

19 Intuitive Psychology as Mind Designer: Scaffolding Cognitive Novelties in Early Childhood

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Intuitive psychology, also known as theory of mind or mindreading, has been a dynamic and expansive academic industry for almost forty years. Perhaps the most important insight of the multidisciplinary work undertaken in this area is how central and indispensable intuitive psychology is to social interactions, communication, cultural and language learning and transmission, and education. Less explored and less well understood is the crucial contribution of intuitive psychology to mental development and the very construction of the human mind. It is a contribution that takes the form of new (mostly) cognitive abilities that emerge at different stages of ontogeny and reshape the developing mind. I call this the *mind-design work* of intuitive psychology. In several past works I have explored this mind-design role of intuitive psychology in a few areas of cognitive development construed in evolutionary terms – reflexive thinking or thinking about one’s own thoughts, learning word meaning and reference, predicative thinking, self-consciousness, and imagination (Bogdan, 2000, 2001, 2007, 2009, 2010, 2013). In sampling and expanding on key themes of this prior work, this chapter discerns several mind-design patterns through which intuitive psychology, in discharging its basic functions, *scaffolds* new cognitive abilities as ontogenetic adaptations to pressures arising at distinct stages of childhood.

The basic idea is this. The business of intuitive psychology is to register, represent, and interpret mental states of oneself and of others (cognitive component) and, as a result, guide appropriate reactions by way of thought, speech, and action, as part of one’s goal-pursuing strategies (practical component). It is on the latter *practical* side, when in new domains children face new pressures on their actively initiated and pursued goal strategies, that the expertise of intuitive psychology is recruited to provide adaptive solutions that gradually end up scaffolding new cognitive abilities. The scaffolding follows several patterns that I call templates, matrices, assemblies, escalators and infrastructures. The earliest such scaffoldings, discussed below, occur in domains that generate some of the strongest pressures on young minds, such as meaning-based communication, learning word reference and mastering predicative communication and thinking.

The first part of the chapter provides a theoretical background for this basic idea. It introduces a certain conception of intuitive psychology and explains its mind-

design potential, when its categories and abilities operate in mental rehearsals of goal strategies as scaffolders of new cognitive abilities. Several patterns of scaffolding in infancy and early childhood are then identified and briefly examined and illustrated in the second part of the chapter.

Theoretical Background

About Intuitive Psychology

If there is one feature shared by all organisms, it is their pursuit of goals, which I construe as the ability to aim at and bring about mostly external states of affairs that satisfy basic internal parameters such as homeostasis, metabolism, reproduction, defense, and more. In the interactions among and within species, it is also vital for organisms to *recognize* that other organisms are alive and pursue goals by acting accordingly. We may call this cognitive ability *intuitive biology*. Its importance resides in the fact that any major evolutionary advance in social cognition and (more narrowly) intuitive psychology is driven by the pressures to recognize and react to the goals of other organisms by representing and inferring them from various signals and symptoms: behavioral, communicational, and mental (Bogdan, 1994, 1997).

Building on their intuitive biology, a few intensely sociopolitical species (primates, elephants, dolphins) are also able to represent the *specific* goals and world-relations of others, and predict their actions, from a few overt signals and symptoms. This new cognitive ability may be called *intuitive teleology*. It represents and tracks the crude, observable agency of other organisms by recognizing their gaze, head and bodily posture, and direction of behavior, as well as what they perceive and know, and what they ignore (Bogdan, 1997, p. 71–84). We can think of intuitive teleology as joining a strict behaviorism and a minimal epistemology, both limited to what is observable about other organisms' behaviors and their overt relations to an environment. Missing in intuitive teleology is an awareness of the *mental* sources of those behaviors and relations (Bogdan, 1997, 2000; Csibra and Gergely, 2013; Gergely and Csibra, 2003; Tomasello and Moll, 2013).

Apparently only one species, the human one, shows awareness of *mental* states, such as attention, desires, beliefs, intentions, and emotions, and an ability to factor this awareness into its representing, predicting, and reacting to others. This new mind-sensitive competence is variously called intuitive psychology, mindreading, or theory of mind. Labels do not matter much as long as they simply name a competence or expertise, without further bias. Unfortunately two of these labels are much too suggestive and tend to bias the theorizing. Both mindreading and theory of mind suggest too passive a competence whose job is merely to represent and infer mental states. That is only half of the truth; there is, just as importantly, a practical, reactive, and action-guiding side to the competence. Furthermore, both mindreading and theory of mind are often applied to nonhuman species that do not and cannot detect and track mental states and are only capable of intuitive teleology

and merely behavior-sensitive social cognition. Finally, the “theory” in “theory of mind” does not quite fit the procedural and skill-like nature of a good part of the human competence under discussion, particularly in its early ontogenetic stages. Hence, I prefer *intuitive psychology* for being less misleading and also in terminological tune with the popular labels of other functionally dedicated and domain-specific competencies attributed to humans and a few other species, such as intuitive physics, intuitive biology, or intuitive arithmetic.

Two major features of intuitive psychology, as I construe it, are particularly relevant to the argument of this chapter. The first concerns its tripartite constitution, the second its practical character and orientation.

Constitutionally, I think, intuitive psychology is not one single and unitary competence, maturing organically out of an embryonic and genetically dedicated core, but actually three fairly distinct though overlapping competencies, developing at distinct stages of ontogeny, with largely different (though, again, overlapping) domains of application and modes of operation, in response to ontogenetically distinct selection pressures. If we think of ontogeny in evolutionary terms, as we should (Bjorklund & Pellegrini, 2002, 2007; Bogdan, 1997, 2000, 2010; Nelson, 1996), these three competencies can then be regarded as distinct sets of ontogenetic adaptations.

What follows is a brief introduction to the three competencies, to be further elaborated and illustrated in the second part of the chapter, when we turn to their impact on mental development.

In early infancy, the first intuitive-psychological competence is exercised *bilaterally* in communication and overt exchanges of mainly affects, emotions, and intents to interact or socialize (Hobson, 1993; Meltzoff, 2013; Trevarthen, 1993, 2011). This is an extraordinary initial platform for intuitive psychology, since it provides infants with an incipient and implicit but very consequential *sense of the mental* in others, which detects and tracks *invariant* patterns behind various overt expressions of them (Bogdan, 2000, 2001, 2009). Mother, for example, can show joy (the mental invariant), which the infant detects through its various overt expressions, such as singing, lively eyes, smile, exuberant gestures, and so on. The point is not that infants know or are explicitly aware of mental states, but rather that they are primed to recognize and react to a common factor behind a variety of manifestations. Such is the entry of the mental in infant (and thus human) social cognition, turning it (likely for the first time in evolution) into an intuitive psychology.

This initial and exclusively bilateral grasp of the mental in others is an exclusively ontogenetic achievement, due to evolutionary pressures specific and possibly unique to human infancy. If intuitive psychology builds on and expands this infantile sense of the mental, and in so doing also redesigns a primate mind into a human one, as I argue here and elsewhere, then the human mind can be said to be the *evolutionary* (and not just maturational) product of a unique ontogeny. This building-on and expansion process occurs because the infantile sense of the mental in others is factored into as well as amplified by the successor competencies of intuitive psychology (Bogdan, 2009, 2010, 2013).

In a second stage of ontogeny, extending from late infancy to around age four, children develop a new competence to detect, represent, and react to the *world-oriented* mental states of others, and only of others, such as seeing, attending, simple desires, visually based beliefs, trying to do something, and the like. They also recognize when someone else has perceptual knowledge and when they are ignorant (i.e., lacking such knowledge) (Doherty, 2009; Perner, 1991). Some of these recognition abilities are also present in chimpanzees (their intuitive teleology, actually) but without a grasp of the *mental* component of world-directed states and actions. This asymmetry suggests that the initially bilateral infant sense of the mental is an evolutionary novelty that would later enable older children to engage in shared attention and joint action, in which two or more individuals interact in a shared world through a mutually acknowledged recognition of such trilateral or multilateral interactions – something that apes and other species apparently cannot do (Tomasello, 1999; Tomasello and Moll, 2013). I call this second competence *naïve psychology*. Its grasp of the mental is only *other*-directed and still dependent on its *overt* expressions. One's own mind is not yet explicitly on the radar of the young naïve psychology (Bogdan, 2010).

In a third stage, after the age of four, children develop a competence to represent, reason about, and react to subtler, conceptually networked, and not always overtly displayed attitudes, such as intentions, opinions, perspectives different from one's own, plans, complex emotions (e.g., hope, regret), and the like, of both other people and themselves. I call this third competence *commonsense psychology*. Dissenting from a widely shared view, I think that only older children (4 years or above), turn commonsense psychology toward their own minds and begin to represent their own thoughts and attitudes in the same (common or publicly shared) terms and under the same concepts as they represent those of others. Commonsense psychology is made possible by new post-four executive developments, such as inhibition, top-down control, a capacious working memory, offline thinking, and more, as well as cognitive developments, particularly metarepresentation, perspective-taking, and a suppositional stance. There is fairly solid evidence that I read as indicating that these latter cognitive abilities develop first in representing other minds before turning to one's own (Bogdan, 2010).

Parenthetically, but importantly, I think that commonsense psychology is ontogenetically the first and only competence that remotely resembles an intuitive "theory of mind" literally construed as concerned with understanding, explaining, justifying, and rationalizing the mental states and actions of others and oneself (concerns absent in earlier versions of intuitive psychology) and capable of representing mental states through well-integrated and flexibly deployed networks of concepts under systematic generalizations (Gopnik and Wellman, 1992). Projecting, even by weakening and miniaturizing, this late "theory of mind" back on earlier forms of intuitive psychology, and assuming a linear, organic, and merely maturational development of the former out of the latter, has been (in my view) an unnecessary and empirically unsupported position that violates the evolutionary dimensions of ontogeny and the significant reorganizations of young minds and their intuitive psychology.

Closer to our topic, this mistake also obscures the distinct mind-design contributions of the distinct competencies of intuitive psychology. This is because an important difference between the three versions of intuitive psychology, with implications for their mind-design work, is the nature and *modus operandi* of their respective abilities, both largely determined by the selection pressures of different stages of ontogeny.

Infancy is mostly about bilateral adult–offspring co-regulation, protection, and survival, and early childhood mostly a world-oriented, well-scheduled, and fairly tightly constrained initiation into language, regimented communication, basic cultural practices, and joint activities – all universal values strongly imprinted epigenetically in the species. This is why, not surprisingly from an evolutionary angle, the intuitive psychologies of infancy and early childhood are mostly procedural and implicitly formatted skills, whereas the later commonsense psychology leans much more on publicly shared concepts, explicit representations, and inference (Aperly 2010; Bogdan, 1997; Karmiloff-Smith, 1992).

This contrast suggests that the intuitive psychologies of infancy and early childhood result from a fairly tight co-evolution of a complex epigenetic bargain between what infant and young minds evolved to expect and are able to assimilate, on the one hand, and how adult parental and cultural practices in turn evolved to co-regulate, assist, and enculturate those developing minds, on the other hand. As telling examples, think of the unreflective spontaneity with which adults engage infants in baby talk or “motherese,” to which infants respond equally spontaneously yet not imitatively, or a similar kind of spontaneous reciprocal interaction, this time imitative, in shared attention and joint actions. Both examples testify to evolved procedural and unreflective mechanisms in both parties. Understanding this co-evolutionary adjustment is still work in progress, as far as I can tell.

As intuitive psychology pursues its ontogenetic evolution and simultaneously its mind-design work, the inevitable impact of parental and cultural variability is bound to grow, as many studies have shown (summarized in Banaji and Gelman, 2013; Bjorklund, 2011; Nelson, 1996, 2007). This also makes evolutionary sense and reflects a more flexible co-evolutionary process than that of infancy and early childhood. Indeed, to become and remain successful, older children must inevitably adapt to the immense diversity of languages, cultures, and even civilizational stages that characterize human societies. As a result, more than its ontogenetic precursors, the commonsense psychology of late childhood and adulthood evolved to handle these diversities more flexibly, explicitly, and reflectively, with differential impact on how distinct genders or even ethnic groups, for example, perform some intuitive-psychological tasks, such as empathizing or figuring out complex emotions, or cognitive tasks, such as gossip, narration, or autobiographical recall – all deeply dependent on intuitive psychology (see Banaji and Gelman, 2013, for a review).

Despite their evolutionary and operational distinctness, what the three competencies have in common functionally, what makes them *psychological*, is (a) that they all recognize and track *mental* states behind their overt expressions, either minimally and in a mostly implicit (procedural) form in the first two versions or more probingly in an explicit (representational) form in the third version; and (b) that the successor

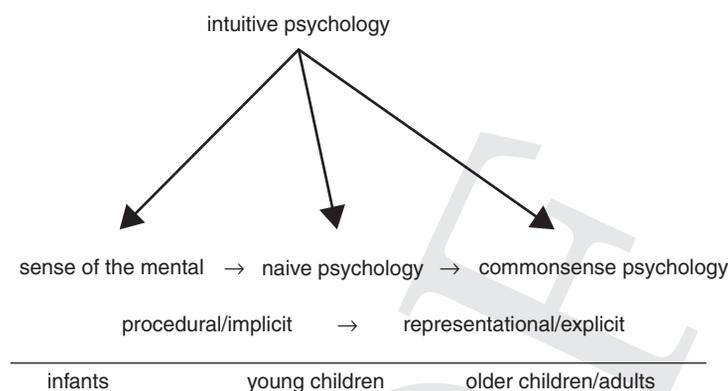


Figure 19.1. *Intuitive psychology*

competencies incorporate, retool, and build on earlier acquisitions, perhaps through the “representational redescription” advocated by Annette Karmiloff-Smith (1992) and/or some internally operating scaffolding and assembly, along the lines suggested here, or some other appropriation process. Schematically, the picture of intuitive psychology drawn so far can be diagrammed as shown in Figure 19.1.

The second major feature of intuitive psychology relevant to what follows is this. Intuitive psychology is sensitive not only to how a mind relates to other minds and/or targets in the world, but also to the *affordances* or *implications* of such relations – mental, communicational, or behavioral – as grounds for action, reaction, and intervention. Far from being spectatorial, “theoretical,” or merely “simulational,” as most popular accounts assume, intuitive psychology is eminently practical, forward-looking, interventionist, and interested in, as well as shaped by, the implications and affordances for action or communication of the mental states it represents. In all its ontogenetic versions, intuitive psychology is a practically motivated set of abilities, and it evolved for this very reason. Natural and other forms of selection would not have it any other way (Bogdan, 1997). This critical point, all too often neglected, is crucial when examining the work of intuitive psychology as mind designer and its resulting impact on mental development, since that work and its impact emerge precisely on the practical side of the exercise of intuitive psychology, as noted next.

Rehearsing With Mental States

My conjecture is that the mind-design potential of intuitive psychology emerges on the practical or application side of intuitive psychology, when children rehearse mentally with representations of mental states in new domains they perceive as similar, close, or relevant to that of intuitive psychology. I will parse this conjecture in terms of its basic components. I begin with mental rehearsals.

As has become clear in recent years, brains are *projection engines* that anticipate states of the world, sensory inputs, and impending actions on the basis of prior

expectations, habits, and accumulated experiences, and do so either automatically or deliberately. Such projections operate spontaneously and constantly, whether in sleep, dreaming, under anesthesia, in mind wandering, or in voluntary thinking (Hohwy, 2014). The mental projections of interest here operate either online, immediately preceding motor actions or various reactions (communicational, emotive, etc.), or offline, in deliberately anticipative thinking.

The mental projections with intuitive-psychological categories, representations, and schemes are *metamental* since the projecting states, themselves mental, are about or directed at other mental states, of other people and oneself – which means “mental about or involving mental,” or, in short, “metamental.” The metamental projections of interest here are most often conscious and voluntary, whether online, in infancy and early childhood, or offline, in late childhood and adulthood. When complex in structure and deployed sequentially and inferentially, such projections take the form of *metamental rehearsals* (Bogdan, 2007, 2010, 2013).

When the categories, representations, and schemes of intuitive psychology (which constitute its cognitive component) enter into metamental rehearsals that guide one’s goal strategies and actions (which is the practical component) opportunities emerge for scaffolding new cognitive abilities. These opportunities become mental reality if and when at least two key conditions obtain:

- (a) *subjectively*, children *perceive* an initial similarity, overlap, or proximity between the domain of intuitive psychology and a new domain, and hence perceive new challenges in the new domain as (more or less) *variations on familiar intuitive-psychological themes*; as a result, children’s minds are prone to and likely to recruit familiar intuitive-psychological resources for new, stable, and routinized deployments in their online or offline rehearsals of goal strategies in the new domain, thus incorporating the intuitive-psychological resources into new cognitive capacities
and
- (b) *objectively*, between intuitive-psychological abilities recruited by children’s minds in their metamental rehearsals and the new cognitive capacities thus scaffolded in new domains, there is actually an *initial similarity* or *close proximity* of cognitive resources, modes of operation, and developmental schedules.

When these two key conditions are met, children’s metamental rehearsals can be said to “mentalize” facts and patterns in new domains, such as those of communication, social interaction, and joint action, and often even in physical or biological domains as well as the cultural domains of artifacts, legends, and religion. As understood here, to “mentalize” is to represent facts and patterns in new domains in terms of mind-to-mind, mind-to-world, or mind-to-targets – or, in philosophical jargon, “intentional” relations. (The idea of mentalizing echoes in developmental and more general terms the well-known notion of “intentional stance” proposed by Dan Dennett many years ago as an explanatory and predictive strategy of (what is called here) commonsense psychology (Dennett, 1971)).

We can then say that the potential of intuitive psychology to scaffold new cognitive capacities derives from the propensity of children as intuitive

psychologists to meet new challenges in new domains by mentalizing key aspects in those domains – that is, by representing them in terms of mind-to-mind and mind-to-target relations. Mentalization is what “exports” intuitive-psychological abilities to new cognitive capacities in new domains through scaffolding. If and when such mentalizations come under strong and persistent pressures to become mental skills or routines, the way is open to the scaffolding of new cognitive abilities in new domains, as argued in the second part of this chapter. Several patterns of such scaffoldings are briefly introduced next and illustrated later.

Patterns of Scaffolding

I use the notion of *scaffolding* in its original (dictionary) sense of an initial platform and basic skeleton of a building, which serves as the support and framework for further additions and enrichments. A scaffold may end up incorporated in the much-enriched and diversified building as final result or may be partly or entirely discarded as the construction expands its structure yet retains the shape of the scaffold. In the present context, the scaffolding is done by intuitive psychology and the final building is a set of novel cognitive competencies. The well-known Vygotskian notion of scaffolding by adults guiding children to a higher level of performance compatible with their potential is about improving a competence, whereas the more basic notion used here is about building a competence to begin with. The ability of intuitive psychology to scaffold new cognitive competencies through mentalization seems to follow several patterns, which I call template, matrix, assembly, escalator, and infra-structural scaffolding. They will be elaborated and illustrated in the next sections, after the following brief and informal definitions.

A *template* is an intuitive-psychological category or ability that is copied or emulated by a new category or ability operating in a new domain. Analogies and metaphors operate as conceptual templates. They abound in scientific thinking: the heart is almost literally represented as a pump; the planetary system provides an intuitive template for the structure of the atom; something hitting and moving something else is often an intuitive template for causation; and so on.

A *matrix* is an established inferential pattern in intuitive psychology that configures, partly or completely, a new inferential pattern in a new domain. Matrices are frequent in ordinary thinking, often by linking distinct templates, as for example in understanding natural phenomena in terms of what the gods are doing and then understanding the latter in terms of people’s intentions and actions. (The latter understanding is an instance of mentalization.)

An *assembly* joins several abilities and categories in old domains to scaffold a new ability or category in a new domain. Reading and writing are examples of new abilities in new behavioral domains assembled out of prior visual, motor, memory, and conceptual abilities initially evolved or developed in other domains. Children’s categories of right and wrong and other moral values, for example, are initially assembled out of prior and simpler categories they understand, such as “everybody does it,” “it would displease father” or “displease the gods,” or the like.

An *escalator* is a sequence of mental developments partly or entirely scaffolded by intuitive psychology along an ontogenetic sequence shaped by its advances. Differently said, an escalator operates along an ontogenetic staircase (so to speak) in which every important new step forward is made possible by a prior step largely or entirely shaped by earlier intuitive-psychological categories and abilities. As noted below, word acquisition is made possible by a prior platform of shared attention, which in turn is made possible by a still-earlier platform of recognition of gaze and pointing and their mental components (intent, interest, curiosity). Both platforms, as earlier steps, belong to intuitive psychology.

Finally, *infrastructural scaffolding* is at work whenever an initial competence – call it *incubator competence* – with its proprietary domain and tasks, provides an infrastructure or skeleton that is later enriched, diversified, and integrated with other competencies, and applied to new domains, the result being an *outcome competence*. Elsewhere, I argued that imagination (in a strong suppositional sense) is likely to have been infrastructurally scaffolded by the prior and more basic competence of strategizing (or thinking how to get the best results) in cooperative and competitive contexts of social interactions (Bogdan, 2013). In the same spirit, reasoning was theorized to have been infrastructurally scaffolded by the prior and more basic ability to evaluate arguments and evidence in communication (Mercier and Sperber, 2011).

The scaffolding strategies and nature of the scaffolded abilities are a function of the relevant resources operating in a particular intuitive-psychological competence at a given stage of ontogeny. This is to say that children mentalize in new domains and as a result develop (through scaffolding) new cognitive capacities at a given age-interval to the extent allowed and enabled by the mentalizing resources of the relevant competence of intuitive psychology. For reasons of space, I will illustrate this process only with some examples from infancy and early childhood.

Scaffolding Through Mentalization

Gricean Scaffolding: Sense of Mental → Meaning

As a reminder, a *sense of the mental* is an infant's bilateral grasp of "mental invariants" – initially mostly affects, emotions, and motives – detected behind a variety of overt expressions, such as facial, vocal, bodily, and gestural. This sense of the mental operates implicitly and procedurally in interactive and communicative acts exchanged between infants and adults (Adamson, 1995; Hobson, 1993; Trevarthen, 1993, 2011).

The major scaffolding contribution of this infantile ability is a grasp of communicative intent and of the reciprocal intent-recognition-and-acknowledgment loop that would become the *matrix* for producing and registering bilateral meaning, in a Gricean sense that I read in developmental and pre-linguistic terms as follows (where capital letters indicate the scaffolding intuitive-psychological categories and abilities and bold letters indicate the new scaffolded abilities):

- i) communicators **mean** something by an act → is scaffolded by → communicators INTEND the act to produce a mental effect (e.g., attention, emotion, belief) in an audience by means of the audience's RECOGNITION of this INTENT (to produce the mental effect in question) and ACKNOWLEDGMENT of this RECOGNITION (original text: Grice, 1957; developmental accounts: Bogdan, 2009; Bruner, 1983; Tomasello, 1999)
- (ii) communicative acts **mean** something → is scaffolded by → communicators **mean** something

This is a two-steps scaffolding enterprise. The first ontogenetic step, which is scaffolding a communicator's meaning in (i), is managed by an *assembly* of intuitive-psychological categories and abilities exercised bilaterally, namely, an *intent* to produce a mental state + *recognition* of that intent + *acknowledgment* of the recognition. The result is the initial *matrix of meaning*, as we may call it. The second step, in (ii), is a transfer from people meaning something to communicative acts and expressions, including words, meaning something, whereby the former (people) meaning becomes a *template* for the latter (acts) meaning. Three scaffolding strategies are at work here – assembly, template, and matrix.

The intuitive-psychological assembly and the resulting matrix in (i) are an indispensable ladder that enables infants to grasp personalized communicative meanings, before being discarded and replaced by impersonal and “fossilized” meanings attached to gestures, words, and utterances. As a skill installation, this process is not that different from impersonal routines, such as writing or driving, that eventually replace the initial personal instruction provided by scaffolding teachers and for a while may be literally remembered and rehearsed as the teachers instructed.

The earliest communicative exchanges between infants and adults are bilateral, face-to-face: this is the *initial domain* in which infantile intuitive psychology operates. Yet later on infants recognize the bilateral meaning of an expression of a mental state, even when the expression is decoupled from the physical presence of the adult; the gesturing mother may look elsewhere or vocalize from another room but in ways perceived by the infant as similar to those displayed in face-to-face communication. Such meaning-conveying but decoupled expressions as communicative acts constitute a *new domain* handled by infants in their comprehension mode with the *same* intuitive-psychological abilities initially used in face-to-face communication (old domain). In the production mode, involving metamental rehearsals and goal strategies, an infant's *intent* to catch an adult's attention and initiate communication may recruit the memory of a decoupled expression (gesture, vocalization) and project it online to *mean* “intent to communicate it” and expect the adult to recognize this intent and acknowledge the recognition (completing the bilateral meaning loop).

In sum, infants face a new challenge in a *new domain* when they have to grasp the meaning of a decoupled expression of a mental state in indirect (not face-to-face) communication. As subjectively perceived by infants, there is a close *proximity* or overlap of the domains involved (face-to-face interaction versus indirect communication). Furthermore, objectively, the *same intuitive-psychological resources* are

employed in roughly similar ways through online metamental rehearsals servicing a goal strategy of initiating communication with or catching the attention of another person. The basic conditions of scaffolding through mentalization are met first by a matrix in which the initial sense-of-the-mental scaffolds an understanding of the bilateral meaning of a communicator, and then, in a fairly rapid developmental sequence, by a template that transfers the communicator's meaning to the impersonal meaning of a communicative act (Bogdan, 2009).

Scaffolding by Naïve Psychology: Shared Attention → Mastery of Word Reference

Naïve psychology is my label for the intuitive psychology operative from late infancy until around age four. Integrating the infantile bilateral sense of the mental, naïve psychology represents and reacts to the mostly visible, concrete, and behaviorally or verbally manifested mind-to-target relations of other people, as displayed in seeing, attending, simple desires, visually based beliefs, shared attention, and joint action (Apperly, 2010; Doherty, 2009; Perner, 1991; Tomasello, 1999). I will focus on what is perhaps the most momentous scaffolding in early childhood – namely, understanding word reference by way of shared attention. This, I think, is done in three major steps (Bogdan, 2009).

First step: a sense of co-referential intent in shared attention. The typical scenario operates roughly as follows. In a communication context, adult or child intends to refer through preverbal means (looks, gestures, vocalizations) to a shared target by making the intent manifest to the other party. The latter recognizes and acknowledges the intent. This intent to refer *and* its recognition and acknowledgment, resulting in a (mutual) sense of co-reference, are *scaffolded* by the new ability to share attention, which combines (i) the naïve-psychological representation of another person's attention to targets and (ii) a prior sense of bilateral meaning of communicative acts acquired earlier in infancy. For the child, this pre-linguistic scaffolding step, leading to a sense of co-reference, occurs in the already familiar naïve-psychological *matrix* of shared attention (Bruner, 1983; Tomasello, 1999).

Second step: acquiring the ability to direct attention co-referentially. The already acquired intent to co-refer pre-linguistically through shared attention *scaffolds* as a *template* a new ability to direct attention to a shared target by way of pre-linguistic co-reference through looks, head and eye movements, and hand gestures.

Third step: words that refer. The pre-linguistic co-referential work of directing attention to a shared target in turn *scaffolds* as a *template* the ability to comprehend and produce words as referential symbols. Children are likely to treat words initially as a new sort of attention directors, hence as part of a familiar game of shared attention, before regarding them as impersonal symbols (Bates, 1976; Bogdan, 2009; Bruner, 1983; Hobson, 1993; Tomasello, 1999).

Within naïve psychology as the old domain, shared attention itself is *assembled* out of prior abilities (namely, a bilateral sense of the mental plus representation of attention as mind-to-target relation) and in turn constitutes, in the new and later-developing domain of pre-linguistic and referential communication, a *matrix* that scaffolds children's sense of co-referential intent. The latter intent in the new domain of pre-linguistic co-referential communication is then recruited and actively projected, and often rehearsed online, to drive the child's goal strategy of directing another person's attention to a shared target by way of words – a still newer domain of linguistic communication.

The scaffolding conditions are therefore met: in children's minds, the old domain of shared attention to a target of mutual interest is close to the new domain of pre-linguistic co-referential triangulation, which in turn is close to the still newer domain of linguistic co-referential communication. The mental resources involved, from looks to gestures to words, are initially treated as attention directors and derive their functions from children's naïve psychology that manages interpersonal interactions to targets of mutual interest in a shared environment. Finally, the developmental advances occur in tight succession during the second and third year of life (Bogdan, 2009).

To sum up, once capable of shared attention, the young naïve psychologists initially acquire and treat words as co-referential attention directors, as they already treated looks and pointings in prior exercises of shared attention, before word acquisition and use become impersonally fossilized and routinized. These successive scaffoldings, which embed novelties in already familiar structures through templates, matrices, and assemblies, go a long way toward explaining why and how the immensely difficult and evolutionarily unprecedented task of learning word meaning and reference is carried out so speedily and apparently effortlessly in early childhood. The young children's minds come already well equipped and prepared for this task through earlier acquisitions initially evolved for handling challenges facing their intuitive psychology.

Scaffolding by Naïve Psychology: Shared Attention → Topic-Comment Predication

In doing its work, shared attention has another momentous implication: it scaffolds a unique format of communication and thinking, that of *topic-comment predication*. It is a format that is likely to be unique to human minds and, as far as I can tell, is not intrinsic to or simply maturing out of resources for grammar, semantics, and logic. Rather, it is an outcome of naïve-psychological scaffolding through mentalization (Bogdan, 2000, 2009).

In directing attention to a shared target, as a topic of mutual interest, and having such directing recognized and acknowledged, child and adult also exchange pre-linguistic *comments*, in the form of overtly expressed emotions, vocalizations, and gestures. As words begin to replace looks, head movements, and hand gestures as co-referential attention directors to shared targets as topics of mutual interest, the comments remain for a while pre-linguistic, before being gradually replaced by

linguistic comments. The latter are likely to be *initially* viewed by young children as symbolic versions of pre-linguistic communicative interactions through shared attention (Bates, 1976; Bogdan, 2009; Tomasello, 1999). This scaffolding process can be analyzed as follows.

First step: shared attention as matrix scaffolds pre-linguistic predication.

Words as attention directors (prior acquisition) operate as shared topic fixers. When words fix targets of interest as shared topics and comments are still pre-linguistic (inherited from shared attention interactions that are recognized and acknowledged), the result is a sort of half-linguistic topical predication.

Second step: pre-linguistic comments scaffold predicate phrases.

The predicate phrases are intended, for a present or virtual audience, to add information about or reactions to a shared topic, with appropriate recognition and acknowledgment by the audience. My reading of the developmental literature is that in their earliest fully linguistic conversations with adults, once a topic is set, young children add or respond to earlier adult utterances with comments that are similar in tone and function to their pre-linguistic reactions, as comments, to shared items of interest (Bates, 1976; Bruner, 1983; Hobson, 1993; Nelson, 1996, 2007; Tomasello, 1999).

The scaffolding conditions posited by my analysis are met in this case as well: children perceive the old domain of shared attention to a target of mutual interest as similar or close to the new domain of exchanging reactive comments – first pre-linguistic and later wordy – to a shared topic. The resources employed belong initially to the infantile sense of the mental (as bilaterally shared meaning) and its successor, the young naïve psychology, in the form of shared attention, whose pre-linguistic resources become templates for the linguistically formed topics and comments. Shared attention itself becomes a matrix for early child–adult linguistic conversation. Finally, the developmental schedule for topic-comment predication overlaps with that of word acquisition by shared attention but extends into the third year of life, indicating a gradual incorporation of topic-comment predication initially based on shared attention into the emerging linguistic discourse (Bogdan, 2009).

Concluding Comments: Evolutionary Implications

I conclude with a few reasons why the mind-design work of intuitive psychology by way of scaffolding through mentalization makes evolutionary sense.

To begin with, not only does the human species rely essentially on intuitive psychology for its social and political (or competitive) interactions and cultural acquisitions and transmission, but the strongest pressures on young children – immature, helpless, and adult-dependent as they are – are also eminently social, political, and cultural. Children cannot respond and adapt to these pressures without access and reaction to the minds of others through intuitive psychology. For these

reasons alone, intuitive psychology is in a uniquely strong evolutionary position to influence mental development, particularly in domains, such as those examined in this chapter, which initially require or encourage representations of mental states. This is what I think leads to opportunities for scaffolding through mentalization.

Second, natural and other forms of selection are known to be conservative and gradualist tinkerers: they tend to handle new selection pressures by modifying minimally, and building upon, existing and reliable resources. With social-cognitive precursors in nonhuman primates and archaic humans, intuitive psychology is older and more deeply grounded in the modern human mind than the cognitive novelties it scaffolds, such as word acquisition, predicative thinking, reflexive thinking, or imagining. This historical pedigree, earlier operation, and deeper evolutionary grounding again place intuitive psychology in a good position to scaffold more recent cognitive novelties through similarities of domains, modes of operation, and mentalizing resources employed.

Third, natural and other forms of selection act on overt behavioral interactions between organisms and their worlds, so that the impact of selection is first reflected in an organism's goal strategies that guide its behaviors. If an organism is capable of advance rehearsals of its goal strategies, as human children are, then these anticipatory resources will be the first in the mind to be subject to the forces of selection. And if mental rehearsals operate with and over representations of mental states, as they do in young (and adult) intuitive psychologists, then such metamental rehearsals hold the promise of turning to new domains and new challenges, and eventually evolve new (ontogenetic) adaptations, if the new domains and challenges are perceived subjectively by children as open to mentalizing – which is precisely what happens according to the argument of this chapter.

Finally, natural and other forms of (nonsexual) selection are first and foremost operative during *ontogeny*, for a simple reason: the forces of selection operate on phenotypes, not genotypes, and the latter *become* phenotypes during ontogeny; therefore, the work of selection is done through, during, and on development, including mental. Since the strongest and most urgent pressures on young human minds are bound to be sociocultural and later sociopolitical, children cannot respond to these pressures without access and reaction to other minds, namely through intuitive psychology. But since the pressures vary across age intervals, intuitive psychology as a generic know-how will respond with different resources (subsumed under the three competencies discussed here) and those resources in turn are bound to scaffold different new cognitive capacities. In evolutionary terms, therefore, intuitive psychology has the reasons, means, and opportunities to be a powerful and far-reaching mind designer.

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