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Commitments and the sense of joint agency

Víctor Fernández-Castro¹  | Elisabeth Pacherie² 

¹Philosophy Department I, University of Granada, Granada, Spain

²Institut Jean Nicod, UMR8129, CNRS, DEC, ENS, PSL University, Paris, France

Correspondence

Víctor Fernández-Castro Departamento de Filosofía I, Edificio de la Facultad de Psicología, Campus de la Cartuja, Universidad de Granada. 18011 Granada, Spain.

Email: vfernandezcastro@ugr.es

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The purpose of this article is to explore the role commitments may play in shaping our sense of joint agency. First, we propose that commitments may contribute to the generation of the sense of joint agency by stabilizing expectations and improving predictability. Second, we argue that commitments have a normative element that may bolster an agent's sense of control over the joint action and help counterbalance the potentially disruptive effects of asymmetries among agents. Finally, we discuss how commitments may contribute to make acting jointly emotionally rewarding, both by improving coordination and by inducing or reinforcing the circumstances under which shared emotions emerge among co-agents.

KEYWORDS

action predictability, commitments, joint action, normative control, sense of joint agency, shared emotions

1 | INTRODUCTION

An important body of work in philosophy and psychology has emphasized the importance of commitments in joint actions and social interactions (Bratman, 2014; Clark, 2006; Gilbert, 2013; Michael & Pacherie, 2015; Michael & Salice, 2017; Siposova et al., 2018). In philosophy, for instance, Margaret Gilbert has claimed that joint actions require co-agents to form shared intentions which, she argues, essentially involve joint commitments, thus putting joint commitments at the very heart of her theory of joint action. Even authors like Michael Bratman (2014), who denies that joint actions necessary involve joint commitments in Gilbert's sense,

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accept that joint actions require that each participating agent be committed to acting jointly with others, that is, at least, committed to the mutual compatibility of their relevant sub-plans and committed to helping others fulfill their role if needed. In psychology, a growing body of empirical research in developmental and cognitive psychology explores the relation between joint actions and commitments and normative understanding (Carpenter, 2009; Gräfenhain et al., 2009; Michael & Székely, 2018; Rakoczy et al., 2008; Siposova et al., 2018). For instance, Siposova et al. (2018) have investigated the role that commitments and their verbal and gestural elicitation could play in the development of children's capacities for cooperation.

The importance of commitments in joint agency is often associated with their capacity to improve coordination and prediction by stabilizing partner's expectations regarding each other's actions (Michael & Pacherie, 2015). The sense of joint agency refers to the sense of acting together or to the experience of having joint control over an action (Dokic, 2010; Seemann, 2009). Some theoretical proposals have identified several factors that may influence the sense of joint agency (e.g., Pacherie, 2012, 2014; Salmela & Nagatsu, 2017) and the role played by some of these factors has been empirically tested (e.g., Bolt et al., 2016; Dewey et al., 2014; Le Bars et al., 2020, 2022; van der Wel, 2015;). However, despite a vast literature on commitments in joint action, the role commitments may play in shaping the sense of joint agency remains underexplored.

This article aims at investigating the role of commitments in the generation of the sense of joint agency. Our purpose is not to engage with current controversies on whether joint actions require shared intentions or not, and if so, on how best to construe the notion of shared intention.¹ We think it is possible to explore the links between commitments and sense of agency in joint action while remaining neutral on these issues. In what follows, we operate with a minimal characterization of joint action, understood as any form of social interaction where two or more individuals coordinate their actions in pursuit of a shared goal. In particular, sharing a goal should not be taken as synonymous with sharing an intention. Rather, we understand shared goals along the lines proposed by Butterfill (2012), where the function of shared goals is to coordinate the activities of several agents and where for two agents or more to share a goal it is sufficient that there be a single goal to which each agent's action are directed, that each agent expect the other agents she identifies to perform actions directed to the goal and expect this goal to be realized as an effect of all their actions directed to the goal.²

We are also happy to maintain a pluralist stance on commitments. We accept that the commitments present in joint action can take various forms—for example, joint commitments, or public personal, unilateral commitments—and that the obligations stemming from these

¹Classical philosophical accounts typically hold that joint actions require co-agents to form shared intentions, but also disagree on how best to construe the notion of a shared intention (e.g., Alonso, 2009; Bratman, 2014; Gilbert, 2013). In contrast, in recent years, so-called minimalists have argued that at least some forms of joint actions need not involve shared intentions (see, e.g., Fiebich, 2020).

²As Butterfill (2012) notes, shared goals can be seen as primitive counterparts of shared intentions. On the one hand, they fulfill only one of the functions classically assigned to shared intentions: They serve to coordinate the activities of agents but not to structure bargaining or coordinate planning. On the other hand, while sharing an intention is often thought to require knowledge that the intention is shared, sharing a goal only requires agents to form expectations about their own and other agents' goal-directed actions and their common effect. Note also that when sharing a goal is understood in this way, the characterization we operate with need not be taken as less minimal than the characterization of joint action offered by Sebanz, Bekkering, and Knoblich 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” (Sebanz et al., 2006, p. 70). Rather, it merely emphasizes the goal-directed nature of the coordinated actions implicit in their characterization.

commitments can be of a rational, a moral, or a *sui generis social* kind.³ It is not the purpose of this article to defend a particular stance on whether particular types of commitment are constitutively involved in joint action. Rather, we simply take it that various forms of commitments are very common in joint action. We also accept that commitments can be established in various ways, through explicit speech acts such as promises, nonverbal communication such as facial expressions (Siposova et al., 2018), or, even more implicitly, through repetition or the investment of effort or other resources (Gilbert, 2006; Michael & Salice, 2017). While we are open to the existence of various forms of commitments in joint action, our focus will be on commitments that are public as the commitments most likely to make an important contribution to a sense of joint agency. Of course, explicit public commitments provide a paradigmatic basis for common knowledge, but even more implicit commitments, to the extent that they are detected, can provide a basis for common knowledge, or at least common belief. In this article, we will mainly be interested in two features of (public) commitments in joint action: They create in other expectations concerning what one will do, and they generate normative pressure to act in conformity with these expectations.

In what follows, we would like to explore how such commitments may play a central role in shaping three aspects of joint action that distinguish it from individual action and thus be involved in the emergence of the experience of joint agency: The higher complexity and number of required predictions regarding actions and their consequences, the various forms of asymmetries that can exist among the participants to a joint action (e.g., roles, degrees of expertise, and hierarchy), and the distinctive emotional experiences and affective states that may motivate the action or that individuals may experience during its unfolding.

The article is structured as follows. After introducing the notion of the sense of joint agency and three of its main distinctive characteristics (Section 2), we discuss the role commitments may play in shaping these distinctive characteristics. First, we propose that commitments may contribute to the generation of the sense of joint action by stabilizing expectations and improving predictability, and thus, improving the match between the expected and actual results of the partners' action. However, the contribution of commitments is not in generating expectations regarding lower-level aspects of actions like motor patterns, but in stabilizing expectations regarding higher-level aspects like goals (Section 3). Second, we argue that commitments have a normative dimension that entitles the recipient of the commitment to display regulatory actions—for example, protesting or reprimanding—when the author of the commitment fails to fulfill the expectations generated by their commitment. Such an entitlement may produce a sense of control over the joint action to the extent that it enables the recipient to influence the behavior of the co-agent and thus the overall joint plan and goal and to counterbalance the potentially disruptive effects of asymmetries in the experience of joint agency (Section 4). Finally, we discuss how commitments may shape the affective dimension of the sense of joint agency by improving coordination and making it easier to achieve rewarding outcomes, but also by providing exculpatory justifications when the action produces undesired consequences (e.g., harm), or by fostering circumstances under which shared emotions emerge.

³For instance, Margaret Gilbert's (2013) conception of the normativity involved in commitments is neither that of moral norms nor that of norms of practical rationality but, rather, a *sui generis* form of social normativity. For discussions of possible taxonomies of commitments, see Michael and Pacherie (2015), Clark (2006), and Shpall (2014). For a recent discussion of the various forms commitments can take and the roles they can play, see Michael (2022).

2 | SENSE OF AGENCY AND SENSE OF JOINT AGENCY

Our voluntary actions are typically associated with a certain sense of agency, that is a subjective experience of control over our actions and their consequences (Haggard & Chambon, 2012; Moore, 2016). While the processes contributing to individual sense of agency have been much scrutinized since the late 1990s, interest in the sense of agency agents experience when acting jointly is more recent and the number of studies that have investigated this phenomenon remains limited (e.g., Bolt et al., 2016; Dewey et al., 2014; Le Bars et al., 2020, 2022).

Research on the sense of agency for individual actions has uncovered a rich set of mechanisms and factors that contribute to its emergence and modulation, ranging from sensorimotor comparison processes that measure the degree of congruence between the predicted consequences of motor commands and sensory reafferences (Frith et al., 2000) to general-purpose causal inference processes (Wegner, 2003). In recent years, the sense of agency has been proposed to result from the weighted integration of the cues contributed by these different processes, along a Bayesian perspective where prior beliefs contribute to and shape the emergent sense of agency (see Chambon et al., 2014; Moore & Fletcher, 2012). Studies have also shown that beyond cues and processes associated with action programming and performance, the sense of agency is also influenced prospectively by the fluency of action selection processes internal processes involved in the selection of actions, in advance of the action itself (Sidarus & Haggard, 2016). In addition, properties of action outcomes, such as their magnitude or emotional valence, have also been shown to influence the sense of agency for an action (Kawabe, 2013; Yoshie & Haggard, 2013).

Relative to individual action, the sense of agency in joint action has received much less attention. It has been suggested that when people coordinate their actions with others they may feel a sense of joint agency, which is the sense that “we” did it (Pacherie, 2014). However, little is known about the concrete factors that contribute to the emergence or modulation of a sense of joint agency.

Pacherie (2014) has proposed that while the mechanisms supporting the sense of agency in individual action may also be involved in the emergence of a sense of joint agency, the specificities of joint action introduce further complexity. To begin with, joint action does not only require predicting the consequences of one's own actions (self-predictions), but also predicting the actions of one's partner and their consequences (other-predictions) and integrating both types of predictions to build predictions about the joint consequences of the combination of actions (joint-predictions). However, it is unclear whether low-level sensorimotor predictions and discrepancies between these predictions and sensory feedback play as important a role in the sense of agency for joint actions as they do for individual action or whether the sense of joint agency may rely more on predictions of others' actions based on higher-level processes.

In addition, joint actions can take a great diversity of forms and present various forms of asymmetries among agents. These asymmetries may be found at the action selection stage (e.g., decider vs. follower); during action execution, with possible qualitative and quantitative differences in the agents' respective contributions to joint action (e.g., experts vs. novices; more pivotal vs. more peripheric roles) and in the forms of coordination involved (asymmetric vs. mutual), as well as in respect to possible differences in how much each participant benefits from the action outcome, once it is completed (e.g., equal, proportional, or unfair distribution of benefits). Much remains to be done in exploring the impact these asymmetries might have on the emergence of a sense of joint agency. The few existing studies suggest however, that asymmetries may have a detrimental effect on the sense of joint agency. For instance, Bolt et al.

(2016) investigated the effect of mutual coordination on the sense of joint agency using a task where people had to coordinate to produce a sequence of tones. They found that their participants experienced a stronger sense of joint agency in a version of the task where they had to produce the tones in alternation, thus requiring tight mutual coordination since each partner had to adapt the timing of their own actions to the timing of their partner's actions, compared to a sequential version of the task where only the second partner had to adapt the timing of their actions to the timing of their partner's actions.

Finally, while there is evidence that the emotional valence of an action outcome modulates the sense of agency for individual actions, this and other emotional factors may also modulate the sense of agency for joint action. First, joint action may help us achieve positive outcomes that it would be difficult or even outright impossible to achieve alone. In addition, as emphasized by Salmela and Nagatsu (2017), acting jointly may also be intrinsically rewarding insofar as it contributes to the emergence of positively valenced shared emotions, including social emotions such as fellow-feeling or sense of affiliation. Consider, for instance, two people preparing a meal together. They might do it not only, or not so much, because it makes achieving the desired outcome easier and faster (sometimes it is simpler to be alone in a kitchen!) as because they enjoy doing something together. As we shall see in Section 5, Salmela and Nagatsu argue that shared emotions play a crucial role in the affective phenomenology of joint action and detail various mechanisms of shared affect in joint action.

In this section, we highlighted three distinctive characteristics of the sense of agency for joint action. First, it depends on predictive mechanisms that may be more complex than those supporting the sense of agency for individual action and contributions from various predictive mechanisms may be weighted differently. Second, various forms of symmetry or asymmetry among agents may tend to either bolster or disrupt their sense of joint agency for an action. Third, to the extent that joint actions can involve emotions of a social nature, affective phenomenology may play a more important role in the sense of joint agency than it does in the sense of individual agency. In the three sections that follow, we will discuss the role commitments may play in shaping these distinctive characteristics.

3 | UNCERTAINTY REDUCTION AND THE SENSE OF JOINT AGENCY

Several authors have emphasized the role of commitments in making agents' actions predictable as a pivotal element for successful joint actions (Michael & Pacherie, 2015; Michael & Salice, 2017; Siposova et al., 2018). According to these authors, commitments enable agents to have more reliable expectations about their partners' actions than would otherwise be possible, thus reducing uncertainty and facilitating cooperation and coordination. Michael and Pacherie (2015), for instance, have argued that commitments are important tools for reducing the various forms of uncertainty that can undermine the success of joint action. First, one may doubt that the co-agent is fully motivated to perform the joint goal (motivational uncertainty). Second, two agents may be motivated to pursue the joint goal but have different beliefs regarding how to achieve their joint goal (instrumental uncertainty). Finally, the two co-agents may both share a joint goal, instrumental beliefs, and all the relevant background information but fail to be aware that this is the case (common ground uncertainty). Commitments may therefore facilitate

coordination and mutual predictability among co-actors by stabilizing expectations regarding action but also by providing reasons for acting jointly.

Now, does the capacity of commitments for generating stable predictions influence the sense of joint agency? As emphasized in the previous section, the sense of joint agency depends significantly on how well one can predict not just one's own behavior and its consequences (self-prediction) but also the actions of one's co-partners and their effects (other-prediction) and the consequences of the agents' combined actions (joint prediction). Thus, our sense of joint agency depends at least partially on our capacity to make accurate predictions.

Given the capacity of commitments for stabilizing expectations and reducing uncertainty, we can see in what sense they can impact the sense of joint agency. To the extent that commitments can produce more reliable expectations and reduce uncertainty regarding co-partner's actions and its consequences, we can expect that the sense of joint agency will be stronger for joint actions where the participants have established clear commitments regarding their joint goal and the specific tasks or actions entrusted to each of them. Furthermore, given that the sense of agency also depends on the accuracy of predictions regarding the consequences of the partners' combined actions, the reduction of uncertainty and the reliability of expectations may also help partners make more accurate joint predictions.

The idea that commitments and sense of joint agency are related has received indirect support from empirical evidence showing that perceived coordination or movement synchronization may bolster our sense of commitments (Michael et al., 2016; Vignolo et al., 2019). For instance, in a series of experiments, Michael et al. (2016) presented a group of participants with different videos where two persons either made independent individual contributions to a joint action (low coordination condition) or made contributions that were tightly linked (high coordination condition). After watching the videos, the subjects were asked to estimate whether and for how long the observed agents would resist a tempting outside option and remain engaged in the joint action. The results indicated that participants were more likely to expect agents to resist outside options when observing joint actions with a high degree of coordination, suggesting that people perceive coordination as a cue of the degree of commitment that the agents take on a joint action. According to the authors, these results support the hypothesis that within a highly coordinated joint action an agent's performance of their contribution expresses her expectations about the other agent's upcoming actions, as well as her reliance upon those expectations, generating social pressure on the other agent to perform their contribution to avoid disappointing her expectations and wasting her efforts. In other words, coordination creates (implicit) commitment. Taking the perspective of one of the agents may in turn lead participants to sense this social pressure and accordingly to perceive a higher degree of commitment.

At this point, however, one may wonder whether commitments play more than a marginal role in shaping our sense of joint agency. Joint actions involve a myriad of different mechanisms for coordination and prediction (Knoblich et al., 2011; Vesper et al., 2017). Some identified devices include motor predictions (Blakemore & Decety, 2001), entrainment or rhythmic synchronization (Harrison & Richardson, 2009), perception-action matching (Brass & Heyes, 2005) or motor simulation (Sebanz & Knoblich, 2009). Many of these mechanisms rely on low-level representations including motor specifications or perceptual expectations that encode fine-grained specifications of the action. However, the expectations associated with commitments seem to be produced by more high-level representations involving abstract plans and goals. One might think, then, that the low-level mechanisms that are involved in the realization of the joint actions would play a greater role than commitments in shaping a joint sense of agency. In other words, the objection runs, given the number of low-level mechanisms

involved in joint action, it seems improbable that the sense of joint agency would depend on commitments rather than on these representations and processes.

Replying to this objection requires emphasizing that both individual and joint actions involve different levels of action specification. According to Pacherie (2008, 2012), there are three main levels of action specification involved in the phenomenology of individual and joint action: a distal intention level which involves reasoning about ends, means, and plans and high-level rational guidance and monitoring of action; a proximal intention level that inherits a plan from the distal level and anchors the plan in the situation of action; and a motor intention level, involving motor representations that specify the fine-grained details of action execution. These levels of specifications contribute differently to the phenomenology of action in general and the sense of agency in particular. For instance, while motor intentions contribute to the sense of control only when discrepancies between predicted and actual consequences that are too large to be automatically corrected are present, distal, and proximal intentions play a continuous role in the experience of control relying on the perceived match between the predicted and actual perceptual effects of the situated goals or the conceptual congruence between desired and actual outcome.

Analogously, one may expect predictions involved in joint action to be typically organized along a hierarchy of intentions and action representations. For instance, when one perceives one partner's hand moving toward a door handle, one can generate motor predictions regarding their arm's trajectory or the shape of their grip but also more distal predictions regarding one's partner goal (e.g., he is heading toward the kitchen to prepare some coffee). While commitments may not be very useful in helping us predict lower-level aspects of an action they might play an important role in helping us predict higher-level aspects of action like general goals and objectives or plans. Thus, we have compelling reasons to believe that the high-level expectations regarding a co-agent's behavior generated by commitments may contribute to the sense of joint agency to the extent that they match with the actual outcomes of their action.

In addition, if our sense of joint agency relied solely or mostly on sensorimotor information, we should expect it to be weaker than our sense of individual agency. First, the match between the expected sensory consequences of an agent's own actions and their actual sensory consequences could be distorted by one's co-agent does (van der Wel et al., 2012). Second, our access to the sensorimotor cues our partners use when acting is at best limited and indirect, thus seriously limiting the accuracy and reliability of our predictions regarding their motor actions and their sensory consequences. As several authors have emphasized (Dewey et al., 2014; Pacherie, 2014; van der Wel et al., 2012), these problems may be partially solved if one takes the sense of agency for joint action to arise predominantly at the perceptual rather than at the sensorimotor level. On such a perceptual account, perceptual cues present in the environment may help us infer the proximal intentions of our partner and predict the perceptual consequences of their actions. If the sense of agency for joint actions depends on the degree of match between the expected and actual perceptual consequences of actions, it will not necessarily be reduced for joint action compared to individual actions. Its strength will depend on how well co-agents perform and on how much perceptual information they share.

However, joint actions do not always take place in a shared perceptual environment, as many of us have learned trying to work together virtually during the Covid-19 pandemic. In addition, many joint actions involve more than just a pair of agents, making it difficult or even impossible to make detailed perceptual predictions regarding the consequences of their actions and to monitor their actual perceptual consequences. Thus, while lower-level capacities like motor simulation may still play an important role in small-scale joint actions requiring very

fine-grained spatiotemporal coordination, it is plausible that for many joint actions, the sense of joint agency may rely more on predictions of others' actions based on higher-level processes. Some recent studies (Dewey et al., 2014; Le Bars et al., 2020, 2022) support the idea that agency cues are weighted differently for individual and for joint agency, with the sense of agency for individual action relying more on cues linked to sensorimotor predictions and the sense of joint agency giving more weight to cues derived from higher-order inferences. While these studies did not directly investigate the contribution of commitments to the sense of joint agency, it is reasonable to assume that the capacity of commitments to generate high-level expectations may contribute to the sense of joint agency to the extent that the co-agent's behavior matches these expectations. By stabilizing high-level expectations regarding objectives and plans, commitments may mitigate decreases in sense of control by attenuating the possible distortions introduced by the co-agents or compensating for a lack of shared perceptual environment. For instance, if my partner does something unexpected at the proximal level, I may still trust she is doing something coherent with the joint goal and plan to the extent that we have established relevant commitments, thus attenuating my feeling that I do not have control over the situation provoked by these distortions or unexpected behaviors.

4 | **NORMATIVITY AND CONTROL**

As noted in Section 2, the notion of joint action encompasses many different types of interactions that can take significantly diverse and heterogeneous forms. Joint actions may differ along various dimensions, including the number of agents and their roles in the execution of the action, the hierarchies or structures that shape their interactions, their contribution to the overall goal and plans, or the forms of coordination involved among their participants. In principle, asymmetries along these dimensions may substantially impact the way individuals experience the sense of joint action (Pacherie, 2012). In this section, we argue that commitments may contribute to the sense of agency to the extent that they give us a form of control over our partner, and thus, may modulate and counterbalance some of the possible negative impacts of these asymmetries. But, how may commitments help partners exert control over each other and how may they contribute to preserve a sense of joint agency in the presence of such asymmetries?

In the previous section, we have seen how commitment-based expectations can reinforce the sense of agency to the extent that they reduce uncertainty, and thus, increase the match between expected and actual actions and their consequences. In this sense, commitments can facilitate the reinforcement of the sense of collective agency precisely to the extent that they produce the feeling that the agents are in control of the action because everything happens as expected.

However, the control that co-agents exert on a joint action can be limited and indirect. Even though agents might influence each other in the absence of a hierarchy, it seems that it is mainly when agents have some sort of authority over their partners that they can exert some form of control over their actions with commands, orders, or gestures. Even in that case, though, the impact on the co-agent's behavior may be loose, which, in turn, makes room for spurious experiences of control, that is, a sense of control over others' behavior derived not from actual control but rather from our ability to accurately predict their behavior (Pacherie, 2012). So, could commitments play a role in counterbalancing such looseness, and thus, helping co-agents to exert actual control over the joint action? Here, we propose that one way in which commitment may contribute to the sense of agency is by facilitating the exercise of control on a

co-agent's behavior in a less spurious manner. Furthermore, we argue that the form of control over one's partners afforded by commitments may help counterbalance the possible disruptions in the sense of joint agency provoked by certain asymmetries among agents.

Appreciating our idea requires considering the fundamental normative nature of commitments. In the previous section, we have emphasized the idea that commitments help us generate various expectations regarding actions. However, the nature of expectations is peculiar, as they can be descriptive or normative (Greenspan, 1978; Paprzycka, 1998). When we expect an agent A to do X because she is committed to G, we do not just predict and anticipate X (descriptive expectations) but we are entitled to demand X from A on the basis that she has the obligation to G (normative expectation). Imagine, for instance, that an agent A reliably predicts that another agent B will be at the bus stop at 9.00 on the basis that A has consistently seen that agent B at the bus stop at 9.00 every day. Now, consider that one makes the same prediction on the basis that agent B has promised to A that she will be at the bus stop at 9.00. While the frustration of this expectation entitles A to express their annoyance, to blame or to sanction B in the second scenario, that is not the case in the first scenario.

The normative dimension of commitments is perhaps at its most obvious in Margaret Gilbert's classic analysis of joint commitments according to which they give rise to obligations for their authors to act in accordance with their commitments and concomitant rights or entitlements on the part of their recipients to demand that they so act (Gilbert, 2013). While we agree with Gilbert that such networks of mutual obligations and entitlements play a central role in joint action, we are more reluctant to admit that accepting the presence of such networks of obligations and entitlements in joint action forces us to accept the claim that joint commitments are constitutive of shared intentions or indeed that shared intentions rather than simply shared goals are necessary for joint action. As Pettit and Schweikard (2006) claim, it may well be it is in virtue of their jointly acting together that people are jointly committed to one another, rather than people jointly acting together in virtue of their being jointly committed. Similarly, we take the presence and role of mutual obligations and entitlements in joint action to be in principle compatible with a range of normative theories. While one may understand their normativity as a *sui generis* form of social normativity, as Gilbert herself does, one may instead take the normativity at stake to be the normativity at stake is moral in kind (e.g., Alonso, 2009). Our purpose here, though, is not to try and adjudicate between these different views but to understand how the normative aspect of commitments may contribute to the sense of agency. For that, we need to consider the basic psychological mechanisms through which obligations and entitlements impact our behavior.

To get a more precise sense of how the normative aspect of commitments may contribute to the sense of agency, we must pay attention to the entire dynamic exchange when commitments are frustrated or fulfilled in an interaction. Elaborating on several views of moral responsibility (Fricker, 2016; McGeer, 2012), we argue elsewhere (Fernández Castro & Pacherie, forthcoming) that reactive attitudes like blaming, or reprimanding have a forward-looking dimension that seems to be fundamental for understanding how they scaffold the agency of others. When an agent reacts to the frustration of a commitment, for instance, by reprimanding or manifesting surprise or disapproval, the recipient of such reactive attitudes understands that her behavior is being subjected to normative review, and thus, she may co-react by offering an apology or adjusting her action. These co-reactions only make sense when we see reactive attitudes as urging the wrongdoer to review her behavior and mental attitude in the light of the expectations generated by the commitments that the wronged party attributed to her. For our purpose, the importance of these reactive attitudes is that they seem to impact the cognition and disposition

of the author of the commitments (the recipient of the reactive attitude). As Fricker (2016) claims, even when the wrongdoer does not admit the violation or does not acknowledge her previous commitment, the reactive attitude can produce sufficient psychological friction on the wrongdoer to orient her mind toward an evaluative stance and lead her to review her motives or reasons to behave as she did.

The importance of the normative aspect of commitments for the sense of agency lies in the regulatory power or looking-forward dimension of reactive attitudes. From the point of view of the recipient, the establishment of the commitment entitles them to regulate and react to their co-agent behavior according to the expectations the commitment generates. In addition, the forward-looking dimension of such regulative actions like protesting or manifesting disapproval when the commitments are violated ensures that the recipient of the commitment can exert control over their partner's action. In this sense, the normative aspect of commitments may boost the feeling that one is in control of the joint goal to the extent that they entitle the recipient of the commitment to exert control on the partner's behavior through different reactive attitudes and thus provide them with a greater capacity for influencing the overall joint action.

The forms of control over our partners made possible by commitments can shape our sense of joint agency in general. For instance, the social dynamics of reactive attitudes and co-reactions explicated above may not only help to scaffold agency, but also, to develop a sense of responsibility or duty.⁴ As such, commitments may also contribute to the emergence of the sense of joint agency to the extent that they enforce responsibility and in particular responsibility for the outcomes of the joint action.⁵ We believe, however, that there is a more specific way in which the normative aspect of commitments may influence the emergence of the sense of joint agency; namely, commitments may counterbalance the possible disruptive effects of the different forms of asymmetries among agents.

Although the empirical studies investigating how various forms of asymmetries among agents may impact the sense of joint agency remain scarce, we already have some evidence that point in that direction. For instance, Le Bars et al. (2020) investigated the effects of differences in how much each agent contributed to the joint action and differences in how rewards were distributed among co-agents and found that the sense of joint agency was significantly enhanced when agents' contributions and rewards were symmetrical (i.e., equal).

Several studies have also explored the impact of leader-follower situations on the sense of joint agency, with somewhat inconsistent results. Bolt et al. (2016) asked their participants to rate their feelings of control over the timing of the tapping sequence on a scale ranging from "shared control" to "independent control". Their participants reported feeling stronger joint agency when they held the role of follower compared to leader. In these tapping studies however, even leaders did not have a choice of which action to perform, they only differed from followers in that they had more control over action timing. In contrast, van der Wel (2015), used a decider-follower scenario, where one actor decided on the target, but the contributions of both actors were needed to reach the chosen target. The study found that actor role did not systematically influence the sense of agency participants reported, except when the decider's choice of target conflicted with the preferred target indicated by the follower at the start of a trial, in which case the follower reported a reduced sense of control. Le Bars et al. (2022) used a novel

⁴Thanks to an anonymous referee for pointing this out to us.

⁵There is evidence that the sense of responsibility is highly dependent on the symmetric or asymmetric nature of the normative relations among agents. See for instance, Caspar et al. (2020) on effect of military training on sense of agency and responsibility.

collaborative task where they varied the amount of strategic decision noise. Participants had to reach one of four targets, each associated with a given payoff. The targets' payoffs could be either equal or unequal for both players, making players' interests respectively congruent or divergent. In addition, participants were asked to separately rate their individual sense of control and their collective sense of control over the action. The study found that both individual and collective agency ratings were consistently lower for followers compared to leaders. More specifically, in situations of divergent interest followers' but not leaders' individual agency ratings decreased, but collective agentive ratings were reduced for both agents compared to situations of common interests, in line with van der Wel's suggestion that when the agents' intentions or interests are incongruent the sense of joint agency may break down.

Although the potential impact of other asymmetries on the joint sense of agency remains to be tested (e.g., differences in level of expertise, knowledge asymmetries or asymmetries in access to information relevant to the execution of the joint action) and asymmetries that have been empirically investigated have only been tested in a very limited range of situations, one may extrapolate from the above empirical findings that those asymmetries might also disrupt the sense of joint agency.

As a result, one may wonder why even though many of these factors might negatively impact on the sense of joint agency, people might still, in some cases, feel satisfaction in taking part in such joint action and experience a robust sense of joint agency. A clear case, for example, is that of a soldier who feels part of a collective and experiences a significant degree of joint agency in carrying out a mission with their fellow soldiers even though their actions are done in obedience to the orders of their commanding officer. Another example might be a player on a basketball team whose role is secondary to that of the stars of the team but who nonetheless feels like an indispensable member and experiences a sense of joint agency for the plays of the team.

In our view, it is precisely the capacity of commitments to enable certain regulative actions on the part of the participants that enables those individuals to experience a sense of joint agency despite the asymmetries that should in principle undermine it. As soon as there is a commitment between individuals who are part of a collective, these individuals become entitled to evaluate and regulate the behavior of others in accordance with the expectations that follow from the commitment. In this sense, they automatically acquire the normative status that endows them with a certain capacity to control the behavior of their peers regardless of whether or not they have greater control over the situation due to other factors such as their role or knowledge. To return to our basketball example, even the bench player who goes out on the court with the team's star in a basketball game can express his displeasure (and exercise some psychological friction on the others) when the star performs an action that is not expected given the tacit acceptance of the team's strategy.⁶

Such examples show us how the existence of certain commitments can help counterbalance the effects of asymmetries that might otherwise undermine the sense of joint agency. In this sense, it is not trivial that in sports or military contexts training usually involves rituals or other types of actions that help reinforce the group's collective commitments to certain goals or

⁶At this point, one could argue that the sense of joint agency is not necessarily connected to control, but rather to collective responsibility. However, as we noted above, we think that the sense of responsibility emerges from the obligations and entitlements associated with commitment and above all from the social dynamics of reactions and co-reactions that scaffold it. In this sense, we understand the sense of responsibility as a psychological by-product of the normative aspects of engagement and social dynamics, and thus in a control-dependent sense.

values, for instance, blame games. These rituals and actions have, of course, an important function in reinforcing emotional and affective factors (see Section 5 below) but also in reinforcing the normative expectations to which group members must respond as a collective.

Further, this normative force of commitments influences the sense of joint agency not only because joint action may require general joint commitments to reach collective goals or plans that can counterbalance the possible negative impact of existing asymmetries, but also because asymmetries among agents—for example, unequal roles or different degrees of expertise—are typically associated with specific duties and entitlements. In everyday cases involving leader-followers' situations or unequal distributions of rewards for instance, there will also be a different distribution of normative expectations and accountability between agents differently situated. For example, if an agent commits to act as leader in a given joint action, she also undertakes obligations that she would not have otherwise and generates corresponding expectations in her co-agents. In this sense, the followers are entitled to demand that the leader carry out the specific responsibilities she undertook when committing to act as leader and, to that extent, can exert control over the leader's behavior even if the joint action in general is influenced to a lesser degree by their own individual actions.

Let us take stock. Commitments exhibit an important normative element that is manifested in the fact that when a commitment is in place, each party is entitled to holding the other party responsible for their duties and, for instance, to engage in regulative actions—for instance, expressing displeasure, blaming, or asking for reasons—when a commitment-based expectation is frustrated. Such a normative status results in a greater capacity for exerting control over the co-agent, and consequently, in a stronger feeling of control over the joint action. Commitments, then, might influence the emergence of the sense of joint agency by boosting the feeling of control of the parties to the commitment. Furthermore, the normative element of commitments may also shape the sense of joint agency by counterbalancing or reducing the possible disruptive effect that various asymmetries among members of the group may cause. In cases where an unequal distribution of rewards or the different roles or degree of expertise of the members may risk disrupting the sense of joint agency, commitments can repair the feeling to the extent that they endow the individuals potentially affected by such asymmetries with the capacity to exert normative control over the actions of others, and thus have a greater impact on the joint action in general.

5 | COMMITMENTS AND THE AFFECTIVE DIMENSION OF SENSE OF JOINT AGENCY

As we indicated in Section 2, experiences of joint agency are likely to have a stronger affective component than experiences of individual agency. On the one hand, joint actions can be instrumentally rewarding, insofar as they can yield valued outcomes that would be more difficult if not downright impossible to achieve were one acting alone. On the other hand, as argued by Salmela and Nagatsu (2017), acting jointly may also be intrinsically rewarding insofar as it contributes to the emergence of positively valenced shared emotions, including social emotions such as fellow-feeling or sense of affiliation. How, then, do commitments contribute to shaping the affective component of the experience of joint agency and how, conversely, are they modulated by affective experiences?

Let us first briefly consider the positively valenced emotions linked to the achievement of valued outcomes. As we discussed in Section 3, one important role of commitments in joint

action is to stabilize expectations and thus to facilitate coordination and mutual predictability among co-actors. Clear commitments the agents abide by thus make the success of a joint action and the positive emotions linked to the achievement of its desired outcome more likely. In addition, monitoring the progression of the joint action as it unfolds and seeing that it is on the right track and likely to yield the valued outcome may generate shared positive affect and this emotional convergence may both function as a coordination smoother for joint action by facilitating the bodily and cognitive alignment of co-agents (Michael, 2011) and reinforce the motivation of participants to act as committed.

In contrast, agents' sense of individual and joint agency is typically reduced when their actions have negatively valenced consequences (e.g., hurting people). As shown by Caspar et al. (2020), this may be especially the case when a strict hierarchical organization is in place, as in the armed forces. These authors also showed that denying responsibility was not merely a post hoc attempt at avoiding blame, but that in agents obeying orders in such an organization the brain processes underlying the sense of agency were altered, with reduced intentional binding between action and outcome and reduced processing of the action outcome.

While strict hierarchical organization may present an extreme case, both the sense of individual and the sense of joint agency are also typically reduced in more mundane situations. Take an amateur basketball team losing a game after playing poorly, anecdotal evidence suggests that back in the locker room they can easily engage in a blame game. Each attributes responsibility to some other players or their coach for their failure, a common complaint being that this or that player was not sufficiently committed to the joint goal of winning the game or was putting his own individual interests ahead of the team's interests (e.g., John was trying to show off by attempting to take a 3-point shot himself instead of passing the ball to Mehdi who was in a better position to shoot and score).

However, as emphasized by Salmela and Nagatsu (2017), beyond the affective value, positive or negative, attached to the outcome of a joint action, acting jointly may also be intrinsically rewarding. Salmela and Nagatsu detail various mechanisms of shared affect in joint action. These include first the affective rewards of various forms of behavioral and physiological synchrony as evidenced in several studies on motor behavior (Hove & Risen, 2009), body postures and gaze patterns (Shockley et al., 2009), facial expressions (Chartrand & Bargh, 1999), or heart rate (Vikhoff et al., 2013). Salmela and Nagatsu also discuss collective effervescence, the emergence of shared emotions in ritualistic social interactions as analyzed in the Durkheimian tradition of sociology (e.g., Collins, 2014), the pleasure derived from corresponding sentiments, as proposed by Adam Smith (2002 [1759]) and more recently Sugden (2002), and the way in which joint intentional activities can generate such corresponding sentiments. Finally, they consider the proposal put forward and empirically tested by Lawler et al. (2014) that social exchanges that begin with instrumental motivations can give rise to strong affective ties between partners that transform the motivational structure of those exchanges. On that basis, Salmela and Nagatsu argue convincingly that shared emotions are “noncontingent concomitants and consequences of most joint actions” that are “capable of rendering joint actions rewarding in their own rights to the participants” and are “an important contribution to the phenomenology of joint action” (2017, p. 466).

In addition, Salmela and Nagatsu distinguish three types of shared emotions. According to their typology, shared emotions of the weakest type “emerge when a group of individuals appraise the emotion-eliciting event convergently in relation to their overlapping private concerns”, and when various mechanisms “synchronize the individuals' emotional responses, producing a shared affective experience among individuals who are mutually aware that others are

feeling the same” (pp. 459–460), as in the case of shareholders' fear of a market meltdown. Moderately shared emotions involve collective rather than individual concerns, that is, are experienced by individuals *qua* group members, “but the group membership is normatively weak because it is maintained through a private identification or commitment” (p. 460). Finally, the stronger type of shared emotions they identify “is founded on a collective commitment to the underlying shared concern” and thus felt by individuals as group members in a normatively strong sense” (p. 460). As we can see, Salmela and Nagatsu's typology of shared emotions is based on the nature of the concerns and commitments that ground their emotional evaluation of a situation: private concerns and commitments for the weakest type; private commitments to collective concerns for the moderate type, and collective commitments to collective concerns for the strong type. While similar mechanisms may be involved in producing a shared affective experience in all three cases, identification to the collective in the stronger forms of shared emotions would, according to Salmela and Nagatsu, give rise to more robust affective synchrony and add to the intensity of the shared affective experience.

People acting together are typically committed to a joint goal and thus, in Salmela and Nagatsu's sense, have at least a minimal collective concern, the success of their joint action. In addition, their commitment to the joint goal may be collective rather than private and encompass further concerns beyond the particular concern corresponding to the current joint goal (e.g., they may share a group-ethos in Tuomela's sense [Tuomela, 2007]). Thus, acting together is likely to give rise to the stronger forms of shared emotions in their typology. This might be truer, though, for some forms of joint actions (e.g., smaller-scale, egalitarian) than for others (Pacherie, 2012, 2014). For instance, a factory worker's commitment to doing their part on the assembly line might have more to do with their private concern for keeping their job than with their company's concern for increasing profits. Interestingly, organizations marked by a strict hierarchical organization and various forms of coercion may use collective rituals and other strategies aimed at building esprit de corps and team culture to compensate for the loss of sense of control experienced in these hierarchical contexts. A well-known example is the management system of large Japanese corporations, with collective rituals such as singing the company's song, after-hours socializing (*nomikai*) where the hierarchical rules of the workplace context are relaxed, and policies of job security and generous benefits to insure loyalty to the firm. We may thus conclude, following Salmela and Nagatsu, first, that joint actions are rewarding in their own right insofar as they give rise to shared emotions and, second, that the intensity of these shared emotions and the extent to which they are rewarding depends on the nature and strength of the participant's commitments.

This leaves us, though, with a final question: Why is it that sharing emotions, including possibly negative emotions, feels good? In closing, we would like to suggest that this question and the question what motivates us to abide by our commitments have closely related answers. We recently argued (Fernández Castro & Pacherie, 2021), that the need to belong, that is, the need to affiliate with others and form long-lasting bonds with them (Baumeister & Leary, 1995), is what primarily motivates us to interact and engage with those around us and act as committed so as to preserve and reinforce the bonds we have forged (see also Godman, 2013; Godman et al., 2014).

Here, we would like to suggest that, similarly, the main reasons why shared emotions feel good is that they manifest bonding and affiliation among those who share in them and thus current satisfaction of the need to belong. This may contribute to explaining why even shared negative emotions may feel good to some extent and thus why, for instance, the scenario described earlier of members of a defeated sport team playing the blame game once back in the

locker room is not ineluctable. In a close-knit team, the intrinsic reward linked to shared emotions, even negative, might be more important than the external reward associated with a victory. Sharing the same fate, be it defeat rather than victory, might be the more important affective experience.⁷ Thus, the need to belong, commitments and shared affects may be part of a mutually reinforcing dynamic. The need to belong motivates agents to commit to collective concerns and act accordingly, inducing shared affective experiences and fostering a sense of joint agency and these positive experiences associated with belonging may in turn reinforce our commitments to collective concerns and increase our willingness to engage in joint actions.

6 | CONCLUDING REMARKS

While there is a substantial body of theoretical and empirical research investigating the different mechanisms involved in the generation of individual sense of agency, research on the sense of joint agency is far scarcer. Addressing this phenomenon requires, we believe, taking into account the specificities of joint action in comparison with individual action. Joint action, for instance, does not only involve generating predictions regarding one's own actions and their perceptual consequences, but also generating predictions about the actions of our partner(s) and their consequences and integrating both types of predictions to build predictions about the joint consequences of the combination of actions. Furthermore, joint actions present a wide variety of forms and may involve various types of asymmetries among agents. Finally, the affective phenomenology of joint action seems to be richer and more complex than the affective phenomenology of individual action. For example, collective actions usually involve shared emotions such as fellow-feelings or feelings of affiliation. Moreover, joint action on numerous occasions appears to be intrinsically rewarding, that is, we find them gratifying and pleasant regardless of our interest in the outcome.

It would not be unreasonable to suppose that these distinctive features of shared actions will have a definite impact on our sense of joint agency. In this article, we have explored the idea that commitments, which seem to play a fundamental role in the formation and unfolding of joint actions, may modulate some of these aspects and, consequently, play a fundamental role in our experience of acting jointly. According to our proposal, commitments can affect our experience of shared agency in several ways. First, commitments can generate reliable higher-level expectations about the behavior of co-agents, which would positively impact our sense of joint agency to the extent that these expectations are met. Second, commitments enable the


⁷Note though that while the need to belong is a powerful motivation, it may not be sufficient to insure one's continued affiliation to a particular group if the group's actions stray too far from the values one cares about. The varied reactions of Republicans to the storming of the US Capitol on January 6, 2021, provide an interesting case study. The shared shame experienced by some on behalf of the actions of fellow Republicans might have led them to dissociate from the party and seek another political affiliation. Others instead might have tried to preserve their affiliation and dissociate themselves from the actions of the rioters by considering that they were extremists and did not represent the Republican party. Yet others seem to have coped with the dissonance by redefining reality, remembering the participants as protesters primarily peaceful and law-abiding rather than rioters, or embracing the conspiratorist view that the storming was a false-flag operation perpetrated by left-leaning groups. (<https://fivethirtyeight.com/features/why-republicans-take-jan-6-less-seriously-than-other-americans/>). How often our need to belong is in tension with the actions and emotions of a group we affiliate with may depend on the size and cohesiveness of the group. How one reacts to such tensions when they arise may in turn depend on the availability of alternative affiliations and on the ease with which one can sever affiliation to the group. We thank an anonymous reviewer for pointing out this issue and providing the example of Republican voters.

recipient to demand that the author behaves in accordance with the commitments and the expectations they generate and to sanction, reprimand, or express dissatisfaction when that is not the case. This normative function of commitments allows the recipient to exert more control over the joint action in general and may counterbalance some of the asymmetries often present in joint action. Finally, expressing commitments implicitly or explicitly can modify the affective dimension of collective action, and therefore, the way we experience it. Moreover, to the extent that commitments create or reinforce collective concerns, they can enable the emergence of stronger collective emotions.

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ORCID

Victor Fernández-Castro  <https://orcid.org/0000-0001-7627-5738>

Elisabeth Pacherie  <https://orcid.org/0000-0003-2337-581X>

REFERENCES

- Alonso, F. M. (2009). Shared intention, reliance, and interpersonal obligations. *Ethics, 119*(3), 444–475.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*, 497–529.
- Blakemore, S. J., & Decety, J. (2001). From the perception of action to the understanding of intention. *Nature Reviews Neuroscience, 2*, 561–567.
- Bolt, N. K., Poncellet, E. M., Schultz, B. G., & Loehr, J. D. (2016). Mutual coordination strengthens the sense of joint agency in cooperative joint action. *Consciousness and Cognition, 46*, 173–187.
- Brass, M., & Heyes, C. (2005). Imitation: Is cognitive neuroscience solving the correspondence problem? *Trends in Cognitive Sciences, 9*(10), 489–495.
- Bratman, M. E. (2014). *Shared agency: A planning theory of acting together*. Oxford University Press.
- Butterfill, S. (2012). Joint action and development. *The Philosophical Quarterly, 62*(246), 23–47.
- Carpenter, M. (2009). Just how joint is joint action in infancy? *Topics in Cognitive Science, 1*(2), 380–392.
- Caspar, E. A., Bue, S. L., Haggard, P., & Cleeremans, A. (2020). The effect of military training on the sense of agency and outcome processing. *Nature Communications, 11*(1), 1–10.
- Chambon, V., Sidarus, N., & Haggard, P. (2014). From action intentions to action effects: How does the sense of agency come about? *Frontiers in Human Neuroscience, 8*, 320.
- Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology, 76*, 893–910.
- Clark, H. H. (2006). Social actions, social commitments. In N. J. Enfield & S. C. Levinson (Eds.), *Roots of human sociality: Culture, cognition, and interaction* (pp. 126–150). Berg.
- Collins, R. (2014). Interaction ritual chains and collective effervescence. In C. von Scheve & M. Salmela (Eds.), *Collective emotions* (pp. 299–311). Oxford University Press.
- Dewey, J. A., Pacherie, E., & Knoblich, G. (2014). The phenomenology of controlling a moving object with another person. *Cognition, 132*(3), 383–397.
- Dokic, J. (2010). Affordances and the sense of joint agency. In B. Michela (Ed.), *Neuropsychology of the sense of agency* (pp. 23–43). Springer.
- Fernández Castro, V., & Pacherie, E. (2021). Joint actions, commitments, and the need to belong. *Synthese, 198*, 7597–7626. <https://doi.org/10.1007/s11229-020-02535-0>

- Fernández Castro, V., & Pacherie, E. (forthcoming). Robots and resentment: Commitments, recognition and social motivation in HRI. In C. Misselhorn, T. Poljansek, & T. Störzinger (Eds.), *Emotional machines. Perspectives from affective computing and emotional human-machine interaction*. Springer.
- Fiebich, A. (Ed.). (2020). *Minimal cooperation and shared agency*. Springer.
- Fricker, M. (2016). What's the point of blame? A paradigm based explanation. *Noûs*, 50(1), 165–183.
- Frith, C. D., Blakemore, S., & Wolpert, D. M. (2000). Explaining the symptoms of schizophrenia: Abnormalities in the awareness of action. *Brain Research Brain Research Review*, 31(2–3), 357–363.
- Gilbert, M. (2006). Rationality in collective action. *Philosophy of the Social Sciences*, 36(1), 3–17.
- Gilbert, M. (2013). *Joint commitment: How we make the social world*. Oxford University Press.
- Godman, M. (2013). Why we do things together: The social motivation for joint action. *Philosophical Psychology*, 26, 588–603.
- Godman, M., Nagatsu, M., & Salmela, M. (2014). The social motivation hypothesis of prosocial behavior. *Philosophy of the Social Sciences*, 44, 563–587.
- Gräfenhain, M., Behne, T., Carpenter, M., & Tomasello, M. (2009). Young children's understanding of joint commitments. *Developmental Psychology*, 45, 1430–1443.
- Greenspan, P. S. (1978). Behavior control and freedom of action. *The Philosophical Review*, 87(2), 225–240.
- Haggard, P., & Chambon, V. (2012). Sense of agency. *Current Biology*, 22(10), R390–R392.
- Harrison, S. J., & Richardson, M. J. (2009). Horsing around: Spontaneous four-legged coordination. *Journal of Motor Behavior*, 41(6), 519–524.
- Hove, M. J., & Risen, J. L. (2009). It's all in the timing: Interpersonal synchrony increases affiliation. *Social Cognition*, 27(6), 949–960.
- Kawabe, T. (2013). Inferring sense of agency from the quantitative aspect of action outcome. *Consciousness and Cognition*, 22(2), 407–412.
- Knoblich, G., Butterfill, S., & Sebanz, N. (2011). Psychological research on joint action: Theory and data. *Psychology of Learning and Motivation*, 54, 59–101.
- Lawler, E. J., Thye, S. R., & Yoon, J. (2014). The emergence of collective emotions in social exchange. In C. von Scheve & M. Salmela (Eds.), *Collective emotions* (pp. 189–203). Oxford University Press.
- Le Bars, S., Bourgeois-Gironde, S., Wyart, V., Dilan-Sari, I., Pacherie, E., & Chambon, V. (2022). Interplay of motor coordination and strategic reasoning on explicit and implicit sense of agency in joint action. *Psychological Science*, 33, 736–751. <https://doi.org/10.1177/09567976211053275>
- Le Bars, S., Devaux, A., Nevidal, T., Chambon, V., & Pacherie, E. (2020). Agents' pivotality and reward fairness modulate sense of agency in cooperative joint action. *Cognition*, 195, 104117. <https://doi.org/10.1016/j.cognition.2019.104117>
- McGeer, V. (2012). Co-reactive attitudes and the making of moral community. In C. MacKenzie & R. Langdon (Eds.), *Emotions, imagination and moral reasoning* (pp. 299–325). Psychology Press.
- Michael, J. (2011). Shared emotions and joint action. *Review of Philosophy and Psychology*, 2(2), 355–373.
- Michael, J. (2022). *The philosophy and psychology of commitment*. Routledge.
- Michael, J., & Pacherie, E. (2015). On commitments and other uncertainty reduction tools in joint action. *Journal of Social Ontology*, 1(1), 89–120.
- Michael, J., & Salice, A. (2017). The sense of commitment in human–robot interaction. *International Journal of Social Robotics*, 9(5), 755–763.
- Michael, J., Sebanz, N., & Knoblich, G. (2016). Observing joint action: Coordination creates commitment. *Cognition*, 157, 106–113.
- Michael, J., & Székely, M. (2018). The developmental origins of commitment. *Journal of Social Philosophy*, 49(1), 106–123.
- Moore, J. W. (2016). What is the sense of agency and why does it matter? *Frontiers in Psychology*, 7, 1272.
- Moore, J. W., & Fletcher, P. C. (2012). Sense of agency in health and disease: A review of cue integration approaches. *Consciousness and Cognition*, 21(1), 59–68.
- Pacherie, E. (2008). The phenomenology of action: A conceptual framework. *Cognition*, 107(1), 179–217.
- Pacherie, E. (2012). The phenomenology of joint action: Self-agency vs. joint-agency. In A. Seemann (Ed.), *Joint attention: New developments* (pp. 343–389). MIT Press.
- Pacherie, E. (2014). How does it feel to act together? *Phenomenology and the Cognitive Sciences*, 13(1), 25–46.

- Paprzycka, K. (1998). Normative expectations, intentions, and beliefs. *Southern Journal of Philosophy*, 37(4), 629–652.
- Pettit, P., & Schweikard, D. (2006). Joint actions and group agents. *Philosophy of the Social Sciences*, 36(1), 18–39.
- Rakoczy, H., Warneken, F., & Tomasello, M. (2008). The sources of normativity: Young children's awareness of the normative structure of games. *Developmental Psychology*, 44(3), 875–881.
- Salmela, M., & Nagatsu, M. (2017). How does it really feel to act together? Shared emotions and the phenomenology of we-agency. *Phenomenology and the Cognitive Sciences*, 16(3), 449–470.
- Sebanz, N., Bekkering, H., & Knoblich, G. (2006). Joint action: Bodies and minds moving together. *Trends in Cognitive Science*, 10, 70–76.
- Sebanz, N., & Knoblich, G. (2009). Prediction in joint action: What, when, and where. *Topics in Cognitive Science*, 1, 353–367.
- Seemann, A. (2009). Joint agency: Intersubjectivity, sense of control, and the feeling of trust. *Inquiry*, 52(5), 500–515.
- Shockley, K., Richardson, D. C., & Dale, R. (2009). Conversation and coordinative structures. *Topics in Cognitive Science*, 1, 305–319.
- Shpall, S. (2014). Moral and rational commitment. *Philosophy and Phenomenological Research*, 88(1), 146–172.
- Sidarus, N., & Haggard, P. (2016). Difficult action decisions reduce the sense of agency: A study using the Eriksen flanker task. *Acta Psychologica*, 166, 1–11.
- Siposova, B., Tomasello, M., & Carpenter, M. (2018). Communicative eye contact signals a commitment to cooperate for young children. *Cognition*, 179, 192–201.
- Smith, A. (2002 [1759]). The theory of moral sentiments. In *The theory of moral sentiments*. Cambridge University Press.
- Sugden, R. (2002). Beyond sympathy and empathy: Adam Smith's concept of fellow-feeling. *Economics and Philosophy*, 18, 63–87.
- Tuomela, R. (2007). *The philosophy of sociality*. Oxford University Press.
- van der Wel, R. P. (2015). Me and we: Metacognition and performance evaluation of joint actions. *Cognition*, 140, 49–59.
- van der Wel, R. P., Sebanz, N., & Knoblich, G. (2012). The sense of agency during skill learning in individuals and dyads. *Consciousness and Cognition*, 21(3), 1267–1279.
- Vesper, C., Abramova, E., Büttepage, J., Ciardo, F., Crossey, B., Effenberg, A., Hristova, D., Karlinsky, A., McEllin, L., Nijssen, S. R. R., Schmitz, L., & Wahn, B. (2017). Joint action: Mental representations, shared information and general mechanisms for coordinating with others. *Frontiers in Psychology*, 7, 2039. <https://doi.org/10.3389/fpsyg.2016.02>
- Vignolo, A., Sciutti, A., Rea, F., & Michael, J. (2019). Spatiotemporal coordination supports a sense of commitment in human-robot interaction. In *International conference on social robotics* (pp. 34–43). Springer.
- Vikhoff, B., Malmgren, H., Åström, R., Nyberg, G., Ekström, S.-R., Engwall, M., Snygg, J., Nilsson, M., & Jörnsten, R. (2013). Music structure determines heart rate variability of singers. *Frontiers in Psychology*, 4(334), 1–16.
- Wegner, D. M. (2003). The mind's best trick: How we experience conscious will. *Trends in Cognitive Sciences*, 7(2), 65–69.
- Yoshie, M., & Haggard, P. (2013). Negative emotional outcomes attenuate sense of agency over voluntary actions. *Current Biology*, 23(20), 2028–2032.

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