remain.

CONCLUSION

A developmental approach to the study of implicit social cognition will ultimately allow us to better understand the phenomena we care about and create theories that are better able to account for existing data (see also Dunham & Olson, 2008). This is accomplished by considering evidence not only from the end state but from across the ages that marks the emergence and maturation of constructs of interest. We see perhaps the most important question to be the one we opened with: What can development can tell us about the ontogenetic history of implicit constructs? For example, what

can development tell us about the interaction between implicit and explicit processes throughout development, and how does that interaction relate to the emergence, trajectory, and malleability of these constructs as they appear in adulthood? These are promising questions for future research.

Thus, we strongly encourage those looking to pursue questions such as these to find developmental colleagues with whom to collaborate in order to design the best measures, make age-appropriate conclusions, and accrue relevant background knowledge and encourage social psychology students to receive training in developmental methodologies. In so doing, we believe a developmental approach can fit squarely in the domain of social psychology, joining methods such as functional magnetic resonance imaging, psychophysiology, and reaction time measures in the social psychologists' toolbox. Most important to the present discussion, we see development as uniquely important in the building of theories concerning the distinction between implicit and explicit processes and representations. This is surely one of the most interesting directions in both developmental and social psychology.

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