Commentary to the target article by Tobias Grossmann

Cooperative care as origins of the "happy ape"?

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Fan Yang

The University of Chicago

Corresponding author: Fan Yang, Department of Psychology, The University of Chicago, Chicago, IL, USA, Email: fan.yang@uchicago.edu, Webpage: https://voices.uchicago.edu/potentialslab/

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Abstract: Grossmann proposes an interesting framework to explain how heightened fearfulness among humans could be evolutionarily adaptive in the context of cooperative care. I would like to propose that cooperative care may also be a potential mechanism promoting *enhanced happiness expression* among humans, shedding light on questions about the scope and boundary of the fearful ape hypothesis.

Grossmann proposes that heightened fearfulness could be evolutionarily adaptive in the context of human cooperative care, which explains why humans display enhanced fearfulness compared to other apes. I would like to propose that the central mechanisms stipulated may also be potentially applied to explain the evolution of enhanced *happiness expression* among humans, which may shed light on questions about the scope and boundary of the framework.

The target article first presents evidence showing that humans are "fearful apes" who display heightened fearfulness compared to chimpanzees. In fact, humans may also experience and display more enhanced happiness than chimpanzees do. Humans are a particularly happy species, evolved to experience positive feelings not only to positive stimuli but also to even neutral stimuli (Diener et al., 2015). People around the world have been found to be generally in positive moods most of the time, even including those living under difficult circumstances (Diener & Diener, 1996). In terms of happiness expressions, chimpanzees *laugh* in response to playful stimuli (e.g., a good tickle) similar to how humans do (Kret et al., 2020). But only humans display *smiles* when experiencing inner enjoyment. The "Duchenne smile" —the authentic smile that engages muscles around the eyes—enables human happiness to be more obviously and frequently observed, which has no known correspondence among non-human primates (Parr & Waller, 2006). It has been theorized that ubiquitous happiness among humans may have evolved to motivate behaviors (e.g., sociality, creativity, and planning) that increase one's own survival and reproductive fitness (Diener et al., 2015). But is it possible that human cooperative care also plays a role in the evolution of happiness expression among humans?

Grossmann has provided evidence that human children and adults are highly sensitive to fearful faces, which is necessary to support the view that enhanced fearfulness is an adaptive trait linked to cooperative cognition. In the same vein, it has been shown that humans are highly sensitive to happy faces. Happy faces are *vivid* to humans: They are more discriminable at a distance than other emotion expressions, and they automatically engage processing even at the earliest stages of perception (Becker & Srinivasan, 2014). The ability to perceive happiness expressions is so deeply rooted among humans that even 3-month-old infants are able to discriminate happiness expressions from other expressions (e.g., Barrera & Maurer, 1981; Kuchuk et al., 1986; Young-Browne, 1977). Directly relevant to caregiving behaviors, human adults are found to be able to detect even subtle features and changes in happiness expressions of infants and children (Dinehart et al., 2005; Lobmaier et al., 2010).

Crucial to establishing an evolutionary link between cooperative care and happiness expressions, human adults are known to display positive and caring responses when perceiving happy expressions of infants and children (see review by Franklin & Volk, 2018). Human adults respond to happy infant and child faces with strong interests and nurturing motivation (Aradhye et al., 2015; Parsons et al., 2014). Happy (but not sad or neutral) infant faces activate reward-related brain regions in mothers (Strathearn et al., 2008). Happier infants also receive higher levels of parental care and play behaviors (Braungart-Reiker et al., 2001). Therefore, similar to the possibility that fearful expression stimulates care and approach responses, happiness expression also seems to elicit positive and caring responses from others.

To establish the existence of a virtuous caring cycle, Grossmann also presents evidence that fearfulness is associated with *cooperative* tendencies among fearful children and adults, supporting the possibility that fearful children may grow up to be cooperative people who are caring toward younger generations. Similar (and even stronger) associations have been found between happiness and cooperation. Happy adults and adolescents are more motivated to perform prosocial and kind behaviors (e.g., Aknin et al., 2012; Erreygers et al., 2019; Isen & Levin, 1972; Otake et al., 2006). Children who display higher levels of happiness are rated by their peers as being more prosocial and cooperative even one year later (Yu et al., 2022). Contributing to the virtuous caring cycle, happiness early in life is predictive of happiness levels across the life span (e.g., Coffey et al., 2015), and it has been shown that happier adults are more likely to be nurturing parents and raise happy children (Douglas, 2019).

Therefore, the above analysis shows that just as cooperative care could lead to enhanced fearfulness among humans, cooperative care may also promote enhanced happiness expressions among humans. Two interesting questions remain unanswered: (1) The virtuous cycle involving cooperative care might predict that humans would be selected to engage in increasingly higher levels of fear (and happiness), which may not be optimal or evolutionarily adaptive. High intensity of happiness has been shown to lead to overwhelmingness and negative adjustment outcomes (Aragon et al., 2015; Gruber et al., 2011). Might there be some built-in mechanism for cooperative care to promote *optimal* rather than excessive levels of emotions? (2) Relatedly, the framework is currently silent about whether cooperative care may play a role in the evolution of some emotion expressions (e.g., fear and happiness) but not others. Non-human primates and humans share many emotions (De Waal, 2019), but some emotional expressions (such as those

associated with surprise) appear to be visibly present only in our own species (Kret et al., 2020). Might cooperative care also have influenced the evolution of these emotional expressions? To answer these questions, the framework may have to go beyond explaining how cooperative care could amplify a displayed emotion during evolution, but it also has to explain why and how the virtuous cycle is established in the first place.

In conclusion, I propose that similar to its role in promoting enhanced fearfulness among humans, cooperative care may also be a key mechanism leading to enhanced happiness expressions among humans. It will be important to further theorize why certain emotional expressions are more likely to elicit caring responses from others, which may help illuminate the scope of the theory as well as the origins of our emotional nature, such as the fearful ape or happy ape.

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CONFLICT OF INTEREST

The author declares no financial interest.

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