

other species (van Vugt & Tybur, 2014). Here the kneeling may serve to communicate deference to God. However, Catholics also cross themselves in a specific way. While the action carries meaning, it wouldn't be easily understood by someone who had never seen it before or didn't understand the context. It is an arbitrary symbol. Thus, new humans may solve the complex problem of understanding people's non-instrumental actions, first by asking whether they communicate about relationships and roles, then by computing whether they fit the structure of innate concepts of social relationships. If not, infants may then interpret them as ritual actions, especially when imitated. The bifocal stance theory could therefore be expanded to include non-instrumental actions that are meant to acknowledge or communicate desires for specific types of relationships or roles within them.

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## On the evolutionary origins of the bifocal stance

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### Abstract

In this commentary we advance Jagiello et al.'s proposal by zooming in on the possible evolutionary origins of the “bifocal stance” that may have enabled a major transition in human cultural evolution, arguing that the evolution of the bifocal stance was driven by an explosion in cultural complexity arising from cooperative foraging, which led to a feedback loop between the ritual and instrumental stances.

Jagiello, Heyes, and Whitehouse offer an exciting proposal for a theoretical unification of work in cultural evolution on both high-fidelity transmission of knowledge and the production of innovations. Not only does their *bifocal stance theory* (BST) mimic Daniel Dennett's highly successful attempt at building a theoretical framework for the study of thinking about other minds (the intentional stance; see Dennett, 1987; Veit et al., 2019), but it also provides us with a decidedly teleonomic framework. Indeed, they offer us an evolutionarily plausible explanation for why the mimicking of causally irrelevant behaviour can itself be explained in an adaptive way, rather than just seeing it as a by-product of the copying of successful actions by others. We find these features of their account extremely compelling as a pathway to bring together the diversity of work on cultural evolution, showing that rather than having one type of cultural learning arise only as a by-product of the other, both can be seen as adaptive in their own right.

Our goal in this commentary is to further advance their proposal by zooming in on the possible evolutionary origins of the bifocal stance, which may have enabled a major transition in human cultural evolution. As Jagiello et al. recognize at the end of their article, “the bifocal stances [...] may hold the key to understanding the evolutionary origins of human uniqueness” (target article, sect. 6, para. 1) and it is this idea that we want to focus on here, because the authors themselves appear to treat this as the greatest potential of their theoretical framework.

The BST describes two different stances agents can take towards social and cultural learning. The first is the instrumental stance, which focuses on the accomplishment of end goals and allows for innovation to achieve these ends, and the ritual stance, where the focus is on affiliation with group members, and through which high-fidelity transmission takes place. As the authors note, the truly unique part of the bifocal stance is the second of these. The ability to learn socially is fairly widespread throughout many species of mammals and birds, and potentially even some invertebrates (Whiten, 2019). This appears to be via the instrumental stance, where animals are focused on the end goals. However, what is not seen in other species is the behaviour of “overimitation,” in which causally irrelevant idiosyncratic aspects of a behavioural sequence are also copied. This ability, a signifier of the high-fidelity copying associated with the ritual stance, appears unique to humans; while other animals typically ignore behaviours that are unrelated to the goal (Horner & Whiten, 2005).

Humans appear to have the ability to adopt these two different stances towards social learning, along with an acuity towards identifying situations in which innovation matters more than cultural fidelity and vice versa. What, then, is the unique feature of human social life that has allowed for the development both of the ritual stance alongside the more common instrumental stance,

and the bifocal stance that allows flexible switching between both? We think that light can be shed on this question through an investigation of how it may have emerged in our hominid ancestors. Following Sterelny's (2012) account of the evolution of human cognition, which emphasizes feedback loops between learning, environmental scaffolding, and cooperative foraging, we maintain that the evolution of the bifocal stance should be understood in the context of cooperative foraging. This type of social arrangement creates unique pressures and opportunities that can support the development of both types of cultural learning, as well as the ability to move between them as appropriate.

Successful cooperative foraging can provide a surplus under which investments into cultural learning can be sustained before they inevitably have to pay off. Elsewhere, one of us has argued that it is in this context that we can understand the evolution of resolve as a means to enable interpersonal exchange (Veit & Spurrett, 2021). Here too, the value of the instrumental stance increases. With sharing and trading becoming a central feature of the lives of our early hominid ancestors, there was a need to evolve both motivation and attention towards keeping track of the instrumental value of different actions, which could be scaffolded to promote a greater awareness of the instrumental value of both behavioural innovations and other people's actions. With more complex foraging methods, the value of learning and innovation also increases, further expanding the human foraging niche. However, importantly, this also has the potential to have facilitated the development of the ritual stance. Human societies are unique in the degree of reliance of individuals on the community. Under these conditions, the risks from social ostracism are much higher, as it would be near impossible for an individual to survive in isolation. As the authors have demonstrated, the salience or threat of social ostracism seems to lead into the ritual stance, where copying fidelity increases. In general, as the rewards of social cohesion increase, along with the costs of ostracism, we should expect to see the elaboration of the ritual stance; and this is precisely what occurs with the rise of cooperative foraging.

Cultural learning is far more complex in humans than any other species, seemingly responsible for many of the features we take to be unique about human cognition and societies. Although other animals, particularly some nonhuman primates, show some forms of social learning and cultural transmission, right now it appears that only humans are capable of the high-fidelity copying that arises from the ritual stance, and of moving flexibly between the different types of learning as need suits. We suggest that it is through the emergence of cooperative foraging, and the unique selective environment thus created, that the bifocal stance will have truly come into its own, creating feedback loops that have led to its current form.

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## Representational exchange in social learning: Blurring the lines between the ritual and instrumental

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### Abstract

We propose that human social learning is subject to a trade-off between the cost of performing a computation and the flexibility of its outputs. Viewing social learning through this lens sheds light on cases that seem to violate bifocal stance theory (BST) – such as high-fidelity imitation in instrumental action – and provides a mechanism by which causal insight can be bootstrapped from imitation of cultural practices.

According to bifocal stance theory (BST), how faithfully someone imitates depends on their goals. We copy actions faithfully to affiliate with others or to highlight our membership in a group (the “ritual stance”), but selectively copy only what is necessary to achieve instrumental goals (the “instrumental stance”). We agree that social learning can serve both affiliative and instrumental ends. However, we disagree that high-fidelity copying is necessarily triggered by non-instrumental goals. Humans can perform a variety of computations to learn from others, from faithfully copying others' actions to inferring the values and beliefs that caused them. Collectively, these computations trade off the cost of performing the computation against the flexibility and compositionality of its outputs. Understanding social learning through the lens of this trade-off can guide theorizing about when high-fidelity imitation and mentalizing may be deployed toward the same goal, and provides a mechanism by which causal insight can be bootstrapped from faithfully transmitted cultural practices.

A general principle of intelligent behavior is to use simple methods whenever possible and more complex strategies when necessary. An emerging framework has framed the arbitration between simple and complex strategies as a resource-rational trade-off (Lieder & Griffiths, 2020). Much like a thrifty shopper or an efficient long-distance runner, adaptive organisms should not only maximize rewards, but also account for the cognitive costs of different strategies. While resource-rational adaptations have been widely studied in the context of individual decision making (Kool, Gershman, & Cushman, 2018; Shenhav et al., 2017), we propose that a similar trade-off exists in social learning (Wu, Vélez, & Cushman, 2022).