

## Gradual Belief Change in Children

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### Key Words

Belief · Cognitive development · Competence · Contextualism · False belief · Object permanence · Performance · Philosophy of mind · Theory of mind

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### Abstract

Major cognitive developments are unlikely to happen instantaneously. Consequently, children must frequently pass through periods of being 'in between' genuine understanding and failure to understand. The current literatures on false belief understanding and object permanence largely fail to recognize the importance of such in-between states of understanding. Recent philosophical accounts of belief also fail to make sufficient room for such in-between states. An approach based on Ryle's [1949] account of belief is recommended and is compared with some other approaches, including the competence/performance approach and contextualist approaches.

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It may sometimes happen that an important development in a child's understanding of the world occurs in an instant, in a flash of insight, before which the child could not be said to have at all the relevant understanding of the phenomena in question and after which she consistently maintains that understanding. Suddenly, perhaps, the child realizes – aha! – you can talk about the past by adding 'ed' to the end of certain words. However, it seems likely that most major changes in the way children understand the world are the result of some more gradual process. This paper will describe two cases in which most children's understanding seems to develop gradually, and it will make a suggestion about how we might think of belief and knowledge more generally in light of

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such cases of gradual belief change. (Throughout the paper, I will be using ‘belief’, ‘understanding’, and ‘knowledge’ more or less interchangeably, though I realize that in so doing I am blurring distinctions that in other contexts are very important.)

### **False Belief Understanding**

Consider the widely discussed ‘false belief tasks’ in cognitive development. In the classic version [Wimmer and Perner, 1983], the child is told a story in which another child, ‘Maxi’ say, puts some chocolate in a green cupboard and then goes out to play. While Maxi is gone, his mother moves the chocolate from the green cupboard to a blue cupboard. Maxi then returns, seeking his chocolate. Question: Where will Maxi look for the chocolate? Three-year-old children tend to answer that Maxi will look in the blue cupboard, where the chocolate really is, while 4- or 5-year-old children tend to answer as an adult would, that Maxi will look in the green cupboard, where he originally left the chocolate.

Another well-known false belief task is the ‘deceptive container’ task. One takes, for example, a Smarties box (Smarties are a well-known candy in Britain and Canada with a distinctive opaque box) and replaces the candy with a pencil. When a 3-year-old child is presented with the Smarties box and asked what it contains, she (of course) says ‘Smarties’. The box is then opened and the pencil is revealed. Then the child is asked something like, ‘When you first saw the box, before we opened it, what did you think was inside it?’ The 3-year-old’s answer: ‘A pencil’. ‘Now imagine that [name of friend] comes in and I ask her/him: “[Name of friend], look what I’ve got here. What do you think is in here?” What will [name of friend] say is in the box?’ ‘A pencil’ [Gopnik and Astington, 1988; Perner, Leekam, and Wimmer, 1987; Wimmer and Hartl, 1991].

These experiments and others like them have widely been interpreted as showing that children younger than 4 do not understand that beliefs can be false. The results are robust; they have been duplicated in multiple labs using different techniques and a variety of controls [e.g., Astington, 1993; Gopnik and Astington, 1988; Lillard and Flavell, 1992; Moses and Flavell, 1990; Perner, 1991; Wimmer and Perner, 1983; Zaitchik, 1990].

However, other experiments seem to point to an earlier acquisition of false belief understanding. For example, Sullivan and Winner [1993] performed a version of the deceptive container task in which the child was induced to ‘trick’ an experimenter by putting string in a crayon box, with much affect about how fun it is to trick someone. Three-year-olds did much better in predicting the false belief of the ‘tricked’ person than did control subjects given the standard deceptive container task.

Bartsch and Wellman [1989] presented children with a Band-Aid box and a plain white box and showed them that the plain white box but not the Band-Aid box contained Band-Aids. A puppet with a cut, ‘Bill’, was then introduced, who went to the Band-Aid box and started to open it. The children were then asked to explain why Bill was doing that. If the children did not mention anything about the puppet’s beliefs, they were prompted with the question, ‘What does Bill think?’ Three-year-olds tended to say that Bill thought there were Band-Aids in the box. In this experiment – which relies on the explanation of past behavior rather than the prediction of future behavior – 3-year-olds’ responses seem to suggest that they do realize that people can be mistaken in their beliefs.

When presented with data of this sort, which point in different directions regarding the timing of a particular cognitive achievement in children, a very natural reaction is to think that one or another set of experiments must be faulty. Either the experiments that purport to show that the child does not understand false belief until 4 are too difficult, introducing needless distractions, complications, or linguistic demands that interfere with the child's ability to reveal her understanding; or the experiments that purport to show that the 3-year-old does understand false belief are too easy, allowing the child to solve the task by simpler, 'cheating' strategies or by taking hints that don't depend on any real understanding that beliefs may be false. Perhaps all the prompting about 'tricks' or what the puppet 'thinks' provides the 3-year-olds with clues that allow her to guess the answer the adult wants without really understanding the situation – in which case the children really don't understand false belief until 4. Or perhaps the standard Maxi and the chocolate and deceptive container tasks are too complicated, or don't make the false beliefs salient enough for the children to express the real knowledge they have at age 3 of the existence of false beliefs.

Inquiry into such possible shortcomings of developmental experiments is crucial to good scientific method. However, it is a mistake to think that there *must* be such methodological errors every time results point in different directions regarding the timing of some particular developmental achievement. If we grant, as I think we must, that there normally is not a single *moment* at which a child comes to understand once and for all something as fundamental as that beliefs may be false, then there will be a period, perhaps a rather protracted one, during which we should expect inconsistency in the children's responses – a period during which children are accurately describable neither as fully understanding that beliefs may be false nor as fully failing to understand that. They are *between* understanding and not understanding, and thus we should expect that some perfectly good experiments would tend to evoke behavior suggestive of understanding while other equally good experiments would evoke behavior suggestive of a failure to understand.

It seems plausible to suppose that 3-year-olds are in an in-between state of development regarding the question of whether beliefs can be false, and thus that there isn't necessarily anything terribly wrong with either the experiments that suggest competence or those that suggest incompetence. While I think this is a sensible approach to take, it must in some ways be unintuitive, since many developmental psychologists seem to assume that one or the other set of experiments must be flawed. Thus, some psychologists have endorsed the experiments suggesting early competence and have argued that the experiments suggesting that the competence does not emerge until 4 put excessive extraneous demands on the children [Bartsch and Wellman, 1989; Cassidy, 1998; Chandler, Fritz, and Hala, 1989; Freeman and Lacoche, 1995; Leslie, 1994; Lewis and Osborne, 1990; Moses, 1993; Robinson and Mitchell, 1995; Sullivan and Winner, 1993]. Under this heading I include people who say that the knowledge is really there but 'fragile' or 'expressed only in a limited variety of situations'. Others have argued that the early-competence experiments are faulty or have disregarded them in assessing the child's knowledge of belief [e.g., Astington, 1993; Olson and Campbell, 1993; Perner, 1991; Sodian, Taylor, Harris, and Perner, 1991; Wellman, 1990; Wimmer and Hartl, 1991].

Few have explicitly endorsed the position that the 3-year-old is between understanding and failing to understand that beliefs may be false, although some researchers, especially recently, have made brief comments that might be interpreted that way [Dalke, 1998; Jenkins and Astington, 1996; Sabbagh and Callanan, 1998; Saltmarsh,

Mitchell, and Robinson, 1995; Zaitchik, 1991], while others [e.g. Riggs, Peterson, Robinson, and Mitchell, 1998] seem deliberately cagey about when, exactly, false belief understanding is achieved.

This view of the child as between understanding and not understanding is to be distinguished from the view that the knowledge is really there but fragile and expressed only in limited situations, because the latter view insists that the knowledge *is* really there – at least from time to time. The assumption behind this view seems to be that the knowledge is really there as soon as the child begins to behave in any way suggestive of it. It seems to follow that the knowledge – if not innate – arrives all at once, either at the time of its first expression or sometime shortly before. And then it remains really there in the child, but recondite, only peeping out in the most favorable of situations, while otherwise the child behaves completely as if she didn't have that knowledge; or perhaps, instead, the knowledge passes frequently in and out of mind, fully present when the child acts as if she knows, absent when she acts as though she does not. To me, at least, this sort of sudden-construction approach is quite unappealing. A genuinely gradualist view regards the child as not fully possessed of the knowledge until it reliably informs the child's action.

Common metaphors that describe the child's knowledge as 'displayed', 'revealed', or 'expressed' in a limited variety of situations tend to favor an all-or-nothing approach: The knowledge, like a finished document stored somewhere in the dark of the mind, is brought forward to the light, first only under very favorable circumstances, then more regularly [on similar metaphors for memory, see Roediger, 1980; on the importance of gradualist metaphors in the discussion of infant perception, see Haith, 1993]. Such a picture may be gradualist in allowing the reliability with which the knowledge is *revealed* gradually to increase. Nonetheless, the picture suggests antigradualism in one key respect, that is, in its characterization of the knowledge as genuinely present, somewhere in the mind, from the moment of its first 'display'; one cannot display something that does not really exist. Although it is hard consistently to avoid using containment-and-display metaphors, the molding metaphor, on which a child's understanding and abilities are gradually shaped to match the adult's, is sometimes helpful and is a less misleading metaphor for the thorough gradualist.

Gradualism about the acquisition of understanding – refusing to say that the knowledge either really is or really is not there in the child – seems sensible from the outset. Few developmental psychologists would explicitly deny it. Yet, when one starts thinking about the merits and demerits of actual experiments and what they show, one is almost irresistibly drawn to assert that the children tested either really do or really don't have the understanding in question. The middle road seems to fade as an option. Perhaps we prefer to cut development into clean stages; perhaps we lust after the single, decisive experiment that will draw a clear developmental line between the haves and have-nots. It takes deliberate, conscious work to remind ourselves of the plausibility of gradualism.

## **Object Permanence**

Another area that has been widely studied and widely debated, and in which I think it is plausible to suppose that development is gradual, is the infant's understanding of the continued existence of unperceived objects – what has been called the understanding of 'object permanence'. Piaget [1954] argued that it is not until at least 9 months of age that children start to understand that objects continue to exist after having left their

perception. Piaget observed that if a toy in which an infant is interested is removed from view by being placed, in full view of the infant, under a blanket or behind an occluding object, children under 8 or 9 months will not search for it. This finding has been widely replicated [see Brainerd, 1978, for a review]. In Piaget's view, the infant does not realize that the unperceived object still exists.

Other research, based primarily on the infant's looking behavior, has suggested an earlier understanding of object permanence. For example, very young infants will move their heads to regain sight of objects that have passed from their visual fields [Piaget, 1954], and they will reach for an object even if their environments suddenly become dark [Bower and Wishart, 1972; Clifton, Rochat, Litovsky, and Perris, 1991; Hood and Willatts, 1986]. They will visually track an object that passes behind an occluder, anticipating its reappearance at the far side [Bower, Broughton, and Moore, 1971]. Also, Baillargeon and Spelke and their colleagues have performed a number of 'habituation' experiments recording long looking times in 4-month-old infants, interpreted as indicative of surprise, when an object seems to pass through another, occluded object [Baillargeon, 1987; Baillargeon and DeVos, 1991; Spelke, Breinlinger, Macomber, and Jacobson, 1992; Katz, Purcell, Ehrlich, and Breinlinger, 1994] – for example, when a drawbridge seems to close down and squash an occluded box.

So why do infants fail to retrieve objects from under or behind occluders? Five-month-old infants are able manually to retrieve an object from behind a transparent screen [Bower and Wishart, 1972], and 7-month-olds will pull a blanket to retrieve an object placed on it behind a transparent screen [Munakata, McClelland, Johnson, and Siegler, 1997], suggesting that before they succeed in the classic Piagetian retrieval task, infants of this age have the motor skill to move obstacles and the means-ends reasoning necessary to co-ordinate two actions to retrieve an object. Some research also suggests that infants at this age are not disturbed if an object moving behind an occluding screen does not appear in a gap in that screen before reappearing at the far end [Moore, Borton, and Darby, 1978; but see Baillargeon and DeVos, 1991; Spelke, Kestenbaum, Simons, and Wien, 1995].

Now again in this case, I suspect most people will feel an inclination either to criticize the experiments that suggest an early knowledge of the existence of hidden objects or the experiments that suggest that the knowledge does not appear until later; and perhaps a reasonable case can be made for doing one or the other; but as with false belief, it makes sense not prematurely to foreclose the possibility that the development of the knowledge that objects continue to exist unperceived happens gradually. Six-month-olds may be in the throes of acquiring this knowledge, such that it is not quite right either to describe them as not knowing that objects exist unperceived or to describe them as genuinely but tenuously having that knowledge.

Nonetheless, many developmental psychologists seem to insist either that the 6-month-old infant really does or that she really does not know that objects exist unperceived. On the early competence side we see, for example, Bower [1974], Baillargeon [1987], Spelke et al. [1992], Diamond [1991], and Bjork and Cummings [1984]; while others have defended the view that 6-month-olds really do not have this knowledge, such as Lourenço and Machado [1996], Moore et al. [1978], Bogartz, Shinsky, and Speaker [1997] and Müller and Overton [1998].

A few psychologists, such as Fischer and Bidell [1991], Halford [1989], and Munakata et al. [1997] have defended a gradualist interpretation of the experiments I have mentioned, explicitly refusing to answer the question of whether the infants 'really' have

the relevant understanding at 6 months. As in the false belief case, however, this seems to be a minority position among those writing on the topic.

### The Nature of Belief

I suspect that most developmental psychologists would accept a gradualist approach to belief and knowledge in principle. My point is not to argue against an imagined opponent who rejects wholesale the possibility of in-between cases of belief. My point, rather, is that despite the plausibility of a gradualist approach to belief in development, in fact most people, when discussing particular developments, fail seriously to consider the possibility that their subjects are in a state of being not quite accurately describable either as believing or as failing to believe the proposition in question.

Perhaps one source of the tendency to overlook gradualist approaches to development is that it seems to leave us at something of a loss regarding how to describe the cognitive condition of the child who is in one of these in-between states. A gradualist would refuse to say that the 3-year-old believes, for example, that beliefs can be false; she would also refuse to say that the child fails to believe this. Both assertions are misleading, and it is perfectly appropriate to refuse to endorse either one, just as I might refuse to endorse either the proposition 'Larry is a big drinker' or the proposition 'Larry is not a big drinker' if Larry is a big drinker on holidays and a teetotaler otherwise. Instead of responding to your question, 'Is Larry a big drinker?' with a simple yes or no, I either reframe the question: 'Do you mean should we expect him to drink a lot on New Years?'; or I qualify my answer: 'Larry is a big drinker on holidays, but otherwise he never touches the stuff.' The question is what kind of equivalent response we can give to the person who asks us whether the 3-year-old realizes that beliefs can be false or whether the 6-month-old realizes that objects continue to exist unperceived. We can say something about how the youngster will *behave*, but how can we talk about what she *believes*?

The most popular accounts of belief and knowledge in philosophy today do not seem to provide the opening for an answer. If a belief is a representational state of the mind in the sense described by philosophers such as Fodor [1981], Field [1978], Dretske [1988], Millikan [1993], or Searle [1983] – to collapse some important distinctions – then it seems natural to speak of a person as either representing objects as existing unperceived or failing to represent objects that way. To speak of someone 'kind of' or 'halfway' representing something is at least as vague and unsatisfying as describing him as 'kind of' or 'halfway' believing it. Bayesian accounts of believing that assign a value from zero to one for the degree of belief in a proposition [e.g., Jeffrey, 1983; Skyrms, 1990] explicitly allow for cases in which one sort of believes something, but they do so only in allowing someone to have a low or intermediate degree of confidence in the truth of a proposition, not in the developmental sense required here. It is not that infants start out with a low degree of confidence in the proposition that objects exist independently of their perception, as one might have a low degree of confidence in the outcome of a football game, and then gradually gain confidence in its truth. Rather, they behave in some situations as though they thought it true, in others as though they did not.

The most helpful treatment of belief for the gradualist about belief development is, I think, something like the out-of-fashion dispositional account of belief proposed by

Ryle [1949]. Ryle argued that to believe a particular proposition was nothing more or less than to be *disposed* to do and feel certain sorts of things in certain situations. To believe that the ice is dangerously thin, in Ryle's [1949, pp. 134–135] words, is simply

to be unhesitant in telling oneself and others that it is thin, in acquiescing to other people's assertions to that effect, in objecting to statements to the contrary, in drawing consequences from the original proposition, and so forth. But it is also to be prone to skate warily, to shudder, to dwell in imagination on possible disasters and to warn other skaters. It is a propensity not only to make certain theoretical moves but also to make certain executive and imaginative moves as well as to have certain feelings.

In Ryle's view, any belief can be characterized by some such long (perhaps indefinitely long) set of dispositional claims.

In thinking about this view, I find it helpful to employ the concept of a *dispositional stereotype*. A *stereotype* is a cluster of properties we are apt to associate with a thing, or a class of things, or a property [for a similar definition of 'stereotype', see Putnam, 1975]. A *dispositional stereotype* is a stereotype whose elements are dispositional properties. So, for example, there is a stereotype for being a reliable person. This stereotype includes the dispositional property (or more economically the 'disposition') of tending to show up to meetings on time, the disposition to follow through on commitments, the disposition to be prudent and careful in making important decisions, and so forth. Personality traits, such as being hot-tempered, courageous, or tenacious, are all arguably characterizable by means of such clusters of stereotypical dispositional properties. To have these personality traits is really nothing more than to match, to an appropriate degree, these stereotypes. The Rylean idea is that belief can be characterized in much the same way.

Thus, consider the belief that one's car is parked in the driveway. A sample of the dispositions associated with this belief includes: the disposition to utter, in appropriate circumstances, sentences like 'My car is parked in the driveway'; the disposition to go to the driveway if one wants to get in the car; a propensity to feel anxious about one's car should one hear loud sounds of a certain type coming from the direction of one's driveway; the disposition to think to oneself, in appropriate contexts, 'My car is in the driveway'; an aptness to feel surprise should one go to the driveway and find no car; the disposition to draw conclusions logically entailed by the proposition that one's car is in the driveway (for example, that there is a car in the driveway, that one's car is near the house); and so forth.

A person who possesses all the dispositions in the stereotype for believing 'My car is in the driveway' or 'The ice is dangerously thin' can always, on my view, accurately be described as believing that her car is in the driveway or that the ice is dangerously thin. A person who possesses none of the dispositions associated with these beliefs can never accurately be so described. And, of course, bridging the gap between these two extremes is a wide range of cases in which the person has some but not all the dispositions stereotypically associated with those beliefs. Roughly speaking, the greater the proportion of stereotypical dispositions a person possesses, and the more central those dispositions are to the stereotype, the more appropriate it is to describe her as possessing the belief in question.

To have a particular belief, on the Rylean view I am proposing, is just to match to an appropriate degree and in appropriate respects the dispositional stereotype for having that belief. What respects and degrees of match are to count as 'appropriate' will

vary contextually and cannot be specified by any simple rule, and so must be left to the judgment of the person attributing the belief.

Although Ryle did not pursue his account in this direction, I believe that a view of this sort offers the best hope for dealing with cases in which children fail to be accurately describable as either completely believing or completely failing to believe some particular proposition. There is a particular set of dispositions characteristic of the belief that objects continue to exist unperceived, and 6-month-old infants have some of those dispositions, but not all of them. Very roughly speaking, many of their dispositions involving looking behavior seem to match the stereotype, while many of their other dispositions do not. If they had none of the stereotypical dispositions, we could quite comfortably and accurately describe them as not having the belief in question; once they have all these dispositions, we can comfortably say that they do have the belief. But in the middle, in the hurly-burly of development, we cannot say either of these things.

Still, we *can* speak of the infant's cognitive state: We can say exactly in what respects the infant's dispositions match and fail to match the characteristic set of dispositions for the belief in question. If a belief just *is* a complex dispositional state of the sort Ryle describes, then there is no legitimate further question of whether, underneath it all, the infant really does or really does not have the belief. There is no switch in the brain that must be determinately on or off; no representation that must either be held or not held in mind; no interior chalkboard that must either have or fail to have the relevant sentence inscribed on it in the language of thought. And all this, of course, is good for the developmental gradualist.

### **Relation of This View to Some Other Views**

A number of psychologists have addressed the issue of how to describe the cognition of children in such messy transitional periods. Piaget [1971], for example, is famously pessimistic about the possibility of constructing a general theory of what he called 'horizontal decalages', or differences in timing between the successful application of a supposedly general skill in one arena and its successful application elsewhere. (Some neo-Piagetians have attempted, however, to provide more structure for understanding patterns of horizontal decalage [e.g., Case, 1992; Kreitler and Kreitler, 1989; Ribautpierre, Rieben, and Lautrey, 1985]).

Chomsky's [1965] competence/performance distinction is sometimes invoked in describing the cognitive state of children whose performance on related tasks is variable. Gelman and Greeno have been particularly enthusiastic about this approach [Gelman and Greeno, 1989; Greeno, Riley, and Gelman, 1984]. The idea behind the distinction is the very plausible suggestion that sometimes when a person fails at a task purporting to test a certain ability, that failure may not indicate a genuine lack of that ability but rather result from the interference of environmental conditions or the lack of an ancillary ability required to complete that particular version of the task. In such a case, we might say that the person has the competence that is purportedly being tested, even if her performance fails to reveal it on the particular task. I might, for example, be quite capable, in most situations, of solving calculus integrals using certain techniques from trigonometry, yet on one particular occasion, when I am severely sleep-deprived and anxious over my sick wife in the next room, be unable to solve an integral that would yield to a familiar trigonometric technique. In such a case, it seems helpful to describe



me as being competent to perform such tasks despite this particular failure in performance. After all, I can *generally* solve integrals in that way, and it is perfectly comprehensible why this particular occasion should prove an exception.

Deployment of the competence/performance distinction as a general approach to handling transitional cognitive states in children, however, is likely to be antithetical to gradualism, since it would appear to recommend the attribution of full-blown competence to children who are successful in any variation of a task, even if on most variations the children fail. If it does not imply this [as Sophian, 1997, interestingly suggests], then it cannot, at least in its traditional form, serve as a general approach to gradual belief change, since it follows that there will be cases in which a child's pattern of success and failure cannot be characterized as the consequence of an underlying competence sometimes masked by poor performance. Taken as a general approach, it is like the view, described above, of the child's knowledge in periods of transition as genuine but 'fragile', and it is susceptible to the same difficulties: It seems to force either an impossibly strong nativism on which every competency is innate or a view of development as consisting of sudden erections of complete, but largely undetectable competencies.

Views that stress social and other contextual factors in development [e.g., Bidell and Fischer, 1992; Clark, 1997; Cole, 1996; Rogoff, 1990; Valsiner, 1997; Vygotsky, 1978; Wertsch, 1998] may more easily accommodate gradual belief change. If contextual factors are not mere noise or masks hiding the child's true abilities, then assessments of the knowledge of a child in the midst of cognitive change may be sensible only relative to particular contexts. On such a view, although one might accurately describe the child as acting with understanding in one context, and as not doing so in another, no overall assessment need be made of whether the child, considered independently of context, really understands or not. Bidell and Fischer [1992] and Rogoff, Baker-Sennett, and Matusov [1994], at least, forcefully defend views of this sort. Such contextualist views are nicely compatible with gradualism in development: At first, a skill operates only sporadically and with much assistance, in a limited range of environments; gradually, the ability is deployed in a broader range of contexts. There is no determinate point at which the child passes over into 'really having' the knowledge in question.

Contextualist views, however, present an inconvenience if they do not offer us a way of talking about what an individual child, not just a child-in-a-situation, believes or understands. The child, entering and exiting environments, brings something of his own to them, something cognitive, which does not vary from environment to environment (or varies, for the most part, slowly). It would be a mistake to deprive ourselves of language for discussing such features of the child. The most radical forms of contextualism, which describe the cognitive states of people as (often) partly 'constituted' by or 'distributed' over features of their environments [e.g., Clark, 1997; del Río and Álvarez, 1995; Rogoff et al., 1994; Wertsch, 1991], may be subject to this shortcoming if they do not permit us to describe features of the child, considered in abstraction from the environment, responsible for the child's particular contribution to the interaction of child and environment.

A dispositional account of belief may help the contextualist avoid this particular difficulty, since dispositions are often stable features of people across environments, even though their manifestations may depend crucially upon environmental factors. Thus, dispositional approaches to cognition may allow both stability of attribution and contextual sensitivity. During some particular phase in development, for instance, a child may be disposed to behave in one way in one environment and to behave in quite a

different way in a different environment. She might be disposed to act skillfully on a particular task with a certain sort of maternal support and to act incompetently without that support. Such two-pronged (or similar multi-pronged) dispositions will ordinarily remain the same as the child shifts between environments (passing, in our example, from skillful to incompetent action), unless the child learns something relevant in the meantime. If contextualists of the sort I have described find nothing objectionable in such dispositional characterizations, a Rylean account of belief could allow them to speak of the cognitive states of individuals without abandoning their commitment to the importance of context and the variability of behavior.

The dispositional approach to belief I recommend, however, does not depend for its plausibility or usefulness on an acceptance of the great importance of contextual factors in development. Other gradualist approaches that emphasize different sources of variability in children's performances, such as Siegler's [1996], which emphasizes strategy changes dependent on particular details of a problem and factors internal to the child, are just as compatible with dispositionalism about belief. All gradualist approaches describe children as passing through periods during which inconsistent performance is a consequence of neither completely having nor completely lacking the knowledge in question. It is this feature of gradualism, not contextualism per se, that a dispositional account of belief is well-suited to describe.

Since Ryle is widely (though perhaps not with complete justice) regarded as a behaviorist, it is natural to wonder whether behaviorism comes into the view I am endorsing here. Philosophical behaviorists [e.g., Malcolm, 1971] regard all mental terms as properly referring ultimately to nothing but facts about publicly observable behavior and therefore deny that one can sensibly speak of private experiences not exhibited behaviorally. This view is nearly universally repudiated, and I do not endorse it. I have quite deliberately avoided characterizing belief exclusively in terms of dispositions to *behave* in certain ways, but have also included dispositions to undergo certain kinds of private experiences (such as surprise or disappointment) and to engage in certain sorts of cognition (such as drawing conclusions). Such experiential and cognitive dispositions cannot in my view be reduced to facts about behavior. Nor do I endorse the dictum of the methodological behaviorist [e.g., Watson, 1924] that features of one's internal mental life are not the proper subject matter of psychology. In the case of belief in particular, I heartily endorse exploring what internal mechanisms are responsible for deviations from dispositional stereotypes in adults and developing children and what mechanisms might serve to preserve or restore adherence to the stereotypes.

An objection sometimes raised against behaviorism, which may seem to apply also to the dispositional approach to belief, is that such accounts have too little material to work with when behavior is severely limited, such as in cases of paralysis, or – more to the point in a developmental context – in the first few months of an infant's life. This difficulty is mitigated to the extent discussion of nonbehavioral dispositions is permitted: Both the quadriplegic person and the infant can feel surprise and anxiety. Furthermore, developmental psychologists working with habituation and other paradigms have done an excellent job of demonstrating how rich the behavioral repertoire of even a young infant can be, when examined in the right way. On a more philosophical note, there is still a broad variety of behavioral dispositions that the quadriplegic person and the infant share with normal, adult believers – such as the disposition to cross the room to retrieve a much-desired object, if one knows the object is there, sees nothing as standing in the way, and has the physical capacity to get over to the object. The fact of their

physical incapacity guarantees that such dispositions will not normally be manifested, but it does not follow that those dispositions are absent, as might be revealed if a manageable means of transport is provided.

## Conclusion

Unlike methodological behaviorism, contextualism, and microgenetic approaches to development like Siegler's [1996], my purpose is not primarily to advocate changes in the sorts of experiments that psychologists do. My main purpose, rather, is to advocate a new way of interpreting and describing experiments that are already being done, a way of thinking about knowledge that allows us to talk with precision and comfort about gradual cognitive change. One might be concerned, however, that the dispositional account is deficient in exactly this regard, since in in-between cases of believing it seems to recommend nothing beyond describing each particular disposition of the subject – which, practically speaking, would simply be to describe the outcomes of particular experiments. And how far does that get us?

At least this far: The dispositional account provides a way of thinking about an individual's cognition that is compatible with some sensible and important, but as I have argued, often ignored, advice – that we should not insist always on finding a definite yes-or-no answer to questions about what the child knows or believes. Acting contrary to this advice forces one to pick an age at which the knowledge in question is suddenly, 'really' acquired and thus consistently to interpret as flawed any experiments suggesting the emergence of that knowledge at ages other than the selected one. If the only way to describe the child's cognition during the course of gradual change were to list the differing results of different experiments, that would be cumbersome, but at least it would not require us to dismiss perfectly adequate studies.

However, something more positive can be added to this picture. In adults, when dispositional stereotypes break down, and we are forced to describe a person as neither quite believing nor quite failing to believe some particular proposition, the person's dispositional profile is rarely a random mix of discordant dispositions. Cognitive psychologists, for example, have long been interested in cases that I would describe as in-between cases of believing – such as when a subject can recognize but not recall some piece of information or can act on basis of some knowledge but cannot put that knowledge into words. Such cases are in-between cases of belief because the person's dispositions partially, but not completely, accord with the stereotype for the belief in question: She might be disposed to pick out Port-au-Prince as the capital of Haiti on a multiple-choice test, but not be disposed to give it as an answer to a more open-ended question about the capital of Haiti.

Once a particular pattern of deviation from a stereotype is recognized, it can be labeled – as, for example, belonging to the pattern of recognition memory without recall memory, or procedural knowledge without semantic knowledge, or implicit knowledge without explicit knowledge. People whose dispositions deviate from the stereotype of a particular belief can be examined to see if their dispositions fall into one of these regular patterns. If their dispositions do fall into such a pattern, we have a shorthand way of describing their cognitive states without insisting on the full presence or absence of knowledge.

Fitting breakdowns into recognized patterns gives us a handy way of thinking about and interpreting what is going on cognitively with the people in question. In doing so, nothing is said, of course, about the internal causes of conformity to or deviance from the dispositional stereotypes, although noting the patterns may help us gain insight into the causes. Even without knowledge of causes, the observance of patterns can provide substantial scientific insight and explanation. Kepler's observation that the planets travel in elliptical orbits was the observation of a pattern only, not a cause, yet it revolutionized our thinking about the solar system.

Such patterns of deviation from the dispositional stereotypes could be looked for in developmental psychology. Assuming (as is not *quite* the case) that 6-month-olds do well on habituation tests of object permanence but poorly on reaching tests, we can describe their in-between states of belief briefly by noting that pattern – and it may be profitable to examine other domains for similar patterns of performance. False belief research might profit from a systematic investigation of the conditions under which children are likely to succeed or fail at false belief tasks [Cassidy, 1998, and Astington, 1996, make starts in this direction]. Tasks may fit into a neat and universal gradation from easy to difficult, or, more likely, such a gradation may break down in several ways: Different children may find different tasks to be the hardest; different contexts may promote or hinder success both generally and to different extents for different tasks; the same child may find the same, or similar, tasks easy on one occasion and difficult on another due to differences in formulation, context, or the internal state of the child.

If we are interested in describing the cognitive states of children in the midst of gradual belief change, we must either search for such patterns or give up hope of ever accurately predicting or economically describing their behavior. The dispositional approach to belief provides a framework with which to characterize the results of such searches – without a needless insistence on yes-or-no answers to questions about what the developing, in-betweenish child 'really' believes.

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