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Development of Collective Intentionality

Hannes Rakoczy

1. INTRODUCTION

When and how does collective intentionality develop? This question has come into the focus of research in cognitive development in recent years with the establishment of collective intentionality as a phenomenon to be studied empirically by the cognitive sciences. In the last two decades, cognitive science has been investigating, from an ontogenetic point of view, how collective intentionality emerges and develops in humans and how it relates to other forms of intentionality, and from a comparative point of view, whether or to which degree it might mark one of the cognitive foundations of human uniqueness. The present chapter will give an overview of this research on the emergence and early development of different forms of collective intentionality in human ontogeny, with an eye to the comparative question of which of these kinds of collective intentionality might be shared with other species and which might be uniquely human.

Historically, the empirical interest of the cognitive sciences in collective intentionality arose as a consequence of the establishment of collective intentionality as a separate field of study in the, by now, classical philosophical literature of the 1980s and 1990s (Bratman 1992; Gilbert 1990; Searle 1990; Tuomela & Miller 1988). The empirical phenomena studied and the questions asked have been drawing much inspiration from the different philosophical accounts. Importantly, however, most empirical approaches start off from pre-theoretical folk notions of collective intentionality and thus remain theoretically neutral vis-à-vis the different philosophical accounts of how to best explicate these folk notions—much like, for example, how cognitive science research of people's "theory of mind" investigates how people ascribe mental states to others and themselves without thereby committing to any one specific position in the philosophy of mind. So, while the cognitive science of the development of collective intentionality does neither have to wait until an agreed upon philosophical analysis comes forth (if this ever happens) nor to commit to any one of the currently debated accounts, the empirical results of

developmental and other cognitive science research might well have implications for the philosophical debates. It might turn out, for example, that different accounts are suitable to varying degrees for describing one or the other form of developing shared[1] intentionality.

In the following, we first review empirical milestones in the emergence and early development of different forms of collective intentionality, and then discuss potential implications for conceptual analyses and philosophical disputes.

2. WHAT MIGHT THE EARLIEST FORMS OF COLLECTIVE INTENTIONALITY BE?

When trying to uncover the primordial forms of collective intentionality in evolution or ontogeny, empirical research is faced with a fundamental methodological problem: how to distinguish truly collective intentionality from merely individual intentionality or even simpler non-intentional forms of social coordination? As has been stressed in the philosophical literature, two instances of socially coordinated activities by two or more participants (e.g. people walking beside each other (Gilbert 1990) or running to a shelter (Searle 1990)) may look identical from some perspectives—yet, with human adults, in cases of doubt we could just ask the participants what they were doing and get informative answers ("I am taking a walk" vs "we are taking a walk"). In the absence of language in small children and non-human animals, distinguishing true collective intentionality from simpler phenomena is a complicated and controversial endeavor, with different approaches differing in their rigor. While liberal approaches tend to set the bars for collective intentionality relatively low, considering, for example, the coordinated hunting behavior of hyenas an expression of true collective intentionality (Searle 1990), other approaches would be more cautious and set the bars considerably higher, doubting whether the social coordination in distributed hunting, for example, requires collective rather than merely complex individual intentionality (Rakoczy & Tomasello 2007).

Concerning human ontogeny, the earliest forms of coordinated social activities that might be considered by liberal accounts as primordial forms of collective intentionality can be found early in the first year of life. From around 2 months, infants engage in proto-conversational dyadic interactions with caregivers that reveal a contingent turn-taking structure such that infants, for example, smile or vocalize contingently upon the caregiver's actions. From the point of view of very liberal approaches, such forms of interaction have been interpreted as an instance of true and primary intersubjectivity or cooperation (Trevarthen & Hubley 1978). Such interpretations, however, are very controversial and not widely shared. Basically, it is simply not clear why contingent interaction per se should reveal anything about cooperation or sharedness in any more stringent sense. Furthermore, we do not have any evidence that children this young have any grasp of other agents' intentionality, and it is hard to see how an infant should be able to share intentionality and build joint cooperative intentions or other attitudes in the absence of any grasp of the cooperators' intentionality[2].

It is therefore more promising, according to widespread consensus, to look for the earliest forms of true collective intentionality later in ontogeny once children have acquired some basic grasp of other agents' intentionality. A prominent picture of the

mind has it that the logically and ontogenetically most basic forms of the mental are generally supposed to be those at the fringes of the head, so to speak, namely perception (on the cognitive side) and intentional action (on the conative side). Following this picture, it can plausibly be expected that the primary forms of individual intentionality of second order should be ascription of perception and intentional action, and that the primary forms of shared intentionality should be shared perception and shared intentional action. The next sections, therefore, deal with the early development of shared perception (joint attention) and shared action, respectively.

3. JOINT ATTENTION

From around 9 months, there are reliable signs that children begin to operate with a basic grasp of other agents' intentionality, often termed "perception-goal psychology" (in contrast to the later developing fully fledged belief-desire folk psychology); they understand what others perceive of their surroundings and what intentions they pursue in their actions (Tomasello et al. 2005; Wellman 2002). And it is from around this time that earliest forms of joint attention emerge as well (see Chapter 10). Intuitively, joint attention involves two (or more) subjects looking[3] at some object or situation together. For example, wondering what is left for dinner, A and B might open their fridge and look at its contents together ("Let's see what we have left"). What makes such an episode one of truly joint attention? It is not sufficient that each of them looks at the same target, nor that, asymmetrically, one sees the other looking somewhere and follows her gaze to the same target. It is not even sufficient, more symmetrically, that each looks at the same target while knowing that the other does so as well (otherwise I would be jointly attending to many football games with many friends all around the world whenever we watch the same game, and know of each other that we do so, in front of different and very remote TV sets). Rather, in some intuitive sense that conceptually proves notoriously difficult to spell out, both have to attend to the same target in joint and coordinated ways.

Ontogenetic Origins of Joint Attention

Concerning development, when in ontogeny do we see the emergence of joint and coordinated attention-sharing? A basic methodological problem here is the following: while in adults and older children, linguistic data (such as "Let's see what we have left") usually disambiguate whether a given episode reflects merely parallel or truly joint attention, we have to rely on purely pre-verbal indicators and manifestations of joint attention in infants.

Empirically, earliest forms of social coordination of attention that have been considered to manifest joint attention emerge from around 9-12 months of age (Carpenter et al. 1998). Children begin to passively follow the gaze of others and actively direct it to objects and situations. This is not only asymmetrical following or directing of individual attention, however, since infants alternate their gaze between partner and object, check the partner's attention and actively coordinate and align the partner's attention and their own by communicative (gestural) means. Furthermore, some studies have directly analyzed "sharing" and "knowing" looks by the infant towards the partner that intuitively appear to be pre-verbal analogues of "Let's look . . ." or "We're looking . . ." (Hobson & Hobson 2007).

Additional evidence suggests that the social gaze coordination emerging at this time manifests truly joint attention rather than mere attention-following or manipulation. In their proto-declarative pointing (pointing out situations or states of affairs without any further instrumental ends in mind but simply for the sake of "telling" the social partner), infants expect certain —joint attentional— responses (Liszkowski et al. 2007a, 2007b); when an infant points out a situation to a partner (e.g. that there is a ball over there), she will only be satisfied (and thus stop pointing) when the adult not only looks at the specific situation, but alternates gaze in coordinated ways between the situation and the infant (as if saying "Yes, I saw it, it's the ball we're talking about"). And infants keep track of what was in the focus of joint attention with a given partner (a proxy of what was mutual knowledge among them) over time: they understand one and the same ambiguous communicative act (such as "can you give it to me" vis-à-vis several objects) systematically differently as a function of the previous joint experience they had with the interlocutor (Moll et al. 2008); when one interlocutor and the child had previously jointly engaged with object A, the child gives this object to the interlocutor, but gives to another interlocutor object B to which they both had previously jointly attended.

Older children use joint attention in systematic and sophisticated ways for action planning; when the child and a partner (in a Stag Hunt coordination game) each faced the choice of pressing button A to get a moderate reward, or to press button B to get a higher reward, but only if both pressed B, 4-year-old children actively alternated gaze with the partner and decided for B only when the partner emitted alternating, coordinated and "knowing" looks between the child and the apparatus (Wyman et al. 2013).

Comparative Perspectives on Joint Attention

In sum, children from around 1 year begin to engage in the kinds of attention-sharing with others that plausibly reflect truly joint attention given the systematic interpersonal coordination at a given time and over time—and thus a primordial form of perceptual we-intentionality. From a comparative point of view, this understanding of perceptional intentionality and engaging in shared perceptual we-intentionality in children reveals very interesting commonalities and differences with the cognitive capacities of non-human primates. Concerning commonalities, great apes and some monkeys reliably engage in gaze-following and manipulate others' gaze for instrumental purposes in proto-imperative pointing. And they take into account what others see or have seen for strategic individual action planning (e.g. foraging food that competitors cannot see (Hare et al. 2000)). There are crucial differences, however, in that non-human primates seem not to enter into any form of truly joint attention given the absence of systematic gaze alternation and coordination, "knowing" looks, proto-declarative pointing and the like (Carpenter & Call, 2013; Tomasello et al. 2005).

4. JOINT ACTION

The most obvious and natural case of collective intentionality clearly is acting together. It is cooperative activities that most philosophical accounts of collective intentionality

focus on. And it is cooperative activities that present the clearest case for the development of collective intentionality as well.

Ontogenetic Origins of Joint Action

Natural observation and experimental results suggest that children begin to reliably engage in intentional cooperative activities with others in the course of the second year, both in joint instrumental action aimed at some further end, and in joint playful actions that serve as ends in themselves (Tomasello & Hamann 2012). At first, from around 14-18 months, children coordinate and communicate successfully with others in simple collaborative actions involving some basic division of labor (for example, retrieving a reward from an apparatus where one needs to open a flap so that the other can grasp the object (Brownell & Carriger 1990; Warneken et al. 2006)). In subsequent develop-ment in the second and third year, the joint-ness of the actions becomes much clearer, and the interpretation of children's social coordination as true shared intentionality much less ambiguous. Cooperation now manifests a suite of features all pointing towards true we-ness. Children not only coordinate and communicate in acting with one another, they also seem to have some basic understanding of the basic structure of complementary roles underlying the division of labor—as indicated in their so-called "role reversal imitation"; when they learn a novel collaborative activity comprising the complementary roles A and B by performing A (while the partner performs B), they do not just acquire egocentric information about their part, rather, they then sponta-neously switch roles and perform B as well (Carpenter et al. 2005). Concerning roles, children do not just coordinate in taking up complementary roles, but respond in sophisticated ways when a partner fails in her fulfillment of the role: they try to reassign the role to her communicatively (by pointing out to her the object to be acted upon or the location where to act), help her to fulfill it and generally try to re-engage her for the cooperation (Warneken et al. 2006). And they do so specifically when the partner is still generally willing to participate in the cooperation yet unable to fulfill the role, but not when the partner is unwilling to cooperate (Warneken et al. 2012). From around age 3, children show explicit signs of feeling committed to the pursuit of a cooperative activity. When, in a recent study, children were involved in a mildly interesting cooperative activity with a partner, and then seduced by the option of doing something much more exciting, they often hesitated and then excused themselves before leaving the joint action (Grafenhain et al. 2009). They also indicate a sense of commitment to the successful pursuit of the joint project in other ways. Hamann and colleagues (Hamann et al. 2012) had pairs of peers cooperate by operating apparatus with complementary roles. Successful fulfillment of the roles resulted in rewards for each player. Crucially, however, the reward for player A was issued earlier than the reward for player B, so that from the point of view of A, she could basically stop at that point. This is exactly what happened in a control condition in which the two players acted separately in parallel. In the cooperation condition, however, player A still continued her part until player B's reward was issued as well. Similarly, when the apparatus issued a joint reward for the two players together, children took great pains to distribute it equally (but did not do so in a control condition in which two agents acted individually and in parallel (Hamann et al. 2011)).

Subsequent Developments

In subsequent development, children's grasp of cooperation, its division of labor, role structure and its normative aspects becomes more and more sophisticated. For example, 4-year-olds have completely agent-neutral conception of complementary action roles that can be freely filled by any agent at any time, and flexibly use such a conception for future planning of cooperative activities and their parts therein (Fletcher et al. 2012; Rakoczy et al. 2014). Generally, however, the development of shared intentional activities from children's earliest joint games to fully fledged adult cooperation is currently not well understood yet.

(Sub-Personal) Cognitive Underpinnings of Shared Action

Cognitive science has recently begun to investigate the fine-grained cognitive underpinnings of shared cooperative activities. Theoretical work has introduced distinctions between a hierarchy of representations of shared intentions at different levels, ranging from personal-level conceptualized future-directed intentions to act together to sub-personal motor representations of coordinated social behavior such as how to move one's leg in relation to a dancing partner's leg movements (Pacherie 2008, 2011). And experimental work with adults has shown that such sub-personal motor representations of shared activities are formed and operate swiftly and spontaneously below the threshold of subjects' awareness (Sebanz et al. 2006). From a developmental point of view, little is currently known about the ontogeny of the cognitive underpinnings of shared action. But the first study on this recently has suggested that the same kinds of fine-grained sub-personal motor representations of shared actions as found in adults might be in operation even in preschool-aged children (Milward et al. 2014).

Comparative Perspectives on Joint Action

Much recent research suggests that great apes (and perhaps other non-human primates) have some basic understanding of others' individual intentionality, and systematically use this understanding of what others perceive and intend for strategic purposes in competitive interactions (Call & Tomasello 2008). Yet whether they go beyond such individual intentionality of second order and engage in truly shared intentionality in the form of joint action is highly controversial. Experimental findings suggest that apes are quite skillful in social coordination with others, perhaps even involving something like division of labor (Melis et al. 2006). Whether such coordination amounts to true cooperation remains questionable, however, given that apes do not show the characteristic signatures of acting together that we find in children such as re-engagement of partners, reassignment of roles, sharing of rewards, helping others to fulfill their role or excusing oneself (Tomasello & Hamann 2012). More systematic research is needed to shed more light on the question of whether or to which degree basic forms of joint action are uniquely human or shared with other primates.

5. ROOTS OF INSTITUTIONAL REALITY

According to many conceptual analyses, there is a particular and peculiar sub-form of collective intentionality that underlies our institutional and societal life. In contrast to

basic forms of cooperative action such as, say, walking together, this form of collective intentionality is essentially conventional, rule-governed and fact-creating. One prominent approach has it that the logical structure of this form of collective intentionality can be best captured by the notion of status function assignment and the complementary notion of an institutional fact (Searle 1995; Chapters 20 and 23. this volume). Status functions pertain to objects or actions simply because we collectively treat them as having these functions: nothing in a slip of paper is inherently valuable, nothing in a given person inherently makes her a president. Things are money or presidents because of our collective practices. Such institutional facts (that a given object is money or a president) of the form "this X counts as Y in a given context C" are socially constructed facts in contrast to raw facts that hold independently of any particular collective practice or perspective. And they are essentially normative: the status collectively assigned to an object normatively licenses certain forms of treating it while making other kinds of action inappropriate. The fact that something is a queen in chess, say, entitles one to use it in certain ways but not in others. Being a teacher or a president, entitle both the holder of the role and interactors to certain actions but not to others.

The Early Ontogeny of Status Function Assignment

When and where do we find the first and primary forms of such collective intentionality with status assignment in ontogeny? Clearly, young children seem to have no grasp whatsoever of most of the standard examples of institutional facts such as those pertaining to political power, linguistic meaning or economic matters. But children from very early on do engage in activities that can be considered to share the basis logical structure of status assignment and institutional reality, namely games of various sorts. From their second year on, children begin to engage in pretend play and in simple non-pretense rule games. In pretend play—say, in pretending that a wooden block is an apple—objects are assigned fictional status ("the block counts as 'apple' in the context of our pretense") in much the same way objects are assigned serious status (this X counts as Y in context C) in institutional practices generally. And children from around ages 2 to 3 have been found to grasp the basic logical structure of fictional status assignment in joint pretense and its inferential and normative consequences. They not only engage in solitary and isolated acts of pretending, but they pick up, understand and respect the stipulations of the joint pretense scenario set up by a play partner (such as "this wooden block is our 'apple', and this pen is our 'knife'") and guide their own actions in the course of the pretense accordingly. In particular, they produce acts that are normatively appropriate, inferentially licensed by the fictional status assignment. For example, they pretend to cut the wooden block with the pen, handle the pen "carefully" because it is "sharp" etc. (Harris & Kavanaugh 1993; Rakoczy et al. 2004). And not only do they act appropriately themselves, but also indicate an awareness of the normative structure of such practice more actively; when a third person joins the game, but makes a "mistake," i.e. does not respect the pretense status of an object, they protest and criticize her (Rakoczy 2008; Wyman et al. 2009a). And children's awareness and enforcement of the normative implications of fictional status assignment is already sensitive to the context-relativity typical of status assignment. One form of context-relativity pertains to multiple statuses: That an X counts as a Y_1 in a given context C_1 leaves open the possibility that the very same object

can have some other status (Y_2) in some other context C_2. A given card may be a trump in one kind of card game but a lousy card in another. Similarly, one kind of object may at the same time have one kind of fictional status in one pretense game, and a different one in another game. Children at age 3 understand this multiple fictional status, flexibly switch between contexts and adapt their actions accordingly (Wyman et al. 2009b). A related form of context-relativity is the following: given that X counts as Y in C, within the context C there are normative implications as to how to treat X such that a given action may constitute a mistake, but outside of the context C no such implications hold so that the very same kind of act may be perfectly fine. Again, children aged 2–3 understand this form of context-relative normativity; they protest against the very same kinds of act when performed in a context in which it constitutes a mistake in light of the status assignment in this context, but do not do so when the same kind of act is performed outside of this context, for example when the agent had announced "I'm not joining your game, I'll be doing something else" prior to acting (Rakoczy et al. 2008; Wyman et al. 2009a).

So by the third year of life, children have entered into the basics of this remarkable practice of games of pretending, collectively treat objects they know to be Xs as Ys, follow and respect the implications of the proto-constitutive rules of the game, and normatively criticize deviations from the rules. In embryonic and isolated form we thus have here the basic structure of institutional reality in the games of 2-year-olds. Of course this is a long way from money, marriage and universities, but the seeds are there, and so joint pretending quite plausibly can be considered the central cradle for, and the entering gate into institutional life. In fact, it may be no coincidence that pretense and other games constitute a, if not the, cradle for growing into institutional reality more generally. A fundamental problem in coming to participate in institutional life is its holistic structure: most forms of status (e.g. political) cannot be understood without understanding many other forms of status intimately connected (e.g. economic, power relations etc.). So how and where should a child ever be able to break into this circle? Games may do the trick. First, they are in some intuitive sense "non-serious," and however this elusive notion is to be spelled out, one aspect of this is that it is quarantined from the rest of institutional life to a considerable degree. Second, while the contexts of many forms of institutional reality are abstract and far-reaching both spatially and temporally (currency areas etc.), the contexts of simple joint pretense games are very tangible, short-lived and action-based ("in this pretense we're doing right here and now . . ."). Third, setting up fictional status, even in very young children, is intimately linked with language in a way that is typical for institutional reality more generally. One (if not the) paradigmatic form of status assignment is declarative speech acts of the form "This (X) is now a Y" such as "You are now husband and wife" or "From now on, this ship is called MS. Hildegard" (Searle 2010). In their joint pretense, children routinely set up the scenario by declaring things like "this (block) is now the apple, and this (pen) is the knife," often with specialized grammatical marking to signal the non-literal force of the speech act (Kaper 1980). Ontogenetically, thus, pretense declarations such as "this is now the apple" may well be the foundation for serious status declarations such as "you are now husband and wife." Such a general picture of pretense as an ontogenetic foundation for institutional reality is in the spirit of a fascinating account by Kendall Walton (1990) that ascribes a similar foundational role to pretense as a basis for all kinds of representational art.

Comparative Perspectives on Status Function Assignment

From a comparative point of view, there is no convincing evidence in any non-human species for any kind of social practice with status function assignment. Concerning play, there are widespread forms of rough and tumble and other kinds of sensorimotor play in non-human primates and other mammals. But there is no convincing and solid evidence (beyond highly ambiguous natural observation anecdotes) for true pretend play or other types of rule-governed games (Gómez 2008). But do not many animals respect social status in serious domains, for example, in the form of dominance hierarchies etc.? The problem here is that there are at least two radically different notions of social status, dominance etc. On an institutional reading, dominance status—say, in a corporation—is a matter of convention and collective assignment. Yet, on a brute reading, dominance status is a purely causal notion (cashed out, in the end, by physical force and the like). So, while there is ample evidence that non-human animals are sensitive to social status in the latter sense, there is basically no evidence to suggest they respect the former.

6. OUTLOOK

The cognitive science of collective intentionality and its development is a relatively recent phenomenon. So, while we have learned about potential roots, earliest forms and developmental courses of different forms of collective intentionality in many respects we have just begun to scratch the surface, with many conceptual and empirical challenges for future research.

Conceptual Challenges

Empirical approaches to studying collective intentionality and its development, as mentioned in the introduction, usually start off from our pre-theoretic notions of collective intentionality and need not take a stance in the debate between different philosophical attempts at conceptual analysis of "collective intentionality" and related notions. However, the empirical results of developmental cognitive science may well have implications for the plausibility of different such accounts. For example, when attempting to describe the earliest ontogeny of shared cooperative activities, reductionist accounts that analyze shared intentionality in terms of complex forms of higher-order individual intentionality in much the same way as Gricean accounts analyze meaning in terms of individual higher-order communicative intentions (Bratman 1992, 2014) run into trouble. This trouble can be captured with the following schematic trilemma (Breheny 2006; Rakoczy 2006):

1. shared intentionality presupposes higher-order recursive propositional attitudes
2. young children do not yet have such attitudes, but
3. young children manifest shared intentionality.

So, which of the inconsistent triad should be given up? The most plausible solution lies in a refinement and qualification of (i): While full-blown and complex adult shared intentionality might in fact presuppose such attitudes, there are developmentally (and evolutionarily) primary and less complex forms of shared intentionality (Butterfill 2012; Pacherie 2013).

A related set of questions concerns the developmental relations of second-order individual intentionality and collective intentionality more generally. Gricean approaches, notably Bratman's (1992), assume that second-order individual intentionality is necessary and sufficient for collective intentionality (the latter is just a complex and coordinated form of the former), and thus the development of collective intentionality is just the development of a certain complex form of individual intentionality. In contrast, anti-reductionist accounts such as Searle's (1995), assuming that collective intentionality is a primitive phenomenon, seem to imply that second-order individual intentionality is not only not sufficient, but also not necessary for collective intentionality and thus that the two kinds of intentionality might develop without intimate relations to each other. Yet, from a developmental point of view, there might be an interesting third way: second-order individual intentionality and collective intentionality may be intimately related (such that some form of the former is necessary without being sufficient for the latter) and thus develop in close tandem with each other. For example, it may be that joint attention and cooperation—as basic forms of collective intentionality—present the primary contexts in which individual intentionality of second order (ascribing perceptual perspectives, goals etc. to interaction partners) develops (Moll & Meltzoff 2011).

Empirical Challenges

From an empirical point of view, many fundamental questions concerning the development of collective intentionality remain to be addressed: Ontogenetically, what are the origins and roots of collective intentionality? Once basic forms of collective intentionality are in place in early childhood, how do more complex forms develop, such as collective belief? Once children participate in basic forms of joint status assignment and institutional life, how do they develop a more sophisticated and reflective grasp of the logical structure of institutional, observer-dependent facts and their categorical difference to brute facts? More generally, how is development to be characterized? Are there discrete and qualitatively distinct stages of development (e.g. Tomasello et al. 2012)? Are there qualitatively different systems and/or processes, for example for minimalist vs full-blown collective intentionality, as is often assumed in other areas of cognitive development such as numerical or social cognition (Apperly & Butterfill 2009; Carey 2009)?

From the point of view of comparative psychology, more systematic research concerning commonalities and differences in the development of individual and collective intentionality of human and non-human primates is needed. Is collective intentionality as it develops from the second year in human ontogeny per se uniquely human? Or can basic collective intentionality, at least in rudimentary form, be found in non-human primates as well, yet with clear limits when it comes to collective intentionality with status assignment and institutional practices?

RELATED TOPICS

Collective Action and Agency (Ch. 1), Coordinating Joint Action (Ch. 6), Joint Attention (Ch. 9), Social Construction and Social Facts (Ch. 20), Collective Intentionality in Non-Human Animals (Ch. 32), Origins of Collective Intentionality (Ch. 33).

REFERENCES

Apperly, I.A., & Butterfill, S.A. (2009) "Do Humans Have Two Systems to Track Beliefs and Belief-Like States?" *Psychological Review* 116 (4): 953–70.

Bratman, M.E. (1992) "Shared Cooperative Activity," *The Philosophical Review* 101 (2): 327–41.

——— (2014) *Shared Agency: A Planning Theory of Acting Together*, Oxford: Oxford University Press.

Breheny, R. (2006) "Communication and Folk Psychology," *Mind and Language* 21 (1): 74–107.

Brownell, C., & Carriger, M.S. (1990) "Changes in Cooperation and Self-Other Differentiation During the Second Year," *Child Development* 61: 1164–74.

Butterfill, S. (2012) "Joint Action and Development," *The Philosophical Quarterly* 62 (246): 23–47.

Call, J., & Tomasello, M. (2008) "Does the Chimpanzee Have a Theory of Mind? 30 Years Later," *Trends in Cognitive Sciences* 12 (5):187–92.

Carey, S. (2009) *The Origin of Concepts*, New York: Oxford University Press.

Carpenter, M., & Call, J. (2013) "How Joint is the Joint Attention of Apes and Human Infants?" in J. Metcalfe & H.S. Terrace (eds) *Agency and Joint Attention*, New York: Oxford University Press.

Carpenter, M., Nagell, K., & Tomasello, M. (1998) "Social Cognition, Joint Attention, and Communicative Competence from 9 to 15 Months of Age," *Monographs of the Society for Research in Child Development* 63 (4): 176.

Carpenter, M., Tomasello, M., & Striano, T. (2005) "Role Reversal Imitation and Language in Typically Developing Infants and Children With Autism," *Infancy* 8 (3): 253–78.

Fletcher, G.E., Warneken, F., & Tomasello, M. (2012) "Differences in Cognitive Processes Underlying the Collaborative Activities of Children and Chimpanzees," *Cognitive Development* 27 (2): 136–53.

Gilbert, M. (1990) "Walking Together: a Paradigmatic Social Phenomenon," *Midwest Studies in Philosophy* 15: 1–14.

Gómez, J.C. (2008) "The Evolution of Pretence: From Intentional Availability To Intentional Non-Existence," *Mind & Language* 23 (5): 586–606.

Grafenhain, M., Behne, T., Carpenter, M., & Tomasello, M. (2009) "Young Children's Understanding of Joint Commitments," *Developmental Psychology* 45 (5): 1430–43.

Hamann, K., Warneken, F., Greenberg, J.R., & Tomasello, M. (2011) "Collaboration Encourages Equal Sharing in Children but Not in Chimpanzees," *Nature* 476 (7360): 328–31.

Hamann, K., Warneken, F., & Tomasello, M. (2012) "Children's Developing Commitments to Joint Goals," *Child Development* 83 (1): 137–45.

Hare, B., Call, J., Agnetta, B., & Tomasello, M. (2000) "Chimpanzees Know What Conspecifics Do and Do Not See," *Animal Behaviour* 59 (4): 771–85.

Harris, P.L., & Kavanaugh, R.D. (1993) "Young Children's Understanding of Pretense," *Monographs of the Society for Research in Child Development* 58 (1)[231]: v–92.

Hobson, J., & Hobson, P. (2007) "Identification: the Missing Link Between Joint Attention and Imitation?" *Development and Psychopathology* 19 (2): 411–31.

Kaper, W. (1980) "The Use of Past Tense in Games of Pretend," *Journal of Child Language* 7 (1): 213–215.

Liszkowski, U., Carpenter, M., & Tomasello, M. (2007a) "Pointing Out New News, Old News, and Absent Referents at 12 Months of Age," *Developmental Science* 10 (2): F1–F7.

——— (2007b) "Reference and Attitude in Infant Pointing," *Journal of Child Language* 34 (1): 1–20.

Melis, A.P., Hare, B., & Tomasello, M. (2006) "Chimpanzees Recruit the Best Collaborators," *Science* 311 (5765): 1297–1300.

Milward, S.J., Kita, S., & Apperly, I.A. (2014) "The Development of Co-Representation Effects in a Joint Task: Do Children Represent a Co-Actor?" *Cognition* 132 (3): 269–79.

Moll, H., & Meltzoff, A.N. (2011) "Joint Attention as the Fundamental Basis of Understanding Perspectives," in A. Seemann (ed.) *Joint attention: New developments in psychology philosophy of mind, and social neuroscience*, Cambridge, MA: MIT Press.

Moll, H., Richter, N., Carpenter, M., & Tomasello, M. (2008) "Fourteen-Month-Olds Know What 'We' Have Shared in a Special Way," *Infancy* 13 (1): 90–101.

Pacherie, E. (2008) "The Phenomenology of Action: a Conceptual Framework," *Cognition* 107 (1): 179–217.

——— (2011) "Framing joint action," *Review of Philosophy and Psychology* 2 (2): 173–92.

——— (2013) "Intentional Joint Agency: Shared Intention Lite," *Synthese* 190 (10): 1817–39.

Rakoczy, H. (2006) "Pretend Play and the Development of Collective Intentionality," *Cognitive Systems Research* 7: 113–27.

——— (2008) "Taking Fiction Seriously: Young Children Understand the Normative Structure of Joint Pretend Games," *Developmental Psychology* 44 (4): 1195–1201.

Rakoczy, H., & Tomasello, M. (2007) "The Ontogeny of Social Ontology: Steps to Shared Intentionality and Status Functions," in S.L. Tsohatzidis (ed.) *Intentional Acts and Institutional Facts: Essays on John Searle's Social Ontology*, Berlin: Springer Verlag.

Rakoczy, H., Tomasello, M., & Striano, T. (2004) "Young Children Know That Trying Is Not Pretending: A Test of the 'Behaving-as-If' Construal of Children's Early Concept of 'Pretense,'" *Developmental Psychology* 40 (3): 388–99.

Rakoczy, H., Warneken, F., & Tomasello, M. (2008) "The Sources of Normativity: Young Children's Awareness of the Normative Structure of Games," *Developmental Psychology*, 44(3): 875–81.

Rakoczy, H., Gräfenhain, M., Clüver, A., Schulze Dalhoff, A., & Sternkopf, A. (2014) "Young Children's Agent-Neutral Representations of Action Roles," *Journal of Experimental Child Psychology* 128 (201–9)

Searle, J. (1990) "Collective Intentions and Actions," in P. Cohen, J. Morgan, & M. Pollack (eds) *Intentions in Communication*, Cambridge, MA: MIT Press.

——— (1995) *The Construction of Social Reality*, New York: Free Press.

——— (2010) *Making the Social World: the Structure of Human Civilization*, Oxford: Oxford University Press.

Sebanz, N., Bekkering, H., & Knoblich, G. (2006) "Joint Action: Bodies and Minds Moving Together," *Trends in Cognitive Sciences* 10 (2): 71–6.

Tomasello, M., & Hamann, K. (2012) "The 37th Sir Frederick Bartlett Lecture: Collaboration in Young Children," *The Quarterly Journal of Experimental Psychology* 65 (1): 1–12.

Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005) "Understanding and Sharing Intentions: the Origins of Cultural Cognition," *Behavioral and Brain Sciences* 28 (5): 675–735.

Tomasello, M., Melis, A.P., Tennie, C., Wyman, E., & Herrmann, E. (2012) "Two Key Steps in the Evolution of Human Cooperation: the Interdependence Hypothesis," *Current Anthropology* 53 (6): 673–92.

Trevarthen, C., & Hubley, P. (1978) "Secondary Intersubjectivity: Confidence, Confiding and Acts of Meaning in the First Year of Life," in A. Lock (ed.) *Action, Gesture and Symbol*, London: Academic Press.

Tuomela, R., & Miller, K. (1988) "We-intentions," *Philosophical Studies* 53: 367–89.

Walton, K.L. (1990) *Mimesis as Make-Believe*, Cambridge, MA: Harvard University Press.

Warneken, F., Chen, F., & Tomasello, M. (2006) "Cooperative Activities in Young Children and Chimpanzees," *Child Development* 77 (3): 640–63.

Warneken, F., Gräfenhain, M., & Tomasello, M. (2012) "Collaborative Partner or Social Tool? New Evidence for Young Children's Understanding of Joint Intentions in Collaborative Activities," *Developmental Science* 15 (1): 54–61.

Wellman, H. (2002) "Understanding the Psychological World: Developing a Theory of Mind," in U. Goswami (ed.) *Blackwell Handbook of Childhood Cognitive Development*, Malden, MA: Blackwell Publishers.

Wyman, E., Rakoczy, H., & Tomasello, M. (2009a) "Normativity and Context in Young Children's Pretend Play," *Cognitive Development* 24 (2): 146–55.

——— (2009b) "Young Children Understand Multiple Pretend Identities in Their Object Play," *British Journal of Developmental Psychology* 27: 385–404.

——— (2013) "Non-Verbal Communication Enables Children's Coordination in a 'Stag Hunt' Game," *European Journal of Developmental Psychology* 10 (5): 597–610.

NOTES

1. While "shared" and "collective" intentionality are used largely interchangeably in the philosophical literature, some psychological approaches use the two notions to refer to different forms of joint intentionality (e.g. Tomasello et al. (2012); see Chapter 33). In the present chapter, I will follow the philosophical literature and use "shared" and "collective" synonymously.

2. Strong anti-reductionist accounts of collective intentionality such as Searle's (1990, 1995) may be read as allowing for exactly this possibility: if collective intentionality is understood as a primitive *sui generis* form of intentionality quite separate from any individual mode of intentionality, then one could imagine

a creature capable of forming we-intentions without being able to ascribe individual intentions to her cooperators. In our view, this is a very implausible possibility, and anti-reductionist accounts ought to claim, not that collective intentionality is completely separate from individual intentionality of higher order, but rather that some form of individual intentionality of higher order, while necessary, may not be sufficient for collective intentionality (Rakoczy & Tomasello 2007).

3. . . . or attending in some other sense modality. For simplicity's sake, we focus on visual perception here.