Beyond Anthropocentrism in Comparative Cognition:

Recentering Animal Linguistics[*]

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1   The Problem

What is the right balance between humans and animals in studies of comparative cognition? The issue is particularly pressing for animal communication, which has been dominated by the search for precursors of human language. While we are beyond the stage at which the Linguistic Society of Paris (1866) prohibited submissions on language origin, relations between animal communication and linguistics are suboptimal. In a typical example, several articles argued for the existence of syntax and compositionality in bird calls (Engesser et al. 2016, Suzuki et al. 2016, 2017). Opponents, including linguists, responded that the properties at stake are incomparable to human language (e.g. Bolhuis et al. 2018a,b, Schlenker et al. 2016c). This is a common occurrence: to linguists, claims on animal communication often seem overblown and devoid of relevance to human language; to ethologists, linguists often seem dogmatically attached to the uniqueness of human language and to theories that ensure that it remains this way. Neither animal nor human nor comparative cognition is well served by this situation, which is often mired in terminological issues.

2   A Proposal

We propose that the root of the problem lies in an excessive anthropocentrism: studies of animal communication would be more fruitful if they were primarily focused on comparative animal 'linguistics' and cognition, and only secondarily on a comparison with human language. By 'animal linguistics', we mean the detailed analysis of animal communication, complete with:
1. formal models that describe precisely the form and function of the communicative signals found in a given species;
2. a comparative approach that develops a typology of such mechanisms across species (including humans, when relevant);
3. an evolutionary approach that seeks to determine which properties in a given taxon are inherited by common descent, when they appeared in time, and possibly why; and which properties give rise to

convergent evolution, and why, with a strong connection to explicit models of meaning evolution (e.g. Searcy and Nowicki 2005, Skyrms 2010).

It is only within this comparative framework that possible precursors of human language can be evaluated (e.g. are similarities due to common descent or convergent evolution?). The recentering we propose might appear to make animal communication research less ambitious because human language is backgrounded. But the program is in fact broader because it has a stronger formal, comparative and evolutionary component, and it promises a more accurate assessment of any similarities with human language.

3   Animal Linguistics: Formal, Comparative and Evolutionary

Birdsong research led to detailed syntactic results—e.g. it is generally accepted that birdsongs lie within the finite-state part of the 'Chomsky hierarchy' [Berwick et al. 2011]. Still, birdsongs arguably display a 'phonological syntax' without a semantics, as their primary function is to defend territory or advertise the singer's quality (Ballentine et al. 2004, Brumm et al. 2011). By contrast, numerous calls and gestures were described which clearly convey information to the receiver (Zuberbühler 2009), sometimes with apparent morphological or syntactic rules.

Studies usually focus on a given species, with an eye to human-language-like properties. Campbell's monkeys (Ouattara et al. 2009a,b) rose to prominence because their calls apparently display morphology and syntax (using these terms to describe data patterns, not cognitive processes). On the basis of a simple vocabulary (*boom*, *krak*, *hok*), they form the complex calls *krak-oo* and *hok-oo*, possibly by adding a suffix with a constant meaning. On one analysis (Schlenker et al. 2014), *krak* is a general alarm call and *krak-oo* a weak general alarm call; *hok* is a non-ground alarm call and *hok-oo* a weak non-ground alarm call. *Boom* is a non-predation call, and might follow a syntactic rule: it appears in pairs at the beginning of sequences.

While fascinating, Campbell's 'grammar' only bears superficial resemblance to human language: *pace* sequence-initial *boom boom*, there are no clear syntactic patterns, and no reason to treat individual calls as anything but complete utterances (only *krak-oo* and *hok-oo* arguably have internal structure). But Campbell's grammar raises interesting challenges for animal linguistics. First, what is the space of possible analyses of call meanings? This question led to collaborative work between primatologists and linguists, who explored several possible theories and a non-trivial division of labor between semantic and pragmatic principles; for instance, in one theory, the 'general alarm' meaning of *krak* could be enriched by pragmatic competition with more informative calls (*krak-oo* and *hok*) to yield a 'serious ground alarm' meaning (Schlenker et al. 2014).

Second, how do these calls compare to those of other monkeys, and can their evolutionary history be reconstructed? These questions are open. For instance, few comparable 'suffixes' have been described across species, hence it is unclear whether *-oo* is of anecdotal or deeper relevance. By contrast, the non-predation call *boom* appears in entire subfamilies of Cercopithecines and certainly existed millions of years ago (Schlenker at al. 2016b). Beyond this promising initial evolutionary result, however, little is known.

In other species, the formal models and evolutionary questions involved are even less human-language-related. Finite-state analyses of birdsongs use models that are refuted for human syntax (though not human phonology [Heinz and Idsardi 2011]). Recent analyses of Putty-nosed and Titi monkey call sequences involve an animal-specific 'Urgency Principle', which mandates that calls providing information about the nature/location of a threat should come first (Narbona Sabaté et al. 2022, Schlenker et al. 2016a). More radically, work on call decoding across bird species suggests that individual acoustic features are interpreted (e.g. an upward melodic slope signals distress), sometimes with convergent evolution, hence the need for new semantic and evolutionary models.

Recent claims about syntax and compositionality in bird calls raise other issues. The argument is based on instances in which alarm calls are followed by recruitment calls to yield an *alarm-recruitment* sequence that triggers mobbing behavior, an apparently new meaning. There is a formal, a comparative and an evolutionary question to ask. Formally, do these cases genuinely require syntax and compositionality, or can they be analyzed according to the principle that 'one call is one complete utterance', without any non-trivial structure (Schlenker et al. 2016c)? In comparative and evolutionary

terms, how common is this pattern across species? It is found in different varieties of tits (e.g. Suzuki et al. 2016, Dutour et al. 2017, 2019), but also in the Southern pied-babbler, which diverged from them approximately 30 million years ago (Engesser et al. 2016; Selvatti et al. 2015). Furthermore, strikingly similar call sequences have been described by Leroux et al. 2022 in chimpanzees. Thus it seems likely that convergent evolution is involved. If so, how should models of meaning evolution account for this pattern?

A comparative approach to animal linguistics would certainly unearth further interesting cases of convergent evolution. Wheeler and Fisher 2012 argued that across primate species, a general alarm call tends to be used for ground predators, whereas raptors elicit a specific call. In view of the diversity of species that display this pattern, this might result from convergent evolution. If the sole focus is on a comparison with human language, there is little incentive to study this in detail. But if one takes a broader view of meaning in nature, the generalization is an interesting puzzle for theories of meaning evolution.

4   Animal Linguistics and Human Linguistics

The relation between animal and human languages should continue to be studied, but from this broader perspective. Breakthroughs might be close. In a comparative study of great ape gestures, Byrne et al. (2017) unearthed a great ape 'lexicon' that is largely conserved across species. Remarkably, Kersken et al. (2018) found many of these gestures in human infants. The question is what these gestures become in adults, and whether they bear any relation to human language or are the remnant of another communication system.

Irrespective of possible relations to human language, the program we outlined (with a formal, a comparative and an evolutionary component) would benefit from expertise from linguists, for instance to: help formulate explicit models of syntax, semantics and pragmatics; investigate the division of labor among these modules, a subtle matter; and find generalizations across complex data sets, a key issue in comparative animal linguistics. There could thus be fruitful interactions between linguists and ethologists on a specifically *animal* linguistics.

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