

The Ontogeny of Human Self-Consciousness

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Abstract

Self-consciousness is an essential characteristic of what it means to be human and is arguably a unique adaptation of our species. Human self-consciousness is construed here as the propensity to perceive and be aware of oneself not only for oneself, but also through the evaluative eyes of other individuals. The origins and determinants of this characteristic remain wide-open questions. I propose a developmental account and suggest possible new directions in the investigation of genetic, brain, and cultural factors that play a role in the ontogeny of human self-conscious psychology.

Keywords

self-consciousness, origins of self-consciousness, determinants of self-consciousness, development of self-consciousness, human self-consciousness

Why do only humans adorn themselves with jewels and makeup? The question is not trivial. It points to a defining feature of human psychology, which in comparison with the psychology of other animals is imbued with self-consciousness. For the purposes of the present discussion, self-consciousness is defined as the propensity to perceive and be aware of oneself not only for oneself, but also through the evaluative eyes of other individuals (i.e., the *looking-glass self*, a term introduced by Cooley, 1902). Self-consciousness is essential to what it means to be human, and is arguably a unique adaptation of our species.

Self-consciousness is a mechanism that could be relatively primary. It is potentially a precondition to many unique adaptive features put forth by various theories—old and new—on human evolution and what it means to be human. Some five centuries ago, for example, Rabelais pointed to the unique human proclivity toward imagination and humor as a defining feature of human psychology. Today's theories on the foundation of human psychology bring to the foreground unique, and potentially cardinal, adaptive features, such as language (Pinker, 1994), cultural transmission (Sperber, 1985; Tomasello, 2001), prestige and cooperation (J. Henrich & Gil-White, 2001; N. Henrich & Henrich, 2007), teaching (Csibra & Gergely, 2011), executive function and memory capability (Donald, 1991), metacognition (Carruthers, 2008), symbolic functioning (Deacon, 1997), or mental

time travel (Suddendorf & Corballis, 2007). In theory, all of these human adaptive features could derive from self-consciousness proper as a human-specific propensity. In this view, self-consciousness could be the necessary enabling stem mechanism standing upstream to all putative human-specific features proposed by current theories on human evolution. In the case of teaching, for example, awareness of being instructed or of instructing, a proposed uniquely human adaptive feature (Csibra & Gergely, 2011), implies the evaluation of the self's knowledge and competence in relation to others', and hence self-consciousness as a necessary precondition.

With this general idea in mind, in this article I discuss the origins and determinants of the human propensity toward self-consciousness. How does self-consciousness as a human adaptation come on line in development, and what mechanisms might drive such development?

Origins

Starting state: implicit self-awareness

For more than 50 years, accumulating evidence has demonstrated that contrary to what most pioneer

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psychologists (i.e., Freud, Piaget, but most famously James) proposed, the starting state of human psychological development is not a blooming, buzzing, confusion between the self and the world. Research has shown that human children, like any precocial animals, come to the world equipped with an implicit sense of who they are as differentiated and agentive entities among other nonself entities in the world. That is, from the outset, human infants express rudiments of *implicit self-awareness*. For example, newborns do not confound single touch with double touch. They root significantly more toward someone else's finger touching their cheek (single touch) than toward their own hand touching their cheek (double touch). They discriminate a single touch as specifying an object external to the self (e.g., someone else's finger) and a double touch as specifying the self as a differentiated entity among other entities in the world (Rochat & Hespos, 1997). A few weeks later (by the age of 8 weeks), babies display systematic self-defensive reactions to impending collisions with objects moving toward them, raising their arms, leaning backward in their seat, and blinking when a large object looms toward them (Ball & Tronick, 1971). Implicitly, they experience themselves as substantial entities occupying space, and thus as potential obstacles to other moving objects calling for preventive actions. This implicit sense of self is unmistakable when, by the age of 4 months, infants start reaching for objects within their reach, but tend to inhibit such action when an object is either too large for grasping or slightly out of reach (Rochat, Goubet, & Senders, 1999).

These observations, among many others, demonstrate that from the outset, infants possess an implicit sense of their embodied self as a differentiated (distinct), substantial (occupying space), agentive (causing effects in the world), and situated (relatively located) entity among other distinct entities in the world (Rochat, 2011). If implicit self-awareness is a starting state that we may share with other animals, what does it take for infants to become self-conscious "moral persons" showing explicit concerns for other individuals, caring about their reputation, and experiencing pride, shame, or guilt?

As I discuss next, it takes 18 months from term birth for typical children to express what can be described as an explicit and conceptual sense of self, construing themselves as public objects of recognition and evaluation ("hey, that's me in the mirror; look how ugly [or beautiful] I am"). This objectified sense of self emerges in conjunction with the manifestation of a general symbolic competence that includes the linguistic ability to refer to things with arbitrary signs (i.e., differentiation of signifier and signified across domains). To apply James's famous distinction, the embodied perception of "I" (signifier) becomes represented as the concept of "Me" (signified). However, there are precursor signs

of a transition from implicit to explicit and conceptual (objectified) self-awareness. Next, I discuss some of these signs in the chronological order of their manifestation. These signs could be unique to human development.

Evaluative social perception at birth

Faces and the canonical Y-shaped facial configuration of eyes, nose, and mouth are early attractors of visual attention, from birth (Johnson & Morton, 1991) and even, as has recently been demonstrated, in the womb (i.e., among fetuses during the last trimester of pregnancy; Reid et al., 2017). Newborns pay significantly more attention to facelike displays that are right side up as opposed to inverted or scrambled, particularly (and this is crucial) if the eyes stare directly at them as opposed to looking sideways (Farroni, Menon, & Johnson, 2006). From the outset, face perception has a social dimension as well. It involves more than just a built-in preference toward the mere surface and canonical organization of eyes, nose, and mouth. At birth and within the first few weeks of life, face perception proceeds, at least in part, in reference to the self as the focal object of social attention (Farroni et al., 2006; Reddy, 2000).

From approximately the age of 6 weeks, as infants start to engage in mutual face-to-face exchanges, and in particular as they exhibit the universal emergence of socially elicited smiling (Konner, 2010; Rochat, 2001; Wolff, 1987; Wörmann, Holodyski, Kärtner, J., & Keller, 2012), they manifest marked sensitivity to the social partner's degree of affective attunement. From approximately 2 months of age, infants show signs of disengagement if their interlocutor adopts a still face, avoids eye contact, or does not engage in contingent affective mirroring or turn taking (Muir & Hains, 1999/2010; Murray & Trevarthen, 1985; Tronick, Als, Adamson, Wise, & Brazelton, 1978). Clearly, these robust observations reveal that implicit gauging and evaluation of others in reference to the self is deeply rooted in human ontogeny.

Outward social referencing by the age of 7 months

By the second half of the first year (at approximately 7 months of age), infants start to manifest major changes in their social attention. Along with exhibiting mutual attention tracking in the context of direct face-to-face and bodily interactions (primary intersubjectivity), they now begin to engage in social referencing and bouts of joint attention (secondary intersubjectivity). Infants' social attention grows to include a focus on other individuals' gaze toward novel things and situations encountered in the environment, particularly if they trigger wariness (e.g., encounters with strangers or visual cliffs). They start checking the reactions and expressions of

familiar others as third-party witnesses and emotional benchmarks. They use these emotional cues in their decisions to either approach or avoid novel things (Campos & Sternberg, 1981). Outward social referencing is a sign of a significant change in the communication between self and others, which at this point starts to be determined by shared objects of attention. This represents a major developmental milestone that has been observed across highly contrasting cultural environments (Callaghan et al., 2011; Tomasello, 1995).

Social referencing also represents a major first step toward the evaluation of others in reference to the self—in particular, the evaluation of whether what others perceive in the environment more or less matches one's own perception (e.g., whether they also think it is safe to approach a certain object or dangerous to greet a certain person). Social referencing is a crucial developmental step toward the awareness of self and others as joint evaluators of objects and people in the environment. However, and this is crucial, it is not yet the full-fledged expression of self-consciousness (i.e., the explicit awareness of self through the evaluative eyes of others). If social referencing and joint attention (i.e., secondary intersubjectivity) are necessary features of human self-consciousness, they are not sufficient.

At this developmental juncture (7 months), infants do not seem to have a deliberate inclination toward impression management, nor do they manifest unambiguous social emotions, such as guilt, shame, or pride, when they detect that others have given them a poor evaluation. The coy smiling of infants reported prior to their first birthday indicates that early in life infants do sense that they can be an object of social attention. When other people, particularly strangers, insistently gaze toward a 7-month-old, the child is likely to respond with coy smiling, clinging to the mother, or avoiding the gaze (Reddy, 2000). However, these findings do not demonstrate that infants have a sense of the self as an object of social evaluation. They simply show that infants are aware of being an object of attention, are aware that this attention can come from strangers as opposed to familiar individuals, and can experience it as uncanny if it is too insistent, as in the case of the still-face paradigm. The first clear demonstration of self-consciousness proper emerges by the middle of the second year, and not earlier, with remarkably consistent timing in typical development.

Inward social referencing by the age of 18 months

In his 1872 book on the expression of the emotions in humans and other animals, Darwin (1872/1965) wrote

that “blushing is the most peculiar and the most human of all expressions” (p. 309). He was struck and puzzled by the unique and selective human crimsoning of the face, “a region of the body that is most conspicuous to others” (p. 309). In a follow-up article detailing observations of his own child, Darwin (1877) wrote:

I saw the first symptom of shyness in my child when nearly two years and three months old: this was shown towards myself, after an absence of ten days from home, chiefly by his eyes being kept slightly averted from mine; but he soon came and sat on my knee and kissed me, and all trace of shyness disappeared. (p. 292)

Guided by broad evolutionary questions, Darwin captured an essential and unique transition in human development: By the end of the second year, the self becomes a cognized entity, objectified and valued in reference to others. Infants start to pass the mirror mark test by reaching directly toward a mark they discover on their face, something also demonstrated in many other animals, including chimpanzees, elephants, dolphins, and even magpies. Arguably, however, human infants pass this test with unique signs of self-consciousness proper, as defined here (see Rochat & Zahavi, 2011). Unlike other animals, human infants who pass the mirror mark test show social emotions such as embarrassment, marked inhibition, pride, or acting out (Amsterdam, 1972; Amsterdam & Levitt, 1980; Rochat, Broesch, & Jayne, 2012; Stipek, Recchia, McClintic, & Lewis, 1992). What they recognize in the mirror is not only their embodied self but also their public self, that is, how others might see them. From this point on, social referencing is not only outward, but also inward. A unique feature of human ontogeny, this transformation opens up new possibilities for the development of a self-conscious psychology: the human concern with reputation (from the Latin verb *putare*, “to calculate”) and the human propensity toward impression management, including the use of makeup and other bodily adornments (see Botto & Rochat, 2018, for recent empirical evidence on the onset of this human propensity by the end of the second year).

But what might drive this unique ontogenetic transformation toward inward social referencing? Does it entail the maturation of particular brain regions and connectivity? Is it genetically prescribed and universal across human cultures? Current research in behavioral genetics, developmental neuroscience, and cross-cultural psychology provides stimulating leads on putative determinants of human self-consciousness.

Determinants

Genetic factors

Williams syndrome is a neurodevelopmental disorder linked specifically to an inherited genetic cause: the deletion of 28 genes on an identified chromosome. Many developmental researchers now consider individuals with Williams syndrome as providing a “unique window to genetic influences on cognition and behavior” (Meyer-Lindenberg, Mervis, & Faith Berman, 2006, p. 380). Aside from its association with particular physical traits, Williams syndrome has a behavioral phenotype marked by a very specific domain disability: great weakness in visuospatial construction (e.g., drawing), with preserved strength in language and rote memory (Mervis, Morris, & Klein-Tasman, 2003).

Interestingly, individuals with Williams syndrome also have a unique personality that is observed from early infancy. From the age of 8 months, they attend to faces in a distinct way, not showing the typical signs of stranger anxiety around this age. Already as toddlers, they are low on shyness and tend to be overly friendly, exhibiting no apparent differences between the way they approach familiar versus unfamiliar people (Mervis et al., 2003). Hypersociable, even with strangers, they are particularly prone to empathy. Future research should probe genetic determinants of self-consciousness by investigating the extent to which the personality and temperament profile typical of Williams syndrome might also correspond to a marked decrease in or even absence of sensitivity to others’ evaluation of the self.

Recent evidence suggests that domesticated dogs, who are much more gregarious than their common ancestor (the wolf), show remarkable homology with the genetic makeup associated with Williams syndrome (vonHoldt et al., 2017). Domesticated dogs could have evolved a particular genetic makeup and behavioral phenotype to become “man’s best friend”: overwhelmingly gregarious, but also less socially nuanced in their affective investment compared with the wolf. There is an analogy in the hypersociability of individuals with Williams syndrome compared with typical individuals. In this latter case, the particular genetic makeup of Williams syndrome could be a cause for either absent or depleted self-consciousness.

Brain factors

From the point of view of brain growth, there is a developmental synchrony between the metacognitive abilities, potentially turned toward the self, that emerge around 2 to 3 years of age and the documented brain maturation of frontal cortical regions. Growth of the rostrolateral region of the human prefrontal cortex is

thought to correlate with the development of new levels of consciousness, in particular the transition from minimal self-awareness to metacognitive levels of self-consciousness (Bunge & Zelazo, 2006; Zelazo, Hong Gao, & Todd, 2007). Specifically, four cortical regions have been identified as maturing in succession: the orbitofrontal, ventrolateral, dorsolateral, and rostrolateral regions of the prefrontal cortex (Zelazo et al., 2007). Work in developmental neuroscience (electroencephalography, positron-emission tomography), animal models, and neurological case studies all indicate that each of these regions is associated with a particular level of executive functioning and rule use, and by extension with the development of a particular level of self-awareness: from simple to more complex, eventually reflective and evaluative self-awareness. The more advanced level appears to be particularly linked to the maturation of the rostrolateral region of the prefrontal cortex (Bunge, 2004; Bunge & Zelazo, 2006). A question awaiting further scrutiny from developmental neuroscientists is how the protracted postnatal development of prefrontal cortex and its connectivity to other brain regions might mirror and eventually enable the emergence of humans’ unique proclivity toward self-consciousness. An interesting recent study demonstrated that there are neuroanatomical predictors of mirror self-recognition in chimpanzees. Those passing the mirror mark test ($n = 27$ out of 61) showed greater white matter tracts linking frontal and parietal regions of their brain compared with those who failed the test (Hecht, Mahovetz, Preuss, & Hopkins, 2017).

Cultural factors

Infants are raised, educated, and cared for in very different ways across cultures, and these differences may determine the forms and expressions of emerging self-consciousness. For example, there is significant variation across cultures in the manifestation of embarrassment by toddlers and young children who discover in a mirror that a mark has been surreptitiously put on their forehead. In research conducted in small-scale traditional societies with shared alloparenting practices, a prevalence of corporal punishment, little one-on-one teaching, and a tendency to use shaming in order to control children, a large majority of 18-month-old to 7-year-old children tested in the mirror mark test tended to freeze in front of the mirror, not daring to touch the mark on their forehead. The majority of them did not pass the test (false negative response; see Broesch, Callaghan, Henrich, & Rochat, 2010). In contrast, most Western children do pass the test when they reach their second birthday. In another recent study (Broesch, Itakura, & Rochat, 2017), Japanese 2-year-olds,

compared with U.S. and rural Canadian 2-year-olds, were more likely to shy away from requesting help from an adult when faced with a problem they could not solve. This difference fits the norms of Japanese adult culture, which for decades has been described by ethnographers and anthropologists as a “shame culture.” Shame is a trademark of predominantly interdependent cultures (e.g., Japan) but is less characteristic of societies that are predominantly independent and individualistic (e.g., the United States and Canada). Culture does appear to affect the forms and expressions of emerging human self-consciousness.

Conclusion

These examples, though brief, point toward some of the factors in need of continuing investigation, especially in light of new tools (in addition to brain-imaging techniques) available to researchers. For example, cross-cultural studies could use infrared cameras to capture with precision the human crimsoning that struck Darwin 150 years ago as a proxy for humans’ self-consciousness: the uniquely heightened propensity to perceive and construe oneself not only for itself, but also through the evaluative eyes of others. Because self-consciousness might be the primary mechanism underlying all other distinctively human adaptations, making us who we are as a species, continuing and renewed research efforts to figure out its origins and determinants will contribute in crucial ways to the advancement of psychological science.

Many strides have been made in describing social and cognitive predispositions at the outset of human development, but what should continue to inspire future research is what is unknown—specifically, what might cause and predict the transformation of such predispositions, some of them shared with other animals, into the self-conscious psychology that is a human trademark. This transformation occurs by the end of the second year, and some precursor mechanisms still need to be better understood. In human ontogeny, these mechanisms enable the developing expression of social emotions such as those manifested in blushing, but also the emergence of deliberate self-presentation and impression management, two essential expressions of what it means to be human.

Recommended Reading

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