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Evolutionary and Developmental Homologies between Basic and Higher-Cognitive Emotions

The central claim of my talk will be that many so-called higher-cognitive emotions have more basic forms that are homologous with them at multiple levels. These more basic forms appear early in phylogeny and ontogeny and are systematically transformed into their higher-cognitive forms via their integration with more sophisticated socio-cognitive capacities that emerge later in development and evolution. The parallels between evolution and development in the emergence of HCEs are striking, and suggest that earlier and later forms of these emotions are developmental homologues, or as I prefer to say, are “homologous at the developmental level”. I will focus on three emotions: pride, shame, and disgust. I also maintain that these homologies between earlier and later emerging forms of many emotions are best construed as serial homologies. The application of the serial homology concept to psychological traits is novel and I address a number of questions and problems associated with it.

Phylogenetic homologies between basic and higher-cognitive emotions

It is common to divide emotions into basic emotions (BEs) and higher-cognitive emotions (HCEs) based on their level of involvement with sophisticated social and cognitive capacities. Two sources of evidence that are frequently cited for the BE/HCE distinction are phylogenetic and ontogenetic discrepancies in the appearance of BEs and HCEs—HCEs are held to develop, and to have evolved, later than BEs. In both lines of reasoning, it is the (evolutionary or developmental) emergence of higher-cognitive capacities that is thought to underlie or constitute HCEs.

BEs are typically seen as evolutionarily ancient sets of stimulus-detection mechanisms and stereotyped physiological and behavioral response patterns supported by specialized neural circuits, with a genetic basis that has evolved in response to recurrent environmental challenges, and which we share with nonhuman mammals. These patterns are capable of being activated by unconditioned stimuli and lead to unconditioned, involuntary responses of brief durations. HCEs on the other hand are held to require complex cognitive capacities not present in other species (such as means-end and counterfactual reasoning, long-term planning, social cognition, a ToM, etc.), and to be constituted primarily by cultural and cognitive factors. HCEs are also alleged to lack many features of BEs such as characteristic physiological and neural components.

Contrary to assumptions that emotions like pride, shame and higher-cognitive forms of basic emotions (e.g., moral disgust or moral anger/outrage) lack the central features of basic emotions, recent preliminary evidence questions this assumption, and an increasing number of authors are converging on the conclusion that such HCEs are homologous to more basic forms of these emotions in other animals. Both pride and shame appear to have characteristic, universal whole body expressions, distinctive

physiological correlates, distinct neural correlates, distinct behavioral patterns and deeply rooted, evolved social functions centering around status hierarchies. These features also characterize related emotions in other animals that are concerned with hierarchical dynamics: displays of dominance status in animals strongly resemble pride displays in humans, while appeasement displays strongly resemble shame. Because status in other animals is determined primarily by dominance, I have called these forms dominance-pride and dominance-shame.

In humans, dominance-based status is complemented by prestige-based status. Henrich and Gil-White define prestige as a form of status resulting from freely conferred deference which evolved in order to facilitate the transmission of information by cultural exchange. Prestige is a form of ‘nonagonistic exchange between individuals with differing assets, skills or resources’ in which social learners show deference towards successful, skillful individuals in order to gain proximity and the opportunity to emulate and acquire information relevant to their success. Prestige hierarchies can only arise once certain HC capacities are in place, such as ‘infocopying’ which in turn involves such things as ‘true imitation’ that are unique to humans. In such contexts, status is associated with high performance relative to social standards, and pride is elicited in situations in which the actor succeeds in the performance of socially valued activities, or in acquiring socially valued goods and traits, whereas shame results from failures in prestige contexts, and also as an appeasement gesture involved in showing deference.

Unlike dominance-based status, prestige is granted to the actor by the observer, rather than being attained through force. Prestige-based pride and shame also share expressive, behavioral, physiological, neural, etc. features with dominance-based forms of these emotions, and in prestige contexts, pride and shame serve functions which overlap with their dominance-based forms at a higher level of generality (e.g., hierarchical dynamics). These overlaps are sufficient to ground a prima facie case for homologies between the basic and more complex forms of these emotions. Importantly, despite such similarities prestige-based emotions have also acquired new and distinct functions related to prestige-based dynamics, where both the means of achieving status and the subsequent psycho-social outcomes are significantly different. I have called these prestige-pride and prestige-shame.

Disgust offers us another angle on the same problems. Recent research broadly converges on a tri-partite division of disgust into pathogen, sexual and moral forms, each with its own task demands related to the avoidance of toxins and parasites, the avoidance of sub-optimal mating choices, and the avoidance or punishment of moral violators, respectively. Pathogen disgust appears to have been primary, with specialized forms of sexual disgust co-opting the features of pathogen disgust very early in evolution, followed later by the co-optation of the features of more basic forms of disgust into moral disgust.

Whereas solving the problems related to pride and shame require the identification of basic forms of these emotions, in the case of disgust, the basic emotion is well established and the challenge is to demonstrate that this basic form is genuinely homologous to its higher-cognitive form. Many have argued that moral disgust is merely a metaphorical extension of basic disgust; i.e., that moral disgust neither evolved from, nor shares the characteristic features of basic disgust. However, recent evidence indicates that moral disgust involves the expressive, behavioral, physiological, and neural features of basic disgust, as well as similar learning mechanisms, thus supporting a claim of genuine homology.

Developmental homologies between basic and higher-cognitive emotions

In addition to such evolutionary relationships, the developmental literature also supports strong connections between early-emerging forms of these emotions and their later-emerging HC forms. This is in contrast to claims that whereas basic emotions very early, and with little social input, HCEs emerge de novo late in development and both require and are primarily constituted by HC. While many developmental psychologists do indeed claim that ‘pride’ and ‘shame’ only emerge later in development, a simplistic reliance on such conclusions obscures the fact that most of these theorists also emphasize a strong continuity between these emotions and various precursors to them earlier in development. Viewed in context, the pronouncements of developmental theorists on this point are better regarded as a semantic device for marking off the differences between earlier and later forms of “the same” emotion at different stages, differences which almost all acknowledge.

Michael Lewis, for example traces a multi-stage developmental progression from simpler forms of various emotions to their HC forms. He distinguishes between basic emotions, self-exposed emotions, and self-evaluative emotions, each involving increasingly sophisticated forms of cognition related to awareness of one’s own self and that of others, and the related capacities for understanding and internalizing social norms. For example, shame begins in ‘self-exposed’ embarrassment that requires little cognition, from which a more sophisticated self-evaluative embarrassment follows, which in turn gives rise to shame proper. This progression involves multi-directional interactions between HC and emotions, each of which helps to bootstrap the other.

Offering a ‘component systems’ account of emotional development, Mascolo & Harkinsⁱ argue that pride and shame do not emerge fully formed, but rather manifest first in simpler forms, which grow more complex with age and experience, and as a result of the ‘emotional scaffolding’ provided by parents. Pride behavior, for example initially occurs in response to the awareness of simple action-effect contingencies, and becomes more sophisticated as the child develops awareness of the self as an agent of outcomes, as a competent agent, and the ability to make comparative assessments of the self. They support this with their own study of the development of pride-related behaviors which showed a trend towards greater complexity in children’s pride-relevant behaviors with age, both before and after success.

Parkinson offers a “transactionalist” account of emotions, arguing that both basic and ‘higher cognitive’ emotions should be specified in terms of pre-reflective, noncognitive ‘relational modes’ of engagement between the actor and the physical and social environment, which later come to be integrated with cognition. On this view, pride starts in infancy as a prereflective relational mode unfolding in dynamic response to another’s praise. Initially, it is a relatively simple noncognitive response to such praise and does not depend on the ability to represent oneself or one’s acts as praiseworthy. While the capacity to respond in this simple manner remains intact in adults, the development of a sense of self, and the ability to perceive and internalize norms makes the mature pride reaction more complex, and more independent from the actions and standards of others.

Oddly, given its status as a paradigmatic BE, next to nothing is known about the development of disgust. Nevertheless, a consideration of the messy and complicated evolution of disgust suggests that the most basic disgust responses are co-opted numerous times throughout development, so that e.g., the development of pathogen disgust is delayed until the time the child has had time to learn local food

customs and begins to navigate the world independently, while sexual disgust is timed to the onset of puberty, when it is first needed.

Many other developmental researchers arrive at similar conclusions, and with respect to a wide variety of emotions. A striking feature of such developmental progressions is their close parallels with the corresponding evolutionary progressions. The emergence of new socio-cognitive capacities in development and the resulting increases in emotional complexity associated with them parallel the emergence of new forms of these emotions in evolution as a result of the evolutionary emergence of the very same socio-cognitive features. For example, the emergence of a robust, uniquely human ToM in the later stages of development that gives rise to uniquely human forms of pride and shame is also a key factor in the evolutionary basis of the emergence of these emotions in phylogeny.

Initially at least, the HCEs described here probably arose out of bidirectional developmental interactions between existing emotional capacities and newly emerging socio-cognitive capacities (each being driven by partly dissociable selective pressures) rather than being genetically determined from the outset. While these interactions have probably been genetically stabilized to some degree, they remain highly sensitive to, and dependent upon socially-mediated developmental processes, and their development certainly continues to involve stable, epigenetic developmental interactions between higher-cognition, more basic emotional capacities, and the various social processes that scaffold these interactions.

The persistence problem and serial homology

A key feature of all of these transformations is the fact that the simpler forms of these emotions are retained throughout development and phylogeny, and continue to perform their original functions, despite the emergence of their higher-cognitive forms; i.e., basic forms persist alongside their HC forms at later stages. For example, dominance hierarchies and their dynamics continue to play a role in human life despite the emergence of prestige-based hierarchies, and dominance forms of pride and shame are retained in such contexts. Basic forms of disgust are also retained throughout development and evolution, and these basic forms continue to play their original functions alongside the later emerging socio-moral forms. This poses a problem for accounts of such progressions in terms of the standard interpretation of homology according to which an ancestral trait is transformed into a derived trait, but does not persist independently. I have called this the ‘persistence problem’ for evolutionary theories of HCEs.

Despite major overlap in the features and functions of these forms, the task demands of these pairs often diverge to such a degree that there is a strong pressure to consider them as distinct emotions. We are thus confronted with a situation in which the different forms of the emotions under consideration are “the same but different”. I will review existing attempts to account for these facts. These include the most common approach, the ‘expansion view’, which holds that higher cognitive forms of emotions result from the expansion of the elicitors, responses, functions, etc. of their basic forms, the result of which is a single emotion with expanded functionality. Another recent approach comes from Tracy et al., who argue that pride is a single emotion with two “facets” that have been selected for different evolutionary functions.

I argue that these attempts are likely to fail to capture the senses in which these emotions are the same but different. Instead, I propose that we view them as serial homologies. According to this view, the features of more basic emotions are duplicated in development within new contexts and allowed to vary in their functions under different selective pressures. ‘Context’ here may include all levels, including neural, physiological, behavioral, cognitive, social, etc. contexts. Similarly the features that are duplicated may in principle range from the duplication of the expression alone to the duplication of the total integrated response, and every piecemeal possibility in between (though I think it is closer to the latter than the former).

The serial homology approach towards emotions has been in use at least since Darwin, whose account of the successive co-optation of emotional expressions (e.g., from biting responses in physical conflicts to bared-teeth expressions of anger) is essentially a serial homology account, given that the original functions of such expressions remains intact (e.g., organisms still bare their teeth to attack) despite the acquisition of new communicative functions. The application of the concept of serial homology to emotions considered as *psychological traits* (rather than, e.g., behavioral traits) is more novel, and faces a number of challenges, primary among which is how such duplication and modification is realized in neural structures, which must be the ultimate basis of such processes. I consider various possibilities of how this might be done, settling on the phenomenon of neural re-use, which I believe is itself best considered as a form of serial homology.

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