The Priority of Intentional Action: From Developmental to Conceptual Priority*

[Penultimate draft. Final version forthcoming in *The Philosophical Quarterly*]

Abstract. Philosophical orthodoxy has it that intentional action consists in one's intention appropriately causing a motion of one's body, placing the latter as (conceptually and/or metaphysically) prior to the former. Here I argue that this standard schema should be reversed: acting intentionally is at least conceptually prior to intending. The argument is modelled on a Williamsonian argument for the priority of knowledge developed by Jenifer Nagel. She argues that children acquire the concept KNOWS before they acquire BELIEVES, building on this alleged developmental priority of knowledge to establish its conceptual priority. I start by taking a closer look at Nagel's argument, canvassing extant objections to do both with the empirical adequacy of her claims and their philosophical implications. Doing so allows me in the second part of the paper to draw lessons that inform the construction of a revamped parallel argument for the priority of ACTS INTENTIONALLY.

1. INTRODUCTION

It is safe to say that the project of reductive definition is not as attractive to philosophers today as it once was. The task of identifying (at least) necessary and sufficient conditions for some concept or phenomenon to obtain is seen by many as uninteresting and futile. But interest in whether, say, knowledge is composed of belief plus other conditions could be maintained alongside pessimism about the prospect of defining the former in terms of the latter. For such interest could stem from the question of (metaphysical or conceptual) *priority* between the two concepts or phenomena, an interest that is very much alive in philosophy today. It is this question of relative priority that motivates the investigation of the present paper — specifically, the priority between intention and intentional action.

Philosophical orthodoxy has it that the former is prior to the latter: proponents of the so-called 'standard story' in action theory (a.k.a 'causalism') hold that intentional action consists in one's intention appropriately causing a motion of one's body. A fairly recent rival of the standard story,

* For extremely helpful discussions and comments on previous drafts, I am very grateful to Susan Carey, Gil Diesendruck, Jenifer Nagel, Tim Williamson, two anonymous referees, and audiences at the University of Haifa and the conference 'Knowledge and its Limits at 20' at the University of Geneva. Research for this paper was supported by the Israel Science Foundation (grant no. 381/23).

among various extant others, draws inspiration from the 'knowledge first' program in epistemology, championed by Williamson (2000). Knowledge First proponents famously reject the traditional analysis of knowledge in terms of belief, truth and other conditions, in favour of treating knowledge as non-composite, not susceptible to reductive definition. Those who treat intentional action in parallel fashion resist the attempt to analyze it in terms of intention and bodily movement (O'Brien 2007: ch. 8; Levy 2013; Holton 2015; Williamson 2017). If knowledge or intentional action are indeed basic, they must *a fortiori* be prior to at least those concepts or phenomena thought traditionally to compose each, respectively. The present paper aims to establish that intentional action is prior to intention, whether or not it is also basic or non-composite.

The inspiration from the knowledge first approach need not be limited to the basic reversal of the received order of priority. Extant *arguments* for treating knowledge as prior may also have instructive structural parallels in the case of action. The ensuing discussion explores one such prospect in particular – that of deploying a form of argument originally presented by Jenifer Nagel (2013) for thinking that the concept KNOWS is prior to BELIEVES on the basis that it is acquired first. Both arguments naturally rely quite heavily on empirical detail. The process of developing the parallel action-theoretic argument, set out below, is informed by three main lessons we may draw from critical discussions of Nagel's argument. The original argument and the lessons it gives rise to are set out in §2 below. §3 then presents the revamped argument for the priority of ACTS INTENTIONALLY over INTENDS, and §4 rounds off the discussion. The question of priority may be formulated in either the conceptual or the metaphysical mode; it is conceptual priority that is primarily of interest here. To say that *C* is conceptually prior to *D* is to say at least that being able to recognize *D* depends on being able to recognize *C*, but not the converse. SMALL CAPS will be used to indicate reference to concepts, and single quotes to indicate reference to words. Concepts are assumed here to be mental representations.[1]

[1] The doctrine that concepts are mental representations enjoys default status in cognitive science, and is very widely accepted in philosophy as well (Carey 2009; Pinker 2007; Margolis & Laurence 2007). Though an adequate defense

Tracing parallels in logical structure between knowledge and intentional action offers one route, explored below, to defending the central contention of this paper. But there are other routes, some of which have been taken previously by fellow travelers. Michael Thompson (2008, part II), for example, roundly rejects the standard story of action which construes intention as a mental state of a particular type (see §3 for more details). Thompson sees the fundamental form of action-explanation (his famous 'naïve action theory') as one in which actions explain other actions and intentions, which are themselves stages within the unfolding active process. Anscombe (1957) may be another early source of the view that acting intentionally is prior to intending.[2] And even Davidson in his earlier writings (1963) toyed with the idea that the 'intention with which' one acts is syncategorematic – a way of redescribing what one is *doing*.

In the same paper, Davidson set out the view that evolved to become standard in the field,[3] on which intentional action is explained by a 'primary reason' consisting of a belief-desire pair, assigning to intention a minor role. In a much later contribution, Davidson proclaimed that "intentional action cannot emerge before belief and desire, for an intentional action is one explained by beliefs and desires that caused it" (1999: 10). Substitute 'intention' for 'belief and desire' – as most contemporary adherents of the standard story would – and the argument of this paper may be read as *modus tollens* to Davidson's *modus ponens*: intentional action cannot be explained by intentions that cause it, for intentional action emerges before intention. (Indeed, the conclusion reached is stronger: intending is explained by acting intentionally.) Davidson's mental holism led him to identify "a perhaps insuperable problem in giving a full description of the emergence of

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of the view cannot be attempted here, its place in the discussion should be noted. For if concepts turn out instead to be abstract Fregean senses for example, then it is not clear what the developmental data could teach us about their relative priority.

[2] As noted, for example, by Bratman (1987: 5-6). Bratman also credits, besides Anscombe, Alvin Goldman (1970) for adopting the "methodological priority of intention in action", which Bratman himself rejects.

[3] An anonymous referee doubts that the 'standard story' of action is still worthy of the honorific (first applied by Velleman 1992). The view is certainly not without detractors. Still, the Stanford Encyclopedia of Philosophy describes it as "possibly the most widespread and accepted theory of intentional action" (Piñeros Glasscock & Tenenbaum 2023), and it seems to be presupposed by many outside action theory. If any view of the nature of action enjoys majority support among philosophers, it is this.

thought", making him "thankful that I am not in the field of developmental psychology!" (1999: 11). Engaging with results from that field more carefully than Davidson had appetite for (or recourse to) leads to a view diametrically opposed to his present-day followers' with respect to the relation between intention-thought and intentional-action-thought.

2. THE ARGUMENT FOR THE PRIORITY OF KNOWS OVER BELIEVES – AND ITS CRITICS

2.1 Nagel's argument

The argument in question is gestured at in Williamson (2000). In a footnote half-way through chapter 1, Williamson suggests that "a further ground for suspicion of analyses of the concept knows in terms of the concept believes is that they seem to imply that the latter concept is acquired before the former. Data on child development suggest, if anything, the reverse order." (2000: 33). Williamson's suggestive remark does not flesh out the details of the argument he has in mind here, and he is quick to acknowledge that "the data can be interpreted in various ways, and their bearing on the order of analysis depends on subtle issues in the theory of concepts" (Ibid). The slack is picked up by Jenifer Nagel (2013), who develops the argument much more fully, with an extensive discussion devoted to various empirical results from developmental and social psychology, which allegedly support thinking that knowledge is developmentally prior to belief.[4]

Nagel summarizes the thrust of her argument thus: "arguably, if intuitive representation of knowledge really is a composite involving intuitive representation of belief, the capacity to represent knowledge should not be available unless and until the capacity to represent belief is in place." (2013: 292). This helps to get a handle on the overall structure of Nagel's Williamsonian argument. Data suggest that the capacity to attribute knowledge-states to others emerges before the parallel capacity to attribute beliefs. This conflicts with the standard picture on which our grasp

[4] Phillips et al. (2021) have recently offered a sustained defense of the idea that knowledge is prior to belief, drawing on a wide range of methodologies and sources of evidence from across cognitive science.

of knowledge depends on grasping belief, which seems to imply that BELIEVES must emerge before KNOWS. Hence, the standard picture must be mistaken: KNOWS is prior to BELIEVES. After setting out this argument in skeletal form, the bulk of Nagel's discussion is devoted to substantiating its first, developmental premise.

Two main lines of evidence are adduced by Nagel in support of thinking that an understanding of KNOWS develops prior to an understanding of BELIEVES. Since the debate over whether in fact knowledge is prior to belief is not ultimately the topic of the present paper, these will be mentioned only briefly. One such line of evidence concerns children's acquisition of items from the mental state lexicon (Nagel 2013: 292-5). Thus some studies have found that children use 'knows' earlier and much more frequently than they use 'thinks' (Bartsch & Wellman 1995; Shatz, Wellman & Sibler 1983). For example, in a well-known study examining over 200,000 utterances by children up to the age of six, 'knows' was found to appear in more than 70% of epistemic claims, compared to only 26% for 'thinks' (Bartsch & Wellman 1995).

The second main strand of evidence Nagel draws on, which will be in focus for our discussion here, concerns children's mindreading or theory of mind capacities – i.e., capacities for attributing mental states to other creatures on the basis of behavioural and environmental cues. Exercise of mindreading capacities in experimental tasks is thought to indicate subjects' emerging ability to recognize the mental states in question. Thus early studies cited by Nagel suggest that young children are much better at answering questions about scenarios designed to distinguish attributions of knowledge from attributions of ignorance, than they are at questions that test for correct attribution of false belief (for example, questions about where a child-protagonist would look for some chocolate that was initially hidden in one location, and later moved to a different location while the protagonist was not there to witness the switch [Wimmer & Perner 1983]). One such study found that only 6% of subjects aged 3 were reliably able to answer questions of this type, compared to 39% who were able to do so for questions about knowledge versus ignorance.

The gap narrows down considerably with development, and by the time children reach 5 years of age it stands at 76% to 88%, respectively (Hogrefe, Wimmer & Perner 1986).

An understanding of knowledge and an ability to distinguish it from ignorance as early as 3 years is also said to be exhibited by subjects' tendency to rely only on knowledgeable informants (Sodian, Thoermer & Dietrich 2006; Robinson & Whitcombe 2003). Nagel also cites studies from comparative psychology which arguably suggest that nonhuman primates, just like children, manage to distinguish knowledge from ignorance while failing to identify false beliefs. But it is not necessary to discuss any of these results in detail in order to appreciate the force of the criticisms that have been levelled against the use Nagel makes of them.

2.2 Doubts over Nagel's argument

Broadly speaking, the doubts voiced about Nagel's argument raise two main kinds of concern. The first focuses on the range of evidence Nagel brings forth, charging her with failing to consider results that do not align with her claims and potentially undermine the picture she favours (§2.2.1). The second kind of concern allows that KNOWS may be developmentally prior to BELIEVES as Nagel claims, and targets her inference of a corresponding conceptual priority (§2.2.2). Canvassing these objections here is done with an eye to drawing lessons that could inform the construction of a more robust parallel argument for the priority of intentional action over intention, rather than taking a stand in the dispute between Nagel and her critics.

2.2.1 Does the data suggest that KNOWS emerges before BELIEVES?

Of course, the findings Nagel cites only support her case for conceptual priority of KNOWS if they are to be explained as manifesting subjects' mindreading capacities. But this interpretation has been challenged. For example, some suggest that, far from indicating possession of epistemic-state concepts like KNOWS and BELIEVES, the results from false belief tasks are due more

mundanely to performance errors (Scholl & Leslie 2001; Apperly 2011: 22-6). Recall that Nagel's case here is based in part on comparing how well children handle questions about whether a protagonist knows some claim (e.g., where some toy is located) with questions about what a protagonist (falsely) believes (about the location of said toy). And the issue some raise is that the former is a much simpler, yes/no question, whereas the latter calls for a more complex answer, requiring the child to successfully exercise such executive functions as inhibition control and management of working memory capacity. The child who answers the standard false belief question incorrectly may be failing to suppress her own belief about the location of the toy, for instance, in which case her performance on the task does not indicate her lacking possession of BELIEVES. A similarly deflationary interpretation of children's success in discriminating knowledge and ignorance suggests that they conflate acting knowledgably with acting successfully. When e.g., answering the yes/no question about whether some protagonist knows, children may in effect be tracking the disposition to successfully achieve one's goal – in which case it is hard to see their behaviour as revealing any grasp of KNOWS at all (Perner 1991: 304; Roessler 2013: 326).

Moving on, and setting deflationary interpretations to one side, some argue that results amassed over recent decades overturn Nagel's picture.[5] Thus for example, the studies she cites suggest that children first gain an understanding of knowledge, but not belief, at around the age of 3. But some contend that children of roughly the same age actually pass versions of the standard false belief tasks (Clements & Perner 1994; Garnham & Ruffman 2001). Meanwhile other works, using different methods, find that children much younger than 3 are already sensitive to other agents' false beliefs. A pioneering and widely-discussed study by Onishi and Baillargeon (2005) probes this question using the well-established observation that infants look longer at occurrences that violate their expectations. Onishi and Baillargeon found that infants as young as 15 months expect

[5]As regards the data from discourse analysis studies, which is not in focus here, it has been argued that some of the claims Nagel cites are based on a very small sample size that can hardly be considered representative (Rose 2015: 388-90; McGlynn 2017: 80).

a protagonist who did not witness some object being relocated to look for it where she falsely believes it to be. This finding has been replicated many times (Surian, Caldi & Sperber 2007; Scott & Baillargeon 2009). Some report sensitivity to false belief in infants as young as 7 months (Kovács, Téglás & Endress 2010; Southgate & Vernetti 2014).

Now in response, Nagel could try to argue that the newer results do not reflect possession of BELIEVES at all, offering instead a more minimal or deflationary interpretation of the capacities involved. And, as we shall see in §3 below, there are in fact lean interpretations to which Nagel could potentially appeal. However, doing so proves to be something of a double-edged sword. For if one defended a lean interpretation of the findings on false belief, it would be very hard to then turn around and defend a rich interpretation of the essentially similar studies on knowledge attribution, as Nagel's argument requires (Butterfill 2013: 315; McGlynn 2017: 88-9).

Results of the sort cited above are seen by many psychologists today as undermining the claim that the ability to ascribe belief emerges as late as Nagel suggests, or at any rate later than the ability to ascribe knowledge. If the aim here were to settle this thorny question, a much more comprehensive discussion of the results would be called for (for more on this, see Rose 2015, McGlynn 2017, Butterfill 2013, Roessler 2013, Dudley 2018, and Phillips et al. 2021). But that would constitute an unwelcome digression here. For present purposes, the lesson to draw from extant doubts over the empirical soundness of Nagel's conjecture is simply that a compelling case for the developmental priority of ACTS INTENTIONALLY over INTENDS should strive to present more decisive data, and discredit deflationary interpretations thereof. In doing so, as we shall see, it will prove useful to bear in mind the specific challenges to Nagel's empirical case.

2.2.2 Is the inference from developmental to conceptual priority warranted?

Waiving the objections from the previous section, we assume here that the available data does indicate that some grasp of KNOWS develops before grasp of BELIEVES. Still, one might question

Nagel's inference of a corresponding *conceptual* priority. For one thing, as Stephen Butterfill puts it, "the fact (if it is a fact …) that humans acquire a capacity to represent knowledge before they can represent belief does not entail that their representation of knowledge is not *eventually* a composite involving representation of belief" (Butterfill 2013: 312; emphasis in the original). Butterfill's remark is on point: Any argument like Nagel's, which infers conceptual from developmental priority, must strive to verify that the order in which the concepts first emerge is kept in place well into maturity.[6] How could one demonstrate that this is so? As we shall see in §3 with respect to the priority of ACTS INTENTIONALLY, there are grounds for thinking that the relevant mindreading patterns witnessed in infancy operate continuously up to adulthood. This suggests that the concepts first acquired do not radically change in content over time.

A further source of doubt over Nagel's inference of conceptual priority is revealed when reflecting more carefully on the space of options. Suppose Nagel is right that KNOWS is developmentally prior to BELIEVES (with no significant changes occurring thereafter). Does it follow that KNOWS is also conceptually prior? Not unless a 'no priority' view can be safely ruled out. On one version of this view, KNOWS and BELIEVES are mutually independent so that neither concept derives from the other. Alternatively, the 'no priority' claim could be understood to propose a form of conceptual holism or interdependence: while understanding belief requires understanding knowledge, understanding knowledge in turn requires understanding belief (Roessler 2013: 324).[7] The latter version is incompatible with allowing, as the present section does, that KNOWS is developmentally prior to BELIEVES (but it becomes a live option again if combined with the empirical objections to the developmental priority of KNOWS in §2.2.1). The important point is that, for any claim of priority to convince, both versions of the 'no priority' view should

[6] Nagel does cite some studies from the discourse analysis literature which suggest that the ubiquity of 'knows' continues into adulthood (Nagel 2013, n. 22). But she does not address the question of continuity at all when it comes to the mindreading data.

[7] The resulting circularity need not be vicious, as the aim is not to offer any kind of reductive definition, either in conceptual or metaphysical terms, of either knowledge or belief. Hyman (2017) argues that belief can be defined in terms of knowledge and not vice versa, but denies that this should lead us to view knowledge as basic or primitive because he rejects what he calls "the hierarchical conception of philosophical analysis".

come to seem implausible. For if either version holds, the developmental data would be of no use to either side in making their case for conceptual priority.

To summarize: The controversies canvassed in this section carry three lessons for arguments, as in §3, that infer conceptual from developmental priority. First, such arguments should strive for empirical adequacy, which includes ruling out deflationary interpretations of the data in terms unrelated to concept-possession. Second, the arguments should verify continuity of the conceptual capacities between the time they emerge and until they are fully mature. And finally, the suggestion that neither concept is prior to the other should be discredited.

3. THE CONCEPTUAL PRIORITY OF INTENTIONAL ACTION

This section sets out the case for thinking that ACTS INTENTIONALLY is prior to INTENDS. The argument is modelled on a revamped version of Nagel's argument, informed by the lessons drawn above. Data suggest that grasp of intentional action emerges before grasp of intention. Since ACTS INTENTIONALLY and INTENDS do not exhibit discontinuity, and are not plausibly independent of each other, the former must be prior to the latter:

1. If grasp of ACTS INTENTIONALLY emerges before grasp of INTENDS, the former is prior to the latter, unless neither is prior to the other or the two are discontinuous.
2. Grasp of ACTS INTENTIONALLY emerges before grasp of INTENDS.
3. INTENDS and ACTS INTENTIONALLY are not discontinuous.
4. A no priority view is specious.

So,

5. ACTS INTENTIONALLY is prior to INTENDS.

The ensuing discussion marshals support for premises 2, 3 & 4 of the master argument, explaining along the way how the lessons from §2.2 are implemented. We begin in §3.1 with the

evidence for the developmental priority of ACTS INTENTIONALLY. But to appreciate the import of the data, we need at least a rough handle on the phenomena that subjects in the experiments are claimed to be tracking. What is the picture of intention and intentional action assumed here in asking when young children come to identify intentions and intentional actions?

For present purposes, it seems best to work with an intuitive understanding of *intentional action*. As we shall see in §3.1.1, infants track action by means of several converging cues, which function as clues to the presence of intentional action and are neutral between competing theoretical conceptions thereof. But *intention* is open to different interpretations even at the intuitive level, and should hence be more clearly explicated. In one sense, 'intention' is synonymous with 'goal', the state of affairs which the action is designed to bring about. But this thin sense of 'intention' is not the one at play here. As the reader will recall, the ultimate target of the argument being developed is the standard story of action. And this widely accepted theory implies that intention is prior to intentional action where the former is understood as *a specific kind of mental state*. Thus McCann states that "intending, properly so called, is a mental state …" (1998: 92), while Mele speaks of intentions as executive attitudes toward plans (1992: 162). Similarly, Knobe & Burra (2006) opens thus: "Consider the concept *intention*. This is the concept of a particular type of mental state" (113); and the entry on Intention in the Stanford Encyclopedia of Philosophy notes "the prevalent acceptance of intention as a mental state" (Setiya 2018).

The philosopher who develops this picture of intention most systematically is Michael Bratman (1987). On his influential view, intention is a *sui generis* state, defined by a set of unique functional characteristics which subserve its role within the agent's planning economy.[8] Intentions are essentially plan-like states that facilitate in various important ways our temporally extended agency.

[8] A referee raises the intriguing question of whether *cognitivist* theories of intention, on which intention consists in or essentially involves a kind of belief (Velleman 1989, Setiya 2007, Marušić & Schwenkler 2018), fall under the scope of the master argument. The issue is hard to settle since, as noted in §2.2.1, there is considerable disagreement among mindreading researchers today as to when a capacity to represent belief emerges, with some denying that it occurs at any point during infancy.

They are thought of as fairly stable and robust states. Once formed, we are disposed (and indeed rationally pressured) not to revise or reconsider them. There is likewise pressure to get our intentions to cohere with the rest of our psychology so as to ensure they get executed, and abandon those intentions that cannot be executed. These and similar functional attributes are thought to afford certain important advantages when it comes to our existence over time. The advantages in question include our ability to sustain complex projects (both intrapersonal and interpersonal); our being in a position to close off deliberation and avoid expending further time and effort working out what to do; our having certain practical fixed points in our foreseeable future which could serve as premises in further reasoning and deliberation; and so on.[9]

One last piece of set-up needs to be in place before we turn to examining the evidence for the priority of ACTS INTENTIONALLY. This concerns the scope of the master argument. Since that argument targets *conceptual* priority, proponents of the standard story may hope to escape its force by framing their position in metaphysical rather than conceptual terms (as a referee pointed out). The move is open to causalists, though it is unclear how many would find it appealing. David Velleman is probably not among them. In a classic defense of his preferred version of the standard story, Velleman (1992: 466-7) provides reasons to focus on the conceptual mode:

> Does the philosopher seek to explain what we ordinarily mean when we call something an action, or does he seek to explain what something ordinarily is when so called? My aim is to explain the former, at least in the first instance. For I suspect that our practices of deliberation, rationalizing explanation, and moral assessment are designed for action as we conceive it to be, and that any account of a reality substantially different from this conception will not help us to understand the logic of these practices.

[9] The rough sketch in the text outlines the standard view of *prior* intention. The latter forms the basis for the derivative notion of intention-in-action (or the intention with which one acts). To have a prior intention is to be in a future-directed plan-like state, whereas to act with some intention is to be in a plan-like state that is being executed (Searle 1983, Ch. 3; Bratman 1987, Ch. 8; Pacherie 2000). While there are no doubt intimate connections between the two kinds of intention, the ensuing discussion will focus on the former since the latter is harder to disentangle from the action itself. This makes it much harder to dissociate attributions of intentional action from attributions of the intention with which one acts.

For similar reasons, McCann understands the philosophy of intention as "pertaining to the everyday concept of intending" (1998: 210). Now of course, the nature of concepts and their psychological representation are philosophically stimulating and time-honored topics in their own right. But even a proponent of causalism that is ultimately trying to figure out the nature of reality rather than our concepts has reason to take interest. For the possibility could hardly be ruled out that ACTS INTENTIONALLY and INTENDS, like our other concepts, are helpful (though imperfect) guides to the states and processes they stand for.[10]

3.1 The developmental priority of ACTS INTENTIONALLY over INTENDS

3.1.1 Evidence for the emergence of ACTS INTENTIONALLY

Our task here is to try and determine approximately when children first recognize intentional action, to be compared with when they first recognize intention (§3.1.2). The main source of data, as with Nagel's argument, comes from mindreading studies. A wide range of results converge to suggest that, when given appropriate cues, infants in their first year tend to view scenarios in intentional terms. Csibra et. al. (2003) showed infants aged 6 to 12 months an animated film in which a small ball starts to move towards a barrier on the screen, with a larger ball then going into motion along the same path after it (**Figure I**). The small ball goes through a gap in the barrier, while the large ball, unable to fit into the narrow gap, goes around the barrier. Both shapes then disappear so that the scene terminates abruptly. Now there is a strong and natural tendency (witnessed also in adults; more on this below) to interpret such scenarios as involving intentional acts, with one ball construed as chasing the other and following it, while the other is seen as fleeing, escaping, etc. And Csibra and his colleagues, using the looking-time method mentioned earlier, found that infants already exhibit this tendency. In two separate trials, subjects were shown

[10] In his (2000), Williamson defends both metaphysical and conceptual theses about the nature of knowledge and its relation to other mental items. And in a discussion of his views, Fricker (2009: 33) notes: "I follow Williamson in ruling out the possibility of an error theory—that our concept 'knows' could be complex, while it in fact denotes a simple state. It is doubtful whether this is even coherent, and it can surely be discounted."

different possible endings to the scene – one in which the small shape stops, and the larger one touches it, coming to rest afterwards ("catching trial"); and another ending where the small shape again stops and the larger one passes it by ("passing trial"). Infants tended to look longer in the passing trial, indicating a violated expectation that the large ball would catch the small one when it could. Apparently, they understood the scene in goal-directed terms.

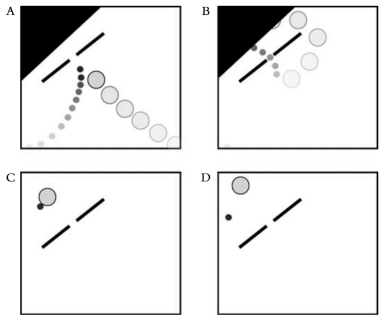

Figure I

The finding was replicated several times (Wagner & Carey 2005; Csibra et. al. 1999). Csibra and Gergely themselves conducted a series of influential studies over the years demonstrating infants' striking tendency to identify teleological, arguably even instrumentally rational patterns of behaviour. In another representative such study reported in Csibra et. al (2003), 12-month-olds were shown a scene with a ball first rolling along a straight path (**Figure II**). When the ball reaches a segment of the path hidden from view by a screen, it appears to jump and then returns back to the path. The screen was later removed and the scene repeated itself, with one trial revealing an obstacle where the ball was seen jumping, and the other trial showing no such obstacle. With the screen removed and the scene visible in its entirety, children looked longer in the trial that did not include an obstacle. They were evidently surprised that the ball opted for the instrumentally inefficient action of jumping over a non-existent barrier, when it could more easily have proceeded along its path. To understand the scene in this way is to discern a teleological, instrumentally calculative structure that is characteristic of intentional actions.[11]

[11] One could of course question whether this is in fact the correct interpretation of the data. The important question of how the results should be interpreted is taken up in §3.1.3 below.

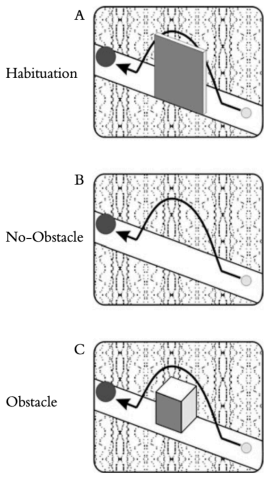

Figure II

Phillips & Wellman (2005) obtained similar results to Csibra and colleagues (2003) in a complementary study involving a human hand instead of a geometric shape. Other studies likewise suggest that infants in their first year, indeed the first six months, recognize goal-directed behavior. In a seminal study, Woodward (1998) showed 5-month-olds a small stage with two toys located on either side of it (**Figure III**). At one point, a human hand reached in from the side to grasp one of the toys. The toys then switched locations, and subjects subsequently participated in one of two trials. In the first, the hand moved towards the object it had initially grasped (a ball) in its new location and grasped it there. In the second trial, the hand moved towards the initial location, grasping the new object now located there (a teddy bear). Infants looked longer in the second condition, suggesting that their understanding of the original scenario included a representation of the hand's goal (to get the ball) and not merely its spatio-physical attributes. In a follow-up study, Woodward (1999) demonstrated that 6-month-olds are able to discriminate goal-directed behavior from behavior that accidentally achieves some goal. She showed her subjects essentially the same scene as in the previous study, except that the hand did not reach in from the side to grasp the toy but rather dropped from above, hand backwards, to land on top of it. In this condition, subjects showed no comparable tendency to look longer when the hand came into contact with the different toy in the original location. Somerville, Woodward & Needham (2005), likewise using the looking-time method, report that a grasping event modelled on Woodward's paradigm elicits goal-

directed representations in infants as young as 3-months, provided they are allowed to experience the action themselves first.[12]

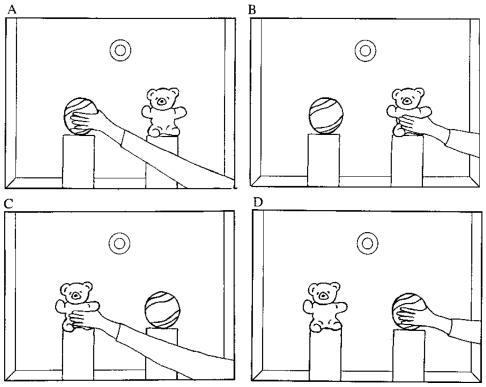

Figure III

One might object that the above is, at best, evidence for infants' emerging ability to grasp *goal-directed* behaviour, which falls short of intentional action (consider a sunflower tracking the sun's motion or a heat-seeking missile: they exhibit goal-directedness, but are clearly not agentive). Indeed, a proponent of the received priority of intention over intentional action may seize on this point as indirect confirmation of her position. She may suggest that young infants are not yet able to represent intentional action precisely because they still lack an ability to represent intentions.

Now, the objection is surely correct that a creature that is only able to represent goal-directedness cannot be credited with grasping intentional action. However, we cannot infer from this that what such a creature lacks is the ability to represent intention. For at least one alternative ingredient which could play the same role as intention (and is fully compatible with the priority of intentional action) is *agency*. A representation of *goal-directed behavior performed by an agent* would offer an equally good conceptual approximation of intentional action. Such an approximate representation would allow infants to discriminate, at least in typical cases, between the merely

[12] That producing goal-directed representations is conditional on infants' having prior first-hand experience may support the "Like Me" hypothesis, according to which attributing goals to other agents quite generally depends upon a prior grasp of one's own agency, plus the apprehension that others are "like me" (Meltzoff, 2011). More on Meltzoff's results below.

goal-directed motion of the sunflower and the intentional actions of a human agent. But it falls short of capturing all the subtle nuances of ACTS INTENTIONALLY, and will inevitably miscategorize some instances; while virtually all goal-directed behaviour performed by agents amounts to intentional action, exceptions may be found when countenancing far-fetched scenarios (a sleepwalker making herself a cup of tea?) Hence, if infants can represent goal-directed behavior performed by an agent, they evidently possess at least a rudimentary, proto-conceptual grasp of ACTS INTENTIONALLY – much like their grasp of most other phenomena at such an early stage in life. And in fact, studies done with infants around the same age as reported above suggest that they do also grasp agency, as will now be shown.

The studies in question show infants tracking several converging features, which function as cues for the presence of an agent (Spelke 2022: ch. 7). Two central such features are *self-generated motion* and *causal efficacy*. Cicchino and colleagues (2011) showed their subjects sequences involving two shapes coming into contact, while varying the infants' impression as to which of the objects was self-propelled. Subjects first saw an event in which a simple geometric shape enters from off-screen and comes into contact with a different shape, setting the latter immediately into motion. The next scene featured either only the impacting (i.e., causally efficacious) shape or only the impacted shape. In both conditions, the event began with the single shape at rest, followed by a brief pause after which it started moving before going offscreen. Subjects looked longer when the impacted shape was the one to propel itself, indicating a violation of their expectation that causally efficacious entities are also self-propelled (see also Cicchino & Rakison 2008).

Other experiments reveal another key signature of infants' grasp of causal efficacy, viz. that efficacy requires physical contact. Thus for example, Kosugi & Fugita (2002) showed subjects a person moving toward a large stationary object that stood behind a screen. The person then disappeared behind the screen, and the object began to move away from the person. The screen was subsequently removed, and infants viewed alternating events in which the person either

contacted the object at the time it began to move or stopped short of contacting it. Infants looked longer at the latter event, indicating that they attributed the object's motion to the person who contacted it.

The cues of self-propulsion and causal efficacy (via direct physical contact) go together with indications of *efficiency* and *goal-directedness* revealed in the landmark experiments by Gergely & Csibra and their colleagues, reviewed above. Saxe et al. (2005) showed subjects a real-life rendering of one of Csibra et al.'s (1999) animated scenes. Infants watched a beanbag emerge at one side of a puppet stage, already in motion. The beanbag passed over a barrier, landing on the opposite side of the stage. It rose just high enough to sail over the barrier, demonstrating precisely the kind of instrumental efficiency seen in Csibra & Gergely's original experiments. Although the source of the beanbag's motion was not visible, the scene was made to appear as though the beanbag was thrown onto the stage by a hidden agent. Infants then viewed alternating events in which the beanbag again flew across the stage, followed by the emergence of either a hand or a toy train, either on the side where the beanbag had emerged or on the side where it landed. Infants looked longer when the hand appeared on the side where the beanbag landed. Evidently, they expected the hand – a familiar, reliable source of self-propulsion and efficacy – to appear on the side from which the beanbag was thrown. Importantly, subjects did *not* look longer when the train emerged at the side where the beanbag landed, suggesting they had no comparable expectation that an inert object would perform such goal-directed, instrumentally efficient action (see also Liu & Spelke 2017; and Steward 2009). Saxe and colleagues conclude that

> infants distinguish between animate or intentional entities, to whom goals are assigned, and inanimate objects, to whom goals are not assigned. When a moving object is inanimate, infants, like adults, may attribute to the *inferred* agent both a goal … and the causal power to accomplish that goal. (2005: 1000).

Studies such as those reviewed above strongly suggest that the same set of circumstances simultaneously elicit from infants attributions of self-propulsion, causal power, and goal-directedness. This cluster of features evidently combines to form a representation of agentive goal-directed behavior, which approximates the representation of intentional action.[13] But what if any evidence is there to help us determine the stage at which an apprehension of *intending* first emerges?

3.1.2 Evidence for the emergence of INTENDS

Several experiments demonstrate that by 2-3 years of age, toddlers can identify and understand the intentions of others. For example, Schult & Wellman (1997) found that 3-year-olds were able to discriminate intentional from unintentional actions in scenarios presented to them and probe the intentions underlying them. Hickling & Wellman (2001), and Wellman, Hickling & Schult (1997) confirm these findings and extend them to around 2 years of age.

However, these results demonstrate somewhat sophisticated, partly verbal capacities that require some mastery of executive functions (see §2.2.1) and likely depend upon a more rudimentary grasp of INTENDS that is already in place much earlier (Baird & Astington 2005). Indeed, an opponent may insist that the evidence reviewed in §3.1.1 for infants' recognition of intentional action should *also* be thought of as evidence for recognition of intending. This raises an important and subtle question about the exact interpretation of the results, to be taken up in §3.1.3 below. The point to note here is that, absent further argument at least, the data presented in §3.1.1 confirming infant's ability to discern intentional action does *not* by itself warrant any

[13] A longstanding debate carries on concerning the nature of the mechanisms in virtue of which infants come to have these representations. Domain-specific theorists have proposed that infants possess an innately specified module responsible for perceiving self-propelled motion (Permack 1990, Leslie 1994) or a core knowledge system pertaining to agency (Carey 2009, Spelke 2022). In contrast, domain-general theorists argue that representation of agency is achieved through associative learning (Jones & Smith 1998, Quinn & Eimas 2000). The details of this debate are largely orthogonal to our concerns, however, as both sides agree that grasp of agency is in place by the first 5-6 months of life.

inference that they are also able to attribute states of intending. As Brandone & Wellman (2009: 86) put it:

> That infants appreciate successful actions as goal-directed does not necessarily imply that they appreciate the intentions underlying those actions. In the case of successful actions, infants may identify the goal object that the actor is moving toward on the basis of the external result of the action — a teleological rather than [mentalistic] understanding.

When infants identify the goal of completed actions, they manifest their understanding that *actions* have goals. But this need not imply an understanding that *agents* have goals – which would be tantamount to understanding the basic idea of intending. To get around this indeterminacy and test specifically children's ability to discern intentions, Brandone & Wellman focus on failed actions. They reason persuasively that an appreciation of failed intentional action as intentional requires "penetrating more deeply than the surface appearance of the action" (2009: 85) to track the goal as encoded by the agent – that is, to track her intention. This observation has been deployed productively in the past, going back to a classic study by Meltzoff (1995). He showed his 18-month-old subjects sequences of agents performing various actions, under two conditions. In the first condition, agents were seen to successfully complete what they were doing; in the second, they tried but failed (e.g., to separate two parts of some object). Meltzoff found that subjects in both groups were equally and reliably able to reproduce the action they witnessed. By 18 months, infants are evidently able to recognize the intention underlying an incomplete action.

Replications of Meltzoff's study confirm this observation and extend it to slightly younger subjects. Carpenter, Akhtar & Tomasello (1998) showed 14- to 18-month-olds action sequences in two parts, one marked vocally as intentional ("There!"), and one as unintentional ("Oops!"). When given the opportunity, subjects exhibited a strong tendency to reproduce only the intentional actions they witnessed, suggesting that they can read off intentions from failed performances. Bellagamba & Tomasello (1999) replicated Meltzoff's results with 18-month-olds.

Importantly, they also failed to obtain similar results with 12-month-olds. These younger infants reproduced only those intentional acts they saw completed successfully (see also Olineck & Poulin-Dubois 2005; Bellagamba et. al. 2006; Johnson et. al. 2001). This suggests that grasp of intention emerges somewhere between 12-14 months – considerably later than grasp of intentional action.

Brandone & Wellman (2009) demonstrate a slightly younger cut-off point for an understanding of intentional action without an understanding of mere intention, using a replication of Phillips & Wellman's (2005) paradigm mentioned above. Subjects were first shown a hand reaching over a barrier towards a ball located at the far side (**Figure IV**). In the first condition, the hand successfully managed to grasp the ball while in the second it fell short. In the next scene, the barrier was removed, and subjects saw the hand again reach for the ball, either along a straight path ('direct-reach condition') or an indirect path ('indirect-reach condition') as if going over the (now absent) barrier. Both these attempts to grasp the ball were successful. Brandone & Wellman found that subjects aged 10 and 12 months who witnessed the incomplete action first, looked longer in the indirect- than the direct-reach condition. This suggests that infants at this age are able to infer the goal of unsuccessful actions, as they were evidently surprised that the hand did not achieve its (inferred) goal directly when it could. Significantly, 8-month-olds in the indirect-reach condition only looked longer if they initially witnessed the action successfully brought to completion, suggesting they lack a comparable ability to infer intentions. Brandone & Wellman's results thus confirm the existence of a developmental gap between a capacity to recognize intentional action and a capacity to recognize intention.

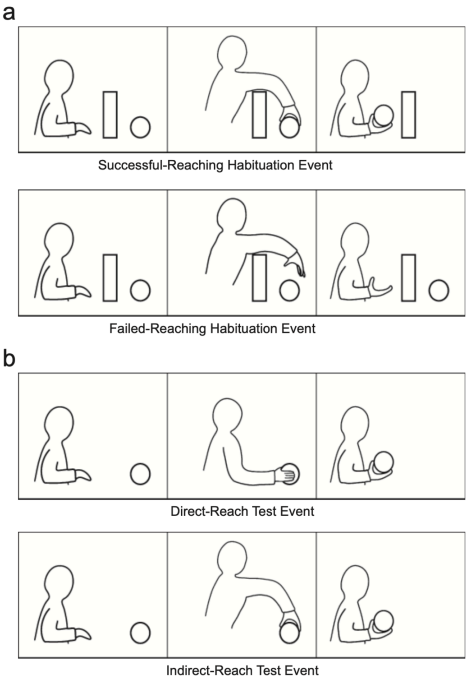

Figure IV

3.1.3 Metallically rich or lean interpretation?

The reader will recall that §2.2.1 raised the challenge for Nagel's argument over whether the data she cites should in fact be given the interpretation she favors. One deflationary alternative noted was that the results do not indicate possession of conceptual or mindreading capacities at all but are rather due to performance errors – for example, poor command of executive functions. Now in the present context of interpreting data about the priority of intentional action, the interference of executive demands is not a genuine concern. A more pertinent deflationary suggestion is that infants' looking longer at some event does not indicate any violated expectation of the sort presumed, but rather fascination or puzzlement by some unrelated feature of the scene. Concerns of this sort are standardly addressed by a procedure dubbed 'habituation', designed to familiarize infants with a novel event that is not part of what the experiment is meant to test. If the scene includes an arm moving in a curving motion, for example, as in the indirect-reach condition of Phillips & Wellman's study (2005; see above), subjects will be shown this event in the habituation phase over and over again, until their interest declines by some preset ratio. This guarantees that any potential fascination with the sheer novelty of the movement was extinguished

before the test trials, and therefore cannot be what explains longer looking times – paving the way for an alternative explanation in terms of infants' violated expectations. Habituation is deployed in increasingly sophisticated ways to rule out various deflationary interpretations.

A thornier, theoretically-loaded question of interpretation concerns the general framework for theorizing about infants' mindreading capacities. To see what is at issue, bracket for the moment the evidence reviewed in §3.1.2 for the emergence of INTENDS and focus on the data about ACTS INTENTIONALLY. Three main accounts of that data can, and indeed have been offered, varying in the degree of richness they impute to infants' mentalistic repertoire. At the sparse end of the spectrum is the 'behavioral rule' interpretation. This view denies that infants' see others as minded creatures. Rather, their performance in the experiments is explained as resulting from statistical learning that allows them to detect low-level physical and spatio-temporal regularities. Instead of representing some scene in terms of an agent having the goal of reaching for or grasping some object, the infant may be appealing to such behavioral rules as e.g. 'If an object repeatedly follows some path, it will continue doing so unless a change in the environment permits taking a straighter path.' (Povinelli 2001; Baird & Baldwin 2001). If correct, this austere interpretation undercuts the argument that infants possess conceptual capacities sufficient for identifying intentional action as such.

However, it is widely held today that austere accounts fall short in view of the impressive levels of complexity and sophistication infants exhibit in mindreading studies. Prospects seem dim for a satisfactory explanation of infants' achievements purely in terms of case-specific, surface regularities. As Carruthers put the point recently (2018: 11351):

> The consensus among most researchers in the field is that there are now too many infant studies, using too many variations in materials and methods, for [the lean] account to be plausible.

There are several reasons why this consensus has emerged. First, many different rules could potentially be invoked in any given situation to explain infants' behaviour: Which rule do infants supposedly follow in the results reported by Csibra et. al. (2003) – the one noted above, citing objects following the straightest available line, or an alternative rule stating that 'a rolling ball will (roughly) follow the contours of the surface it is rolling along'? For any specific such rule proposed, lean accounts will struggle to explain why we should privilege *it* over its many possible surrogates (Scott 2014: 301). Second, lean accounts face the challenge of demonstrating that infants will have had adequate opportunities to *learn* the proposed rules in the first few months of life. This problem becomes particularly intractable given that at least some of the spatio-physical features of objects in the paradigms reviewed in §3.1.1 are quite unusual, involving shapes travelling along curved paths and the like. This seems to afford fewer opportunities to learn such rules so early in life (Carey 2009: 171).[14]

Third, and arguably most seriously, the sheer *number* of behavioural rules that would need to be postulated to explain all the data places lean accounts in poor standing with respect to some central features of good scientific theorizing. To see this, recall some of the classic results from Amanda Woodward and her colleagues discussed in §3.1.1. Woodward (1999) was claimed to have shown that 6-month-olds are sensitive to the difference between intentional and accidental action, as they looked longer at a hand when it came into contact with a toy but only if the hand *grasped* the toy, not if it merely touched the toy backhand. But someone might suggest that this need not indicate any ability on infants' part to detect goals. The results could instead be explained by subjects' heightened attention to *causally significant* goings-on. After all, a hand grasping an object often portends some noteworthy event – for example, a change in the object's location or some other

[14] In another example illustrating the same point, in order to explain Scott and Baillargeon's (2009) results about infants' attributions of false belief, "it seems that infants would need to have had opportunities to learn a rule such as this: 'People who have reached for the divisible one of two otherwise similar objects will reach for the location of the hidden member of the pair when the other of the two is visible in its joined state, provided that the construction of that object out of its parts did not take place within the person's line of sight.' " (Carruthers 2013, n. 7).

effect. Merely touching the object with the back of the hand is far less likely to issue in something worth tracking.

The suggestion may seem plausible as far as it goes. But it does not go far enough. Recall an earlier result from Woodward's lab (1998), in which subjects expected the hand to grasp the same object it was initially seen reaching for after the object changed location, and were surprised if the hand instead went for a different object in the original location. The above rule about grasping vs. merely touching clearly could not explain subjects' reaction here, as both objects were grasped. Hence, a different rule would need to be postulated – perhaps one about hands reaching for the same object over and over again typically continuing to do so (Ruffman 2014: 279). This is just one illustration out of very many that could be provided to demonstrate the point that lean accounts must invoke "a myriad of low-level processes or behavioral rules" (Baillargeon, Scott & Bian 2016: 177) if they are to adequately explain all the available findings.[15] Consequently, lean accounts put forth an unparsimonious, inelegant, messy theoretical construct compared to a common underlying explanation in terms of mindreading abilities. To be sure, the former approach is simpler in one sense, as it avoids invoking mentalistic explananda. But the explanations it ultimately furnishes are revealed as much more complex when we reflect on the huge number of rules it must posit, and how ramified and elaborate the content of some of these rules must be. Worse still, the lean approach is much less *fruitful* in comparison. For it is necessarily *post-hoc*, constructing rules to explain new evidence as it comes in rather than generating novel predictions of its own that could advance the debate (Scott 2014; Carruthers 2013, §2.5). All told, it is hard to

[15] For another such illustration, consider the rule 'People will search for an object where it was last in their line of sight', which could potentially explain Onishi and Baillargeon's (2005) seminal finding that infants understand false belief (Perner 2010). However, this rule cannot explain how infants come to attribute beliefs about objects' *identity* rather than location, as demonstrated by Scott and Baillargeon (2009), among various other findings. This serves to underscore the point that behaviour-rule theories would have to account for data about false belief attribution as well, and not just, as in §3.1.1, about intentions and goals – making the task for these theories all the more daunting.

identify the content of behavioral rules, and hard to see how they could all have been learned. In addition, such rules are displeasingly complex and post-hoc constructs.

A behavioral rules explanatory schema threatens to undercut any mentalistic rival. But it might seem to pose a special challenge for a view such as that propounded here, as an anonymous referee pointed out. This is because intentional action is quite closely tied to behavior; indeed, it plausibly *is* a kind of behavior. And this may be taken to reinforce the charge that behavioral regularities are all one needs to account for the empirical results. If such a behavior-based construct as ACTS INTENTIONALLY is doing the explanatory work, what could justify a further appeal to mentalistic constructs? In considering this objection, we should not lose sight of the fact that representations of intentional action are here posited as an early constituent of a developing conceptual repertoire. Anticipating a point made later in discussing the continuity of the nascent concepts acquired in infancy (§3.2.1), ACTS INTENTIONALLY functions as the basis for later attributions of mental states where behavior is partly or wholly absent (one example of this was seen above, with Brandone & Wellman's [2009] subjects inferring agents' intentions from their incomplete actions). Therefore, even if – waving the above objections to lean approaches stemming from simplicity, fruitfulness, difficulties in identifying the correct rules, and paucity of opportunities to learn them – there remains a further serious obstacle: How to explain children's emerging ability to make sense of situations where an agent's intentions, desires, etc. are not fully manifested in visible behavior.

Located at the opposite end from lean interpretations are mentalistically rich ones. These accounts view infants in their first year, and indeed typically by six-months, as possessing fundamentally complete (though not yet fully mature and streamlined) mindreading capacities, which enable them to represent mental states of all basic types (Leslie 1994; Carruthers 2013). The position threatens to eliminate the developmental gap argued for here between the emergence of ACTS INTENTIONALLY and INTENDS. It proposes that infants' recognition of intentional actions marches in lockstep with recognition of states of intention (if not prior intention, then at least

intention-in-action.[16]) In fact, an opponent could invoke both lean and rich views to stage a dilemma of a similar structure to the one directed at Nagel's argument (see §2.2.2): If the lean account prevails, the data from §3.1.1 do not indicate grasp of ACTS INTENTIONALLY in early infancy. But if we opt for the rich account instead, we can no longer maintain that grasp of INTENDS emerges later.

A way around the dilemma comes from a third interpretation that occupies a middle-ground between the two stark alternatives of rich vs. lean. Moderate views propose that infants possess a limited, quasi-mentalistic conceptual repertoire that allows them to track states of mind without representing them as such – similarly to how one might track the toxicity of foods by representing, not their toxicity but rather their odor, avoiding those that smell foul.[17] A prime example of this explanatory schema is Butterfill & Apperly's (2013) influential "Minimal theory of mind". They offer a detailed account of the sort of surrogate states an infant does represent as part of her minimal mindreading system, including the state of *registering*, *encountering*, and importantly for us – *having a goal*. These proxy states figure in four principles, which according to B&A govern infants' psychological reasoning about others. The first principle is the one most germane to the present discussion. It states simply that "bodily movements form units which are directed toward goals" (2013: 614), where goals are understood teleologically as the action's function (to *V*). As B&A explain (2013: 613): "The virtue of this way of representing goals is that it allows them to be inferred from actions without appealing to intentions, beliefs, preferences or other psychological states."[18] In this way, minimal mindreading can explain how infants are able to track beliefs while lacking in the language and executive skills that seem to be required. The minimalist view can also

[16] For the distinction between prior intention and intention-in-action, see n. 9 above.
[17] The analogy comes from Butterfill & Apperely (2013: 607).
[18] B&A might protest that their view is being distorted as they claim that possession of minimal ToM only allows infants to represent goal-directed behaviour, while "[t]o represent intentional actions as such you also have to represent intentions or propositional attitudes such as beliefs and desires" (Butterfill & Apperely 2013: 613). However, the possibility was noted above that infants may instead be representing intentional action via a complex representation of goal-directed behaviour *performed by an agent*. The latter representation is not beyond the reach of a minimal ToM system.

explain findings suggesting that in some cases, tracking of perceptions and beliefs is automatic and relatively effortless while in other cases it is nonautomatic and demanding (Apperly & Butterfill 2009). Much of B&A's motivation for proposing their minimalist theory is thus *independent* of the present discussion over what grasp of intentional action involves. (For a more detailed discussion of the motivations for minimal mindreading, see Butterfill & Apperly 2013, §§2-3).

Csibra and Gergely also offer a mentalistically minimal view of how infants understand goal-directed action. They construe infants as 'mindblind' creatures "that – although unable to represent intentional mental states – could nevertheless have evolved a reality-based interpretational strategy to represent goal-directed actions." (Gergely & Csibra 2003: 290). Very briefly, similarly to B&A, on Csibra and Gergely's view, infants do not represent intentions or other states of mind. Rather, intentional action is interpreted according to what they dub "the teleological stance". This involves viewing the end-state as the action's goal, the observed behaviour as the means, and the physical environment as situational constraints. The infant pieces all three elements together by means of a "principle of (instrumental) rationality" or efficiency: The action is assumed to aim at the outcome in the least effortful way, given the situational constraints. An apparent violation of the rationality principle explains, according to C&G, why infants are surprised when e.g. a geometrical shape moves as if clearing a non-existent hurdle in its path (Csibra et. al. 2003; see §3.1.1 above). While the teleological stance does not impute to young infants an ability to attribute mental states, it does see them as able to go beyond mere physical and spatial regularities in understanding actions, goal-states and instrumentally rational patterns. This places the view as intermediate between rich and lean views.[19]

[19] Perner & Roessler (2005; 2013) also defend a moderate, quasi-mentalistic gloss of children's grasp of intentional action, focusing specifically on the perceived role of belief. They deny that infants understand a false belief scenario, where e.g. the protagonist is heading towards the cupboard, in terms of her believing that the item she desires is located there. Rather, Perner & Roessler suggest that infants expect the protagonist to act on the *actual* location of the item, i.e. on what she has most reason to do given her goal. Their view thus suggests that an understanding of intentional action precedes an understanding of *belief*. But it is silent on the question of priority between intentional action and intention, which is the focus of the view defended here.

Minimal theories of mind pose a serious challenge to rich views. Whether that challenge is ultimately successful cannot be determined here. But even if it is not, rich views would still need to contend with the data from §3.1.2 about the later emergence of INTENDS. Now one way of doing so would be to concede that grasp of states of intending in particular emerges later than infancy (or at least later than early infancy), while holding on to the original position with respect to core states of belief, knowledge, desire, and preference. The limited concession need not seriously upset rich views (it would not be ad hoc either, as there is no principled reason why the capacity to attribute all mental states should be thought to co-emerge). Therefore, if adopted, this minor fix to the rich view renders the argument here constructively neutral as to whether the mindreading data should be given a minimal or rich gloss. Whichever turns out to be correct, it confirms that INTENDS emerges later than ACTS INTENTIONALLY.

* * *

This concludes the argument of §3.1 that ACTS INTENTIONALLY is developmentally prior to INTENDS. §3.1.1 reviewed data showing that as early as 3-6 months of age, infants appear to first grasp intentional action as such. §3.1.2 showed that parallel data about intention points to a later stage of around 10 months. §3.1.3 took a closer look at how the findings should be interpreted. Lean, purely behavioral interpretations were ruled out as implausible. Mentalistically rich views, which would similarly invalidate the priority of ACTS INTENTIONALLY, must contend with the minimalist challenge, and moreover struggle to accommodate the data from §3.1.2. But to accept the argument of this paper, one need not commit to minimalism. Given a defensible version of the rich view which allows for the later emergence of INTENDS compared to other states, both it and its moderate rival come out as compatible with the main line of argument here.

3.2 From developmental to conceptual priority

The discussion in §3.1 strived to implement the lessons from discussions of Nagel's argument, to do with comprehensiveness of the data presented and its correct interpretation. If successful, it establishes the developmental priority of ACTS INTENTIONALLY. Two further concerns which emerged in §2.2.2 remain to be addressed before conceptual priority may be claimed. The first is the question of conceptual continuity (§3.2.1), and the second is the possibility of a no-priority view (§3.2.2).

3.2.1 Continuity

One source of support for the stability of conceptual structures emerging in infancy comes from identifying the same mechanisms at play in adulthood. A prime example in the present context is the tendency to view scenes involving geometric shapes in intentional or goal-directed terms. In their classic studies, Heider & Simmel (1944) showed adults animated clips with shapes moving on a screen in various interacting patterns. Much like the results from infants obtained among others by Csibra and colleagues (1999, 2003; see §3.1.1 above), Heider & Simmel's adult subjects displayed a strong inclination to interpret the scenes as involving intentional acts. They described the shapes variously as "fleeing", "chasing", "hiding", etc. (and also "wanting" and "thinking"). Many subsequent studies confirm this result. Wagner & Carey (see Carey 2009: 191-2) had adults describe the scene used in Csibra et. al. (2003). They found that intentional language was used in 75% of scenarios in which infants attributed goals to the shapes, compared with only 13% of scenarios in which infants did not do so. That adults should construe motions of animated shapes in agential terms is all the more striking given that they will of course have known that such descriptions cannot be apposite.

Converging results are reported by Susan Johnson (2003), who compared adults' with infants' interpretations of scenarios involving a human protagonist interacting with a small furry robot controlled remotely by experimenters. Johnson found that in their descriptions of the scenes, adults treated the object as an intentionally-behaving agent in just those conditions where infants

did so. They described the object as e.g. "looking for something" and "trying to figure out where it was"— again, knowing full well that these descriptions are strictly false – whether it appeared to have a 'face' or not, provided it beeped in response to the human protagonist's actions. In the different condition where the robot beeped randomly, adults in Johnson's study said such things as "The thing turned due to a program. It was programmed according to the sounds. After so many, the thing rotated."

A related strand of support for the same point comes from the language used by adults to describe intentional acts in more everyday circumstances. Infants, it was argued at length above, first represent intentional action non-mentalistically. And one prevalent way adults describe intentional scenes evidences a parallel tendency for non-mentalistic representation. Thus adults will say such things as: 'Bernhard the baker gets up at 3am to have the bread ready by 7', rather than 'Bernhard the baker gets up at 3am, because he *intends* (wants) to have the bread ready by 7' (Perner & Esken 2015). Perner and Esken argue that such 'teleological' explanations are the norm, with mentalistic explanations reserved for "special cases" (2015: 74).[20] But the present point does not require committing to such a strong claim. Suffice if teleological explanations play a "central role … in adult commonsense psychology" (Perner & Roessler 2018: 521). This more modest claim reinforces the thought that non-mentalistic action understanding remains in place in adulthood. Additional data on non-mentalistic action explanation in adults are provided by Malle (2011), and Malle et. al. (2007).

Consider next evidence for continuity between infants' sensitivity to intentional action and general mindreading capacities emerging later in childhood. On the picture endorsed here, grasp of intentional action foreshadows and forms the basis for a richer, mentalistic understanding involving states of intending. If this is true, one might expect infants' individual levels of aptitude in identifying intentional action to be correlated with how well they perform on mindreading tasks

[20] Perner and Esken's claim here echoes Thompson's (2008, part II) earlier insistence that what he dubs 'naïve action theory' is more fundamental than its sophisticated surrogate.

later in childhood. As Yamaguchi and colleagues put it (2009: 750), adeptness in recognizing goal-directed action may reflect "an interest in and attention to the social world that may differ across infants and ultimately cause some to be more observant and learn more about the social world than others." And in fact, some fairly recent longitudinal studies have found just such correlations. Recall that the looking time method typically involves an initial stage of familiarization ('habituation') with the scenario, to rule out novelty of the scene as a possible explanation for longer looking times. Yamaguchi et al. (2009) used decrement of attention during habituation as a measure for how quickly infants encode the goal-directed scene, apparently losing interest once they finish processing it. Subjects were drawn from the pool that had originally participated in Kuhlmeier et. al. (2003), where they were shown animated clips designed to test their ability to differentiate different goal-directed act-types and interpret future behavior of the same geometric 'agents'. Subjects were tested again at the age of 4 on a standard battery of theory-of-mind tasks, and a strong correlation was found between their individual performance and their level of 'habituation decrement' recorded in the first study.

In a similar vein, Ascherleben et al. (2008) tested 4-year-olds who participated as 6-month-old infants in a study with a Woodward-style paradigm (Woodward 1998; see §3.1.1 above). The authors found correlation in performance levels specifically with false belief tasks. Nevertheless, they draw the more general conclusion that "[t]he correlation points toward the assumed possibility that infants' action understanding is an early step in a process that results in preschoolers' ToM abilities", suggesting that lack of continuity with other ToM tasks may be due to subjects' very early age in the initial study, when they had lacked an understanding of emotions required to succeed in some of the tasks (Ascherleben et al. 2008: 866). Both Ascherleben et al. (2008) and Yamaguchi et. al. (2009) are extensions of Wellman and colleagues' (2004, 2008) studies, which found continuity between the richer, partly mentalistic understanding evident in later infancy and pre-schoolers theory of mind. Finally, in another longitudinal study, Sodian et al. (2016) found that infants' non-mentalistic understanding of intentional action is linked specifically

with their later ability to attribute *intentions* in a morally relevant context. Subjects who at 7 months successfully encoded the goals of actions shown to them, and moreover at 18-months correctly anticipated the goal of truncated actions, were more likely at 5 years to evaluate an accidental transgressor's intentions as positive. All studies controlled for the alternative possibility that external factors such as IQ and language competence in fact explain the correlations found.

3.2.2 No priority?

The reader will recall the two possible versions of the 'no priority' view mentioned in §2.2.2, which Nagel's argument must rule out if it is to convince that KNOWS is prior to BELIEVES. A parallel point holds for the present argument. If ACTS INTENTIONALLY and INTENDS turn out to be either mutually interdependent or mutually independent, the developmental data would fail to deliver the philosophical import touted here.

Both options are nonstarters, however. If grasping intentional action required grasping intention and vice versa, the two conceptual capacities would have to co-emerge if they were to emerge at all. But data reviewed in §3.1.2 speak against co-emergence. The possibility of conceptual *in*dependence, meanwhile, is strictly compatible with the evidence for developmental priority of ACTS INTENTIONALLY. But it simply defies belief that our concept ACTS INTENTIONALLY could be independent of INTENDS. Motivated by different concerns, two of the leading lights of contemporary action theory brush the possibility briskly aside.[21] Thus Elizabeth Anscombe warns at the outset of her seminal (1957) against coming to suppose that "there are various senses of 'intention' and perhaps … it is thoroughly misleading that the word 'intentional' should be connected with the word 'intention'" (1957: 1):

> Where we are tempted to speak of 'different senses' of a word which is clearly not equivocal, we may infer that we are in fact pretty much in the dark about the character of the concept which it represents.

[21] Cf. also another influential philosopher of action, Alfred Mele, who opines that "presumably, there is some interesting connection between intentions and intentional actions" (Mele 2009: 691).

The starting point of Anscombe's hugely influential inquiry into the nature of intention makes clear that she sees a tight connection between intention and intentional action, so much so that she regards them as different manifestations or guises of one and the same concept. Her guiding question of what unifies the three guises of intention – prospective intention, intention-in-action, and intentional action – has since become a standard way of framing the debate, presented as such for example in the Stanford Encyclopedia of Philosophy's entry on *Intention* (Setiya 2018).

In a similar vein, Michael Bratman (1987: 111) states that

> It is part of our commonsense psychological framework that [acting intentionally and intending] are not completely unrelated. In classifying both our actions and our states of mind in terms of some root notion of intention, commonsense psychology clearly assumes that there is some important commonality.

Bratman's rhetoric of acting and intending being "not completely unrelated" is surely over-cautious (and indeed he himself doubles down by noting the existence of "some important commonality"), as his own view of the matter makes plain. His classic functionalist account of intention (1987) is a prime instance of an attempt to single out one of the three guises, viz. prospective intention, treating it as the fundamental notion which then explains the others and thereby unifies the entire trichotomy.[22]

[22] An anonymous referee raised an important complication. The celebrated 'Knobe Effect' (Knobe 2003, 2006) demonstrates a possible divergence between the folk concepts of intention and intentional action when it comes to the moral valence of the intended action. As Knobe & Burra put it (2006: 128): "As long as the behavior was morally good, use of the concept of acting intentionally was closely connected to use of the concept of intention. But when the behavior was morally bad, use of the concept of acting intentionally more closely resembled use of the concept of foresight." There is no space here for an in-depth discussion of the Knobe Effect and its potential implications for the present discussion. But two points may be noted briefly: (a) The investigation in this paper pertains to ACTS INTENTIONALLY and INTENDS, as these are studied by philosophers. The ultimate aim is to dispatch and supplant the standard philosophical view of how the two concepts are related. Additionally, (b) Even if the folk concepts exhibit the diverging usage reported by Knobe & Burra, this need not entail that they are mutually independent; it may be that the connection between them is less straightforward than philosophers tend to suppose.

4. Conclusion

The aim of this paper has been to reverse the received order of priority and establish that intentional action is in fact conceptually prior to intention, on the basis of the order at which the concepts are acquired. In the first part of the paper, an interesting recent attempt by Nagel to achieve a structurally similar reversal with respect to knowledge vs. belief was examined, with three criteria of adequacy emerging: The empirical claim should be compelling; the order of concept acquisition must be preserved; and the possibility of no priority must be ruled out.

The attempt to meet these criteria began with setting out the developmental case for thinking that ACTS INTENTIONALLY emerges before INTENDS, with evidence presented for separate stages at which each representational capacity comes into place, respectively. Deflationary interpretations of the data as attesting to no more than statistical learning of mechanical regularities were thrown into doubt. Meanwhile rich interpretations, on which a more or less complete mentalistic repertoire is in place by early infancy, were seen as problematic insofar as they conflict with the later emergence of INTENDS, and additionally must overcome the challenge from minimalist theories of mind. The possibility of a rich view *sans* states of intending was floated as plausible middle-ground. With the developmental claim thus defended, the two remaining obstacles to conceptual priority were cleared: continuity between the incipient and mature representations was shown to exist, and a no-priority view was exposed as specious.

A natural further question to raise is *why* ACTS INTENTIONALLY should be cognitively primary, as the paper maintains. Part of the answer seems to involve the greater availability of intentional action. After all, children are assailed by numerous intentional acts – concrete, perceptually perceivable events or processes – virtually from birth onwards. Well before they can pick up objects themselves, babies observe other people acting on objects in various ways. The mental state of intending, in contrast, like all states of mind, is not visible to the eye and moreover,

detecting its presence in others requires somewhat sophisticated powers of inference from behavioural and environmental cues, which very young children may well lack.

But we can dig a little deeper to provide the beginnings of a more rounded conjecture as to why action representations ended up being basic. In an interesting recent case (cited above) for the primacy of knowledge representations, Phillips and colleagues (2021) speculate that the fundamental capacity for representing knowledge evolved for the purpose of learning from others. They suggest, plausibly enough, that learning from others about *p* is better facilitated by tracking those who know that *p* than those who merely believe that *p* – even if the latters' belief happens to be accidentally true; it is the former who are the more reliable guides. Now, focusing on the case of *knowing how*, a similar point may be speculatively put forward with respect to the fundamentality of action representation: learning from others how to perform some action is better facilitated by tracking their performance of that action.[23] Someone who successfully *V*-s is a better, because more reliable guide as to how to *V* than someone who merely intends to *V* – even if the latter's intention happens to be accidentally successful.

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[23] The speculation put forth in the text seems to presuppose a fairly tight connection between *V*-ing intentionally and knowing how to *V*. Recent work by Pavese (2021, 2022) substantiates this connection.

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