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Reflective Imagination via the Artistic Experience: Evolutionary Trajectory, Developmental Path, and Possible Functions

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Abstract

Elsewhere I have argued that particular degrees of imagination and consciousness, a cognitive process that I call *reflective imagination*, distinguish humans from other species and make possible, and underlie, the artistic experience. I take the artistic experience to be the universal and characteristically human capacity to experience oneself or others in a story by means of music, dance, song, pantomime, drawing, pretend play, or spoken or written language. In this paper I reconstruct the developmental path of the reflective imagination via the artistic experience in five stages: infancy, childhood, adolescence, adulthood, and senescence, and its plausible evolutionary trajectory from *Australopithecines* to *Homo sapiens*. Drawing upon both evolutionary and developmental theory, I conclude that the reflective imagination via the artistic experience has fulfilled, and still fulfills, important functions by activating memory systems, regulating emotional expression, promoting mutuality, training attentional focus, developing motor control, enabling prediction, freeing from actuality, sourcing identity, complexifying consciousness, and affording behavioral adaptation.

Keywords: artistic experience, reflective imagination, imagination, consciousness, evolution, development, functions

INTRODUCTION

In the last century several models have been put forward to understand human cognition. Typically these have focused on human abilities such as language or analysis (Foley 2007, xvi, xvii); few researchers (e.g., Eugen Bleuler) have focused on the cognitive capacity to imagine (Harris 2000, 1–7). Imagination was, for instance, not even listed in Michael Tomasello and Josep Call's 1997 review of primate cognition (Tomasello and Call 1997 in Whiten and Suddendorf 2007, 33). Elsewhere I have argued that particular degrees of imagination and consciousness distinguish humans from other species and make possible, and underlie, the artistic experience. I call this cognitive process *reflective imagination* (Wah 2017). Building upon both evolutionary and developmental theory, I here explore the emergence and development of the reflective imagination via the artistic experience.

Anna Abraham recently proposed five categories to analyze the human imaginative mind: (i) perceptual/motor related mental imagery, (ii) recollective or intentionality processing, (iii) generative or novel combinatorial processing, (iv) exceptional phenomenology in the aesthetic response, and (v) altered psychological states such as dreams, hallucinations, and delusions which range from commonplace to dysfunctional (Abraham 2016, 4197). The first, the second, and the fifth categories are, to some extent, present in nonhuman animals, whereas the third category, the power to intentionally

recall, retain, and manipulate mental patterns, including visual, auditory, olfactory, gustatory, tactile, and kinesthetic images, is characteristically human (Darwin 1871, 47; Romanes 1885, 142–154; Clayton et al. 2003; Plotnik et al. 2010; de Waal and Ferrari 2012, 4, 5; Thomas 2014, 140; Harpham 2017, 94). From the perspective of this paper, the fourth category is problematic, as Abraham uses the aesthetic and the artistic interchangeably. I have argued that, unlike the artistic experience, aesthetic processing does not require reflective imagination (Wah 2017). The reflective imagination, I argue, emerges from the first three categories, and underlies the artistic experience.

The artistic experience is defined here as the characteristically human and universal capacity to experience oneself or others in a story by means of music, dance, song, pantomime, drawing, pretend play, or spoken or written language (Wah 2017, 52). To analyze this human narrative capacity I draw on the theory proposed by Francesco Ferretti et al. They postulate that the cognitive mechanisms underlying the human narrative ability are global coherence (the capacity to relate events causally); and a triadic system consisting of mental space travel (the capacity to imagine different spatial locations), mental time travel (the capacity to imagine oneself or others at different times, distinguishing between past, present, and future), and mental mind travel (the capacity to attribute mental states to oneself or others, also referred to as mind-reading or theory of mind). The fact that the triadic system of mental space travel, mental time travel, and mental mind travel is, to some extent, present in nonhuman animals suggests that this system precedes verbal language (Ferretti et al. 2017, 111–114).

From this standpoint, reflective imagination is a cognitive process that changes throughout evolutionary time and develops throughout life. To reconstruct a phylogeny, ontogeny, and possible functions of the reflective imagination via the artistic experience is important because although the emotional sources of the artistic experience have been described (Dissanayake 2000), and scholars of evolutionary aesthetics have explored its roots in evolved preferences for adaptive sensory stimuli (e.g., Voland 2003), the cognitive foundation of this experience remains largely unexplored outside the realm of literary theory (e.g., Carroll 1995, 1999). Only in recent years has the study of the cognitive process underlying the artistic experience come to include the term imagination, as in "aesthetic imagination" (Dissanayake 2001), "kinematic imagination" (Donald 2001), "creative imagination" (Damasio 2003), "self-imagination" (van Heusden 2009), or "reflective imagination" (Wah 2017). Focusing on the cognitive process underlying the artistic experience, I offer an alternative to "unify the arts" as a category, to posit a kinship of the arts. This unification, as Ellen Dissanayake points out, would have to include the arts of all kinds, in all times and places, including the evolutionary past, making it possible to explore their universality and probable adaptive value (Dissanayake 2015, 5).

DEVELOPMENTAL PATH

The development of human imagination seems to be closely linked to the development of memory retrieval mechanisms such as semantic memory (knowing), episodic memory (self-conscious remembering), and autobiographical memory (personal memories that appear repeatedly during one's life) (Schacter and Tulving 1994; Tulving 2005, 9, 34). Based upon this classification, Anna Abraham and Andreja Bubic propose semantic memory as the root of all aspects of imagination (Abraham and Bubic 2015). I here argue that reflective imagination emerges from and expands beyond episodic memory, which requires, but goes beyond, the semantic memory system. In this section I reconstruct a developmental path of the reflective imagination via the artistic experience in five cumulative stages: infancy, childhood, adolescence, adulthood, and senescence.

As these cumulative stages require fostering, there may be variations between individuals and social groups, and in atypical development their attainment may be accelerated, substantially delayed, or even absent.

Infancy

Humans are born in an immature state and require prolonged attention and care from their caretakers. During infancy, memory is nonconscious or implicit. This means that memory is evoked and instrumental but not reflective or accessible to voluntary recall, expanding over a sequence of actions and interactions. The phenomenon of infantile amnesia is attributed to this lack of memory rehearsal and undeveloped cognitive self (Nelson and Fivush 2000, 2004; Nelson 2005, 121–128). Infants cannot manage more than one mental pattern at a time (Lucariello 2004, 35). They do not create meaning as much as feel what is meaningful—security, warmth, and emotional nourishment (Dissanayake 2000, 73). Early interaction in infants is thus stereotyped and characterized by outward-directed attention. Infants respond to stimuli in the here and now on the basis of evolved preferences, basic reflexes, basic emotional responses, and universal meanings.

Typically developing infants are born with an evolved drive and adaptive predisposition to engage in social-emotional interaction. As they imitate, mirror, coordinate, and share emotional states with others, they develop into social beings (Dissanayake 2000, 6). The absence of this interaction compromises their individual and social development. Such interaction is sometimes called "motherese," and has been described by many researchers, but usually with reference to its contribution to subsequent language learning—emphasizing the utterances of the mother—but overlooking her unusual facial expressions and head and body movements, as well as the multi-modal presentation (visual-vocal-gestural) that are processed by the infant. Dissanayake traces the origins of what she calls "artification" in this adaptive mother-infant interaction and views it as a ritualized behavior in the ethological sense (see Huxley 1914; Tinbergen 1952; Smith 1977; Eibl-Eibesfeldt 1989).

Dissanayake explains how the affiliative vocalizations, facial expressions, and head and body movements of the adult are transformed into attention-getting signals by the process of ritualization becoming stereotyped, repeated, exaggerated, elaborated, and temporally patterned. The function of these communicative signals is to attract and sustain the attention of the infant and trigger emotion, helping the infant achieve homeostatic equilibrium and emotional regulation, influencing its cognitive functioning for the rest of its lifespan. This interaction affects their nervous system, predisposes them to reciprocity and mutuality, and is essential for survival because the recognition and prediction of patterns in the behavior of oneself and others will lead to mind-reading, belonging to a group, and will lie at the basis of empathy, reasoning, and analysis (Dissanayake 2000, 3–17, 38–49, 158–160; 2001, 85–93; 2015). Mental mind travel begins thus with reading emotions (Corballis 2011, 133).

In the first year, the infant's consciousness grows rapidly from fleeting levels of awareness to sustained periods of engagement. The first level of experiential awareness in infants is that of a self, one that distinguishes the boundary between self and other; midway in the first year this boundary extends to a relation between self, other, and object (Nelson 2005, 126–128). This means that the beginning of the understanding of space precedes the understanding of time (Corballis 2011, 119). The ability to mental space travel is a property of semantic memory and is therefore a precondition for mental time travel (Tulving 2005, 7). In general, humans can develop the capacity to externalize mental patterns in movements, sounds, gestures, artefacts, language, diagrams, and structures (van Heusden 2009, 619). Infants can externalize mental patterns only in movements, sounds,

and gestures. Elements of these externalizations can be viewed as the foundation of the artistic experience since they are the beginning of the capacity to experience music, dance, song, and pantomime.

There is evidence for the evolved drive and early emergence of proto-musical and dance-like behaviors during development. Infants as young as three weeks spontaneously synchronize body movements to auditory stimuli such as entraining beats, an effect evident throughout early childhood and replicated cross-culturally (Fitch 2006; Christensen et al. 2017, 10–11). By six weeks of age infants also begin to respond to and reproduce repetitive sing-song vocalizations (Dissanayake 2009, 138). Moreover, the three-and-a-half to five-second segmental length of a typical mother-infant interaction also corresponds to the temporal length of a musical phrase, a poetic line, and a phrase of speech in adults (Turner and Pöppel 1983; Lynch et al. 1995). The tendency in mothers or caretakers to spontaneously produce rhythmic and coordinated patterns, the sensitivities of newborns to recognize and reciprocate them, and the universal measure suggest their primal importance.

These behaviors are referred to as "proto-musical" and "dance-like" because in infancy interaction is still unintentional and unimaginative, relying only on the perception of rhythmic and coordinated sensorimotor patterns in the here and now. Babies do not yet have a conception of past and future, nor the capacity to understand another's perspective (Nelson 2005, 129). However, proto-musical and dance-like behaviors, as well as sing-song vocalizations, seem to foster the development of these imaginative abilities because, while attending to cause and effect relations in rhythmic patterns, babies begin to expect and predict, developing sustained attention and motor skills, as well as spatial and temporal cognition.

From a biobehavioral point of view, an important function of these first behaviors is to reequilibrate biochemical imbalances; for example, dance-like behaviors or watching others dance sustains attention and focuses the biological systems into a singular train of thought and neuroendocrine state, inducing a recovery state after episodes of sensorial overstimulation, anxiety, and stress (Christensen et al. 2017, 16–17). Charles Darwin (1871) first raised the question of the evolution of music and dance and associated them with courtship and mating. In line with his theory some still argue that music and dance are fitness indicators for purposes of sexual selection and mate attraction (e.g., Miller 2000; Dutton 2009). This argument has led to misunderstandings, even to the prohibition of dance in some cultures, and fails to explain why infants, babies, toddlers, and prepubescent children begin to dance spontaneously and frequently. This last suggests that musicality is a trait that is unlikely to have been sexually selected, as sexual traits tend to emerge only in sexual maturity (Fitch 2006; Cross 2016, 10; Christensen et al. 2017, 9, 22).

The course of infancy is marked by a rapid change in perceptual and motor capacities (Nelson 2005, 118). Saito et al. point out that at about one year of age babies begin to scribble. Their scribbling develops from accidental markings to controlled lines, and gains variation as motor skills develop. Drawing also plays an important role in the development of imagination; it begins to free one from actuality, and enhances the ability to internalize one's own and others' viewpoints, thereby enabling the sharing of one's own and another's mental patterns (Saito et al. 2014, 2233, 2244). Perceptual play also emerges early in ontogeny (Wah forthcoming). Babies endlessly repeat and rehearse the activities of reaching, grasping, and investigating with eyes, hands, and mouth and begin to learn how things in the world look, sound, smell, feel, and taste. Young children begin to handle and manipulate artefacts with increasing coordination and goal-orientation, and gradually become able to imagine their actions having an effect on objects and on others. Planning and predicting develop here (Dissanayake 2000, 101–105).

As their hands become more refined instruments of interpersonal communication, a first degree of narrative and symbolic processing also emerges by means of mime and nonlinguistic gesture; for example, manual gestures, such as pointing at about one year, aim at sharing information (Corballis 2011, 163).

Childhood

In typical development, the first recognition of the self has been set towards the end of the second year, once the young child passes the mirror test (the ability to recognize that one's image reflected in a mirror belongs to oneself). The cognitive self is the beginning of memory as a recursive or metacognitive phenomenon (Tulving 2005, 34; Corballis 2011, 83). This ability hinges on the capacity to keep in mind two different mental patterns at the same time, and is based upon the development of representational systems or mappings (Bjorklund 2012). That children start to express occasional ontological doubts and to acknowledge the doubts of others means that they can distinguish between the perceived and the imagined (Harris and Koenig 2007, 115–117).

Children begin to respond emotionally not only to stimuli in the here and now, but also to the consciously recalled and imagined. The stimuli that arrest attention begin to be no longer characterized only by repetition, exaggeration, and elaboration, but also by surprise, uncertainty, and deviation (Dissanayake 2001, 94). Imagination plays a vital role in turning sensory stimuli into meaningful experience (Thomas 2014, 158). The meaning that children impose on objects starts to dominate their perception of the objects. Towards the end of the second year typically developing young children begin to apply their knowledge base to symbolically manipulate objects; for example, a banana may be talked into as if it is a telephone, an empty cup may be "sipped" from as if it contains hot liquid (Leslie 1987; Harris 2000; Nielsen 2012, 176; van Dorsten 2015, 147).

Just as children naturally start to dance, sing, mime, draw, and play, they also begin to engage in make-believe (Dissanayake 2000, 182). The spontaneous interaction of imitation turns into deliberate imitation as simulation or pretense (Dissanayake 2001: 94, 95). Imagination begins to free from actuality through pretend play. Pretence invariably involves doing "as if" objects, oneself, or others were another and had different meanings. It therefore invariably involves the use of imagination (Goldman 1998, 2). Pretending "as if" is somewhat constrained in its themes and targets: pretending that one common object is more interesting than another, pretending that a person-like object is animated, pretending to be different animals, and later pretending social roles and acting. All these features constitute a form of training for imaginative mind-reading capacities (Boyer 2007, 241; Taylor et al. 2007, 82).

In order to pretend, players have to maintain the imagined world, and share and agree on the rules and the possible consequences of any behavior. Through pretend play children recreate, without serious consequences, actions they have learned from adults. This recreation allows creativity and innovation to flourish (Harris and Kavanaugh 1993; Rakoczy 2008; Nielsen 2012, 177). Pretend play also supports emotional development by allowing children to express emotions symbolically. It increases their ability to concentrate, their attention span, the complexity of their motor skills, and their capacity for logical thought (Singer and Singer 1990, 88; Scarlett 2004, 58).

The development of cognition becomes evident around the third year, with considerable advances in episodic memory. Episodic memory involves conscious acts of construction and locates events in time. In this period children begin to reflect upon their experiences (or potential experiences) in the past, present, and future, and can mental time travel (Tulving 1985; Suddendorf and Corballis 1997, 2007; Terrace and Metcalfe 2005; Ferretti et al. 2017, 110). They become aware of contrasts between

past, present, and future, and can follow a storyline (Nelson 2005, 128, 134). Through narratives children can imagine others' behaviors into internally coherent accounts. Narratives provide a resource for linking otherwise isolated events into causal-chronological wholes (Herman 2013, 74, 237; Ferretti et al. 2017, 107). This capacity to follow a story is manifested in drawing. By the time children are three years old they begin to create representational drawings, to complete forms and missing parts, and to search for upright orientation (Cox 1992; Saito et al. 2011; Saito et al. 2014, 2233–2240).

Children master narrative skills as they experience stories by means of music, dance, song, pantomime, drawing, pretend play, and language. As for language, first they listen to stories, later on can narrate them, and are eventually able to experience them through reading and writing. Children learn rules and social skills by acquiring systematic and storied accounts. Shared belief-systems and myths satisfy the need for meaning and for explaining the how and why of things. Eventually, theological, philosophical, and scientific systems will also become ways of ordering and explaining the world (Dissanayake 2000, 78–85).

Adults surround children with oral stories. Children notoriously like to listen repeatedly to the same story because they begin to imagine it developing in different ways while becoming aware of the dynamics of their own experiences (Gielen and van Heusden 2012, 46). Engaging with fiction is rooted in counterfactual or "what if" inference processes (Boyer in Roth 2007, xxxiv). Adaptive functions that have been postulated for fictional narratives include providing one with game-plan scenarios, practical problem-solving, didactic messages, and useful information on human nature and the environment (Scalise Sugiyama 2001, 2005; Saunders 2015). Fiction also provides low-risk ways of solving survival problems in the imagination, as well as an extensive and complex catalogue of persons and scenarios to make sense of both past and future interactions (Boyer 2007, 242–245; Boyd 2009; Kandel 2012, 393).

At the end of this stage, children continue developing mental mind travel, the imaginative ability to predict, take another's viewpoint, and understand their own and others' mental states, such as thoughts, feelings, actions, and intentions (Currie 1995; Thomas 2003, 81; Damasio 2010, 296). The capacity to retain and compare multiple mental patterns underlies this imaginative skill and increases dramatically between ages five and eleven (Goswami 2008). This means that the cognitive capacities for mental space travel, mental time travel, and mental mind travel underlying reflective imagination can be fully present in late childhood or, in the words of Barry Bogin and Holly Smith, the juvenile stage (Bogin and Smith 1996; 2012). It is then that the so-called "cultural programming" characterized by the awareness of cultural roles invoked by institutions (moral, ethical, legal), the beginning of cultural identity (religious, national, ethnic), and the acquisition of cultural knowledge systems (philosophic, scientific) is nurtured (Nelson 2005, 135–136).

The capacity to imagine oneself or others in a different space, time, and mental state has a very important function in learning and the transmission of knowledge. Assimilating others' experiences serves to broaden one's own experience. The emotion evoked makes it more likely that the second-hand experience is shared and remembered (Vygotsky 2004, 17; Harris 2000, 89; van Dorsten 2015, 118). Children gradually become more self-conscious and begin to replace material-, space-, and time-limited pretend play with daydreaming and fantasy (Singer and Singer 1990, 234). Nonetheless, even if it becomes more private, reflective imagination will continue to develop and to play a crucial role in one's adaptation to the environment and therefore in survival.

Adolescence

In adolescence memory enhancement continues marked by major developments in autobiographical memory. Episodic memory combined with aspects of semantic memory makes up what is known as autobiographical memory (Corballis 2011, 84). Although both semantic memory and episodic memory benefit from language, they do not depend on it (Tulving 2005, 12). Adolescents acquire the meanings, significances, and values of their social group. They move from mother-infant mutuality in infancy to belonging to a group in childhood to developing a sense of identity in adolescence. With the beginning of conscious identity comes awareness of the distinct identity of others (Hurlbut 1997, 21). Memory is central to one's identity, and identity constructions are important because they provide orientation, guide behavior, and may lead to action (Damasio 2003, 208; Kandel 2006, 116; van Heusden 2009, 13; Damasio 2010, 294; van Heusden 2010, 159–161).

The sense of identity is connected to what one knows about one's own family and community, and the events that have directly and indirectly touched one's own life. Sources of identity include religion, nation and race. Humans feel affiliation with and degrees of closeness to others who share these identities. Persons deprived of mutuality and belonging may lack a sense of identity, whereas those whose mutuality and belonging needs are met will be more secure. That said, religious fanaticism, extreme nationalism, and racism also grow from the need to belong. Religious, national, and ethnic identities are thus constructions, and are fully established in this stage (Dissanayake 2000, 64–69; Nelson 2005, 135). However, another function of the reflective imagination is, via the artistic experience, to manage life through a process of identity construction, both individual and collective (Dissanayake 2000, 49, 203; van Heusden 2009, 611; 2010, 159–161; Damasio 2010, 294). Reflective imagination via the artistic experience can also fulfill the evolved propensities for mutuality and belonging and afford a sense of identity.

Experiencing a story collectively—by means of music, dance, song, pantomime, drawing, pretend play, or spoken or written language—attracts attention, instills feelings of confidence and trust, and reinforces the individual's identity within the group. The physical control required in ceremonies and rituals provides a sense of emotional competence and reassurance, which are adaptive. Their characteristic focused and elaborated activity reduces uncertainty, anxiety, and stress (Mithen 1996; Dissanayake 2000, 63, 141–145; Mithen 2005, 2007, 17). These activities release chemicals such as oxytocin, which promotes affiliation, and suppress cortisol, which is released in stressful situations (Freeman 1995 in Dissanayake 2000, 163; Gebauer et al. 2016). For instance, the most frequently described function of the experience of music, song, and dance is social cohesion (Clayton et al. 2005; Cross 2016, 7; Christensen et al. 2017). However, these explanations tend to focus only on the synchronized movement involving coordinating perception and behavior around periodic pulses or beats overlooking the role played by imagination and metacognition in establishing affiliation among individuals promoting bonding within a group.

According to Joseph Jordania, rhythmic group singing originates from mother-infant interaction and triggers a mental state characterized by analgesia (painlessness) and aphobia (fearlessness). He describes this collective experience as an effective survival strategy, defense, or attack system for critical moments such as wars (rhythmic group chanting at sports events could also be an example). This experience creates a collective identity and a strong bond between group members, sending a strong message to the predator about the unity and determination of the group (see Geissmann 2000; Jordania 2011, 98–101). This stage of reflective imagination via the artistic experience is characterized by the imitation of others' patterns of behavior. Its outcome can be both positive

and negative for the individual, society, and the environment because identity constructions do not entail a process of understanding. The understanding of the process of identity construction develops only in a following stage once the individual, instead of imitating others' patterns of behavior, re-creates one's own. During adolescence, thinking gradually becomes more abstract and more flexible (Griffin 1992, 201). Imagining reflectively via the artistic experience can trigger the development of the capacity to think about situations from different perspectives.

Adulthood

Imagination does not vanish in adulthood, but merely becomes more private (Singer and Singer 1990, 266). The development of inward-directed attention in this stage makes reflective imagination more challenging to study, as its products become less accessible to direct observation—unless externalized. Based on evolved propensities for mutuality and belonging, this stage is characterized by imagining reflectively on general human concerns such as birth, death, attachment, desire, loss, hope, awe, helplessness, and the unknown (Dissanayake 2000, 49, 203). The experience of any emotionally competent stimulus, whether recalled, perceived, or imagined, can trigger it (Damasio 2010, 143, 149; Kandel 2012, 313; Wah 2017, 54). This experience may take place privately and not require active participation. However it, at least implicitly, involves others with whom one engages intimately and profoundly. From the awareness of being dependent on others and on nature arises an intrinsic sense of duty, obligation, and commitment to the survival and betterment of others and the environment. This awareness can enlarge one's sense of being and give a sense of completeness or transfiguration (Dissanayake 2000, 49, 203; Wah 2017, 53–54).

Mihaly Csikszentmihalyi explains that optimal states of experience lead to complexification of consciousness and are characterized by peaks of total involvement that produce intense feelings of enjoyment, creativity, and self-esteem. By transforming physiological processes into subjective experiences, consciousness makes it possible to gain control over instincts, increasing adaptation spurred on by the enjoyment it provides (Csikszentmihalyi 1988, 20, 63–64, 366–369). In this stage the artistic experience increases full awareness of one's body (exteroception, interoception, and proprioception) and of one's choices, motivations, intentions, and actions. This experience provides socioemotional coping skills that increase self-confidence and boost self-esteem, as well as a platform to channel interpersonal and intrapersonal communication through a mirroring mechanism (see Hagen and Bryant 2003; Brown et al. 2004; Christensen et al. 2017, 9, 19–20). For instance, in this stage the artistic experience, including that of music, not only generates bonding, but by virtue of its "polyvalent significances" also facilitates communication. The meanings created through this experience are susceptible to change according to the contexts in which they are experienced, an attribute that can be described as "floating intentionality" or "floating meaning" (Cross 1999, 2016).

A concrete example is the project of musician Jordi Savall and singer Montserrat Figueras on the cohesive force of music. In 2008 UNESCO appointed the two as European Union ambassadors for intercultural dialogue, naming them "Artists for Peace" for their work with musicians and singers from nations at war (Savall 2009). By playing music and singing together, the musicians and singers imagined themselves in a situation different from their actual one, marked by the learned tensions of war, empathizing with each other. This exemplifies the unique power and function of this stage of the reflective imagination via the artistic experience. In contrast to the previous stages, this stage of development of the reflective imagination can, through the artistic experience, help humans to re-create or forget prior experiences

and so-called "cultural programming," mostly learned in childhood and established in adolescence. This experience triggers full flexibility of response, thereby affording behavioral adaptation bringing positive consequences to oneself, others, and the environment.

Imaginative empathy draws upon the evolved predisposition to engage in emotional communication with others (Dissanayake 2001, 96). Empathy is an expression of the broader biological capacity for mimesis. Identification at its fullest involves the capacity to make others an extension of self, to reach out mentally, and make the situation of the other one's own. Such experience requires imagining oneself in the actual place and actions of others and adopting their beliefs, intentions, and subjective feelings (Hurlbut 1997, 15, 19). This experience provides a powerful adaptive advantage because by imagining others' points of view as one's own, one comes to value and respond to things in new ways. Such experience is a path to moral growth and understanding (Currie 2007, 173).

Some scholars have emphasized how the experience of literary fiction benefits humans by allowing them to take a distance from actuality, whereas others have argued that experiencing literary fiction triggers empathy (see Hakemulder 2000; Keen 2007; Mar et al. 2009; Oatley 2011; Kidd and Castano 2013). From the perspective of this paper, both arguments are valid, and can be better understood in the context of the different developmental stages. The capacity to distance oneself from direct perception via the artistic experience emerges in childhood, whereas full empathy via the artistic experience characterizes adulthood. At best, this experience generates novel mental patterns and is a process of analysis, understanding, and transcendence, marked by a fleeting loss of self replaced by an enlarged sense of being.

Senescence

Senectitude follows the years of adulthood and is characterized by a diminished ability to adapt to environmental stress (Bogin and Smith 2012, 545). Although the pattern of cognitive decline varies greatly between individuals, older adults tend to generate fewer episode-specific details relating to past events than younger adults (Schacter et al. 2007, 658). However, imagining reflectively via the artistic experience enhances memory and triggers episode-specific details relating to past events. It may be that this is possible because, as Daniel Schacter explains, imagining and remembering use the same neural network (Schacter et al. 2012).

Until now most evidence has come from the experience of music. The experience of music has been proven to delay, arrest, or even reverse the detrimental effects of ageing on learning and memory capacity while recruiting attention, motor function, semantic processing, episodic memory, and autobiographical memory (Reybrouck et al. 2018, 94–96). These effects have been shown most typically in cases of Alzheimer's disease, which is the most common form of dementia, but significant effects have also been observed in cases of pain, autism, anxiety, and depression (Matrone and Brattico 2015, 3). Thus even though the end of the life cycle is characterized by memory loss, imagining reflectively via the artistic experience reactivates memory systems.

EVOLUTIONARY TRAJECTORY

The recursive modes of thought underlying the human narrative capacity seem to have been gradually shaped during the Pleistocene (Corballis 2011, 207). The methodological routes to understanding how imagination has been shaped by evolution have consisted of fossil and archaeological records as well as recent genetic evidence (Whiten and Suddendorf 2007, 32). The question of mental origins is difficult because fossils have no soft tissue, nor do they explain the behavior of extinct species (Donald 2013, 174). Moreover, although archeological records may indicate the presence and perhaps evolution of imagination, some

archeological evidence may not have survived or may still be undiscovered, and the available findings may be insufficient to prove the existence of certain imaginative capacities.

Even though the parallels between the ontogeny and phylogeny of cognitive change do not necessarily imply a similar mechanism (as in recapitulation), because ontogeny depends on individual and social fostering, much developmental research suggests that the development of cognitive processes reflects, or at least sheds light on, their evolutionary trajectory (Nelson 2005, 119; Donald 2013, 181). In this section, I infer the evolution of the reflective imagination via the artistic experience based upon its developmental path. A more useful and accurate way to think of the evolution of the imagination via the artistic experience begins thus not with artefacts but with the tendency to imitate, mirror, coordinate, and share mental patterns by means of movements, sounds, and gestures.

Australopithecines and early Homo

About 5–7 million years ago (mya) the hominin lineage last shared a common ancestor with chimpanzees (Cross 2016, 12). Over this time hominins went through a series of evolutionary changes in anatomy, cognitive function, and social structure (Donald 2013, 170). According to Ian Cross, the capacity to entrain or synchronize with others to an external perceived rhythm, pulse, or beat, characteristic of both music and dance, must have arisen at some point in the hominin lineage over the last five to seven mya. The fossil record, in particular their angled knee, suggests that *Australopithecines* were partially bipedal (Cross 2016, 13). At this stage their inner ear bony labyrinth could not yet have provided full balance for walking, but as Steven Mithen states, the better our ancestors walked, the more rhythmic they became; and the more rhythmic they became, the better they walked (Mithen 2005, 142, 152). The strong curvatures displayed in their finger bones also suggest that *Australopithecines* were tree climbers. They seem to have sought the shelter of trees to escape predators, especially at night (Corballis 2011, 185; Gurche 2013, 38).

The universality of singing and the localization of singing faculties in humans strongly contradicts the idea of a late origin of singing in human history. Jordania argues that unlike other apes, who became silent in order to survive on the ground, human ancestors gradually became louder, singing in groups and developing rhythmically united choral singing (Jordania 2011, 90–91). The reconstructed thorax of *Lucy* (dated at around 3.2 mya) has been described as somewhere between the funnel-shaped chest, like that of chimpanzees—which does not permit sufficiently fine control over phonation to make the subtly differentiated vocal sounds required for singing—and the barrel-shaped chest, like that of humans (Gurche 2013, 54).

It thus seems reasonable to suggest that not only proto-musical and dance-like behaviors, but also early sing-song vocalizations characterized the behavior of *Australopithecines* and *early Homo*. Archeological evidence suggests that only *late Australopithecines* and *early Homo* made and used stone tools. Both of these activities are intrinsically rhythmic and require some initial capacity to imagine space from different perspectives or mental space travel. The earliest evidence comes from the Oldowan industrial complex found in South Africa, dated 2.3 mya, but perhaps as early as 3.4 mya (Donald 2013, 178). These tools are likely to have been made through individual trial and error learning (Mithen 1999; Nielsen 2012, 172). The capacity to mental time travel has been suggested to have been present in *Homo rudolfensis* (Corballis 2011, 205).

Homo ergaster, Homo erectus, and Homo heidelbergensis

According to Merlin Donald, the evolutionary source of the human capacity to imagine is in what he calls mimesis. He explains that this mimetic capacity emerged around 3.4 mya, had

its origins in *late Australopithecines*, and can be fully found in *Homo ergaster*. This cognitive capacity depended upon changes in the nervous system, and meant a radical change in hominin evolution. Previously, the action systems in every known mammalian species were focused on the environment rather than internally on the action itself. Inward-directed attention allowed humans to focus in detail on their own actions, to evaluate them, and to improve them on the basis of an imagined idea, which may have originated in the event structure of the environment or in the acts of oneself or others. A mimetic act is thus a performance that reflects, reenacts, or recreates an event. Its cognitive core is kinematic imagination, the ability to envision one's own body in motion. Mimesis has three behavioral manifestations: rehearsal of skill, in which the actor imagines and reproduces recalled actions with a view to improving them; mime, in which one reproduces patterns of action, usually of others; and nonlinguistic gesture, in which an action communicates an intention through resemblance. Metacognition (self-reflection) and event representation (imagination) seem thus to be the neurocognitive mechanisms that underlay mimesis and made hominins capable of symbolic processing (Donald 1991; 2001, 263–74; 2006, 7–10; 2013, 180–85, 192).

Due to the increasing brain size in hominins their period of gestation gradually became reduced. This suggests that the mother-infant interaction described in ontogeny must have been present in *Homo ergaster* or *Homo erectus* (Dissanayake 2009, 141; Dissanayake 2015). With *Homo ergaster,* the barrel-shaped chest is fully present, and the capacity to control fine-grained sounds, such as sing-song vocalizations, can be fully postulated (Frayer and Nicolay 2000; Morley 2013; Cross 2016, 13). Around two mya bipedalism became obligate rather than facultative, freeing the hands and arms for manipulative purposes, including manual gestures (Corballis 2011, 185).

Before language evolved human ancestors probably developed nonverbal skills for reading each other's minds through whole-body gesticulation and vocal modulations. Many theoretical models have explored the selective pressures behind language origin. Several researchers agree that in the evolution of hominin communication a mimetic or pantomimic stage was present, and consider this to be the basis of human linguistic narrative abilities (e.g., Donald 1991; Boyd 2009, 159; Zlatev 2014; Corballis 2015; Ferretti et al. 2017). Taking into account the inherently narrative character of language, Ferretti et al. underline that pantomime was the nonverbal, mimetic means to communicate mental patterns to others using a narrative format (sequence of events) (Ferretti et al. 2017, 111–14).

The Acheulian industrial complex is associated with this stage. It appears in the Lower Paleolithic at about 1.8–1.6 mya with teardrop-shaped bifacial hand axes (Asfaw et al. 1992; Chazan et al. 2008). These hand axes demand considerable devotion of time and effort (Stout 2002). They suggest constant monitoring and correcting of achieved results, and evidence not only imitation but also signs of a mind predisposed to innovate (Nielsen 2012, 172). The emergence of mimetic skills was accompanied by some pedagogical capacity. This involves imagining and planning a motor act, executing it under conscious metacognitive supervision, predicting and analyzing the outcome, practicing and refining the final form of the action-pattern, and copying and profiting from the skill of others (Donald 2013, 179). Although the diversity of tool use by other great apes may open a question about the extent to which the first Oldowan stone tools marks a threshold in human cognition, there is in this stage little doubt that a distinctive human imagination is present (Mithen 2007, 24).

Further archeological evidence includes 500,000-year-old engraved shells found in Java, Indonesia (Joordens et al. 2015). These geometric and symmetric zigzag engravings show that *Homo erectus* were representing drawings with a meticulous attention to detail. *Homo erectus*

quickly spread from Africa into Asia and to the border of Europe, evidencing spatial mapping skills (Gurche 2013, 124, 144). Frederick Coolidge and Thomas Wynn hypothesize that this mental space travel capacity may have been facilitated by physiological changes in sleep patterns related to the tree-to-ground sleep transition (Coolidge and Wynn 2009, 5). The fact that *Homo erectus* controlled fire and took their tools with them to different locations also suggests their foresight or mental time travel capacity (Gurche 2013, 118, 125; Gowlett 2016). The Acheulian industrial complex gave way to the Levallois technology (Corballis 2011, 206). *Homo heidelbergensis* flintknappers produced bifaces with three-dimensional symmetry 400,000 years ago. According to Coolidge and Wynn, the fact that these changes unfolded over tens of thousands of years rules out creativity and conscious experimentation (Coolidge and Wynn 2009, 170). However, instead of ruling out these capacities, I suggest considering different degrees of creativity, conscious experimentation, and imagination.

Homo neandertalensis and Homo sapiens

Evidence based on dental ontogeny suggests that childhood emerged as a life history stage in the Middle Paleolithic (Zollikofer and Ponce de León, 2010). Mark Nielsen argues that the presence of childhood as a step in the life cycle was critical to the evolution of human cognition, making possible extensive learning, creativity, innovation, and symbolism, fostered through one of the foundational elements of the human sociocognitive mind: pretend play (Nielsen 2012).

Around 300,000 years ago the Mousterian tool kit emerged, commonly associated with *Homo neandertalensis*, late archaic humans, and anatomically modern humans (Nielsen 2012, 174). The diversity of these artefacts and the proliferation of their forms reflect a rich imaginative background (Donald 2006, 9). These tools also evidence the emergence of clearly identifiable regional identities and stylistic variants (McBrearty and Brooks 2000; Ambrose 2001). Problems of personal, social, and biological identity might have arisen out of the contact between *Homo neandertalensis* and *Homo sapiens*, igniting on both sides an explosion in the use of personal ornaments (d'Errico et al. 1998, 36).

The archeological record attributed to *Homo neandertalensis* includes a 400,000-year-old wooden spear found in Germany (Thieme 1997), body painting in the form of 285,000-year-old traces of cosmetic red ochre pigment found in east Africa (McBrearty 2001, 92), a 176,500-year-old composition of broken stalagmites found in France (Jaubert et al. 2016), as well as 130,000-year-old jewelry made with eagle talons found in Croatia (Radovčić et al. 2015). They are known to have hunted, controlled fire, and made clothing, activities which suggest social learning and active teaching. The discovery of the first-known *Neandertal* hyoid bone in 1983 suggested, but without certainty, the presence of spoken language (Gurche 2013, 225–229).

The oldest archeological findings attributed to *Homo sapiens* include 135,000 to 100,000-year-old shell beads and necklaces found in north Africa (Vanhaeren et al. 2006), and well-known 40,000- to 28,000-year-old evidence from the Upper Paleolithic, including fired ceramics and small female sculptures carved from stone such as the Venus figures of Willendorf and Schelklingen, representational drawings and paintings displayed in Franco-Cantabrian caves, and several musical instruments made from bone and ivory found in southwestern Germany, France, and Austria (Conard, Malina and Münzel, 2009).

The fossil record indicates that *Neandertals* were robust and fast hominins with a brain larger than that of *Homo sapiens*. Michael Corballis argues that instead of strength and speed, *Homo sapiens* possess a unique recursive mind (Corballis 2011, 181, 194). This uniqueness seems to lie not in the capacities

to mental space or time travel, both clearly present in other hominins, but in the degree of the capacity to mental mind travel. It seems due to the presence of this evolved imaginative triadic system that *Homo sapiens* can be caring and empathic, yet cruel and torturous (Gurche 2013, 302–305).

Mental mind travel is also critical to social cohesion and cooperation (Corballis 2011, 15). *Homo sapiens* build on past progress, accumulate innovations, and disseminate knowledge. The presence of spoken language facilitates social learning and teaching. All these capacities make possible rapid adjustments to changing environments as well as a high reproductive rate, population expansion, and migration. *Homo sapiens* entered Europe about 44,000 years ago, having a spike in their longevity about 30,000 years ago. By 27,000 *Neandertals* were extinct but not without descendants—as genetic evidence has proven (Green et al. 2010; Gurche 2013, 226–34, 304).

Bogin and Smith argue that *Homo sapiens* evolved a life history stage—adolescence (Bogin and Smith 1996; 2012). This stage of reflective imagination via the artistic experience, as pointed out in ontogeny, establishes and maintains group identity and affords social cohesion, thereby fulfilling the individual and social need to belong. However, this stage does not entail a process of analysis and understanding of oneself, others, and the environment. The dominant impact of *Homo sapiens* on the environment (and on others) could partly explain the recently proposed, but not yet officially accepted, notion of the Anthropocene as the current subdivision of geological time. If the developmental path of the reflective imagination via the artistic experience sheds light on its evolutionary trajectory, *Homo sapiens* appear to be in an adolescent stage with sparks of adulthood.

CONCLUSION

Elsewhere I have argued that particular degrees of imagination and consciousness, a cognitive process that I refer to as *reflective imagination*, underlie the artistic experience. I take the artistic experience to be the characteristically human and universal capacity to experience a story by means of music, dance, song, pantomime, drawing, pretend play, or spoken or written language (Wah 2017). In this paper I have reconstructed a developmental path, from infancy to senescence, and a plausible evolutionary trajectory, from *Australopithecines* to *Homo sapiens,* of the reflective imagination via the artistic experience. Drawing upon both evolutionary and developmental theory, I have concluded that, via the artistic experience, reflective imagination has fulfilled, and still fulfills, important functions by activating memory systems, regulating emotional expression, promoting mutuality, training attentional focus, developing motor control, enabling prediction, freeing from actuality, sourcing identity, complexifying consciousness, and affording behavioral adaptation. The artistic experience thus maintains the stability of social systems and enhances the likelihood of survival in all evolutionary-developmental stages.

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