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A comparative glance on self-conscious emotions: A commentary on Kret et al. (2020)

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Kret et al. (2020) thoroughly reviewed expressions of basic emotions in humans and great apes and concluded that, although there are some species variations, many features of emotional expressions are conserved across humans and non-human great apes (hereafter, great apes). Here, we argue that the comparison between emotional expressions of humans and great apes is incomplete unless the whole range of emotions, including more complex self-conscious emotions is taken into account. Previously, such emotions were thought to be restricted to humans because of the advanced socio-cognitive skills they require (e.g., Parr et al., 2005). However, recent studies suggest that great apes might have these necessary socio-cognitive skills (e.g., Krupenye and Call, 2019; Krachun et al., 2019). To that end, we suggest that comparative studies on emotions should incorporate self-conscious emotions. Here, we discuss the human and great apes literature on self-conscious emotional expressions, namely embarrassment, shyness, shame, guilt, and jealousy¹.

In humans, embarrassment is expressed through a controlled smile (lip corners up and lips pressed against each other) in combination with a gaze down, head turns, and face touch. In action units (AU) of Facial Action Coding System (FACS), this is coded as: 12 = lip corner puller, 24 = lip press, 51 = head turn left, 54 = head down, 64 = eyes down. Similarly, shyness (i.e., coyness) is expressed through a smile (AU 12) in combination with a gaze shift and/or head turn/down. Shame is expressed through head tilt down with a gaze down without a smile (AU 54, 64) (Cordaro et al., 2018). Guilt has not been found to have a unique facial or bodily nonverbal expression but recent evidence suggests that people may frown, touch their necks, and try to repair when feeling guilty (Julle-Danière et al., 2020). Similarly, jealousy does not have a

unique facial or bodily expression but may be expressed through bids for attention, putting oneself between a rival and loved one, surveillance, and aggression (Roseman and Steele, 2018).

There has been no systematic investigation of self-conscious emotional expressions in great apes. However, anecdotal reports about the expressions of such emotions in great apes exist. For example, it has been reported that one chimpanzee who failed to emulate the actions of a human experimenter successfully, banged its head and showed signs of frustration (Hart and Karmel, 1996). Also, orangutans and chimpanzees have been found to cover their genitals when being observed to possibly avoid embarrassment of social exposure (Hart and Karmel, 1996). Similarly to humans when experiencing embarrassment after a mistake (Ruggieri et al., 1982), great apes self-scratch, especially with their left hand, when making a mistake on a task (Wagner et al., 2016). These findings suggest that great apes may experience heightened arousal after a failure similar to the arousal that humans experience after a failure, which is typically reflective of embarrassment or shame.

To explore the possibility that great apes experience self-conscious emotions, we adopt a developmental and evolutionary psychology perspective. First, we discuss the cognitive capacities needed to experience self-conscious emotions in humans. If the same cognitive capacities exist in great apes, we may conclude that great apes have the capacity to experience self-conscious emotions. Second, we explore the functions of self-conscious emotions in humans, and consequently discuss whether such emotions could be adaptive for great apes as well. If we assume that they function to motivate certain adaptive behaviors in a social context, comparing whether these behaviors are conserved

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¹ Pride, which is also a self-conscious emotion, was not discussed in this commentary because it was discussed in the review of Kret et al.

across humans and great apes may help us understand whether great apes, similarly to humans, might experience self-conscious emotions underlying these behaviors. In other words: “It is more likely that if humans and related species respond similarly under similar circumstances, the emotions behind their responses are similar, too” (De Waal, 2011, p.192).

Self-conscious emotions occur when one reflects upon and evaluates the self in relation to others and social situations, for example, when a person violated a certain social rule or accomplished an important social goal (Lewis, 2001). Traditionally, it has been assumed that first self-conscious emotions emerge only around the age of two, when children acquire self-awareness. At this age, children may feel shy and embarrassed due to being socially exposed. Around the age of three-to-four, children internalize social standards against which they can evaluate their behaviors and they understand that others can evaluate them and, thus, they can experience evaluative self-conscious emotions like shame and guilt (Lewis, 2001). Recent theoretical and empirical work on self-conscious emotions suggests, however, that some emotions, such as exposure embarrassment and jealousy appear in infancy (e.g., Chung and Harris, 2018; Colonnese et al., 2020) and that shame and guilt expressions have been found in toddlers (e.g., Drummond et al., 2017) before they typically internalize social rules and norms and understand that others may evaluate them. Thus, although it is likely that these rudimentary self-conscious emotions do not include complex self-evaluations (e.g., I am a bad person and others will reject me) such as adults' self-conscious emotions, it seems that some self-conscious emotions in their rudimentary form appear in infancy and toddlerhood before the sophisticated cognitive skills evolve. This raises the possibility that great apes may experience at least rudimentary self-conscious emotions, too, as it has been suggested that great apes, similarly to infants and toddlers, are able to represent oneself in mind manifesting through self-recognition, perspective-taking (Krachun et al., 2019), empathy (Clay et al., 2018), and engaging in pretense (Matsu-zawa, 2020). It has recently been argued that great apes may internalize social norms and rules (Fitzpatrick, 2020; van de Waal et al., 2013) and possess some forms of Theory of Mind (Krupenye and Call, 2019) giving rise to the possibility that they may experience even more complex forms of evaluative self-conscious emotions, such as shame and guilt.

Which functions do self-conscious emotions serve in humans? Self-conscious emotions navigate one's social status when it is at stake, for example, due to misbehavior (Keltner and Buswell, 1997; Nesse, 1990). While embarrassment and shyness appear after a mishap or a small transgression or at the possibility thereof, shame and guilt typically occur after a serious transgression (Lewis, 2001). The non-verbal expressions of these emotions serve to appease others after a transgression because they communicate that the person who is experiencing these emotions recognizes that they violated a social rule or norm and that they care about others' opinions. This, in turn, lessens the negative evaluation of others and helps the transgressor avoid social rejection. The function of jealousy, similarly to other self-conscious emotions, is also to regulate social relationships, but in situations in which these relationships are threatened due to the presence of potential rivals (Chung and Harris, 2018). The non-verbal expressions of jealousy, then, serve to prevent rivals from usurping important social relationships.

Similar to humans, primates live in complex social organizations, and have elaborate inter-individual relationships. According to some, the need to effectively navigate this unpredictable social environment has been an important selective pressure in primate cognitive evolution (Jolly, 1966; Freeberg et al., 2012). This also seems to apply to communicative signals, because species that are faced with a more socially complex environment appear to have a larger diversity of communicative signals (Freeberg et al., 2012), including facial expressions (Dobson, 2009). The functionality of such expressions becomes apparent in the context of agonism, for example: individuals can employ specific expressions to display submission or appeasement after a conflict (de Waal, 2000). Great apes use different non-verbal displays to

communicate submission and appeasement after a conflict and these displays may reflect arousal experienced due to self-conscious emotions. For example, the silent bared-teeth display in great apes, and especially the horizontal bared-teeth display, which involves strong horizontal and vertical lip retraction, is often found in subordinate chimpanzees when they are threatened by more dominant animals or when they try to reconcile after a conflict (Van Hooff, 2012). This expression is, thus, thought to communicate appeasement and defuse hostility of other animals, similarly to embarrassment, shyness, and shame displays in humans. Increased positive engagement with the opponent after the conflict in great apes is assumed to help repair a damaged relationship and this seems to parallel guilt displays of repairing in humans (Van Hooff, 2012). And negative reactions, such as agonism and intervention attempts of great apes when a newly introduced group member could threaten a valuable relationship by becoming close with one of existing social partners seem to parallel those of human infants and adults when their relationships are threatened by rivals (Webb et al., 2020).

In sum, great apes seem to possess the cognitive capacities necessary to experience self-conscious emotions and they display behaviours that serve the same appeasement function as the expressions of humans' self-conscious emotions. Thus, it is possible that both humans and great apes experience and display self-conscious emotions and that more complex expressions of self-conscious emotions in humans evolved from appeasement expressions in great apes. However, it has to be noted that, due to the need to cooperate in large social units, humans have developed sophisticated socio-cognitive skills and emotional experiences. Moreover, human cognitive development is strongly influenced by language, and explicit teaching and feedback from conspecifics (Heyes, 2018). This might also apply to the development of sophisticated self-conscious emotions in humans, and possibly explains the apparent pervasiveness of self-conscious emotions in humans compared to other social species. Although non-human animals may experience self-conscious emotions, these emotions may occur less often or in less diverse social situations within their own social norms and social organization. It may be that it is less relevant for great apes to experience and express self-conscious emotions simply because social situations that typically elicit these emotions occur more rarely or it may be less relevant to appease and reconcile with others even if these conflict situations occur. It is also possible that their experience of self-conscious emotions is not necessarily similar to human adults' experiences. For example, great apes may have a more implicit and embodied experience of self-conscious emotions compared to human adults. Finally, it may be possible that great apes, under their unique evolutionary pressures, developed a different set of self-conscious or similar emotions, reflected through certain behaviours not shared with humans. Nevertheless, direct evidence for these emotions in great apes is currently lacking. Novel experimental designs in which social settings specific to the occurrence of self-conscious emotions, such as violation of a group norm adequate for great apes (e.g., a failure to pant-grunt to a higher-ranked male in the group or aggressive act during play with an infant chimpanzee) could be manipulated, in combination with measuring physiological arousal, would advance our understanding of self-conscious emotions in non-human animals.

In conclusion, great apes and humans both need to navigate complex social environments. Therefore, experiencing and communicating self-conscious emotions such as embarrassment, shyness, guilt, shame, and jealousy could also be adaptive for great apes. However, most of the evidence on this topic up until now has been anecdotal. Therefore, we suggest that a comparative framework to understand emotions in humans and great apes should also include self-conscious emotions. Only by investigating self-conscious emotions as well, we can fully understand the diversity of emotional states and signals that great apes employ.

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