Origins and Evolution of Language
Week 9 tutorial
Tutor notes

Comments for tutors are in italics.

This is a final opportunity to practice reading, summarising, and evaluating research papers, with a bit of encouragement from questions are intended to help think critically about the paper's methods and conclusions. As it says below, this paper is a nice one to finish on because it provides a summary of the (potential) explanatory role of cultural evolution in explaining the origins and evolution of language, and the re-framing of the main question for biological evolution as being one of explaining how the preconditions for cultural evolution become established.

For the final tutorial we will read and discuss Thomas & Kirby (2018). This article (which is essentially a précis of James Thomas's PhD thesis) provides a nice summary of a couple of ideas that have been central to this course, namely that a bunch of interesting features of language are a product of cultural evolution, and that understanding the evolution of the capacities underpinning cultural transmission is therefore a central question in language evolution. The paper also presents the argument that the precursor traits they identify can be understood as products of self-domestication. I have suggested some issues you could consider when you are reading it and discussing it in your groups, but don't feel constrained by these - this is a nice paper to finish up on because it touches on nearly all the topics we have covered on the course, so you can make the discussion as wide-ranging as you like. Possible points to consider

- What do they think the key "precursor traits" for cultural evolution are? Do you agree with their list?

Their precursors are 1. Social learning of signals (specifically production learning, as defined in the reading on vocal learning, i.e. copying the form of signals, rather than e.g. usage learning); 2. sensitivity to communicative intent, as involved in inferring the intended meaning behind communicative signals.

This is quite close to what we have covered elsewhere on the course, although I ended up being more specific about both capacities. For precursor 1, in the week 5 lecture I split this into 3 capacities, vocal learning, sequence learning, and compositional rule learning (you can have one without the other, e.g. various species of monkey have done OK on sequence learning tasks as assessed by artificial grammar learning paradigms); for precursor 2 I also emphasised ability to reason about knowledge and ignorance in others, as required for 2nd order intentional communication (i.e. signalling to change the mental states of others). Of course the students might have other capacities they see as relevant!

- What lessons do they take from Bengalese finches and domesticated dogs specifically? What do Siberian foxes add to the argument? What changes if the interpretation of the fox domestication experiment changes?

Bengalese finches are domesticated white-rumped munias, and as a result of their domestication (for plumage, apparently), they seem to have undergone a process where a relaxation of constraints on their song leads to a greater role for learning, possibly a greater role for female preferences (only the males sing, as a display to attract/impress mates), and more complex song. This has been attributed to a relaxation of selection which otherwise minimises the role of learning in communication, e.g. because in the wild species identification is particularly important (or perhaps because spending time/effort learning and/or producing complex song is punished more in the wild than in captivity). This is a potential model for how domestication or relaxation of selection pressures in general might unveil/amplify vocal learning capacities.

Domestic dogs have a greater sensitivity than e.g. wolves to communicative gestures produced by humans, which I think they would like to attribute to domestication/sharing an environment with humans. Personally I find this rather unconvincing since it seems like dogs have probably been under pretty strong selection for capacity to infer human intent, which is where the Siberian foxes come in. The claim here is that they also have good sensitivity to human communicative intent, despite never being selected for that capacity, and instead only being selected for docile temperament/tolerance of humans – if so, that would suggest (much like the munia/finch case) that sensitivity to communicative intent might be a "free" by-product of domestication. However, the Siberian foxes experiment worries me a bit. I have heard some chat from biologists who know more of the history who were sceptical as to whether there were additional selective factors operating rather than just tolerance of humans (e.g. maybe the experimenters were inadvertently selecting for some other aspects of the "domesticated phenotype"); there is also some debate about whether some or all of the traits identified as being a consequence of domestication actually pre-existed the domestication experiment (as summarised in the article I linked). If that's the case then it might muddy the waters as to whether traits like sensitivity to communicative intent can be generated as a consequence of selection for tameness, or whether more is going on there.

- What is the relationship between self-domestication and (cultural) niche construction - are they the same thing, or are there important differences? What do they imply about ongoing evolution in humans for language-related capacities?

They are similar in that they emphasise how changed environments can lead to changed selection pressures, leading to relaxation/removal of some pressures and creation of new selection pressures. As I understand the self-domestication claim though, the emphasis there is on changes which are unselected-for consequences of removal of selection pressures (for vocal learning) or selection for apparently unrelated traits (e.g. if selection for tameness leads to sensitivity to communicative intent). The gene-culture co-evolution examples emphasised how culture can create selection pressures for directly related capacities (e.g. how dairying introduces selection for lactose tolerance, or how presence of a communication system generates selection for improved articulatory/perceptual capacities used in communication), and also emphasises the reciprocal nature of the interactions between culture and genes (e.g. increased tolerance of lactose rewards more heavy reliance on dairying; increased production/perception capacities lead to further evolution/elaboration of the communication system). I think the gene-culture co-evolution perspective therefore suggests that humans might be under ongoing selection for our language-related abilities,

which is not a central component of the self-domestication hypothesis. But of course they are compatible – maybe something like the self-domestication scenario outlined by Thomas & Kirby explains the early development of these capacities in humans, and then gene-culture co-evolution explains their subsequent elaboration.

- Do you buy the Thomas & Kirby argument regarding self-domestication? What are the convincing points? What are the weaknesses? Have you seen any competing theories to explain the same set of observations?

Obviously this is mostly quite open! In terms of other theories to explain the same capacities, the other ones we have seen on the course (which are quite under-developed) are that tool-use and/or a particular style of social living generated selection pressures which favoured communicative abilities (e.g. sensitivity to mental states in others, or communication skills required to facilitate transmission of tool technologies), or it generated selection for social learning capacities in all domains which were then appropriated for communication, or it selected for generally smarter and bigger-brained organisms which then generated these capacities as a side-effect (not actually so different from the self-domestication idea in that the key capacities are an inadvertent side-effect of selection for something else). It could also be primarily gene-culture co-evolution from the start – it's possible that human capacities for learning and inferring mental states were initially only a little different from the same skills in apes, but just complex enough to generate a socially-learned communication system that generated selection pressures that lead to the elaboration of those capacities through the processes we discussed in class today. At the moment I think we don't have evidence which particularly favours any of these scenarios. Also worth knowing that for vocal learning (which has evolved multiple times independently) there are a number of other theories out there, other than relaxation of selection. for what selection pressures lead to its evolution, e.g. https://doi.org/10.1016/j.conb.2014.06.007.