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Partnering Up: The Social Cognition of Partnered Interaction in Life and Art

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In this article, I present a model of social cognition that is grounded in the interplay between mentalizing and joint action during social interaction. I first propose a psychological distinction between a "character" and a "partner" as two different ways of conceiving of people in social cognition. A character is someone whom we connect with as a spectator. We can mentalize about *them*, but they cannot mentalize about us at the same time, since there is no direct interaction. A partner, by contrast, is someone with whom we are engaged in a social interaction such that the mentalizing is reciprocal. However, the defining feature of partnered interaction is not mentalizing *per se* but instead the *adaptivity* by which partners make ongoing behavioral adjustments to one another during their interactions. Such adaptivity provides a foundation for forming social bonds with people. I present a Dual Cohesion perspective that focuses on two complementary manners for achieving social cohesion with people during partnered interactions: alignment in conversation and entrainment in joint physical actions. Alignment is based on a cognitive convergence of ideas, whereas entrainment is based on a behavioral coordination of actions. Overall, the model reveals the interplay between mentalizing and joint action in social cognition and partnered interaction.

Keywords: mentalizing, joint action, partnering, social cognition, theory-of-mind, conversation, entrainment, social cohesion

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Imagine that you and I are attending a performance of *Romeo and Juliet* at the local theater. Before the show begins, we talk about the terrible difficulties that we tend to have in finding parking at the theater ever since the renovations began 6 months ago. As soon as the curtain goes up, we stop talking and we redirect our attention to a group of fictional characters interacting with one another in the imaginary storyworld depicted on the stage in front of us. Romeo and Juliet are teenagers from opposite sides of the tracks who meet at a private party, dance together, fall in love, get married in a secret ceremony, and kill themselves shortly thereafter. These fictional characters experience their world in a very similar manner to the way that you and I experience our own real world. We can easily relate to these characters and empathize with their struggles. While Romeo and Juliet are fictional characters devised by a playwright, they are able to be brought to life thanks to the performance skills of actors who exist in our own real world. In fact, you and I have come to the theater tonight because our good friend Ellen is performing the lead role of Juliet. We look forward to getting some dessert with her after the show and talking about the performance. We have asked you to pick the restaurant, as usual. I will use this scenario—you and I attending a dramatic performance that contains within it a depiction of another world where the people interact with one another in a similar manner to the way that we do—as a point of reference in building a model of social cognition and partnered interaction.

CHARACTER AND PARTNER: A "DUAL MENTALIZING" FRAMEWORK

A key human-specific component of social cognition is mentalizing, also known as theory-of-mind and mindreading. Mentalizing refers to the cognitive act of inferring the unobservable mental states of another person, including their emotions, knowledge, beliefs, and intentions (Frith and Frith, 2003; Nichols and Stich, 2003). It has been referred to as a process of "mental mind travel" (Ferretti et al., 2017). One can never have direct knowledge of what another person is experiencing, but mentalizing allows us to make reasonable inferences about what another person is thinking and feeling internally, although it can also refer to when we do the same thing to ourselves through acts of self-reflection. While mentalizing is typically conceptualized in the psychology literature as a unitary process of mental inference, I am going to propose a "dual mentalizing" framework that is predicated on the idea that there are two fundamentally different ways of conceiving of people in social cognition, namely as a character or as a partner. A character is someone whom you connect with exclusively using a *spectator* mode of processing—you can observe them, but they cannot observe you in return—whereas a partner is someone whom you connect with through direct social interaction, most especially in the engagement of joint actions. Gallotti et al. (2017) refer to the spectator mode as "offline" processing and the partner mode as "online" processing.

Before elaborating on the character/partner distinction, I want to point out that it shows important parallels with another distinction from a very different domain of human behavior, namely that of motor entrainment, where the term entrainment refers to the process of coordinating one's actions in time with either human or inanimate timekeepers, such as synchronizing one's dance movements with a partner. Within the analysis of rhythmic timekeeping, there is a distinction between "external entrainment" and "mutual entrainment" (Chauvigné et al., 2014) (see **Figure 1**). External entrainment is exemplified by tapping your finger to a fixed timekeeper, such as a metronome beat. While *you* have the capacity to entrain to the metronome, the metronome cannot entrain to you[1]. The situation is unidirectional, non-mutual, and non-adaptive[2]. You can only be a follower to a metronome, but you cannot lead it. Mutual entrainment, by contrast, is the situation of reciprocal adaptation in timing, as exemplified by dancing with a partner or marching together with a troop. In such situations, you have the ability to entrain to other people and they can entrain to you at the same time. The situation is reciprocal and mutually adaptive (Goebl and Palmer, 2009; Keller et al., 2014; Gallotti et al., 2017). Each of you can function as the leader or the follower of the joint interaction, although such roles may be constrained in certain contexts, such as in tango dancing, where one member of the pair is designated as the leader in the dance. That said, the flow of information between the two dancers with regard to their physical interaction is bidirectional and reciprocal (Kimmel, 2012, 2019).

Let us now apply this same type of reasoning to mentalizing. When you connect psychologically with a character, you engage in an observer-based process that I will refer to as *spectator mentalizing* (**Figure 1**), which is the standard form of third-person mentalizing that is analyzed in the psychology literature on theory-of-mind processing (e.g., Baron-Cohen et al., 1985). If you were to mentalize about Juliet's beliefs or emotions during the performance that we are attending, you could mentalize about *her*, but she could not mentalize about you. This is completely analogous to the unidirectional arrangement of external entrainment to a fixed timekeeper, such as tapping your finger to a metronome beat. Despite this non-mutuality, it is quite possible for you to become emotionally engaged with Juliet and to feel great empathy for her. You might even cry at the end of the play when she kills herself. But nothing about your emotional engagement with Juliet would ever change the fact that she cannot mentalize about you[3]. A character is someone whom we can respond to, but who cannot respond to us in kind. The interaction is purely "offline" (Gallotti et al., 2017).

This applies to all of the fictional characters of drama and literature. But it also applies to real people in situations where knowledge about one another is highly asymmetric, such as in the case of politicians, movie stars, professional athletes, and other media figures. You can think about a pop star, but they cannot think about you, at least not as an individual person. Importantly, virtually all theory-of-mind tasks in the psychology literature are based on the unidirectional, non-adaptive arrangement of spectator mentalizing. Likewise, the "mentalizing system" of the human brain that has been proposed to mediate theory-of-mind processing (Frith and Frith, 2003, 2006; Saxe and Kanwisher, 2003; Spunt and Lieberman, 2013) has been established experimentally based first and foremost on spectator mentalizing.

But now consider a different situation, namely you and I having a face-to-face conversation before the theater performance begins about the parking problem at the theater. When we do this, we engage in a process of *partner mentalizing*: I can mentalize about you and you can mentalize about me at the same time. This is a reciprocal and "online" process, one that is analogous to mutual entrainment in the realm of behavioral coordination. In fact, not only is conversation *analogous* to mutual entrainment, but it actually *engages* a number of processes of mutual entrainment, including turn-taking (Stivers

[1]Two caveats need to be noted about this statement. First, you can choose *not* to entrain to a metronome beat. Second, in modern times, there are computer programs that drive adaptive metronomes that *do* have the capacity to adjust to the tapping person (Fairhurst et al., 2014), but I will ignore inanimate systems such as these in my discussion.

[2]I am using the terms adaptive and adaptivity not in the Darwinian sense of an evolutionary adaptation, but in the motor-control sense of ongoing mutual adjustments between interaction partners (Goebl and Palmer, 2009; Keller et al., 2014). The term denotes reciprocity in interaction, not an enhancement of survival potential and Darwinian fitness.

[3]It needs to be pointed out that, due to the amazing flexibility of the imagination, it *is* possible for you to imagine Juliet mentalizing about you. You could create a mental simulation of a conversation between yourself and Juliet in which you imagine not only your own mentalization about Juliet, but Juliet's mentalization about you as well. Because Juliet is a fictional character, such an interaction with her would be restricted to the realm of the imagination.

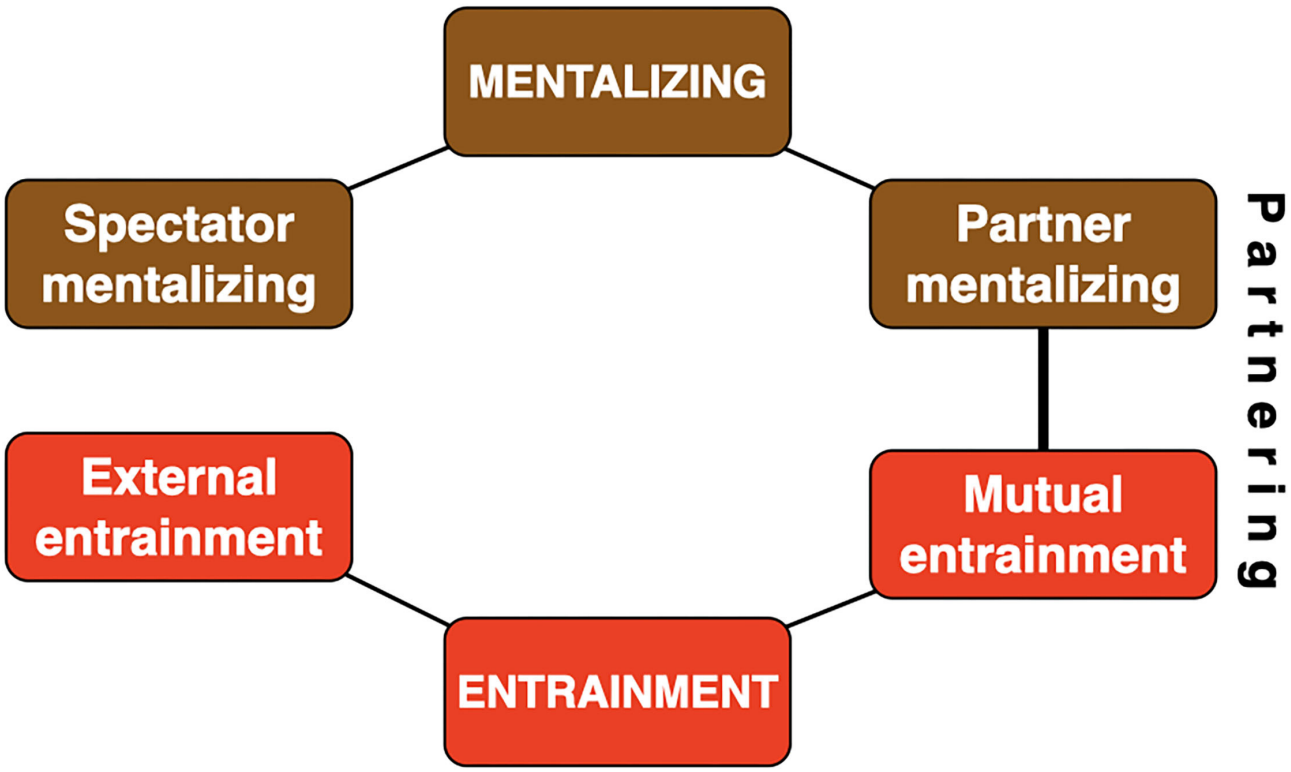

FIGURE 1 | Parallels and interactions between mentalizing and physical entrainment. Spectator mentalizing (i.e., character mentalizing) is analogous to external entrainment (left side of figure) in that both of them are unidirectional, non-adaptive processes for which someone can only be a follower. By contrast, partner mentalizing is analogous to mutual entrainment in joint action since both of them are bidirectional, adaptive processes, with the capacity for leader/follower dynamics. Partner mentalizing and mutual entrainment interact with one another to create the foundation for partnered interaction, as shown by the vertical bar connecting them on the right side of the figure. Partner mentalizing is linked to adaptive motoric processing in a way that spectator mentalizing cannot be.

et al., 2009; Levinson, 2016) and the convergence of facial expression and body gestures that is well known to occur when people converse in an affiliative manner (Pickering and Garrod, 2004; Dale et al., 2013; Manson et al., 2013; Duran and Fusaroli, 2017; Gaziv et al., 2017; Wacewicz et al., 2017). This is depicted in **Figure 1** by a vertical bar connecting partner mentalizing and mutual entrainment. Partner mentalizing is linked to motor processing in a way that spectator mentalizing is not. Another way of thinking about this is that partner mentalizing is a necessary, but not sufficient, condition for partnering to occur, since partnering also requires an ongoing process of behavioral adjustment between the partners. Such mutual adjustment is by no means the only behavioral feature of partnering, which instead is comprised of processes driven by joint planning, joint agency and collaborative actions (Sebanz et al., 2006; Pacherie, 2012; Keller et al., 2014). A key component of partner mentalizing is joint intentionality (Knoblich and Sebanz, 2008), which is itself part of what is known as intersubjectivity in the philosophy of mind (Stahl, 2016).

The biggest difference between partner mentalizing and mutual entrainment is that mentalizing is purely a covert activity, whereas behavioral entrainment involves an overt adaptivity of actions between the partners (**Figure 2**). It is for this reason that the defining feature of partnering is not mutual mentalizing, but instead *behavioral adaptivity* (mutual entrainment) in real time (Redcay et al., 2010; Keller et al., 2014; Gallotti et al., 2017), something that is not possible with a character or when performing an action on one's own. A partner is someone whom we adapt to as they adapt to us. Overall, the partnered arrangement, compared to the spectator arrangement, is interactive, reciprocal, adaptive, and often times collaborative as well. Throughout most of human history, social interactions only ever occurred in a live, face-to-face-manner. Due to the advent of telecommunication technologies in the 20th century, live social interactions can also occur in a mediated manner in real time, such as when we talk to someone on the telephone or engage in a text-based chat.

In order for this analysis to apply to everyday life, it is important that I broaden the definition of a character in a way that may perhaps seem counterintuitive. While characters can certainly be fictional people (e.g., Juliet), they can also be real individuals, including public figures, but also friends who

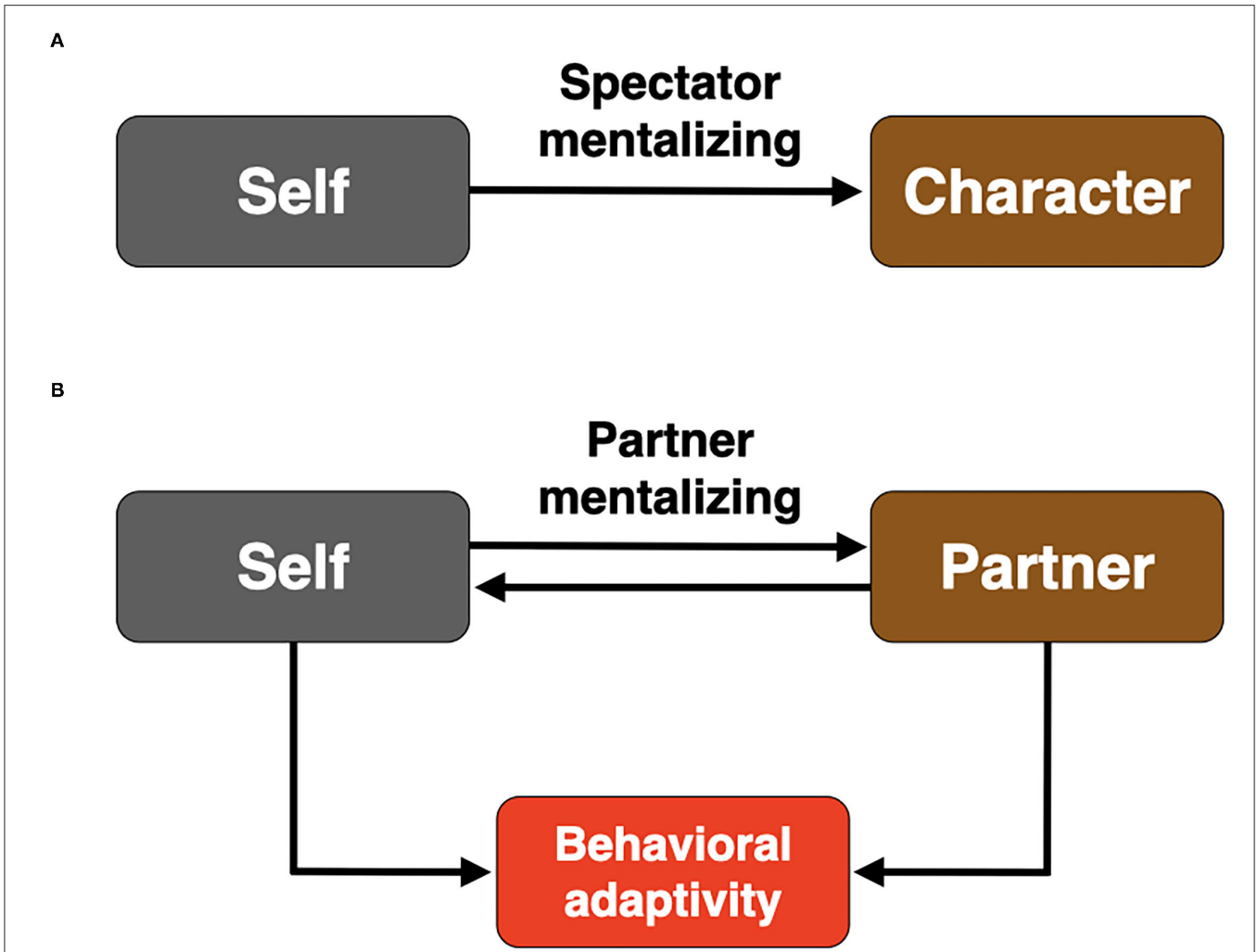

FIGURE 2 | Behavioral adaptivity is a defining feature of partnering. **(A)** When someone conceives of a character, the mentalizing is unidirectional and non-reciprocal. **(B)** When people interact as partners, not only is the mentalizing bidirectional and reciprocal, but the partners engage in an ongoing process of behavioral adaptation to one another during their interactions, a form of mutual entrainment that is not possible with a character or when carrying out a task on one's own.

are not currently interacting with us as partners (**Figure 3**). I want to use the term character to refer to any type of "non-interacting person," whether that person be real or fictional, familiar or unfamiliar. Hence, when you and I are having a conversation about Ellen before the show begins, we engage in partner mentalizing between ourselves, but we engage in spectator mentalizing about Ellen, since our mentalizing about her is non-reciprocal. Ellen is a character in our conversation in the same way that Juliet would be if we were talking about her.

This idea could apply more broadly to strangers in public places. For example, I may be aware of a woman sitting in the row in front of me in the theater who is not aware of me. Even though this person is present for me, my mentalizing about her is of the spectator type since it is non-reciprocal. What happens if she turns around and we make momentary eye contact? Does a partnership emerge with her as a result of this incidental interaction? There are many conceptually complex situations like this one that are difficult to classify with regard to the character/partner distinction. I will discuss them in detail in the section called "Permutations on Partnering." My main point here is that the term character is not restricted to fictional entities, but can apply quite well to living people, even those who serve as partners during times of interaction but who are not currently present. The principal criterion for partner mentalizing is whether the mentalizing has the capacity to be reciprocal (partner) or not (character).

Both forms of mentalizing that I am discussing here—spectator and partner—can occur in either an implicit or explicit manner. When you and I talk about Ellen before the show, we may discuss Ellen's frustrations with the actor Frank who is playing the role of Romeo, hence engaging in explicit spectator mentalizing about Ellen's presumed mental states. When I hear you defending Frank, I may get the impression that you have a personal problem with Ellen, in which case my partner

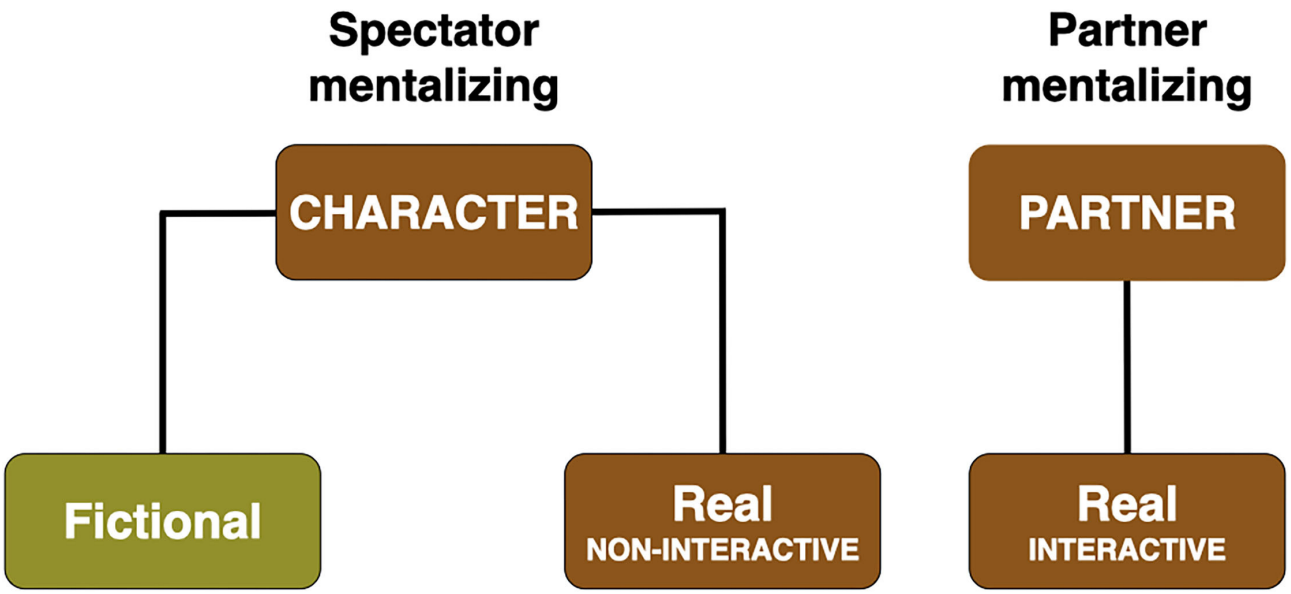

FIGURE 3 | Character and partner. A character is defined as a "non-interactive person," whether that person be fictional or real. We can only mentalize about them as a spectator. A partner, by contrast, is someone we can mentalize about in a reciprocal manner since we are engaged in an interaction with them, whether that be spoken or unspoken, live or mediated. The second row demonstrates that real people can be either characters or partners depending on whether we are interacting with them at the time. According to the current framework, a real person who is not interacting with us at the moment is a character. By contrast, fictional characters can never be partners, except in the realm of the imagination.

mentalizing about you is implicit. If I confront you on this issue, then this partner mentalizing becomes explicit since I am directly inquiring about your mental states. When the show begins, my spectator mentalizing about Ellen becomes implicit, as does my mentalizing about you, Juliet, and the woman sitting in front of me.

An important feature that unites spectator and partner mentalizing is that both of them can be *recursive* (O'Grady et al., 2015; Wu et al., 2020). Not only can I mentalize about what you yourself are thinking (first-order mentalizing), but I can mentalize about what you think of me, or what you believe Ellen is feeling (second-order mentalizing). I can even mentalize about what you think Ellen feels about Frank (third-order mentalizing). If you suspect that Frank is secretly in love with Joan (the actress playing Lady Capulet) and that this is the basis of Ellen's discord with Frank, I can mentalize about what *you* think *Ellen* would feel about *Frank's* presumed love for *Joan* (fourth-order mentalizing). Experimental studies have demonstrated that mentalizing can achieve up to seven levels of embeddedness (O'Grady et al., 2015).

Does partner mentalizing occur from a second-person perspective? Theoretical work in social neuroscience has argued that too much of the study of social cognition has been predicated on third-person (3P) observation of social interactions, and that it has lacked the interactive or second-person (2P) arrangement of a partnered interaction (Schilbach, 2010; Redcay and Schilbach, 2019). While I am fully supportive of this critique of the study of social cognition, I would like to look beyond it and address the ancillary question of whether partner mentalizing is literally a 2P process. On the surface, this makes a great deal of sense. We invariably use the second-person pronoun "you" when interacting with a partner, whereas we never do so when we are not interacting with them. Ellen is a "you" when I am interacting with her, but a "she" when I am not. However, this might be a purely linguistic and discursive modification, not a core difference at the level of mentalizing. For example, I can address my interaction partner as "you" in a conversation but still think to myself "Why on earth is he doing that?" or "He's clearly in a bad mood today." It is quite likely that partner mentalizing is as 3P a process as spectator mentalizing, despite the fact that we make a pronoun adjustment in our utterances when verbally addressing a partner. Therefore, unless there is compelling evidence that partner mentalizing operates in a different manner than spectator mentalizing at the level of perspective taking, then it is best to consider the two as being the same overall process, functioning in different contexts and with different targets toward either a character or a partner. I would argue that the critical distinction regarding how we mentalize about people is not that between 3P and 2P, but instead that between non-mutual (character) and mutual (partner) mentalizing, where both are 3P mechanisms at their core. Again, this point is completely separate from the valid critique that Redcay and Schilbach (2019) raise about how the study of social cognition needs to be based on partnered interaction, not social observation alone.

THE NEURAL BASIS OF PARTNERING

If partnering is indeed the marriage of partner mentalizing and behavioral adaptivity, then how does this play out in the brain?

This can be formulated as two related questions: (1) How does partner mentalizing differ from spectator mentalizing in the brain? and (2) How does the mentalizing system—the brain network that mediates theory-of-mind processing—interact with the systems for motor production during partnered interactions, whether that be for cognitive tasks like conversation or physical tasks like dancing? An hypothesis that I would like to propose, based on my contention that partner mentalizing is intrinsically a 3P process, is that partner mentalizing engages the same general mentalizing system in the brain as spectator mentalizing (see Alkire et al., 2018), where the latter is the standard paradigm for studying mentalizing in the psychology literature.

Prince and Brown (2022) performed a quantitative meta-analysis of neuroimaging studies of partnered interaction, as compared to a control condition of non-partnered performance of the same tasks. They did this cross-modally across both cognitive tasks (e.g., the prisoner's dilemma game) and physical tasks (e.g., joint control of force production). The most concordant area of activation associated with partnered interaction was the right temporoparietal junction (TPJ), which is a key node in the mentalizing system of the brain (Vogeley et al., 2001; Ruby and Decety, 2003, 2004; Saxe and Kanwisher, 2003; Elliott et al., 2006; Schulte-Rüther et al., 2007; Lombardo et al., 2010; Rabin et al., 2010; Spreng and Grady, 2010). Prince and Brown compared this activation peak with those found in meta-analyses of standard 3P spectator mentalizing, and observed a strong overlap between them, supportive of a sharing hypothesis.

An important implication of this finding is that *partnered interaction automatically stimulates a process of implicit mentalizing in the partners*, even when the task at hand does not require explicit mentalizing by the participants (Redcay et al., 2010; Alkire et al., 2018; Abe et al., 2019), since none of the tasks included in the meta-analysis of Prince and Brown were explicit mentalizing tasks. Mentalizing seems to be an intrinsic component of partnering. This is a highly underappreciated aspect of partnering, not least for physical tasks like dancing or engaging in sports activities. The claim here is not that partner mentalizing is nothing more than spectator mentalizing—in fact, I will argue below for a fundamental difference between them—but that the two processes share a common neural hub in brain areas such as the TPJ. Importantly, the results of Prince and Brown's analysis showed that the TPJ was active in both cognitive and physical tasks, arguing that it most likely functions in an amodal (i.e., domain-general) fashion. Quesque and Brass (2019) too have argued that the TPJ has the features of a domain-general brain area, as related to the self/other distinction. Three important conclusions can be taken away from this analysis: (1) partnered interaction automatically engages implicit mentalizing in the participants; (2) this seems to be mediated, at least in part, by a core brain area that is used for explicit spectator mentalizing about characters, arguing for a sharing of neural resources; and (3) this brain area seems to operate amodally across both cognitive and physical formats of partnering.

This latter point leads naturally to the second issue about the neural basis of partnering, namely the *mentalizing/motor relationship*. The results from Prince and Brown's meta-analysis suggested that potential nexus points for this relationship might include the inferior frontal gyrus (IFG) and premotor cortex (PMC), which are key motor-planning areas in the brain. The mentalizing system might interface with modal aspects of partnership through its input to the IFG and PMC. The TPJ and IFG are connected with one another via a neural pathway called the superior longitudinal fasciculus (SLF) that projects from the parietal lobe (where the TPJ is located) to the frontal lobe (where the IFG and PMC are located) (Barbeau et al., 2020). Interestingly, Quesque and Brass (2019) meta-analysis of brain areas involved in spectator mentalizing (e.g., theory-of-mind processing) demonstrated peaks bilaterally in the IFG. Additional neural systems, such as the cerebellum and basal ganglia, are also critically important for the kind of motor entrainment that underlies adaptive motor timing (Shmuelof and Krakauer, 2011; Chauvigné et al., 2014), whether for solo actions (external entrainment) or partnering (mutual entrainment). The caveat here is that the connection between the mentalizing system and the motor system needs to create the potential for "modal dispersion" to permit mentalizing to influence such divergent formats of partnering as conversation and dancing. How this occurs is not well-understood at the present time.

The overall neural model of partnering that I am proposing is a two-factor model (**Figure 4**) in which an amodal mentalizing system—including the TPJ—interacts with modal production systems to bring about the various formats of partnering in human social interaction. The IFG and PMC might be nexus-points in the mentalizing/motor relationship, allowing a common mentalizing system to influence diverse motor-production systems. Regarding the amodality of the TPJ, Yuan et al. (2018) carried out a neuroimaging study of cross-modal narrative production (solo, not partnered) in which the participants had to convey the same character-based narrative scenarios through either speech, pantomime, or drawing. The results showed that a mentalizing-related activation in the TPJ was common across the three modalities of production, even though the production systems themselves were quite different in kind, namely the vocal system for speech, the upper body for pantomime, and a wrist-based production system for drawing. This supports the contention of the two-factor model that the TPJ functions cross-modally, whereas the motor components are linked to specific modalities of production and partnering.

Finally, I would like to mention the possibility that the mentalizing vs. motor distinction during partnered actions might be related to segmentation within the TPJ. Abe et al. (2019) carried out a hyperscanning fMRI study in which two participants were instructed to match their grip strength on a force transducer using visual feedback of their force levels. Whereas, the partnered vs. solo contrast revealed activity in the *posterior* part of the TPJ—corresponding to the classic mentalizing region—the partners' level of cooperation on this physical task correlated with activity in the *anterior* part of the TPJ, near the supramarginal gyrus. Hence, this might suggest that mentalizing-related functions are located posteriorly in the TPJ, whereas motor-related functions may be located more anteriorly.

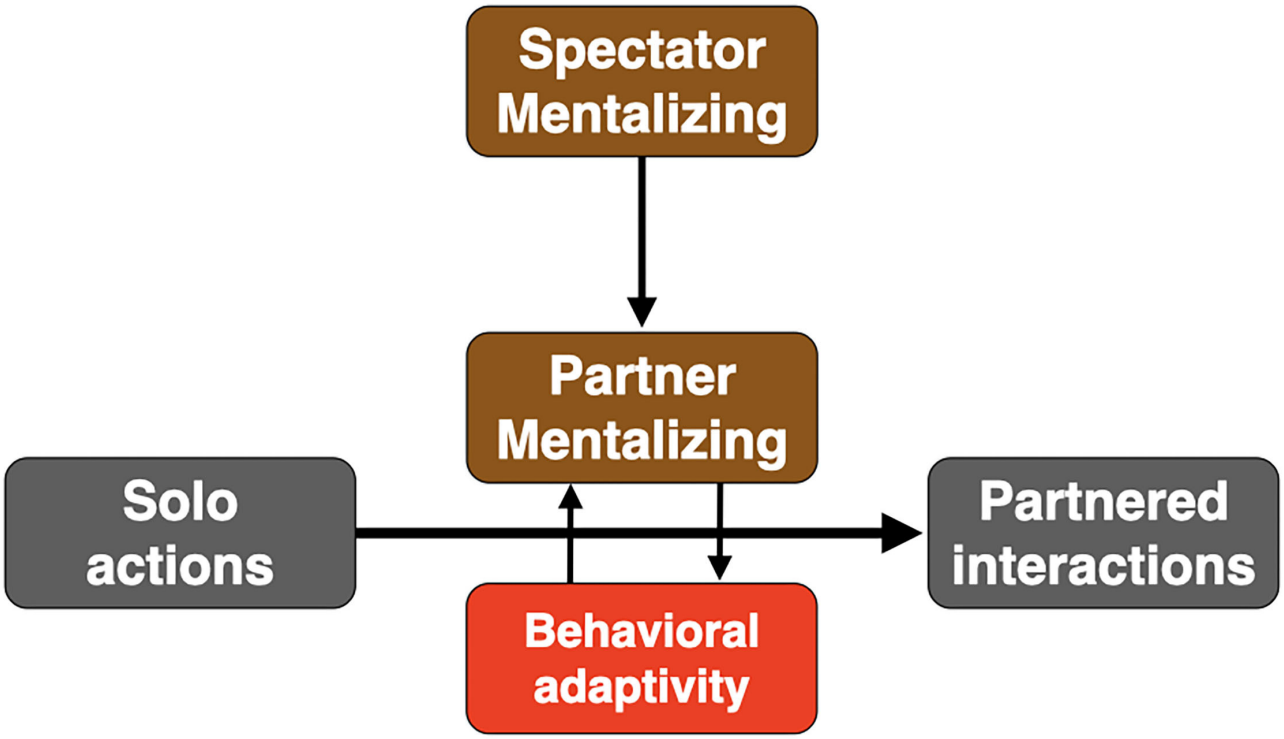

FIGURE 4 | A two-factor model of partnering. Partnering is based on the two interactive processes of partner mentalizing and behavioral adaptivity (mutual entrainment). Partner mentalizing is proposed to take advantage of the same mentalizing system as spectator mentalizing. Behavioral adaptivity is linked to particular effectors of production, such as the voice (conversation) and limbs (dance). The mentalizing/motor relationship is poorly understood at the present time. In the proposed model, an amodal mentalizing system influences the motor pathways for partnered interaction via a "modal dispersion" mechanism (not shown), allowing mentalizing to impact different effectors of production during different forms of partnering (e.g., conversing vs. dancing).

LEADING AND FOLLOWING IN PARTNER MENTALIZING

While the study of motor entrainment during physical partnering routinely examines a leader/follower dynamic between the partners (Goebl and Palmer, 2009; Kimmel, 2012; Keller et al., 2014; Timmers et al., 2014; Chang et al., 2017), the standard conception of mentalizing is that of a pure follower, in other words a spectator. Mentalizing is thought to serve an important evolutionary function in terms of predicting the intentional actions of other people (and perhaps of animals as well). Mentalizing is conceived of as a *reactive* system that is triggered by the need to correctly anticipate another person's actions. It is a tracking system for inferring invisible mental states similar to the way that sensory systems serve as tracking systems for visible actions. However, the tracking function of mentalizing operates the same way whether we are in a spectator or partner mode.

While partner mentalizing does not differ from spectator mentalizing in perspective (I contend that both are 3P processes), the fact that it works in a reciprocal and interactive manner means that it clearly has a different dynamic to it than spectator mentalizing. A key feature that distinguishes partner mentalizing from spectator mentalizing is that, just as with mutual entrainment during joint actions, partner mentalizing can assume *a leader/follower dynamic* to it on a moment-by-moment basis. When you and I are having a conversation, there are times when I am trying to lead your mentalizing in order to devise strategies to persuade you of something, and likewise there are times when you are trying to lead my mentalizing. These instances more or less co-occur with our speech turns. When I am talking, I am trying to instill a certain psychological content into your mind, and so my own mentalizing is of the leader kind. When you are doing the talking, I am processing the psychological content of your utterances in a more reactive manner as a follower, although much of my listening time is spent on trying to formulate a verbal response for my next turn (Levinson, 2016). Watching a film only involves follower mentalizing, but engaging in a conversation with someone also allows for leader mentalizing to occur, in addition to an ongoing transitioning between leader and follower mentalizing.

If what I am arguing is correct, then *the unique feature of partner mentalizing is leader mentalizing*, and not follower mentalizing, which is shared with spectator mentalizing. Wu et al. (2020) pointed out that "[s]ubstantial literature shows that by nature, humans engage in mentalizing during tactical activities such as deception and lie detection (Granhag and Hartwig, 2008), and persuasion (Slaughter et al., 2013). Humans also engage in mentalizing during practical activities such as

teaching and learning (Wang, 2015)" (p. 244; references cited in the original). All of these situations are ones in which someone is attempting to lead the mentalizing of their interaction partner to instill a certain psychological content into their mind through acts of persuasion, teaching, and even deception (Baron-Cohen, 1999). Such a view need not imply anything Machiavellian about mentalizing (Baimel et al., 2021), but could simply reflect its cooperative and interactive nature.

Ultimately, we need a concept of partner mentalizing that is not just predictive and anticipatory—which applies equally well to spectator mentalizing—but also interactive and reciprocal. Furthermore, we need a concept that, like mutual entrainment, is adaptive and coordinative and that can operate through ongoing processes of exchange, such as during a conversation. Finally, we need one that can be leader-driven, persuasive, and even manipulative. Wu et al. (2020) employ the useful term "co-mentalizing" in describing the interactive aspect of mentalizing during social interactions. However, they only apply it to the partners' mentalizing about a third person (e.g., you and I jointly mentalizing about Ellen during our conversation), but not to the partners themselves. Partner mentalizing is unquestionably a process of co-mentalizing, but this applies as much to the partners themselves (dyadically) as to any third parties being discussed (triadically).

I will use the term *directive mentalizing* to refer to a kind of mental simulation in which I attempt to imagine the consequences of my actions on you as I attempt to bring you into alignment with my stance cognitively or to promote your coordination with my actions behaviorally. Directive mentalizing is primarily a second-order process since it requires, at minimum, a concept of me mentalizing about how you perceive me. I will contrast this with *reactive mentalizing*, which is the corresponding follower process and that comprises the standard sense of mentalizing in the psychology literature. All mentalizing is predictive and reactive, but partner mentalizing has the unique potential to be directive as well. Directive mentalizing is a defining feature of partner mentalizing, one that has no counterpart in spectator mentalizing[4]. It links social interaction with the strategies that interaction partners employ for achieving both cognitive alignment (e.g., conversation) and physical entrainment (e.g., dance).

If there is indeed a process of directive mentalizing during social interaction, does such mentalizing *drive* the behavioral processes of adaptivity? This is a difficult question to answer for several reasons. First off, mentalizing is a private experience, not a public behavior like a motor action to which you can make adjustments and receive feedback. While my own mentalizing might in fact be directive, I cannot transmit this information to you in a direct manner except through my observable behaviors. For example, if I want you to accept my proposal to do something, I might mentalize "Please say yes. Please say yes." However, unless I utter words to that effect, your interpretation of my desire will be based solely on my observable gestures, and perhaps not even on that if we are engaged in a phone conversation without video. Second, there is currently minimal understanding of the temporal dynamics of mentalizing, whereas a large literature on motor entrainment during joint actions has provided precise quantitative information about the micro-timing of the behavioral adaptivity that occurs over the course of joint actions. In cases of intentional entrainment, such as during piano duetting, the motor synchronization between two people can be on the order of tens of milliseconds (Goebl and Palmer, 2009). However, we simply do not have dynamic information about mentalizing and how its content changes over time, either reactively or directively. This is important since there seem to be several types of behavioral adaptivity, spanning from the more automatic (emergent) mechanisms of joint body sway spontaneously emerging during a conversation to the more effortful, intentional, and planned types of adaptivity that underlie leader/follower differentiation during a partnered task like a couple dance (Knoblich and Sebanz, 2008; Knoblich et al., 2011). The latter type of adaptivity requires that the partners establish *co-representations* of their intentions and action-plans (Knoblich et al., 2011; Keller, 2014; Keller et al., 2014; MacRitchie et al., 2017). Mentalizing might reasonably be a running commentary by each partner on the success or failure of their jointly-executed actions. The psychological content of this commentary might mirror differences between the leader and follower roles during these actions, for example either preceding or following, respectively, a component of the action. Third, there are times when the pragmatics of the situation dictate that one should *not* overtly reveal what one's mentalizing is directively indicating. I may desperately want you to "Please say yes" without giving any indication that I desire such an outcome. In other words, the pragmatics of the situation might demand that I hide my true intentions, in which case I would want to prevent my mentalizing from influencing my overt behavior toward you. Despite all of these caveats, I am going to speculate that directive mentalizing is indeed a critical factor in producing behavioral coordination.

This will become particularly important when it comes to physical tasks like couple dancing, where mentalizing is not typically given any consideration at all due to the generally non-verbal nature of the interaction. Partner mentalizing contributes to mutual adaptivity by helping the partners infer the behavioral strategies needed to achieve a state of coordination and ultimately to create a sense of social cohesion. This is a highly underappreciated aspect of physical partnering, where studies tend to emphasize sensorimotor processes like coordinative timing, turn taking, and gestural convergence. Much of the literature on behavioral entrainment in humans emphasizes sensorimotor mechanisms for timing coordination without giving much consideration to the psychological factors that

[4]I will now consider a potential objection to my own reasoning here. Imagine watching an action movie in which the hero is in a life-threatening situation but in which we, the audience members, are aware of a way for the hero to escape his present danger, for example, by opening a hidden door. As the hero's death gets ever closer and as the suspense of the scene intensifies, we might think to ourselves "Use the door! Use the door!". Is this not a form of directive mentalizing during a spectator-based activity? As mentioned in Footnote 3, this might simply be an artifact of our ability to mentally simulate an interactive relationship with a fictional character. There is a literature on "parasocial relationships" that describes people's imaginary social interactions with fictional characters (Madison and Porter, 2016). More generally, this situation reflects the phenomenon known as dramatic irony.

support this coordination, including ongoing mentalizing. I am in no way trying to downplay the role of sensorimotor processes in partnered interaction, but am instead attempting to make the case for studying reciprocal adjustments in the mind and body. As described earlier, there is an implicit process of partner mentalizing that seems to be automatically triggered during any act of physical partnering. I believe that partner mentalizing is a missing link in the study of human entrainment. On the one hand, people can only entrain physically with others when there is a certain level of agreement regarding shared intentions, goals, and action plans (Pacherie, 2012). On the other hand, the mutual adjustments underlying entrainment require an ongoing process of predictive mentalizing about the probable actions and responses of one's interaction partners (Baimel et al., 2015). This includes both the directive mentalizing of a leader and the reactive mentalizing of a follower.

On the flip side, the vast majority of studies of mentalizing have occurred outside of the context of direct social interaction, with the exception of neuroimaging studies, where mentalizing is inferred from patterns of brain activation (Redcay et al., 2010; Alkire et al., 2018). In one of the few studies to examine mentalizing in the context of social interaction, Baimel et al. (2018) had small groups of participants move cups back and forth on a table while singing a national anthem, doing so either synchronously with one another or asynchronously. The synchronous group showed higher scores than the asynchronous group on measures of mentalizing, and this effect was specific to members of the group, rather than being a broad effect that extended beyond group members. More studies of this type are needed in order to create a linkage between mentalizing and sensorimotor factors during joint actions.

PERMUTATIONS ON PARTNERING

The simplest model of partnering is a two-person arrangement, such as the conversation that you and I have before the play or the conversations that Romeo and Juliet have within the play. The three-way conversation that we have with Ellen after the show might simply be a ramping up of a two-person interaction. Perhaps the biggest difference would be that most of the utterances would contain the plural you, rather than the singular you, although there is no case marker for this in English. But what about my interaction with the hundred strangers in the audience of the theater? What about Ellen's interaction with those same hundred people while she is performing? In both of these situations, the partnering is very remote, if it exists at all. The situations that I am going to discuss here are quite heterogeneous, and I can do little more than describe them in very general terms. I will conceptualize them as two opposing situations: (1) *partner-as-character*, situations where partnering is present but is poorly-defined; and (2) *character-as-partner*, situations where what appears to be a partnered interaction is not live or real, hence being instead a virtual partnership. This is summarized in **Figure 5**. Many of these complicated formats of partnering are accompanied by a transition from second-person to third-person pronouns (from "you" to "she/he," and from "plural you" to "they"). Because English lacks a case marker for the plural you, I am going to represent it using its capitalized form, You.

Partner-as-Character: The Ill-Defined Partner

There are many types of situations in human life in which the partnering arrangement is poorly-defined. One example is what I will refer to as the "silent partner" arrangement during an incidental interaction, which is typically based on a non-verbal interaction. I mentioned this in a previous section with reference to having an incidental interaction with a woman sitting in front of me in the theater when she turned around and made momentary eye contact with me. Does this momentary interaction constitute a partnership, since we now have the potential to mentalize about one another at the same time? I might have a similar incidental interaction, but in a purely haptic manner without visual contact, with the person sitting next to me in the theater and with whom I am competing for the arm rest between our seats. There are many situations like this in public places where any semblance of a partnership extends only as far as the level of eye contact or haptic contact, but no verbal interaction. Walking down a street can lead to many incidental interactions of this kind, although the advent of cell phones has blunted this significantly, since many people no longer look up when walking down the street. Silent partnerships not only occur with strangers but with familiar people as well. During a typical faculty meeting that I attend at the university, only a handful of people will do most of the talking. I may arrive a bit late and not have a direct verbal interaction with any of the people at the meeting, and yet we are all silent partners at that meeting. To the extent that interpersonal coordination does occur in such situations, it reflects what Knoblich et al. (2011) refer to as "emergent" coordination that is spontaneous and unplanned.

Business meetings involve relatively small numbers of people, but partnering is even more complicated when individuals interact with larger groupings, including mass audiences. Consider the situation of a professor lecturing to a class of 300 students in a large lecture hall. Does this situation meet the criteria for being a partnered arrangement? On the one hand, all of the participants are in the same physical location for the same event. They are all engaged in a joint interaction such that the students are paying attention to the professor, perhaps laughing when she tells a joke. When the professor says "Your final exam is on Monday" (with an implicit You), each student might imagine this to be a dyadic statement. An individual student could address a question about the exam directly to the professor during the class, using the singular you ("Will you be posting the quiz scores before the final exam?").

From the standpoint of the professor, things are quite different. She will view her audience as an amorphous entity, a large "they." She may know very few of the students individually. Even if she does make eye contact with a familiar student during the lecture, this may be only a fleeting moment as she attempts to spread her gaze equally across the room. Whereas, the students might think of the professor as "she" or even "you," she probably thinks of her audience as a collective "they," rather

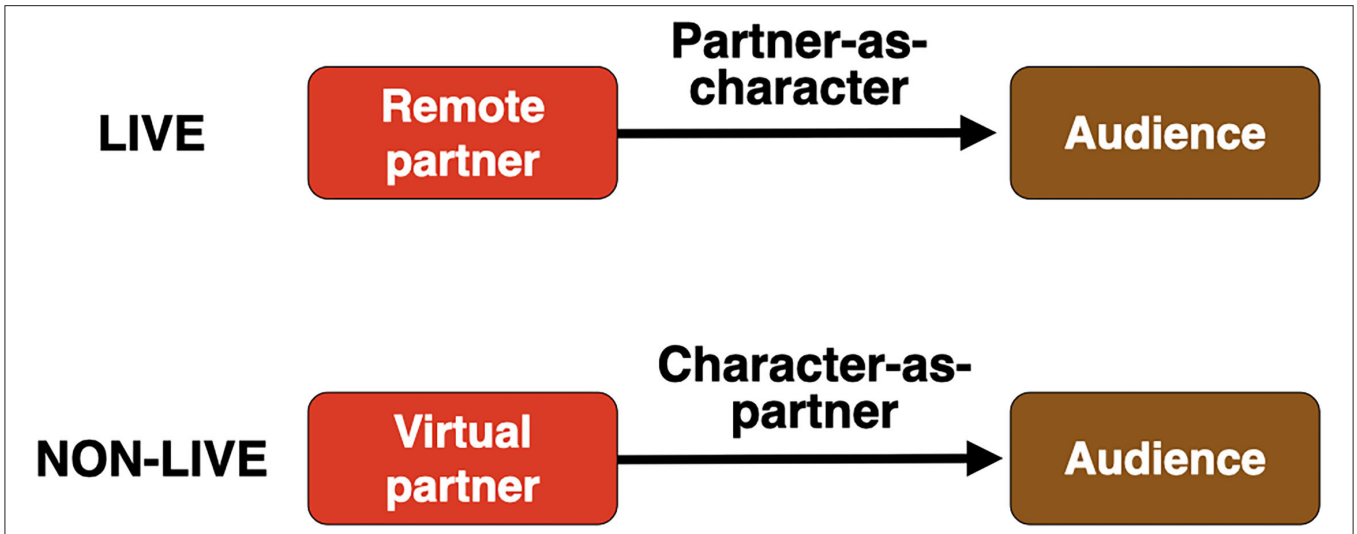

FIGURE 5 | Permutations on partnering. The figure describes two permutations on the standard arrangement of live, face-to-face partnering. In the "partner-as-character" arrangement, the partnering is remote and even completely silent. If often relies on visual and/or haptic interactions alone, as seen in the interaction between strangers on a bus. In the "character-as-partner" arrangement, a virtual partnership emerges, typically in a non-live situation, such as in the interaction that we have with an exercise instructor in a workout video. This can be thought of as a "2P spectator" arrangement.

than an assortment of individual "you." Masses of people can be individuated if the presenter is able to focus on one or more individuals in the group, such as when a student asks a question and engages in a short dialogue with the professor. In other words, there are ways of picking out individuals from mass groupings. For example, I may think of a symphony orchestra as a large "they" but be able to pick out the principal flutist as a "she" during a solo passage. A stand-up comic may approach his audience as a "they" but be able to pick out one person as a "he" based on his unusual laugh. The mass situation fits my criterion for partner mentalizing by being real-time, reciprocal, and adaptive. But the reciprocity is asymmetric. The audience is much more responsive to the presenter than the presenter is to each individual in the audience. The presenter reacts to a collective response, not to each individual's response, since the presenter typically has minimal awareness of the individuals. The audience sees the presenter as a singular entity, but the presenter sees the audience as a mass entity. All of the situations that I have described here are those in which partners become relegated to characters because of an absence of a directed and reciprocal interaction.

Character-as-Partner: The Virtual Partner

A different kind of complication in the partnering arrangement arises when a non-present person gives the semblance of being a partner. An interesting blend of 2P and 3P processing occurs in the form of a little-described phenomenon that I will refer to as "2P spectator" mentalizing, which is mentalizing about a virtual partner. The standard spectator arrangement for mentalizing is a 3P situation, such as our experience of characters in the narrative arts (e.g., Juliet). But consider a workout video on the internet recorded 3 years ago in which the instructor faces the camera head-on and addresses her audience as "you." This recorded session is just like the live version of a workout class, but it is now transmitted via mass-media technology. Hence, the communication arrangement is asynchronous, rather than being live. It is similar to the lecture arrangement mentioned above, but is now a virtual partnership. In fact, the absence of a live audience makes it unclear if the instructor's 2P address is to a singular or plural you. From the viewer's standpoint, it comes across as a singular you, although it is almost certainly a plural you from the standpoint of the instructor. Compared to watching a movie or TV show, there is an unusual middle ground of virtual interactivity in this video since the instructor is facing you head-on and is addressing you in a 2P manner ("Can you feel the burn in your legs?" or "Great job! Go grab some water"). Even though this is purely a spectator arrangement, it strongly resembles a situation of live partnering due to the 2P nature of the utterances and the facial perspective of the camera shot. The 2P spectator arrangement creates a true intermediate condition between the 3P spectator condition (e.g., Juliet) and the 2P partnering arrangement (e.g., you and me conversing). It is *a virtual partnership*. You adapt to the person as you would a partner. However, they are unable to adapt to you.

There are numerous examples of the 2P spectator arrangement in the arts. One set of examples consist of poems and song texts written in the second person. When you hear someone singing "I hope you don't mind that I put into words how wonderful life is while you're in the world," the you being addressed in the song is singular, but it is being transmitted to a mass audience, often times asynchronously through recording technology. Poetry and songs are common examples of the 2P spectator arrangement in the arts in which the you/You distinction is blurred. This establishes the condition for a "vicarious you," as if you are eavesdropping on a conversation between the singer and the person who the song is actually

directed to. You are well aware that the "you" of the song is not you personally, and yet you imagine that it is. You take on the song's "you" role vicariously and imagine the singer to be directing the lyrics to you personally ("you are so beautiful to me" or "I want you just the way you are"), as if in a parasocial relationship with that person. A final example of the 2P spectator arrangement that I will mention here is when a character in a play or TV show breaks the fourth wall and directly addresses the audience. In this case, it is a fictional character, not a real person, who is addressing the audience in a 2P manner, and so this strongly blurs the character/partner distinction, in addition to the you/You distinction, as described further in the next section. The 2P spectator arrangement is a situation in which characters present the illusion of being partners, although they are, in actuality, virtual partners.

THE INTERPLAY OF CHARACTER AND PARTNER IN THE ARTS

The model of social cognition presented in this article was inspired by ideas coming from the psychology and anthropology of the arts (Brown, 2019, 2022). The spectator/partner distinction provides an integrative means of classifying the arts into two categories that I have referred to as the *narrative arts* (theater, literature, visual art) and the *coordinative arts* (dance, music). The narrative arts function to tell stories, often to promote social learning through the modeling of prosocial behaviors. The coordinative arts function to stimulate group participation through synchronized actions, thereby serving as a reinforcer of group affiliation and a promoter of social cooperation.

From the standpoint of the current framework, the narrative arts employ spectator mentalizing ("character"), whereas the coordinative arts employ partner mentalizing ("partner"). Narrative artforms such as theater and literature are able to produce realistic representations of the social behaviors that occur in everyday life via their depictions of character relationships and interactions. However, music and most forms of dance do not present depictions of fictional interactions, but instead comprise *actual* social interactions between people, such as when people come together to sing in a chorus or dance in a group. This often occurs in a metrically-timed fashion that permits not only coordination but synchronization in time, where synchronization refers to a type of coordination between people that occurs on the fine-grained time-scale of hundreds of milliseconds (Clayton et al., 2020). I have referred to these artforms as coordinative arts since their primary social function is to stimulate processes of group participation and behavioral coordination as a means of enhancing social cohesion (see next section). Overall, the arts straddle the divide between *representing* social interactions (the narrative arts) and *being* social interactions themselves (the coordinative arts). Another way of thinking about this is by saying that the narrative arts *simulate* social interactions, whereas the coordinative arts *stimulate* social interactions (Brown, 2019).

The narrative arts depict people as characters, regardless of whether the narrative modality is diegetic (like storytelling) or mimetic (like theater), and whether the medium is dynamic (like theater) or static (like visual art). We can only perceive characters using a spectator mode. At the same time, there is something recursive about the structure of the narrative arts, most especially in the case of theater: narratives are simulations of characters in fictional storyworlds but in which *the characters interact with one another as partners* (**Figure 6**). In other words, embedded within these fictional storyworlds are partnered interactions between characters that resemble those between people in the real world, for example, the conversations between Romeo and Juliet that we hear in our stage performance at the theater. However, we ourselves are completely external to these worlds and so can only perceive such people as characters using a spectator mode. Jucker and Locher (2017) refer to this distinction between the characters' world and our own real world as intradiegetic vs. extradiegetic, respectively, and Landert (2021) refers to it as Communicative Levels 2 vs. 1.

The coordinative arts of music and dance, by contrast, are based on live interactions between social partners in our own real world. Such interactions—often times occurring in the context of group rituals—can reinforce collective belief systems, plan for cooperative actions, enhance group identity, and solidify social bonds. The social actions of the coordinative arts are consequential for the participants, both individually and collectively. Overall, the narrative arts create depictions of implicit partnering, whereas the coordinative arts create opportunities for explicit partnering.

There are other interesting hybrid situations that straddle the divide between character and partner and that blur this distinction, beyond the example mentioned above of a dramatic character breaking the fourth wall. In a theater company, the actors portray fictional characters, but interact with one another as performance partners. Hence, Ellen, who is playing the role of Juliet, can blame Frank, who is playing Romeo, for falling down on the incorrect part of the stage when performing Romeo's suicide. The same is true of actors who use implements such as puppets as the performers, for example puppeteers or ventriloquists who work in pairs. A similar situation occurs in multiplayer video games, in which the performers are virtual objects. Each player controls an avatar, which interacts with other avatars within the storyworld of the game, but the players interact among themselves as gaming partners in the real world. Another interesting example consists of virtual-reality chat groups in which people interact with one another as their own selves, but who employ avatars that have the fanciful appearance of fictional characters, rather than their true appearance. Yet another example is when fictional characters interact with us as partners, for example when Mickey Mouse puts his arm around us when posing for a family photo at Disneyland. Perhaps the most common situation outside of the arts is that of conversation. Interlocutors interact with one another as partners, but if the topic of conversation is a third person who is not there (e.g., you and I talking about Ellen before the show), then that absent person serves as a character in the conversation (whether real or fictional), since that person can only be perceived by the conversationalists using a spectator mode, hence creating two distinct sources of mentalizing, namely partner and character.

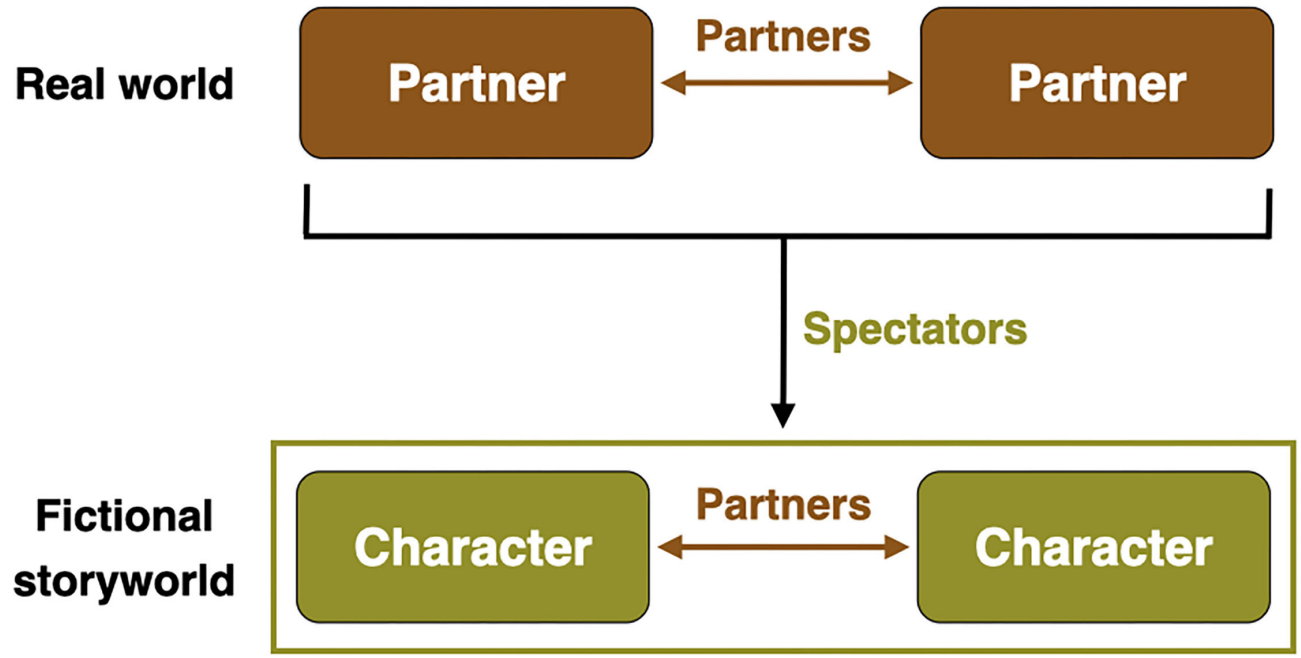

FIGURE 6 | The recursiveness of the narrative arts. People in the real world, for example theater audiences and book readers, perceive the narrative arts using a spectator mode. And yet, embedded within these arts are fictional storyworlds that contain simulations of *partnered* interactions between the characters that resemble such interactions in the real world. Because audience members are external to these embedded storyworlds, they can only perceive these interactions as spectators.

Hybrid situations such as these that straddle the divide between character and partner have important implications for the "divided consciousness" that often occurs during acting (Metcalf, 1931; Chekhov, 1953). While this is typically conceptualized as a dyadic split between self and character when an actor performs a role, we can think of it as being equally a triadic divide when we include the facet of performance partners in group productions, for example the divide between Ellen (self), Juliet (character), and Frank (partner). Likewise, audience members can mentalize about the actor and the character in parallel as two separate entities having a single body, analogous to rivalrous perception in the realm of object perception (e.g., the face/vase illusion in psychology). In the case of characters having dual natures (e.g., Clark Kent and Superman), this can be extended to include three separate entities. The divide in consciousness that is thought to define the actor's experience is equally a facet of the experience of the spectators (Smith, 2011; Gallagher and Gallagher, 2020). While an actor has to have confidence that she is presenting a believable impression of being a fictional character to an audience, this process is only meaningful if the audience members themselves believe that the actor is indeed that character. Hence, the divide operates comparably in both perception and production. An implication of this discussion is that the transportation between the real world and storyworld can go both directions. When a viewer gets immersed in a story while watching a film, they are transported *into* the storyworld. When a story character breaks the fourth wall, they are being transported *out of* the storyworld.

TWO ROADS TO SOCIAL COHESION DURING PARTNERING: ALIGNMENT AND ENTRAINMENT

Having described the nature of character and partner, I will conclude this article with a discussion of partnering alone due to the vital importance of group cooperation to the evolution of the human species (Boyd and Richerson, 1985; Sober and Wilson, 1998; Richerson et al., 2016). The neural model of partnering described above (see **Figure 4**) included a process of "modal dispersion" whereby a common mentalizing system could interact with a multitude of behavioral systems for partnering using different motor effectors. In the current section, I will argue that the diversity of partnering arrangements in human behavior can be nicely encapsulated by two complementary behaviors, although there are intermediate arrangements that sit in between them. I will refer to these two contrastive functions with reference to their most prevalent behaviors in human life: *conversation* and *dance* (**Figure 7**). Conversation is mainly a cognitive activity—i.e., an exchange of information and attitudes—whereas dance is a physical activity. Conversation is primarily about the mind, while dance is primarily about the body, although conversation and dance both have cognitive and physical components to them.

There are many features that distinguish conversation and dance as acts of social interaction, but the main performative feature that I want to highlight here is that conversation is an *alternating* exchange between participants, whereas dance is generally a *synchronous* interaction between performers.

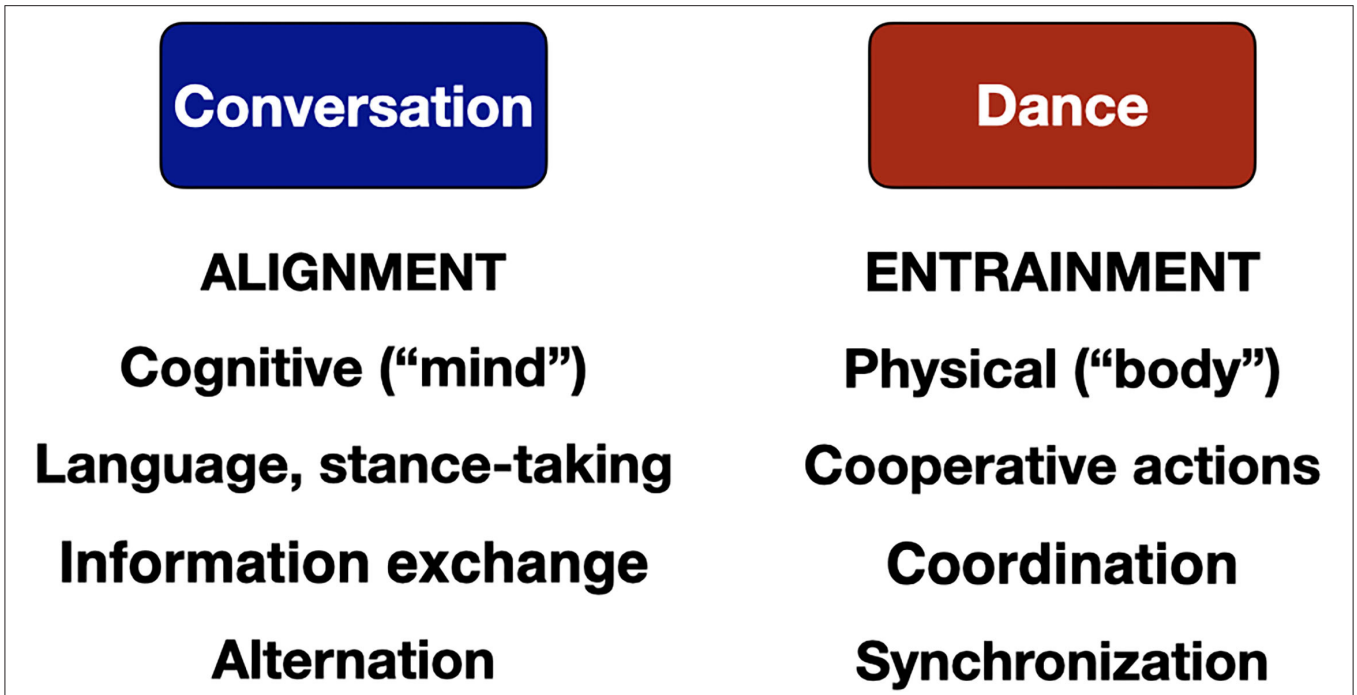

FIGURE 7 | The Dual Cohesion model. The model argues that there are two complementary means of creating social cohesion in human interactions: alignment in conversation and entrainment in joint physical actions like dance. The former is a convergence of ideas, while the latter is a coordination of actions.

Conversation is a means of exchanging information between people such that simultaneous speaking hinders that exchange (with the exception of group speech, which is far more similar to a dance than a conversation). Dance, by contrast, is a means of creating behavioral coordination between people such that simultaneity is the dominant means of achieving this. Related to this difference in performance arrangement, the rhythms of conversation are non-metric, whereas much group dancing employs metric rhythms since such rhythms foster synchronization. Overall, there appears to be *a categorical distinction between conversation's system of creating coordination through alternation and dance's system of creating coordination through synchronization*, thus establishing these two functions as poles of a coordinative spectrum.

This leads to a major proposal of this article, what I am calling the Dual Cohesion model. The model posits that there are two novel mechanisms that have evolved in humans that allow people to become connected with one another during social interactions so as to establish social cohesion: (1) *alignment* during conversation and (2) *entrainment* during joint physical actions. Alignment refers to the cognitive process of positioning oneself on a topic in the same manner as one's conversation partner such that the two people come to be "on the same page" with respect to that topic. Alignment falls under the domain of "stance taking" in conversation analysis, whereby people express their attitudes and feelings about a particular topic or about their interlocutors (Du Bois, 2007; Gales, 2011; Goodwin et al., 2012; Freeman, 2019). It is deeply grounded in the process of partner mentalizing and the adaptive mechanisms by which people accommodate to another psychologically. The opposite of alignment is disalignment, which occurs when people have conflicting viewpoints on a topic, for example during an argument (Du Bois, 2007; Paxton and Dale, 2013; Kiesling et al., 2018). It is important to note that I am using the term "alignment" in the manner that is employed in the study stance-taking in conversation analysis, rather than other meanings that refer to any type of convergence process between two people in a social interaction, such as in their syntax (Pickering and Garrod, 2004), physical gesturing (Dale et al., 2013; Wacewicz et al., 2017), or joint intentionality (Gallotti et al., 2017). The second major manner for creating interpersonal cohesion is motor entrainment during joint actions, such as when people coordinate their body movements in a synchronous manner during a dance (Kimmel, 2012; Chauvigné et al., 2019). Alignment and entrainment are the two complementary manners by which humans are able to achieve social cohesion, one focusing on the mind and the other on the body. Such mechanisms are important evolutionarily since social-bonding mechanisms provide people with a motivation to cooperate.

It is critical to point out that alignment and entrainment are not independent processes but that they instead have a *mutual influence* on one another, as shown in **Figure 8**. There is much empirical evidence showing that when speakers become aligned during a conversation, they also tend to become matched at the level of their gesturing. This includes a matching of body sway, gesticulation, posture, facial expression, eye contact, speech prosody, speech rate, and turn rate (Chartrand and Bargh, 1999; Pickering and Garrod, 2004; Shockley et al., 2007; Dale et al.,

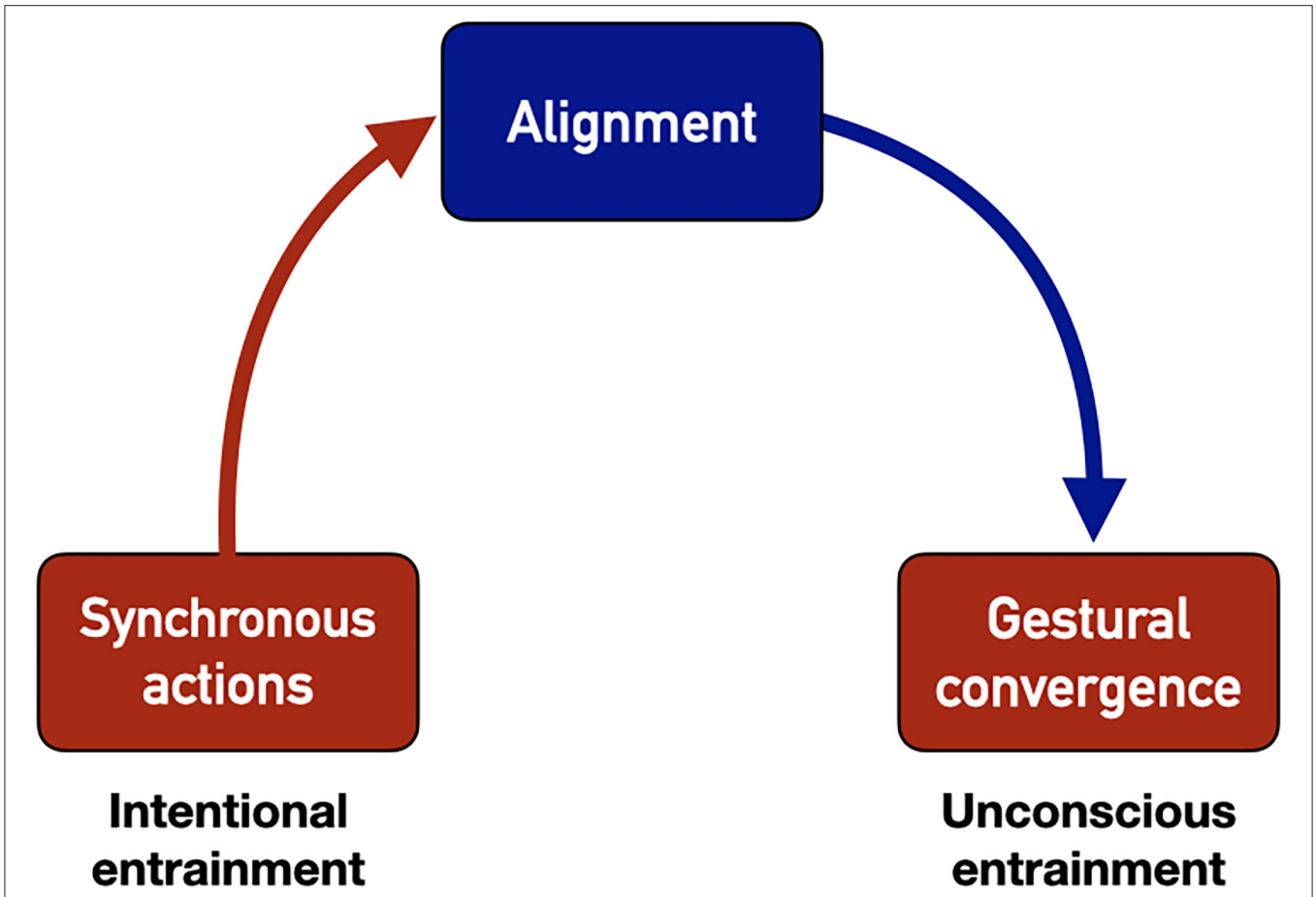

FIGURE 8 | Reciprocal interactions between alignment and entrainment. Conversational alignment stimulates gestural convergence between interlocutors through an unconscious process of non-metric entrainment (blue arrow). The intentional act of synchronizing with someone through behavioral processes like dancing and chorusing can have a direct impact on alignment and consensus-building at the cognitive level, leading to an inclination to cooperate with people (red arrow).

2013; Manson et al., 2013; Duran and Fusaroli, 2017; Gaziv et al., 2017; Stevanovic et al., 2017; Wacewicz et al., 2017)[5]. This occurs through a contagious process of unconscious imitation. For the purposes of this article, I will make a distinction between alignment—which pertains to the conceptual and linguistic process of achieving a similar affective stance to someone on a conversational topic—and *convergence*, which pertains to the paralinguistic matching of body gesturing, facial expression, and speech parameters between two or more interlocuters. This is also referred to as micro-coordination, interactive alignment, mimicry, and social resonance, among other terms (Wacewicz et al., 2017).

To some theorists, gestural convergence, most especially in the form of mutual body sway, is conceived of as a *virtual dance* between people. While convergence is unquestionably the closest thing to a dance as an intercorporeal phenomenon in conversation, it is dissimilar from dance in that the people are not intentionally trying to achieve a state of spatial or temporal coordination through their body movements, which is a defining feature of dance. Rather, the gestural matching of interlocutors typically occurs in a unconscious manner, as demonstrated in the classic Chameleon Effect (Chartrand and Bargh, 1999). In addition, the rhythm of the interaction is non-metric, rather than metric. In other words, the interaction is asynchronous, although coupled (Gaziv et al., 2017). The main point here is that an alignment in stance-taking has an impact on physical interaction. It engenders an unconscious and non-metric form of physical entrainment between two or more people during a conversation. Hence, alignment has a mind/body axis to it that encompasses the impact of alignment (mind) on gestural convergence (body) during conversation, where convergence is an unconscious form of entrainment.

I would argue that there is a similar axis for entrainment, except that it is a body/mind axis (**Figure 8**, left side). There is compelling empirical evidence that synchronizing one's body movements or vocalizations with other people produces numerous prosocial cognitive consequences, including an enhancement of liking, trust, connectedness, a desire to help, a willingness to cooperate, and an identification and affiliation

[5]Beyond this gestural level, there is also a linguistic matching of word choice and syntax (Pickering and Garrod, 2004; Du Bois, 2014).

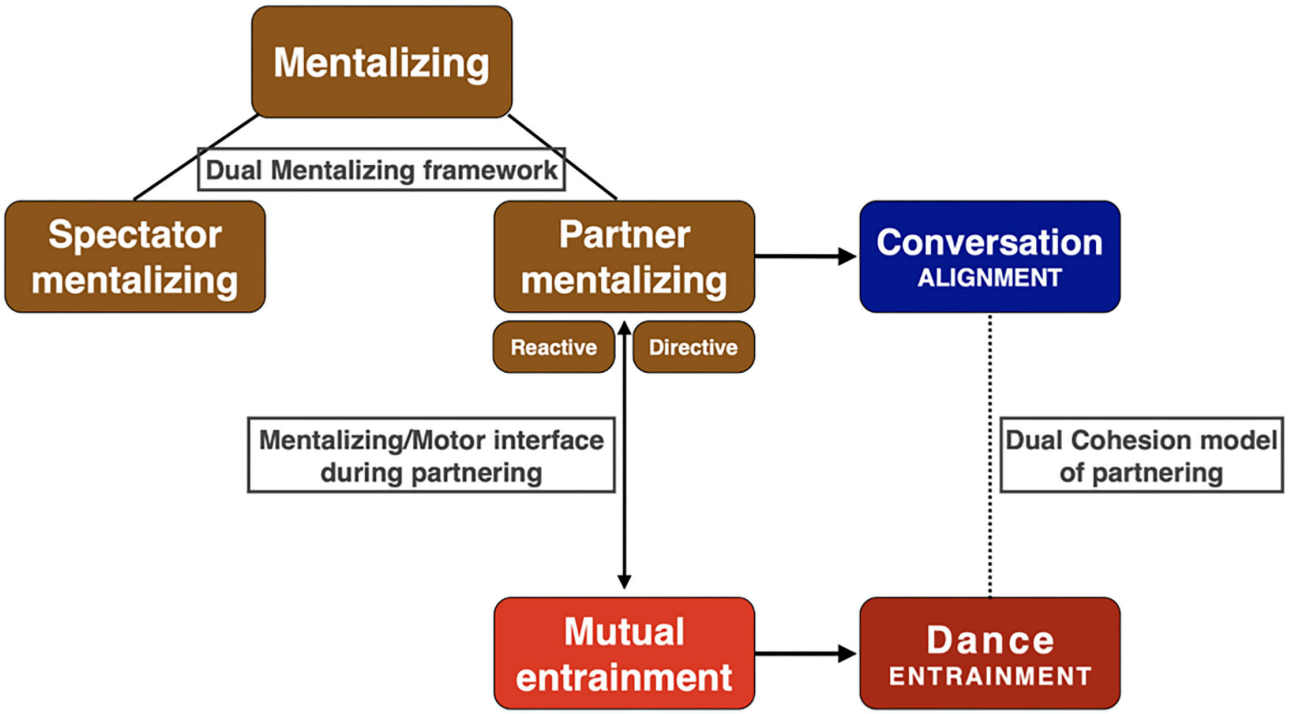

FIGURE 9 | Summary of the major concepts. The rectangular text-boxes indicate the three major theoretical perspectives discussed in the article. See **Figure 8** for a more detailed analysis of the Dual Cohesion model.

with the group (Anshel and Kipper, 1988; Hove and Risen, 2009; Wiltermuth and Heath, 2009; Kirschner and Tomasello, 2010; Dunbar et al., 2012; Fischer et al., 2013; Reddish et al., 2013; Cirelli et al., 2014; Pearce et al., 2015; Good and Russo, 2016; Launay et al., 2016; Rennung and Göritz, 2016; Weinstein et al., 2016; Kniffin et al., 2017; von Zimmermann et al., 2018; Cross et al., 2019; Mehr et al., 2021; Savage et al., 2021). From a functional perspective, a short-term intervention of synchronized movement and/or vocalizing with others has the long-term benefit of fostering a communitarian sense of belonging to the group and of supporting cooperative endeavors with group members, not least with non-kin. In fact, these effects provide important insights into the concept of alignment that is not apparent in standard work on stance-taking. While the literature on alignment places the focus on the conversational topic alone—i.e., how interlocutors come to converge in their stances toward it—alignment in fact has a significant impact on *the social relationship itself* (i.e., affiliation) and thus on the extent to which people like and trust one another and are willing to help and cooperate with their conversation partner(s). I believe that the alignment literature can benefit from a consideration of the affiliative effects that are observed in entrainment studies. People strive to develop social relationships with others who have values and attitudes that are similar to their own, a phenomenon known as "homophily" in the study of social networks (McPherson et al., 2001).

While the discussion of this article has focused on dyadic forms of partnering, the ultimate aim of the Dual Cohesion model is to highlight the importance of alignment and entrainment as emergent *group-level* traits that can enhance social bonding among large groups of people, including whole societies. This would include the impact of religious and political discourse on mass consensus, persuasion, and conflict resolution (Innes, 2004; Giles and Ogay, 2007; Balliet, 2010), as well as the impact of group chorusing and dancing on mass entrainment during group rituals, such as ceremonial rituals (Radcliffe-Brown, 1922). People engage in group rituals not only to strengthen social bonds and to enhance group identity, but to reinforce belief systems and generate a feeling of consensus and commitment, ultimately motivating cooperative joint actions by the group. The major aim of the Dual Cohesion model is to account for two complementary, species-specific coordinative traits in humans: alignment as a cognitive convergence of ideas, and entrainment as a behavioral coordination of actions.

CONCLUSIONS

Figure 9 provides a summary that ties together the major arguments put forth in this article. I first proposed a "dual mentalizing" framework that distinguishes spectator mentalizing (non-reciprocal) from partner mentalizing (reciprocal), as based on a parallel distinction between external and mutual entrainment, respectively, in rhythmic timekeeping. The dual mentalizing framework underlies a distinction between two ways of conceiving of people in social cognition: character and

partner. This has important implications for the arts. In the narrative arts, we conceive of people as characters, whom we come to understand using a spectator mode of processing. In the coordinative arts of music and dance, we instead conceive of people as interaction partners, just as we do during everyday activities outside of group rituals. Narrative artworks such as dramas have the hybrid feature of being depictions of characters who interact with one another as partners (**Figure 6**).

The rest of **Figure 9** is about the nature and diversity of partnering. Partners are not only people about whom we mentalize, but people with whom we engage in an ongoing process of mutual adjustment during joint actions. Hence, partnering, whether cognitive or physical, depends on an obligatory coupling between mentalizing and behavioral adaptivity, where the latter is a form of mutual entrainment. The nature of the coupling between mentalizing and motor activity is poorly understood, but I proposed that mentalizing could have a similar leader/follower dynamic to entrainment, such that "directive mentalizing" is the leader version of it, perhaps associated with the anterior region of the TPJ. This could then impact the motor system, resulting in parallel leader/follower dynamics in both domains. Finally, I proposed a Dual Cohesion model of partnering, which argues that there are two complementary roads to achieving social cohesion during partnered interactions: alignment in conversation and entrainment in dance. Alignment is based on a cognitive convergence of ideas, whereas entrainment is based on a behavioral coordination of actions. Alignment in conversation leads to a non-metric form of entrainment, as seen in the joint body sway of interlocutors. Likewise, entrainment in physical partnering tasks engages the process of partner mentalizing, including directive mentalizing, in the dynamic of leading and following between the partners. Both roads to cohesion can lead to consensus, cooperation, collaboration, and coordinated actions through an interplay between mentalistic and behavioral processes in mediating social cognition and interpersonal interaction.

AUTHOR CONTRIBUTIONS

SB conceived the ideas and wrote the manuscript.

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