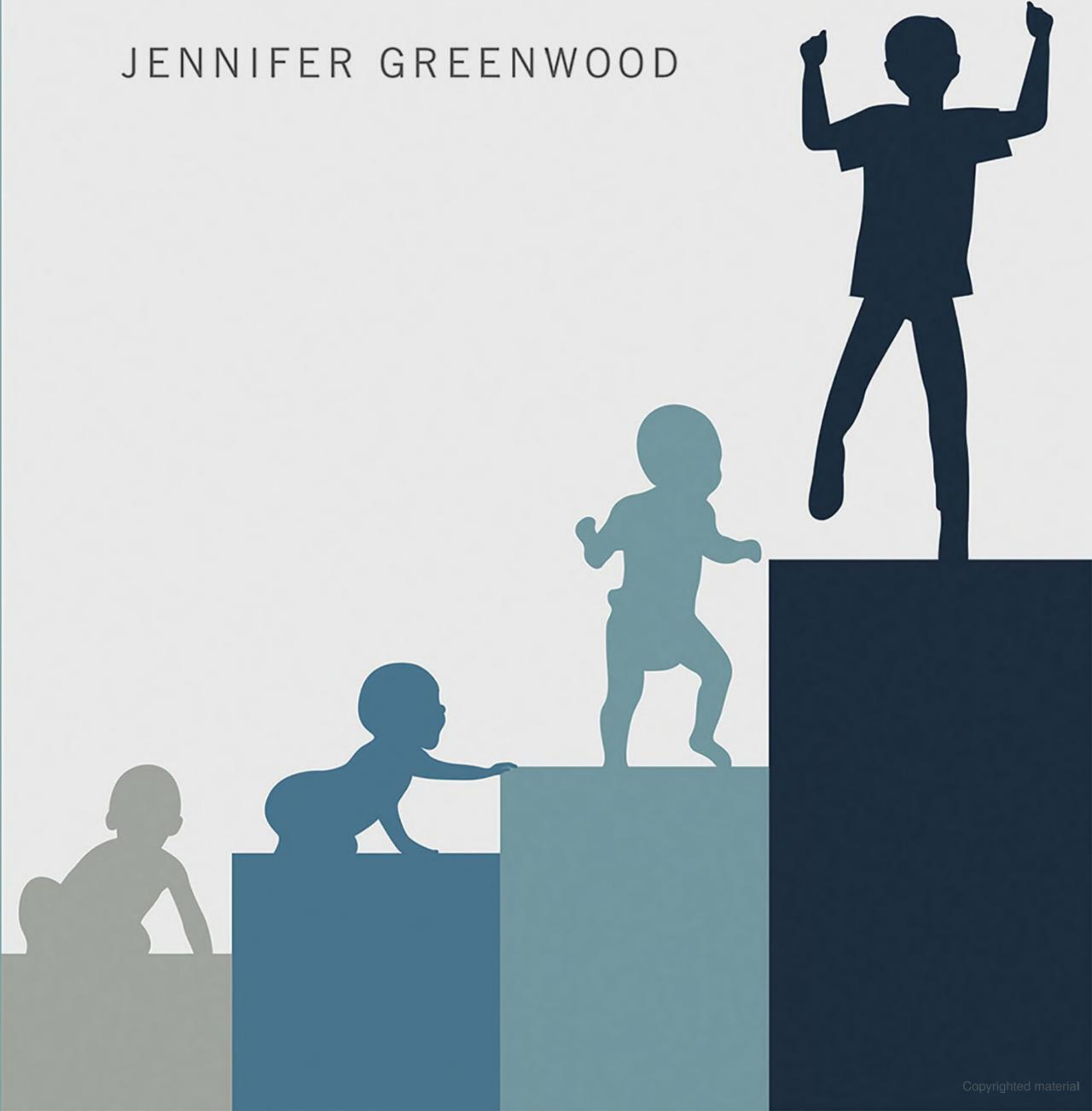
Becoming Human

The Ontogenesis, Metaphysics, and Expression of Human Emotionality

JENNIFER GREENWOOD



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Preface

There are a number of interesting debates in contemporary emotion theory and a similar number in philosophy of mind, but two tend to stand out: the nature–nurture debate in emotion theory and the intracranialist–transcranialist debate in philosophy of mind. Theorists in emotion theory argue that emotions are either predominantly inborn, biological, or "natural" devices or predominantly learned, cultural, or "nurtured" devices. Intracranialist theorists in philosophy of mind argue that cognition takes place entirely in the head, and transcranialists argue that it can and frequently does take place in cognitive systems that extend into the natural, technological, and sociocultural world. This book has an important contribution to make to both debates. It demonstrates clearly that the nature–nurture debate is unfounded; biological and cultural resources are deeply functionally integrated throughout the development process. It also demonstrates clearly that human emotional and language development is a transcranialist achievement; human ontogenesis takes place only in extended cognitive systems that include environmental, technological, and sociocultural resources.

This book tells the story, the quite wonderful story, of how each one of us becomes a full human being. It tells the story of how human brains are constructed and how these brains acquire their contents through massive epigenetic scaffolding. The process of becoming fully human takes some twenty years to (almost) complete. This should be unsurprising.

Consider the human newborn. This newborn is the most dependent of mammalian newborns; she is minimally equipped with emotional, linguistic, and cognitive precursor preadaptations that function as assistance- or attention-soliciting devices to attendant caregivers. She is barely sentient, sensitive only to absolute stimulus thresholds that signal internal homeostatic conditions (e.g., water depletion) and external environmental conditions (e.g., loud noises). In addition, she is born into the most complex and challenging physical, technological, and social environments on earth. Yet, in some twenty years' time, this creature will become an entirely independent, autonomous agent, fully sapient, who emotes, thinks, and communicates in ways typical of, or unique to, her species and culture. What this implies is that the human newborn is a highly efficient learning machine.

Investigation into the "design specification" for this human learning machine demonstrates its remarkable elegance and economy. It includes a neonatal repertoire of minimal inborn coarse-grained constraints and capacities, a perfectly complementary repertoire of coarse-grained maternal constraints and capacities, and a range of neurochemicals that fuel the interaction of these two repertoires. The equipment of minimal coarse-grained capacities in both partners allows their progressive and flexible epigenetic fine-tuning. This flexibility allows the infant to adapt to the increasing complexity of her physical and social worlds as a result of increasing mobility and sociality. Limiting inborn resources to a minimum ensures that the infant can attend to only a minimum number of stimuli and exercise only a minimum number of capacities. This ensures that she focuses only on such stimuli and capacities to learn, respectively, how to recognize them and to practice their exercise. The maternal constraints repertoire ensures that the mother learns to respond promptly and sensitively to the infant's assistance- and attention-soliciting needs. The mother is, of course, equipped with the full repertoire of human capacities that the infant must learn during development, and the mother's constraints repertoire ensures that she has the motivation to help the infant learn them.

Endogenous opioids and prosocial neurochemicals are released during the mundane caring and nurturing activities that continue day in, day out, during the first year and beyond. What would inevitably be construed as tediously repetitive and sometimes even unappealing caring activities are rendered delightful through the release of these neurochemicals. They induce strong prosocial and bonding feelings in both partners to ensure that a close, linguistically mediated relationship develops between them. The mutual delight and developing relationship ensure that the interaction continues for the length of the developmental period. These neurochemicals also excite intraneural genetic products into neurogenesis and circuit

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Material from these two articles has been included mainly in chapters 3 and 4 of this book.

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1 Introduction and Chapter Outlines

1.1 Introduction

All the world's a stage
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts,
His acts being seven ages. As, first the infant,
Mewling and puking in his nurse's arms.
And then the whining schoolboy, with his satchel
And shining morning face, creeping like snail
Unwillingly to school. And then the lover
Sighing like furnace, with a woeful ballad,
Made to his mistress' eyebrow.

—Shakespeare, *As You Like It*

This monograph tells the story of how a mewling, puking infant becomes an unwilling schoolboy and, eventually, a ballad-creating lover, but it is also a story that demonstrates, possibly surprisingly, just how important mewling is to development. It is a story that focuses on the development of human emotionality, but—because they are so closely connected, indeed, often develop concurrently—it is also a story of how the mewling infant becomes an articulate natural-language speaker (and, by implication, a symbolic thinker). Human infants and children learn to emote, to think, and to speak largely through the same developmental mechanisms and at the same time. It is really a story, therefore, that demonstrates how exquisitely the human newborn is minimally prepared biologically for a life of learning, a life of culture.

The epigenetic development implied in the last sentence should not be construed as sequential, that is, as first genetic and biological, and second environmental and cultural. Such a construal is typical of current orthodoxy in philosophy and psychology of emotion, and this is precisely one construal this book has been written to challenge. Contemporary orthodoxy in emotion theory construes emotions as falling into two distinct groups, one being largely innate, the basic emotions, and the other being largely socially constructed, the higher cognitive emotions. In addition, current orthodoxy construes emotions as operating primarily in psychological economies, that is, as operating primarily to benefit the subject-emoter and, as such, as individualistic. Individualism (or internalism) in philosophy of mind views the structures and processes that exist to determine and support emotional ontogenesis and experience (i.e., the underpinning metaphysics), and, indeed, mentality more generally, as being located entirely within the individual agent, in her brain and nervous system. In this book, I also argue that both of these construals are mistaken. I argue that basic emotions and, subsequently, higher cognitive emotions develop from inborn emotion precursors (affect expressions) and, further, operate primarily in social economies to enable human social life, first through interpersonal regulation and subsequently through intrapersonal regulation. In light of this, I also argue that the structures and processes that determine and support emotional ontogenesis and experience, and mentality more generally, extend beyond the brain and nervous system of the individual emoter-cognizer into her social and physical environment. The book therefore offers a novel theory of emotional ontogenesis, within the context of human ontogenesis more generally, and a metaphysics consistent with it.

I begin the story with the broadest of brushes to enhance its accessibility to what I hope will be a multidisciplinary readership. I become more fine grained later in this chapter and, more especially, in the chapters that follow.

The human neonate is the most immature of mammalian neonates, especially in terms of neurological and motor development. Her neurological development at birth is just sufficient to support an extremely limited repertoire of primitive emotional (affective), communicative, and cognitive capacities. She depends completely on others to provide for her basic needs, such as nutrition, warmth, and intimacy. To ensure that such needs are provided for, the neonate's primitive inborn capacities function as signals of relative physiological and psychological well-being. They signal to attendant caregivers that something of salience to the infant's well-being is being experienced, for example, that she is cold, hungry, uncomfortable, and so on. I term these primitive capacities *assistance-soliciting* (or *producer*) *devices*. In addition, and as an additional safeguard, her primary caregiver (typically her mother) is preadapted with a complementary repertoire of dispositions and skills, collectively termed intuitive parenting skills, that enable the caregiver to diagnose what is ailing or pleasing her infant and provide whatever assistance is required to remediate or prolong it. I term these dispositions and capacities *assistance-providing* (or *interpreter*) *devices*. Both of these repertoires are preadaptations, that is, the results of an evolutionary process of natural selection. Natural selection thus equips the human neonate with a range of assistance-soliciting devices, and her primary caregiver with a wonderfully complementary range of assistance-providing devices, to ensure the infant's survival and well-being. This is the proper function of such devices, the function they were selected for.

This barely sentient creature, however, is born into the most complex environment on earth, typified by apparently accelerating physical, social, and technological change. Despite the complexity of the environment, within sixteen to twenty years, the infant has morphed into a fully sapient, independent agent who emotes, communicates, and thinks in ways unique to, or typical of, her species and culture. She responds appropriately to the continuously changing exigencies of her environment. This results from the continuous interaction of the preadapted constraint repertoires of neonates and primary caregivers that bootstraps this development.

The constraints (assistance-soliciting devices) with which neonates are preadapted are minimal in number and extremely coarse-grained or general-purpose. They include primitive affect expressions (e.g., unfocused crying, motor unrest) that point to or express *something* of salience to the infant's well-being to attendant caregivers. As such, these are ostensive-expressive devices (ostension = to point to). As general-purpose capacities, they do not signal what the *something* is; caregivers have to discover this for themselves and correct it. Inborn constraints also include certain sensorimotor competencies, such as a preference for human(like) faces and voices. Such inbuilt human emotionality from emotion precursors (affect expressions) and in the development of segmented speech from a range of nonlinguistic and linguistic precursors. It is the very tightness of the constraint repertoires and the most protracted, highly dependent childhood on earth that enable the development of fully flexible thought, intrapersonal control of emotion, and full natural language. This is not to suggest that nonhuman animals do not "emote" in a manner appropriate to their lifeways; indeed, it is their supposed similarity to one group of human emotions, namely, basic emotions, that led to the construal of homology between animal and human emotions. It is to suggest, rather, that full *human* emotionality is language dependent.

It has been recognized since the 1960s that a close, linguistically mediated social relationship is the most significant factor in the development of distinctly human capacities; if denied this sort of relationship, human neonates and children will fail to develop into normal human adults. Scholars from a range of disciplines have contributed explanatory insights into this phenomenon, but few have shared their insights across disciplines. I think the single-discipline approach is understandable but regrettable; cross-disciplinary interaction lends breadth to research, as I hope this book bears witness. It is informed by insights harvested from philosophy and psychology of emotion, developmental psychology, metaphysics, biosemantics, and psycholinguistics that have usefully cross-fertilized. In this respect, my approach is consistent with that of two giants in philosophy. It is consistent with De Sousa (2014), who suggests that philosophy of emotion is vastly enriched by the relevant empirical literature. It is also consistent with Millikan (1984, 2004), who eschews conceptual analysis and philosophical argument concerning abstractions in favor of theory construction concerning exactly how people interact with their environments to create meaning and reference in thought. Research like mine sets out to construct just such a theory.

As a result of my interdisciplinary approach, I have come to construe emotion precursors and their affect expressions as being at one end of a continuum of increasingly complex ostensive-expressive devices; emotion precursors and discrete emotions are all ostensive-expressive devices of differing levels of specificity and sophistication. In addition, I construe the species-typical behavior patterns of human neonates that are present at birth or develop soon afterward also as being at one end of a continuum of ostensive-expressive devices, which develop through gestures and pragmatic foundation to end in full natural language. Relatedly, I construe emotion precursors and species-typical behavior patterns as referentially opaque expressions of homeostatic and physiologic status, the referential opacity decreasing progressively as caregiver behavior shapes the development of discrete emotions and language. Increasing referential clarity is acquired in both basic emotions and higher cognitive emotions with the assistance of language. In terms of language, referential clarity increases in the development of gesture, pragmatic foundation, and, finally, semantic language devices. Continuity is also reflected in the development of the neural substrata on which this continuum of ostensive-expressive devices partly supervenes. Each stage on the continuum represents a move away from fixed to highly flexible responses to salience (or relevance) detectors. The continuum begins in an extremely limited range of biological salience detectors (e.g., homeostatic absolute stimulus thresholds) and ends in a huge range of learned and considerably less obvious salience detectors (e.g., linguistic strings). All these responses to salience detectors are, of course, salience expressive.

Given these views on ostensive-expressive devices, another feature of my theorizing is my insistence that they are all intentional devices, even if, like emotion precursors and species-typical behavior patterns, only minimally so. They are intentional devices because they coevolved with the devices that use or consume them to the benefit of both. It was Dawkins (1986) who observed that sometimes traits are so perfectly complementary and integrated that "design" has to be implicated.

What the foregoing discussion also implies is that I construe all human communication to be essentially inferential; linguistic coding is clearly involved, but it enters inference processes as evidence of meaning just like nonlinguistic evidence. I think inference (albeit of a very simple kind) is involved in all mammalian communication.[2] Vervet alarms, for instance, communicate to conspecifics that a predator is approaching, but the conspecifics have to see where the communicating vervet is looking to discover from which direction the predator approaches. They also have to look at her facial expression to see how close the predator is (i.e., how alarmed she is). Human natural language relies on inferencing processes, too, but much more sophisticated and complex inference processes. In addition, and relatedly, I construe all communication, in terms of both production and comprehension, as irredeemably context sensitive. What all of this leads to is my conviction that human emotionality, language, and thought are overwhelmingly learned capacities. I argue that the human neonates' very few biological preadaptations equip them perfectly for development in a social environment replete with sensory-perceptual stimulation and symbols.

My research has also led me to a rather atypical view of epigenetic behavioral scaffolding. Epigenesis can suggest that behavioral development involves a process of transformation from imperfect, immature precursors into the more perfect, more coordinated, and finely tuned behavioral repertoires of adults. This view is generally attended by a construal of scaffolding as external adult support, for example, when an adult holds the baby upright to enable "walking." The support is always unidirectional, that is, from adult or adult-provided physical support structure to child and, as such, is always controlled by the adult. Of course, human adults do provide this type of scaffolding, as my walking example demonstrates. This is not the only type of scaffolding they provide, however, or the most important. The type of scaffolding that is crucial to human development involves the interactions of neonatal and maternal constraint repertoires, noted earlier, which provides the context for the development of progressively more advanced forms of behavior (and the neural substrata on which they supervene) in *both* partners, but to differing degrees. Both partners are jointly involved in the interaction and its control. For ease of reference, I term external adult scaffolding of the "walking" variety *Scaffolding 1*, and the coconstructing interactive variety *Scaffolding 2*.

Given that my account includes terms such as *preadaptation*, *biological equipment*, and others, it is worth emphasizing that it reflects a merely minimalist construal of nativism and utterly rejects genetic determinism. Nativists are inclined to view genes as specific instructional causes of maturation with environmental factors featuring merely as background or permissive causes. This is not the position I take. My position is that neonates possess what Perovic and Radenovic (2011) term *biological prerequisites* of maturated neurological centers that are present at birth or, more likely, emerge postnatally. These maturated neurological centers enable learning and are the result of genetic, epigenetic, and environmental instructive influences, as my account of emotional and language development illustrates. My position, therefore, is consistent with that of Perovic and Radenovic (2011), who characterize development as including two "segments," namely, a maturational segment followed by a social segment. In the maturational segment, biological processes interact with epigenetic and environmental processes to produce neural circuits or "endogenous biological machinery" (Perovic and Radenovic 2011, 399). In the social segment, which kicks in after the prerequisite neural circuits have been sufficiently maturated, learning is enabled also via biological, epigenetic, and environmental factors. The point is that learning cannot take place until these centers are developed. The distinction, therefore, does not depend on the relative primacy of genetic, epigenetic, or environmental influences; rather, it depends on the distinction between the processes and capacities that require learning and those that do not. This entire book, in particular chapters 4 and 5, is entirely consistent with this view:

> Everyday activities and routines in which a caregiver regulates child's eating, sleeping, levels of arousal, and the like are environmentally as well as biologically based processes necessary for the development of brain centres responsible for language learning or social cognition. Such social environmental causes are indispensable for the development of the brain structures after the child is born, as are the inner genetic and epigenetic (biological/environmental) processes in the prenatal period. Even so, the brain structures necessary for learning are not a result of the learning process which is virtually non-existent before the development of these centres is finalised. (Perovic and Radenovic 2011, 413)

The development of these views has led to an increasingly radical externalism in my theorizing. I was recruited to First Wave Extended Mind (EM), a progeny of mainstream functionalist information processing, by Clark and Chalmers's (1998) landmark paper "The Extended Mind," and like a number of First Wave enthusiasts, I have morphed into Third Wave via Second Wave. First Wave EM was based on a parity principle, that is, on functional isomorphism, and the Second Wave was based on the principle of complementarity, both parity and complementarity relating to biological and non-biological elements in cognitive states and processes. Third Wave theorists construe First and Second Wave theories as presupposing that internal and external resources are fixed and noninterchangeable (Kirchhoff 2012). In addition, these theorists also suggest that Second Wave presupposes that sociocultural resources augment but do not significantly transform the brain's representational capacities during development. Third Wave theorists deny this idea.

Theorists who favor the complementarity of internal and external resources, which include sociocultural and natural environmental resources, construe them as deeply functionally integrated and as playing complementary roles in extended cognitive systems. Complementarity, therefore, is clearly a matter of degree. My own research focuses on the extremely deep and complex functional integration of neural and sociocultural resources that actually build and furnish brains, and to this extent my argument here is broadly consistent with Third Wave.

According to Clark, in a number of publications, mind "leaks" or "spills" into world, an idea that implies that extension is unidirectional, from mind to world. Clark (1997) does acknowledge world-to-mind extension, too, notably in his construal of continuous reciprocal causation, but his "leaking" and "spilling" metaphors are what apparently inform the standard view of EM; see chapter 3 in this book. My research demonstrates a reciprocal world-to-mind extension, and because of this I have deliberately replaced the term *EM* with leading intracranialists' term of abuse "contingent transcranialism" (CT) to signal my rejection of an implied mind-to-world unidirectional extension. I argue that there is a world-to-mind extension, and I use human emotional ontogenesis and language development as my examples.[3] I argue that the synchronous modulation (Scaffolding 2) of neonate and maternal activity that develops during emotional ontogenesis and language development and results in neurogenesis and neural connection is a world-to-mind transcranial achievement. In light of the degree of deep functional integration (DFI), which includes (contingent) transcranial processes, I replace EM with DFI with CT.

The research has taken five of my ten years' training in philosophy, during which time changes in construals regarding emotion, metaphysics, and language processing, in particular, have apparently accelerated. I briefly outline these various construals and show how they relate to my own theorizing in the chapters that follow. The sequence of these chapters is, of course, deliberate. I separate my chapter on metaphysical realization and function to present the monograph in what I hope are digestible bite-sized chunks. In addition, function and biosemantics appropriately fit between chapter 5, "Out of the Mouths of Babes and Sucklings," and chapter 7, "Loose Talk, Tight Worlds."

so entrenched that scholars are beginning to talk of stalemate. My view is that Extended Mind theorists have failed to disarm the intracranialist challenge because they have failed to explicate precisely the nature of the deep functional integration on which their claims to vehicle or locational externalism depend and, in light of this, provide compelling examples of it.

Intracranialists accept that much of cognition is heavily scaffolded by extracranial technological, natural environmental, and sociocultural resources, that is, by Scaffolding 1. It is the metaphysics of externalism with which they take issue. Indeed, by misconstruing the nature of the external scaffolding of cognition, intracranialists claim that Extended Mind theorists make a number of errors:

(i) They fallaciously conflate causal coupling with constitution.
(ii) They fail to recognize the mark of the mental.
(iii) They are methodologically mistaken.
(iv) They view mind always as extending unidirectionally, that is, as mind extending into world.

Beginning in this chapter and continuing in all subsequent chapters, I argue that intracranialists are mistaken on all four counts. My analytic tool for this discussion is that of metaphysical realization. I briefly contextualize my discussion of metaphysical realization with a short history of the individualism–externalism debate and proceed to explicate R. A. Wilson's (2004) views on context-sensitive realization. This systematic treatment of metaphysical realization permits an analytic precision that might otherwise not be achieved. It provides a context-sensitive view of realization, which is the only one compatible with the theory of emotional ontogenesis I develop. I apply this analytic tool to two types of augmentations that transcranialists claim can extend cognitive systems, namely, technological and natural environmental systems. I conclude the chapter with Rupert's (2004) comparative analysis of the hypothesis of extended cognition versus the hypothesis of embedded cognition; this provides a useful summary of the main points of contention between intra- and transcranialists, as well as further opportunity to press the transcranialist case.

1.2.3 Chapter 4: Mirror, Mirror … Human Emotional Ontogenesis

This chapter focuses on human emotional ontogenesis. It draws heavily on empirical research from developmental psychology and the relevant cognitive neurosciences to address the limitations of traditional views of emotionality. It identifies the range of constraints in affect expressions and sensorimotor competencies and intuitive parenting skills, respectively, with which neonates and primary caregivers are preadapted and how they interact. It demonstrates how caregivers shape discrete emotions, in both BEs and HCEs, starting from referentially opaque affect expressions.

The depth of the complementarity, complexity, and integration of these in the neonate's emotional developmental trajectory become evident during the extremely detailed analysis. I include this level of detail to preclude any intracranialist denial of DFI with CT in this example. I argue that the repertoires of constraints are perfectly complementary and enable the development of the very close, linguistically mediated social relationship on which emotional ontogenesis so crucially depends. This relationship provides the context in which infants learn which stimuli cause which responses, their differential phenomenologies, and what they are called or termed in the embedding culture.

This analysis provides grounds for my claims that (i) emotions are ostensive-expressive devices that evolved to enable mammalian, including human mammalian, social life; and (ii) the same developmental mechanisms (and relationship) underpin the development of basic emotions from emotion precursors and subsequently to higher cognitive emotions. It demonstrates clearly that human neonates are biologically prepared for culture and that Scaffolding 2 is operational in human emotional ontogenesis. The analysis also subverts previous claims that the origins and development of BEs and HCEs are so different that emotions cannot form a natural kind.

Chapter 4 is meant to highlight the depth of the functional integration of intraneural and external sociocultural resources in emotional ontogenesis for which both neonate and caregiver are genetically preadapted. My analysis thus shows that there is no causal coupling–constitution fallacy operational in my theorizing about emotional ontogenesis.

1.2.4 Chapter 5: Out of the Mouths of Babes and Sucklings

This is a second chapter on emotional ontogenesis, and given that full human emotionality in both BEs and HCEs is language dependent, I also address the acquisition of language (and, by implication, the attainment of symbolic thought). As such, the discussion demonstrates, again, by including the same level of detail as in chapter 4, and for the same reason, the depth of complexity, complementarity, and integration, that is, DFI with CT in human ontogenesis.

My analysis focuses on species-typical behavior patterns (STBPs), which are innate or develop soon after birth, and how these provide the basis for the development of language. I argue that the linguistic environment into which human neonates are born and the complementary repertoires of neonatal STBPs and maternal intuitive parenting skills provide the necessary and sufficient conditions for the construction of a pragmatic foundation into which a semantic lexicon will subsequently be incorporated.

The analysis demonstrates the singular importance of "punctuated" suckling, a type of suckling that is unique to our species, which sets up the basis for joint attention and the development of different types of gestures. I argue that the importance of both turn taking and joint attention (which is also unique to our species) is underestimated in the relevant literatures; turn taking provides the time to imitate and practice new behaviors, and joint attention is hugely influential in speech production and comprehension.

It also demonstrates the importance of "motherese" in establishing the child's pragmatic framework. Exaggeratedly succinct maternal utterances, which emphasize clause boundaries and the prosodic changes that occur naturally at them, and maternal mirroring (and correction) of the infant's or toddler's "words," enable the construction of the pragmatic foundation of communication. The child naturally imitates mother's interactive timing, clause boundary recognition, and the rhythms, stresses, and intonations associated with commands, requests, statements, and questions. These are repetitiously practiced day in, day out, in mother-child interaction. I argue that before the child can comprehend and produce her first word, she can engage in "conversation" with adults. She can distinguish different linguistic devices in the utterances of adults and produce them herself by varying the pitch, volume, and rhythm of her own vocalizations.

This chapter once again demonstrates the depth of functional integration of internal and external resources in language development, for which both neonates and caregivers are genetically preadapted. It reinforces my rebuttal, in chapter 4, of the alleged intracranialist causal coupling–constitution fallacy.

1.2.5 Chapter 6: From Evolution to Emotionese

The analyses in this chapter support my arguments for the DFI with CT of emotional ontogenesis and language development, but they also do something more (or more explicitly than previous analyses): they demonstrate the complexity of the DFI that operates between intraneural and external resources. In addition, whereas chapters 4 and 5 rebutted the causal coupling–constitution fallacy claim, this chapter also rebuts the claim that transcranialists fail to recognize the mark of the cognitive.

In previous chapters, I noted that affect expressions and species-typical behavior patterns of human neonates are the results of brute physiological processes that are interpreted as—that is, function as—signs of physiological or homeostatic status by preadapted caregivers. That this is universally the case points to a selectionist history; affect expressions and species-typical behavior patterns (STBPs) are produced by devices that were selected for in ancestral environments (and continue to be selected for) because they conferred (and continue to confer) a fitness advantage on their bearers. Given this history, the chapter focuses on function and biosemantics (a naturalistic theory of how mental states acquire their contents or meaning, i.e., their intentionality).

The theory of function adopted is that of Millikan (1984) on proper function; I discuss direct proper function, and because they are so explanatorily powerful with respect to biological and cultural devices alike (and thus fit so well with my theory), I also discuss relational, derived, and adapted proper functions. I also use Millikan (2004) to analyze the relationship of natural, intentional, and linguistic signs and explain how one can emerge from another through a ratcheting process. Natural signs carry locally recurrent natural information; the information carried is recurrent because of the real causal connection between sign and signified. Intentional and linguistic signs carry locally recurrent information, too, but the only information represented intentionally is that which is useful to its consumers. Perception through language, according to this account, is as natural as perception through any other sensory-perceptual modality.

Finally, intracranialists allege that transcranialists fail to recognize the mark of the cognitive, which, they suggest, consists in nonderived representations, possessing intrinsic intentionality, which they further claim are found only in brains. I argue, in the light of this chapter's analyses, that the cognitive is marked by organismal attention to environmental saliences. In addition, I argue that representations are defined by the way they function not just in the head but in wider cognitive systems, which include representation-producing devices, objects in the environment, and representation-consuming devices. The representation-producing device produces representations that run isomorphically to the environmental conditions as defined by a semantic mapping rule, and the representation-consuming device uses this rule to produce behaviors that will be effective only if these environmental conditions obtain. Representations are defined by their proper functions, that is, the functions they were selected to have in their evolutionary past. Intentionality is grounded in external proper relations between representations and their representeds, the term proper being defined in terms of evolutionary history of either the species or the evolving individual (or both). There is nothing in the head, just as such, that displays intentionality.

1.2.6 Chapter 7: Loose Talk, Tight Worlds

In this last research-based chapter, it is entirely fitting that continuity, context, and constraints should feature as strongly as in previous chapters. Continuity is reflected in the move from natural signs (affect expressions and STBPs) to intentional signs (affect expressions, STBPs, gestures, and a range of inflectional and intonational pragmatic features) in previous chapters to linguistic signs (literal, loose, and metaphoric strings) in this chapter. Continuity is also reflected in the processing of linguistic devices in two ways. First, exactly the same processing mechanisms are operational in the processing of literal, loose, and metaphorical expression. Second, the processing involved is like all mammalian communication processing; that is, it is primarily inferential because it is context dependent. Context constrains both language production and interpretation in this account. What this implies is that my approach eschews a construal of human communication as primarily one of encoding–decoding. I argue that the code model of communication massively underdetermines communication interpretation, although human communication frequently includes encoded strings. These, however, enter the inferential process as evidence of meaning in exactly the same way as nonlinguistic evidence. I describe in some detail how a coding model underdetermines meaning, and show how an inference model avoids it.

2 Theories of Emotion

2.1 Introduction

It is consensually agreed that emotions occur at the interface of our internal concerns and the outer world, especially our social world. As such, emotions are essentially what they are in virtue of their relational and functional properties, meaning that their properties can vary according to their relations and the context within which the agent finds herself. An agent can be terrified or mildly afraid of a whole range of objects and events, in a range of conditions that include her current physical and mental states, and a range of environmental, including social environmental, conditions. Emotions are evolved capacities (which may or may not be well designed for the modern world), many of which, scientists traditionally assumed, emerged from inbuilt neural circuits that are homologous in all mammals, others from repeated epigenetic interaction of those circuits with ecological and social environments, and yet others from our distinctly human capacity to semantically conceptualize issues of importance to us. At their most basic, emotions track affect valence and are associated with subcortical limbic structures in both human and nonhuman mammals.

Within both philosophy and psychology, emotions are considered to comprise or involve or essentially be the following:

- Thoughts (propositional attitudes, e.g., judgments, cognitive appraisals, desires) (Solomon 1977, 1993, 2003; Lyons 1980; Lazarus 1991; Arnold 1960)
- Modulation of mental processes (e.g., attention, memory) (Oatley 2004; Oatley and Johnson-Laird 1987)
- Categorization (L. Barrett 2005, 2006, 2009; Lindquist et al. 2012)

- Subjective feelings of pleasure or displeasure (Ledwig 2006)
- Subjective feelings of bodily changes: facial expression, orientation, musculature, visceral organs (Prinz 2004; De Lancey 2002; Griffiths 1997; le Doux 1998; Ekman 1984; Papanicolaou 1989; Zajonc 1980; Darwin 1872/1965; Lange 1885/1922; James 1884)
- Action tendencies (Frijda 1986)
- Interactive orientation devices (Zinck and Newen 2008)
- Paradigm scenario acquisition devices (De Sousa 1987)
- Imagination (Morton 2013)[1]

Although all theorists would agree that these components typify emotional experience, apart from the last one, they disagree on (at least) three issues. First, they disagree about which particular component is the emotion or is essential to emotional experience. Theories range from purely somatic-feeling (e.g., James 1884; Lange 1885/1922) to purely cognitivist (e.g., Nash 1989), with a range of less-radical views intervening, for example, somatic (Prinz 2004; Damasio 1994); and "hybrids" of various composites (e.g., Zinck and Newen's multifactorial theory [2008], Lyons's cognition-feeling hybrid [1980]). Second, theorists disagree about the extent to which emotions are genetically hardwired or culturally and socially constructed. Theorists who opine the former (e.g., Panksepp 1998, 2000, 2007; Ekman 1984, 2004) tend to do so because there is at least some evidence of universal emotion elicitors and expressions and because there is increasing evidence of specific neural substrata for at least some emotions (e.g., fear). Social constructionists, in contrast, deny the existence of universal emotions and therefore of genetic hardwiring. Emotions, to hard-nosed social constructionists (e.g., Harre 1986; Armon-Jones 1986; Averill 1980; Solomon 1977), are socioculturally determined. Third, theorists disagree on whether emotions are natural kinds and on their basicality or nonbasicality. Those who favor emotional natural kinds (e.g., Prinz 2004), or even just a "unified ontological class" (e.g., Zinck and Newen 2008), favor a blending or combination of basic emotions; those who reject the natural-kind status of emotions also tend to reject the blending or combination thesis.[2]

I address these three issues in this chapter. I review (of necessity, not exhaustively) the main theories of emotion, including those that relate to their nature and function, from both the philosophy and psychology of emotion. I show that even if subjective feelings and cognitions are necessary to individuate emotion (and there is evidence that, for some emotional capabilities anyway, they may not be), neither is sufficient. In addition, I show that despite their obvious dissimilarities, they share a number of less obvious similarities related to their foci. They all focus on fully developed adult emotions and on their essential nature, that is, their form. The debate focuses on the essentiality of cognitive judgments, propositional attitudes, perception, and bodily reactions and feelings in adult experience. This is despite consensus that emotions are evolved capacities, the functions of which increased hominid fitness. In addition, this focus on adult emotions persists despite agreement that the emotional repertoires of adult humans and human infants and children vary considerably in both number and complexity. As a consequence, both contemporary philosophies and psychologies miss the point of the emotions and misconstrue their essential nature. They do involve perception, cognition and judgment, and bodily reactions and feelings, to differing degrees and in different circumstances, but they are not essentially perceptive or cognitive devices. In the two chapters that follow, I show that the emotions are essentially ostensive-expressive, that is, communicative devices that evolved to regulate mammalian (including human mammalian) social life, first through interpersonal regulation, and subsequently through intrapersonal regulation. The focus on adult emotionality leads to a mistaken construal regarding the nature of basic emotions and higher cognitive emotions and, as a result, on their basicality or nonbasicality and natural-kind status. I conclude that analyses of emotional ontogenesis should reveal how an extremely limited range of patterns of bodily perturbation refers to, or is implicated in referring to, an extensive range of distinct perceptive-cognitive-affective-behavioral complexes. I begin, however, with some brief, rock-bottom preliminaries related to emotion.

2.2 Emotions: Some Rock-Bottom Preliminaries

The emotions are typically classified into (at least) two basic groups despite the recent challenge to this distinction; see chapter 1. These are affect programs (Griffiths 1997; Ekman 1973), also known as blue-ribbon emotions (Maclean 1990) and basic emotions (J. Clark 2010), and the higher cognitive emotions (Griffiths 1997), also known as higher sentiments (Maclean 1990). These two groups are a function of discernible stages in brain development, characterized by increasing neurobiological volume, complexity, and interconnectedness (Panksepp 1998, 2000, 2007).

2.2.1 Blue-Ribbon, Basic Emotions (BEs)

Basic emotions evolved from primitive reptilian brains, composed almost exclusively of corpus striatum, which still forms the innermost and oldest part of the brain. These reptilian brains controlled the essential life functions of land-based vertebrates, such as choice of home site, choice of mate, territory defense, flocking, and daily routines. Daily routines include waking, local foraging, defecating, returning home, and settling to sleep. Neural circuits arising in this ancient part of the brain control reflexive affects, a group of eruptive and transient responses that are closely tied to precipitating environmental conditions, such as startle, gustatory disgust, pain, and the various homeostatic distresses (e.g., hunger, thirst) and pleasures (e.g., good tastes).

Essential life functions and reflexive affects are governed by reactive representations that register states of the environment and trigger appropriate fixed responses. The connections between registration and response are simple and hardwired; the creature that possesses only this type of representation, therefore, is completely under environmental control (R. Wilson 2004).

Basic emotions, that is, those typically thought to include (but see Prinz [2004] for an interesting alternative view) fear, anger, sadness, joy, affection, and interest, can markedly outlast precipitating environmental (and, in humans, internal precipitating) conditions. They are governed by a set of neural circuits in intermediate areas of the brain (Panksepp 1998, 2000, 2007) and are conceptualized as sensorimotor command circuits.[3]

The cortices of mammals orchestrate the complex and coordinated behavioral, physiological, cognitive, and affective responses characteristic of fear, anger, and so on. In terms of complexity, they involve several expressive elements in, for example, changes in facial musculature, musculoskeletal functioning (e.g., flinching), orienting, expressive vocal changes, endocrine system changes, changes in autonomic nervous system (ANS) activity, subjective feelings, and a range of cognitive phenomena, such as directing attention. In terms of coordination, various elements co-occur in recognizable patterns or sequences, and in terms of automation, they unfold without need for conscious attention (Ekman 1984).

Symbolic representations enable language, a social life governed by convention, and rich cultural traditions. The HCEs presuppose language, since they can be experienced only by creatures with the ability to semantically conceptualize; for example, shame minimally presupposes the conceptual grasp of self and responsibility for transgression. In addition, the cultural traditions that structure human social life account for differences in their fine-grained natures and the relative plasticity of their expression. What HCEs an agent experiences, therefore, are a function of her language and culture.

It is worth noting that higher brain functions are not essential for generating feelings. There is evidence that direct neocortical stimulation fails to generate affective states, but the evidence that various brain stem areas mediate affect is substantial. Damage to cortex only modulates the degree of emotionality, not the ability to have emotional feelings (Le Doux 1998). Clearly, what the cortex allows is ever-more-sophisticated ways for organisms to regulate their emotions (and, in human beings, how this ability develops, and the neurogenesis on which it is based, will be described in subsequent chapters).

2.3 The Functions of Emotions

Emotions are considered to have at least two functions: first, to monitor the environment and orchestrate the most appropriate response; and second, to enable the development and maintenance of social relationships. In terms of monitoring the environment and orchestrating the most appropriate response, emotions bring an animal's attention to relevant environmental properties and mobilize resources to deal with them (Frijda 1994; Scherer 1994):

- Some neural circuits are hardwired to solve specific adaptive problems (Panksepp 1998, 2000; Cosmides and Tooby 2000) and, when simultaneously activated, could deliver outputs that conflict, for instance, sleep and flight from a predator. To prevent such conflicts and maximize chances of survival, superordinate programs are developed that override some programs when others are activated.
- Some adaptive problems are best solved by simultaneous activation of many different neural circuits; for example, predator avoidance may

require simultaneous shifts in both heart rate and auditory acuity. Superordinate programs are required to activate and coordinate these differing circuits.

Emotions provide such programs; they are adaptations that have arisen in response to the adaptive problem of mechanism orchestration (Cosmides and Tooby 2000). This (probably) obtains for all vertebrate species.

More important for this monograph, however, is the function of emotion in enabling the development and maintenance of social relationships:

- Many emotions produce characteristic species-typical displays that broadcast to conspecifics the emotional state of the signaler (e.g., "I am afraid") and the identity of the recurrent evolutionary situation being confronted (e.g., "danger, above, in the local environment"). Many emotional expressions appear designed to be informative, and these have been so reliably informative that conspecifics have coevolved the appropriate response programs.

Vervet monkeys, for instance, use three distinct vocal-gestural alarm signals when threatened by predators. One alarm signals "snake," another signals "eagle," and a third signals "leopard." These different vocal-gestural alarms elicit the appropriate defensive responses in conspecifics, either to take to the trees or to take to the undergrowth. In addition, human beings have coevolved automated "interpreter" circuits to decode public facial displays of emotion into knowledge of others' mental states (Ekman 1984; Darwin 1872/1965), and when they cannot or will not verbalize intense emotion, they elicit from others typical comforting behaviors (e.g., hugging, kissing). It is also the case that smiling is a universally recognizable signal of readiness for friendly interactions (Izard and Ackerman 2000, 258).

- Facial expressions are required for normal attachment in infants and for attachment in courtship. Infants born with congenital facial paralysis have enormous difficulties forming any sort of social relationship. Facial expressions are also required to regulate aggression (Ekman 1984).
- People with emotional deficits due to damage to prefrontal cortex, for example, Phineas Gage, have considerable difficulty in making plans that involve others (Damasio 1994).