Young Children's Understanding of Thinking and Consciousness

John H. Flavell

A developmental psychologist shows a 5-year-old a candy box and asks her what is in it. "Candy," says the child. When she then opens up the box, however, she discovers to her surprise that it actually contains crayons rather than candy. What will a naive child who has not opened the box think is in it, the experimenter now inquires. "Candy!" says the child, grinning at the trick. The researcher repeats the procedure with a 3-year-old. The response to the first question is the expected "candy," but the response to the second is surprising: "crayons." Even more surprising, the child also says he himself had initially thought crayons would be in the box. Unlike the 5-year-old, the 3-year-old shows no evidence of understanding that either he or other people could hold a belief that is false.

Findings such as this stud a new and exciting area of cognitive-developmental research concerning the ontogenesis of our knowledge and beliefs about the mental world—our folk psychology or naive theory of mind. More than was true of earlier metacognitive and social-cognitive approaches to the same general problem, this new approach probes children's developing conceptions of the most basic components of the mind, such as beliefs and desires, and children's knowledge of how these components affect and are affected by perceptual inputs and behavioral outputs. In just a few short years, this fast-growing area has spawned scores of research articles and a number of book- and monograph-length treatments.[1]

John H. Flavell is Anne T. and Robert M. Bass Professor in the School of Humanities and Sciences at Stanford University. Address correspondence to John H. Flavell, Department of Psychology, Stanford University, Stanford, CA 94305-2130.

DEVELOPMENTAL HIGHLIGHTS

During infancy, children come to view people very differently from other objects. They see people as *compliant agents,* that is, as kindred creatures who move under their own power (agency) and are responsive to the infants' requests and other communications (compliance). Infants also acquire some sense of intentionality, recognizing that people's behavior, unlike that of objects, makes reference to or is "about" something other than itself. Children demonstrate some capacity for empathy by the end of infancy, suggesting that by this point they have begun to construe people as experiencers as well as agents.

During the early preschool years, children acquire the basic distinction between mental and physical events. For example, they can distinguish between an imagined dog and a real dog. They show a beginning understanding of percepts, knowledge, desires, emotions, and their interrelations. Thus, they know that another person viewing from a different position may not be able to see an object that they presently see, and for that reason might not know it is there. Also, they recognize that people are likely to feel sad or happy depending on whether their desires are fulfilled. Young preschoolers also develop pretense skills, and the ability to interpret as pretense the make-believe of other people.

Later in the preschool period, children seem to acquire a rudimentary mental-representational conception of the mind. That is, they begin to sense that people form and act upon mental representations of reality, representations that may not portray reality correctly. This newly acquired conception makes it possible for them to understand false beliefs, as in the foregoing candy-crayons task. Similarly, it enables them to think of deceptive or illusory objects and situations as appearing or seeming to be one thing to a perceiver while simultaneously really being something different. For example, older preschoolers readily understand that a straight object viewed through a distorting lens looks bent (i.e., is perceptually represented as being bent) but is really straight.

Subsequent to the preschool years, children further elaborate their understanding of people's minds as mental-representational devices. For example, they increasingly realize that how people represent what they perceive will be influenced by the nature and quality of the perceptual information they receive and their prior knowledge and experience. In addition, school-age children endow themselves and other people with enduring personality traits, come to understand second- as well as first-order beliefs (i.e., beliefs about beliefs), and show numerous metacognitive acquisitions, such as knowledge about memory and memory strategies.

THINKING

Most of the research done in this area thus far has focused on children's understanding of mental *states,* such as beliefs, desires, knowledge, emotions, and inten-

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tions. In contrast, there has been little investigation of children's knowledge about mental *activities,* that is, mental things that one could be said to *do* rather than *have*.[2] The paradigmatic mental activity is that of *thinking,* defined here very broadly as attending to, thinking of, or being conscious of anything. In a recent series of studies,[3] my colleagues and I assessed preschoolers' understanding of thinking by testing their ability to distinguish thinking of something from seeing it, acting on it, talking about it, and knowing it—four activities or states that often co-occur with thinking and that young children might therefore confuse with thinking. Some distinctive characteristics of thinking become evident when we contrast it with these four. First, in contrast to knowing something, thinking of or about something tends to be an episodic, on-and-off activity rather than a continuous, enduring state. Second, unlike physical action and talking (aloud), thinking is covert. Third, unlike seeing and other perceptual activities, thinking can and often does proceed in the absence of any relevant sensory input.

Our studies revealed that young children (3 to 4 years of age) know at least enough about thinking to be able to distinguish it from seeing, talking, acting, and knowing under some circumstances. One of the studies showed that even young 3-year-olds could accept and apparently understand that a person could be thinking of one thing while looking at or physically acting on something else. In another study, they gave evidence of believing that a person whose eyes and ears were covered could nevertheless think about both present and absent objects. In a third study, one experimenter showed another experimenter (and the subject) a trick box that appeared to be empty when first opened but had money in it when reopened and asked the second experimenter how the money got in there. The second experimenter said, "That's a hard question. Hmm. Give me a minute." She then turned away from the box and looked stereotypically pensive, much in the manner of Rodin's *The Thinker.* The 3- and 4-year-old subjects were asked, "What is she *doing* right now?" Interestingly, almost all the 4-year-olds said "thinking," even though that word had not previously been mentioned in the testing session. Although only a few of the 3-year-olds gave this answer, they did show some understanding subsequently. That is, on further trials of this kind, they usually replied in the affirmative when asked if the second experimenter was thinking about the problem stimulus, but in the negative when asked if she was seeing it, talking about it, or touching it. Similarly, in an unpublished study by Rosenkrantz,[4] almost all of a sample of 3-year-olds identified the more pensive looking of two people engaged in a drawing task as the one who was "thinking."[5] Our finding that children as young as 36 months of age are capable under some circumstances of viewing thinking as different from talking goes strongly counter to Piaget's claim that even children as old as 6 or 7 years of age often construe thinking as synonymous with speech.[6] Finally, the results of three other studies in this series suggest that most 4-year-olds do not treat "thinking about" and "knowing about" as synonymous. Rather, they seem quite willing to say—often correctly, but not always—that a person does not know something but is currently thinking about it, or does know it but is not currently thinking about it.

STREAM OF CONSCIOUSNESS

Of course, there is more to learn about thinking, broadly defined, than that it is an internal activity distinguishable from perceiving, acting, talking, and knowing. One of its most central and interesting characteristics is its tendency to flow incessantly in a conscious person—the continuous "stream of consciousness" about which William James[7] and many other people have written. I have just cited evidence that preschoolers will usually infer that a person is thinking when the visible evidence for this activity is clear and strong, as when the person has just been given a problem to solve and looks stereotypically reflective. Would they also infer a continuous stream of mental content or activity when there is no perceptual input or behavioral output to suggest it, for example, when a person is just sitting quietly, with nothing to do or look at? My colleagues and I recently conducted three studies to find out.[8]

In the first study, children (of 3, 4, and 6 to 7 years) and adults were trained and tested as follows. One experimenter (call her Mary) said that last night while she was deeply asleep and not dreaming, her mind was "empty of thoughts and ideas," and pointed to an empty "thought bubble" to represent her empty mind. However, she said that on her way to school this morning, she had had some thoughts and ideas, and after describing them, she pointed to a thought bubble containing three asterisks to illustrate this nonempty state of her mind. Then, at the other experimenter's request, Mary went across the room "to wait for a few minutes." She sat quietly in a chair with her back to the subject and facing a blank wall. The other experimenter then said to the subject: "Mary is just sitting there waiting, isn't she? How about her mind right now? Is she having some thoughts and ideas, or is her mind empty of thoughts and ideas? Point to the picture [thought bubble] that shows how her mind is while she is waiting there." There were two such Waiting trials in the testing session, given

in alternation with a Looking trial (Mary looking at a picture) and a Problem-Solving trial (Mary trying to figure something out). We reasoned that subjects who believed in an ever-present stream of consciousness would opt for the thought bubble with the three asterisks on the Waiting trials as well as on the other two trials. We found a striking increase with age in the tendency to show this pattern of attribution. For example, the percentages of subjects attributing some thoughts and ideas on both Waiting trials were 5% for 3-year-olds, 20% for 4-year-olds, 55% for 6- to 7-year-olds, and 95% for adults. In contrast, the age increases for the Looking and Problem-Solving trials were much less marked, with 65% or more of the subjects in even the youngest groups attributing ideation on these trials.

Studies 2 and 3 used only 4-year-olds as subjects. In Study 2, we strongly emphasized that "thoughts and ideas" should include idle, undirected ones as well as directed ones. Nevertheless, the mean percentage of correct Waiting trials was similar to that found in Study 1 for this age group. In addition, 62% of the children said that if she tried, the second experimenter would be able to keep her mind "completely empty of all thoughts and ideas" for 3 min (a period of time with which subjects had been familiarized just previously). Similarly, in Study 3, 4-year-olds tended to say that the mind of a waiting person was "not doing anything" rather than "doing something." This was true when the waiting individual was the child subject as well as when it was the experimenter.

Consistent with this last result, in a series of current studies, we are repeatedly finding that 5-year-olds are inclined to deny that they had been having any thoughts just previously, even though experiences we had given them just previously ensured that they must have been thinking. In contrast, children of 7 to 8 years are proving to be much better introspectors.

CONCLUDING SPECULATIONS

Our studies suggest that, although they know something about thinking, preschoolers are not aware of the continuous, nonstop nature of mental activity. There are at least three reasons why this awareness might develop relatively late. First, as was the case in our Waiting trials, there is often no visible evidence to suggest that other people are thinking, because no problem has just been presented to them and they show no pensive facial expressions or behaviors. Second, adults probably find few reasons to call children's attention to the ceaseless flow of mental content, and there is no single common term for it (in English, at least) for the adults to use or the children to learn. Finally, our data and common observation suggest that preschoolers are relatively lacking in the disposition or ability to reflect on the contents of their own consciousness.

How might children come to discover the stream of consciousness? One possibility is that they first notice it during those relatively rare periods when they are awake but not engaged perceptually or motorically with the external world, such as perhaps just prior to falling asleep or just after waking up. Some of the trains of thought that occur at such times might have two properties that would facilitate this awareness. On the one hand, these thoughts may be charged with negative affect and therefore impossible not to notice (e.g., worries about monsters). On the other hand, they may persist as salient mental content despite the child's fervent wish that they go away. More generally, persistent worries and other abiding preoccupations may be among the first examples of the stream of consciousness that children notice.

In conclusion, our results suggest that young children's conception of themselves and other people as mental creatures may be very different from that of older children and adults, despite their considerable knowledge about the mental world. Adults and older children tend to assume that mental activity is essentially continuous in time, with *something*—one thing or another—going on all the time in a waking mind. Young children, in contrast, may view mental activity more as an on-and-off, episodic affair. They may assume that the mind is active only when it has some job to do—when there is some stimulus to notice or some problem to solve. When the mind has nothing to do, they may assume that it does nothing, much as our bodies do nothing when we are physically inactive. For decades, psychologists have asked what mental content young children will attribute to other people—for example, whether children will egocentrically misattribute their own perspectives to others. Our data suggest that the question should sometimes be whether children are likely to attribute to others any mental content at all, egocentric or otherwise.

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Notes

1. See, e.g., L.J. Moses and M.J. Chandler, Traveler's guide to children's theories of mind, *Psychological Inquiry, 3,* 286–301 (1992); J. Perner, *Understanding the Representational Mind* (MIT Press, Cambridge, MA, 1991); H.M. Wellman, *The Child's Theory of Mind* (MIT Press, Cambridge, MA, 1990).

2. This *do–have* distinction is owed to R. D'Andrade, A folk model of the mind, in *Cultural Models in Language and Thought,* D. Holland and N. Quinn, Eds. (Cambridge University Press, New York, 1987). For other work on children's understanding of mental activity, see the research by Wellman and colleagues cited in J.D. Woolley and H.M. Wellman, *Origin and truth: Young children's*

understanding of the relation between mental states and the physical world, unpublished manuscript, University of Texas at Austin (1992).

3. J.H. Flavell, F.L. Green, and E.R. Flavell, *Young children's knowledge about thinking,* unpublished manuscript, Stanford University, Stanford, CA (1992).

4. S.L. Rosenkrantz, *Children's recognition of the facial expressions associated with cognitive states,* unpublished manuscript, Stanford University, Stanford, CA (1991).

5. For results similar to those of Rosenkrantz, see S. Baron-Cohen and P. Cross, Reading the eyes: Evidence for the role of perception in the development of a theory of mind, *Mind and Language, 7,* 172–186 (1992).

6. J. Piaget, *The Child's Conception of the World* (Routledge and Kegan Paul, London, 1929).

7. W. James, *The Principles of Psychology,* Vol. 1 (Henry Holt, New York, 1890).

8. J.H. Flavell, F.L. Green, and E.R. Flavell, Children's understanding of the stream of consciousness, *Child Development* (in press).

Nutrition and Mental Development

Henry N. Ricciuti

The relationship between nutrition and behavioral development, particularly the development of intellectual competence, has been the subject of much inquiry during the past 30 years by investigators from behavioral and biomedical disciplines, working with both human and animal subjects. Greatest attention has been directed to the problem of protein-energy malnutrition, a chronic health problem endemic in poor populations worldwide. The main question has been whether malnutrition of varying degrees of severity, which typically leads to impaired physical growth and brain development, also causes delayed cognitive development, and possibly irreversible mental retardation as well.

A second area of growing research interest during the past 10 to 15 years deals with a widespread, specific nutritional deficiency, namely, iron deficiency, and its potential effect on brain function and intellectual development. Finally, during the past few years, an old issue that received some attention in the 1940s and 1950s has resurfaced: the question of whether substantial supplements of vitamins and minerals can raise IQ levels in nonmalnourished subjects, or perhaps even reduce the likelihood of antisocial behavior.

Henry N. Ricciuti is Professor of Human Development, Emeritus, in the College of Human Ecology at Cornell University. His major interest is in biological and environmental risk factors affecting infant development. Address correspondence to Henry N. Ricciuti, Department of Human Development and Family Studies, Cornell University, Ithaca, NY 14853.

PROTEIN-ENERGY MALNUTRITION (PEM)[1] AND MENTAL DEVELOPMENT

The possibility that early malnutrition might produce significant and perhaps irreversible impairment of children's intellectual development became a matter of increasing concern to both the research community and policymakers in the early 1960s. During the next 10 years or so, many studies reported significantly reduced IQ levels and school performance in poor children with a history of early clinical malnutrition, as well as children assumed to have experienced chronic, mild-to-moderate undernutrition as judged by their relatively short stature. Also, there were reports of reduced brain size and number of brain cells, as well as impaired learning, resulting from experimentally induced early malnutrition in animals.

Based on these findings, and influenced also by the perceived social and political urgency of the problem, many people concluded, rather prematurely, that malnutrition in children was a direct cause of impaired intellectual development, including permanent mental retardation, because of its effect on brain growth. The complementary view was that simply improving the dietary intake of low-income children at risk of chronic malnutrition should produce a significant enhancement of their cognitive development.

During this period, and increasingly in the 1970s and 1980s, this rather simplistic view of malnutrition as a direct, independent cause of significantly impaired learning and intellectual development was challenged empirically, and it is no longer widely accepted. At the same time, it is recognized that the observed associations between malnutrition and behavioral development represent a significant scientific as well as public-health problem that is complex and needs to be more fully understood. Recent research has thus tended to focus increasingly on the identification of possible mechanisms through which malnutrition might influence intellectual development, in interaction with the adverse socioenvironmental and health conditions characterizing the "ecology of malnutrition."[2,3]

Role of the Child's Developmental Environment

One of the major limiting problems in most retrospective or correlational studies of malnutrition and