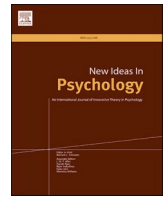


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

New Ideas in Psychology

journal homepage: <http://www.elsevier.com/locate/newideapsych>

Conventional minds: An interactivist perspective on social cognition and its enculturation

Robert Mirski^{a,b,*}, Mark H. Bickhard^c

^a Department of Philosophy, The John Paul II Catholic University of Lublin Al. Raclawickie 14, 20-950, Lublin, Poland

^b Nicolaus Copernicus University in Toruń, ul. Gagarina 11, 87-10,0, Toruń, Poland

^c Department of Philosophy, Lehigh University, 27 Memorial Drive West, Bethlehem, PA, 18015, USA

ARTICLE INFO

Keywords:

Social cognition
Theory of mind
Mindreading
Folk psychology
Enculturation
Interactivism

ABSTRACT

We argue that the traditional theory of mind models of social cognition face in-principle problems in accounting for enculturation of social cognition, and offer an alternative model advanced within the interactivist framework. In the critical section, we argue that theory of mind accounts' encodingist model of mental representation renders them unable to account for enculturation. We focus on the three problems: (1) the copy problem and impossibility of internalization; (2) foundationalism and the impossibility of acquisition of culturally specific content; and (3) the frame problems and the inadequacy of mental-state attribution as a way of coordinating social interaction among (encultured) individuals. The positive section begins with a brief sketch of the theoretical basics of interactivism, followed by a more focused presentation of the interactivist model of social cognition, and concludes with a discussion of a number of issues most widely debated in the social cognition literature.

1. Introduction

Philosophy and social sciences have been interested in the subject of social cognition since their very conception. Over recent years, however, the problem has been largely dominated by the area of research called theory of mind (ToM). Originating a couple decades back (Premack & Woodruff, 1978), the idea that human sociality is founded on the ability to attribute mental states to others has dominated psychology and related fields (reviews of the field can be found in Baron-Cohen, Tager-Flusberg, & Lombardo, 2013; Fenici, 2017a; Wellman, 2018). So much so that thoughts on the subject coming from other research traditions have to be laboriously reintroduced into this ToM-dominated climate today (e.g. Carpendale & Lewis, 2006; De Jaegher & Di Paolo, 2007; Gallagher, 2001, 2008; Nelson, 2007). The problem of culture's role in how we view one another fits this trend: While the relation between culture and the individual is one of the perennial topics in social sciences at large, it is only over the recent years that theory of mind research has begun to explore culture's significance for socio-cognitive abilities and their development (Lavelle, 2019; Taumoepeau, 2019).

Most researchers working within ToM do not consider culture exceptionally problematic for their models. Although data are

accumulating of a cross-cultural variance in performance on standard ToM tasks both among children (Dixon, Komugabe-Dixon, Dixon, & Low, 2017; Hughes et al., 2014; Mayer & Träuble, 2012; Vinden, 1999, 2002; Wellman, Fang, Liu, Zhu, & Liu, 2006; Wellman & Liu, 2004) as well as adults (Adams et al., 2010; Kobayashi, Glover, & Temple, 2006; Mitchell, Macrae, & Banaji, 2006; Perez-Zapata, Slaughter, & Henry, 2016; Savitsky, Keysar, Epley, Carter, & Swanson, 2011), ToM theoreticians tend to assume that they are simply evidence of theory of mind – a mental attribution mechanism – developing differentially depending on the cultural context. Alternatively, those of more nativist leanings argue that culture modulates other cognitive process while the ToM mechanism is innate and impervious to the impact of culture (Helming, Strickland, & Jacob, 2014, 2016; Westra & Carruthers, 2017).

In this paper, we point out that ToM accounts of cultural effects on social cognition are far from being free of controversy. We argue that ToM models cannot in fact account for genuine enculturation of social cognition – much less for the existence of a social reality – due to fatal problems intrinsic to their overarching theoretical framework. As an alternative, we present an account of social cognition within the interactivist framework (Bickhard, 2009) and demonstrate how it accommodates enculturation of social cognition and emergence of social

* Corresponding author. The John Paul II Catholic University of Lublin Al. Raclawickie 14, 20-950, Lublin, Poland.

E-mail address: robmirski@gmail.com (R. Mirski).

URL: https://www.researchgate.net/profile/Robert_Mirski (R. Mirski).

<https://doi.org/10.1016/j.newideapsych.2021.100856>

Received 26 June 2020; Received in revised form 7 February 2021; Accepted 8 February 2021

Available online 11 March 2021

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reality. Finally, we discuss the proposed framework in the context of some of the most discussed problems in the ToM-dominated social cognition research: false belief understanding, folk psychology, cross-cultural differences in social cognition, and the influence of language on socio-cognitive development.

2. The uncultured ToM

ToM models come in a few variants, the most notable of which in the present context are nativism (Carruthers, 2013, 2015; Fodor, 1992; Leslie, Friedman, & German, 2004; Scott & Baillargeon, 2017; Westra, 2017), and rational constructivism (theory theory) (Gopnik, 2011; Gopnik & Wellman, 1992; Meltzoff & Gopnik, 2013; Wellman, 2014).¹ The underlying presupposition that unites these otherwise divergent views is that social cognition is underwritten by a mental-state attribution mechanism – the titular ToM. The mechanism is claimed to be indispensable in competent social interaction; it is thanks to sub-personal mindreading (i.e. not folk psychological, but of lower-level of organization) – as the workings of ToM are often termed – that we can imitate, learn a language, feel empathy, and essentially do any other thing that involves participation in social interaction.

This idea has been criticized extensively from an empirical perspective; many researchers have pointed out that data currently available speak against the ToM-mechanism views (e.g. Carpendale & Lewis, 2006; Fenici & Garofoli, 2017; Heyes, 2018; Nelson, 2007). As this paper focuses on theoretical issues, we will not review these debates. We do, however, believe that our positive proposal accounts for the data problematic to ToM models, which we will point out where relevant. In this section, we offer criticism of the ToM accounts' underlying theoretical framework and argue that it faces in-principle problems when the issue of enculturation of social cognition is concerned.

All traditional ToM proposals are characterized by encodingism (see, e.g. Bickhard & Terveen, 1995; Brette, 2019; Mirski & Bickhard, 2019). Encodingism is the view that the fundamental form of representation is via encoded meanings. That is, according to encodingism, cognition consists in minds utilizing mental representations that refer to the world via their encoded content, which predicates the world to be a particular way (e.g. if a representation of a car is tokened, the organism predicates that there is a car in the field of vision). Encoding relationships can be rendered in a number of ways – as correspondence, correlation, informational relationship, covariance etc. – but they all boil down to the same principle of the state of the representational vehicle “standing in” for what is being represented. This harkens back to the classical, computational model of the mind (e.g. Fodor, 1975; Newell & Simon, 2006).² Perception is transducing or encoding incoming stimuli into appropriate symbols, and action is transducing computed representations back into motor directions. It is now the standard framework of cognitive psychology (e.g. Groome & Brace, 2014) and a taken for granted truth in ToM proposals.

Encodingism births a plethora of problems (Bickhard, 2009; Bickhard & Terveen, 1995; Brette, 2019; Mirski & Bickhard, 2019), but the ones most relevant for the present discussion are the copy problem,

¹ There have naturally been others, such as simulation theory (Goldman, 2008) or Perner's teleology and mental files (e.g. Doherty & Perner, 2020; Perner, Priewasser, & Roessler, 2018), but their role in debates on culture's role in socio-cognitive development has been much lesser than the two mentioned. In any case, as our criticism is against the underlying theoretical framework of ToM models, any other accounts are its subject just the same insofar as they follow the same presupposition that social cognition is founded on the ability of mental-state attribution (albeit differing in detail, both simulationism and Perner's proposals do take that view as well).

² And in some version even to the ancient Greek idea that “like represents like” – see Aristotle's signet ring argument.

foundationalism, and the frame problems, which we discuss below.

2.1. The copy problem and internalization

A fundamental characteristic of encodings is that by their very nature, they require an interpreter to have their meaning; an encoded representation has to inform someone or something's functioning in a way that is consistent with what the representation encodes, what it stands for. It is the interpreter that provides content for the representational vehicle.

One fatal consequence of the necessity of an interpreter is that the organism cannot, in fact, encode any new fundamental meanings. The only access to reality that the organism has is through encodings and so any ‘new’ knowledge would have to already be known (to the interpreter). An interpreter must interpret into something already available. Consequently, if we model our cognitive system as a system that uses solely encoded representations, then we make it impossible for it to learn new representations – to encode new meanings.

The above problem has been pointed out already by Piaget (1971) in his copy argument. If our representations of the world are copies of it in some sense (encodings), then we would have to already know the thing that we wish to copy or encode. The sensory “imprint” of an object (e.g. chair) carries no information about what it is an imprint of, and so to take it as a representation of a chair requires the organism to already know what chairs are. In other words, encoding new meanings would require some independent epistemic access to that which is to be copied, which is impossible if encodings are taken to be the fundamental type of representation.

Relevant to our present purposes, the copy problem has serious consequences for the notion of internalization as a model of enculturation. Both Piaget (1999[1951]; Piaget & Inhelder, 2000[1969]) and Vygotsky (1978) used the notion of internalization, but in the context of enculturation, it is Vygotsky's proposal that is most relevant and has had the most influence (Zittoun & Gillespie, 2015). While there have been various elaborations of the model, the fundamental problem is that it simply cannot happen as long as we take cognition to be based on encoded representations. The principal idea behind internalization is that something that is external – e.g. a social rule or norm or culturally specific mental concept – is transmitted or impressed into the child's mind (copied). Within an encodingist framework, however, the only way any internalization could possibly happen would be by encoding new content. But this is precisely what we have shown is impossible – the child would have to already know the rule or norm or concept in order to internalize it (for more exhaustive criticism, see Christopher & Bickhard, 2007).³

2.2. Foundationalism and enculturation

There is (seemingly) one way out of the copy problem. If the system came with a set of already existing representations with encoded meanings known by the system innately, then new representations could be created as recombinations of these innate foundations – no “copying” would be necessary. In fact, an innate representational foundation is the only way out for encodingist models to account for learning, and we refer to the theoretical necessity of postulating such foundations as *foundationalism* (Allen & Bickhard, 2013; Mirski & Gut, 2018). The concept of the chair cannot be “copied” from experience, but it can be assembled on its basis if the organism has already available its

³ Nelson (2007, pp. 68–71) argues that the copy (encodingist) reading of Vygotsky's internalization is incorrect, and that an action-based constructivist interpretation of it, much like the proposal offered in this text, is a more accurate exegesis of his ideas. This might be true, but the fact remains that internalization within encodingism is untenable, and even if not originally intended as such, the term invites such a reading.

constituent representations – experience is then viewed as instructions for how to combine whatever innate representations the particular model starts with. The difference between encodingist rationalists (or concept nativists) and empiricists is in essence that the former start with fairly complex foundational representations, while the latter posit more primitive building blocks. In both cases, however, development necessarily boils down to reconfiguration of the representational givens. It is customary for encodingist models to be open about their foundations, as we see explicitly done by both nativism, as well as theory theory (Gopnik, 2003; Wellman, 2014, p. 197). Even when it is not openly claimed, however, foundationalism is a necessary constraint on all encodingist models of cognition – these accounts have to rely on an idea of cognitive development as reconfiguration of the innate representations since new ones cannot *in principle* be created.⁴

Central to our present purpose, foundationalism does not really help with the problem of enculturation. If no genuine learning is possible, then no genuine cultural learning is possible. Within an encodingist framework, children start with the foundational concepts, form hypotheses, some of which are confirmed in some cultures, but are falsified in others, which eventually leads to the children constructing culturally specific theories of mind. However, there is no qualitatively new mental content possible – the cultural concepts are merely recombinations of the universal foundations. The Welsh concept of *hiraeth*, for instance, which means a specific kind of homesickness (Polk, 1982), and which Welsh people report to feel and undoubtedly read others as feeling, will have to consist of some highly nuanced mixture of desire and other purportedly innate concepts. Although in theory such constructivism could exist, it is highly controversial to take it to be an adequate model of how humans develop cognitively: Remember, it implies that the truth-bearing properties of the mental structure all come from the foundation, and so must even such concepts as car sickness or e-mail.⁵ Consequently, even though a nativist may claim that “novel concepts can be acquired, and new principles of attribution learned, relying both on individual experiences and cultural input” (Westra & Carruthers, 2017, p. 166), it seems that there is little to the effect of an actual model of how that might be so. With the constraints intrinsic to the ToM framework, enculturation can be nothing more than reconfiguration of innate contents.

2.3. The frame problems and holism of mental-state attribution

From a more epistemological perspective, encodingism faces problems when the context sensitivity of natural cognition is concerned, which has been discussed in AI literature under the label of the frame problems (Ford & Pylyshyn, 1996). Let us first discuss briefly the general nature of the frame problems, after which we will turn to their expression within the context of social cognition.

The underlying presupposition of encodingist frameworks is that explicit representation is the most fundamental kind; it is by encoding information about objects, their properties and relations, that an agent manages to successfully interact with reality, to successfully anticipate what will happen and act accordingly.⁶ However, we behave in

⁴ Note that distributed processing, such as in connectionism or dynamic systems, which are sometimes claimed to be an alternative to classical symbol architectures can be just as encodingist as their predecessor. Dynamic systems is more nuanced, however, as it does not presuppose an encodingist metaphysics and can be given a more tenable metaphysical interpretation (such as the one discussed in the present text). Classical symbol computationalism and connectionism do presuppose an encodingist metaphysics and thus are untenable at the outset. For a fuller criticism see Bickhard (2015b); Bickhard and Terveen (1995).

⁵ This theoretical necessity is perhaps best illustrated by Fodor’s radical concept nativism (Fodor, 1975, 1981).

⁶ By “explicit” we mean roughly “actually present in the content of the representation”, not “conscious” as it is often understood in the literature.

agreement with an unbounded set of aspects of reality without representing them explicitly, and so do other animals (e.g. all organisms behave in accordance with gravity, but only humans have managed to represent it explicitly) and so this presupposition is plainly wrong. If we were to function in such explicit ways, the tasks would be computationally and memory-wise impossible: Any aspect of the situation, and past situations, can be potentially relevant for the present interaction, and so the system would have to encode an unbounded set of relevancy relationships and compute their applicability for the present context every step of the way. This is evidently an impossible undertaking (for a more thorough discussion, see Bickhard & Terveen, 1995, pp. 214–233).

Thus, any purported explicit representations or encodings that are claimed to drive the agent under determine their actual behavior, and consequently – what is most relevant for the present discussion – any *attribution* of such explicit representation to another agent under-determines prediction of their behavior. The latter has been pointed out in social cognition literature (Morton, 1996; Zawidzki, 2013). As these researchers note, mindreading models cannot account for competent social cognition due to the holism of propositional attributions: Mental state attribution is a poor predictor of another’s behavior because how a person acts is determined by an unbounded set of possible mental state combinations and other parts and aspects of their cognitive system and situation. Beliefs and other mental states attributed by the purported ToM mechanism translate into actions only together with the context of the whole of the organism’s state – they do not determine what a person will do. I might believe that it is raining, but still not take out my umbrella if I wish to get wet, for instance. What is more, the holism problem becomes even greater as mental states relevant to future behavior can be culturally specific, the acquisition of which is, as we have argued, a more fundamental problem on its own.

Zawidzki (2013) claims that the problem of holism is solved by processes of mindshaping: Humans living in a society become alike in how they think and behave – their culture shapes their minds – so that attribution of mental states becomes tractable. Mindshaping certainly takes place, and our proposal provides a model of it too, but we believe that the problem of holism goes deeper than Zawidzki considers. He remains explicitly agnostic about the mechanism underlying social competence, staying open to an encodingist mental-state attribution mechanism doing the job (2013, xiv-xv). Our claim is therefore stronger in that we believe the frame problem persists as long as we stick to an encodingist framework; a cognitive system cannot possibly be driven by explicit encodings to begin with, which means that no attribution of such encodings can successfully predict its behavior, no matter the amount of mindshaping that has taken place.

Some cognitivist accounts have attempted to tackle this problem – e.g. Apperly and Butterfill’s “tracking” beliefs through representation of “belief-like” states (2013) – but the fact remains that encodingism does not provide resources to model competent interaction without explicit representation of the thing interacted with; it does not model implicitness, which clearly permeates all of cognition (we do not “token” all the beliefs we “hold” about reality and encodingism requires that we would).

2.4. The coordination problem

Holism is closely related to another frame-problem issue – that of social coordination (Schelling, 1997[1963]). Briefly, in order to correctly anticipate behavior in most *interpersonal* situations, one needs to consider that another’s behavior is contingent on how they represent *my anticipation of their behavior*, which fact, in turn, has to be taken into consideration by my anticipation, leading an infinite regress of iterations. Hence, the intractability of holism is aggravated even further when we consider actual interpersonal interaction, not just third-person observation of another’s behavior. The hierarchy of reflexivities in the ontology and epistemology of social situations is intrinsically unbounded, and the encodingist commitment to explicitness requires that

the entire hierarchy be explicit — and that will not fit into a head (or solar system, or the universe).

It is interesting that ToM research almost entirely ignores the problem. The debate has for the most part presupposed that mental-state attribution does the trick, and focused instead on how the capacity for it is implemented and acquired developmentally. However, mind-reading is an impossible prediction tool – its purported main function – even from an observer’s perspective, and even less so in interpersonal situations that require reciprocal characterization between the interactants.

We believe that this issue, and the ones discussed previously, are solved once we shift to an action-based model of representation, one that models representation on the relation of implicit presupposition, rather than explicit encoding, as we discuss in the latter part of this paper. The shift, we believe, not only solves the problems, but also allows for a more fruitful model of socio-cognitive development and its enculturation. We present the positive model below.

3. Interactivism – basics

In this section we present the framework of interactivism, which we believe avoids the problems discussed above. This section is concerned with metaphysical foundations, while the next one will focus specifically on the interactivist model of social cognition and its enculturation.

Interactivism falls within the wider family of approaches that adopt an action-based ontology of the mind. The action-based conception derives in varying degrees from a number of theoretical predecessors – Piaget, Vygotsky, American Pragmatists, Gibson’s ecological theory of perception, or later Wittgenstein’s model of language – and its other most notable models today include Carpendale and Lewis’ social-constructivist approach (Carpendale & Lewis, 2006, 2015) and Nelson’s Community of Minds (Nelson, 2007). These approaches are the closest to interactivism, and it might be viewed as a low-level complementation of C&L’s and Nelson’s more theoretically lean models. Of slightly different provenance (much greater influence of phenomenology), but still largely convergent with the action-based conception of cognition, are enactivist approaches (see the review in Ward, Silverman, & Villalobos, 2017). Here disagreements are greater, but it is clear that they too are pointing in the generally same direction as the interactivist model. We believe the unifying thread of action-based approaches to be the claim of ontological emergence of the mind through or within (social) interaction, and the constitution of cognition by interactive anticipations rather than encoded information. The proposed model’s affinity to the above proposals should become apparent in our exposition below, but the interested reader might consult previous work that has explicitly compared some of these and other accounts with interactivism (enactivism – Bickhard, 2016a; predictive processing – Bickhard, 2015c, 2016b; Mirski, Bickhard, Eck, & Gut, 2020; an exhaustive review of various models – Bickhard & Terveen, 1995).

One of the aims of interactivism lies in making explicit the foundational presuppositions of the action-based conception, solving any conceptual issues that might emerge thereby, and proposing a detailed account of the most fundamental aspects of cognition. This inevitably involves a substantial amount of explication of other frameworks and introduction of new technical concepts, some of which would perhaps not be entirely acceptable by other action-based theoreticians. One central such issue is the interactivist retention of the concept of representation, which many action-based approaches either avoid or actively attack (e.g. Hutto & Myin, 2013, 2017). We believe that this animosity to the concept stems from unwarranted equating of “representation” with its encodingist model, which – as discussed in the previous section – we also claim to be untenable. “Representation” can, however, be given an action-based interpretation, one which is unlike the encodingist standard and which can be highly illuminating for an action-based theorist, especially in the context of development and enculturation. The interactivist concept of representation or representing comes about

naturally from an analysis of the dynamics of cognitive systems and the consideration of their metaphysics – it is not arbitrarily and normatively projected on it as is the case with the encodingist model that borrows the concept from artificial intelligence and attempts to force it onto natural systems. The core problem of representation is and has always been that of accounting for truth value – that organisms can be wrong or right about what they ‘assume’ reality to be is a problem that needs explanation. The basic claim against encodingism has at its core that encodingism cannot account for truth value, which is why this has been a core problem since the Pre-Socratics. Interactivism claims to account for truth value, and thus claims to account for the core problem of representation/representing. Similar treatment is given to some other extant concepts – such as “concept”, “intension” or “mental content” – instead of being abandoned altogether they are explicated in terms of the framework. Sometimes this results in a diverse ontology proposed in place of what has been traditionally assumed to be a unitary phenomenon; this is the case for the notion of a concept that in its traditional meaning spans what interactivism identifies to be a fairly diverse dynamics (Bickhard, in preparation). In short, the general strategy adopted in interactivism is to treat the extant conceptual landscape as needing a new, tenable interpretation rather than as inherently doomed.

Interactivism has been formulated with the use of various formalisms – such as automata theory (Bickhard, 1980), dynamic systems (Bickhard, 2015c; 2015d), or topology (Bickhard & Campbell, 1996) – and more formal treatments of what is discussed here are naturally possible. However, the main concern of the current paper lies not in the adequacy of any particular formalization, but rather in fundamental metaphysics of cognition and social reality: the discussion concerns the fundamental nature of what the various formalisms can be used to describe, but which cannot be fully captured by the meanings inherent in the languages of any currently available formal system. For that reason, although necessarily technical, the following discussion is presented in informal terms.

3.1. Representation

Mental representation is a kind of normativity. Thus, the problem of normativity is a more fundamental one, and the question of how normative phenomena can exist in a world of causes has to be answered. Interactivism models normativity as an emergent property in far-from-thermodynamic-equilibrium (FFE) dynamics (R. J. Campbell, 2015). FFE systems by their very nature need maintenance if they are to persist – they need some processes (either internal or external to the system) to provide the necessary conditions for their continued existence (persistence). That a certain process can contribute or not to the maintenance of an FFE system constitutes those processes as functional or dysfunctional relative to that continued existence, which gives us naturalized normativity (Christensen & Bickhard, 2002).⁷

Living organisms are a special kind of FFE systems: They are recursively self-maintenant. This means that they not only constitute part of the processes ensuring their own persistence (self-maintenance), but also that they can switch how they operate in different environments to such functional organizations that serve the overarching function of self-maintenance (recursive self-maintenance). When considered as processes, living things can be said to be flowing, differently in different

⁷ *Serving* a function is primary for us. *Having* a function is derivative from serving a function; a process has a function if it is functionally presupposed in some capacity (as serving the function) by another process. The present *synchronic* account of normativity of function is in contrast to etiological models of function, which see *having* a function as primary and define it diachronically (Dretske, 1988; Millikan, 1984, 1995). We believe the etiological proposals to be insufficient; function normativity is claimed to be constituted by the history of selection, which renders it synchronically causally epiphenomenal (Bickhard, 2015).

conditions, so that they do not dissipate into equilibrium, and the organization of the functional processes that constitute that flow is the subject matter of life and social sciences.

To stay self-maintenant across a number of different environments, an organism needs to be able to detect those environments, and to switch to such a mode of functioning that will enhance its probability of survival in it. The former needs to be distinguished from the latter; while it is necessary for an organism to be able to detect environments, to come into epistemic contact with them, it is the adopted mode of functioning that is either functional or dysfunctional, and thus exhibits normativity. When an organism adopts a certain way of functioning, it implicitly presupposes the environmental conditions that are necessary for the mode to be functional, to actually contribute to the self-maintenance of the system. When *E. coli* detects that it is moving down a sugar gradient, it tumbles – when it is moving up, it swims. In doing so, it implicitly presupposes that the environmental conditions are such that the adopted mode of functioning is self-maintenant – it presupposes a certain orientation to a distribution of sugar concentration. The truth of this presupposition matters a great deal for the organism because its FFE existence depends on it.

Given the complexity of the environment in which complex organisms such as humans stay self-maintenant, it makes sense that they do not automatically react to detected conditions with some fixed mode of functioning, but rather divide their internal organization into two basic kinds: one that indicates what interactions are possible, and one that selects what interaction to actually engage in, given the present state of the organism. The former are the processes that have the *function of representation* for the organism, and exhibit causally-efficacious semanticity – they are used by the organism to “probe” reality for possibilities of interaction.⁸ This allows the organism not to be triggered by a stimulus, but to consider a wider spectrum of interactive possibilities in the represented environment and settle on the one that best serves its current goals.

Interactivist representation describes the organism utilizing the normativity of its FFE subprocesses for the fulfillment of its goals. The organism’s interaction with the environment has an aspect internal to the organism; that is, interaction is accompanied by an internal anticipatory (FFE) process, which implicitly presupposes conditions necessary for its persistence. Representational processes of the organism use that property of implicit presupposition in order to indicate what is *possible* in the given situation, defining the situation as such where some set of interactions can be potentially engaged in. This can be done because the world exhibits regularities that determine contingencies between possibilities of interaction, and these regularities are informationally redundant – a presence of a tiger in the vicinity, for instance, can be accessed in many ways, such as spotting its tracks, other animals running away, or hearing its roar. This means that the organism can use interactions to differentiate environments and indicate what other interactions are possible. For example, imagine there were two kinds of fruit in the habitat of some organism – one firm and the other soft. The firm one is sweet and edible, while the soft one bitter and nauseating. The organism could then use squeezing the fruit as a differentiating procedure, to differentiate between situations that afford eating, and those that do not. For that, all that is needed is an internal organization of processes that makes (the internal aspect of) eating conditional on how (the internal aspect of) squeezing flows. Interactive indication is the interactivist model of (logical or functional, not necessarily linguistic) predication and hence representation.

⁸ The concept of “interactive indication” is similar to Gibson’s concept of affordance. That is, “interactive indication” is very close to one of the number of readings of “affordance” that can be found in the literature, the one that identifies it with the internal processes “readying” the organism to do what the perceived environment affords (Rucińska, 2020). For a detailed explication of Gibson’s theory in interactivist terms, see Bickhard and Richie (1983).

The process of setting up of the organism’s anticipatory processes is termed *microgenesis*, and involves the totality of interactions indicated as possible in the current situation. It needs to be stressed that microgenesis does not explicitly represent the conditions necessary for the indicated interaction to succeed. It does not encode anything. Rather, it implicitly or functionally presupposes the necessary conditions of its stable flow, and these implicit presuppositions are what constitutes mental content within the model. The relation of presupposition, unlike that of encoding, is a naturalistically tenable basis of mental representation (i.e. it follows from the metaphysical considerations of FFE dynamics of living things).⁹ Relevant to the present discussion, implicit presupposition does away with the frame problems in general, and with the problem of holism and infinite iteration of mutual characterization in the coordination problem in particular: Compatibility with the anticipated flow is *implicitly presupposed*, not explicitly represented, and thus does not impose an impossible computational and memory load. We discuss this in more detail in later sections.

3.2. Learning and development

The internal organization of anticipatory processes can be the product of phylogenetic selections and develop biologically in the organism, without the involvement of experience with the external world. It is plain, however, that complex organisms acquire it in ontogeny via their interaction with the world. Hence, a model of learning and development is needed. Unlike encodingist models, which rely on explicit representation, the interactivist model does not necessitate prescience about what is to be learnt – no foundationalism. An organism capable of learning needs to be capable of generating new process flows – in the limiting case, by random variation – and “checking” if they stabilize. In plainer language, the organism needs to be able to try different interactions, and check if they succeed. Then, assuming it is possible for *success* to be retained as a permanent change in the functional organization of the organism and *failure* to be selected against, we have a basic mechanism of learning – variation and selection learning, or evolutionary epistemology (D. T. Campbell, 1974).¹⁰ It should be easy to envisage that, given a certain level of complexity, the organism will be able to create a vast web of iterated interaction possibilities by interacting with its environment and trying out what it can do in it. Importantly, this will be a (recursively) constructive process – once some organizations are retained as a result of successful interaction, they will form the context and ground for further interactions, often opening up possibilities for success at interactions simply not possible at earlier stages.

A useful way of looking at the above dynamics is with the concepts of situation knowledge and world knowledge; we will make use of them when discussing social cognition. Situation knowledge is the present state of the organism’s indications of interactive possibilities. World knowledge is the totality of knowledge inherent to the system’s organization of how to maintain, update, and modify situation knowledge, on the basis of acting and perceiving. In other words, world knowledge is the inherently hypothetical or conditional knowledge of all possible interactions that the organism is capable of, and situation knowledge is

⁹ This constitutes a shift of the metaphysics of representation: away from (encoded) Correspondence to: that which bears truth value”, and it is future oriented anticipations or indications that can be true or false — that bear truth value.

¹⁰ Anticipatory success/failure is a property of processes of recursive self-maintenance of a FFE system. Those processes either contribute (success) or not (failure) to the maintenance of its ability to self-maintain itself. The functionality of such processes lies in that they involve implicit anticipations (which can be true or false) about properties of the environment that are relevant for how the system should reorganize itself to stay in a viable relationship to its FFE conditions.

the knowledge of which of those interactions are (anticipated to be) possible at the moment. For instance, I can know how to ride a bike in general (world knowledge), but to know that I can ride a bike in the present situation some organism-internal conditions need to be fulfilled, such that my world-knowledge structure of “bike riding” is indicated as *currently* available (e.g. certain sensory processes involved in seeing a bike or the bike mechanic telling me that my bike is ready to be picked up – what indicates a structure is a matter of learning). When those situation knowledge conditions are fulfilled and some interactive structure is indicated as currently available, we say that the organism *apperceives* that structure (not as such, that is, but implicitly – it apperceives the potential process flow that constitutes that structure).

Interactive structures of an agent’s world knowledge constitute the world for the agent. The interactive regularities in the world are fairly general – not every bike is the same in all aspects – but bikes do, on the whole, exhibit interactive commonalities: e.g. they can be touched or scanned visually in predictable patterns. It is such interaction-based general schemes for objects and other interactive patterns in the world that will eventually constitute the child’s world knowledge.¹¹ These interactive patterns will constitute the primary representational currency of the interactivist agent’s situation knowledge; they will constitute substructures of the world knowledge and will be indicated as accessible in the situation knowledge. Learning and cognitive development will thus start off on a micro-scale as variations and selections in minute aspects of the anticipatory flow (e.g. muscle activity while manually manipulating an object or anticipating its behavior in vision, cf. Piaget, 1954), but once such interactions are mastered, and the structures responsible for them are part of the child’s world knowledge, development will proceed at a more general level where variation will be mainly between a number of already extant structures (e.g. trying to open a box, the child might attempt to smash it against the floor, pry it open with some other object, or look for the key; she will not start the learning process entirely *de novo* as the system is already organized in some relatively stable manner as a result of previous variation and selection learning). Development is therefore a constructive process in which simple interactions need to be mastered first before more complex ones even become a possibility, resulting in an increasingly more complex world knowledge of the child and her growing competence as an agent.

3.3. Reflection

As has been mentioned, the action-based knowledge discussed above is entirely implicit – it does not represent its own correctness conditions (implicit presuppositions). Roughly, it is the interactivist model of what in contemporary literature is studied under the label of embodied knowledge. Interactivism, however, does offer a model of explicit thought, something which is generally problematic in embodiment frameworks (see, e.g., De Bruin & Kästner, 2012; Edelman, 2003; Goldinger, Papesh, Barnhart, Hansen, & Hout, 2016).

With experience, the functional organization of microgenetic processes (the world knowledge) will form a relatively stable organization. This organization will exhibit properties in its own right, which can be known themselves (they will *instantiate* concepts for the organism). Interactivism models explicit thought as a second interactive system that anticipatorily interacts with level-1 process organization and thus can represent organizations of its implicit presuppositions explicitly.

The crucial point to note is the limitations of basic knowing. Level-1 anticipations are anticipations of *realms of potential internal process flows*, they are not anticipations of things in reality, not even anticipations of some “contentless” discrete mental units that correlate with features of reality. The world of objects, events, and people is not what a level-1

¹¹ For a more thorough presentation of schemes and other functional structures within the framework see Bickhard (1980).

knower experiences.

Level 1 does, however, instantiate or embody the furnishings of our reflective mind. The idea here is that the objects of reflection – items, people, events, types of change and interaction, etc. – are constituted by what will support functional patterns at level 1. A toy, for instance, generally affords the same stable interactive possibilities – it can be manipulated, scanned visually, thrown, given to somebody, etc. – and can be returned to later from some other place. Reflection anticipatorily interacts with these patterns and abstracts their properties, forming explicit representations. This allows the organism to consider different interactions “offline” as well as greatly improve interaction online by implementation of explicit learning strategies, rehearsal, planning, inhibition, and other executive functioning.^{12,13}

4. Interactivism as a framework for social cognition

The above has for the most part addressed the problems we pointed out in our earlier criticism. The anticipatory, action-based model of knowledge together with evolutionary epistemology solves the copy problem and foundationalism, as well as the frame problems: (1) Anticipatory processes can be in the limiting case generated entirely at random and retained if and after they succeed, which means that neither independent epistemic access to reality nor foundational content are needed in this model of learning (Bickhard, 2003, 2010). (2) The frame problems are not an issue due to the fact that content is constituted as implicit presuppositions of anticipatory processes (Bickhard, 2001). These presuppositions are unbounded, and while it might be useful for the organism to explicitly represent some of them in reflection, such explicitness is not necessary for the organism to interact competently with its environment.

It also becomes clear that there are no in-principle obstacles for the model to account for the enculturation of (social) cognition, but a more thorough discussion of this point is due. Below, we present a (necessarily compact) model of socio-cognitive development within the interactivist framework (Bickhard, 1992a, 2008, in preparation, 1980; Christopher & Bickhard, 2007). We hope to show that interactivism naturally accommodates the fact of socio-cultural modulation of socio-cognitive abilities, while at the same time remaining ontologically tenable.

4.1. Situation conventions

From an interactive perspective, knowing is anticipating interactive possibilities. Thus, social cognition is knowing how to interact with other agents, how to anticipate their behavior given one’s own actions. This is in-principle unproblematic (though potentially complex) when we consider interacting with agents that do not learn (e.g. a pre-programmed robot): All there is to learn in order to represent such an agent is to know how they react to one’s actions. Although more complex and involving a much greater context-sensitivity, this can be achieved in ways analogous to how one interacts with physical objects. However, given that even very simple organisms can learn, social cognition is usually trickier than that. Agents that learn acquire their behavioral dispositions during ontogeny (i.e. they construct their world knowledge), and thus their learning histories have to be accounted for in anticipating their behavior. This is a problem not only because it seems

¹² Importantly, level 2 will also exhibit properties, which can be known by a third interactive level, which will also instantiate some properties, also potentially known by a one level higher reflection. And so on. See R. L. Campbell and Bickhard (1986); Bickhard (1998).

¹³ In this presentation, we have skipped the interactivist model of emotion. The reason for that is mainly the limited space. We plan to extend the proposal with a discussion of emotion in further work and for now can only refer the reader to Bickhard and colleagues’ work on the subject (e.g. Bickhard, 2000; Bickhard & Campbell, 1996).

to necessitate learning of the interactive potential of every single individual with their unique history, but most significantly because the individuals we interact with, in turn, learn how to anticipate us as well. In an interpersonal situation, I have to account not only for my interactant's representation of the physical reality – e.g. what objects they see and how they view them – but also for their representation of my own interactive potential. Since my interactive potential clearly hinges on my representation of their interactive potential, this seems to lead to an infinite regress of reciprocal characterization – the coordination problem we mentioned before.

D. K. Lewis (2002[1969]) proposed that the coordination problem is solved by convention, and Bickhard (1980) adopted and adapted the idea into the interactivist model. The basic claim is that we *do not* achieve coordination by mindreading (i.e. encoding information about) another's mind, but by presupposing that they will behave in the way consistent with how we coordinated actions before in a given context.¹⁴ Although it might seem like another vicious circle, it is not – the original coordination success can be achieved by random variation – both parties stumbling upon mutually complementary anticipatory characterizations of each other (the chances of that occurring are clearly aided by innate scaffolds in humans).¹⁵ Once retained (likely after a number of occurrences), a given way of coordinating action in some situation will be the anticipated default for both individuals. Such commonality in the characterization of a situation is a *situation convention* and it forms the basis for social cognition and social reality in interactivism (Bickhard, 1980, 2008). Situation convention, in essence, is a socially emergent “anticipatory agreement” concerning what to do in a social situation, how to interpret each other's actions given the context we are in.¹⁶

Consider an example (simplified to be illustrative). There are many things two individuals living together can do first thing in the morning. Among others, they can wander, go hunting, or sit down and eat. Depending on what an individual decides to do – what his selections within his web of situation knowledge are – anticipation of his behavior by the other person will differ: His situation knowledge must be organized in a way anticipated by me for coordination to be possible; and if he is to interact with me, he has to do the same about my situation knowledge. While there is no way to know in advance what the other will decide to do in the morning, it is in principle possible in the present model to stumble upon a mutually consistent characterization of each other's situation knowledges, which will result in an anticipatory success of both parties and will set precedence for retaining the functional structures responsible for the successful anticipation. If we both happen

¹⁴ Remember that implicit presupposition does not necessitate encoding the infinite number of reciprocal characterizations.

¹⁵ We are aware of the problematic nature of the concept “innate” given the multiply contingent dynamics of development (Oyama, 1985/2000; Samuels, 2004). Here we have decided to use it when talking about a particular kind of scaffolds. With “innate scaffolds” we wish to express that certain organismic forms are a reliable developmental outcome for a species (they are not “preformed” before development occurs, as has been assumed by core knowledge accounts, e.g. Spelke & Kinzler, 2007, but rather emerge reliably in a species across its usual environments) and that these forms are a resource for the process of microgenesis – they constrain the space of anticipatory “guesses” that an agent has available in an interpersonal situation. We acknowledge that that does not do away with the problems with the concept, but we felt the need to differentiate such scaffolds from the ones that might come from the environment as well as the ones that are constructed via microgenesis.

¹⁶ It needs to be stressed here that the meaning of “convention” stipulated here is both more specific and more general than the ordinary meaning of the term. It is more specific in that it refers to a certain class of anticipatory processes, namely such that are in relation of mutual anticipatory consistency. And it is more general in that the class will cut across other classes of processes, transcending its ordinary-language restriction to generic cultural phenomena (e.g. animal alarm calls are by the present definition a case of convention but would hardly classify as such in the ordinary language use of the term).

to assume that we both eat first thing in the morning,¹⁷ and this is indeed what we are doing, then we set precedent for future anticipation. Thus, a situation convention will emerge about what one does in the morning, and I will anticipate the other person to behave in accordance with it. Notice that even though the above example is rather coarse-grained, the same principle can account for mutually consistent interpretation of gestures, or vocalizations, and in fact any other form of interpersonal activity: They all need to be interpreted in a consistent way in order to lead to coordinated anticipations among the individuals involved in the social situation – they need to be apperceived as situation convention.

The above case applies to characterizations of particular individuals in some particular contexts; that is, the situation convention is entirely contingent on past interactions between the individuals involved within some specific settings. As such, it is likely to exhibit a great deal of idiosyncrasy resulting from the particularities of the ways coordination was achieved between the interactants, and not work with another individual who did not take part in those past interactions. This is clearly the case in early childhood family contexts, where the parent and child often develop peculiar communication standards (e.g. Carpendale & Carpendale, 2010).

Naturally, we interact with many individuals, and so we need to be able to know what situation conventions are available with them. One way of achieving this would be to differentiate conventions on the basis of individuals and our corresponding interaction histories with them. It is evident developmentally as newborns already differentiate between persons (Bushnell, 2001). And it is certainly the case in adulthood as well, as we all have conventions specific to individual people we know personally; it is to a certain extent what we mean when we claim that we know each other. Notwithstanding, a much more effective way of coordinating behavior on a wide social scale is by *institutionalization* of situation conventions. First, however, let us consider *typification* of situation conventions, which will make the presentation easier. A convention is typified when some cue (part of my situation knowledge) is anticipated to make another person enter or at least apperceive the situation convention. Typification can be one-sided: the caregiver might anticipate that the child will apperceive a toy as an indication of the situation convention of joint play, but the child herself does not have to anticipate the same about the caregiver (she only knows the situation convention of play, not that her caregiver will apperceive it when presented with a toy). Once she does, however, the typification becomes mutual and the toy can be used as a means to evoke the situation convention of joint play. Such mutually typified conventions that can be invoked by some means are termed institutionalized conventions – it is presupposed that we both know what kind of situation the toy indicates. Institutionalized conventions will tend to spread in a society as people bring conventional structures acquired previously in interaction with other people to every new social situation. They will thus attempt to solve new coordination problems in ways that worked with other people (as the relevant schemes are already in their world knowledge), setting precedent for the establishment of the same type of convention with a new person. As a result of this process, it will become a taken for granted fact that certain objects or behaviors indicate particular types of situation conventions and the need for conventions uniquely suited to every

¹⁷ This example nicely illustrates the role of innate scaffolds for the construction of situation conventions: Organisms need sustenance in the morning and so eating is what they usually will do. The main point is that embodiment and structures selected for in phylogeny will narrow down the space of potential anticipatory “guesses”, leading to more effective success at coordination and establishment of situation conventions. It is important to note, however, that this is not *necessary* in the present model – variation and selection process *can* be entirely blind in theory. This contrasts with encodingism, which necessarily requires inborn concepts in order to get off the ground.

single individual will be avoided.¹⁸

Notice that the process of institutionalization of situation conventions inherently involves conventionalization of the ways in which situation conventions are invoked in social interaction: Building on the above example, joint play can be indicated not only by a toy but by any arbitrarily chosen aspect of the situation knowledge. Any situation convention is constituted by commonality of characterization of the situation in the situation knowledges of the interacting agents; it is not necessarily constrained by any other (non-conventional) part of the situation. In other words, situation conventions can be actualized solely by the interacting individuals as long as they manage to actually characterize the social situation as the same kind of social situation. Due to the inherent arbitrariness, the ways of identifying and invoking situation conventions in social situations will necessarily be conventional themselves, as all interactants need to apperceive them as establishing the same situation convention. In effect, different gestures, sounds, or elements of the context will emerge in a society as conventional indications and transformations of situation conventions.

Such conventions for invoking and modifying conventions are the basis for interpersonal communication, a foundation of language. In essence, they will function as manipulation of the interpersonal situation: When a child brings a book to an adult, for instance, she attempts to transition to the book reading convention, and her gesture is a conventional way of effecting that change. Language, within the present framework, is of the same kind, but its productivity and fine-grainedness allows for much more nuanced situation convention manipulation; we discuss language in section 4.3.

4.2. Social reality

Let us now take an eagle-eye perspective onto the proposed model of social cognition. The main claim is that social reality is constituted by “the factual structures of relationships among world images [or knowledges] that constitute institutionalized conventions and the factual structures of relationships among those conventions” (Bickhard, 1980, p. 78). Social reality is therefore supra-individual functional organization emergent in the dynamics obtaining within and between society’s individual minds, as a consequence of their attempts to coordinate their actions in whatever interaction realm they happen to be interacting.

It is important to appreciate the nature of social reality conceived thus, and a comparison with the representation of physical reality is illustrative here. When an individual learns to interact with the physical world, she constructs functional structures that correctly anticipate possible interactions with the elements of the physical world. An object (psychologically) from an interactivist perspective is a stable, recoverable functional organization that is embedded in the wider functional organization of the world knowledge. Thus, an experienced agent’s world knowledge of the physical world will be constituted as factual structures of relationships within and between such recoverable substructures. Now, the child’s development of her social cognition is akin to that, but the resultant functional organization that represents social reality at the same time participates in the constitution of that reality. Social reality “is a world that originates in [people’s] thoughts and actions, and is maintained as real by these” (Berger & Luckmann, 1967, p. 32). Thus, interactivism offers a naturalized model of social reality, including institutions and intentional objects, which has been a major challenge in social sciences (e.g. Eck, 2015; Legros & Cislighi, 2020; Turner, 1994, 2018).

Importantly, the model accounts for the normativity of social reality.

Since culture is constituted as factual relationships between world knowledges of its participants, its normativity is derived from the normativity of the FFE dynamics of the individual minds. It clearly goes beyond an individual mind, however, as an individual’s anticipations can be wrong with respect to the dominant social reality that inheres in the minds of other people, and conventions, once established, will exhibit a great deal of independence and self-organization. Thus, the supra-individuality of conventions helps us understand the independence of cultural norms from the individual. It also helps us understand the inner conflict that sometimes occurs between the conventional normativities instantiated by an individual mind, and its other, more personal normativities. Moreover, the framework makes sense of the truth value of statements about intentional objects, such as Little Red Riding Hood – it is constituted by the correctness of the anticipatory presuppositions about relevant structures of social reality: e.g. if my anticipatory schema for the story involves representation of a fox instead of a wolf, it will disagree with the convention, which fact might be discovered if interpersonal interaction with other people or physical elements of culture (e.g. a book) fails to support my anticipatory flow that presupposes the fox being involved instead of a wolf.

Social reality is emergent — starts off as a solution to coordination challenges in joint interaction with physical reality. However, once some conventions become established in society, they become a realm of interaction themselves, and as such can lead to further coordination challenges that are embedded *within* conventional reality. And once the solution to those challenges becomes also part of the extant social reality, some yet newer coordination challenges might emerge, for which further conventions may develop; and so on, leading to a social reality gradually more removed from the “natural” world. Clearly, this ontological climb does not proceed forever, and there are other factors that modify social reality as well.¹⁹ These issues are complex and we will not discuss them here; the crucial point for the present discussion is that conventionalization of minds – and thus the emergence of culture and social reality – is a constructive process both ontologically and historically (and phylogenetically)²⁰ with higher-level conventions emerging in the context of the existing ones, often building on, presupposing, and likely modifying prior social and institutional organization.

Further, the framework has important consequences for the ontology of the person. In interactivism, a process or a system is individuated on the basis of its interactive properties – a thing is how it interacts (potentially) with other things. It becomes clear, then, that a considerable, perhaps most significant, part of a person is constituted by convention; it is shaped by the culture the person has developed in (cf. Zawidzki, 2013), as it is through their participation in or co-constitution

¹⁹ An emergence of a group of people who can specialize in acting within social reality might play an important role. Such an emergence can be enabled by many factors, such as growing population or overabundance of resources. Another clear factor is informational constraints: a society with a writing system can clearly establish and maintain a much wider and more complex convention.

²⁰ The framework is fully consistent with the possibility of conventions that are not the product of experience with other agents but develop via dynamics not involving inter-agent interaction. Such “innate” conventions undoubtedly exist – e.g. alarm calls in animals, or a newborn’s crying. They are convention because they are apperceived as indicating the same situation for every member of the species, but they do not require past interaction and coordination with other agents to be apperceived as the same conventions. Such conventions are arguably one of the most significant innate scaffolds with which cognitively constructed conventions are build. Heyes (2018) proposes a somewhat a similar idea, but with important differences.

¹⁸ The differentiation between representations of specific persons and conventionalized roles has been explored recently by others (e.g. Fiebich & Coltheart, 2015; Newen, 2015). The present proposal provides a wider framework that accommodates these remarks.

of convention that they are disposed to interact in a particular way with their surrounding reality, including other people.²¹ Indeed, the proposal provides a naturalized framework to understand the claim that “there is no such thing as a human nature independent of culture” (Geertz, 1973, p. 49).

Finally, let us frame the above considerations in the form that is more in line with how social cognition is investigated in ToM debates: What does a person represent when they apperceive another person? Our answer to that is that their representation is thoroughly conventional as most of the possible interactions with other people are constituted by conventions (as are those people). Granted, the conventions will involve non-conventional structures such as of physical objects or the interactant’s body, and they will form in accordance with all kinds of biological or physical constraints, such as the informational channels of the human senses. However, these will be aspects of situation conventions, and will not be – at least initially – cognitively differentiated from them (they will be *implicit* in the conventional structures). Minds that have grown in a society are inherently cultural, and any biological human universals that are discovered are necessarily abstractions from something that is in its current form a result of complex influences involving biology as much as culture (Oyama, 1985/2000). In contrast to the essentialist assumption of the ToM models, there is no default, culture-free, theory of mind module to which cultural concepts are added, but rather minds that are organically encultured and that view other minds in their encultured ways.

4.3. Language

Language is an interaction system (a part of the world knowledge) specialized for manipulation of situation convention. In its essence, language is highly precise and systematic convention for invoking situation conventions that achieves its goal via intermediate manipulations of the situation convention (Bickhard, 1980, 2007). For instance, the utterance “The toy is broken” involves “the toy” modifying the participating situation knowledges such that the next modification – “be broken” – will apply to that part of the situation knowledges that represents the toy and will modify it accordingly to what “be broken” means.

Development of social abilities will consist in the child’s exploration of possible manipulation within situation conventions, peaking in the development of a language system that will allow the child to selectively target highly specific aspects of situation conventions and thus differentiate those aspects as cognitive (interactive) units. Although verbal behavior accompanies even the earliest conventions, the central property of the language system – its productivity – can only emerge gradually, by increasing differentiation of situation conventions. For instance, the child might first discover that pointing transforms the situation convention into one that involves the object pointed to. She will naturally experiment with it and discover its great potential across different social situations. In the process of this experimentation, the child might discover that uttering a sound while pointing has a systematic effect onto how the situation convention is transformed. It will do away with much of the ambiguity involved in pointing itself, and will

²¹ Interestingly, the special status of social constitution of a person confounds the distinction between epistemology and ontology: In the process of knowing another person, one ipso facto comes to co-constitute the convention that the other person instantiates, as an anticipatory structure that correctly anticipates conventional behavior is also constitutive of that convention. Incidentally, this seems to explain the mutually transformative consequence of cross-cultural interaction – by understanding one another, people *necessarily* become similar. Further analysis is naturally possible: for instance, there seems to be an important difference between “armchair” theoretical knowledge of another culture and embodied knowledge in action of the relevant conventions. These, and more can be explored within the present framework.

become a more reliable transformation tool (Colonnese, Stams, Koster, & Noom, 2010). Then, the child might learn that adding another word after the noun will specify the transformation even further.²² Clearly, it is not long before the child discovers the systematic functionality of words and their combinations, at which point her engagement with language will increase drastically – which indeed seems to be the case in the second year of life (McMurray, 2007). This is naturally hardly a full account of language acquisition, but it should illustrate the principle of language’s ontogenetic emergence within the present framework.

A few words are due about how language – or rather situation conventions or meanings it manipulates – represents. Most fundamentally, as has been already discussed, situation knowledge represents via indications of possible interactions (world knowledge structures) that functionally presuppose certain features of reality. The structures of situation conventions, in turn, represent via functional relationships with the structures that indicate such real-world interactive possibilities. Early and simple cases of this functional link will be highly coarse-grained, such as a gesture for handing one an object. However, with the fine-grainedness afforded by language, the situation convention can be differentiated into the part that specifies the object – e.g. the toy, and the part that specifies what about the toy’s representation is to be manipulated. And analogously for all the other linguistic utterances and their corresponding functional effects onto the situation convention. Moreover, once the child is capable of reflection, the functional organization structured by linguistic use can be represented explicitly, which explains why it is easier to think about things that have names for them.

Naturally, the above is an extremely brief presentation; it should suffice, however, for our present purposes. For more detailed breakdown of issues directly related to (psycho)linguistics see Bickhard (1980, 2007, 2015a), and Bickhard (2008). See also Kempson, Cann, Gregoromichelaki, & Chatzikyriakidis, (2016, 2017) for a convergent approach to language.

4.4. Some comparisons with enactivism

Considerable similarities can be discerned between the interactivist model of language (and social reality more broadly) and the recently proposed enactivist alternative (Cuffari, Di Paolo, & Jaegher, 2015; De Jaegher & Di Paolo, 2007; Di Paolo, Cuffari, & Jaegher, 2018). Although space limitations make any exhaustive comparison impossible for the current paper, we thought it useful to make some tentative comments. This discussion is in response to questions raised, including by an anonymous reviewer, and can be skipped by those who do not wish to pursue a brief discussion of/comparison with enactivism.

Let us first consider the fundamental metaphysics of both frameworks. Autopoietic enactivism (as it has been developed by Di Paolo and colleagues) attempts to derive normativity from the autonomy of the system, which is defined as its ability to sustain identity under precarious conditions. Identity, in turn, is defined as possessing the property of operational closure, which is a property of its organization. By defining autonomy as maintaining identity under “precarious conditions” – recognizing that FFE conditions are necessary for it – Di Paolo and colleagues manage to get something roughly akin to the interactivist property of recursive self-maintenance. However, the proximate source of normativity remains framed in earlier autopoietic terms: It is in reference to the operational closure (a property of system organization) itself that something is considered good or bad for the organism, and not

²² Considerable data suggest that nouns are indeed acquired earlier than verbs, even though the acquisition of verbs is itself more nuanced cross-linguistically (see Waxman et al., 2013). However, the present model is not committed to this sequence, depending on the specificity of a given linguistic context, children might follow different pathways even within the same language: for instance, if verb-use dominated around the child, she might start off with verbs and then augment verb use with the addition of nouns.

to its FFE conditions of viability. That is, although Di Paolo (2005) recognizes that FFE conditions *are necessary* for operational closure, he retains the autopoietic idea that self-maintenance is in reference to operational closure and not in relation to such FFE conditions. However, it is not the system's organization per se that is the source of normativity, but rather its relationship to its FFE conditions, and it is this relationship that is being maintained. A FFE system survives if it stays in FFE conditions, not if it exhibits any particular organizational property. Operational closure might indeed be a property of some organizations that self-maintain their relationship to FFE conditions and thus persist, but a given organization is functional or dysfunctional in relationship to such existential conditions, and not to itself or some other organization (see Bickhard, 2016a).

This might seem like a small technical issue, but it does bear onto subsequent development of the enactivist framework. Since it is the system's organization that is being maintained and not its relationship to FFE conditions, change – including enculturation – must either be modeled as reorganization in some inessential “safe region” of the system's organization, whose breakdowns do not obliterate the system's fundamental autonomy (i.e. some essential organizational relationships) (Di Paolo, 2005; cf. Barandiaran & Egbert, 2014) or/and as a proliferation of separate autonomies that interact with each other in ways that allow them to co-exist. Di Paolo et al. (2018) propose the existence of three basic kinds of such separate autonomies – organismic, sensorimotor, and interactional. The dynamics that are claimed to occur between these autonomies form the bedrock of enactivist theorizing, but given the more fundamental issues with the very construct of autonomy we pointed to above, this approach incurs controversy.

The last one of the basic autonomies – interactional – forms the basis for the enactivist model of social cognition and language. An interpersonal encounter is held to “take a life of its own”, to generate an independent autonomy, with which the other two autonomies of interacting agents have to grapple. This roughly corresponds to the interactionist emergence of situation convention, but the enactivist account goes into much less detail about how it is achieved – the emergence of such an interpersonal “coupling”, as the enactivists term it, is simply assumed to naturally occur in the process of self-organization of the encounter, out of the dialectical tension of the extant autonomies (De Jaegher & Di Paolo, 2007; Di Paolo et al., 2018, pp. 61–86). Since the autonomy of the encounter is regulated by the other autonomies of both agents involved (by their “safe regions”), the agents are claimed to gradually, through a dialectical process, develop ways of co-regulating the autonomy of an encounter in various ways without compromising their own autonomies, a sophisticated form of which amounts to the emergence of language (and enculturation of those agents more generally).

The enactivist idea that language is a means of regulating or interacting with the autonomy of the social encounter is similar to the interactionist proposal that language is a system for interaction with situation convention. And the dynamics and emergent mental organizations that the enactivists claim to be involved there do share the general thrust with what the interactionist model advances. We still see it as questionable, however, that the enactivist proposals builds so centrally on the concept of autonomy. By putting the clash between autonomies of interacting agents in the center of the model (strictly, between their autonomies and the autonomy of their encounter), it might seem that meeting another person needs to pose a grave danger to one's life (organismic autonomy) or freedom (sensorimotor autonomy) in order to incite any attempt at coordination. This conclusion would not be entirely accurate, however, as it is clear that, as it has been developed in the most recent work, partial breakdowns and recoveries of “autonomy” is beginning to do a job similar to interactionist microgenesis, which renders the term itself somewhat misleading – it is not the autonomy (i.e. its ability to self-maintain) of the individual that is being disturbed in a social encounter, but the anticipatory stability of their *representational* (in the interactionist sense, naturally) processes. This function of the notion of autonomy has been embraced when adaptivity was introduced

into the enactivist model (Di Paolo, 2005): An autonomous system involves a “safe region”, where partial collapses of autonomy are held to allow the system to adapt its functioning to the present situation (cf. Barandiaran & Egbert, 2014). And it is this process that is also recognized in the context of social cognition, for example when Di Paolo et al., 2018, state that “[i]nteractive dissonance can arise in subtle ways and need not be experienced as a major frustration of individual intentions but instead as a discomfort or difficulty in the flow of sensorimotor engagements” (p. 143). This is, we believe, the crux of the matter – social cognition emerges within anticipatory dynamics of interacting agents; it is thanks to anticipatory “agreements” or situation conventions that we understand each other. The notion of autonomy does little to illuminate this process, or even obscures it, as it concerns the internal organization of the system – its operational closure – not its relationship to the social situation. In sum, we see the enactivist notion of autonomy as an unnecessary remnant of autopoietic thinking; it is not needed for normativity – self-maintenance of FFE conditions provides that; and it is not needed to account for social cognition, where it confounds what could otherwise be in our opinion a much clearer discussion of inter-agent anticipatory dynamics.

Another issue is that the term of autonomy seems at times rather equivocated. The authors sometimes discuss autonomy also in a sense that seems much closer to the everyday meaning of the term and seem to posit that interpersonal understanding requires that the interactants' personal freedom be maintained (something that critics of enactivism have picked up on, e.g. Westra & Schönherr, 2019). This is, in our opinion, an unnecessary and mistaken claim that seems to be implicitly invited by the retained autopoietic notion. It is certainly worthwhile to discuss how social conventions constrain individual freedom (e.g. we cannot help but think with the use of our conventional structures), or how lack of freedom of one party influences the emergence of conventions (conventions cannot emerge or would emerge differently if agents are not allowed to freely interact within a certain realm), but these issues are secondary and not fundamental to social cognition or language: A victim of a kidnapping can still understand what his oppressors say as long as he and his oppressors all instantiate the relevant anticipatory conventions, the question of personal freedom is only tangential to the issue of social cognition. In short, the notion of autonomy that roughly relates to maintaining one's FFE conditions and the notion of autonomy as high-level personal freedom should not be collapsed: The former indeed is fundamental to social understanding inasmuch as it captures the basic anticipatory nature of cognition at large, but the latter, though related, is a rather different animal. More generally, the charitable application of the notion of autonomy that enactivism gives to an array of different processes, such as metabolism, sensorimotor anticipation, and interactive encounter, carries the danger of equating what could perhaps be best analyzed as different kinds of FFE phenomena.

Certainly, interactionism and enactivism agree on more than they disagree on, and for many purposes the disagreements can be largely ignored – e.g. both frameworks promote research into the dynamics of social encounters as they both hold that it is in such encounters that human sociality emerges in the first place. However, where there are disagreements certainly calls for a more thorough treatment. For this text, we only intend these few remarks to help the reader's appreciation of our proposal if he or she is more familiar with the enactivist framework than interactionism.

5. Current issues in ToM-dominated social cognition research from an interactionist perspective

From the above presentation, it can be easily discerned that interactionism in particular and action-based approaches in general invite different kinds of questions and search for different kinds of answers than the ones of most concern in ToM literature. This can be clearly seen in the existing work of action-based researchers pursuing empirical questions: Issues explored include children's improving representation

of event or social situation schemata (e.g. Dunn, 1988; Nelson, 1986), the emergence of their linguistic abilities within interpersonal and non-linguistic interaction (e.g. Cameron-Faulkner et al., 2020; Carpendale & Carpendale, 2010), or their growing ability to organize their implicit knowledge with the use of reflection (e.g. Nelson & Bruner, 2006). When this research tradition met with the ToM approach, it was initially seen as baffling why ToM researchers are so obsessed with belief attribution and false-belief tasks (see, e.g., Bruner, 1995; Nelson, Plesa, & Henseler, 1998). As should be clear by now, these methodological directions are a natural consequence of the ToM theoretical framework – once you assume that it is all about mental-state attribution, it is the postulated mechanism of attribution you are studying and everything else becomes issues of “mere” performance to be controlled for. That ToM models misguide empirical research is certainly another argument against the framework that further undermines its tenability (Allen & Bickhard, 2013; Ilgaz & Allen, 2020). However, it remains a fact that ToM-(mis)guided research has dominated the field of psychological research on social cognition as well as many philosophical debates of the problem. For that reason, we have decided to offer an explicit treatment of some of the issues of social cognition most widely discussed in ToM literature, with the hope to demonstrate that ToM-based explanations of these phenomena are not the only option available to a researcher, and that they are well accounted for within our preferred framework.

5.1. False-belief task

Given its centrality in contemporary debates on social cognition, representation of beliefs and desires needs to be addressed by our proposal. Within interactivism, propositional attitudes are abstract properties of socio-cognitive structures – they are not elements for constructing such structures. It is indeed useful to abstract the property of predication from a class of conventional structures and differentiate them *reflectively* on the basis of kinds of predications involved – such as believing truly or falsely, or desiring – and children eventually do it. However, this ability is in the current model necessarily derivative from the structures that instantiate such abstract properties and needs to be differentiated from them analytically. The child first forms her level-1 anticipatory representations of social situations, and only then can she start reflectively constructing such level-2 representations as of believing or desiring.²³ Children seem generally capable of such reflective abstraction around age 4 (across different domains, not just in social cognition, see Allen and Bickhard (2018), *Human Development Special Issue* (1992)).²⁴

Let us briefly center on false-belief understanding. Following the spontaneous-response FBT study by Onishi and Baillargeon (2005), many have argued that by 15-months, infants are already able to anticipate false-belief congruent behavior. Recently, however, the robustness of the finding has been questioned as scientists find it difficult to replicate the results (Crivello & Poulin-Dubois, 2017; Dörrenberg, Rakoczy, & Liszkowski, 2018; Kammermeier & Paulus, 2017; Kulke, Duhn, von Schneider, & Rakoczy, 2018; Kulke, Reiß, Krist, & Rakoczy, 2017; Poulin-Dubois et al., 2018). This is to be expected within our proposal: Some infants might have some coarse-grained situation convention representations that, rather than attributing a false belief, anticipate the perceived agent to behave in accordance with the conventional scheme, which happens to manifest false-belief *congruent* anticipation, but does not involve genuine false-belief understanding. So

²³ A similar proposal has been offered as a synthesis of ToM and embodiment accounts of social cognition by Michael, Christensen, & Overgaard, 2014.

²⁴ This is due either to the sufficient stability of structures at level-1 or to some biological maturation of brain architecture that allows for internal reflection around that age. The issue of particular timing is primarily empirical, but the sequence is metaphysically necessary: Level 1 structures have to be constructed first for level 2 to have anything to interact with.

much is the general interpretation of the spontaneous-response FBT also endorsed by other action-based theorists (e.g. Carpendale & Lewis, 2015); the procedural knowledge of the situation that the infant already possesses anticipates others to *act* in accordance with their false beliefs, but this anticipation is implicit in the infant’s embodied or sensori-motor representation of the situation, not a result of the process of belief attribution. The specific form of such possible schemes has been explored by the anti-mentalistic criticism that followed the studies and remains an empirical issue (Borg, 2018; Fenici & Zawadzki, 2016; Heyes, 2014). What we would like to suggest additionally is that at such an early age the conventional part of the child’s functional organization is likely to be highly idiosyncratic and contingent on the particularities of the experience in their short life, which could explain the systematic unreliability of the findings.

The elicited-response FBT seems to require *some* reflective abstraction (cf. Kloo, Kristen-Antonow, & Sodian, 2019). The reason for that is that the child is asked to predict verbally what will happen, not to anticipate it in action. Moreover, the question posed to the child is novel enough for them not to have sufficient level-1 organization to answer it correctly without reflection (Allen & Bickhard, 2018).²⁵ It is important to note, however, that whatever level-2 functional structure the child deploys in the task is likely far from the generality that characterizes an adult folk psychologist; the reflective folk psychological framework is constructed according to the same principles as level-1 functional organization, and can always be potentially extended and revised, including new properties and aspects of the overall functional organization of conventional world knowledge (cf. Carpendale & Lewis, 2006; Nelson, 2007; Stone, Carpendale, Sugarman, & Martin, 2012).

5.2. Folk psychology

Folk psychology within the present framework is a complex phenomenon. Most fundamentally, folk psychology can be defined as a reflective convention. It is reflective in that it involves abstracting certain properties of the functional organization of the mind, such as believing or desiring. And it is a convention in that it is shared by individuals in a society and arguably originated as a solution to various coordination challenges. Overall, anytime commonality in *thinking* (i.e. level-2 anticipation) about people is indispensable for social coordination, folk psychology is the convention we enact. Naturally, there are many ways in which this commonality is achieved, and what falls under the label of folk psychology is likely varied and cognitively differentiated structures that are deployed in various contexts, and towards various goals. Recent work within the so-called pluralist approaches to folk psychology has explored the landscape of these structures (Andrews, 2012, 2015; Fiebich, 2019; Fiebich & Coltheart, 2015; Newen, 2015; Spaulding, 2018). The pluralist approaches to social cognition can be viewed as a culminating point in the long and variegated critique of the ToM conception to social cognition that puts belief-attribution at its base. Drawing on individual points made in earlier criticisms (e.g. Bruner, 1990, 1995; De Jaegher & Di Paolo, 2007; Gallagher, 2001, 2008; Goldman, 2008; Hutto, 2008), these scholars point out that folk psychological reflection does not only involve theorizing about mental states of others, but also stereotyping, explanation by situation, social norms, trait attribution, and potentially more. And these serve a varied set of purposes, including but hardly limited to behavior prediction. This claim is further supported by anthropological analyses that show that folk psychologies differ greatly across cultures

²⁵ In principle, any anticipation can be successfully accomplished by level 1, but it will always require practice; hence, good performance in interactively novel tasks is a good indicator of reflective processes being involved.

(Lillard, 1998; Luhrmann, 2011; Wierzbicka, 2006). Interactivism provides a framework for analyzing these strategies as different functional structures that participate in the constitution of social reality and social cognition.²⁶

Consistent with the pluralist claims, our proposal then accommodates both the traditional view of folk psychology as an explanatory and predictive tool, as well as the more recent points about its different functions. As we have pointed out in our critique in section 2, theory of mind (be it in the form of an implicit mechanism or an actual folk psychological reflection) is generally a bad theory in the sense that it far from exhausts the determinants of another's behavior (and even worse when it is understood as referring to 'things' that don't exist — e.g., encoded propositions in a belief box). However, understood as a reflection over or internal interaction with already contentful socio-cognitive anticipations of social situations, it can aid prediction and explanation. Assume that someone tells me that the man standing in front of my door is the service technician I spoke with over the phone about fixing my broken fridge, and I reflectively attribute to him the mental state of waiting for me and the desire to enter my house and do his job. The folk psychological mental-state attribution modulates my anticipatory processes such that they presuppose him to perhaps greet me and state his business. This presupposition can be wrong or right and is subject to falsification when interacting with the man (e.g. If he is not really the repairman and I start talking to him about my broken fridge and invite him in, his behavior will be unlikely to follow my anticipations. He might try to tell me that I have mistaken him for someone else, or perhaps walk away, giving me a confused look). The important point is that this attribution alone does not explain the whole of my anticipatory processes about that person — the attribution merely modulates the process, but most of implicit presuppositions present there come from general conventionalization of my mind acquired in my culture (e.g. that he will want to shake hands with me or that he has tools in his bag are part of implicit anticipatory structures onto which my explicit attribution only has additional influence, they do not originate in the attribution).

As mentioned earlier, however, behavior prediction is rarely how we use folk psychology and our proposal makes space for such uses as well — folk psychology is a versatile reflective convention that apart from explaining and predicting can be used to communicate one's thoughts, regulate other's behavior, excuse it, and others. One notable point has been made by Brandom (e.g. 2000) and, in the context of ToM research, by Fenici and Zawidzki (2020). The main claim that they champion is that folk psychology is a very bad theory and its real usefulness lies rather in how it regulates social commitments and obligations. For instance, if I say that "John believes X", I am not just or only or at all stating a theoretical claim — I am committing myself to back up that 'claim' if called upon, and/or to justify it (and thus my status as a reliable informative interlocutor) if it turns out to be not correct, and leads you astray, etc. An encoding framework leads one to ignore such social interaction issues, and to interpret folk psychology as a solely denotational theory. Our proposal, on the other hand, can make sense of such uses as well. What the convention of folk psychology does is modulate social anticipations in ways that are shared by people in a given culture (it is a convention); this modulation can be used theoretically to correctly anticipate behavior (function of prediction), but it can also be used regulatively (and perhaps this is its most significant role) to organize social interaction in ways that the above researchers stress. As a reflective convention, folk psychology improves social cognition and

coordination, but is not the driving force behind it.

5.3. Social cognition in different cultures

We have pointed out that enculturation of social cognition poses an insurmountable challenge for ToM frameworks. The interactivist model, on the other hand, accommodates enculturation naturally as part of the process of conventionalization of the mind, and provides a framework for studying cultural effects on social cognition.

The most general point is that apperception of a person is largely constituted by the convention of the given culture, which in turn depends on the kinds of coordination challenges the society has faced in the past and the precedence of solutions to those challenges. Naturally, there are culturally universal coordination challenges as all communities interact with physical reality in order to ensure survival. Taking into account the commonality of embeddedness, embodiment, and evolutionary heritage of humans, it is expected that conventions that emerge as solutions to such basic survival challenges will be at least generally comprehensible cross-culturally (e.g. pointing to draw attention, or going hunting).

It is important to understand such cross-cultural universals correctly. As we have already mentioned, they are not some universal, more primitive conceptual foundation upon or out of which culturally specific structures are built, as core knowledge accounts have held (Spelke & Kinzler, 2007). Rather, they are descriptions of stability across different populations and individuals, stability that in the present framework is explained as the outcome of innate scaffolds, and commonalities in embodiment and embeddedness of the constructive process (Carpendale & Wereha, 2013). In short, descriptions of cultural universals should not be reified into their explanation.

When it comes to coordination challenges that are posed in interaction already *within* the realm of social convention — e.g. when a decision has to be made where to go on a hunting trip — then greater arbitrariness is to be expected. For instance, some communities may develop a social hierarchy where the tribe's chief makes the decision; some others might develop a voting convention. Correspondingly, the higher we go in the emergent hierarchy of conventional reality, the bigger cross-cultural variance is likely, which is perhaps best observed in the diversity of languages, ideologies, and spiritual systems of the world's oldest civilizations.

As far as folk psychology is concerned, beliefs and desires will be present implicitly in conventions of all cultures because they are properties of human cognition in general, not of a particular conventional organization — they denote the intrinsic constraints on knowing at large. So, it makes sense that most cultures develop folk psychologies that capture those properties (although arguably not in entirely the same ways). Indeed, all folk psychological concepts identified by Wierzbicka as truly culturally universal designate characteristics of functional organization that are of natural rather than conventional provenance (Wierzbicka, 2005, p. 265; cf.; Wierzbicka, 2006).

There will be, however, a plethora of other organizational properties of social reality and therefore of conventional minds that are increasingly culturally specific, and these too will often figure in a given culture's folk psychology. These culturally specific folk psychological concepts usually capture characteristics of *conventional* minds who exhibit organizationally universal properties that do not exist outside the structure of that convention, or exist but in a highly dissimilar form (e.g. Lomas, 2018; Wierzbicka, 1999). Consider, for instance, such propositional attitudes as *allow*, *refuse*, *deny*, or *be disappointed in* — they all presuppose a conventional realm of interaction such that makes it possible for someone to allow someone else to do something, or to be disappointed in someone. Any cognitive system implicitly believes things, but allowing something to happen requires one to be an encultured agent. Even though the general categories of this sort seem relatively common cross-culturally, the specifics of their meaning will vary as the social reality that makes it possible for someone to allow, refuse or deny things

²⁶ Many of the pluralist accounts remain largely metaphysically agnostic and thus are potentially consistent with the present proposal (Andrews, 2012; Fiebig, 2019; Newen, 2015; Zawidzki, 2013), which is advanced as a "basic-level" metaphysical framework for understanding enculturation. Others make more concrete metaphysical claims and likely clash with the present proposal (Gallagher, 2015).

often differs cross-culturally.

Further, varying historical contingencies and unique ecological conditions might lead societies to develop highly singular conventions. For instance, the already mentioned Welsh concept *hiraeth* signifies longing for an idealized Wales from the past, one that perhaps never existed, but which permeates Welsh mentality (Polk, 1982). Arguably, Welsh minds often engage in activity that instantiates the property of *hiraeth*, and so it has been useful for the culture to abstract it and include it in its folk psychology. Similar, uniquely conventional ontology can be argued for concepts such as the Chinese *xin* 心, which is characteristic of the traditional way of relating to one another in China (Gut, Hryniewska, Pejda, Mirski, & Stoch, 2019; Yu, 2009). These concepts capture the relations that exist within the organization of the social reality specific to their cultures and can be only approximated by an individual who does not instantiate the convention in question.

5.3.1. Functional scaffolding

The concept of *functional scaffolding* allows us to understand more deeply the way in which the child's construction of culturally adequate functional organization is structured by her social environment (Bickhard, 1992a; 1992b, 2005). As has been noted, interactivism models development as recursively constructive; functional organizations that were successful in past interactions are retained in the world knowledge and form the context of further development. This has important consequences: First, certain conventional interactions might require complex constructions that are unlikely to be successfully generated by the agent from scratch. These constructions, however, might be scaffolded by first engaging in interactions that the agent *can* be successful in, which will be retained and will form the context for interaction with the more difficult task, potentially increasing chances of success and formation of the corresponding construction. In other words, the agent might first have to gain some competence or knowledge in order for further learning to have the desired effect (e.g. teaching a toddler how to write is no use when they cannot hold a pen properly, so successfully holding a pen is a good way to start). What happens to the scaffolds once the target construction is achieved might vary – e.g. they might be no longer needed and thus deteriorate, or they might form an intrinsic part of the target construction, effectively constituting the intension of the representation. Clearly, the model provides numerous ways in which this constructive process can be analyzed and studied.

What is important for the present discussion is how the environment introduces such functional scaffolds. Functional scaffolding consists in *blocking of selection pressures* of certain tasks so that children can acquire the right constructions. Such blocking can be achieved in multiple ways, many of which are clearly present in societies across the world. In essence, however, it boils down to imposing certain interaction onto the child, one that the child can be successful in, so that she will form the right constructions that will allow her to achieve success in some other, more complex interaction at a later date. Note that this contrasts with the Vygotskian notion of scaffolding as provision of knowledge; on an encodingist reading of Vygotsky's ideas, such provision of knowledge must amount to encoding of new information provided by the parent, which we pointed out is impossible in principle. Blocking selection pressures can but *does not have to* be guided by the parent's knowledge of the target construction: What does the scaffolding job proximally is the interactive context that allows for a successful construction, not some transmission of the target structure from the parent's mind. While blocking of selection pressures is often targeted at the child constructing the same knowledge as the parent has, it might just as well be guided by the parent wanting the child to construct knowledge that they *do not* themselves have – they only need to engage the child in the scaffolding interaction. This is nicely illustrated by the work of Reading Corps, an organization that helps to improve children's literacy, which holds trainings for parents who are often illiterate themselves and teaches them to engage in activities that help the child become a better reader (how to hold a book, turn pages, identify letters etc.) (Minnesota, 2020).

Generally, the point we wish to make here is that social scaffolding, even though often guided by the scaffolder's knowledge of the target construction, is achieved not by transmission of that knowledge, but by engaging the child in an interaction with a blocked selection pressure(s) that allows her to achieve interactive success and retain the appropriate constructs to be used in further learning and development.²⁷

The most prominent example of functional scaffolding is perhaps the formal schooling system – children are not expected to appreciate the aim of education, and would probably not engage in the necessary activities were they not skillfully manipulated by the society to do so. Such scaffolding is necessary since the social reality of modern civilization is constituted by conventions accumulated over millennia, and children would not be able to become participants of it otherwise.

The present framework provides tools for understanding how scaffolding influences the construction and constitution of socio-cognitive structures, or conventional minds. Writing and reading are obvious examples, but there are also less conspicuous cases. Consider, for instance, hand-holding with a parent. In the present framework, it will be a convention that scaffolds a number of other tasks and gets discarded later in life (although it can be co-opted later as a form of interaction in romantic relationships, childrearing as a parent, or stress-coping strategy (Weekes, Kagan, James, & Seboni, 1993)). Turn-taking, on the other hand, is a convention usually scaffolded for children that seems to be retained as part of many other conventions (Vandell & Wilson, 1987), most significantly language (Levinson, 2016).

As explored by some developmentalists, the earliest conventional structures of the child's mind will emerge in dyadic interactions or engagements between the child and their caregiver. Reddy (2018) cites evidence that very early in their development (two and three months), infants exhibit anticipatory behavior in dyadic social situations. For example, they adjust their body when the caregiver begins to pick them up (Reddy, Markova, & Wallot, 2013), which adjustment ceases if the caregiver delays her part of the interaction (Fantasia, Markova, Fasulo, Costall, & Reddy, 2015). From the perspective of our proposal, such enacted routines are earliest conventions that emerge between the child and their caregiver. Since conventions are dynamic structures – they are anticipations of the flow of a social situation and thus are time sensitive; if an interactant behaves out of the anticipated flow, anticipation within the situation convention can break down (i.e. timing is intrinsic in situation conventions), which can explain the effect of delays found by Fantasia et al. (2015). Once such second-personal conventions are stabilized, the child has available conventional anticipatory structures that can scaffold her engagement with triadic situation conventions. For instance, being familiar with the second-personal convention of bottle-feeding, the infant is more likely to apperceive an agent who is feeding *someone else* – for example, a doll – from a third person perspective, initially using the same anticipatory structure but gradually reconstructing it to fit the third-personal flow of interaction. Naturally, successfully observing someone else being fed and being fed oneself

²⁷ Scaffolding more generally is achieved by introducing developmental constraints in the developmental system that result in the emergence of some system organization (Oyama, 1985/2000). The introduction of the constraints can happen by human design, as is the case in social scaffolding under discussion here, but also naturally, by variation and selective retention of developmental contingencies in phylogeny (importantly, even in the case of human "design", the original emergence of the design is also necessarily by variation and retention). Kuo's (1967) work on embryonic development of pecking in chicks is a nice illustration here. At some point in a chick embryo's development, its heart begins beating and induces head to move in a roughly pecking manner. Kuo found out that blocking this relation resulted in that the chick could not peck, eat, or even remove itself from the shell. Thus, the heart's influence clearly scaffolds the development of the chick's ability to peck. Yet, it is clear that there is no knowledge of pecking that is being transmitted here – it is the modulation of the developmental process created by the heartbeat that does the job.

involve a great deal of distinct anticipatory presuppositions, but the point is that certain anticipatory organizations established by engagement in second-personal feeding can be co-opted in observing someone else being fed. Importantly, they can be co-opted on the basis of organizational similarity of the anticipatory flow and via random variation and selective retention when the second-personal structure fails to anticipate a third-personal interaction successfully – no homuncular agent doing the comparing within the organism is needed.

Another example, related to reflective abstraction, is reading books for children that simplify social relations, and commenting on them with the child, making sure they understand them well with such techniques as relating the events to the child's own life (Farkas et al., 2020; Salo, Rowe, Leech, & Cabrera, 2016; Ziv, Smadja, & Aram, 2014). In this case, scaffolding seems to concern mostly the child's reflection over social reality, and construction of explicit, folk psychological concepts that can be applied to their own experience. Indeed, such book-reading does predict success on explicit-reasoning ToM tasks (Adrián, Clemente, & Villanueva, 2007; Symons, Peterson, Slaughter, Roche, & Doyle, 2005). A discussion related to this kind of scaffolding follows in the next subsection.

5.4. How does language influence socio-cognitive development?

The convention of language is certainly the most pervasive constituent of social reality; it not only is the most powerful way to interact with situation conventions, but it also constitutes many of them. As such, much of the content of the human mind is language-constituted,²⁸ and perhaps an even larger part of it is implicated in language in the sense that there are functional links from most of functional structures (e.g. representations of objects) to the convention of language (as long as we can talk about something, there must be such a functional link). Therefore, within the proposed framework, asking how language relates to social cognition is akin to asking how vision relates to cognition of physical reality: We know others to a great extent through (anticipation of) linguistic interaction similarly to how we know the physical world significantly through (anticipation of) visual interaction (cf. Gibson's ecological account of vision).

This perspective contrasts radically with the one of the traditional ToM frameworks. As Ilgaz and Allen (2020) have recently pointed out, traditional ToM models necessarily view language in an instrumental way – it is a source of data for the construction of theory of mind and as such can aid the process of its development, but it does not partake in the constitution of social cognition in any way. The authors highlight that this instrumental perspective imposed by the ontological commitments of the traditional frameworks has (mis)guided most of the research on language's role in socio-cognitive development. Linguistic interaction has been looked at primarily as a source of information about the abstract concepts of believing and desiring. This is reflected in both what aspect of linguistic interaction is seen as methodologically relevant (e.g. frequency of use of the terms 'think' or 'want' in the household), as well as what is seen as evidence of improved socio-cognitive skills (mostly false-belief task performance) (cf. Devine & Hughes, 2018; Milligan, Astington, & La Dack, 2007; Tompkins, Benigno, Kiger Lee, & Wright, 2018). From the standpoint of our proposal, although important, this is only a specific part of what social cognition is and how language matters for it.

Naturally, although limited in its scope, the evidence is valuable and requires an interpretation from the present perspective. We will focus specifically on the impact of mastering the terms of "think" and "want", which has been found to improve ToM understanding (Furrow, Moore, Davidge, & Chiasson, 1992; Gola, 2012; Roby & Scott, 2018; Ruffman,

Puri, Galloway, Su, & Taumoepeau, 2018; Ruffman, Slade, & Crowe, 2002; Ruffman, Slade, Rowlandson, Rumsey, & Garnham, 2003), but the points are generalizable to the influence of folk psychological talk in general.

As noted earlier, believing and desiring understood broadly is instantiated by living beings in general – implicit presupposition is a form of believing, and goal-orientedness is a form of desiring. We propose that mastering such terms as 'think' or 'want' creates a functional organization that links classes of functional structures that instantiate such abstract relations with possibilities for social interaction (with conventional structures); it makes the child cognitively differentiate functional organization on the basis of belonging to those abstract classes (something which is not interactively relevant outside of social reality and would probably not be differentiated without language, cf. Pyers and Senghas (2009)). This claim can be perhaps made clearer by a comparison with an analogous differentiation but in a more familiar domain. Take the previously used example of the edible fruit that is sweet and soft and can be identified by squeezing it (as opposed to the other, inedible fruit that is firm, bitter, and makes one nauseous, but which is identical to the former in all its other characteristics). Cognitive differentiation between softness and firmness of the fruit makes a difference for the organism – by learning to differentiate the two kinds of fruit on the basis of their property of softness,²⁹ the organism can better interact with its environment (i.e. it can achieve anticipatory success). Now, our suggestion is that a similar advantage for anticipatory success in a cultural milieu is bestowed by differentiating conventional cognitive structures on the basis of the property of belief and desire. These properties, although inherently present in any real-life cognitive agent (their situation knowledge), can be only differentiated if they make a difference for how the process of interaction flows. They make such a difference most prominently in conversations about mental states where mental-state talk corresponds to how people behave (whether somebody informs us of someone else's belief, or they declare it themselves, or they hold us accountable for a belief we have voiced earlier, or the child's caregiver attributes a belief to a character in the picture book they are reading etc.), and so learning to successfully anticipate the flow of such a mental-state interaction requires – and thus provides an incentive to construct – differentiations of conventional structures on the basis of mental states held by the interactants. This is naturally a much more complex task than the one in the fruit example, but mentalistic language certainly helps it – once mastered, it creates an anticipatory organization in which such a differentiation is embodied. In order to correctly use and understand folk psychological talk, the child needs to establish appropriate functional link on the basis of such a differentiation; otherwise, she will fail in her anticipation. Importantly, this *does not* imply that believing and desiring are represented reflectively or explicitly, but only that they become an organizing principle of the functional organization of the child's mind when she learns to communicate effectively with the use of such terms.

That being said, a full competence in folk psychology seems to require appropriate reflective functional organization as well – being able to apply the principles of folk psychology to novel examples, to think back to past situations, to compare and hypothesize about different possible mental states etc. are all frequent presuppositions of a conversation about social life. Without thinking reflectively about believing and desiring, there seems to be little possibility of anticipatory success in such conversations. Consequently, folk psychological conversations can be seen as imposing a selection pressure onto the reflective organization of the child, and once the child is capable of reflection, engaging in joint contemplation of minds with the parent provides more opportunities for the generation and subsequent

²⁸ Remember that content is meant here in the interactivist sense: It is constituted as implicit presuppositions of anticipatory processes, so when there is anticipation of linguistic interaction, the content is language-constituted.

²⁹ Strictly, on the basis of two possible process flows of squeezing that implicitly presuppose either softness or firmness of the object and are part of the organism's functional structures that implicitly represent the fruit.

retention of the right reflective structures (note that the process is usually scaffolded by the parent, as mentioned earlier).

Thus, as an initial claim to be extended in the future, we wish to point to two ways in which mental-state talk likely contributes to the child's improved competence in reflective socio-cognitive tasks: (1) being able to use such terms as 'think' and 'want' for varied interactional purposes results in a functional organization that differentiates classes of structures on the basis of their abstract properties, such as believing and desiring (but also allowing, refusing etc. – this can apply to any abstract property).³⁰ And (2) being able to engage in folk psychological discussion about other minds (e.g. using mental-state terms in the context of a joint reflective activity) imposes selection pressure onto the child's reflective processes, and thus the more frequent such activity, and the better it is scaffolded by the parent, the quicker the child should construct the appropriate reflective structures.

6. Conclusions

We have argued that ToM models cannot account for enculturation of social cognition in principle due to their encodingist commitments. To make our case, we reviewed three related issues that encodingist frameworks face: the copy problem, foundationalism, and the frame problems. The copy problem and foundationalism imply the impossibility of genuine enculturation: With no independent epistemic access to social reality, a ToM agent has no way to acquire culturally specific concepts, which forces ToM accounts into the claim of innate foundational content that can serve as the basis for development. The frame problems of holism and interpersonal coordination unveil the epistemological inadequacy of mental state attribution as a behavior prediction and coordination ensuring tool: With no model of implicitness, ToM models cannot account for the unbounded relevancy relationships that hold between one's behavior, their mental states, and elements of the world.

As a positive alternative, we have argued for interactivism as a framework for understanding social cognition and its enculturation. We have pointed out its strong metaphysical base (representation as implicit presupposition of anticipatory processes, and normativity rooted in FFE dynamics), and argued that it naturally accommodates enculturation of social cognition, drawing relevant connections with existing empirical and theoretical research. We suggest interactivism has great potential for studying encultured or conventional minds.

Funding information

This work was supported the National Science Centre (Poland) under Grant PRELUDIUM 12 (UMO-2016/23/N/HS1/02887) awarded to Robert Mirski for the research project entitled "On Socio-Cultural Entanglement of Folk Theories of Mind. A Discussion on the Boundaries of Universality and Commonality of Mental Concepts and Attributions."

Declaration of competing interest

The authors declare no potential conflict of interest.

³⁰ Notice that this nicely accommodates the data showing that non-mentalistic use of "think" and "want" does not help the child do better on ToM tests, and even seem to retard it (S. Lewis, Hacquard, & Lidz, 2012). Mastering such non-mentalistic conversational uses of the terms creates a different functional organization than mastering them in their mentalistic use, and this functional organization, once extant in the mind, might require reconstruction to accommodate mentalistic use of the terms.

References

- Adams, R. B., Rule, N. O., Franklin, R. G., Wang, E., Stevenson, M. T., Yoshikawa, S., & Ambady, N. (2010). Cross-cultural reading the mind in the eyes: An fMRI investigation. *Journal of Cognitive Neuroscience*, 22(1), 97–108. <https://doi.org/10.1162/jocn.2009.21187>
- Adrián, J. E., Clemente, R. A., & Villanueva, L. (2007). Mothers' use of cognitive state verbs in picture-book reading and the development of children's understanding of mind: A longitudinal study. *Child Development*, 78(4), 1052–1067. <https://doi.org/10.1111/j.1467-8624.2007.01052.x>
- Allen, J. W. P., & Bickhard, M. H. (2013). Stepping off the pendulum: Why only an action-based approach can transcend the nativist-empiricist debate. *Cognitive Development*, 28(2), 96–133. <https://doi.org/10.1016/j.cogdev.2013.01.002>
- Allen, J. W. P., & Bickhard, M. H. (2018). Stage fright: Internal reflection as a domain general enabling constraint on the emergence of explicit thought. *Cognitive Development*, 45, 77–91. <https://doi.org/10.1016/j.cogdev.2017.12.005>
- Andrews, K. (2012). *Do apes read minds?: Toward a new folk psychology*/Kristin Andrews. Cambridge, Mass., London: MIT Press.
- Andrews, K. (2015). The folk psychological spiral: Explanation, regulation, and language. *The Southern Journal of Philosophy*, 53(4), 50–67. <https://doi.org/10.1111/sjp.12121>
- Barandiaran, X. E., & Egbert, M. D. (2014). Norm-establishing and norm-following in autonomous agency. *Artificial Life*, 20(1), 5–28. https://doi.org/10.1162/ARTL_a_00094
- Baron-Cohen, S., Tager-Flusberg, H., & Lombardo, M. (2013). Understanding other minds: What's new? In S. Baron-Cohen, H. Tager-Flusberg, & M. Lombardo (Eds.), *Understanding other minds: Perspectives from developmental social neuroscience*/edited by Simon Baron-Cohen, Helen Tager-Flusberg and Michael Lombardo (3rd ed., pp. v–x).
- Berger, P. L., & Luckmann, T. (1967). The social construction of reality: A treatise in the sociology of knowledge. In *Anchor books: A 589* (Anchor books ed.). Garden City, NY: Doubleday.
- Bickhard, M. H. (in preparation). The whole person: Toward a naturalism of persons: Contributions to an ontological psychology.
- Bickhard, M. H. (1980). *Cognition, convention, and communication*. New York N.Y.: Praeger.
- Bickhard, M. H. (1992a). How does the environment affect the person? In L. T. Winegar, & J. Valsiner (Eds.), *Children's development within social context* (pp. 63–92). Hillsdale, N.J.: L. Erlbaum.
- Bickhard, M. H. (1992b). Scaffolding and self-scaffolding: Central aspects of development. In L. T. Winegar, & J. Valsiner (Eds.), *Children's development within social context* (pp. 33–52) (Hillsdale, N.J.: L. Erlbaum).
- Bickhard, M. H. (1998). Levels of representationality. *Journal of Experimental & Theoretical Artificial Intelligence*, 10(2), 179–215. <https://doi.org/10.1080/095281398146824>
- Bickhard, M. H. (2000). Motivation and emotion: An interactive process model. In R. D. Ellis, & N. Newton (Eds.), *The caldron of consciousness*. Amsterdam: John Benjamins Publishing Company.
- Bickhard, M. H. (2001). Why children don't have to solve the frame problems: Cognitive representations are not encodings. *Developmental Review*, 21(2), 224–262. <https://doi.org/10.1006/drev.2000.0521>
- Bickhard, M. H. (2003). Process and emergence: Normative function and representation. In J. Seibt (Ed.), *Process theories* (pp. 121–155). Dordrecht: Springer Netherlands.
- Bickhard, M. H. (2005). Functional scaffolding and self-scaffolding. *New Ideas in Psychology*, 23(3), 166–173. <https://doi.org/10.1016/j.newideapsych.2006.04.001>
- Bickhard, M. H. (2007). Language as an interaction system. *New Ideas in Psychology*, 25(2), 171–187. <https://doi.org/10.1016/j.newideapsych.2007.02.006>
- Bickhard, M. H. (2008). Social ontology as convention. *Topoi*, 27(1–2), 139–149. <https://doi.org/10.1007/s11245-008-9036-1>
- Bickhard, M. H. (2009). The interactivist model. *Synthese*, 166(3), 547–591. <https://doi.org/10.1007/s11229-008-9375-x>
- Bickhard, M. H. (2010). Interactive knowing: The metaphysics of intentionality. In R. Poli, & J. Seibt (Eds.), *Theory and applications of ontology: Philosophical perspectives*/edited by roberto poli and johanna seibt (pp. 207–229). Dordrecht, London: Springer.
- Bickhard, M. H. (2015a). The social-interactive ontology of language. *Ecological Psychology*, 27(3), 265–277. <https://doi.org/10.1080/10407413.2015.1068656>
- Bickhard, M. H. (2015b). What could cognition be if not computation...Or connectionism, or dynamic systems? *Journal of Theoretical & Philosophical Psychology*, 35(1), 53–66. <https://doi.org/10.1037/a0038059>
- Bickhard, M. H. (2015c). Toward a model of functional brain processes II: Central nervous system functional macro-architecture. *Axiomathes*, 25(4), 377–407. <https://doi.org/10.1007/s10516-015-9276-9>
- Bickhard, M. H. (2015d). Toward a model of functional brain processes I: Central nervous system functional micro-architecture. *Axiomathes*, 25(3), 217–238. <https://doi.org/10.1007/s10516-015-9275-x>
- Bickhard, M. H. (2016a). Inter- and En- activism: Some thoughts and comparisons. *New Ideas in Psychology*, 41, 23–32. <https://doi.org/10.1016/j.newideapsych.2015.12.002>
- Bickhard, M. H. (2016b). The anticipatory brain: Two approaches. In V. C. Müller (Ed.), *Fundamental issues of artificial intelligence* (pp. 259–281). Cham: Springer International Publishing.
- Bickhard, M. H., & Campbell, R. L. (1996). Topologies of learning and development. *New Ideas in Psychology*, 14(2), 111–156. [https://doi.org/10.1016/0732-118X\(96\)00015-3](https://doi.org/10.1016/0732-118X(96)00015-3)
- Bickhard, M. H., & Richie, D. M. (1983). *On the nature of representation: A case study of James gibson's theory of perception*/mark H. Bickhard, D. Michael Richie with Robert

- Hughes, James dannemiller. New York, NY, USA: Praeger. <https://doi.org/10.1057/9781137400437.0005>
- Bickhard, M. H., & Terveen, L. (1995). *Foundational issues in artificial intelligence and cognitive science: Impasse and solution*. *Advances in psychology* (Vol. 109). Amsterdam, New York: Elsevier.
- Borg, E. (2018). On deflationary accounts of human action understanding. *Review of Philosophy and Psychology*, 9(3), 503–522. <https://doi.org/10.1007/s13164-018-0386-3>
- Brandt, R. (2000). *Making it explicit: Reasoning, representing, and discursive commitment* (3rd pr). Cambridge, Mass: Harvard University Press [u.a.].
- Brette, R. (2019). Is coding a relevant metaphor for the brain? *Behavioral and Brain Sciences*, 1–44. <https://doi.org/10.1017/S0140525X19000049>
- Bruner, J. S. (1990). *Acts of meaning. The Jerusalem-Harvard lectures*. Cambridge, Mass: Harvard University Press.
- Bruner, J. S. (1995). Commentary. *Human Development*, 38(4–5), 203–213. <https://doi.org/10.1159/000278316>
- Bushnell, I. W. R. (2001). Mother's face recognition in newborn infants: Learning and memory. *Infant and Child Development*, 10(1–2), 67–74. <https://doi.org/10.1002/icd.248>
- Butterfill, S. A., & Apperly, I. A. (2013). How to construct a minimal theory of mind. *Mind & Language*, 28(5), 606–637. <https://doi.org/10.1111/mila.12036>
- Cameron-Faulkner, T., Malik, N., Steele, C., Coretta, S., Serratrice, L., & Lieven, E. (2020). A Cross-Cultural Analysis of Early Prelinguistic Gesture Development and Its Relationship to Language Development. *Child Development*. Advance online publication. <https://doi.org/10.1111/cdev.13406>
- Campbell, D. T. (1974). Evolutionary epistemology. In P. A. Schilpp (Ed.), *The philosophy of karl popper* (pp. 413–463). Open Court.
- Campbell, R. J. (2015). *The metaphysics of emergence*. New York: Palgrave Macmillan.
- Campbell, R. L., & Bickhard, M. H. (1986). *Knowing levels and developmental stages. Contributions to human development* (Vol. 16). Basel: S. Karger.
- Carpendale, J. I. M., & Carpendale, A. B. (2010). The development of pointing: From personal directedness to interpersonal direction. *Human Development*, 53(3), 110–126. <https://doi.org/10.1159/000315168>
- Carpendale, J. I. M., & Lewis, C. (2006). *How children develop social understanding. Understanding children's worlds*. Malden, Mass., Oxford: Blackwell Publishers.
- Carpendale, J. I. M., & Lewis, C. (2015). The development of children's understanding of social interaction. In S. Robson, & S. Flannery Quinn (Eds.), *Routledge international handbooks of education. The Routledge international handbook of young childrens thinking and understanding* (pp. 123–132). Milton Park, Abingdon, Oxon, New York, NY: Routledge.
- Carpendale, J. I. M., & Wereha, T. J. (2013). Understanding common developmental timetables across cultures from a developmental systems perspective. *Human Development*, 56(3), 207–212. <https://doi.org/10.1159/000351276>
- Carruthers, P. (2013). Mindreading in infancy. *Mind & Language*, 28(2), 141–172. <https://doi.org/10.1111/mila.12014>
- Carruthers, P. (2015). *Mindreading in adults: Evaluating two-systems views*. *Synthese*. Advance online publication. <https://doi.org/10.1007/s11229-015-0792-3>
- Christensen, W. D., & Bickhard, M. H. (2002). The process dynamics of normative function. *The Monist*, 85(1), 3–28.
- Christopher, J. C., & Bickhard, M. H. (2007). Culture, self and identity: Interactivist contributions to a metatheory for cultural psychology. *Culture & Psychology*, 13(3), 259–295. <https://doi.org/10.1177/1354067X07079881>
- Colonnesi, C., Stams, G. J. J. M., Koster, I., & Noom, M. J. (2010). The relation between pointing and language development: A meta-analysis. *Developmental Review*, 30(4), 352–366. <https://doi.org/10.1016/j.dr.2010.10.001>
- Crivello, C., & Poulin-Dubois, D. (2017). *Infants' false belief understanding: A non-replication of the helping task*. *Cognitive Development*. Advance online publication. <https://doi.org/10.1016/j.cogdev.2017.10.003>
- Cuffari, E. C., Di Paolo, E., & Jaegher, H. de (2015). From participatory sense-making to language: There and back again. *Phenomenology and the Cognitive Sciences*, 14(4), 1089–1125. <https://doi.org/10.1007/s11097-014-9404-9>
- De Bruin, L. C., & Kästner, L. (2012). Dynamic embodied cognition. *Phenomenology and the Cognitive Sciences*, 11(4), 541–563. <https://doi.org/10.1007/s11097-011-9223-1>
- De Jaegher, H., & Di Paolo, E. A. (2007). Participatory sense-making. *Phenomenology and the Cognitive Sciences*, 6(4), 485–507. <https://doi.org/10.1007/s11097-007-9076-9>
- Devine, R. T., & Hughes, C. (2018). Family correlates of false belief understanding in early childhood: A meta-analysis: A meta-analysis. *Child Development*, 89(3), 971–987. <https://doi.org/10.1111/cdev.12682>
- Di Paolo, E. A. (2005). Autopoiesis, Adaptivity, Teleology, Agency. *Phenomenology and the Cognitive Sciences*, 4(4), 429–452. <https://doi.org/10.1007/s11097-005-9002-y>
- Di Paolo, E. A., Cuffari, E. C., & Jaegher, H. de (2018). *Linguistic bodies: The continuity between life and language*. Cambridge MA: The MIT Press.
- Dixon, H. G. W., Komugabe-Dixon, A. F., Dixon, B. J., & Low, J. (2017). *Scaling theory of mind in a small-scale society: A case study from Vanuatu*. *Child Development*. Advance online publication. <https://doi.org/10.1111/cdev.12919>
- Doherty, M. J., & Perner, J. (2020). Mental files: Developmental integration of dual naming and theory of mind. *Developmental Review*, 56, 100909. <https://doi.org/10.1016/j.dr.2020.100909>
- Dörrenberg, S., Rakoczy, H., & Liszkowski, U. (2018). *How (not) to measure infant Theory of Mind: Testing the replicability and validity of four non-verbal measures*. *Cognitive Development*. Advance online publication. <https://doi.org/10.1016/j.cogdev.2018.01.001>
- Dretske, F. (1988). *Explaining behavior: Reasons in a world of causes/fred dretske*. Cambridge, Mass: MIT Press.
- Dunn, J. (1988). *The beginnings of social understanding*. Cambridge, Mass: Harvard University Press.
- Eck, D. (2015). *The encultured mind: From cognitive science to social epistemology*. Ph.D. thesis. University of South Florida.
- Edelman, S. (2003). But will it scale up? Not without representations. *Adaptive Behavior*, 11(4), 273–275. <https://doi.org/10.1177/1059712303114009>
- Fantasia, V., Markova, G., Fasulo, A., Costall, A., & Reddy, V. (2015). Not just being lifted: Infants are sensitive to delay during a pick-up routine. *Frontiers in Psychology*, 6, 2065. <https://doi.org/10.3389/fpsyg.2015.02065>
- Farkas, C., Santelices, M. P., Vallotton, C. D., Brophy-Herb, H. E., Iglesias, M., Sieverson, C., & Álvarez, C. (2020). Children's storybooks as a source of mental state references: Comparison between books from Chile, Colombia, Scotland and USA. *Cognitive Development*, 53, 100845. <https://doi.org/10.1016/j.cogdev.2019.100845>
- Feeney, M. (2017a). *Rebuilding the landscape of psychological understanding after the mindreading war*. Advance online publication. https://doi.org/10.13128/Phe_Mi-21113
- Feeney, M., & Garofoli, D. (2017). The biocultural emergence of mindreading: Integrating cognitive archaeology and human development. *Journal of Cultural Cognitive Science*, 1(2), 89–117. <https://doi.org/10.1007/s41809-017-0008-0>
- Feeney, M., & Zawidzki, T. W. (2016). Action understanding in infancy: Do infant interpreters attribute enduring mental states or track relational properties of transient bouts of behavior? *Studia Philosophica Estonica*, 9(2), 237–257.
- Feeney, M., & Zawidzki, T. W. (2020). *The origins of mindreading: How interpretive socio-cognitive practices get off the ground*. *Synthese*. Advance online publication. <https://doi.org/10.1007/s11229-020-02577-4>
- Fiebig, A. (2019). In defense of pluralist theory. *Synthese*, 165(1), 13. <https://doi.org/10.1007/s11229-019-02490-5>
- Fiebig, A., & Coltheart, M. (2015). Various ways to understand other minds: Towards a pluralistic approach to the explanation of social understanding. *Mind & Language*, 30(3), 235–258. <https://doi.org/10.1111/mila.12079>
- Fodor, J. A. (1975). *The language of thought. The language and thought series*. New York: Crowell.
- Fodor, J. A. (1981). The present status of the innateness controversy. In *Representations: Philosophical essays on the foundations of cognitive science/jerry A. Fodor*. Brighton, Harvester.
- Fodor, J. A. (1992). A theory of the child's theory of mind. *Cognition*, 44(3), 283–296. [https://doi.org/10.1016/0010-0277\(92\)90004-2](https://doi.org/10.1016/0010-0277(92)90004-2)
- Ford, K. M., & Pylyshyn, Z. W. (1996). The robot's dilemma revisited: The frame problem in artificial intelligence. In Kenneth M. Ford & Zenon Pylyshyn. *Theoretical issues in cognitive science*. Norwood, NJ: Ablex Pub.
- Furrow, D., Moore, C., Davidge, J., & Chiasson, L. (1992). Mental terms in mothers' and children's speech: Similarities and relationships. *Journal of Child Language*, 19, 617. <https://doi.org/10.1017/S0305000900011594>, 03.
- Gallagher, S. (2001). The practice of mind: Theory, simulation or primary interaction? *Journal of Consciousness Studies*, 8(5–7), 83–108.
- Gallagher, S. (2008). Direct perception in the intersubjective context. *Consciousness and Cognition*, 17(2), 535–543. <https://doi.org/10.1016/j.concog.2008.03.003>
- Gallagher, S. (2015). The new hybrids: Continuing debates on social perception. *Consciousness and Cognition*, 36, 452–465. <https://doi.org/10.1016/j.concog.2015.04.002>
- Geertz, C. (1973). *The interpretation of cultures; selected essays*.
- Gola, A. H. (2012). Mental verb input for promoting children's theory of mind: A training study. *Cognitive Development*, 27(1), 64–76. <https://doi.org/10.1016/j.cogdev.2011.10.003>
- Golding, S. D., Pappas, M. H., Barnhart, A. S., Hansen, W. A., & Hout, M. C. (2016). The poverty of embodied cognition. *Psychonomic Bulletin & Review*, 23(4), 959–978. <https://doi.org/10.3758/s13423-015-0860-1>
- Goldman, A. I. (2008). *Simulating minds: The philosophy, psychology, and neuroscience of mindreading. Philosophy of mind*. Oxford, New York: Oxford University Press.
- Gopnik, A. (2003). The theory theory as an alternative to the innateness hypothesis. In L. M. Antony, & N. Hornstein (Eds.), *Philosophers and their critics. Chomsky and his critics* (pp. 238–254). Malden, MA: Blackwell Pub. <https://doi.org/10.1002/9780470690024.ch10>
- Gopnik, A. (2011). The theory theory 2.0: Probabilistic models and cognitive development. *Child Development Perspectives*, 5(3), 161–163. <https://doi.org/10.1111/j.1750-8606.2011.00179.x>
- Gopnik, A., & Wellman, H. M. (1992). Why the child's theory of mind really is a theory. *Mind & Language*, 7(1–2), 145–171. <https://doi.org/10.1111/j.1468-0017.1992.tb00202.x>
- Groome, D., & Brace, N. (2014). *An introduction to cognitive psychology: Processes and disorders* (3rd ed.). London, New York: Psychology Press, Taylor & Francis Group.
- Gut, A., Hryniewska, J., Pejda, K., Mirski, R., & Stoch, N. (2019). Body and mind: Comparative research on mentalistic conceptualization in Poland and China. In B. Duda, R. Kiełtyka, & E. Konieczna (Eds.), *Studies in linguistic, anglophone literatures and cultures* (pp. 70–92). Peter Lang.
- Helming, K. A., Strickland, B., & Jacob, P. (2014). Making sense of early false-belief understanding. *Trends in Cognitive Sciences*, 18(4), 167–170. <https://doi.org/10.1016/j.tics.2014.01.005>
- Helming, K. A., Strickland, B., & Jacob, P. (2016). Solving the puzzle about early belief ascription. *Mind & Language*, 31(4), 438–469. <https://doi.org/10.1111/mila.12114>
- Heyes, C. (2014). Submentalizing: I Am not really reading your mind. *Perspectives on psychological science. A Journal of the Association for Psychological Science*, 9(2), 131–143. <https://doi.org/10.1177/1745691613518076>
- Heyes, C. (2018). *Cognitive gadgets: The cultural evolution of thinking*. Cambridge Massachusetts: The Belknap Press of Harvard University Press.
- Hughes, C., Devine, R. T., Ensor, R., Koyasu, M., Mizokawa, A., & Lecce, S. (2014). Lost in translation?: Comparing British, Japanese, and Italian children's theory-of-mind

- performance. *Child Development Research*, 2014(6), 1–10. <https://doi.org/10.1155/2014/893492>
- Human Development Special Issue. (1992). The age 4 transition [special issue]. *Human Development*, 35(3).
- Hutto, D. D. (2008). *Folk psychological narratives: The sociocultural basis of understanding reasons/daniel D. Hutto*. Cambridge, Mass., London: MIT Press.
- Hutto, D. D., & Myin, E. (2013). *Radicalizing enactivism: Basic minds without content/daniel D. Hutto and erik Myin*. Cambridge, MA: MIT Press.
- Hutto, D. D., & Myin, E. (2017). *Evolving enactivism: Basic minds meet content*. Cambridge Massachusetts: MIT Press.
- Ilgaz, H., & Allen, J. W. P. (2020). (Co-)Constructing a theory of mind: From language or through language? *Synthese*, 78(3), 1–22. <https://doi.org/10.1007/s11229-020-02581-8>
- Kammermeier, M., & Paulus, M. (2017). Do action-based tasks evidence false-belief understanding in young children? *Cognitive development. Advance online publication*, 46, 31–39. <https://doi.org/10.1016/j.cogdev.2017.11.004>
- Kempson, R., Cann, R., Gregoromichelaki, E., & Chatzikiyriakidis, S. (2016). Language as mechanisms for interaction. *Theoretical Linguistics*, 42(3–4), 1. <https://doi.org/10.1515/tl-2016-0011>
- Kempson, R., Cann, R., Gregoromichelaki, E., & Chatzikiyriakidis, S. (2017). Action-based grammar. *Theoretical Linguistics*, 43(1–2), 643672. <https://doi.org/10.1515/tl-2017-0012>
- Kloo, D., Kristen-Antonow, S., & Sodian, B. (2019). Progressing from an implicit to an explicit false belief understanding: A matter of executive control? *International Journal of Behavioral Development*, 85. <https://doi.org/10.1177/0165025419850901>, 0165025419850901.
- Kobayashi, C., Glover, G. H., & Temple, E. (2006). Cultural and linguistic influence on neural bases of 'Theory of Mind': An fMRI study with Japanese bilinguals. *Brain and Language*, 98(2), 210–220. <https://doi.org/10.1016/j.bandl.2006.04.013>
- Kulke, L., Duhn, B., von Schneider, D., & Rakoczy, H. (2018). Is implicit theory of mind a real and robust phenomenon? Results from a systematic replication study. *Psychological Science*, 29(6), 888–900. <https://doi.org/10.1177/0956797617747090>
- Kulke, L., Reiß, M., Krist, H., & Rakoczy, H. (2017). *How robust are anticipatory looking measures of theory of mind? Replication attempts across the life span*. *Cognitive Development. Advance online publication*. <https://doi.org/10.1016/j.cogdev.2017.09.001>
- Kuo, Z.-Y. (1967). *The dynamics of behavior development: An epigenetic view*. New York: Random House.
- Lavelle, J. S. (2019). The impact of culture on mindreading. *Synthese*, 87(3), 1–24. <https://doi.org/10.1007/s11229-019-02466-5>
- Legros, S., & Cislighi, B. (2020). Mapping the social-norms literature: An overview of reviews. *Perspectives on psychological science. A Journal of the Association for Psychological Science*, 15(1), 62–80. <https://doi.org/10.1177/1745691619866455>
- Leslie, A. M., Friedman, O., & German, T. P. (2004). Core mechanisms in "theory of mind". *Trends in Cognitive Sciences*, 8(12), 528–533. <https://doi.org/10.1016/j.tics.2004.10.001>
- Levinson, S. C. (2016). Turn-taking in human communication—origins and implications for language processing. *Trends in Cognitive Sciences*, 20(1), 6–14. <https://doi.org/10.1016/j.tics.2015.10.010>
- Lewis, D. K. (2002). *Convention: A philosophical study* [1969]. Oxford: Blackwell.
- Lewis, S., Hacquard, V., & Lidz, J. (2012). The semantics and pragmatics of belief reports in preschoolers. *Semantics and Linguistic Theory*, 22, 247. <https://doi.org/10.3765/salt.v22i0.3085>
- Lillard, A. S. (1998). Ethnopsychologies: Cultural variations in theories of mind. *Psychological Bulletin*, 123(1), 3–32. <https://doi.org/10.1037/0033-2909.123.1.3>
- Lomas, T. (2018). *Translating happiness: A cross-cultural lexicon of well-being*. Cambridge, Massachusetts: The MIT Press.
- Luhmann, T. (2011). Towards an anthropological theory of mind. *Journal of the Finnish Anthropological Society*, 36, 5–69.
- Mayer, A., & Träuble, B. (2012). Synchrony in the onset of mental state understanding across cultures?: A study among children in Samoa. *International Journal of Behavioral Development*, 37(1), 21–28. <https://doi.org/10.1177/0165025412454030>
- McMurray, B. (2007). Defusing the childhood vocabulary explosion. *Science (New York, N.Y.)*, 317(5838), 631. <https://doi.org/10.1126/science.1144073>
- Meltzoff, A. N., & Gopnik, A. (2013). Learning about the mind from evidence: Children's development of intuitive theories of perception and personality. In S. Baron-Cohen, H. Tager-Flusberg, & M. Lombardo (Eds.), *Understanding other minds: Perspectives from developmental social neuroscience*/edited by Simon baron-cohen, helen tager-flusberg and Michael Lombardo (3rd ed., pp. 19–34). <https://doi.org/10.1093/acprof:oso/9780199692972.003.0002>
- Michael, J., Christensen, W., & Overgaard, S. (2014). Mindreading as social expertise. *Synthese*, 191(5), 817–840. <https://doi.org/10.1007/s11229-013-0295-z>
- Milligan, K., Astington, J. W., & La Dack. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. *Child Development*, 78(2), 622–646. <https://doi.org/10.1111/j.1467-8624.2007.01018.x>
- Millikan, R. G. (1984). *Language, thought, and other biological categories: New foundations for realism*. Cambridge, Mass: MIT Press. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=49593>.
- Millikan, R. G. (1995). *White queen psychology and other essays for Alice (2. print)*. A Bradford book. Cambridge, Mass: MIT Press.
- Minnesota reading Corps website. Retrieved from <https://minnesotareadingcorps.org/>, (2020, March 23).
- Mirski, R., & Bickhard, M. H. (2019). Encodingism is not just a bad metaphor. *Behavioral and Brain Sciences*, 42, e237. <https://doi.org/10.1017/S0140525X19001286>
- Mirski, R., Bickhard, M. H., Eck, D., & Gut, A. (2020). Encultured minds, not error reduction minds. *Behavioral and Brain Sciences*, 43, e109. <https://doi.org/10.1017/S0140525X19002826>
- Mirski, R., & Gut, A. (2018). Action-based versus cognitivist perspectives on socio-cognitive development: Culture, language and social experience within the two paradigms. *Synthese*, 28(2), 96. <https://doi.org/10.1007/s11229-018-01976-y>
- Mitchell, J. P., Macrae, C. N., & Banaji, M. R. (2006). Dissociable medial prefrontal contributions to judgments of similar and dissimilar others. *Neuron*, 50(4), 655–663. <https://doi.org/10.1016/j.neuron.2006.03.040>
- Morton, A. (1996). Folk psychology is not a predictive device. *Mind*, 105(417), 119–137. <https://doi.org/10.1093/mind/105.417.119>
- Nelson, K. (1986). *Event knowledge: Structure and function in development*. Hillsdale, NJ: Erlbaum.
- Nelson, K. (2007). *Young minds in social worlds: Experience, meaning, and memory/Katherine Nelson*. Cambridge, Mass., London: Harvard University Press.
- Nelson, K., & Bruner, J. S. (2006). Narratives from the crib. In *University Press paperback ed (1st Harvard)*. Cambridge, Mass., London: Harvard University Press.
- Nelson, K., Plesa, D., & Henseler, S. (1998). Children's theory of mind: An experiential interpretation. *Human Development*, 41(1), 7–29. <https://doi.org/10.1159/000022565>
- Newell, A., & Simon, H. A. (2006). Computer science as empirical enquiry: Symbols and search. In J. L. Bermúdez (Ed.), *Routledge contemporary readings in philosophy. Philosophy of psychology: Contemporary readings/edited by José Luis Bermúdez and Fiona MacPherson* (pp. 407–432). London: Routledge.
- Newen, A. (2015). *Understanding others: The person model theory*. Advance online publication. <https://doi.org/10.15502/9783958570320>
- Onishi, K. H., & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science (New York, N.Y.)*, 308(5719), 255–258. <https://doi.org/10.1126/science.1107621>
- Oyama, S. (1985/2000). *The ontogeny of information*. Duke University Press. <https://doi.org/10.1215/9780822380665>
- Perez-Zapata, D., Slaughter, V. P., & Henry, J. D. (2016). Cultural effects on mindreading. *Cognition*, 146, 410–414. <https://doi.org/10.1016/j.cognition.2015.10.018>
- Perner, J., Prievaser, B., & Roessler, J. (2018). The practical other: Teleology and its development. *Interdisciplinary Science Reviews*, 43(2), 99–114. <https://doi.org/10.1080/03080188.2018.1453246>
- Piaget, J. (1954). *The construction of reality in the child* (Vol. 20). London: International library of psychology. <https://doi.org/10.1016/B978-008044490-1/50022-3> [Place of publication not identified]: Routledge; [publisher not identified].
- Piaget, J. (1971). *Genetic epistemology*. New York: Norton.
- Piaget, J. (1999) [1951]. *Play, dreams and imitation in childhood. International library of psychology* (Vol. 87). London: Routledge.
- Piaget, J., & Inhelder, B. (2000). *The psychology of the child* [1969]. New York: Basic Books.
- Polk, D. (1982). *A book called hiraeth: Longing for Wales/compiled by dora polk*. Port Talbot: Alun.
- Poulin-Dubois, D., Rakoczy, H., Burnside, K., Crivello, C., Dörrenberg, S., Edwards, K., & Ruffman, T. (2018). Do infants understand false beliefs? We don't know yet – a commentary on Baillargeon, buttelmann and southgate's commentary. *Cognitive Development*, 48, 302–315. <https://doi.org/10.1016/j.cogdev.2018.09.005>
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 1, 515. <https://doi.org/10.1017/S0140525X00076512>, 04.
- Pyers, J. E., & Senghas, A. (2009). Language promotes false-belief understanding: Evidence from learners of a new sign language. *Psychological Science*, 20(7), 805–812. <https://doi.org/10.1111/j.1467-9280.2009.02377.x>
- Reddy, V. (2018). Why engagement? In A. Newen, L. de Bruin, & S. Gallagher (Eds.), *Oxford library of psychology. The Oxford handbook of 4E cognition*. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780198735410.013.23>
- Reddy, V., Markova, G., & Wallot, S. (2013). Anticipatory adjustments to being picked up in infancy. *PloS One*, 8(6), Article e65289. <https://doi.org/10.1371/journal.pone.0065289>
- Roby, E., & Scott, R. M. (2018). The relationship between parental mental-state language and 2.5-year-olds' performance on a nontraditional false-belief task. *Cognition*, 180, 10–23. <https://doi.org/10.1016/j.cognition.2018.06.017>
- Rucińska, Z. (2020). Affordances in dennett's from bacteria to bach and back. *AVANT. The Journal of the Philosophical-Interdisciplinary Vanguard*, 11(2). <https://doi.org/10.26913/avant.2020.02.05>
- Ruffman, T., Puri, A., Galloway, O., Su, J., & Taumoepeau, M. (2018). Variety in parental use of "want" relates to subsequent growth in children's theory of mind. *Developmental Psychology*, 54(4), 677–688. <https://doi.org/10.1037/dev0000459>
- Ruffman, T., Slade, L., & Crowe, E. (2002). The relation between children's and mothers' mental state language and theory-of-mind understanding. *Child Development*, 73(3), 734–751.
- Ruffman, T., Slade, L., Rowlandson, K., Rumsey, C., & Garnham, A. (2003). How language relates to belief, desire, and emotion understanding. *Cognitive Development*, 18(2), 139–158. [https://doi.org/10.1016/S0885-2014\(03\)00002-9](https://doi.org/10.1016/S0885-2014(03)00002-9)
- Salo, V. C., Rowe, M. L., Leech, K. A., & Cabrera, N. J. (2016). Low-income fathers' speech to toddlers during book reading versus toy play. *Journal of Child Language*, 43(6), 1385–1399. <https://doi.org/10.1017/S0305000915000550>
- Samuels, R. (2004). Innateness in cognitive science. *Trends in Cognitive Sciences*, 8(3), 136–141. <https://doi.org/10.1016/j.tics.2004.01.010>
- Savitsky, K., Keysar, B., Epley, N., Carter, T., & Swanson, A. (2011). The closeness-communication bias: Increased egocentrism among friends versus strangers. *Journal of Experimental Social Psychology*, 47(1), 269–273. <https://doi.org/10.1016/j.jesp.2010.09.005>

- Schelling, T. C. (1997). *Strategy of conflict* [1963] (2. edition). London: Harvard University, 16. printing.
- Scott, R. M., & Baillargeon, R. (2017). Early false-belief understanding. *Trends in Cognitive Sciences*, 21(4), 237–249. <https://doi.org/10.1016/j.tics.2017.01.012>
- Spaulding, S. (2018). How we understand others: Philosophy and social cognition. In *Routledge focus on philosophy* (1 edition). New York: Routledge.
- Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science*, 10(1), 89–96. <https://doi.org/10.1111/j.1467-7687.2007.00569.x>
- Stone, J. E., Carpendale, J. I. M., Sugarman, J., & Martin, J. (2012). A Meadian account of social understanding: Taking a non-mentalistic approach to infant and verbal false belief understanding. *New Ideas in Psychology*, 30(2), 166–178. <https://doi.org/10.1016/j.newideapsych.2011.09.002>
- Symons, D. K., Peterson, C. C., Slaughter, V., Roche, J., & Doyle, E. (2005). Theory of mind and mental state discourse during book reading and story-telling tasks. *British Journal of Developmental Psychology*, 23(1), 81–102. <https://doi.org/10.1348/026151004X21080>
- Taumoepau, M. (2019). Culture, communication and socio-cognitive development: Understanding the minds of others. In T. Tulviste, D. L. Best, & J. L. Gibbons (Eds.), *Children's social worlds in cultural context* (Vol. 78, pp. 41–54). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-27033-9_4
- Tompkins, V., Benigno, J. P., Kiger Lee, B., & Wright, B. M. (2018). The relation between parents' mental state talk and children's social understanding: A meta-analysis. *Social Development*, 78, 1052. <https://doi.org/10.1111/sode.12280>
- Turner, S. P. (1994). *The social theory of practices: Tradition, tacit knowledge and presuppositions/Stephen Turner*. Cambridge: Polity Press.
- Turner, S. P. (2018). *Cognitive science and the social: A primer/Stephen P. Turner (1st)*. London: Routledge.
- Vandell, D. L., & Wilson, K. S. (1987). Infants' interactions with mother, sibling, and peer: Contrasts and relations between interaction systems. *Child Development*, 58(1), 176. <https://doi.org/10.2307/1130299>
- Vinden, P. G. (1999). Children's understanding of mind and emotion: A multi-culture study. *Cognition & Emotion*, 13(1), 19–48. <https://doi.org/10.1080/026999399379357>
- Vinden, P. G. (2002). Understanding minds and evidence for belief: A study of mofu children in Cameroon. *International Journal of Behavioral Development*, 26(5), 445–452. <https://doi.org/10.1080/01650250143000391>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes/L. S. Vygotsky; edited by Michael Cole ... [et al.]; [translated from the Russian]*. Cambridge, Mass. London: Harvard University Press.
- Ward, D., Silverman, D., & Villalobos, M. (2017). Introduction: The varieties of enactivism. *Topoi*, 36(3), 365–375. <https://doi.org/10.1007/s11245-017-9484-6>
- Waxman, S., Fu, X., Arunachalam, S., Leddon, E., Geraghty, K., & Song, H.-j. (2013). Are nouns learned before verbs? Infants provide insight into a longstanding debate. *Child Development Perspectives*, 7(3). <https://doi.org/10.1111/cdep.12032>
- Weekes, D. P., Kagan, S. H., James, K., & Seboni, N. (1993). The phenomenon of hand holding as a coping strategy in adolescents experiencing treatment-related pain. *Journal of Pediatric Oncology Nursing : Official Journal of the Association of Pediatric Oncology Nurses*, 10(1), 19–25. <https://doi.org/10.1177/104345429301000105>
- Wellman, H. M. (2014). *Making minds: How theory of mind develops. Oxford series in cognitive development*. Oxford, New York: Oxford University Press.
- Wellman, H. M. (2018). Theory of mind: The state of the art. *European Journal of Developmental Psychology*, 7, 1–28. <https://doi.org/10.1080/17405629.2018.1435413>
- Wellman, H. M., Fang, F., Liu, D., Zhu, L., & Liu, G. (2006). Scaling of theory-of-mind understandings in Chinese children. *Psychological Science*, 17(12), 1075–1081. <https://doi.org/10.1111/j.1467-9280.2006.01830.x>
- Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, 75(2), 523–541. <https://doi.org/10.1111/j.1467-8624.2004.00691.x>
- Westra, E. (2017). Pragmatic development and the false belief task. *Review of Philosophy and Psychology*, 8(2), 235–257. <https://doi.org/10.1007/s13164-016-0320-5>
- Westra, E., & Carruthers, P. (2017). Pragmatic development explains the theory-of-mind scale. *Cognition*, 158, 165–176. <https://doi.org/10.1016/j.cognition.2016.10.021>
- Westra, E., & Schönherr, J. (2019). Beyond 'interaction': How to understand social effects on social cognition. *The British Journal for the Philosophy of Science*, 70(1), 27–52. <https://doi.org/10.1093/bjps/axx041>
- Wierzbicka, A. (1999). *Emotions across languages and cultures: Diversity and universals/Anna Wierzbicka. Studies in emotion and social interaction* (Second series). Cambridge: Cambridge University Press.
- Wierzbicka, A. (2005). Empirical universals of language as a basis for the study of other human universals and as a tool for exploring cross-cultural differences. *Ethos*, 33(2), 256–291. <https://doi.org/10.1525/eth.2005.33.2.256>
- Wierzbicka, A. (2006). On folk conceptions of mind, agency and morality. *Journal of Cognition and Culture*, 6(1), 165–179. <https://doi.org/10.1163/156853706776931286>
- Applications of cognitive linguistics. In Yu, N. (Ed.), *The Chinese heart in a cognitive perspective: Culture, body, and language* (Vol. 12), (2009). Berlin: Mouton de Gruyter. <https://doi.org/10.1515/9783110213348>. Retrieved from <http://reference-global.com/doi/book/10.1515/9783110213348>.
- Zawidzki, T. W. (2013). *Mindshaping: A new framework for understanding human social cognition*. Cambridge, MA: MIT Press.
- Zittoun, T., & Gillespie, A. (2015). Internalization: How culture becomes mind. *Culture & Psychology*, 21(4), 477–491. <https://doi.org/10.1177/1354067X15615809>
- Ziv, M., Smadja, M.-L., & Aram, D. (2014). Mothers' and teachers' mental-state discourse with preschoolers during storybook reading. *Journal of Cognitive Education and Psychology*, 13(1), 103–119. <https://doi.org/10.1891/1945-8959.13.1.103>