Joint Agency and the Uniquely Human Cooperation Hypothesis

Abstract: We propose an account of the evolution of joint agency that contrasts with views that take joint agency to be a uniquely human trait that facilitated the evolution of our social lifeway. We argue that there is huge variation in cooperative behavior and that while much human cooperative behavior may be explained by invoking cognitively rich capacities, such as joint intention, much cooperative behavior does not require such explanation. As a result, promising evolutionary approaches to cooperative behavior explain how it arises in many contexts. Our approach should also shed light on the evolution of such behavior in humans.

1. Introduction

How is complex, coordinated social action possible? The question can be pursued from a philosophical perspective by analyzing the mental states, reasons, or commitments required to distinguish genuine cases of group action or joint agency from individual action or agency. The question can also be pursued from an evolutionary perspective by identifying the historical factors responsible for a transition from solitary to group living, or from a competitive and individualistic life way to a more social and cooperative one. Lately the interaction of these two questions has become the target of theorizing about human evolution with some arguing that the capacity to engage in joint action set humans on their unique evolutionary trajectory towards our current state of extreme cooperation and sociality (Tomasello et al 2012; Angus and Newton 2015). This task requires bridging the gap between "thinner" evolutionary accounts of joint action that involve the strategic dynamics of cooperative behavior and "thicker" philosophically loaded, cognitively rich accounts that invoke shared intentions, group commitments, and notions of agency. Here we argue that this gap presents a more significant hurdle than current accounts suppose. In particular, we will critically evaluate Michael Tomasello's influential hypothesis that joint agency is a uniquely human capacity that had profound impact on the evolution of morality in our lineage (Tomasello 2014; Tomasello 2016). Part of our project involves clarifying the standards any positive evolutionary account of joint agency needs to meet and points towards an alternate evolutionary account.

Before unpacking the different approaches to joint action, let's identify Tomasello's evolutionary conjecture. The conjecture is that the capacity to engage in joint action, and form commitments to undertake specific roles to bring about a joint end, emerged against the backdrop of early hominin obligate cooperation and facilitated a transition to more extreme human sociality and specialized cooperation. Some strategic cooperative interactions had already been undertaken in the human lineage, but the peculiarly human forms had yet to emerge (Tomasello et al. 2012; Tomasello 2016). On this view, joint agency is supposed to be both a distinct achievement of the human lineage as well as a capacity that facilitates increasingly complex cooperative behavior culminating with morality. Also, this approach divides cooperative behavior into two categories: simple strategic cooperation of a sort that we see across the biological domain versus uniquely human cooperation facilitated by joint agency. So, what is the cognitive capacity (or set of capacities) underlying joint action and how (or in what sequence) did it evolve? And further, is the capacity for joint agency (or, is the suite of components that allows individuals to participate in joint agency) the direct product of selection or is it a byproduct of the potentially myriad selection pressures that shaped human cognition?

2. Thick versus thin and the diversity of group action

We engage in myriad group actions: co-parenting; two people carrying a log; two people sawing a log; a group hunting expedition; playing a game of soccer; or co-writing a paper. Social institutions such as banks, corporations and political systems can be broken down into numerous group actions. There are many alternate approaches to explaining group action and the behavior of social groups ranging from game theoretic accounts with minimal assumptions about the cognitive capacities of the agents involved (see Section 3 below) to various accounts of joint intention invoking richer psychological assumptions about agents. Two examples of the latter approach are instructive: Michael Bratman's shared intentions (see, e.g., Bratman 1993) and Margaret Gilbert's joint commitments (Gilbert 1992; 2009).[1] Bratman accounts for Jill and Sue's co-parenting in terms of their shared intention to co-parent. Their shared intention is two (or more) individual states of the form "I intend that we J" and the relations between these states. In contrast, Gilbert proposes that ascribing intentions to groups presupposes a "unification of agency." Joint commitments of the form "I will co-parent if you will co-parent" are group commitments on this account rather than individual commitments. When joint commitments hold, intentions and beliefs are properly attributed to the group rather than individuals in the group. Within the philosophy of social science, alternate accounts such as Bratman's and Gilbert's are appraised against the background of the individualist/collectivist debate (Tollefsen 2014). We have no dog in this fight, rather we want to illustrate the appeal to the rich psychological assumptions attributed to agents involved in group action by both Bratman and Gilbert.

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[1] We are aware of the many other approaches to accounting for joint action but focus on Bratman and Gilbert here because they are invoked by Tomasello in his evolutionary accounts of joint intention.

Tomasello invokes both Bratman and Gilbert in introducing his own account of joint intention, which is introduced not only to explain group action or cooperation but is part of his account of the evolution of morality. He also understands the evolution of joint intention as a key step in our uniquely human evolutionary trajectory. For Tomasello, developing partnerships to engage in collaborative activities such as antelope hunting led to the formation of joint commitments and this in turn, "created an evolutionarily novel form of moral psychology" (Tomasello 2016, 5). Here's how he connects these elements: "The central claim of the current account is that the skills and motivation to construct with others an interdependent, plural -agent "we" – that is, the skills and motivation to participate with others in acts of shared intentionality (Bratman, 1992, 2014; Gilbert, 1990, 2014) – are what propelled the human species from strategic cooperation to genuine morality" (Tomasello 2016, 3-4). This results in the view that "human morality is a form of cooperation, specifically, the form that has emerged as humans have adapted to new and species unique forms of social interaction and organization" (Tomasello 2016, 2).

For Tomasello, joint intention, and other cognitive capacities required for the evolution of human hyper-sociality, are uniquely human traits. Any account of the evolution of these traits must explain how they arose only in humans. He draws support for this view from his work on animal cognition, specifically his work on great apes. He concludes from this work that "[The] empirical facts establish beyond a reasonable doubt, in our opinion, that human beings are biologically adapted for collaboration in a way that other great apes are not." (Tomasello 2016, 77). If we were to see two chimpanzees carrying a log together, or making a ladder to escape their enclosure (Held 2019), we cannot explain this behavior in terms of joint intentions. Arguably, an implication of Tomasello's account is that such behavior should not be considered collaborative, as joint action, or as cooperative behavior.[2] We maintain that such, possibly uncomfortable, implications arise from a combination of the way in which one chooses to explain joint action and the kind of evolutionary account required to support such an explanation. Tomasello, following philosophers such as Bratman and Gilbert, maintains that rich cognitive capacities are required for cooperative behavior and so accounting for the evolution of such behavior requires an account of the evolution of the relevant rich cognitive capacities. In contrast, we propose no such restrictions on our attributions of cooperative behavior. This opens access to different approaches to accounting for the evolution of cooperative behavior or joint action.

We are not challenging human evolutionary uniqueness here—we acknowledge that we deploy language, culture and norms in ways that are not replicated anywhere in evolutionary history as any cursory examination of the tree of life will reveal. However, we do challenge the claim that joint agency facilitated cooperation is the hallmark of human uniqueness. Evaluating an uniqueness hypothesis requires a comparative approach. Tomasello's main contrast is chimpanzees and their relative inability to cooperate to the degree of sophistication of human children. Yet the problem of cooperation is one evolution has solved time and time again, building new biological individuals out of the simpler organisms. We will return to cognition, but first we need to explore a broadly comparative framework for thinking about cooperative joint action before we evaluate whether different cognitive capacities are necessary for that behavior.

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[2] Richard Joyce's (2006) account of the evolution of cooperation has similar implications.

3. An evolutionary approach to joint action

Evolutionary game theory provides a natural framework for analyzing joint action in a comparative way. Joint action, especially the sort we see in complex cooperation or divisions of labor, involves strategic interactions between multiple individuals. Game theory provides a way of representing the incentives of the participating individuals and, combined with a dynamics, identifies when cooperative behavior will be stable or collapse. Most thinkers on human evolution have embraced game-theoretic characterizations of the cooperative and coordination challenges that faced human ancestors and that joint agency purports to solve.[3]

That said, using the formal framework of evolutionary game theory immediately raises a problem for the "uniquely human" part of the joint agency hypothesis: strategic interaction and cooperation are found across the tree of life from microbes to humans. In effect, we must confront a version of the problem that Gold and Sugden (2007) raised for philosophical accounts of shared or collective intentions that produce group action. They point out that two individuals engaged in Nash equilibrium behavior look like they possess a collective intention to produce the Nash equilibrium but many philosophers would argue that these cases involve a sort of pseudo-coordination and are not candidates for true group action.

Consider a simple competition over resources as represented by the Hawk-Dove game. In this game each player has a choice between an aggressive hawk strategy and a deferential dove strategy. Hawk beats dove and takes all the resource; doves split the resource evenly; dove loses to hawk but avoids any cost or injury; and finally, hawk-hawk interactions lead to the worst outcome, an escalating conflict that risks injury. Against a dove, you would rather play hawk, but

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[3] Even Tomasello (2012) endorses the game-theoretic characterization, although it creates tension with his conjecture on the role of joint agency in human evolution. More on this below.

against a hawk, you prefer to play dove and avoid conflict. This game has three Nash equilibria—pairs of strategies such that each player chooses the simultaneous best response to their opponent. There are two pure Nash equilibria where one plays hawk and the other dove and one mixed where each player randomizes between hawk and dove in a way that makes their opponent indifferent between their choice between hawk and dove. Gold and Sugden (2007) point out that pairs of individuals playing the pure Nash equilibrium look to have a collective intention to bring about a group action: one player wins the resource and the other walks away with nothing. Given their opponent's play, each prefers their respective strategy of hawk and dove, and neither can do better by unilaterally changing their strategy. Thus, the pair seems to collectively intend that they play the Nash equilibrium and act on these intentions to bring about a joint action. Yet this seems absurd, especially for the dove player who loses the resource. Evolutionary dynamics provide further support for Gold and Sugden's diagnosis, as neither pure Nash equilibrium is evolutionarily stable. The challenge Nash equilibria behavior poses for accounts of joint intentional accounts of group action is even more pressing for the classic game of cooperation, the (one-shot) Prisoner's Dilemma. This game has but one Nash equilibrium: both players defect. Yet accounts of joint action are usually invoked to explain how we can *cooperate* in these sorts of scenarios, not defect (see, e.g., Tuomela 1992).

Perhaps another game would better capture the nature of joint agency in cooperation and avoid this unpalatable consequence. Many evolutionary theorists prefer the Stag Hunt as a representation of early cooperation in human ancestral lineages (Skyrms 2004; Tomasello et al. 2012; Sterelny 2012). As Rousseau describes the scenario, each individual has a choice between cooperating with their fellows to bring down a stag or defecting to hunt rabbits on their own. The stag is the preferred quarry but your partner must also hunt stag. Hunting rabbit guarantees prey but of less value. In this game cooperation is risky but stable, if achieved. Many have argued that the mutual interest of cooperation captured by the Stag Hunt best characterizes the problems human ancestors faced with respect to collective foraging, defense, and reproductive cooperation. This led us to become obligate cooperators and produced the scaffolding necessary to solve more difficult cooperative problems. That the Nash equilibrium for hunting stag counts as joint action seems much less troublesome, for this game represents a paradigm coordinated activity: group hunting. However, there are more Nash equilibrium solutions to the game. In particular, hunting hare is a Nash equilibrium and this looks like the paradigm of individual, not joint, action. Any account of joint action requires the resources to sort Nash equilibria behavior into true and spurious joint actions, if evolutionary game theory is to be of any use.

One obvious solution to this challenge is to make some form of cognition necessary for joint action. Ultimately this may be the necessary solution, and would cohere with the philosophical approaches to joint agency, but it is not an ideal solution for an evolutionary approach for two reasons. First, human cognitive evolution is tightly bound up with human cooperation and sociality. If certain cognitive capacities are constitutive of joint action then such an ability cannot serve the purpose of explaining the *origins* of complex human cooperation and sociality. Joint action would have had to have evolved earlier in response to different selection pressures. Second, and relatedly, making cognition constitutive of joint action compromises the generality and power of evolutionary game theory for explaining the origins and stability of cooperative behavior, a key feature of almost all hypotheses concerning human evolution. To elaborate, having rich cognitive capacities—to form the intention to hunt stag and to communicate this to potential partners—can make it trivial to achieve cooperation in the Stag Hunt. Yet they are by no means necessary. Evolutionary dynamics produce cooperation in the

Stag Hunt with regularity when, for example, simple signaling or correlated interaction is introduced (Skryms 2004). Bacteria can solve the comparatively more difficult public goods scenarios (Inglis et al. 2012), so solving a Stag Hunt is well within microbial reach. In fact, one of the attractions of *evolutionary* game theory is that it does not presume the rich rationality and common knowledge constraints common to economic game theory (Skyrms 1996). Evolutionary dynamics find the stable cooperative equilibrium through either biological (sex and death) or cultural (learning and plasticity) means. Attributing joint agency to these systems is feasible, if we adopt a thin, deflationary account of the notion and give up any possibility of this feature playing a special role in human evolution.

One strategy for avoiding such a thin characterization of joint agency yet adhering to a broadly comparative approach involves distinguishing "aggregative" group action from "interactive" group action (Conradt and List 2009). Bird flocks and fish schools are classic examples of aggregative group action whereas symbiosis or sharing reproductive roles in cooperative breeding count as interactive. On this view, true joint agency would involve interactive group action. This requires identifying the criteria for interactive group action. Cooperation would certainly be a part of this account but additional criteria could help exclude many of the problematic Nash equilibrium cases. Natural candidates for these additional criteria would involve causal interaction, spatial integration and other features of *biological individuality*. A community of microbes engaged in a public goods game may each be pursuing their individual evolutionary interests and only cooperating or engaging in joint action in an aggregative way. Interactive joint action would involve, say, the tight, specialized coupling of metabolisms between host and symbiont. This couples an account of biological joint agency with the evolutionary features that involve the emergence of new biological individuals. Samir

Okasha (2018) defends this connection most explicitly, arguing that agents are biological individuals that exhibit sufficient "unity of purpose" understood in terms of the selected functional integration of their components. This effectively mirrors a move seen in the philosophical literature that links group action to the metaphysics of agency (Rovane 2019).

Developing criteria for interactive group action may be part of the right evolutionary account of joint agency, yet it fails to vindicate the claim that joint agency is a uniquely human achievement. Transitions in individuality are rare evolutionary events but have occurred across the tree of life (Booth 2014). Further, it is not at all clear that we want to commit to the idea that human cooperation always involves the emergence of a higher order agent or individual. Yet, however we decide to pursue an evolutionary account of joint agency, the claim that humans and only humans can engage in true joint action is doomed on comparative grounds. This brings us back to the idea that joint agency is a peculiar cognitive capacity, rather than a kind of cooperative behavior, unique to humans.

4. Joint agency and human cognition

A common inferential pattern found in the study of animal cognition involves identifying, through a combination of designed experiments and careful observation, behavioral patterns and postulating the minimal cognitive capacities necessary to produce those patterns. To take just one example, researchers designed experiments for the tool-using New Caledonian crows in an effort to assess their cognitive compacities for learning and solving novel problems (Taylor et al. 2010). Based on the crows' performance, researchers can make inferences about what sorts of learning mechanisms may be implicated in crow cognition. Much like tool use, cooperative behavioral patterns, even complex interactive kinds of cooperation, are not unique to the human lineage. Therefore, the existence of cooperative behavioral patterns alone is not sufficient for there to be selection pressures in place to engage in joint agency. So, what else is required for joint agency to emerge or be assembled? What sort of selection pressures are required?

At this point, some skepticism that joint agency is a single, unified cognitive capacity is warranted. Consider what cognitive competences joint agency minimally requires in the context of a group hunt. An individual band member needs to recognize and keep track of other band mates and their positions, to be able to plan, and to communicate those plans. Once the action starts, individuals may need to track gaze, to respond fluidly to changes in circumstance, to remember the plan, and to react accordingly. This is, by no means, a simple task, and it implicates a range of cognitive capacities that are subject to different sorts of selection pressures and are deployed in a wide range of tasks beyond cooperation and social interaction.

Rather than taking these capacities as a package that is evolutionarily novel in humans, we hold that we owe an evolutionary account of the large number of cognitive capacities that make up the purported package. Furthermore, taken individually, components of the joint agency package are not unique to humans. Gaze tracking, for example, is well documented in several mammals and is prevalent in many primates (see, e.g., Tomasello et al. 2007; and the overview in Zuberbühler 2008). In Tomasello's work on this topic, he and his collaborators pick out differences between the gaze following of humans and the great apes, pointing to the need for an evolutionary story that accounts for such differences. We maintain that this would not provide an evolutionary account of the emergence of joint agency but rather, an evolutionary account of one part of the package of cognitive capacities that make up joint agency.

There are several alternate accounts of the evolution of such cognitive capacities in humans. Sarah Hrdy (2009) provides one such account, which contrasts with Tomasello's idea that joint agency evolved as a package. Kristen Hawkes (2020) identifies a key difference between these two approaches to the evolution of human cognitive traits: Hrdy's is a life history approach. Hrdy's account of the evolution of the cognitive differences between human infants and apes, such as those documented by Tomasello, among others, places the evolution of the relevant traits in ancestral infants: "preferences for participation, engagement and sharing attention and intentions with others that emerge in infancy, evolved as survival responses to the cognitive ecology of ancestral infancy" (Hawkes 2020, p. 2). Just as the tadpole life stage of frogs faced different selection pressures than adult frogs, ancestral human infants faced different selection pressures to ancestral human adults. Hawkes, Hrdy and Tomasello all share an explanatory target: the difference between human infant cognitive activity (and human social cognition in general) and that of the great apes. Hrdy agrees with Tomasello that humans have unique social cognition (as do we), but neither Hrdy nor Hawkes see in Tomasello an answer to the question of how our social cognition evolved. According to Hrdy and Hawkes, one part of the human social cognition package evolved in ancestral infants who "arrive[d] into a socioecology where mothers, depending on allomothers, bear another offspring before the previous one is independent" (Hawkes 2020, p. 6). The key difference between ancient human socioecology and ape socioecology is the presence of grandmothers. Ancient infants were forced to attract the attention of caregivers other than their birth mothers. Hawkes points out that Tomasello's alternate evolutionary explanation for unique human social cognition invokes cooperative hunting but that this does not differentiate between great apes and us, whereas cooperative breeding does.

Another alternative approach, due to Richard Wrangham (2019), treats the cooperative communication behaviors that are hallmarks of joint agency as initially emerging as a *byproduct* rather than a directly selected effect. Wrangham argues that the ability to tolerate direct gaze and spend time in close proximity to conspecifics—a necessary feature of close cooperation and joint action—evolved as part of a process of self-domestication, or selection against reactive aggression. Wrangham offers a comparative argument that selection for domestication (and against reactive aggression) produces a similar domestication syndrome in mammals, and the ability to follow gaze and tolerate individuals are paedomorphic (juvenile) traits accompanying this syndrome (2019, 172-189). He concludes that "[i]n domesticated animals, increased cooperative ability emerges as an incidental consequence of selection against reactive aggression" (Wrangham 2019, 189), though he is quick to make clear that this origin is compatible with subsequent ratchet-like selection for increasing cooperation in the human lineage.

This brief sample illustrates not only are alternate evolutionary approaches available to account for a wide range of cooperative behavior, but there are a wide range of alternate evolutionary approaches available to account for "uniquely human" cooperative behavior. In fact, the continuity of cooperative behaviors across the tree of life undermines the idea that there is a distinct category of uniquely human cooperation—human cooperative behavior simply differs in degree and sophistication from non-human cases. Further, human cooperative behavior may well be supported by a cognitive package that some characterize as joint agency, but that package has most likely been assembled from disparate cognitive capacities. The evolution of each of the components of this package may call for different accounts and these accounts may create tradeoffs or conflict amongst the array of selection pressures.

Such evolutionary accounts vary in many ways and are responsive to the explanatory task at hand. Evolutionary game theory can provide insight into a wide range of cooperative behavior across the animal kingdom but, as we have seen, some argue that it fails to account for human cooperative behaviors. There are drawbacks to attempts at providing an evolutionary account of the origin of a new cognitive package, such as joint agency. First, such accounts downplay the many components involved in such a package and their likely separate evolutionary histories. Second, Tomasello's prominent account ignores the possibility that taking into account different life stages can provide evolutionary insight into the origins of uniquely human traits.

5. Conclusion

Collective action, cooperation, and joint agency all call for explanation. Game theorists can account for some cases of cooperation but their approach is often criticized for falling short in accounting for cooperation that appears to require sophisticated cognitive activity. Such cases of cooperation or joint action seem more amenable to accounts that spell out the requisite cognitive capacities. Shared intention or joint agency are alternate approaches here. Evolutionary theorists are interested in these phenomena, too. If human cooperation is achieved by application of sophisticated cognitive capacities, how these capacities evolved is an important question. Some argue that joint agency, or some cognate cognitive capacity, evolved in humans and it is an evolutionary precursor to our hyper-social lifeway. We have urged a different approach to the evolutionary question. We recognize that there are many types of cooperative behavior and that many non-human animals achieve various levels of cooperation. For many of these cases, evolutionary game theory, with its minimal assumptions about the cognitive capacities of agents, can make headway in explaining how such behaviors arise. Further, we argued that such behaviors should not be ruled out as instances of cooperation on the grounds that they are not supported by a rich suite of cognitive capacities. We canvas alternate answers to the question of how our hyper-social lifeway evolved as we do not find the proposal of the evolution of a sophisticated cognitive capacity as a one-shot-deal in humans persuasive. First, it seems unlikely that a cognitive capacity to mediate cooperation evolved as one mechanism, because the relevant behavior is supported by many mechanisms acting in concert. Social cognition involves tracking cooperators (my team), gaze following, fluid response patterns, and memory, among other cognitive capacities. These cognitive activities are exhibited in other animals. As a result, the evolutionary question becomes: what evolutionary forces led to the different versions of these capacities present in great apes and humans? Second, we encourage a broader range of evolutionary answers to this question. Once we acknowledge that cognitive capacities can be understood in terms of many sub-capacities also present in other animals, we can then look to aspects of ancestral human life that provide selection pressure to change these capacities. Such selection pressures need to be specific to humans and may also select upon specific human life stages, for example, ancestral human infants are a site of certain selection regimens. Also, some relevant human capacities may have arisen as evolutionary bi-products rather than as a product of selection. We conclude that cooperation is widespread and evolved in different ways. Some forms of sophisticated human cooperative behavior are best accounted for by appealing to a suite of cognitive capacities and the relevant evolutionary question is how each of these capacities were shaped in human evolutionary history. We reject the idea that a complex cognitive mechanism evolved de novo and gave rise to uniquely human cooperative behavior.

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