Joint Guidance: a Capacity to Jointly Guide

ABSTRACT

Sometimes, we act in concert with others, as when we go for a walk together, or when two mathematicians try to prove a difficult theorem with each other. An interesting question is what distinguishes the actions of individuals that together constitute some joint activity from those that amount to a mere aggregation of individual behaviours. It is common for philosophers to appeal to collective intentionality to explain such instances of shared agency. This framework generalizes the approach traditionally used to explain *individual* action: a behaviour is an action just in case it causally follows from the relevant intention. Contemporary philosophers of action, as well as cognitive psychologists, however, have criticised this way of explaining individual actions, favouring instead an approach that puts "control" or "guidance" as the discerning factor: a behaviour is an action just in case the agent controls it, or just in case it is guided by the agent. In this paper, I argue that we should include talk of guidance even in cases of joint action. I first show that problems of deviant causation arise also in cases of joint action, and that therefore guidance is required to face this issue. Then, I show what a "capacity to guide" amounts to for a group and how joint guidance relates to individual guidance. Joint guidance is actually constituted by task co-representation and the sense of commitment. I argue that an approach that favours joint guidance over collective intentions eschews a lot of metaphysical problems about collective mentality and group subjects, and it is thus more explanatorily fruitful.

Keywords: *Collective Intentionality, Shared Agency, Joint Action, Guidance, Joint Guidance, Agential Control, The sense of Commitment, Commitments.*

Introduction

We often act in concert with others, as when you and a friend go for a walk together, or when two or more mathematicians try to prove a difficult theorem working with each other. An important philosophical question is to understand what it is to *act together*. What distinguishes the actions of individuals that together constitute some joint activity from those that amount to a mere aggregation of individual behaviours?

In this paper I intend to make progress on this issue. It has been argued that actions are constitutively exercises of agential capacities. To explain exercises of agency, therefore, we need to explore the agential capacities of individuals (Alvarez & Hyman, 1998, pp. 221–223; Buehler, 2022; Hornsby, 2004; Hyman, 2015, p. 43; Steward, 2012). Here I argue that *individuals* possess, *inter alia,* a capacity to *jointly guide* actions. This psychological capacity has two components: task co-representation by the co-agents, and the sense of commitment. By appealing to this capacity, I claim, we can offer independent, non-circular, explanatory conditions for how individuals jointly act, and do so in a way that integrates with our knowledge from empirical science. I maintain that this proposal is to be preferred over competing accounts because it is metaphysically simpler – it does not require for us to postulate group subjects, nor primitive psychological states such as "we-intentions" – and because it is informative – it gives us new information about the underlying cognitive processes that enable people to perform actions together.

This paper is thus structured: in section 1. I will provide a brief overview of the classical theory of joint action and its problems. Specifically, in section 1.2. I will introduce deviant causal chains for joint contexts. In section 2, I will begin my argument for joint guidance. Task co-representation and the sense

of committed will be introduced in sections 2.1.1. and 2.1.2., and the actual constitution claim will be substantiated in section 2.2.. Section 3. will be devoted to clarifying my proposal, and section 4. will present open problems, future directions and conclusions.

1. The Standard Theory of Joint Action

In the realm of individual action, the standard view is that a behaviour is an action just in case it causally follows from a relevant intention (Bishop, 1989; Bratman, 1999a; Davidson, 1963; Mele, 2002; Mylopoulos & Pacherie, 2019; Sellars, 1974; Shepherd, 2021; Wu, 2023). Understandably, this approach has been readily applied to joint action as well: if an individual's behaviour counts as an action just if it causally follows from an individual's intention, then a collective behaviour counts as an action just if it causally follows from a collective intention (e.g. Bratman, 1987; 1993, 1999; Gilbert, 1990; Searle, 1990; Tuomela, 1991, 2005; Tuomela & Miller, 2020; Velleman, 1997; see also Seeman, 2009 for why this parallelism may or may not be accurate). How to understand collective intentions, and how they relate to individual intentions, however, has proven to be a rather controversial matter: for example, *what* exactly is collective about collective intentions? Some argue that it's the *content* that has to be collective (Bratman, 1987; 1993; 1999), others argue that it's the *mode* that has to be collective (Searle, 1990; Sellars, 1974; Tuomela & Miller, 2020), yet others argue that the "collectiveness" has to be a property of the *subject* of the intention, which has to be a *plural* or a *group* subject (Gilbert, 1990; Pettit, 2003, 2009; Pettit & Schweikard, 2006).

Each of these proposals has generated a debate of its own, and none goes without problems or criticism (see for example Baier, 1997; Petersson, 2007; Stoutland, 1997); however, it is not my intention here to reconstruct nor evaluate those arguments[1]. What I want to do, instead, is to explore a different dimension of shared agency: joint guidance. It has been argued that, when agents act, they *guide* their activities towards some goal, *i.e.* they are *in control* of what they're doing (Buehler, 2022; Shepherd, 2014, 2021).

I argue that to better understand how we jointly act, joint action theorists should recognize that *individuals* possess a psychological capacity to jointly guide actions. What is guidance and why is guidance so important? In order to answer this question, I will first illustrate how and why guidance has been helpful in explaining individual action. I will then argue that the same problems that fostered the need for guidance in individual action also arise for joint actions.

1.1. The Story of Guidance

In the study of individual action, agential guidance has been proven useful for dealing with various metaphysical problems. Most importantly, it has been argued that agential control makes it possible to deal with the problem of *causal deviance*[2] (Di Nucci, 2011a; Frankfurt, 1978; Shepherd, 2021; Wu,

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[1] For an up-to-date critical discussion of joint intentions, see the Stanford Encyclopaedia of Philosophy entries on "Shared Agency" and "Collective Intentionality" (Roth, 2017; Schweikard & Schmid, 2021).

[2] In addition to cases of deviance, which are the focus of this article, others have argued that only by appealing to a capacity to guide we can explain instances of unintentional, automatic, highly skilled or habitual agency (Buehler, 2019; Di Nucci, 2011a, 2011b, 2013; Fridland, 2017; Levy, 2013; Pacherie & Mylopoulos, 2021; Pollard, 2006a, 2006b; Wu, 2013; Zhu, 2004). Finally, it has been argued that through guidance we can better understand

2016). In the original formulation of this problem (Chisholm, 1966), an evil nephew intends to murder his uncle for his inheritance, but this thought so unnerves him that he drives excessively fast and accidentally kills a pedestrian who turns out to be precisely his uncle. This is a case of causal deviance: the evil nephew's killing of his uncle was indeed caused by his intention to kill him, but the actual act of killing was not under the nephew's *control*, and without proper control we cannot speak of agency. Another example of causal deviance has been provided by Frankfurt[3] (1978). In this scenario, a man at a party intends to spill what is in his glass because he wants to give a signal to his associates to begin a robbery, and he believes, on the basis of their arrangements, that spilling what is in his glass will accomplish this; but all this makes the man very anxious, his anxiety makes his hand tremble, and so his glass is spilled.

Whatever kinds of causal antecedents are designated as necessary and sufficient for the occurrence of an action, it is easy to show that causal antecedents of this kind can have as their effect an event which is manifestly not an action but a mere bodily movement. The spilling has as its causes a desire and a belief which rationalise the man's behaviour, but the spilling as it happens is *not* an action, because it was not under the *agent's control*. This is where the concept of guidance becomes crucial: philosophers argue that for a behaviour to count as an action, agents must have control over its unfolding, *i.e.* not just initiate it through an intention but also sustain it throughout its execution (Hendrickx, 2023).

What does this notion of control amounts to? Bishop (1989, p. 150) argues, for example, that a behaviour is controlled when the causal link from the intention to the matching behaviour is "sensitive", where sensitivity specifies that over a sufficiently wide range of differences, had the agent's intention differed in content, the resulting behaviour would have differed correspondingly. Similarly, Shepherd (2021, p. 46) writes that control involves the production of behaviour that sufficiently matches a plan-state in circumstances for which the behaviour's causal pathway is a reliable route for success. Wu (2016) has argued that an aspect X of a behaviour φ is agentially controlled if X figures in the agent's intention to φ. Others have argued that for a behaviour to be controlled, agents need to possess specific capacities (Asma, 2021), such as the capacity to effectively intervene over the behaviour if necessary (Frankfurt, 1978; Pollard, 2006a, 2006b; Zhu, 2004); the capacity to stop the behaviour (Di Nucci, 2011, 2013); or the capacity to stop and restart the behaviour (Levy, 2013).

While these debates differ in specifics, they all agree that guidance[4] is necessary to resolve the problem of causal deviance: simply being caused by an intention is not enough to make behaviour an action. In the next subsection, I show how the problems related to deviance apply also to cases of joint action, and that therefore, we need a relevant notion of guidance also for joint actions.

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the place of agency within the natural world (Buehler, 2018, 2022, 2023; Hommel et al., 2016; Schurger & Uithol, 2015; Uithol et al., 2014). That is, by explicating guidance through the operations of the executive system, for example, agency can be embedded in a scientific ontology that is not in conflict with what the natural sciences tell us about the world (Okasha, 2018, 2023). In fact, I believe that all of the above problems also apply to joint action, but for the sake of wordcount, in this paper I'll only deal with the problem posed by deviance.

[3] It has been said that Chisholm's example is not really a case of deviant causation, because the deviancy is not in the action itself (driving), but in the consequences of the action (the uncle's death) (Bishop, 1989). Frankfurt's case is slightly different, inasmuch as the deviant causal path seems "internal" to the action itself, not just to its consequences. Readers that may not be convinced by Chisholm's example may find the Frankfurt one more compelling.

[4] Here and in the rest of this paper, I sometimes talk about guidance and sometimes about control, which might confuse some readers. To clarify, "control" is a *property* of behaviours: behaviours can be controlled or not controlled. Guidance is a *capacity* of organisms. Organisms can possess or lack the capacity to guide. Crucially, we call "agents" those organisms that possess a capacity to guide. Control thus is the successful exertion of an agent's capacity to guide.

1.2. Deviant Causal Chains in Joint Action

The problem posed by deviant causal chains are easily transposed into collective contexts. Let's just focus on the Frankfurt's insight about basic deviance, but suppose, this time, that instead of just one character, there are two.

> **BASIC JOINT DEVIANCE:** Two rock climbers, Alice and Bob, are perched at the edge of a cliff, ready to perform a tandem rappel down a steep face. Their harnesses are linked together, and they have agreed that they will both lean back and start rappelling down at the same time on the count of three. The coordination is essential because the setup requires both to initiate the descent together for safety. They've practiced this and feel prepared. However, as they get into position and look down at the dizzying drop, both Alice and Bob become extremely nervous and anxious. Despite their nerves, Alice starts the countdown: "One... two... three!" But at the moment she reaches "three," both Alice and Bob experience a wave of overwhelming anxiety and faint for a brief moment. As a result of the fainting, their bodies slump backward, and they fall into the proper rappel position. The harness system engages, and they descend down the cliff in perfect synchronization, just as they had planned.

A problem arises regardless of whether we understand collective intentionality as pertaining to the content (Alice intends to lean back *together* with Alice and Alice intends to lean back *together* Bob), the mode (Alice "we-intends" to lean back and Bob "we-intends" to lean back), or the subject (Alice and Bob *together* intend to lean back). The problem is that neither Alice nor Bob taken individually, nor Alice and Bob taken "as a group", were *in control* of what was happening, their intentions notwithstanding. In this case, Bob loses guidance over his own movements, yet the collective behaviour still unfolds as intended. Does this count as a joint action? Any theory of joint action that individuates it solely based on collective intentions offers no clear answer. If we rely only on the causal role of the collective intention, it seems sufficient to label the behaviour a joint action, since the intention caused the outcome. However, this overlooks the fact that Bob's contribution was accidental. This lack of clarity points to a broader issue: the standard theory underdetermines the relationship between collective intentions and the mechanisms that *sustain* joint behaviour. This scenario mirrors cases of *basic deviance* in individual action, where an agent's intended behaviour is realized, but the causal chain leading to its realization is deviant. Here, Alice and Bob's coordination, despite being caused by their joint intention to act together, is accidental. So, just as in the individual cases – where guidance is required to explain how an intention causally sustains a behaviour as it unfolds, or equally how agents are in control of their doings – I argue that we need a concept of joint guidance to account for collective behaviours.

A critic might question the need to introduce the notion of "joint" guidance here. Why not explain the climbers' case as a failure of individual guidance instead? Perhaps this is indeed an example of deviant causation, but the disruption lies in the realization of the individuals' intentions to perform their parts, not in the collective intention itself. In this view, the climbers' behaviour fails to qualify as an action because they individually lost guidance over their own movements. On this hypothesis, no additional capacity for "joint" guidance is required; the failure can seemingly be explained more simply as a failure of individual guidance. However, this explanation is insufficient. Standard theories of joint action are silent on how collective intentions *sustain* behaviour as it unfolds. Without this explanatory mechanism, these theories struggle to address cases where individual guidance fails, yet collective behaviour still occurs. For instance, if Alice and Bob's descent is attributed solely to their collective intention, the loss of individual control (e.g., fainting) leaves us unable to explain why their action as

climbers is undermined. Does the collective intention require both agents to maintain control, or just one? Standard theories offer no clear answer. On these grounds it seems difficult to establish why a failure of individual guidance necessarily entails a failure of joint action.

To address this, one might suggest adding the restriction that, for *x* to qualify as a joint action, every individual contribution to *x* must itself be an action. However, this proposal faces challenges. First, no existing theory of joint action incorporates this requirement. Second, such a restriction may be unrealistic. For instance, commenting on Gilbert, Michael and Pacherie (2015) note that joint actions may not require each participant to have a personal intention to perform their part: ‹‹Speaking of 'intending as a body' [...] conveys the idea that a party to a shared intention may intend to do A *qua* member of that body while possibly lacking a personal intention to do A, i.e., an intention to do A *qua* individual›› (p. 95). Finally, other philosophers working on joint action have highlighted the need for something more robust. For example, Seeman (2009, p. 505) argues that joint control is not simply the sum of individual control: "It isn't that the control I might have over your doings, and you over mine, adds up to [...] joint control. It is, rather, that my and your individual doings are part and parcel of our collective engagement and are experienced in that light". Similarly, Michael and Pacherie (2015, p. 98) emphasize that individual control over one's action is insufficient for *joint* action: "[I]t is not enough that agents control their own actions, i.e., correctly predict their effects, monitor their execution, and make adjustments if needed. They must also coordinate their actions with those of their co-agents [...]". Joint agency, then, requires more than just individual control: it demands an account of how agents monitor, adjust, and integrate their actions with each other, mutually sustaining the collective behaviour, *i.e.* it demands an account of *joint guidance*.

In this subsection, I showed that deviant causal chains appear also in joint contexts. In the philosophy of individual action, deviant causal chains were faced by introducing the notion of guidance. Therefore, it seems reasonable to confront this issue in the same way, by introducing a notion of joint guidance. According to the traditional theory of joint action, what constitutes a collective behaviour as a joint action is a collective intention (Bratman, 1993; Gilbert, 1990; Searle, 1990). In this section my aim was to show that these standard theories underspecify key aspects of what it is to act together. In the rest of this paper, I argue for the claim that all these problems are eschewed by recognizing a capacity to jointly guide action. Joint guidance helps individuate joint action in the sense that it captures and explains paradigmatic agential properties such as group coordination, group integration, individual and group control over the unfolding of a behaviour and the agents' presence over the behaviour qua members of a group, and it points towards specific psychological mechanisms that make these phenomena possible. Joint guidance is therefore an informative theory because it not only explains what it is to act together, it also explains how people act together. This, I think, is already a great advantage over the standard theory of joint action.

2. Joint Guidance: A Primer

Before continuing, I want to restate the issue that is at stake: what distinguishes genuine cases of joint agency from mere spatiotemporal co-occurrence of individual actions? What's the difference between *me and you* going for a walk from A to B at time t *together* from me going for a walk from A to B at time *t and* you going for a walk from A to B at time *t*?

We can call the view that's been traditionally used as an answer to this question INTENTIONALISM:

INTENTIONALISM. *J is a joint action just if it is caused by a collective intention.*

I hope I have convinced you that BASIC JOINT DEVIANCE shows that INTENTIONALISM is not enough. Precisely, INTENTIONALISM needs to be supplemented by an explanation of how a collective behaviour is also *sustained* as it unfolds, *i.e.* it needs a robust theory of guidance, one that at least specifies how *the group* causally sustains and control the unfolding of the collective behaviour, and what is the relationship between the individuals' guidance over their individual actions that are part of the joint action and their control of the joint action as a group. Here, I want to propose this thesis:

JOINT GUIDANCE. *J is a joint action only if it stems from the exercise of a capacity to jointly guide.*

Note that JOINT GUIDANCE is not incompatible with INTENTIONALISM, rather it is a refinement, or an *explication* of INTENTIONALISM[5]. A central problem – if not *the* central problem – in the philosophy of individual action to explain this notion of *guidance:* what does it mean, for an individual, to guide their behaviours? This question has been called *the problem of guidance* (Buehler, 2022; Frankfurt, 1978; Velleman, 1992).

Buehler (2018, 2019, 2022, 2023) has argued that, in paradigmatic cases of agency, agential guidance has to be understood by appealing to the executive system. The executive system is a psychological system whose function is that of organizing and allocating processing and storage resources to other cognitive processes by performing so-called executive functions (Buehler, 2018; Gazzaley & D'Esposito, 2007). Paradigmatic executive functions include *inhibition*, *shifting*, *monitoring* and *updating* (Miyake et al., 2000). These executive functions contribute to directing and sustaining top-down attention, as well as selecting and initiating task-relevant actions. The combined operations of the executive system are sometimes referred to as "cognitive control". Buehler specifically argues that *cognitive control* constitutes the individual's agential capacity by allocating resources to top-down attention, offering a principled method to distinguish agents from sub-agential components. Cognitive control *actually constitutes* the individual's capacity to guide (Buehler, 2022), because it necessarily figures in componential explanations of central or paradigmatic exercises of individual's agency (Buehler, 2019, 2023). Although I do not presuppose Buehler's theory for my account, I take his methodology to be a fruitful example of how to explicate a psychological capacity. I will follow a similar path in this article.

The problem of guidance applies, in almost the same form, also to cases of joint actions: what does it mean for a behaviour to be jointly guided? Note that this question hides two different sub-questions: one concerns the explication of the capacity to jointly guide, the other concerns the conditions for attributing this guidance to some entities and not to others.

The Problem of (Joint) Guidance:

(i)   What is *joint guidance?* That is, we need to explain the notion of *joint* guidance. What are the constituents of this capacity? Who is it attributable to?

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[5] A question may arise concerning the possibility of spontaneous joint actions (e.g., joint actions that prima facie do not require an intention) or ballistic joint actions (e.g., actions that, once initiated, do not need further intention to run to completion). A complete answer to these cases would require extensive discussion and is therefore deferred to a future paper. However, it is worth noting that both task co-representation (Co-R) and the sense of commitment (SoC)—the components of the capacity to jointly guide a behavior—can be elicited automatically, such as through mere exposure to coordination or by fulfilling predicted behaviors. Thus, even in cases where explicit or deliberate intention is absent, the behavior can still be implicitly jointly guided as both components may be active.

(ii) What does it mean for a behaviour to be jointly guided *i.e. controlled*? That is, we need to spell out some conditions for the successful exertion of guidance.

I will later argue that joint guidance is a psychological capacity whose two components are task co-representation and the sense of commitment. This is a psychological capacity held by *individuals* but one that can be exercised only *qua* member of a group (cf. Gilbert, 1990, 2022). Therefore, the right bearer of joint guidance are individuals, under the condition that they are acting *qua* members of a group. I will clarify both of these points in sections 2.1.1. and 2.1.2.. In the next subsections, I will first provide an informal sketch of joint guidance and its components. Particularly, I will introduce task co-representation and the sense of commitment. In the following section, then, I will formally argue that task co-representation and the sense of commitment *actually constitute* the capacity to jointly guide.

2.1. Joint Guidance: A componential sketch

What could joint guidance possibly amount to? A first suggestions comes from Alonso (2009, p. 444), Seemann (2009), and Pacherie (2012), who independently argue that, if there is such a thing as a group *as a whole* controlling its own behaviours, this control cannot be just the collection of all the individual participants' individual guidance. This is because every bodily movement which is part of a joint activity is already a controlled movement of an individual participant, so what distinguishes joint action from other kinds of aggregated phenomena cannot lie solely in a property of the bodily movements of the individual participants (Seemann, 2009). In other words, this constraint is needed to exclude the possibility of what Chant (2007, p. 253) has called UNIVERSALISM:

UNIVERSALISM. Every set of actions co-occurrently performed by two or more individuals composes a joint action.

That is, in the phrase "we are doing something *together*", the "together" does not refer to a mere spatiotemporal proximity of our actions. Rather, it bears substantial metaphysical weight: it identifies our doings as a different *kind* of action.

My proposal is that we can understand how individuals act together by appealing to a psychological capacity they have: the capacity to *jointly guide* action. This capacity, I argue, has as its two components task co-representation and the sense of commitment – or the sense of being jointly committed. That is because paradigmatic, central aspects of joint action such as group coordination, group integration, mutual responsiveness, joint predictions as well as the sense of joint agency and of joint control can only be explained by appealing to these two mechanisms. That is, task co-representation and the sense of commitment necessarily figure in any explanation of (paradigmatic aspects of) joint action. In this section, I will first provide an intuitive illustration of task co-representation and the sense of commitment; then, in the next sections, I provide more precise and official explications of these capacities.

Consider a paradigmatic example of joint action: two people carrying a heavy table across a room. For the action to succeed as a joint activity, both individuals must align their behaviors toward the shared goal of moving the table. This alignment, however, cannot simply stem from individual intentions carried out in parallel. Instead, successful joint action requires both participants to coordinate with one another, adapt to each other's movements, and be mutually responsive and accountable. Importantly, much of this coordination happens automatically. Small adjustments, mutual responsiveness, and the alignment of actions do not require explicit communication or conscious intention. Rather, these

features of joint action arise from two key psychological mechanisms: task co-representation and a sense of commitment.

Task co-representation allows each agent to represent not only their own role in the joint activity but also the actions and intentions of their partner. In the table-carrying example, this involves one individual tracking the other's grip, movement pace, and shifts in posture, integrating these into a unified cognitive structure. This shared task representation facilitates joint predictions, enabling seamless adjustments without explicit communication. For instance, if one person encounters an obstacle, their partner adapts because the co-represented task structure anticipates disruptions and supports adaptive responses. Empirical evidence supports this view: during joint activities, individuals monitor both their own and their partner's actions, integrating them into a shared motor plan (Michael & Pacherie, 2015; Sebanz et al., 2003). This shared representation makes mutual responsiveness possible, a hallmark of joint action.

The sense of commitment adds a normative dimension (Löhr, 2022), ensuring that each participant remains motivated to contribute to the shared goal. In the table-carrying case, this might manifest as each person feeling obligated to maintain their grip and adjust their pace to match the other's needs. This sense of being jointly committed fosters a willingness to exert effort and make sacrifices for the group's success, even when individual convenience or preferences might dictate otherwise (Török et al., 2019). Commitment also ensures a shared sense of control over the joint action, allowing each agent to feel that they are not only controlling their own actions but also participating in a collective effort. Moreover, commitments make actions more predictable, facilitating the other agent's task co-representation. This predictability also enables agents to accept corrective interventions, further enhancing the coordination required for joint action (Fernández-Castro & Pacherie, 2023).

Critically, these two mechanisms reinforce one another in dynamic interplay. Commitments, by motivating agents to act toward a fixed goal and making actions more predictable, support the formation and maintenance of task co-representations. In turn, task co-representation updates commitments as the joint behavior unfolds, enabling flexibility and adaptation to new circumstances. This feedback loop ensures that agents remain aligned, responsive, and integrated throughout the activity (Sacheli et al., 2022).

Together, task co-representation and the sense of commitment are not merely byproducts of joint action; they are its causal drivers. Task co-representation enables the integration of individual actions into a cohesive whole, while commitment ensures sustained engagement and accountability. Their interaction accounts for the coordination, integration, and responsiveness that elevate joint action beyond the sum of individual efforts. In the next section, I will further clarify the structure and interactions of these components, showing how they together constitute the capacity for joint guidance. I will first clarify some points concerning these two components, and I will then offer a componential explanation of joint guidance.

2.1.1. Task Co-Representation

As we have seen in 1.2., joint agency requires more than just agents' being in control of their own actions. Rather, Michael and Pacherie emphasize the importance of agents coordinating their actions with those of their co-agents to achieve a joint goal, and, according to them, this coordination involves *monitoring* the intentions and actions of their partners, *predicting* the consequences of their actions, and *adjusting* one's own actions accordingly to align with those of the partners. Importantly, the

italicised words refer to prototypical executive functions, somehow suggesting that in joint actions agents exercise their agential capacities over their co-agents.

In particular, "monitoring", or *conflict detection,* is an executive function that involves the continuous evaluation of performances and information processing with respect to motor predictions, action goals and context in order to avoid conflicts and errors in the execution of actions (Botvinick et al., 2004; Cohen, 2017; Ullsperger, 2017; Wilken et al., 2023). This function is mainly realized by the anterior cingulate cortex but receives contributions from the basal ganglia, the cerebellum and the supplementary motor area (Botvinick, 2007; Cohen, 2017; Poldrack et al., 2005; Shapira-Lichter et al., 2018). Monitoring continuously checks that, once a goal has been set – consciously or unconsciously – sensorimotor information and cognitive processes are consistent with the goal (Akam et al., 2021), and if it detects a conflict, it recruits the dlPFC, which strengthens the cognitive resources towards attaining the goal-state by modulating top-down attention towards the conflicting stimuli (Cieslik et al., 2015; Norman & Shallice, 1986). This point is crucial: monitoring is only active with respect to an activated goal. So, in order to monitor other people's actions we need somehow to also represent their goals – but not as our own. We would need, instead, to *co-represent* our goals and their goals in a way that complements what we are trying to do.

Indeed, we do have experimental evidence that agents monitor – in this technical sense of executive functioning – other people's action and that they do co-represent their task during joint activities. Take, for example, the Simon effect: a phenomenon in cognitive psychology where reaction times are faster and more accurate when stimuli are presented on the same side as the response hand, compared to when they are presented on the opposite side (Simon, 1969). For example, if a participant is asked to press a left key when they see a red stimulus and a right key when they see a green stimulus, they react faster and more accurately when the red stimulus appears on the left side of the screen and the green stimulus appears on the right side. This effect occurs even though the location of the stimulus is irrelevant to the task. Sebanz and colleagues cleverly demonstrated that the Simon effect appears also when the task at hand is distributed among two people (Sebanz et al., 2003). By using a joint go/no go task, where two people were assigned different cues, they have observed a temporal latency during spatially incongruent trials. This "joint Simon effect" can only be explained by postulating that agents co-represent the actions available to the other person and indeed these co-representations influence one's own actions (for replication and extensions of the study see also Atmaca et al., 2008; and Sebanz et al., 2005). Task co-representation happens irrespectively of the collaborative or competitive nature of the task at hand (Ruys & Aarts, 2010), of the situation being perceived as safe or as a threat (Beaurenaut et al., 2021) and it is found in children as young as 5 (Saby et al., 2014) with some form of goal co-representation allegedly found even in 3 year-old children (Green et al., 2021; Michael et al., 2016b; Michael & Székely, 2019). Further studies allegedly show that people not only represent the task at hand, but also co-represent the other agents' tasks and their activities. In other words, one not only represents *that* the other has to do something, but one also represents *what* the other has to do and *when s*he has to do it (Bruijn et al., 2009; Kourtis et al., 2019; Wenke et al., 2011; Wilson & Knoblich, 2005; Yamaguchi et al., 2019). Also, as Michael and Pacherie (2015) suggest, co-representation happens regardless of whether the individuals have an intention to engage in a joint action. Task co-representation may have some hardwired limits due to our finite cognitive nature, but we do have evidence that it does not occur solely for dyads of people, but it also occurs for groups of three and four people (Milward & Sargeant, 2023)[6].

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[6] Sometimes, however, representing what others have to do or are doing can interfere with what one has to do or is doing. This happens, for example, in cases of automatic imitation or automatic perspective taking (Brass et al., 2000; Heyes, 2011; Qureshi et al., 2010; Ramsey et al., 2019): studies have shown, for instance, that "theory of

Particularly, when I refer to co-representation as one component of joint guidance, I mean that *all of the agents involved* in the collective behaviour are representing what *all the others* are doing. In fact, a more explicit term for what I mean would be *co*-co-representation, or *mutual* co-representation. For the sake of reading (and writing) simplicity, I will just write co-representation; however, bear in mind that anytime you read co-representation, I am intending mutual co-representation.

> **TASK CO-REPRESENTATION:** Task co-representation is the cognitive mechanism by which individuals integrate their own tasks with those of their co-actors into a unitary, multi-agent cognitive structure, encompassing shared goals and specifying interactions and outcomes. This process enables the automatic generation of predictions through shared motor plans, facilitating coordinated action toward a shared goal.

Note that, while my account of co-representation emphasizes that agents represent both their own and others' actions, this process need not rely on sophisticated cognitive capacities. In fact, empirical studies show that co-representation is present in non-human animals, including cooperatively breeding marmosets and macaques, and operates through routine coordination in space and time rather than complex cognitive abilities. For instance, marmosets exhibit a joint Simon effect and use mutual gaze to coordinate behaviors, demonstrating co-representation even with small brains. This evidence indicates that co-representation is accessible to small children and animals, as it often relies on perceptual and motor mechanisms rather than demanding cognitive processes (Miss et al., 2022; Miss & Burkart, 2018).

This empirical foundation suggests that co-representation involves a shared motor plan – a unifying cognitive structure that integrates each agent's actions, their predicted effects, and their temporal and spatial coordination to achieve the joint goal. Motor plans are central because they encode not only the individual's movements but also those of the partner, enabling seamless alignment and adaptation. This is supported by findings that agents can motorically represent collective goals, as demonstrated in tasks like the circle-line drawing paradigm (della Gatta et al., 2017). In these tasks, participants' actions were influenced by interpersonal motor coupling, a phenomenon indicative of motor representations that extend across agents in joint actions but not in parallel actions. This coupling highlights that co-representation is more than an abstract alignment – it is a motoric mechanism that governs execution and coordination in joint contexts. Further, research on action observation shows that observing another person's actions engages similar neural and motor processes as executing one's own actions (Butterfill, 2021; Sinigaglia & Butterfill, 2020, 2022). This implies that co-representation enables agents to simulate their partner's contributions, integrating these into a shared plan. Importantly, such simulation facilitates joint predictions: anticipating each other's movements and adjusting actions

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mind" processes automatically form representations of what others are doing in our mind. In the dot-perspective task, participants are shown a room with red dots on some of the walls. In some of the trials, a person facing one of the walls is put in the middle of the room. Participants are then either asked how many dots they see or how many dots the person in the room can see. The results show that, on incongruent trials, when the number of dots we see does not match the number of dots the other person can see, performance is impaired, meaning that people automatically calculate and represent others' perspective, and then have to actively inhibit it (Michael et al., 2018; Samson et al., 2010). In order to avoid confusion, I will stipulate a definition of co-representation that excludes cases like these ones. In the way I am going to use the term, co-representation is a much more specific phenomenon. Co-representation involves the integration of one's own and a (or multiple) partner's action within a unitary cognitive structure that incorporates the goal of the action that both partners share and that specifies the interactions and the outcomes of the participants' actions in a way that allows for the (automatic) generation of predictions and expectations – something that has sometimes been called a "N-adic motor plan" (Sacheli et al., 2018, pp. 5027 & 5033). Co-representations do not need to be suppressed and do not interfere with actions, rather they structure it, and allow people to better coordinate and understand what each is doing (Clarke et al., 2019; Sacheli et al., 2018).

accordingly to ensure mutual responsiveness and the alignment of behaviour with the shared motor plan.

Task co-representation provides a fruitful criterion thus for understanding the successful exertion of joint guidance, or control: alignment with a shared motor plan[7]. In individual action, control is often defined in terms of the reliable correspondence between an agent's behaviour and their motor plan (Shepherd, 2021). Indeed, I take this section to also be an attempt at bridging the gap between the philosophical debate on intentions – for example, Shepherd's work – and the experimental psychology work on action guidance. Therefore, in joint action, joint guidance occurs when the behaviours of all participants reliably match a dynamically shared motor plan that is co-represented by the agents. This motor plan integrates both one's own movements and those of the co-agent, allowing for real-time adjustments based on observation and mutual responsiveness. Task co-representation thus ensures that the participants' actions are coordinated and aligned with the collective goal. The sense of commitment further reinforces this alignment by making the shared motor plan more stable and predictable, motivating agents to maintain their part in the joint action. Consequently, deviations from the plan – such as a partner slowing down or altering their actions – can be immediately detected and corrected through the expectations encoded in the motor plan. This continuous process of monitoring and adjustment allows joint guidance to be successfully exerted, ensuring that the collective behaviour unfolds as intended (Butterfill, 2021; Butterfill & Sinigaglia, 2014; Sinigaglia & Butterfill, 2022).

2.1.2. The Sense of Commitment

Co-representation on its own, however, is not enough to ground talk of joint guidance. That is because, as I have shown in 2.1.1. (check also footnote 5), co-representation occurs automatically. Every time we observe others acting, we represent their actions, but this does not imply any joint engagement. In other words, co-representation alone does not reject UNIVERSALISM. Instead, co-representation needs to be supplemented by a psychological mechanism that is in place solely when people are part of a more cohesive whole, ideally one that can also account for the motivational stability, shared sense of control, and predictive coordination that joint guidance requires. Fortunately, we know of the existence of such a mechanism: *the sense of commitment*.

> **SENSE OF COMMITMENT:** The sense of commitment is the psychological mechanism that allows individuals to recognize signs indicating that another agent is expecting and relying on them to fulfil specific tasks, prompting them to strengthen or maintain their drive to complete those tasks[8] (Michael et al., 2016b; Michael, 2021). This mechanism plays a crucial role in fostering the sense of joint agency and joint control, motivating shared goals, and accepting agential intervention by others. It also enhances action

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[7] One might ask how the reliance on joint motor plans applies to joint *mental* action. However, I believe this question is unwarranted. First, I reject the distinction between bodily and mental action, as it presupposes a form of dualism. In what sense is a bodily action not mental, or a mental action not physical? A more accurate distinction to this end would be between *overt* and *covert* action. Thus, the question becomes: what about joint *covert* action? I argue that no such thing exists. A full defense of this claim exceeds the scope of this paper, but it suffices to say that meaningful joint action requires a real-time, mutually responsive feedback loop, which is impossible in purely covert action. Joint action, as I have argued, inherently depends on observable, dynamic coordination, which covert action cannot provide. I thank an anonymous reviewer for pressing me on this point.

[8] I talk about *the sense of commitment* and not about commitments *simpliciter,* because the first is the psychological mechanism that drives joint action, whereas the second is a social act. For more on this distinction see Michael, 2021.

predictability, facilitating co-representation by making the actions of each agent more aligned and stable (Fernández-Castro & Pacherie, 2023; Michael, 2021; Michael & Pacherie, 2015).

Unlike traditional notions of commitment – modelled as explicit speech acts, promises, or agreements that rely on intentionality, common knowledge, and a developed theory of mind (e.g., Searle, 1969; Michael, 2021) – the sense of commitment is an empirically discovered mechanism that has been observed in humans, infants, and non-human animals to operate implicitly, without deliberation or formal agreements (Heesen et al., 2020, 2021; Michael et al., 2016b; Michael & Székely, 2019). This distinction is critical, as many joint actions involve agents who lack the cognitive sophistication required for explicit commitments, such as animals or infants (Heesen et al., 2017, 2020, 2021; Székely et al., 2019), or happen spontaneously, without any need to express commitments (Michael, 2021).

As it has been argued, the sense of commitment emerges from situations that meet a *minimal structure* composed of two conditions (Michael et al., 2016b; Michael, 2021):

(G): One agent (ME) desires a specific outcome or is currently working toward a goal (G).

(X): Another agent's (YOU) contribution is essential to achieving that goal.

In this minimal structure, the sense of commitment can arise for one or both agents:

ME's sense of commitment: ME feels that YOU is committed to performing X if ME expects X to happen because both conditions (1) and (2) are met.

YOU's sense of commitment: YOU feels committed to performing X if YOU believes ME is relying on her to contribute X.

This process is itself underpinned by two psychological mechanisms:

Goal slippage: Goals are represented in an agent-neutral manner, allowing an agent to adopt another's goal as their own. For example, observing a partner struggling to complete a task can prompt an agent to spontaneously take on the goal of helping, even without explicit deliberation (Michael et al., 2016).

Expectation fulfilment: Agents are motivated to meet the expectations of others, a tendency likely shaped by natural selection to promote cooperation and trust (Michael et al., 2016).

The sense of commitment is indispensable for joint guidance because it extends and stabilizes co-representation. Co-representation alone enables agents to predict each other's actions, but without the motivational and normative stability provided by the sense of commitment, these predictions lack reliability. By fostering mutual accountability and motivation, the sense of commitment: 1. enhances co-representation – the predictability of an agent's actions increases when they feel committed, enabling their partner to more accurately anticipate and coordinate actions; 2. fosters the sense of joint agency – the sense of commitment allows agents to feel as though they are acting as part of a group rather than as individuals, creating a shared sense of control; 3. motivates shared goals – agents are motivated to act not only for their own goals but also for goals they perceive as shared, ensuring coordinated action; 4. supports agential intervention – by accepting that their actions depend on and are influenced by others, agents become more open to guidance and correction, reinforcing the group dynamic. Together, co-representation and the sense of commitment interact to enable smooth and effective joint guidance. Co-representation provides the anticipatory framework for action, while the sense of commitment adds the motivational and normative layer necessary for joint agency and mutual reliance.

Importantly, task co-representation and the sense of commitment are interrelated but distinct capacities that do not fully presuppose one another, though they co-occur in joint actions. Task co-representation involves the integration of one's own and others' actions into a shared framework,

enabling mutual prediction and coordination. By contrast, the sense of commitment introduces a normative and motivational layer, ensuring that agents remain engaged and accountable to shared goals. These capacities are complementary but can operate independently. For example, task co-representation can occur without the sense of commitment in competitive contexts, where agents monitor and adjust to each other's actions without any shared goals or mutual accountability. Conversely, the sense of commitment can drive joint actions in contexts with minimal co-representation, such as when asymmetrical roles or spontaneous collaboration limit the need for detailed alignment of actions.

In summary, while co-representation is necessary for joint guidance, it is not sufficient. The sense of commitment provides the psychological grounding that stabilizes and motivates joint action, allowing agents to work together effectively. By fostering shared goals, enhancing predictability, and reinforcing co-representation, the sense of commitment transforms the co-represented tasks into genuine joint endeavours. In the next section, I will argue that these two components together constitute a capacity to jointly guide action and explore their implications for challenges such as those posed by deviance.

2.2. Actual Constitution

I claim that task co-representation, together with the sense of commitment, *actually* constitutes joint guidance, *i.e.* our capacity to jointly guide collective behaviours. *Actually constitutive* explanations explain a target capacity given the actual, nomological structure of the world. In this sense, to *actually constitute* a capacity, the sense of commitment, together with task co-representation, must be *real components* of that capacity. To be a real component of a capacity, the sense of commitment, together with task co-representation, must figure in a componential explanation of joint guidance (Craver, 2007; Craver et al., 2021; Weiskopf, 2017). A componential explanation of a capacity, precisely, has to show that the sense of commitment, together with task co-representation, are *robust – i.e.* they have a stable cluster of properties that are detectable in a variety of causally and theoretically independent ways – and that they present *mutual manipulability* with the *explanandum*. Mutual manipulability means that «the target component is a part of the capacity and (i) interventions on exercises of the target capacity change activities of its components, and (ii) interventions on the activities of components change exercises of the target capacity» (Buehler, 2022, p. 37; Craver, 2007; Craver et al., 2021), *i.e.* that the components play an actual causal role in generating the target phenomenon.

2.2.1. Componential Explanation: Co-Representation and The Sense of Commitment

I will start by showing that co-representation is robust, and it is mutually manipulable with joint guidance in paradigmatic examples of joint action. I will then do the same with the sense of commitment.

Recall that by task co-representation I mean that all the agents involved in a collective behaviour represent what others are doing and what they themselves are doing in a unified manner, all sharing the same representation-type. Note that most of the following evidence concerns co-representation in the traditional sense, and not in the sense that I am using, *i.e.* mutual co-representation. Nevertheless, mutual co-representation is not a different *kind* of phenomenon: mutual co-representation is just co-representation by all the agents involved. So, whatever holds for co-representation in the traditional sense also holds for co-representation in my sense.

Task co-representation is a robust phenomenon, as evidenced by its detection in a variety of causally and theoretically independent paradigms. For instance, in joint Simon tasks (Atmaca et al., 2008; Sebanz et al., 2003), participants exhibit interference effects when sharing a task. Specifically, irrelevant features of their partner's stimulus (e.g., spatial location) activate conflicting responses, resembling the effects seen when a single individual performs the entire task. This suggests that participants represent their partner's task rules (stimulus-response mappings) as if they were their own. Similarly, in the dot-perspective task (Michael et al., 2018; Samson et al., 2010), participants implicitly track another agent's visual perspective, even when it is irrelevant to their own task. This demonstrates that co-representation extends beyond motor responses to encompass higher-level representations of attention and perspective-taking.

The robustness of task co-representation is further supported by findings in automatic imitation tasks (Heyes, 2011; Ramsey et al., 2019), where individuals involuntarily mimic their partner's actions, reflecting shared motor representations. These effects occur even when mimicry interferes with the participant's own task, highlighting the automaticity of co-representation. In coordination tasks, such as synchronized movements or joint object manipulation (Clarke et al., 2019), co-representation facilitates real-time predictions of a partner's actions, ensuring seamless coordination.

Finally, studies using response conflict tasks, such as go/no-go paradigms, provide additional evidence for the robustness of task co-representation. These experiments demonstrate that participants experience interference effects even during their partner's turn, indicating that their partner's task rules are represented alongside their own. For example, Wenke et al. (2011) showed that participants represent both their own and their partner's stimulus-response mappings, resulting in competition between self- and other-generated responses during task performance. This interference arises even though participants act independently, demonstrating that task co-representation operates implicitly and automatically, rather than requiring explicit cooperation or shared goals. Therefore, there is no doubt that it is a robust phenomenon.

As for the manipulability criterion, I first need to show that task co-representation is part of joint guidance. That co-representation generates central marks of joint action has been extensively shown in section 2.1.1.. To briefly recapitulate: task co-representation actively enables agents to integrate their own motor plans and goals with those of their partners. It makes monitoring, predicting, and adjusting to others' actions possible, ensuring behavioural alignment with joint goals.

There is extensive evidence that manipulating task co-representation can directly impact the capacity for joint action. When individuals observe the actions of others, they automatically represent these actions using the same motor representations, a process that can sometimes interfere with their own actions, a phenomenon known as the *visuomotor effect* (Brass et al., 2000, 2001; Craighero et al., 1996). However, when performing paradigmatic joint action tasks, visuomotor effects are absent for incongruent partners' actions but present for irrelevant actions from non-partners, suggesting that co-representation is modulated by the context of joint action. This suggests that agents typically co-represent their actions and those of their partners as part of a unified motor representation (Clarke et al., 2019; Sacheli et al., 2018). However, this co-representation can be disrupted when task-related representations are manipulated. For instance, if co-representation is altered – by introducing conflicts or external influences – acting jointly becomes more difficult or even fails. This shows that manipulating the shared representational structure impairs the ability to act jointly. On the other hand, when joint action itself is manipulated – for example, by removing shared goals or introducing sequential tasks – the capacity for co-representation is no longer fully engaged, as the integration of actions into a unified representation is diminished (Vesper et al., 2013). This highlights the direct causal relation between co-representation and joint action: disrupting one mechanism can lead to a failure in the other, demonstrating their mutual manipulability.

Further evidence for the mutual manipulability of task co-representation and joint guidance comes from Zapparoli et al. (2022). In their study, they found that both sensory suppression and intentional binding – paradigmatic agential marks for individual guidance – can be experienced for actions performed by other people on conditions that action monitoring processes can be activated over the behaviours of the co-agents. This monitoring, as we have seen, constitutively requires a unified representation of what the co-agents are doing *and* is modulated by the feeling of commitment[9]. Indeed, Zapparoli and colleagues have found that in tasks were there was a pre-defined interactional role (i.e. follower/leader) participants showed more signs of intentional binding when they were followers rather than leaders, a finding that can be easily explained in terms of commitments: followers are committed to their leaders, for example, but not so much the contrary (see Bolt et al., 2016; Bolt & Loehr, 2017; Shiraishi & Shimada, 2021). Most of the studies that Zapparoli and colleagues reviewed, however, required participants to do something while sequentially alternating roles, which as they themselves recognized, might have not allowed people to integrate their action representations in unified cognitive structures. Indeed, the only study in which they found the same level of intentional binding effect between the joint action group and the control group was a study performed by Jenkins et al. (2021), in which participants were made to act together both in the metaphysical and in the spatiotemporal sense, allowing for both commitments and co-representations to develop (Zapparoli et al., 2022, p. 115).

Let's turn now to the sense of commitment.

First of all, we know that the sense of commitment is elicited by coordination (Michael et al., 2016a), by the perception of effort (Székely & Michael, 2018) even in cases of human-robot interaction (Székely et al., 2019) and by repetition (Bonalumi et al., 2019, 2022). We know how these three factors interact, and that they essentially boil down to mechanisms of effort perception (McEllin et al., 2023), and that therefore commitments are detectable by probing effort. We also know about the failures of the sense of commitment, namely that it is impaired by Borderline Personality Disorder (Ooi et al., 2018). We know why and through which mechanisms commitments motivate action and cooperation (Fernández-Castro & Pacherie, 2023; Michael, 2021; Michael & Pacherie, 2015; Michael & Székely, 2019) and we know how commitments are dissolved (Chennells & Michael, 2022). Finally, we can detect the sense of commitment in a variety of ways: again, by measuring effort perception (McEllin et al., 2023; Székely et al., 2019; Székely & Michael, 2018), by measuring the curvature of walking trajectories (Michael, 2021), and by measuring the involvement of some executive functions, especially inhibition and interference suppression (Michael, 2021). Therefore, it seems possible to conclude that the sense of commitment is a robust psychological entity.

That the sense of commitment is an essential part of joint guidance has been gestured at in section 2.1.2.. More specifically, the sense of commitment plays a foundational role in joint guidance by acting as an essential mechanism that drives the coordination of actions toward a shared goal. First, it ensures that individuals remain aligned with the group's collective goal, providing a stable psychological framework that motivates each participant to fulfil their part of the plan. The sense of commitment also enhances predictive abilities, enabling agents to anticipate their co-agent's behaviour and adapt their actions accordingly. In addition, the sense of commitment strengthens willingness to stick to the shared plan, even when faced with distractions or temptations, by filtering out irrelevant stimuli that could

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[9] In the analysis, Zapparoli and colleagues appeal to "pivotality" as a phenomenon that can manipulate these measures of joint agency. Pivotality refers to the amount of individual contribution to goal achievement (p. 102, see also Le Bars et al., 2020). In contexts were pivotality was equally spread among participants, they showed *more* intentional binding, *i.e.* a stronger feeling of joint agency. However, pivotality, as it is defined, may actually refer to commitments inasmuch as it is experimentally probed through effort, and how much effort one is willing to put into something is a proxy of their commitment (Michael, 2021; Székely & Michael, 2018) Equal pivotality therefore would indicate *joint* commitments.

disrupt the joint effort. Without this binding commitment, individuals would lack the necessary motivation and accountability to align their actions with others, making joint action impossible. In essence, the sense of commitment transforms a group of individuals into a unified entity, allowing them to act together cohesively and effectively.

As for the mutual manipulability, the sense of commitment is strongly related to the sense of joint control. Fernández-Castro and Pacherie (2023) have argued that the sense of commitment plays a crucial role in fostering a sense of joint agency and thus of joint control among individuals, even in situations where inherent asymmetries exist. By establishing (joint) commitments within a group, individuals gain the normative authority to evaluate and regulate each other's behaviour based on shared expectations. This normative force helps balance out power differentials, as even those with less control or influence, such as bench players in sports teams, can express discontent when actions deviate from agreed strategies. Rituals and actions within groups, like those in sports or military training, reinforce collective commitments and normative expectations. Moreover, asymmetries in roles or expertise come with specific duties and entitlements, shaping the distribution of accountability and control within joint actions. For instance, followers can demand that leaders fulfil their committed responsibilities, exerting control over their behaviour within the collective endeavour. Thus, the sense of commitment serves as a mechanism for navigating and mitigating asymmetries, in order to foster a cohesive sense of joint agency and joint control among participants. Furthermore, as Michael and Pacherie (2015) also suggested, the sense of being jointly committed to do something can reduce the motivational uncertainty about what others will do and thus help to stabilize expectations and predictions, helping people to coordinate each other – coordination which in turn bolsters the sense of joint agency (cf. Michael et al., 2016a). Finally, the sense of being committed can justify the presumption to intervene to correct someone's behaviour (and thus controlling it) if it veers off too far from what one has committed to.

There is also further evidence that simply doing something together elicits the sense of commitment (Alonso, 2009; Michael, 2021; Michael et al., 2016b, 2016a). The findings by Michael and colleagues (Michael et al., 2016a) support the argument that engaging in coordinated activities inherently triggers the sense of commitment. Their research demonstrates that the perception of commitment arises directly from the interdependent nature of coordinated actions, where individuals form and rely on shared expectations about each other's contributions. This reliance creates implicit social pressure to fulfil these expectations, ensuring the continuation of the joint action. The experiments revealed that even without explicit agreements or normative obligations, observing coordinated efforts led participants to infer a stronger commitment among the agents involved. These results underscore that by fostering joint guidance one elicits the sense of commitment.

So, in this sense, exercises of joint guidance co-occur with a sense of commitment towards the other agents. Furthermore, specific manipulations of sensorimotor cues like the predictability of a partner's behaviour have a crucial impact on the (implicit) agency experienced over the partner's actions in joint contexts (Frith et al., 2000; Zapparoli et al., 2022), and we have independent evidence that commitments help in grounding predictions about others' actions. Furthermore, in an extensive meta-analysis about the sense of joint agency where they investigated indirect measures of implicit sense of agency like intentional binding and sensory suppression

Building on extant account of individual behavioural control (Bishop, 1989; Shepherd, 2021), the successful exercise of joint guidance involves the continuous production of joint behaviour that aligns with the content of a shared motor plan. Both task co-representation and the sense of commitment are indispensable for this process, as they fulfil distinct yet interdependent roles.

Task co-representation allows for the motor plan to be shared and dynamically updated through joint predictions. By integrating and monitoring each other's actions, individuals create a shared cognitive framework that enables them to adapt their behaviour in real time to align with the collective goal. This requires constant adjustments to accommodate shifts in the task or the actions of collaborators, ensuring that the execution of joint behaviour remains smooth and effective. Co-representation also facilitates mutual understanding of roles, enabling agents to anticipate each other's contributions and coordinate accordingly (Atmaca et al., 2008; Sebanz et al., 2003). It involves executive functions such as inhibition and updating (Michael, 2021) and is facilitated by mechanisms of goal integration (Michael et al., 2016b; Michael & Székely, 2019).

The sense of commitment stabilizes and sustains this dynamic process by reinforcing shared goals and strengthening the reliability of mutual predictions. It motivates individuals to resist distractions and overcome personal temptations that might otherwise lead to disengagement. The sense of commitment also fosters acceptance of agential interventions from others, encouraging individuals to prioritize the collective plan over their individual preferences. By creating normative pressure to fulfil others' expectations, the sense of commitment ensures that agents remain committed to the shared task and accountable for their contributions. These mechanisms collectively maintain alignment with the motor plan and sustain joint control over time.

Critically, both elements are essential. Co-representation provides the cognitive infrastructure for updating and refining the shared motor plan, while the sense of commitment provides the motivational and normative framework that ensures individuals persist in executing it. Without task co-representation, joint behaviour would lack the flexibility and precision required for adaptive coordination. Without the sense of commitment, the motivational drive to adhere to the collective plan and resist alternative goals would falter, undermining the stability of the joint effort.

The interaction between joint commitments and co-representation is crucial. As individuals co-represent tasks, they engage in expectation fulfilment, conforming their behaviours to align with collective expectations even at the cost of some personal control (Michael et al., 2016b). This process of goal slippage and expectation fulfilment creates a strong sense of commitment, motivating individuals to act according to collective expectations. Note that co-representation and commitments are decouplable, each can occur without the other. Nevertheless, when occurring together, the resulting behaviour is a successful exercise of the capacity to jointly guide (Atmaca et al., 2008; Sebanz et al., 2003). Together, task co-representation and the sense of commitment enable the continuous, adaptive exercise of joint control. Co-representation ensures that agents can update and synchronize their behaviours, while the sense of commitment fosters adherence to the shared plan, anchoring agents' actions to a common goal. This interplay fosters a collective sense of control, enabling successful joint action and the attainment of joint goals.

3. Joint Guidance and Joint Actions

I have so far argued that theorists working in the field of joint action should recognize that agents have a capacity to jointly guide action, and that this capacity is actually constituted by the sense of being jointly committed and by task co-representation. Hopefully, I have shown why joint intentions by themselves are insufficient to explain joint action because as in cases of individual action, we also need an explanation of how agents causally sustain the unfolding of the behaviour, *i.e.* a notion of joint guidance.

In doing so, I provided an answer to both questions posed by the problem of guidance (cf. section 2.). As for the first, joint guidance is the capacity that *individuals* possess to jointly guide behaviour. It is composed by task co-representation and the sense of commitment, as both these mechanisms are required to generate paradigmatic hallmarks of joint action. Therefore, answering the second question, a collective behaviour is jointly controlled, *i.e.* it qualifies as a genuine joint action, if it is the result of a successful exercise of the capacity to jointly act by all involved parties. Task co-representation provides a shared motor plan that the actual behaviour needs to match for it to be controlled, and the sense of commitment provides the motivation to actually match it and the willingness to act together in the first place, as well as the willingness for all agents involved to accept other's agential intervention over one's behaviour. Together, co-representation and the sense of commitment, make coordination, mutual responsiveness and adaptability, joint predictions possible, as well as modulate the feeling of joint agency and of joint control.

Let's now go back to BASIC JOINT DEVIANCE. This scenario illustrates a situation in which joint guidance fails, despite the outcome aligning with the jointly intended goal. Recall that Alice and Bob planned to rappel down the cliff together, relying on synchronized action for safety. Their co-representation of the task involved a shared motor plan: leaning back simultaneously on the count of three. Their sense of commitment, established through their agreement, motivated their mutual willingness to act together and trust each other's actions. However, at the critical moment, both Alice and Bob experienced a brief fainting spell due to overwhelming anxiety. This fainting disrupted their ability to exercise joint guidance, which requires both co-representation and the sense of commitment to function effectively. First, the co-represented motor plan was not followed: their behaviours (slumping backward as they fainted) did not match the planned execution of leaning back voluntarily on the count of three. Their bodily movements were automatic and unintentional, driven by the physical consequences of fainting rather than by adherence to the shared motor plan. Second, their sense of commitment was momentarily interrupted. Fainting reflects a loss of the psychological state necessary to sustain mutual engagement and responsiveness, both of which are fundamental to fulfilling the commitment to act together. In this case, while the physical outcome – rappelling in sync –matched the goal of their joint plan, the conditions for successful joint guidance were not met. This highlights a key distinction: joint action is not merely about achieving the intended result but also about how that result is brought about. Successful joint action requires the participants' behaviours to be causally sustained by their joint guidance mechanisms: co-representation and the sense of commitment. To unpack this further, co-representation ensures that both agents share a structured motor plan, which guides how they anticipate and execute their actions in coordination with one another. When Alice and Bob fainted, the physical outcome (slumping backward) did not arise from a match between their actual behaviour and the shared motor plan; instead, it was a coincidence brought about by their loss of control. In terms of joint commitment, the momentary loss of consciousness disrupted their mutual willingness to act together and adapt responsively. Commitment involves more than setting a goal – it entails actively maintaining the relationship between one's own behaviour and the behaviour of the other. This case thus demonstrates why joint guidance is essential to distinguish genuine joint action from cases where the outcome is achieved by accident. The fainting spell broke the causal link between their shared motor plan, their motivation to act together, and their actual behaviours. As a result, Alice and Bob's descent cannot be described as a successfully controlled joint action, even though the outcome aligned with their intended goal. The hallmark features of joint action – mutual responsiveness, coordination, and adaptability – were absent in the execution.

4. Conclusion, Open Questions and Future Directions

A worry that has been raised multiple times by psychology researchers on joint action (e.g. Sebanz et al., 2006; Vesper et al., 2010) is that mere talk of collective intentions is not *informative*. That is, positing collective intentions for explaining joint action does not help researchers truly understand the phenomenon, because the intentionalists' proposal says nothing about the underlying cognitive and neural mechanisms at work in cases of joint action. From the point of view of the cognitive and neural scientist, understanding joint action in terms of collective intentions is mysterious, because they are an *ad hoc* philosophical postulation which does not really help in explaining *how* individuals act together and does not structure the empirical research in any way. On the other hand, I have showed that joint guidance is a more robust concept then "collective intentionality" because it can be traced back to specific cognitive and neural mechanisms. Since guidance is a central construct for understanding how individuals act, the question concerning joint guidance is important insofar as it is a necessary part of the endeavour to find «a cognitive architecture that addresses the cognitive processes enabling people to perform actions together... [one that] covers planning for immediate actions, action monitoring and action prediction, and ways of simplifying coordination» (Vesper et al., 2010, p. 998).

To recapitulate: I argued that joint action theorists should recognize the existence of a capacity to jointly guide action, as the problem that fostered talk of guidance in individual action also applies to joint action. I presented a view of joint guidance as constituted by task co-representation and the sense of commitment. In this last section, I will highlight some still open questions and point towards some future directions of investigation, both philosophical and psychological.

First of all, as I have argued, joint guidance requires joint commitments. So in cases in which we are all committed to do the same thing, but are not *jointly* committed to do that thing, joint guidance predicts that there is no joint action. Probably, these cases can be heavily influenced by culture, and thus whether there is joint guidance depends on contextual cultural factors. Further studies need to be done to understand the interface between culture and cognition. In any case, joint guidance is a completely naturalistic construct, so it eschews the metaphysical problems related to joint intentions and group subjects.

Importantly, co-representation can also be found in some adversarial interactions. For example, in some competitive contexts, competitors co-represent the task at hand even if they have opposing goals. Nevertheless, there is still a sense in which they are jointly committed to do what they're doing. Suppose that we are playing chess against each other. Even though we have opposing objectives, we are still (implicitly) jointly committed to playing chess. If I suddenly get up and punch you in the face there is a sense in which I am disrupting our commitment to play by the rules of chess. In cases like this, joint guidance provides a framework for understanding competitive joint actions.

An interesting worry concern asymmetric cases: imagine a hierarchical structure, one in which I am committed to you, but you are not committed to me. In this case, surely no joint guidance is at play, because one of the two agents involved will not accept the other agential incursions over their agential capacities. Nevertheless, it is perhaps a form of "extended" guidance, a case in which one agent's guidance is partly extended over the other agent. Or, slightly similarly, think of cases in which two (or more) agents are both committed to do something but are not jointly committed to do something. Maybe then collective behaviours have a more complex taxonomy than initially thought, and this is a case of *collective* but not *joint* action. In general, joint guidance seems a fruitful construct to study agency. Another interesting asymmetric case concerns joint actions with artificial systems (cf. Strasser & Schwitzgebel, 2024). These cases have been so-far treated as being akin to tool use, because artificial systems are not *real* agents. We have seen however how people can feel committed to robots (Székely et al., 2019). Maybe people can also co-represent an artificial system's behaviours. If that were the

case, *prima facie,* a person can extend their guidance over the robot's activities. This might not be a case of genuine joint guidance – because artificial systems might not be said to truly feel committed – but as in hierarchical structures, this could be a case of extended individual action. This would be an intermediate position between tool use and quasi-sociality.

Another empirical question is what the bounds of joint guidance are. We know that people are able to co-represent tasks in groups of 2 and 3 people. Can we co-represent a task that involves 78 people? Probably not. 5 people? Probably yes. The exact number will depend on physiological factors. This could be why people prefer to cooperate in small groups, and larger groups tend to inevitably break down in smaller sub-groups.

I believe that this view of joint guidance better explains how joint agency is embedded in the natural world, making a further step in a naturalistic understanding of agency more generally. This is because, first of all, joint guidance does not require agents to have concepts, contrary to shared intentions. Joint guidance does require an executive system, and the two sub-components of the sense of commitment, *expectation fulfilment* and *goal slippage*. As for the first, according to Yin (2024), a primitive executive system has existed since vertebrate evolution's outset. Even in the lamprey, which diverged 560 million years ago, the basic cortico-basal circuit persists, likely supporting some executive functions. This circuit, observed in songbirds, shares similarities with mammals' and hints at a common ancestry dating back at least 300 million years (Yin, 2024). Notably, invertebrates also exhibit a proto-corticobasal circuit; the arthropod's central complex is deemed analogous to the vertebrate circuit (Yin, 2024), implying a bilaterian ancestor approximately 600 million years ago, predating the split between Protostomia and Deuterostomia (Yin, 2024). But then joint guidance also requires commitments. There is evidence that some higher primates like bonobos and great apes can form commitments (Heesen et al., 2020, 2021). However, the extent to which they need mechanisms such as goal-slippage and expectation fulfilment need to be investigated empirically. Nevertheless, my model provides testable hypotheses in this direction.

In the end my proposal is rather modest. I have argued that, as in individual action, we should recognise a capacity to jointly guide collective behaviours. I have given some reasons to believe that such a capacity may be useful for individuating joint actions and that such a capacity is in accordance with what cognitive science tells us. I have argued that joint guidance is constituted by task co-representation plus the sense of being jointly committed.

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