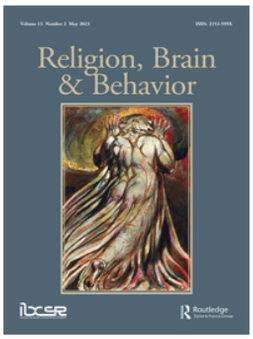

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COMMENTARIES

Cooperative signaling in the sandbox: Future directions for examining collective ritual in child development

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Lang and Kundt present the potential evolutionary origins of collective ritual as a signaling system to indicate cooperative intentions. They identify their purpose as inspiring new research to further untangle this system's evolutionary pathway. We propose that this perspective offers not only an opportunity to look to past interdisciplinary research, but also to inform future research that considers the behavioral and cognitive consequences of conceptualizing collective ritual as a signaling system to cooperative intent (e.g., Lang & Kundt, Rappaport, 1999). Below, we will elaborate on research examining the development and consequences of children's participation in collective ritual before turning to areas for future research, specifically within developmental psychology. In doing so, we will draw from Lang and Kundt's inclusion of evidence from research with children to support the three composite signals that underlie collective ritual: similarity signaling, coalitional signaling, and commitment signaling.

Research in developmental psychology has primarily approached children's engagement in rituals from the perspective of fostering social cohesion (see Legare & Nielsen, 2015 for a review). As such, children's ritual learning has been characterized as an extension of their learning of broader norms and conventions (e.g., Clegg & Legare, 2016; Legare et al., 2015) in order to affiliate with a particular social group (e.g., Watson-Jones et al., 2016). As a consequence of this focus, work on children's high fidelity imitation—which is foundational to ritual learning—tends to reflect this focus on learning conventional behaviors. For example, studies examining children's attention to and imitation of ritualized action often only include a single participant experiencing different cues that are intended to indicate the need for high fidelity replication of more ritualistic or normative behaviors versus an efficiency-focused acquisition of behaviors with instrumental goals. Overall, this body of research provides support for participation in collective ritual as a similarity signal and potentially for coalitional signaling, especially given that many of the cues assessed tie into a desire to affiliate with the model (for a sample of studies related to this signal, see Watson-Jones et al., 2021). Evidence based in developmental psychology work on children's developing ritual learning for children's participation in ritual as commitment signaling, is more limited. Moreover, as outlined below, research that moves beyond children's individualized ritual learning to examine participation in collective ritual is also critical.

The scope of work on the social and behavioral consequences of children's participation in collective ritual is much narrower and, to our knowledge, the entirety of this published work was cited by Lang and Kundt in their explanation of the purpose of each composite signal. From the target article, we know that: engaging in collective ritual results in higher levels of in-group monitoring and preference (compared to non-ritualized joint activity) (Wen et al., 2016, 2020), children's high fidelity imitation of ritualized actions does seem to be based in social motivations (e.g, reinclusion to a social group, Watson-Jones et al., 2016), and even infants expect individuals who perform

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the same ritual action to affiliate with one another (Liberman et al., 2018). These studies provide support for the first two cooperative signals–similarity (e.g., to demonstrate relatedness between ritual participants) and coalitional signaling (e.g., intention to complete joint action). However, there is a lack of evidence to directly support commitment signaling (e.g., intention to complete costly action), though Lang and Kundt cite evidence of children's abilities to evaluate cost when making social evaluations (Jara-Ettinger et al., 2015) and prepare for mutually–exclusive future outcomes (Suddendorf et al., 2017).

Drawing from this work, future research in developmental psychology could lend further support for Lang and Kundt's position. More work needs to be done to examine children's interpretations of others' participation in collective ritual and their own experiences with collective ritual, including both familiar and unfamiliar rituals. We propose next steps are to examine whether children use collective ritual as a commitment signal, combining work on children's cooperation (see Warneken, 2018 for a review) and children's developing attention to collective rituals. Early stages of this work are currently in progress (Wen & Warneken, 2019) and examine children's interpretation of participation in collective ritual as a precursor to intent to engage in and actual engagement in costly actions. Beyond interpretation of others' actions, children's direct participation in collective ritual may have consequences for their own cooperative behaviors. Future research should explore whether novel rituals such as those used in Wen and colleagues' work (Wen et al., 2016, 2020) influence children's cooperation or sharing with peers in their in-group and out-group. Children's experiences with rituals in familiar settings (e.g., religious ceremonies) may also have similar consequences.

Second, there needs to be more work examining the developmental onset of Lang and Kundt's proposed underlying cognitive structures that are required for cooperative signaling. Does children's sensitivity to these signals become stronger with the maturation of these cognitive structures? For example, Lang and Kundt discuss theory of mind as an underlying mechanism for coalitional signaling, since understanding shared intentions is a prerequisite for joint action. Theory of mind skills develop throughout early childhood, which is why we propose work on collective rituals should be focused on preschoolers. As children develop stronger theory of mind skills, there should be a stronger translation between ritual participation and intention to cooperate. Moreover, Baimel et al. (2015) proposed that the behavioral synchrony involved in collective rituals may enhance theory of mind. Thus, it is possible that for children at early stages of theory of mind development, participation in collective ritual may also bolster their ability to understand related mind-reading tasks (for a review of the dual influences of culture and cognitive development on theory of mind, see Taumoepeau et al., 2022).

In conclusion, developmental research provides support for some aspects of the cooperative signaling system underlying the evolution of collective ritual proposed by Lang and Kundt. Although there is support for similarity and coalitional signaling, there lacks direct developmental evidence to support commitment signaling. We propose that developmental psychology research examining whether children use collective ritual as a signal for cooperative intent, and a more fine-tuned understanding of the onset of certain underlying cognitive structures, would further support Lang and Kundt's framework.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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