Against the group actor assumption in joint action research

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Abstract

A central assumption in joint action research is that in order to explain how individuals act as part of a group, we must first explain how the group comes into existence. This assumption has led to an unnecessarily narrow research programme: research has focussed largely on interpersonal coordination mechanisms. I outline an alternative approach predicated on a dynamic conception of the ecosystem. On this view, there is no need to assume that actors must first constitute a group agent with their fellows before entering into coordinated action. Such coordination can be more efficiently explained by recognizing that all actions perturb the structure of the ecosystem itself in a manner that can alter the action possibilities available to neighbouring actors. This move allows us to overcome entrenched debates over the nature of shared intentionality, and to instead focus on practical interventions in multi-actor settings.

Keywords: joint action; shared intentionality; ecosystems; ecological psychology

Introduction: The group actor assumption

The *group actor assumption* is not a commonly-used term; it is a term I introduce here to characterize the way that researchers working in the joint action tradition typically understand their project (Sebanz, Bekkering, & Knoblich, 2006). The assumption might be analysed into the following four claims:

1. the basic form of action is *individual action*
2. *the group* is to be understood as a set of *constraints and structures* placed on individual action (the tactic here might be to *reduce* joint action to structures in individual minds, or, alternatively, it might be claimed that the group itself is an *emergent* structure that constrains the individual components)
3. the existence of the group must be explained in terms of the nature of the individuals involved, and the *coordination* activities they engage in
4. the group must come into existence first *before* a joint action can be implemented

I do not, however, wish to make a fetish out of these four items. So let us immediately simplify this analysis by replacing it with the following statement:

'The group actor assumptions reifies the group'

That is to say, under the group actor assumption, it is understood that the study of activity involving multiple actors requires a special mode of analysis. The group actor assumption says that the group is a *real* entity, and, furthermore, it asserts that this *groupness* will play a crucial role in explaining whatever it is that we wish to explain about some phenomenon of interest. The group actor assumption invites us to divide the world, a priori, into individual actions and joint actions, and says that the latter type requires an additional layer of explanation over and above what is required for the former.

I will provide evidence for all of these claims below. But first it will be useful to consider a specific example of the kind of joint action that we might want to study. I will use this to argue that the group actor assumption leads to an unnecessarily narrow research programme. In the second half of the paper, I outline an alternative approach which avoids the problems identified, appealing to the concept of the ecosystem.

Case study 1: Children's soccer training

When young children, say around age five, are first corralled onto a soccer pitch they can easily enough be divided into two teams and encouraged to act out a soccer game. What one will notice, however, is that these teams exhibit a striking absence of *structure*. The ball will be propelled in some direction, whereupon the children will chase the ball en masse, and then different children will try to coordinate the necessary limb movements in order to make some decisive connection with the ball. At the end of this process, the ball is propelled in some new direction, and the cycle begins again. What is going on here? Here is a succinct explanation: 'A child's basic urge is to run and chase the ball' (Quinn & Carr, 2006). The children's chasing-urge, coupled with the quasi-random trajectory of the ball at a given moment, produces a situation in which all of the action appears to be *reactive* to the current spatial configuration; indeed, the ball itself almost appears to be driving the action.

Contrast this with an accomplished team performance played to a high degree of skill. Take the goal scored by Esteban Cambiasso for Argentina against Serbia and Montenegro at the 2006 World Cup. This is a famous goal because it came after the team had completed a sequence of 24 uninterrupted passes, and it thus serves as an object lesson in dominant possession-based soccer. But let's consider just the last four passes here. For each of these passes the player receiving the ball is already on the move and the passing player, detecting this movement, plays the ball into the space just in front of where the recipient is *going to be*. The whole sequence of four passes goes off in a fluid, continuous fashion. In contrast to the five-year-olds' game, we are no longer tempted to claim that the ball is driving the action. The ball is still *central*, of course, but it has now come under the control of a

disciplined, structured *team*.

The question is: What has changed between these two soccer games? How does one get from the five-year-olds' skill level to something approaching that of the Argentinian players? What does the learning process look like? How can we understand the skilled version of the game in a way that allows us to do useful things like come up with effective training interventions?

It would be reasonable to expect that research on joint action should give us something to say about such matters. A joint action research programme worth the name ought to provide us with some guidance about how to go about formulating and answering appropriate questions. Does it?

From the study of the individual to the study of the group: Where did the action go?

Joint action research has its origins in attempts to expand the traditional, individualistic cognitivist research programme to encompass the study of interpersonal phenomena, such as discourse-level activities in spoken language. For the sake of clarity, here is a definition of that individualistic research programme: 'Cognitivism in psychology and philosophy is roughly the position that intelligent behavior can (only) be explained by appeal to internal "cognitive processes," that is, rational thought in a very broad sense' (Haugeland, 1978).

This immediately raises a problem. Any attempt to deal with multi-actor activities within cognitivism runs straight into an apparent contradiction: how can we appeal exclusively to *internal* processes when the 'inside' is distributed across multiple individuals? The way that researchers have typically dealt with this is through accepting the group actor assumption.

In perhaps the most widely-cited paper on the topic in recent years, Sebanz et al. (2006) frame the problem thus: 'As a working definition, joint action can be regarded as any form of social interaction whereby two or more individuals coordinate their actions in space and time to bring about a change in the environment.' Gilbert (1990) discusses the case of two people going for a walk, and insists that 'in order to go for a walk together, each of the parties must express willingness to constitute with the other a *plural subject of the goal* that they walk along in one another's company.' Bratman (1992) identifies as one of the characteristic features of joint activity that each actor has an 'appropriate commitment' to the joint activity. Marsh, Johnston, Richardson, and Schmidt (2009), who are not themselves cognitivists, go as far as to describe the group as a hybrid organism or 'chimera', an entity 'that has an implausible wholeness, despite the disparateness of the parts that compose it.' Searle (1990) provides a clear-eyed analysis of the problems associated with appealing to intentionality in the group setting, but he also posits a version of the group actor assumption: 'Intuitively, in the collective case the individual intentionality, expressed by "I am doing act A," is derivative from the collective intentionality, "We are doing act A." '

What can be seen in all of these statements is an acceptance of the view that the group must be understood as a real entity—a set of constraints or structures which are imposed on individual action and which must come into existence first before the joint action can be implemented. Debate within the joint action tradition can largely be read as a series of disagreements about what we should expect these constraints and structures to look like.[1]

In practice, this has led to the most intense research effort being directed at the question of *interpersonal coordination* (Vesper et al., 2017): How is it that a dispersed set of individual actors *becomes* a group? The ancillary assumption driving such investigations is that we should be able to identify a single, general mechanism which applies in all cases and which allows multiple individuals to coordinate with one another, no matter the activity they are actually engaging in.

In this vein, Tomasello et al. (2005) attribute the set of behaviours they consider to be uniquely human, such as language and culture, to an entity they call 'shared intentionality'. Tomasello notes at the end of his 2014 book that a 'particularly big' open question remains concerning 'the nature of the jointness or collectivity or "we-ness" that characterizes all forms of shared intentionality.' He favours an appeal to recursive mind-reading of the he-thinks-that-she-think-that-he-thinks variety, a solution similarly favoured by other researchers (e.g., Clark, 1996). On this account, a joint action can proceed only when all participants to the action *understand* themselves to be participating in the action as part of the group. The group exists in the minds of its members.

The most common alternative to recursive mind-reading hypotheses are contagion-based theories which posit that the group comes into existence automatically, as a result of low-level synchronization phenomena (e.g., Pickering & Garrod, 2004; Marsh, Richardson, Baron, & Schmidt, 2006). On such accounts, joint action is made possible—the group is able to act—because the individuals have already, spontaneously, become organized into a coordinated unit. The group exists precisely *in* the coordination of its members.

But notice that, in its pursuit of general mechanisms driving interpersonal coordination, the joint action research programme has indefinitely postponed the study of any particular action phenomenon as an instance of what it says it is: *action*. Nowhere does the group actor assumption lead researchers to ask the kinds of questions suggested above, about how to understand the movements of skilled soccer players, or how to come up with useful training interventions. The research programme appears to be misnamed, because what is actually being studied—interpersonal coordination—is understood only as a prerequisite to the *real* action. Where did the action go?

[1] One research tradition which arguably falls outside these debates is the distributed cognition research programme (e.g., Hutchins, 1995a). While distributed cognition is explicitly *cognitivist*, it succeeds in avoiding the group actor assumption by analysing individual actions as part of a larger system encompassing physical artefacts as well as actors within a space (Hutchins, 1995b).

Case study 2: Group hunting in wolves and chimpanzees

In the wild, wolves are observed to hunt in packs, chasing large prey such as buffalo. A buffalo is a dangerous animal for a wolf: it has horns and powerful legs, which the wolf must avoid. Rather than attack the buffalo directly, the wolves chase the prey animal until it tires and collapses, whereupon the wolves will surround the prey on all sides, cutting off potential escape routes. Muro, Escobedo, Spector, and Coppinger (2011) were able to reproduce this behaviour in a computer simulation, modeling the wolves as agents following two rules: 1) get as close as possible to the buffalo without putting yourself directly in its path (i.e., avoid being trampled on or skewered), and 2) maximize your distance from neighbouring wolves.

Now, we might be tempted to conclude from this that the wolves are *literally* following a couple of simple rules. But the rules here are written as they are only because this is a computer simulation and it therefore requires explicit, symbolic rules in order to produce any output. In reality, the wolves cannot be following rules; the action must be driven by perception. What an individual wolf sees is a vista containing a potential prey animal along with a number of other wolves, all of which are already moving. The whole scene is perceived as a set of threats and opportunities which are continually rearranged as the situation unfolds. The question is, what aspects of this whole structure must a wolf learn to attend to and to exploit in order to successfully act?

A somewhat more structured type of group hunting behaviour has been observed in chimpanzees, who hunt monkeys (Boesch & Boesch, 1989). It is attested that one chimpanzee will instigate the hunt, chasing the monkey from some direction, whereupon further chimpanzees will join in from the sides, driving the monkey into a space where eventually an ambushing chimpanzee will be in a position to catch and kill the monkey.

Boesch (2002) posits that the chimpanzees are able to coordinate this behaviour because they each adopt a specific 'role'. He identifies four roles: chimpanzees can act as driver, chaser, blocker, or ambusher. The suggestion is that these roles have some normative significance: a chimpanzee's role determines the share of the meat that they are entitled to. If this is the case, then some form of mind-reading must be involved, as each chimp would need to know what role the other chimps are playing.

Tomasello (2014) disputes this description, arguing that, in fact, each individual chimp's behaviour can be explained by selfish motives: 'chimpanzees in a group hunt are engaged in a kind of co-action in which each individual is pursuing his own individual goal of capturing the monkey'.

For Boesch, then, the group is reified as a set of normative role assignations. For Tomasello, the group simply does not exist because for it to exist the chimpanzees would have to have a human-like understanding of themselves and their fellows—the very idea is anathema.

But seeking to explain these hunting behaviours in terms of the reified group (or the absence of a group) draws our attention away from the actual action. It draws our attention away from the physical structures, movements, events, and reconfigurations that must necessarily be invoked in a description of the hunting behaviours: the chase, the closing in from the sides that narrows the monkey's escape possibilities, the space where the ambush can occur. In other words, the group actor assumption causes us to overlook the world itself. So let us reformulate our earlier critique:

> **'The group actor assumptions reifies the group *while neglecting the world*'**

Perhaps 'the world' is too imprecise a term here. Below, it will be replaced with the concept of the ecosystem.

The late appearance of the individual in evolution and development: from public action to private action

So far, we have left untouched the special position of individual action, generally understood as action in its most basic form. This assumption, too, must be challenged.

When we take a historical perspective on cognition, we note that the individual, as self-aware, symbol-using actor, is in fact a rather late achievement, in evolutionary terms as well as in terms of development within the human lifespan. Indeed, the notion that the individual should be treated as a given is only a self-evident truth when the matter is considered from *within* the cognitivist research programme.

One approach to psychology which rejects this progression from individual to joint action is that developed by Vygotsky and his followers. According to Vygotsky (1978), the child develops into a competent language-using being not by silently contemplating the actions and utterances of others, but by actually engaging in action: 'Prior to mastering his own behavior, the child begins to master his surroundings with the help of speech. This produces new relations with the environment in addition to the new organization of behavior itself.' Through the repetition of actions that were initially directed outwards, the child eventually starts to direct his actions inwards, at himself. Lake (2012) gives the example of a child speaking to himself as he looks at paint: 'I need the green paint.' Here, the speech is performed 'out loud' but is directed at regulating the child's own behaviour, not directed outwards to an audience.

Through continued practice, the child will eventually learn to regulate his behaviour without needing to say the words out loud. His private, self-directed speech becomes *inner speech*. This process is what Vygotsky referred to as 'internalization'. It should be noted that what has been internalized here is not some arbitrary symbol, or some Platonic notion of greenness, but the self-regulatory *action*. What was an action when it was carried out publicly remains an action when it is directed inwards and carried out privately: 'internalization reflects not "content" poured into a person's psychological structure, it is

how that structure is formed' (Lake, 2012). In other words, it is only through the mastery of externally-oriented actions that the *individual* arises.

But here we are talking about the development of *speech*. What does this have to do with joint *action*?

The difficulty is that as adult humans we are inescabably also language-users. Think back to the two soccer teams described above. While the five-year-olds have a limited vocabulary for explaining to themselves what they are doing, this is not the case for skilled adult players. Soccer players are barked at repeatedly on the training pitch year after year: "keep the ball moving", "give your teammates options", "don't get caught ball-watching", etc. The public behaviour of skilled soccer players is modified and channeled through private self-regulating actions and instructions.

The point here is that *private* action need not be taken as the starting point for the activity of groups. If action in its basic form is a *public* activity, directed outwards at the world and having immediate effects in changing the structure of that world itself, then perhaps the central contradiction driving joint action research—the contradiction which drives researchers to accept the group actor assumption—need never arise. The problem of explaining group action in terms of internal processes can be dissolved by recognizing that those internal processes do not arise until late in evolution and development. Private, self-directed behaviour is the *consequence* of public action, not a prerequisite for it.

An ecosystems view of action: Reinstating space and movement

At the level of biology, an ecosystem is thought of as a rather slow-moving thing: a stable configuration of species, niches, soil types, atmospheric conditions, and so on that exist in some sort of equilibrium (Sarkar, 2016). At the level of psychology, the ecosystem must be thought of as a dynamic system, one in which every public action made by an animal alters, or perturbs, the configuration of the ecosystem itself. Moreover, because the ecosystem contains multiple actors, all public actions are inherently *social*, in the sense that the action changes the whole system in a manner which may be relevant to other animals: it may create new opportunities, erase previously existing ones, reveal threats, etc.

Consider the wolves again. After the pursuit of the buffalo the wolves surround their prey. Now, at this point any movement that a given wolf makes—an anti-clockwise rotation around the buffalo, say—alters the layout of opportunities for the neighbouring wolves, just as it changes the shape of the potential escape gaps for the buffalo. The second wolf may respond to the first movement in any number of ways. In no sense, though, would this response require an 'understanding' of what the first wolf was doing. It is enough to point out that the spatial configuration has changed. If we wish to understand the wolf's behaviour we should investigate what is going on in the relationship between the animal and its surroundings—that is, at the level of public action.

Does this mean that the wolf has *direct perceptual access* to the ecosystem? It does not. An ecosystem is not the kind of thing that can be perceived. Here it is necessary to make a distinction between the *ecosystem* and the *environment*.

James Gibson (1979) developed a psychology of perception that has as a central claim that perception cannot be thought of as something that an animal does on it own, merely *in response to* an environment; perception must instead be thought of as a process enacted within an animal-environment system. The animal's environment is already structured. If it is to survive, the animal must learn to make use of this structure in adaptive ways. Moving forwards creates an optic flow pattern which can be used to direct locomotion. This pattern *only* exists when the action is implemented *and* useable structure is present in the environment—the pattern does not exist for an animal that has never moved, nor is it present for an animal whose environment is filled with thick fog. For the pattern to exist requires both the animal and the environment to be in a certain relation, hence the animal-environment system.

An under-appreciated implication of this view is that it requires us to adopt a view of the environment as *animal-specific*. That is, it requires us to conclude that there are precisely as many environments in the world as there are animals (for a related argument about the concept of information see van Dijk, Withagen, & Bongers, 2015). At the very start of his 1979 book, Gibson says the following about the animal and its environment:

> [I]t is often neglected that the words animal and environment make an inseparable pair. Each term implies the other. No animal could exist without an environment surrounding it. Equally, although not so obvious, an environment implies an animal (or at least an organism) to be surrounded. This means that the surface of the earth, millions of years ago before life developed on it, was not an environment, properly speaking. The earth was a physical reality, a part of the universe, and the subject matter of geology. [...] We might agree to call it a world, but it was not an environment.

So what can we say about what the wolf sees? What it sees is a *perspective* on the ecosystem. But this is only to say that what is seen is a partial view of the structure that exists in the world. If an environment is the complement of an animal, then an environment it is what is experienced from a first-person perspective. An ecosystem, by contrast, is an analyst's label. It is a tool for capturing some of the structure in the world in a manner that can guide our investigation of certain phenomena of interest.

In the case of joint action research, the ecosystems concept is a tool that allows us to understand how multiple actors are able to negotiate a space that is populated with other actors. It allows us to move beyond the interpersonal coordination paradigm by making clear that such coordination is not necessarily something the animals must *do*. A basic level of

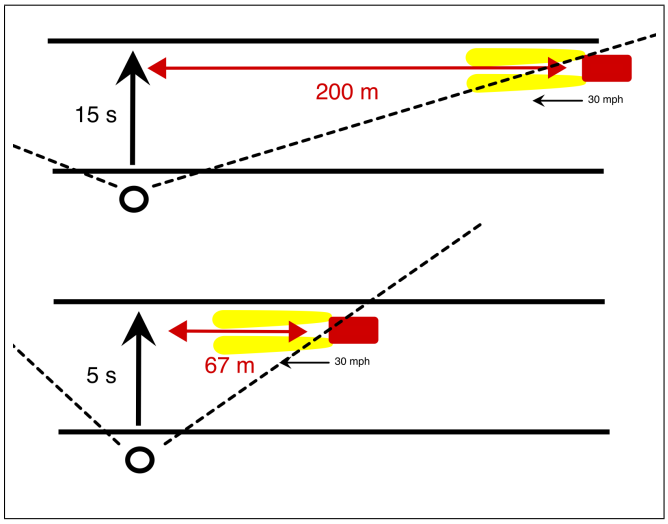

Figure 1: A pedestrian, represented by the black circle, waits to cross the road. In (a) the crossing will take 15 s, and the pedestrian must be attentive to potential threats 200 m down the road. In (b) the task difficulty is drastically diminished: with the crossing reduced to 5 s, the pedestrian now only needs to be aware of potential vehicles up to 67 m away.

coordination is already present by virtue of the fact that the animals already exist within a single ecosystem, whose structure is instantiated in just so many first-person perspectives.

The real question, though is whether the ecosystems view of action actually has any value in terms of its ability to generate practical research. I believe that it does. One example is in its potential application to the design of spaces for multiple actors, such as urban streetscapes.

Case study 3: Pedestrian road crossing

Navigating an urban environment entails continuously coordinating with other actors. An urban design approach that has been popular in Europe in recent years, the shared space approach, argues that interpersonal coordination can be not only necessary but *sufficient* for managing urban traffic flows. This reasoning has led the UK government to publish design guidelines encouraging the removal of formal infrastructure elements such as kerbs and traffic signs, with the aim of forcing drivers to be more attentive to their immediate surroundings (Department for Transport, 2011). This approach has been criticized because it often renders these spaces less accessible for elderly and visually impaired pedestrians (Moody & Melia, 2014). To see why this is the case, it is useful to adopt an ecosystems perspective on the activities of the road users. Here we will consider a simple instance in which a pedestrian wishes to cross a road that carries vehicle traffic. We will focus only on the pedestrian's task.[2]

The first thing to notice is that while this is an interpersonal coordination phenomenon, it is an *asymmetrical* one. Should a collision occur here, it is likely to be more disastrous for the pedestrian than for the driver of the car. The pedestrian thus has an immediate interest in being especially cautious.

The pedestrian's task here involves *prospective control*: it requires the pedestrian to be attentive to ongoing, or unfolding, movements in her environment (Von Hofsten, 1993). This is illustrated in Fig. 1. In order to decide whether to begin crossing, the pedestrian needs to take into account the movements of vehicles in the road that are on course to intercept her path. This decision task is made easier or harder depending on a number of factors, which include: how wide the road is, how fast the pedestrian is able to cross it, and the speed of the traffic. If the pedestrian can only move slowly (or has far to cross), as in (a), then that pedestrian must be aware of vehicles that are much further away compared to a pedestrian who is able to cross quickly (b). The difficulty of the decision-making task (how far the pedestrian has to look down the road) is proportional to the pedestrian's time-to-cross. Prospective control refers to the organization of behaviour with reference to perceived future movement, i.e. with reference to where objects are *going to be*, as the action unfolds. Older, slower-moving pedestrians have particular difficulty in crossing roads (Langlois et al., 1997), and Fig. 1 makes clear why this is the case: the slower one is able to move, the further one has to be able to see in order to control one's movements. In practice, for very wide roads or for very slow pedestrians it becomes impossible to *perceive* safe crossing opportunities.

From the fact that the crossing time is proportional to the distance one has to be able to see down the street, we can immediately derive a general design principle: for the road to be crossable by a given pedestrian, the crossing width, in seconds, can be no longer than the time it will take for a car to appear from beyond the horizon of visible space to intersect the pedestrian's path. In practical terms, this means that in order to make a road accessible to the widest possible range of pedestrians the crossing width should be kept to a minimum, and visibility maximized. This gives theoretical grounding to recent traffic design manuals that recommend just these measures (e.g., World Health Organization, 2013).

While the activity of crossing a road can certainly be described as an interpersonal coordination phenomenon, this is not all that it is. The ecosystems perspective allows us to reach a deeper understanding of the space in terms of: 1) the first-person perspective of the road users (pedestrians and drivers); 2) the movement capabilities, and vulnerabilities, of these actors; 3) the time-extended quality of the action; 4) the actual layout of the street. Some promising potential areas

[2]It might be argued that this is not really a joint action phenomenon at all. Just as Tomasello argued that the individual chimpanzees were all merely hunting in parallel, all in their own self-interest, so one might argue that the pedestrian's activity and the driver's activity are merely two individual action phenomena that happen to overlap in space. But this sort of argument again commits us to dividing the world up a priori into individual and joint actions. The argument is only valid, in other words, if we already accept the group actor assumption.

of application are in designing roads to be inclusive for people of diverse capabilities and in redesigning 'accident black spots', which are *spaces* that are inherently unsafe.

Implications for joint action research

The group actor assumption has restricted research on multi-actor activities to the study of an unnecessarily narrow range of interpersonal coordination phenomena. Rejecting it is a liberating move: it frees researchers from having to address unsolvable questions about shared intentionality. The adoption of an ecosystems perspective, meanwhile, enables an investigation of multi-actor activities for what they are: instances of action. It gives us tools for addressing real-world problems in practical ways. There are some pitfalls to be avoided. I have barely touched on issues of language-use here, but human actions are inherently language-involving. For now, let us restate that internal language use is a kind of private action, and it is derived from public action. This public–private distinction is more useful, and less misleading, than the traditional individual–joint distinction. And let us restate also the ecosystem–environment distinction. The latter is a first-person perspective on the former, which itself is the setting of all social activity.

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