CONTINUITY OF EMOTION AND AGGRESSION IN LANGUAGE EVOLUTION

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While propositional language has been at the center of language evolution theorizing, it faces a problem of discontinuity when it comes to other primates' communication. Our main claim is that continuity should not be abandoned, as it reveals itself in a gradualist approach that ties together the evolution of language/syntax with the management of emotion/aggression, where the two are engaged in a co-evolutionary feedback loop. We rely on the finding that the same mechanism of dense neuronal connectivity between cortical and subcortical structures, implicated in the suppression of reactive aggression, is also responsible for cross-modality (metaphoricity) and for syntactic processing (Benítez-Burraco and Progovac 2021).

In this respect, early forms of language, with simplest grammars and highly concrete, imageable vocabulary have been proposed to be more visceral (and linked to older processing strategies) than typical constructions of modern languages, in which even imageable, emotive words get buried under the layers of abstract syntactic categories (Progovac et al. 2018). Even today, metaphorical, imageable vocabulary has a higher emotional impact than literal language, relying more on the limbic system (e.g. Bohrn et al. 2012). These earliest stages of language would have shown more continuity with animal communication (i.e. vocalizations), which are highly emotional (Darwin 1872; Code 2011).

We tie our proposal to the history of genetic and biological changes associated with changes in the management of aggression, which resulted in physical, behavioral and cognitive changes in our species, and which are sometimes referred to as human self-domestication (HSD) (Hare et al., 2012). The period before 200 kya saw high levels of reactive aggression and hominins at that stage probably relied on brief (even single word) emotion-driven outbursts, such as

commands, warnings, and threats (*Watch out! Run! Move*!) The fossil record suggests that features of HSD, and implicitly of reactive aggression, were gradually decreasing between 200-100 kya (Leach, 2003; Zollikofer and Ponce de León, 2010), which arguably coincided with the emergence of simple (two-slot) grammars, capable of merging only one verb and one noun (e.g. *scatter-brain*; *hunch-back*; *turn-skin*; *cry-baby*; Progovac, 2015). While they would have been truly beneficial in general, these highly metaphorical compositions also turn out to be especially well-suited for insult/verbal aggression, and as such they would have been highly adaptive at this stage in evolution, significantly contributing to replacing physical aggression/contest with verbal aggression/cognitive contest. This further reinforced the trend in selection towards increased control of subcortical networks by cortical devices, contributing further to suppression/inhibition of reactive aggression, and ultimately, to HSD features. Based on the fossil record, HSD reached its peak roughly between 100-50 kya and 10kya (Cieri et al., 2014), at the time when fully-fledged grammars emerged and referential uses of language started to become more important.

Neurobiological and neuropsychiatric findings provide support for our proposal. Reactive (physical) aggression typically implicates the limbic system (Rolls 2015 for review), the striatal regions, and parts of the cortex (Dolan et al. 2002; Yang et al. 2009; Boccardi et al. 2011). The processing of aggressive language, such as swear words and profanity, shows a clear overlap/continuity with physical aggression, implicating the basal ganglia, limbic structures, thalamus, and the right hemisphere (e.g. Code 2011). Disorders which sometimes result in uncontrolled swearing/profanity (e.g. Tourette's Syndrome) also involve enhanced physical aggression, attributable to a basal-limbic connection dysfunction (e.g. Ganos et al. 2013).

Overall, our proposal supports the view that human evolution saw a gradual shift from raw, emotional language (with rudimentary syntax), to structurally highly complex forms of language, which can be quite detached from emotion, and which arguably correlated with the relatively recent rise in proactive/premeditated aggression (Wrangham 2018). Less visceral, more rational uses of language of course open new possibilities for dishonest signaling. The gradual progression in human evolution from reactive aggression (driven by raw emotion), to proactive/premeditated aggression (driven by more detached reasoning), is itself a transition from more emotional to more rational behavior.

Selected References

Benítez-Burraco A. and Progovac L. (2021). Language evolution: examining the link between cross-modality and aggression through the lens of disorders. *Philos Trans R Soc Lond B Biol Sci*. 376(1824):20200188

Boccardi, M., Frisoni, G. B., Hare, R. D., Cavedo, E., Najt, P., Pievani, M., et al. (2011). Cortex and amygdala morphology in psychopathy. *Psychiatry Res.* 193, 85–92. doi: 10.1016/j.pscychresns.2010.12.013

Bohrn, I., Altmann, U. and Jacobs, A. M. (2012). Looking at the brains behind figurative language - A quantitative meta-analysis of neuroimaging studies on metaphor, idiom, and irony processing. *Neuropsychologia* 50, 2669-2683. doi: 10.1016/j.neuropsychologia.2012.07.021

Cieri, R. L., Churchill, S. E., Franciscus, R. G., Tan, J., and Hare, B. (2014). Craniofacial feminization, social tolerance, and the origins of behavioral modernity. *Curr. Anthropol*. 55:419–43.

Code, C. (2011). Nonfluent aphasia and the evolution of proto-language. *J. Neurolinguistics* 24, 136–144. doi: 10.1016/j.jneuroling.2009.12.007

Darwin, C.R. (1872). *The Expression of the Emotions in Man and Animals*. London: John Murray. 1st edition.

Dolan, M., Deakin, W. J., Roberts, N., and Anderson, I. (2002). Serotonergic and cognitive impairment in impulsive aggressive personality disordered offenders: are there implications for treatment? *Psychol. Med.* 32, 105–117. doi: 10.1017/S0033291701004688

Ganos C, Münchau A, Bhatia K. (2014). The semiology of tics, Tourette's, and their associations. *Mov. Disord. Clin. Pract*. 1, 145–153. doi:10.1002/mdc3.12043

Hare, B., Wobber. V., Wrangham, R. (2012). The self-domestication hypothesis: Evolution of bonobo psychology is due to selection against aggression. *Animal Behavior* 83.3: 573-585.

Leach, H.M. (2003). Human domestication reconsidered. *Curr. Anthropol.*, 44, 349–368.

Progovac L. (2015). *Evolutionary Syntax*. Oxford, UK: Oxford University Press.

Progovac, L., Rakhlin, N., Angell, W., Liddane, R., Tang, L., and Ofen, N. (2018). Neural correlates of syntax and proto-syntax: an fMRI study. *Front. Psychol.* 9:2415. doi: 10.3389/fpsyg.2018.02415

Rolls, E. T. (2015). Limbic systems for emotion and for memory, but no single limbic system. *Cortex* 62, 119–157. doi: 10.1016/j.cortex.2013.12.005

Yang, Y., Raine, A., Colletti, P., Toga, A. W., and Narr, K. L. (2009). Abnormal temporal and prefrontal cortical gray matter thinning in psychopaths. *Mol. Psychiatry* 14, 561–562. doi: 10.1038/mp.2009.12

Wrangham R. W. (2018). Two types of aggression in human evolution. *PNAS*, 115(2), 245–253. https://doi.org/10.1073/pnas.1713611115

Zollikofer, C. P. and Ponce de León, M. S. (2010). The evolution of hominin ontogenies. *Semin. Cell Dev. Biol.* 21(4), 441–452.