Great ape interaction: Ladyginian but not Gricean

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Non-human great apes inform one another in ways that can seem very humanlike. At the same time, there are also some manifest differences. How to account for these similarities and differences in a unified way remains a major challenge. Here we précis our recent analysis (Scott-Phillips & Heintz, 2023a). We make a key distinction between the expression of intentions (Ladyginian) and the expression of specifically informative intentions (Gricean). We hence distinguish several varieties of meaning that are continuous with one another. We conclude that the origins of linguistic meaning lie in gradual changes in social cognition, and in communication systems.

Many advances in understanding great ape interaction have been achieved in the past 40 or so years (Byrne et al., 2017; Tomasello & Call, 2019). It is now clear that human modes of interaction are not wholly apart from those of other great apes (hereafter: great apes). At the same time, there remain some manifest differences, most obviously the enormous range and scope of human expression.

In recent years a consensus has emerged that further progress requires scratching beneath the surface: asking what computational tasks deliver observed behaviours (e.g. Graham et al., 2020; Heesen & Fröhlich, 2022; Warren & Call, 2022; Heintz & Scott-Phillips, 2023). Furthermore, existing computational descriptions of human interaction do not include many gradations, which limits the utility of cross-species comparisons. So for deeper understanding we need a framework for interaction that specifies computational tasks and allows for gradations.

Here we present (in brief) a new analytical framework for the cognitive description of interaction. We distinguish in particular expression of intentions from expression of specifically informative intentions. We use this distinction to differentiate some varieties of 'meaning' that are continuous with one another, in contrast to the dichotomy of 'natural' and 'non-natural' meaning. Further detail appears in newly published research (Scott-Phillips & Heintz, 2023a).

Layers of attention manipulation

Figure 1 summarises our 'special case of' framework for classifying different modes of the intentional manipulation of attention. These distinctions will allow us to describe great ape gesture in a way that both recognises its cognitive sophistication, and also accounts for observable differences with humans.
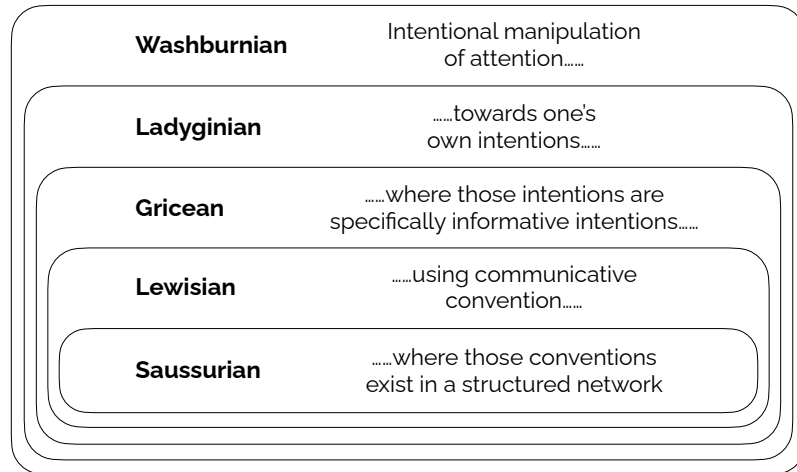
Figure 1: *Graded distinctions in modes of attention manipulation*. The distinctions between these subsets are graded rather than categorical, and shifts between them are gradual. These shifts are critical to the origins of linguistic meaning.

The outermost subset includes all instances of the intentional manipulation of attention. This is effectively how the concept of 'intentional' expression has mostly been used in comparative cognition. We label this subset *Washburnian* after Margaret Floy Washburn, who argued that the difference between the human and the non-human psyche was a difference of degree, and not a difference in kind (Washburn, 1908).

In the next subset, individuals intentionally manipulate others' attention towards evidence of their (the focal individual's) own intentions: which could be to play, to travel, to have sex, to be groomed, and so on. This is possible if the target audience has social cognitive capacities able to identify others' intentions. We label this subset *Ladyginian* after Nadezhda Ladygina-Kohts (born Nadezhda Ladygina), who was an early pioneer in the comparative study of great ape social cognition (Ladygina-Kohts & de Waal, 2002).

In the third subset, individuals intentionally manipulate others' attention towards evidence of a specific type of intention, namely informative intentions. Eating, for instance, is an intentional behavior in humans; but sometimes humans eat in an elaborated or slightly exaggerated way, perhaps accompanied by facial expressions, to suggest to others that the food is tasty, revolting, generous, or fancy. When we do this, we have a specifically informative intention that the audience learns something about the food, and we satisfy this

intention by providing evidence of it i.e. by providing evidence of the intention itself. Such behaviors are commonly called *Gricean* after the philosopher Paul Grice, who developed the idea that meaning in human interaction derives from the provision of evidence for informative intentions (1957, 1989). The labels 'interactional engine' and 'ostensive communication' are often used in ways roughly synonymous with how we use 'Gricean' here (e.g. Origgi & Sperber, 2000; Tomasello, 2008; Scott-Phillips, 2015; Levinson, in press).

So the difference between Ladyginian and Gricean behavior is that whereas Ladyginian behavior intentionally reveals an intention, Gricean behavior intentionally reveals specifically informative intentions. This is not a behavioral distinction but a cognitive one. Both entail informative intentions; the difference is how the informative intention is satisfied. With Ladyginian behavior it is satisfied by making manifest the embedded intention ('I want to play'), while with Gricean behavior it is satisfied by making manifest the informative intention itself ('I want you to believe that I want to play'). This may seem more 'elaborate', but this does not mean it is cognitively 'demanding' or 'complex'. The distinction between Ladyginian and Gricean is, we believe, essential for current and future understanding of great ape interaction.

The fourth and fifth subsets include cases where Gricean behavior is performed by the use of particular, culturally evolved tools. The fourth subset, *Lewisian* (after David Lewis), includes conventions such as used in nodding, pointing or shrugging. The fifth subset, *Saussurian* (after Ferdinand de Saussure), includes cases where the conventions are (self-)organized in highly structured networks. These networks are commonly called 'languages'.

Great ape interaction is (at least) Ladyginian

We focus on the gestural domain. Gestures are certainly not the only modality of great ape interaction—vocalizations and facial expression are also important—but two related features of gesture make it a suitable focus for detailed analysis. First, it is the domain where the evidence for cognitively rich behavior is most compelling and uncontroversial (but see e.g. Crockford et al., 2017). Second, it is also where there has been greater dedicated research attention.

Over the past 15 years, a research agenda that in effect directly targets Ladyginian behavior has proven fruitful and productive (e.g. Hobaiter & Byrne, 2014; Byrne et al., 2017). The main research innovation has been to focus on 'apparently satisfactory outcomes': to observe and measure what reactions cause gesturers to cease gesturing. A large array of distinct gestures have been identified in this way. Exactly how many depends on details of definition and

granularity, but there are certainly scores of them, and many seem to be common across great ape species.

We suggest that these empirical successes are evidence that great ape gesture has a Ladyginian character, because the focus on 'apparently satisfactory outcomes' effectively targets Ladyginian behavior directly. It asks, 'What intentions did the gesturer reveal, which have now been satisfied by the audience?'. The label 'Ladyginian' has not (yet) been used to describe this approach, but Ladyginian behaviors are, we suggest, what has been targeted, and what has hence led to considerable empirical successes.

The key question is whether great ape gesture is also Gricean.

Great ape interaction is (probably) not Gricean

Distinguishing Gricean and Ladyginian modes of interaction is challenging from a methodological point of view, for at least three reasons. First, the distinction is cognitive rather than behavioral: what differentiates Gricean from Ladyginian modes of interaction is not any specific behavior, but the underlying cognitive processes from which behaviors derive. Second, both Gricean and Ladyginian modes of interaction entail satisfying an informative intention. They differ just in how the informative intention is satisfied (see above). Third, both Gricean and Ladyginian modes of interaction are context sensitive: communicators must be sensitive to what audiences can perceive and infer, and take this into account in their expressive behavior.

Nevertheless, Gricean and Ladyginian modes of interaction can be distinguished empirically. (a) On the production side, one approach is to contrast the different reactions that Gricean producers and Ladyginian producers should expect from others. (b) Another production-side approach is to motivate behaviors that are only possible among Gricean individuals. (c) On the audience side, results from several experimental tasks suggest—tentatively at least—that great apes do not ordinarily seem to expect communicators to be Gricean.

We do not have space to review all these possibilities here. Rather, we highlight one example of type (c). Audiences that expect communicators to be Gricean should show a strong sensitivity to the audience's prior knowledge about the communicator's knowledge. One suitable test would be experiments in which the independent variable is the audience's knowledge of the communicator's knowledge, and the dependent variable is the audience's reaction to communicative stimuli. Human infants show differential responses in these two conditions (Tauzin & Gergely, 2018), but there is no similar demonstration in any great ape species.

The claim that great ape interaction is Ladyginian but not Gricean does not preclude the possibility that some of the cognitive capacities necessary for Gricean interaction could, in principle, emerge in great apes living in conditions of enculturation. However, there is a difference between, on the one hand, the presence of a cognitive capacity in the ordinarily developing phenotype of a species; and, on the other, the emergence of a cognitive capacity in specific individuals by virtue of individual experience. Thus, we are not suggesting is that the cognitive capacities for Gricean interaction are wholly impossible in great apes. We are observing that, if they are present, they are still unspecialised, disfluent, not a regular part of the environment, and not part of the ordinarily developing phenotype. This is all in contrast to humans, where the relevant capacities are part of the ordinarily developing phenotype. In short, only humans are 'natural Griceans'. Other great apes appear to be 'natural Ladyginians'.

This conclusion is potentially convergent with some other analyses (e.g. Gómez, 1994; Moore, 2017; Geurts, 2022; Warren & Call, 2022), but those other analyses do not make a clear distinction between Ladyginian and Gricean modes of interaction. We are arguing this distinction is crucial for understanding both similarities and differences between humans and other great apes.

Ladyginian description & analysis

Here we reinterpret one example of great ape interaction captured on video (originally from Fröhlich et al., 2016). We aim to show, briefly, how the concept of Ladygianian behavior enriches understanding of the natural phenomena. We shall discuss this example in more detail in the conference presentation.

[A mother makes multiple attempts to initiate travel with her infant across a water pond](). Between 00:03 and 00:08 she pulls on a branch that the infant is sitting on. Making the assumption that great ape gesture is Ladyginian, we interpret this as the intentional expression of an intention to travel. The gesture is not successful: the infant does not move. At 00:15 the mother moves closer to the infant and briefly puts her (the mother's) hand on her own back. The method of observing 'apparently satisfactory outcomes' (see above) identifies this as a commonly used gesture, named 'Present Climb On' to describe its common usage: to present a body part onto which the audience is expected to climb (Hobaiter & Byrne, 2014). We interpret this momentary gesture as the intentional expression of an intention that the infant climb upon the mother's back, so that they can travel. This also fails—the infant remains unresponsive— and so between 00:20 and 00:26 the mother reverts to the original strategy of pulling on the branch the infant is sitting on. When this too fails, the mother travels back across the pond. Now closer, the infant finally climbs onto her back.

Varieties of meaning

Paul Grice famously distinguished 'natural meaning' from 'non-natural meaning' (1957). This is a binary distinction, and as such does not lend itself to gradualism. Our 'special case of' framework (Figure 1) helps to distinguish some notions of meaning that are continuous with one another, and hence sketch some gradations that are highly relevant for cross-species comparisons.

In the most general sense, 'meaning' is a property of a relationship between an item and a cognitive system, such as an individual mind. Anything can 'have' meaning, just so long as it is processed by (or 'is informative for') some cognitive system. But only a subset of the many possible sources of meaning in the world derive from an individual's intention to have a cognitive effect on others. Specifically:

- In cases of meaning$_W$ (Washburnian), individuals intend to act on others' mental states but do not have any particular motive to reveal this intention. Many clothing choices, for instance, are made to express certain attitudes, without necessarily advertising this intention.
- In cases of meaning$_L$ (Ladyginian), individuals intentionally reveal their intentions. We are arguing here that most great ape gesture has meaning$_L$.
- In cases of meaning$_G$ (Gricean), individuals intentionally reveal a specifically informative intention. Meaning$_G$ is another name for Grice's 'non-natural meaning', or meaning$_{NN}$. It provides the foundation for linguistic semantics.

Conclusion

A crucial takeaway point is that, with respect to the origins of language, the key comparisons to make between humans and other great apes are not in systems of communication as such, but rather in social cognition, and specifically in means of attention manipulation. Communication systems in nonhuman primates share some surface similarities with natural language, but there are also important dissimilarities which collectively constitute strong evidence against evolutionary continuity (see also Scott-Phillips & Heintz, 2023b). Continuity can rather be identified in social cognition, and more specifically in the domain of attention manipulation, with relatively small differences between humans and other great apes. With the key notion of Ladyginian interaction, we hope to have helped understand these small but very consequential differences.

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