

Commentary on:

## Thinking Through Other Minds: A Variational Approach to Cognition and Culture

1. **Target Article Authors:** Samuel P. L. Veissière, Axel Constant, Maxwell J. D. Ramstead, Karl J. Friston, & Laurence J. Kirmayer

2. **Word Counts**

Abstract: 60

Main Text: 999

References: 457

Entire Text: 1516

3. **Title:** The role of communication in acquisition, curation, and transmission of culture

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10. **Abstract**

Veissière et al.'s proposal aims to explain how cognition enables cultural learning, but fails to acknowledge a distinctively human behavior critical to this process: *communication*. Recent advances in developmental and computational cognitive science suggest that the social-cognitive capacities central to TTOM also support sophisticated yet remarkably early-emerging inferences and communicative behaviors that allow us to learn and share abstract knowledge.

11. **Main Text**

Veissière et al.'s proposal tackles a big question: How does human cognition support acquisition and transmission of culture? They suggest that the key link between cognition and culture is social learning, which occurs when people infer others' expectations—about how one ought to interact with the physical environment and about how one ought to interact with others in social contexts—and use these inferences to guide their own behaviors. The scope of the phenomena they try to explain is ambitiously broad, and their model is correspondingly quite general. Yet, despite its generality, their proposal fails to acknowledge a distinctively human behavior that is critical to acquisition and transmission of culture: *communication*.

Their claim that “most of social learning occurs without explicit instruction (p.5)” reflects the widespread (yet misleading) dichotomy between “implicit” vs. “explicit” social learning; the former is often characterized as attentional biases and copying strategies that are rooted in evolution and shared across species, and the latter usually refers to deliberate instruction and pedagogy that emerge relatively late in ontogeny; Heyes, 2018). By adopting this view, Veissière et al. provide a discussion of social learning that is a glass only half-full, omitting a range of rich, inferential epistemic practices that exist “in between” the two ends of the spectrum.

Recent advances in computational and developmental cognitive science offer a more precise account of how mutual expectations and mental-state reasoning naturally give rise to contexts where two parties communicate to achieve a joint goal (Grice, 1975; Tomasello, 2010): One intends to learn, and the other intends to inform. Bayesian models of social learning (Shafto, Goodman, & Griffiths, 2014; Vélez & Gweon, 2018) and communication (Goodman & Frank, 2016) have formalized such cooperative exchanges of information as a set of mutually constraining inferences and expectations about other minds; the learner expects the teacher to consider the learner’s goals and knowledge to provide the best set of evidence for the learner, and the teacher expects the learner to rationally update her beliefs given the evidence. These expectations naturally give rise to powerful inferences and communicative behaviors that are present even early in life and ubiquitous in our everyday social interactions.

**Children as (selective) learners** Prior developmental research has offered initial empirical support for these formal models using children’s exploration as an index of their inferences as learners. When an adult pedagogically demonstrates one causal function of a novel gadget (e.g., pressing a lever plays music), the model expects a knowledgeable, helpful “teacher” to provide an exhaustive demonstration of its functions; consistent with this expectation, children infer that the gadget has no other functions and modulate their explorations of the gadget accordingly (Bonawitz et al., 2011). These results were replicated in Yucatec Mayan culture where pedagogical instruction is rare (Shneidman, Gweon, Schulz, & Woodward, 2016), further supporting the idea that these inferences are rooted in basic social-cognitive capacities rather than culturally specific teaching practices. Learners’ expectations about helpful teachers also allow children to identify unhelpful sources of information. Beyond using accuracy as a cue, preschool-aged children understand that the same accurate information can be under- or over-informative depending on the learner’s prior knowledge, and evaluate others based on what they *expect* of a helpful, knowledgeable informant (Gweon & Asaba, 2017; Gweon, Pelton, Konopka, & Schulz, 2014; Gweon, Shafto, & Schulz, 2018). Although selective social learning is often characterized as detecting cues that indicate when or whom to copy (e.g., learner’s own uncertainty, particular traits of conspecifics such as age or prestige; Kendal et al., 2018), these mutual expectations and mental-state inferences allow young learners to flexibly shield themselves from various forms of misinformation.

**Children as teachers** When one learns primarily through copying and imitation, the decision to copy typically falls on the learner. However, when social learning occurs via communication, the real heavy-lifting comes from teachers who can choose what knowledge should be passed onto the next generation. A recent study suggests that by 5-7 years of age, children make rational decisions about what is best to teach by considering what is rewarding to learn and what is more costly for learners to discover on their own (Bridgers, Jara-Ettinger, & Gweon, in press). While teaching benefits learners by reducing the cost of exploration and trial-and-error, teachers must be selective because it's impossible to teach everything. By prioritizing high-utility knowledge, teachers ensure that learners acquire the most critical, valuable information without the high costs of learning. Over generations, this process curates a body of cultural knowledge that is considered worthy of preserving and teaching.

**Towards a more complete picture of social learning** Ironically, the cognitive capacities that support these epistemic practices are also central to Vessièrè et al.'s proposal: mutual expectations and mental-state reasoning supported by Bayesian inferences and representations of expected utility (Goodman & Frank, 2016; Jara-Ettinger, Gweon, Schulz, & Tenenbaum, 2016; Shafto et al., 2014). Contrary to their assumptions, communication-based social learning emerges early in ontogeny (Csibra & Gergely, 2009), is widespread across cultures (Hewlett, Fouts, Boyette, & Hewlett, 2011), and does not always involve explicit, verbal transmission of knowledge (Gweon, Tenenbaum, & Schulz, 2010). In fact, these assumptions reflect a broader issue in the field: a disproportionate emphasis on copying as the primary means of social learning (Boyd, Richerson, & Henrich, 2011; Rendell et al., 2010).

Human cultural knowledge is far more than a random collection of information. Regardless of its source-- exploration, copying, communication—the evidence we observe is incorporated into a system of abstract, structured knowledge (i.e., intuitive theories) that allow us to explain the past, predict the future, and plan our own actions. Critically, the past includes our mistakes or what we didn't know, the future includes the benefit of “knowing” to our offspring, and the actions include actively sharing our knowledge with those who will benefit from it. To understand how knowledge grows over one's lifetime and over generations, we must ask how human social learning goes *beyond copying*, and how smart social learners become smarter teachers who willingly take on the costs of “cognitive outsourcing”.

## 12. References

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