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WORD COUNTS:
Abstract – 60
Main text – 973
References – 240
Total – 1273

COMMENTARY TITLE:
Fearfulness: an important addition to the starter kit for distinctively human minds

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ABSTRACT

Grossman's (2022) impressive article indicates that - along with attentional biases, expansion of
domain-general processes of learning and memory, and other temperamental tweaks - heightened
fearfulness is part of the genetic starter kit for distinctively human minds. The Learned Matching
account of emotional contagion explains how heightened fearfulness could have promoted the
development of caring and cooperation in our species.

MAIN TEXT

Grossman (2022) makes a compelling case that heightened fearfulness is a component of the genetic
starter kit for distinctively human minds (Frith, 2001). Mother Nature tweaked hominin minds – not
only to increase our social tolerance, enhance our attention to faces and voices, and expand our
capacities for learning and memory (Heyes, 2018a, 2019; Heyes, Chater, & Dwyer, 2020) – but also
to make us more fearful. By giving us unprecedented access to care and information from others,
the small, quantitative changes in the starter kit had huge downstream consequences. Like sticks
and tinder, they ignited a fire of change in our minds and in our lives. Grossman argues convincingly

that heightened fearfulness contributed to the fire by making human infants better able to elicit care, and more likely to develop into caring and cooperative members of their social group.

We are particularly interested in Grossman's account of how heightened fearfulness promoted the development of caring and cooperation. He suggests that, in the context of heightened fearfulness, the integration of a "perception-action coupling" mechanism with a "caring behaviour" mechanism increased the motivation to help (Grossmann, 2022, pp. 9-10). This is plausible but programmatic. More detail is needed to avoid a hint of alchemy - the impression that two mysterious elements conjoined under the stars of fearfulness to create something precious. Grossman's hypothesis can be developed, and the relationship between fearfulness and cooperation elucidated, by looking inside the black box of his perception-action coupling mechanism.

In a wide range of animals, observation of emotional gestures and vocalisations (e.g., wincing, shrieking, laughter) triggers a rapid, matching emotional response (de Waal & Preston, 2017). In humans, this automatic form of empathy, or "emotional contagion", is a major driver of controlled judgements about the plight of others and ultimately of helping behaviour (e.g., Decety & Cowell, 2014; Gonzalez-Liencres, Shamay-Tsoory, & Brune, 2013). Emotional contagion is often called "perception-action matching" and attributed to an unspecified, genetically inherited mechanism – a set of pre-wired connections between emotional stimuli and responses, or an obscure currency converter that can take any emotional input from others and produce matching emotional output. However, there is now a substantial body of evidence – from nonhuman animals, infants, adults, and robots – that emotional contagion is made possible by learned associations, each connecting a distal sensory cue (e.g., an emotional gesture or vocalisation) with a motoric or somatic response belonging to the same emotional category (Heyes, 2018b). According to this Learned Matching account of emotional contagion, these connections are formed in three situations where the experience of a particular emotion "from the outside" is correlated with observation of the same emotion "from the outside": (1) *self-stimulation* – such as when an infant hears her own cries while feeling distress; (2) *affective mirroring* – when a caregiver imitates an infant's facial and/or vocal emotional displays; and (3) *synchronous emotion* – when two or more individuals react to some event in the same way at the same time and observe the emotional reactions of others while experiencing their own.

Heightened fear would multiply and intensify the opportunities for learning in all three of these situations. A more fearful infant would produce more frequent and intense emotional displays (e.g., crying) co-occurring with the internal experience of fear, and thereby promote learning via self-stimulation. The increased frequency of emotional displays resulting from heightened fear would provide greater opportunities for caregiver imitation – promoting learning in the context of affective mirroring. Finally, heightened fear in infants and adults would increase the frequency with which multiple individuals (including the target infant) react in similar ways to an external fear-inducing event – promoting learning through synchronous emotion. Thus, the Learned Matching account of emotional contagion identifies three ways in which heightened fear could supercharge the development of the "perception-action coupling mechanism", and thereby the "caring behaviour mechanism" responsible for controlled helping behaviour, to make more caring and cooperative adults. It suggests that heightened fear changes the relationship between the two mechanisms ontogenetically rather than phylogenetically, and that there is nothing mysterious about their "integration". Via Learned Matching, heightened fear produces a more comprehensive coupling mechanism at an earlier stage of development. Consequently, the coupling mechanism provides earlier, more powerful input to the caring mechanism – coupling gives caring a bigger push.

Learned Matching comes with two bonuses for the Fearful Ape, one specific and the other general. On the specific side, it provides yet further impetus for Grossman's fascinating proposal that the

norms and values of collectivist cultures, rather than buffering against susceptibility, make these societies better able to benefit from heightened fearfulness.   Learned Matching is consistent with this proposal because it suggests that the power and efficiency of the perception-action coupling mechanism depends on three sets of conditions – relating to self-stimulation, affective mirroring, and synchronous emotion – that vary across cultures with childrearing practices and social rituals.

More generally, by underlining the importance of simple learning mechanisms in human development, Learned Matching reminds us that the adaptive consequences of heightened fearfulness could include faster direct and observational conditioning of object avoidance (Mineka, Davidson, Cook, & Keir, 1984). It has long been recognised that conditioning is faster and more complete when the event being predicted is highly salient (e.g., Rescorla & Wagner, 1972). Consequently, enhanced fear may make a moderately threatening stimulus, such as a poisonous spider seen from a distance, more salient, and thereby support good avoidance learning without getting close to a dangerous object. The risk that this learning will result in avoidance of benign stimuli is reduced in the case of observational conditioning. After a lifetime of experience, an adult who shows fear of an object is likely to be providing a signal that the object is truly dangerous. Therefore, an infant who learns faster from the adult's reaction – for whom that reaction is, due to heightened fearfulness, a more salient predicted event – rapidly absorbs genuinely useful information about the world.

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