Limitations of Non-Gricean Approaches to the Evolution of Human Communicative Abilities

Mateusz Włodarczyk*

Abstract: In this paper, I examine two non-Gricean approaches to the evolution of human communicative abilities: Mitchell S. Green's account of organic meaning and Dorit Bar-On's account of expressive communication. I argue that the non-Gricean approaches in question face certain problems: i) they focus on the adaptive function of communicative behaviours and ignore questions about their mechanisms, ontogeny and phylogeny; ii) the notion of organic meaning does not constitute an intermediate form between natural and non-natural meaning but should rather be understood as a special case of natural meaning; iii) the non-Gricean approaches under scrutiny cannot explain the transition from dyadic to triadic communication. I also outline the differences between Gricean and non-Gricean approaches and argue against the usefulness of the non-Gricean approaches discussed in this paper in explaining the evolution of human communicative abilities.

Keywords: Evolution of communication; evolution of language; expressive communication; Gricean communication; organic meaning.

* University of Szczecin
  https://orcid.org/0000-0002-3658-1842
  Institute of Philosophy and Cognitive Science, University of Szczecin ul. Krakowska 71-79, 71-017 Szczecin, Poland.
  ✉ mateusz.wlodarczyk@usz.edu.pl

1. Introduction

Paul Grice's theory of meaning and his theory of conversational implicatures were designed to provide a rational reconstruction of communicative processes rather than to describe the psychological processes that underlie our ability to communicate (Wilson 2017; Saul 2002). Still, many researchers concerned with both the ontogeny and phylogeny of human communication describe their theories as either Gricean or non-Gricean. One example of the former category is Relevance Theory (Sperber and Wilson 1986), which postulates the Cognitive Principle of Relevance (Wilson 2017) not only to explain human forms of communication, but also to explicate mechanisms that govern cognition *in general*. And while Relevance Theory, as a post-Gricean approach, distances itself quite significantly from Grice's original proposal, there are other approaches (especially in the neo-Gricean camp) which retain more of the Gricean spirit and still try to create plausible explanations of the ontogeny and phylogeny of language (Tomasello 2010, 2014; Thompson 2014; Moore 2016, Fitch 2010; Hurford 2003, 2014). As a consequence of the fact that "being Gricean" is quite a nebulous concept, with many Gricean researchers rejecting certain tenets of Grice's theory, it is useful to at least roughly determine what those approaches have in common. For the purposes of this paper, we can point to two main aspects: firstly, on the original Gricean account, the meaning of a speaker's communicative act is constituted by her intention, and successful communication consists in the speaker's expressing and the hearer's recognizing the meaning-constituting intention behind the act; secondly, the recognition of the speaker's communicative intention is an inferential process guided by the cooperative principle, Gricean maxims, a modified set of maxims in neo-Gricean accounts, or by other general pragmatic principles posited in post-Gricean accounts.[1]

---

[1]   One could argue that the cooperative nature of communication is another core tenet of Gricean accounts. However, according to Relevance Theory, for instance, cooperation on the part of the speaker does not have to be assumed by the hearer in order for him to infer the meaning of a communicative act. This suggests that not all Gricean accounts share the assumption that communication is cooperative in Grice's sense.

Nevertheless, despite its prevalence in both linguistics and cognitive science, the intentional-inferential model that forms the core of Gricean accounts seems to be, at least at first glance, ill-suited to explain how human communication has emerged during evolution or how children learn to communicate. This is due to the fact that it places high cognitive requirements on Gricean communicators: it is assumed that a Gricean Being, which I understand as a being capable of expressing and recovering communicative intentions, must be equipped with the following cognitive abilities (Moore 2016):

1. the ability to understand that others have beliefs and false beliefs,
2. the ability to make complex inferences about others' goal-directed behaviour,
3. the ability to form fourth-level meta-representations.

The assumption that the three abilities in question necessarily underlie Gricean communication leads to what is known as the *cognitive load problem.* We observe that children from one to three years old have the ability to participate in linguistic communication, often with great efficiency; but psychological research reported in Breheny (2006), Joseph and Tager-Fluchberg (1999), and Welmann et al. (2001) suggests that they are not equipped with the above-mentioned abilities. One then has to answer the question of how it is possible for them to participate in linguistic communication without being Gricean Beings. Moreover, Gricean approaches face the challenge of explaining how the ability to form complex communicative intentions emerged in the course of evolution. In light of the observed gap between the communicative abilities of humans and those of our extant evolutionary relatives, the explanation of the emergence of speaker meaning (in Grice's sense) should involve some sort of plausible intermediate stages between non-intentional and intentional communication. However, it is still far from clear how those stages might look.

There are different ways in which we can answer this question, and some of them remain Gricean in spirit, allowing us to maintain the basic tenets of the Gricean intentional-inferential programme.[2] However, some researchers suggest that to solve this problem we have to allow for non-intentional

---

[2]   Attempts to resolve the problem of cognitive load within the Gricean framework go in two general directions: Firstly, by rejecting certain aspects of Grice's theory,

and non-inferential forms of information transfer which constitute a stepping stone from non-Gricean to fully-fledged Gricean communication. It is important to note that in calling these approaches non-Gricean, I do not want to say that they reject the claim that the linguistic communication of adult humans is intentional and inferential. Rather, what I have in mind is that they postulate three general claims: i) at least some forms of communication are observed in other animals (and plants) and ii) at least some forms of human communication may be adequately described and explained without reference to the intentional-inferential model; and iii) an adequate account of non-inferential and non-intentional communication—both human and non-human—may be used as a basis to develop a plausible ontogenetic and phylogenetic explanation of the emergence of intentional-inferential communication.

In this paper, I offer a critical discussion of two theories that can be regarded as non-Gricean in the sense explicated above: Mitchell Green's (2017b; 2019) conception of organic meaning and Dorit Bar-On's (2013, 2017) account of expressive communication. They are both designed to describe and account for certain forms of non-Gricean communication that may be regarded as evolutionary and developmental prerequisites for uniquely human communication. I argue that they fail to provide a satisfactory explanation of the evolution of human communicative systems; specifically, I claim that they face the following three problems: firstly, they conflate questions about functions and questions about causes; secondly, contrary to what Green claims, the examples of organic meaning he describes do not seem to be really distinct from what Grice discussed as cases of natural meaning; thirdly, the two models in question fail to provide a sufficient basis for explaining the transition from dyadic to triadic communication.

The paper is organized into four parts. Section 2 discusses Green's idea of organic meaning as an intermediate form between natural and non-natural meaning. Section 3 offers a brief presentation of Bar-On's model of

---

we can lower the demands for Gricean Beings (Moore 2016, Bach 1987); secondly, we can argue that children do in fact possess the abilities necessary to be Gricean Beings (Thompson 2014).

expressive communication. Section 4 argues that the two non-Gricean accounts under discussion faces serious problems. Finally, Section 5 outlines and discusses the differences between Gricean and non-Gricean approaches, and argues against the usefulness of the two non-Gricean approaches described in this paper in explaining the evolution of human communicative abilities.

2. Organic meaning

A central idea behind Green's notion of organic meaning is clear from the outset:

> Natural meaning seems too austere, while non-natural meaning seems too psychologically demanding a basis on which to build an account of the development of communication, either in ontogeny or phylogeny; it also makes it difficult to understand how communication is possible among adults who are developmentally compromised. Might there be middle ground? (Green 2019, 213).

Green's goal is then to find forms of meaning that go beyond the original Gricean contrast between natural and non-natural meaning, and, more importantly, that can be used to explain the evolution and development of human communicative abilities without being susceptible to the problem of cognitive load. It is worth noting that if the notion of organic meaning is to be used to explain the phylogeny and ontogeny of communication, it takes us beyond Grice's rational reconstruction and leads us to the realm of psychological reality—tentatively, we can say that it explains how communication systems emerge among organisms that do not reach a certain cognitive threshold (and maybe even among organisms that reach that threshold—more on that later). But how to define a notion of meaning that would constitute an intermediate form between natural and non-natural meaning? As we know, Grice (1957) defined five conditions that must hold for the particular use of "mean" to fall into the natural category:

1. One cannot consistently say, "Those spots mean measles, but he hasn't got measles." That is, "mean" in its natural usage is factive.

2. One cannot argue from "Those spots mean measles," to any conclusion about what is or was meant by those spots.
3. One cannot argue from "Those spots mean measles" to any conclusion about what anyone meant by those spots.
4. One cannot restate the above example in terms that involve direct discourse. That is, one cannot rephrase "Those spots mean measles," by saying, "Those spots meant, 'measles'," or "Those spots meant, 'He has measles'."
5. One can restate "Those spots mean measles," as "The fact that he has spots means that he has measles."

While Grice acknowledged that the division between natural and non-natural meaning may not be exhaustive (Grice 1957, 379), he nevertheless focused his analysis only on those two aspects. But if our task is to find some sort of intermediate form of meaning—as Green (2019) suggests—then we can now define the task as finding forms of meaning that satisfy only some of the conditions specified by Grice.

Green's starting point is the notion of a *cue* defined as follows:

> [a] feature F of the environment is a cue for organism C if C is able to use the information conveyed by F in a way that tends to improve its chances of survival or reproduction. (Green 2019, 214)

As Green points out, cues are not yet cases of communication; however, communication can emerge on the basis of cues; i.e., in situations when "organisms design, manipulate, or otherwise exploit cues in a way that benefits them due to the response that is engendered among the organisms that use those cues" (Green 2019, 214). When both the sender and the receiver benefit from the exchange of information, we can speak of communication. Using the notion of a cue we can now define the concept of a signal:

> S is a signal iff it is a behavioral, physiological, or morphological characteristic fashioned or maintained by natural selection because it serves as a cue to other organisms (Green 2019, 215).

The following two points should be emphasized here. Firstly, it is crucial that in this story there is no mention of intentions or inferences; therefore, communication involving sending and reading signals so defined can be

potentially referred to in an explanation of the emergence of communication among organisms that are clearly unable to form intentions or to understand that others have any kind of mental states (e.g., bacteria). Secondly, the explanation in question would be based solely on the adaptive function of signals understood as characteristic properties of signalling organisms.

Recall that Green's goal is to find forms of meaning that satisfy only some of Grice's five conditions. How can we use the notions of cues and signals defined above to achieve this goal? Let's consider, following Green (2019, 218), a population of colourful frogs from the family *Dendrobatidae.* Frogs belonging to this family are aposematic: the bright coloration serves as a warning for potential predators that the frog wearing it is extremely noxious. Since the coloration of a frog can be treated by a potential predator as a warning of the frog's toxicity, it can be classified as a cue: if a predator, as a receiver, produces behaviour appropriate to the presented cue, it will increase its chances of survival. Moreover, in this case, both the signaller and the receiver benefit from the exchange of information—the frog, of course, in virtue of not being eaten—so the coloration can also be understood as a signal in accordance with the definition presented above.

Green considers the following hypothetical scenario. Let's assume that in a population of colourful toxic frogs, a mutant is born: a colourful but *non-poisonous* individual. Such an individual would benefit from his coloration for free—because producing the toxin is costly in terms of calories—and in consequence would gain a fitness advantage over his non-mutant conspecifics. Following Green (2019, 218), if we analyse this situation in terms of Grice's five conditions, we can see that:

1. One can consistently say, "That bright coloration means that the frog is noxious, but it isn't noxious." Accordingly, 'mean' as used here is not factive.
2. One can argue from, 'That bright coloration means that the frog is noxious,' to a conclusion about what is or was meant by that bright coloration.
3. One cannot argue from, 'That bright coloration means that he is noxious' to any conclusion about what anyone meant by that bright coloration.

4. One cannot restate the above example in terms that involve direct discourse. That is, one cannot rephrase 'That bright coloration means that he is noxious,' by saying, 'That bright coloration means, "noxious"'.

5. One cannot restate 'That bright coloration means that he is noxious,' as 'The fact that he is brightly coloured means that he is noxious.'

Therefore, only two of the five conditions (3 and 4) for natural meaning hold in the mutant frog case under discussion. Green concludes that the form of meaning that arises in such communicative systems, which he dubs organic meaning, is an intermediate stage between natural and non-natural meaning.[3] Since the emergence of communicative systems based on organic meaning does not depend on intentions and inferences, we can observe them among many different species, from plants to primates. As a corollary of this, the examples of organic meaning in use that Green provides are quite numerous: alarm calls of birds and mammals, intonational patterns in speech, facial expressions and pre-Theory of Mind utterances.

3. Expressive communication

While Green's notion of organic meaning enables us to describe a very broad class of communicative systems, Dorit Bar-On (2013, 2017) concentrates on a narrower category of expressive behaviours, examples of which are growls, lip-smacks, facial expressions of anger, fear, and pain; and alarm calls. The hallmark of these behaviours is that they *show* the signaller's state of mind to suitably attuned observers, and those observers directly recognize the expressed state without the need of inferences (Bar-On 2013, 356). They can be understood as signals, as defined in Maynard-Smith and Harper 2003, but are distinct from other types of animal signals due to certain characteristics: they can guide the attention of the receiver to the

---

[3] One important aspect of communicative systems that are based on organic meaning is that they are stable; that is, they are resistant to cheats. While stability is crucial when we want to explain how communicative systems are established in the course of evolution, it is not connected to the problems that non-Gricean approaches face, as discussed in section 4; therefore, it is not mentioned here.

object of that state (e.g., the predator that caused the emission of the alarm call); they show the quality of the state (e.g., the degree of fear or happiness); and they show that the signaller is disposed to act in a certain way (Bar-On 2013, 356). Expressive signals are units of expressive communication, which is defined as a:

> (...) form of social, intersubjective, world-directed and overt communicative behavior that is naturally designed to enable expressers to show their intentional states of mind to suitably endowed observers, so as to move them to act in certain ways (toward the expresser or the object of her expressed state), in part by foretelling the expresser's impending behavior (Bar-On 2013, 360).[4]

Bar-On also points out that expressive signals can be produced with a certain level of flexibility;[5] however, they are not produced with communicative intentions, nor does their interpretation depend on any kind of inference on the part of the receiver:

> On the expresser's side there's no need for any active desire to cooperate or to share information, or any belief about what it would take to fulfill it. Even where the production of the behavior or some of its aspects are under the voluntary control of the producer, the behavior is not produced *with the intention of affecting others' states of mind*. (...) At the same time, appropriate, active responses to producers' expressive performances can be entirely spontaneous and grounded in simple contagion or other forms of 'resonance'; they needn't be calculated or dependent upon rational assessment of available evidence or inference involving attributions of mental states to others. (Bar-On 2013, 359; italics in the original)

Expressive communication can be understood, then, as a form of communication that is naturally designed; it enables signallers to show their psychological states overtly to receivers and thereby to produce certain

---

[4]   Note that 'intentional' in this definition pertains to the aboutness of the signals (intentionality in Brentano's sense), not to the fact that they are produced with communicative intentions.

[5]   On empirical evidence of the flexible nature of alarm calls, see (Crockford et al. 2012).

response on their part. It is also non-intentional and non-inferential; therefore, it can be classified as a form of non-Gricean communication.[6] In fact, Bar-On does not specify any sort of cognitive abilities necessary for participating in expressive communication. As a corollary of this, expressive communication, like communicative transactions employing cases of organic meaning, can be viewed as involving a wide variety of signals: alarm calls of birds and primates, growls and howls of canines, felid hisses, and sounds produced by cetaceans. However, due to their differences from other animal signals, expressive signals are believed to foreshadow human linguistic communication, as they allow animals to "openly share information about their current states of minds and impending behavior, as well as about their environment to suitably responsive others" (Bar-On 2017, 306); i.e., they specify forms of communication that have certain characteristics of human communication without the need of intentional-inferential cognitive architecture.

4. Problems for non-Gricean approaches

In this section, I argue that Green's conception of organic meaning and Bar-On's theory of expressive communication face certain problems that can be quite challenging if we regard the two models under discussion as attempts to explain the phylogeny and ontogeny of human communicative abilities. It is worth pointing out that the source of those problems is what was supposed to be the biggest strength of the proposals under scrutiny: namely, that they promise to explain the emergence of communication systems without appealing to any sorts of processes involving communicative intentions or inferences about those intentions. In the following sections, I develop three challenges to the above-presented non-Gricean approaches, which I briefly mentioned before. Specifically, I argue that: i) the non-Gricean approaches discussed in Sections 2 and 3 above concentrate on the adaptive function of certain forms of behaviour while neglecting the issue of their underlying mechanisms; that is to say, the models offered by Green

---

[6]   Expressive signals according to Bar-On (2017, 306) can be classified as psychologically involved but only in the sense that they reflect and affect the producer's and recipient's current psychological states.

and Bar-On address the question about the function of a communicative behaviour and largely ignore the question about its causes and mechanisms; ii) appearances to the contrary, the examples of organic meaning discussed by Green seem to constitute special cases of Grice's natural meaning and, for this reason, cannot be regarded as constituting an intermediate form of meaning; iii) both approaches, due to their non-mentalistic nature, fail to explain the transition from dyadic to triadic communication.

To avoid any misunderstandings, it is worth stressing that I do not want to argue that the non-Gricean approaches under discussion fail to explain the adaptive functions of certain communicative systems or how those systems might have emerged in the process of evolution. On the contrary, I think that both approaches are very convincing in that matter and explain certain aspects of non-human communication. However, the questions that the Gricean approaches to the evolution of human communication are designed to answer go far beyond the scope of the non-Gricean approaches: the former not only try to explain the adaptive function of our communicative abilities, but also answer the question how, given the intentional-inferential nature of human communication, human agents gained the cognitive architecture that underlies this form of communication, and how much of that architecture we share with our closest evolutionary relatives. If we conceptualize the goal of the Gricean approaches in this way, it becomes clear that non-Gricean and Gricean theories of the evolution of human communicative abilities overlap to a minimal extent. I would also argue that the limited scope of the non-Gricean approaches prevents them from giving substantial insight into either the phylogeny or ontogeny of human communication.

4.1 Tinbergen's four questions

In his classic work, *On aims and methods of Ethology*, published in 1963, Niko Tinbergen introduced four questions that one has to answer in order to fully understand the behaviour of an animal. The questions pertain to:

1. Causation: what immediate effects the external and internal factors have on the occurrence of behaviour (Hogan 2009)?; what are the mechanism of control of the behaviour (Bateson and Laland 2013)?

2. Function: What are the effects of particular behaviour on the organism's fitness (Cuthill 2009)? What is the survival value of behaviour (Shettleworth 2009), in terms of its current utility (Bateson and Laland 2013)?

3. Ontogeny: How does the trait develop in individuals (Nesse 2013)? How do experience and genetic makeup combine to cause the animal to behave as it does (Shettleworth 2009)?

4. Phylogeny: how did a particular behaviour evolve (Shettleworth 2009)? What is the phylogenetic history of the trait (Nesse 2013)?

While these questions do, in fact, inform each other, it is crucial not to conflate them. As Jerry Hogan pointed out, commenting on the independence of the question about causation from the question about function, 'the outcome of behavior can never determine its occurrence' (Hogan 1994, 9). In other words, even if we determine the adaptive value of a certain behaviour, we cannot, solely on that basis, say anything about the mechanism that causes that behaviour. So, natural selection can only be understood as a casual factor in the *historical process of evolution*, not as a proximate cause of cognitive phenotypes (Bolhuis 2009, 173).

It is important to note the relation between Tinbergen's four questions and another distinction made by Baker (1938) and popularized by Mayr (1961), i.e., the distinction between the ultimate and proximate causes of behaviour. According to Mayr (1961, 1503) proximate causes are understood as immediate set of causes of a particular behaviour, for example bird migration; those causes in the case of migration can include the physiological condition of the bird interacting with photoperiodicity and drop in temperature. On the other hand, ultimate causes are "causes that have history and that have been incorporated into the system through many thousands of generations of natural selection" (Mayr 1961, 1503). Hogan and Bolhuis (2009) state that although Tinbergen's causation corresponds quite precisely to the Mayr's proximate causes, the same cannot be said about the correspondence between Tinbergen's function and Mayr's ultimate causes. As Cuthill (2009) says, by function Tinbergen understood the survival value of the behaviour: its *effects* on the fitness of the animal, in term of the current utility of that behaviour (Bateson and Laland 2013); Mayr on the other hand, wanted to use his distinction between ultimate and proximate

causes to draw a line between causes of behaviour that preceded the life of an animal, and those that occur within an animal's lifetime (Dewsbury 1999, 190) Therefore, Mayr's ultimate causes and Tinbergen's functions constitute different categories: since the function of an item or behavioural trait describes its current utility in terms of the effects it has on the fitness of the organism, it cannot be understood as its cause. This is especially clear when we look at the definition of the term 'ultimate causes' offered in Mayr (1993, 94), where ultimate causes are characterized as laws "which cause changes in the DNA of genotypes". Nevertheless, there is a tendency to treat the notions of *ultimate causes* and *functions* as equivalent or even identical to each other (Hogan and Bolhuis 2009). The relationship between the notions introduced by Tinbergen and Mayr is significant from the point of view of the theses presented in the papers by Macphail and Bolhuis (2001) and de Waal (2008) that will be discussed below. The reason is that while Macphail and Bolhuis use the notions of function and cause in their discussion, de Waal on the other hand is referring to ultimate and proximate causes. However, it is worth stressing how de Waal understands those terms. He defines the proximate cause of a piece of behaviour as a "situation that triggers behavior and the mechanism (psychological, neural, physiological) that enables it"; next, he characterizes the ultimate causes of a behaviour as "the benefits an organism or its close kin derive from [it], hence the probable reason why the behavior was favored by natural selection" (de Waal 2008, p. 280). Therefore, his definition of ultimate causes can, in my opinion, be likened to Tinbergen's characterization of functions rather than to Mayr's understanding of the term 'ultimate'.

It is also worth noting that originally none of Tinbergen's questions directly pertained to cognition; de Waal (2008) and Hogan (2009) note that was Tinbergen's goal: to avoid muddling the scientific discussion about behaviour by appealing to poorly understood cognitive processes. However, as Hogan (2009) points out, the study of cognition has come a long way, and nowadays it is noncontroversial to ask questions about cognitive structures that underlie behaviour. Therefore, the study of causes of behaviour could be now understood—among other things—as involving questions about possible cognitive structures that produce observed animal behaviour. As Shettleworth says (2009, 10): "perceptions, representations, decisions as well as

the neural events that accompany them, are all possible proximate causes of behavior"; and again: "In terms of Tinbergen's four questions, cognition is one of the proximate causes of behavior" (Shettleworth 2009, 11) The fact that the questions about cognitive structures are now understood as questions about the causes or mechanism of behaviour is clearly evident in papers by Macphail and Bolhuis (2001) and de Waal (2008) presented below.

Lastly, I would like to point out that there is currently a debate about the status of Tinbergen's four question as well as that of Mayr's proximate-ultimate distinction[7] in ethology and evolutionary biology. For example, Calcott (2013) suggests that concentrating on the proximate-ultimate distinction, one can obscure another perspective of lineage explanations. Hogan (1988) analyses relations between Tinbergen's questions in the context of development, showing that when studying animal behaviour we have to account for complex interactions between phylogenetic, ontogenetic and causal processes. Bateson and Laland (2013) stress: i) the importance of the influence of parental phenotype in development; ii) analysis of different levels of organization at which natural selection can act; iii) and the need for an update of terminology. Additionally, they point out the need for integrative solutions in regards to four questions. Laland et al. (2011) argue that Mayr's distinction rests on incorrect views on development, which in turn has a consequence for our understanding of the role of culture in the evolution of uniquely human traits. However, despite those issues, there is no doubt about the usefulness of both Tinbergen's four question and Mayr's distinction. Laland et al. (2011, 1514) write:

> Mayr's concern that proximate and ultimate explanations should not be regarded as alternatives remains entirely valid today and is an important and useful heuristic that applies broadly across biological disciplines.

A similar opinion can be found in the works of Laland and Bateson (2013) and of Verhulst and Bolhuis (2009). The consensus among the scholars seems to be that while there is still room for discussion and disagreement about certain details, the general approach to the study of animal behaviour

---

[7]   I would like to thank an anonymous reviewer for pointing out this issue.

proposed by Tinbergen is adequate. And certainly, one cannot deny the importance of the distinction between the cause of a behaviour—that is, its underlying mechanism—and its function.

As evident in Macphail and Bolhuis's (2001) critique of the neuroecological approach to cognition, ignoring the differences between questions about functions and questions about causes can lead to severe problems. The neuroecological approach—which, when applied to human cognition, is called 'evolutionary psychology'—assumes that natural selection results in the emergence of optimal solutions to problems faced by a species—so that, in effect, the cognitive capacities of animals could be deduced from our knowledge of what the optimal behavioural patterns would be (Macphail and Bolhuis 2001, 343). For example, as the authors suggest, one of the consequences of such an approach would be the idea that food-storing birds have different memory mechanisms from non-storing birds. But as I have already stated, answering the question about the adaptive function of a behaviour (and the food-storing behaviour can obviously be analysed in terms of its adaptive value) is different from answering the question about the causes—in terms of cognitive structures—of the behaviour under scrutiny. The only way to establish whether different behaviours are caused by different mechanisms is to look at empirical evidence—and as Macphail and Bolhuis (2001) show, there is no compelling evidence for the hypothesis that memory mechanisms of storing and non-storing bird species are qualitatively different. As they say:

> We suggest that (i) functional and evolutionary considerations cannot explain the mechanisms of cognition, but that (ii) functional and evolutionary considerations may provide clues for the analysis of the mechanisms of brain and behaviour. Importantly, as we shall see, even the use of the latter, trimmed down version of 'cognitive ecology' can be misleading to the extent that we should seriously consider the value of such an approach. (Macphail and Bolhuis 2001, 344)

Frans de Waal in his 2008 paper *Putting altruism back into altruism* shows even more clearly the potential issues that can arise when we conflate the questions about the cause and function. Partly due to the fact that biologists have hijacked the terminology used in the discussion about

altruism, ultimate explanations that focus on return benefits are sometimes treated as an explanation on the level of proximate causes of altruistic behaviour. In other words, there is a widespread assumption that animals other than humans behave altruistically only because they expect reciprocity. But this explanation of altruistic behaviour—de Waal argues—is intrinsically flawed because it assumes that altruistic animals have the cognitive ability to fully grasp the complex consequences of their actions in a dynamic social environment, and to predict often substantially delayed return-benefits. A more parsimonious explanation would be to assume that altruistic behaviour is primarily driven—not only in humans, but in other animals as well—by the capacity to be affected by the emotional states of others, to assess the reasons for those states, and to identify with others, adopting their perspectives (de Waal 2008, 281). In short, we could put forth the hypothesis that what drives altruistic behaviour is empathy rather than reciprocity. A detailed discussion of de Waal's proposal of empathy as the proximate mechanism underlying altruistic behaviours goes beyond the scope of the present paper.[8] My main goal is to highlight the potential problems that emerge when we ignore the difference between questions about the adaptive function of a behavioural pattern and questions about its underlying mechanisms. In the case of neuroecological approaches, this leads to the unfounded claim that considerations of the adaptive function of a behaviour provide sufficiently strong evidence for claiming that there exist qualitatively different mechanisms underlying that behaviour. In the case of altruism, the situation is slightly different. Altruistic behaviour—which at first glance shouldn't be promoted by natural selection, since it involves increasing the recipient's fitness *at the cost* of the performer's fitness—can be adaptive if we consider the return benefits that the performer can experience. However, ultimate considerations play no role in the explanation of why certain animals behave altruistically in specific situations; they only show us why certain traits were favoured over the course of natural selection. In order to specify the mechanism (or the proximate cause)—i.e., the environmental, neural and psychological causes of behaviour—we need to look away from adaptive value and to the realms of neurophysiology and psychology.

---

[8]   Interested readers are referred to de Waal (2008); de Waal and Suchak (2010).

My main thesis in this paper is that theories of organic meaning and expressive communication might be in danger of making a similar mistake to that made in the case of i) neuroecological approach to cognition, whose central tenets were scrutinized by Macphail and Bolhuis, and ii) biological approaches to altruism that conflate motivational and evolutionary terminology. Non-Gricean approaches to communication rest on their respective accounts of the adaptive function of communicative behaviours, and they provide rational reconstruction of certain forms of communication;[9] yet, while the accounts in question enable them to explain why certain traits emerged and were maintained as communicative devices, they do not describe or explain the mechanisms underlying the functioning of the traits under scrutiny. Viewed from the perspective adapted by de Waal in his critical discussion of altruistic behaviour, the models offered by Green and Bar-On fail to provide *proximate mechanisms* for the specified forms of communication. As a corollary of this, the claim that the two notions under discussion—i.e., *organic meaning* and *expressive communication*—can be used to describe communicative systems that do not rest on intentional-inferential capabilities is controversial, since even an adequate account of the adaptive value of a piece of behaviour says nothing about its underlying mechanisms and the mental states involved in its production.

Let us look more closely at the account of organic meaning presented in Green (2019). We can say that by defining this notion Green accomplishes two main goals. Firstly, he specifies the notion of a cue in terms of the adaptive value of some feature F of the environment and, next, uses it to characterize the concept of a signal and the idea of signalling communication. The resulting conceptual framework enables him to explain the adaptive value of certain communicative systems. Secondly, by using Grice's criteria for non-natural and natural meaning, Green concludes that organic meaning can be understood as an intermediate form of meaning. Therefore, what he offers is: i) an account of the adaptive value of certain communicative systems; ii) a rational reconstruction of a form of meaning. Recall that Grice's notion of non-natural meaning as well as his analysis of con-

---

[9]   Which is not surprising since both approaches are based on the application of Evolutionary Game Theory to signals (Maynard-Smith and Harper, 2003).

versational implicatures was not intended as a psychological account of human communication (Wilson 2017, Saul 2002). Grice's goals were philosophical: his notion of meaning and his model of conversational implicatures were developed to provide a way of preserving the truth-conditional approach to language while simultaneously showing how philosophers can be attentive to the various ways language is *used* by speakers (Saul 2002; Neale 1992). Therefore, Grice's account does not provide us with cognitive model of utterance production and comprehension[10]. But since Grice's account as such offers no cognitive model of communication, the problem of cognitive load—or any other problem pertaining to the cognitive aspect of communication—simply does not arise at this stage. Similarly, if Green's account of organic meaning is to be understood as a rational reconstruction of a form of meaning, this account cannot be used to provide a *solution* to this problem. The problem of cognitive load, as well as questions about the development of communicative abilities, concern *cognitive mechanisms* that underlie human forms of communication. To answer these questions, one has to specify the plausible cognitive models that underlie the communicative behaviour observed in humans and other animals. Of course, this does not mean that philosophical considerations cannot yield any useful insight into the psychological processes underlying communication. For example, on the basis of Grice's analysis we can predict that communication involving non-natural meaning probably requires quite complex cognitive systems—certainly more complex than communication observed among bacteria. Bermudez (2005) argues that conceptual analysis provided by philosophers can be, in some ways, useful for psychology and cognitive science. Nevertheless, philosophical considerations do not lead to explanations at the, for example, computational, algorithmic or implementation levels specified by Marr (1982).

It is obvious that *some* Gricean approaches—for instance, the account offered by Relevance Theory—are constructed with an explicitly stated goal of providing a psychological model of communication. However, the insights they offer depart significantly from Grice's original analysis of

---

[10]   See, for example, Saul (2002) for analysis of Grice goals, and how Grice's programme differs from more psychologically oriented relevance theorists' approach. Also Neal (1991) provides an excellent summary of Grice's programme.

communication.[11] This is understandable, since their goal is to develop a psychologically plausible model of communication. To achieve this goal, the proponents of the Gricean approach have to go beyond rational reconstruction and try to tell a story about what is happening—paraphrasing Marina Sbisà (2001)—"in the mind" of speakers and hearers. Basically, we have to provide an operationalization of Grice's ideas of communicative intentions and pragmatic inferences. It is important to stress that the problem of cognitive load can indeed arise at this stage, that is, when we move from the realm of philosophical analysis to the realm of modelling cognitive processes. Note, however, that we can try to model broadly Gricean[12] communication in ways that will avoid this problem. For example, as I have already mentioned, we can *either* try to lower the threshold for Gricean communication (Moore 2016) *or* search for empirical evidence suggesting that infants have the complex intention-reading skills required for Gricean communication (Thompson 2014). Considering whether Gricean approaches are successful in answering the cognitive load problem goes beyond the scope of the present paper. For current purposes, it suffices to note that, taking into account their focus on cognitive mechanisms, they seem to offer adequate conceptual resources one can use to address and solve the problem in question. By contrast, the conceptual frameworks of Green's theory of organic meaning and Bar-On's model of expressive communication do not seem to provide an adequate basis for considering the evolution of cognitive mechanisms and skills underlying human communication.

The problems persist even if we acknowledge that the notion of organic meaning gives us a way to look at the adaptive value of certain traits and

---

[11]   Relevance theorists offer a radically different analysis of what is said and what is implicated; they reject Grice's conversational maxims; they also offer a different analysis of speaker's intentions.

[12]   I say broadly Gricean here mainly because if we look at the different neo and post-Gricean theories that are available today we sometimes see a very different visions of Gricean communication. In fact, there is a need for discussion about what really constitutes a Gricean theory (see for example Jaszczolt 2019). However, most of the contemporary Gricean approaches maintain the intentional-inferential model of communication that can be understood as a 'cornerstone' of broadly Gricean communication.

forms of behaviour. Forms of communication that involve organic meaning described in Green (2019) do not involve any sort of complex communicative intentions on the part of the speaker or hearer; but from the standpoint of functional analysis there *shouldn't* be any mention of intentions: as the discussion of Tinbergen's four questions suggests, the analysis in terms of *functions* tells us nothing about *mechanisms*. In other words: to ask whether a particular communicative behaviour involves processing of certain mental states and how this processing is implemented is to ask a question about the mechanism of cognition; to ask about the adaptive value of a certain behaviour is to ask a questions about its function. In fact, the analysis of organic meaning in terms of its adaptive value presented in Green (2019) does not enable us to differentiate between systems having intentional-inferential cognitive architecture, on the one hand, and non-inferential and non-intentional systems, on the other[13]. For example, certain communicative systems which Green describes as involving cases of organic meaning can, in fact, rest on an ability to form some sort of communicative intentions; prime candidates would be pre-ToM utterances and animal alarm calls. As Crockford et al. (2012) show, the alarm calls produced by chimpanzees constitute a very flexible form of communication that involves the ability to monitor the attentional state of the receiver; furthermore, as Tomasello's analysis shows, the gestural communication of chimpanzees can be understood as a form of *intentional* communication defined as "communicative signals that are chosen and produced by individual organisms flexibly and strategically for particular social goals, adjusted in various ways for particular circumstances" (Tomasello 2010, 14). This class of intentional signals is a starting point for a communication from a psychological point of view: communication that involves signaller attempts to influence the psychological states of the receiver and which is contrasted with non-intentional communicative displays. While it is non-controversial that, for

---

[13]   To expand on this issue: Sherry (2009), following Tinbergen, points out that behaviour serving the same function in different species can be caused by different mechanism; therefore, without causal analysis we cannot really say anything about similarities in mechanisms involved in the production of certain behaviour in different species even if we assume that the function of the behaviour in question is the same.

example, the communicative system based 'coloration' used by noxious amphibians involves no intentions, the same cannot be said about communication among great apes or pre-linguistic infants, which can be construed as a form of intentional, though not fully Gricean, communication. Following Macphail and Bolhuis we can say that, in the end, we need empirical evidence to say something about cognitive mechanisms involved in particular forms of behaviour. In our case, to decide whether a particular form of communication involves intention-reading skills, we have to study not only the function but also the cognitive mechanisms involved. But on Green's account all of the above mentioned forms of communication—from the communication in bacteria to pre-ToM utterances of infants—are characterized as cases of non-intentional communication that require 'minimal minds', without relying on empirical data. In light of this, it is also unclear how non-Gricean approaches can help explain the phylogeny and, in particular, the ontogeny of communication, since ontogeny deals in large part with the question of how mechanisms that cause certain behavioural patterns develop during an organism's maturation.

Green's approach to studying communicative systems seems to face the same problem as the one identified by de Waal (2008) in his critical discussion of the neuroecological account of altruistic behaviour. Because of the limitations of his conceptual framework, Green does not ask the question about the proximate mechanisms of particular communicative behaviours and, as a result, is unable to address the question about the evolution of their underlying cognitive machinery. I would like to be clear about the nature of my objections here. I think that Green's proposal accomplishes the goals formulated above: it is both a rational reconstruction of a form of meaning, and an analysis of adaptive value of certain communicative systems. However, in light of my objections, I do not think that the accomplishment of these goals can provide us with an answer to the cognitive load problem and provide a basis for phylogenetic and ontogenetic research. The problem here is that Green states that his analysis of organic meaning could be used to tackle cognitive, ontogenetic and phylogenetic problems. For example, he states:

> As a result, organic meaning may be of interest as part of an evolutionarily plausible account of the phylogeny of communication

and of a psychologically plausible account of the ontogeny of com-
munication. It will also shed light on aspects of adult human
communication that do not meet the cognitive demands of
speaker meaning. (Green 2019, 212)

Also, as shown in Section 2, Green's notion of organic meaning is pro-
posed as a possible solution to the cognitive load problem. But in order to
accomplish that goal, Green's theoretical framework has to be supplemented
with an additional account of the mechanisms underlying communicative
behaviour as well as with an adequate model of their ontogeny and phylog-
eny. This is not an easy task. For example, Hogan (1988) offers extensive
discussion on the development of behavioural systems, in which he considers
interactions between causal and developmental processes that result in
changes in those systems, as well as the relation of the functions of a be-
haviour to its causes. Among others, he discusses development of so-called
displays: behavioural patterns adapted to serve as signals to conspecifics
(Hogan 1988, 74); Hogan makes a comparison between waltzing, a type of
courtship behaviour observed in chickens and 'oblique posture with long
call' observed among black-headed gulls. Both types of behaviour are clas-
sified as displays. However, in the case of black-headed gulls, experimental
data suggest that social experience can be understood as a causal factor in
the development of the display behaviour in question, while waltzing is
observed even in chickens that were raised in isolation (Hogan 1988, 75);
therefore, the development of waltzing does not seem to be mediated by
social experience. This shows that even when we compare behaviours that
fall into the same category from the functional perspective, the develop-
mental processes (and possible the mechanisms) that lead to the behaviours
under scrutiny can be quite different in two separate species. Once again,
to provide a comprehensive evolutionary explanation of some forms of be-
haviour, we have to answer all four of Tinbergen's questions.

The situation is slightly different when it comes to considering the ex-
pressive communication model offered by Bar-On. The notion of expressive
communication is more robust than the notion of organic meaning and,
therefore, it enables us to specify more precisely the forms of communication
that fall within its scope. For example, not all cases of organic meaning
can be classified as cases of expressive communication. Recall two main

characteristics of expressive communication: i) it expresses an intentional state of the signaller; ii) it is a non-intentional and non-inferential form of communication. Once again, the analysis offered by Bar-On can be understood as an attempt to provide a rational reconstruction of a form of communication. What is more, like Green, Bar-On aims at answering evolutionary questions. However, she does not consider Tinbergen's questions in her analysis; for example, she leaves open the issue of cognitive mechanisms underlying the communicative behaviour. As a consequence, even if we assume that some forms of information transfer can be classified as cases of expressive communication that involve no Gricean intentions, we shall have to deal with two questions: firstly, i) how to differentiate between forms of expressive communication that rest on different cognitive abilities; secondly, ii) how did those forms *transition* into communicative *acts* backed up by communicative intentions. For example, Bar-On suggests in passing that some forms of expressive communication *can* involve the shared attention mechanism. But if this is the case, the question arises as to how shared attention mechanisms evolved; additionally, the mechanisms in question are referred to in some Gricean accounts (Tomasello 2010, 2014; Hurford 2007) of intentional communication. Therefore, in order to account for more advanced forms of expressive communication, Bar-On seems to refer to the same kind of complicated cognitive machinery that is posited by Gricean approaches.

It is worth noting that Sterelny (1995) makes a similar comment on Millikan's (1989) teleological account of representations. He points out that Millikan's analysis is "wholly within the domain of evolution and function" (Sterelny 1995, 252). This approach—which in large part ignores questions about proximate causes—can cause some problems, one of which is that Millikan's model leads to a very liberal view of what constitutes a representational system. As Allen and Hauser (1992) argue, we could say that on Millikan's account even acacias can have representations. On the other hand, while developing his own account of representations, Sterelny takes into account proximate causes, which in turn allows him to distinguish between different levels of complexity among representational systems.

To conclude, Tinbergen's four questions were designed to give a full understanding of animal behaviour, and while they inform each other, they

should not be conflated. Therefore, non-Gricean approaches, which concentrate on adaptive value, cannot provide a complete explanation of communicative behaviour, including its ontogeny and phylogeny. While I understand the need to create more parsimonious accounts of communication, the simplicity of a proposed explanation cannot be the main factor that decides whether to accept it as part of an adequate evolutionary account of human communication.

4.2 Organic meaning as a case of natural meaning

Green's goal is to find a form of meaning that constitutes an intermediate step between natural meaning and non-natural meaning. One candidate for this intermediate form is organic meaning which, according to Green, satisfies only two of the five conditions for natural meaning. Arguably, the most important claim is that organic meaning is not factive. That means we can utter the sentence:

(1)   That bright coloration means that the frog is noxious, but it isn't noxious.

without producing a contradiction. Let's compare that with the paradigmatic case of natural meaning taken from Grice (1957):

(2)   Those spots mean measles, but he hasn't got measles.

At first glance, (2) seems to involve contradiction. What is more, the sense of contradiction can be explained by saying that natural meaning is factive. This supports the hypothesis that organic meaning constitutes a distinct category. However, we need to remember that in the case of organic meaning in (1), we have a story—a reason to treat the use of 'mean' as non-factive. The story is that the frog in question is a mutant—it lacks a certain important quality that is typical for its species—and cannot produce a toxin. The existence of such mutants is purely hypothetical, to my knowledge. In standard conditions, and for the overwhelming amount of frogs, we cannot utter (1) without a contradiction because things in the world are a certain way: frogs that have this coloration *are* noxious. However, the hypothetical nature of this scenario is not a sufficient reason to assume that it cannot give us important insight into the nature of meaning.

Consider, by analogy, what would happen if we applied the same treatment to the standard case of natural meaning presented in (2). Let us assume that John and Jacob are representatives of two different tribes which, over the course of hundreds of years of coexistence, developed a curious ritual. Once a year, there is an outbreak of measles among the members of John's tribe (let's call them Johnathanians). Johnathanians know that members of Jacob's tribe (let's call them Jacobians) are mortally terrified of measles because the disease is especially dangerous to them. In fact, they go to great lengths to avoid any contact with any individuals showing symptoms of the disease. However, Johnathanians do not experience most of the symptoms of the measles, excluding the rash, and, being clever, use this opportunity to send their measles-stricken members to steal food from the Jacobians. Jacobians also benefit from this situation, because Johnathanians, being fierce warriors, prevent other, more aggressive tribes from taking the Jacobians' territory. From the definitions given by Green, we can say that the spots, being characteristic of measles, are cues for Jacobians: they use them to enhance their chances of survival and reproduction. Moreover, since Johnathanians also benefit from this exchange of information, we may define this as a case of communication. Finally, natural immunity to the other symptoms of measles can be understood as an adaptation for Johnathanians; therefore, it is a signal. Now, let's assume that John of the Johnathanians is special—he has a certain type of allergy that is triggered by strawberries. The allergy results in a rash that is the same as the rash of a person suffering from measles. John can, therefore, exploit his allergy and steal food from the Jacobians whenever he wants. In a situation like this, we could say:

(3)   John's spots mean measles, but he hasn't got measles.

without contradiction.[14] This situation is very reminiscent of the situation with the mutant frog: In a hypothetical scenario, we can present a situation when some form of meaning which in normal conditions is factive, becomes

---

[14]   Note that it is not necessary for either Jacobians or Johnathanians to be intentional creatures (by possessing some form of communicative intentions sensu Grice, or by being able to communicate intentionally sensu Tomasello) for this example to work.

non-factive. This suggests that organic meaning is not distinct from natural meaning. Rather, we could understand what Green calls organic meaning as cases of natural meaning that are *used* in communicative systems. Therefore, contrary to what Green claims, organic meaning can hardly be regarded as an intermediate form of meaning.[15]

4.3 From dyadic to triadic communication

One of the hallmarks of human communication is that it is primarily triadic: different communicative and linguistic devices, such as gestures (pointing and pantomiming), words, and utterances, direct the attention of others to outside entities or events (Tomasello 2010, Hurford 2007). Triadic communication appears very early in human ontogeny in the form of proto-declarative gestures. Firstly, children around 9-to-12 months of age start to show adults interesting objects with an accompanying look and smile; secondly, they point to more distal objects with the same look and smile (Carpenter and Call 2013). It is assumed that the motivation for this type of gesture is not a desire to obtain the object or to elicit a positive emotional response on the part of the adult, but to share attention with the other person. Experimental results support this hypothesis (Carpenter et al. 1998; Moore and D'Entremont 2001; Bates, Camaioni and Volterra 1975), as the response that children expect from adults is to simply acknowledge the presence of the object along with a positive emotional response (e.g., a smile). It is crucial that in these communicative situations, the signaller is actively monitoring the receiver's perceptual states (gaze monitoring) and responses, with additional attempts undertaken in case of communicative failure. As Hurford (2007, 46) states, shared attention seems to be a necessary prerequisite for triadic communication.

Most of the communicative behaviour of animals is dyadic, in the sense that it does not involve entities outside the signaller and receiver. Even the remarkably complex forms of communication that we observe among primates—for example, attention-getting and intention-movements—are

---

[15]   I'm aware that Green treats organic meaning and natural meaning as partially overlapping categories (Green 2017). What I'm trying to say is that all cases of organic meaning are "natural-meaning-in-disguise."

primarily used to regulate dyadic social interactions. However, some forms of communication systems observed among animals can be treated as candidates for triadic communication; for example, the alarm calls of birds and mammals. The question is, what sort of cognitive mechanisms underlie these communicative behaviours? Tomasello (2008) argues that most alarm calls seem to be genetically fixed adaptive specializations over which the signaller has very little voluntary control, and which are strongly tied to the emotional states of the animal. Therefore, they do not display crucial features of human triadic communication, and cannot be understood as an evolutionary basis for intentional-inferential communication.

We need to note two points here. Firstly, Tomasello does not claim that there are no cases of triadic communication among primates, but rather that alarm calls, which indeed draw the attention of the receiver to some kind of outside entity (and with that show a certain degree of triadicity), can only be described as *functionally* referential, as they are not produced with the *intention* to draw the attention of the receiver. Thus, they are distinct from the proto-declarative gestures of children, which are produced flexibly and with the intention to share attention with others. It is not hard to create a plausible story of how functionally referential alarm calls could emerge if we use the framework of Green's organic meaning and treat them as a sort of phylogenetic ritualization which does not require communicative intentions. However, Tomasello (2008, 28) points out the existence of attention-getting gestures that chimpanzees use flexibly to draw the attention of conspecifics to found food. This is a form of proto-triadic communication that is intentional and built upon the cognitive architecture of individual intentionality (Tomasello, 2014) in which the communicator expresses his 'referential intention'. Therefore, in the Gricean approach proposed by Tomasello, there is a place for an intermediate (proto-triadic *and* intentional) form of communication that falls between mere displays, on the one hand, and fully fledged Gricean communication, on the other. Secondly, one could argue that Tomasello makes a mistake classifying the alarm calls of chimpanzees as a merely fixed adaptive specialization. As Crockford et al. (2012) suggest, these alarm calls do exhibit features of flexible communication, as they can be modulated with respect to the attentional state of the recipient. However, this does not pose a significant problem for the Gricean approach

proposed by Tomasello, as one can simply argue that those communicative behaviours rest on the same cognitive architecture which underlies proto-triadic attention-getting.

Human triadic communication seems to rests on shared intentionality, which includes shared attention and shared goals of communicating agents. Utilizing Gricean approaches, we can differentiate between non-flexible alarm calls of birds and monkeys, proto-triadic alarm calls and gestures of chimpanzees, and fully fledged Gricean communication of humans by specifying the cognitive abilities that underlie those forms of communication. The story of the evolutionary transition between dyadic and triadic communication is not only a story of adaptive function or the character of the communication (whether it involves entities outside the signaller and the receiver), but also a story about the cognitive mechanisms that produce certain communicative behaviours. And once again, non-Gricean accounts, by omitting the mechanisms underlying communication, cannot paint a full picture of this transition.

5. What is the goal of Gricean approaches to the evolution of communication?

Let me preface this section by once again emphasizing that the notions of organic meaning and expressive communication are well constructed and useful theoretical categories. As I showed in section 4.1., both Green (2019) notion of organic meaning and Bar-On (2013, 2017) notion of expressive communication offer primarily functional analysis. However, I have doubts that they can be used as an alternative to Gricean theories or that they can solve problems that Gricean approaches face. In the previous sections, I have shown that non-Gricean approaches attempt to avoid these problems (e.g., the problem of cognitive load) by concentrating on forms of communication that require minimal—or even non-existent—cognitive abilities and claim that the forms in question provide a sufficient basis on which more complex, maybe even intentional-inferential forms of communication, can build. Therefore, this strategy can be characterized as bottom-up. That is to say, its proponents attempt to account for the evolution

of communication by demonstrating how evolutionarily stable patterns of communication might have emerged on the basis of adaptive values of communicative behaviour. Notice that the notions of expressive behaviour and, especially, organic meaning cover a very wide range of forms of communication. For example, organic meaning can be used to describe communication between bacteria, on the one hand, and pre-ToM utterances on the other, with no clear way to differentiate between them. I have argued that the non-Gricean approaches under discussion face certain serious problems. Proponents of Gricean approaches, by contrast, can adopt a different, top-down strategy. The starting point is an analysis of acts of fully developed human intentional-inferential communication, with a primary focus on the differences and similarities between those forms of communication and the communicative acts of our closest extant relatives. They can categorize different forms of communicative behaviour exhibited by the species in question, hypothesize on the basis of observational and experimental data about possible cognitive mechanisms that underlie those forms of communication (questions about mechanism), how those mechanisms mature in the lifetime of the organism (questions about ontogeny), and what are the evolutionary paths of those features (questions about phylogeny). Of course, Gricean-oriented researchers will also be interested in the adaptive value of different communicative behaviours (questions about function). What is important is that in doing so, one can distinguish different forms of communication underpinned by different cognitive mechanisms. Each and every one of those forms has to be analysed with respect to the four Tinbergen questions. Moreover, one has to have a way to differentiate among the various forms of communication and their underlying cognitive mechanisms.

Let's now consider Tinbergen's questions from the perspective of a more Gricean-oriented account of communication, namely the account of evolution of human communication offered by Tomasello (2010, 2014, 2019). He adopts a broadly Gricean approach to communication, heavily influenced by Relevance Theory. He assumes that, in the process of communication, speakers and receivers have to mutually rely on their abilities to form and read communicative intentions—in other words, the basis of human cognition and communication is an array of complex mind-reading skills. In order to explain how the conventional forms of human communication emerged

in the course of evolution, Tomasello's account distinguishes at least three different cognitive mechanisms responsible for different forms of cognition and communication: i) individual intentionality, responsible for cognitive and communicative abilities observed in the species of the family *Hominidae* and especially in the genus *Pongo*; ii) joint intentionality, hypothesized to appear for the first time in the species *Homo Heidelbergensis*; iii) collective intentionality, which we observe in modern humans. Levels of intentionality are distinguished by reference to different abilities to i) represent physical and mental aspects of the environment, ii) use those representations in cognitive simulations, and iii) self-monitor the agent's own behaviour, with each level of intentionality giving the agent different skills to represent, simulate and self-monitor, and allowing for different forms of communication. For example, individual intentionality allows great apes to represent the goals and attentional states of other agents and also to perform acts of intentional communication (Tomasello 2010). What is important, the analysis offered by Tomasello provides answers to Tinbergen's four questions; secondly, it identifies clear intermediate stages between intentional communication of primates that rests on individual intentionality and intentional communication of humans that rests on the more complex mind-reading skills of shared and collective intentionality, which can help to resolve the cognitive load problem. I do not want to suggest that Tomasello's approach is the right one to account for the evolution of uniquely human cognitive and communicative abilities. However, it undoubtedly offers functional (Tomasello 2008, 2014; Tomasello et al. 2012), causal (Tomasello 2010, 2014; Tomasello et al. 2005), phylogenetic (Tomasello 2014; Tomasello et al. 2012) and ontogenetic (Tomasello 2010, 2019) considerations of human—and more broadly, primate—cognition and communication, as well as providing a basis for solving the cognitive load problem by positing intermediate phylogenetic and ontogenetic stages. Theoretically, forms of communication underpinned by the different levels of intentionality described above could be classified as cases of organic meaning; but if we treat them as such, we leave open the task of explaining i) the transition between them as well as ii) the transition between non-intentional and intentional forms of communication. And, as I previously said, while the notion of expressive communication specifies a narrower class of communicative behaviours, it still does not

account for the cognitive architecture that underlies them, giving rise to the same set of unsolved problems.

To summarize, the main problem that theories of the evolution of human communicative abilities face is the problem of the transition from non-intentional, non-inferential forms of communication to Gricean intentional-inferential communication, which involves the question of the mechanisms of those forms of communication and their intermediate stages. Gricean accounts *can* offer the solution because they address and answer questions about mechanisms, ontogeny and phylogeny. Meanwhile, non-Gricean approaches that concentrate on the adaptive value of communicative behaviour cannot solve this problem, and thus cannot be seen as an alternative to Gricean approaches, simply because they do not address the central questions to be answered.

I would also like to comment on Bar-On's (2017) claims that Gricean accounts are characterized by a sharp dichotomy between code and ostensive-inferential communication, which is problematic if we want to construct plausible evolutionary explanations for human communicative abilities, and that expressive communication, as an intermediate form, can resolve those problems. Indeed, as she points out, on Tomasello's approach—which is definitely Gricean—there is a sharp distinction between animal vocal signals and acts of intentional communication. Bar-On then states:

> On the non-Gricean EC approach advocated here, however, expressive behavior, and the kind of communication it affords, form a theoretically significant category of behavior that lies somewhere between the two endpoints Tomasello describes—i.e., merely reflexive-reactive affective displays and fully reflective-creative intentional utterances (Bar-On 2017, 360).

I would argue that it is not correct to characterize Tomasello's approach as exhibiting this kind of dichotomy. On the contrary, he explicitly indicates a specific form of communication—the gestural communication of primates—as an intermediate form between non-Gricean and fully Gricean communication. However, that form of communication *is intentional*, as defined in section 4.1., and is based on the cognitive abilities of primates that allow them to understand the causal and intentional relations that occur in the world and use that knowledge as a basis for thoughtful and

controlled actions (including communication): individual intentionality. Therefore, it is well within the scope of Gricean approaches to conceptualize the forms of communication that fall between non-intentional signals and intentional-reflective utterances—in other words, Gricean approaches allow for *degrees* of intentional communication.

If we assume, that human communication is built upon complex mind-reading skills, which, I think, is not a controversial view, then we will always have the problem of explaining the transition between forms of communication that pose little or no requirements for cognition and uniquely human intentional communication. Even if we assume that the notion of organic meaning accurately describes the communication between amphibians and predators that threaten them, then we will have to explain how non-intentional organic meaning transitioned to the intentional, yet not fully Gricean, alarm calls of chimpanzees; if we assume that alarm calls are cases of non-intentional organic meaning, we will have to explain how it transitioned to the pre-ToM utterances of infants; if we assume that pre-ToM utterances are cases of organic meaning—still, we will have to explain the transition between non-intentional pre-ToM utterances and intentional communication. And every time that we have this significant transition between non-intentional and intentional communication, the problem of cognitive load arises. And one of the reasons for that is the fact that we do not specify any cognitive mechanisms responsible for those supposedly non-intentional forms of communication, thus creating a 'cognitive gap'. I suggest that to avoid this problem one can i) pose intermediate stages of intentional communication and ii) develop models of Gricean communication that posit lower cognitive demands on communicating agents[16]. As mentioned before, Bar-On claims that expressive communication foreshadows human communication in virtue of certain characteristics that go beyond simple animal signals, but do not require the capacity to form and understand

---

[16]   Of course, there is another option: we can reject the Gricean models of communication in favour of alternative views; in this case, the intentional-inferential model will no longer be the 'end game' of communication that requires explanation in evolutionary and developmental terms. However, since the non-Gricean accounts described in this paper do not make the claim that communication of mature humans is non-Gricean, I did not consider this approach.

communicative intentions. However, those characteristics—the open nature of expressive communication in which the signaller overtly conveys information about his mental states, impending behaviour and environment—do not constitute Gricean communication. There is still a very apparent difference—a gap—between expressive communication and organic meaning on the one hand, and Gricean communication on the other. Therefore, if we want to use non-Gricean approaches to explain the emergence of human communication, we need to explain how expressive communication, or cases of organic meaning, can *transition* into the intentional Gricean communication. Without this, the question remains unanswered. One apparent solution to this problem is to postulate some sort of intermediate levels of *intentionality*, which can underlie 'minimal-Gricean' acts of communication—and this is precisely the strategy that some Gricean approaches have adopted. Bar-On seems to be aware of that: "Once appropriated, and caught up in intentional actions, expressive signals can propagate and stabilize, and come to have a semantic-pragmatic life of their own" (Bar-On 2017, 310); and, "Expressive communication is at times triadic, relying on shared attention mechanisms that allow signalers and receivers to attend together to objects or events of mutual concern" (Bar-On 2017, 310). But the only story that non-Gricean approaches offer is a rational reconstruction of some forms of non-intentional communication and a story about how certain communicative behaviours are established due to their adaptive functions. Therefore, to bridge the gap, non-Gricean approaches have to fall back on concepts that are utilized in Gricean approaches—e.g., shared intentionality—for which they do not offer any evolutionary explanation. In other words, to provide an explanation for the emergence of Gricean communication, we need Gricean answers. For example, if we accept the expressive communication hypothesis, then we have to explain how the shared attention mechanism that supposedly allows for triadic communication has evolved and how it develops. The notion of expressive communication alone does not provide an answer to this; however if we have the story in place of how shared attention evolved, what explanatory role does expressive communication play?

6. Summary

In this paper, I have tried to identify the limitations of two non-Gricean approaches to the evolution of human communicative abilities: Green's theory of organic meaning and Bar-On's model of expressive communications. I have argued that what the two approaches in question offer does not go beyond the rational reconstruction of some forms of communication and the functional analysis of verbal forms of communication. And while this theoretical proposal could be useful, it falls short of the stated goals of providing solutions to cognitive, ontogenetic and phylogenetic problems that arise when we try to construct a plausible account of the evolution of human communication. Tinbergen's four questions show that causal, functional, ontogenetic and phylogenetic considerations in regard to behaviour require different approaches. As Hogan (1994) points out, questions about functions should be clearly distinguished from questions about mechanisms; as de Waal (2008) and Macphail and Bolhuis (2001) show, conflating these two questions can lead to serious problems. Functional analyses are important, but issues like the problem of cognitive load arise when we look at the cognitive processes that underlie our communicative abilities; therefore, functional analyses cannot be treated as solution to those kinds of problems. Furthermore, neglecting the causal analyses can lead to problems in explaining certain characteristics of human (and primate) communication, such as its triadicity. Finally, I have argued that organic meaning could be better understood as a natural meaning in use rather than a distinct category of meaning.

The main problem of the two non-Gricean approaches discussed in this paper seems to be that in order to fill the evolutionary gap between non-intentional and intentional communication they try to reconstruct forms of non-intentional communication in greater detail, while still maintaining that they do not involve any sort of communicative intentions. While this approach may have its merits, it does not really help to fill this gap since we still have to explain the transition between those forms of communication and the intentional communication of humans. On the other hand, Gricean approaches try to resolve the same problem by showing that various cases of intentional communication, broadly understood, can be more

or less cognitively demanding and, as the corollary of this, create a continuum of forms of intentional communication that can provide an adequate basis for plausible ontogenetic and phylogenetic accounts. The analysis of possible cognitive mechanisms involved in communication constitutes a large part of—at least some—Gricean approaches. For this reason, they seem to offer a more adequate conceptual framework within which one can address and attempt to solve the problem of cognitive load.

Acknowledgement

Funding

References

Allen, Colin, and Marc Hauser. 1992. "Communication and Cognition: Is information the connection?" *Proceedings of the Philosophy of Science Association* 2: 81–91. https://doi.org/10.1086/psaprocbienmeetp.1992.2.192826

Bach, Kent. 1987. "On Communicative Intentions: A Reply to Recanati." *Mind & Language* 2 (2): 141–154. https://doi.org/10.1111/j.1468-0017.1987.tb00112.x

Baker, John, R. 1938. "The Evolution of Breeding Seasons." In *Evolution: Essays on Aspects of Evolutionary Biology*, edited by G. R. de Beer, 161–77. Oxford: Oxford University Press.

Bar-on, Dorit. 2013. "Origins of Meaning: Must we 'Go Gricean'?" *Mind & Language* 28 (3): 342–375. https://doi.org/10.1111/mila.12021

Bar-On, Dorit. 2017. "Communicative Intentions, Expressive Communication, and Origins of Meaning." In *The Routledge Handbook of Philosophy of Animal Minds*, edited by Kristin Andrews and Jacob Beck, 301–12. London and New York: Routledge.

Bates, Elizabeth, Luigia Camaioni, and Virginia Volterra. 1975. "The Acquisition of Performatives Prior to Speech." *Merrill-Palmer Quarterly* 21: 205–224.

Bateson, Patrick, and Kevin N. Laland. 2013. "Tinbergen's Four Questions: An Appreciation and an Update." *Trends in ecology & evolution* 28 (12): 712–18. https://doi.org/10.1016/j.tree.2013.09.013

Bermúdez, José L. 2005. *Philosophy of Psychology: A Contemporary Introduction.* New York and London: Routledge.

Bolhuis, Johan. 2009. "Function and Mechanism in Neuroecology: Looking for Clues." In *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology,* edited by Simon Verhulst and Johan Bolhuis, 163–227. Cambridge University Press. https://doi.org/10.1163/157075605774840987

Bolhuis, Johan, and Simon Verhulst, eds. 2009. *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology.* Cambridge University Press. https://doi.org/10.1017/CBO9780511619991

Breheny, Richard. 2006. "Communication and Folk Psychology." *Mind & Language* 21 (1): 74–107. https://doi.org/10.1111/j.1468-0017.2006.00307.x

Calcott, Brett. 2013. "Why the Proximate-Ultimate Distinction is Misleading, and Why It Matters for Understanding the Evolution of Cooperation." In *Cooperation and its evolution*, edited by Kim Sterelny, Richard Joyce, Brett Calcott and Ben Fraser, 249–64. Cambridge: MIT Press.

Carpenter, Malinda, and Josep Call. 2013. "How Joint Is the Joint Attention of Apes and Human Infants." *Agency and Joint Attention*, 49–61. https://10.1093/acprof:oso/9780199988341.003.0003

Carpenter, Malinda, Katherine Nagell, Michael Tomasello, George Butterworth and Chris Moore. 1998. "Social Cognition, Joint Attention, and Communicative Competence From 9 to 15 Months of Age." *Monographs of the Society for Research in Child Development*, 4(63). https://doi.org/10.2307/1166214

Crockford, Catherine, Roman Wittig, Roger Mundry, Klaus Zuberbühler. 2012. "Wild Chimpanzees Inform Ignorant Group Members of Danger." *Current Biology* 22 (2): 142–146. https://doi.org/10.1016/j.cub.2011.11.053

Cuthill, Ian. 2013. "The study of Function in Behavioral Ecology." In *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology,* edited by Simon Verhulst and Johan Bolhuis, 163–227. Cambridge University Press. https://doi.org/10.1163/157075605774840987

de Waal, Frans B. 2008. "Putting the Altruism Back into Altruism: The Evolution of Empathy." *Annual Revie of Psychology* 59: 279–300. https://doi.org/10.1146/annurev.psych.59.103006.093625

de Waal, Frans B., and Malini Suchak. 2010. "Prosocial Primates: Selfish and Unselfish Motivations." *Philosophical Transactions of the Royal Society B: Biological Sciences* 365 (1553), 2711–722. https://doi.org/10.1098/rstb.2010.0119

Dewsbury, Donald A. 1999. "The Proximate and the Ultimate: Past, Present, and Future." *Behavioural Processes* 46 (3): 189–99. https://doi.org/10.1016/S0376-6357(99)00035-2

Fitch, Tecumseh. 2010. *The Evolution of Language*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511817779

Francis, Richard C. 1990. "Causes, Proximate and Ultimate." *Biology and Philosophy* 5: 401–415. https://doi.org/10.1007/BF02207379

Green, Mitchell. 2017. "How Much Mentality is Needed for Meaning?" In *The Routledge Handbook of Philosophy of Animal Minds*, edited by Kristin Andrews and Jacob Beck, 313–23. London and New York: Routledge.

Green, Mitchell. 2019. "Organic Meaning: An Approach to Communication with Minimal Appeal to Minds." In *Further Advances in Pragmatics and Philosophy: Part 2 Theories and Applications*, edited by Alessandro Capone, Marco Carapezza and Franco Lo Piparo, 211–28. Springer, Cham. https://doi.org/10.1007/978-3-030-00973-1_12

Grice, Paul. 1957. "Meaning." *The Philosophical Review* 66 (3): 377–88. https://doi.org/10.2307/2182440

Hogan, Jerry A. 1988. "Cause and Function in the Development of Behavior Systems." *Handbook of Behavioral Neurobiology (vol. 9). Developmental psychobiology and Behavioral Ecology*, edited by Elliott M. Blass, 63–106. Boston, Mass.: Springer.

Hogan, Jerry A. 1994. "The Concept of Cause in the Study of Behavior." In *Causal Mechanisms of Behavioral Development*, edited by J. A. Hogan and J. J. Bolhuis, 3–15. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511565120

Hogan, Jerry A. 2009. "Causation: The Study of Behavioral Mechanisms." In *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology,* edited by Simon Verhulst and Johan Bolhuis, 35–53. Cambridge: Cambridge University Press. https://doi.org/10.1163/157075605774840987

Hogan, Jerry A., Bolhuis, Johan J. (2009). Tinbergen's Four Questions and Contemporary Behavioral Biology. In *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology,* edited by Simon Verhulst and Johan Bolhuis, 25–34. Cambridge: Cambridge University Press. https://doi.org/10.1163/157075605774840987

Hurford, James R. 2007. *Language in the Light of Evolution: The Origins of Meaning.* Oxford: Oxford University Press.

Hurford, James R. 2014. *Origins of Language: A Slim Guide.* Oxford: Oxford University Press.

Jaszczolt, Katarzyna M. 2019. "Rethinking Being Gricean: New Challenges for Metapragmatics." *Journal of Pragmatics* 145: 15–24. https://doi.org/10.1016/j.pragma.2019.01.024

Joseph, Robert M, and Helen Tager-Flusberg, H. 1999. "Preschool Children's Understanding of the Desire and Knowledge Constraints on Intended Action." *British Journal of Developmental Psychology* 17 (2): 221–43. https://doi.org/10.1348/026151099165249

Laland, Kevin N., Kim Sterelny, John Odling-Smee, William Hoppitt and Tobias Uller. 2011. "Cause and Effect in Biology Revisited: is Mayr's Proximate-ultimate Dichotomy Still Useful?." *Science* 334 (6062): 1512–16. https://doi.org/1126/science.1210879

Magphail, Euan M., and Bolhuis John J. 2001. "The Evolution of Intelligence: Adaptive Specializations Versus General Process." *Biological Reviews* 76 (3): 341–64. https://doi.org/10.1017/S146479310100570X

Marr, David. 1982. *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*, New York: W. H. Freeman and Company.

Maynard-Smith, John M, and David Harper. 2003. *Animal Signals.* Oxford and New York: Oxford University Press.

Mayr, Ernst. 1961. "Cause and Effect in Biology." *Science* 134 (3489): 1501–06. https://doi.org/10.1126/science.134.3489.1501

Mayr, Ernst. 1993. "Proximate and Ultimate Causations." *Biology and Philosophy* 8: 93–4. https://doi.org/10.1007/BF00868508

Millikan, Ruth G. 1989. "Biosemantics." *The Journal of Philosophy* 86(6): 281–97. https://doi.org/10.2307/2027123

Moore, Chris, and Barbara D'Entremont. 2001. "Developmental Changes in Pointing as a Function of Attentional Focus." *Journal of Cognition and Development* 2 (2): 109–29. https://doi.org/10.1207/S15327647JCD0202_1

Moore, Richard. 2016. "Gricean Communication and Cognitive Development." *The Philosophical Quarterly* 67 (267): 303–26. https://doi.org/10.1093/pq/pqw049

Neale, Stephen. 1992. "Paul Grice and the Philosophy of Language." *Linguistics and Philosophy* 15(5): 509–59. https://doi.org/10.1007/BF00630629

Nesse, Randolph M. 2013. "Tinbergen's Four Questions, Organized: A Response to Bateson and Laland." *Trends in Ecology & Evolution* 28 (12): 681–82. https://doi.org/10.1016/j.tree.2013.10.008

Saul, Jennifer. M. 2002. "What Is Said and Psychological Reality; Grice's Project and Relevance Theorists' Criticisms." *Linguistics and Philosophy* 25: 347–72. https://doi.org/10.1023/A:1015221313887

Sbisà, Marina. 2001. "Intentions from the Other Side." *Paul Grice's Heritage*, edited by Giovanna Cosenza, 185–206. Turnhout: Brepols.

Sherry, David F. 2009. "Do Ideas About Function Help in the Study of Causation?" In *Tinbergen's Legacy. Function and Mechanism in Behavioral Biology,* edited by Simon Verhulst and Johan Bolhuis, 147–62. Cambridge University Press. https://doi.org/10.1163/157075605774840950

Shettleworth, Sarah J. 2009. *Cognition, Evolution, and Behavior.* New York: Oxford University Press.

Sperber, Dan, and Deirdre Wilson. 1986. *Relevance: Communication and Cognition.* Cambridge, Mass.: Harvard University Press.

Sterelny, Kim. 1995. "Basic Minds." *Philosophical Perspectives* 9: 251–70. https://doi.org/10.2307/2214221

Thompson, Robert J. 2014. "Meaning and Mindreading." *Mind & Language* 29 (2): 167–200. https://doi.org/10.1111/mila.12046

Tinbergen, Niko. 1963. "On Aims and Methods of Ethology." *Zeitschrift für tierpsychologie* 20 (4): 410–33. https://doi.org/10.1111/j.1439-0310.1963.tb01161.x

Tomasello, Michael, Alicia P. Melis, Claudio Tennie, Emily Wyman and Esther Herrmann. 2012. "Two Key Steps in the Evolution of Human Cooperation: The Interdependence Hypothesis." *Current Anthropology* 53 (6): 673–92. https://doi.org/10.1086/668207

Tomasello, Michael, Malinda Carpenter, Josep Call, Tanya Behne and Henrike Moll. 2005. "Understanding and Sharing Intentions: The Origins of Cultural Cognition." *Behavioral and Brain Sciences* 28 (5): 675–91. https://doi.org/10.1017/S0140525X05000129

Tomasello, Michael. 2010. *Origins of Human Communication.* Cambridge, Mass.: Bradford Books/MIT Press.

Tomasello, Michael. 2011. "Human Culture in Evolutionary Perspective." In *Advances in Culture and Psychology: Vol. 1. Advances in Culture and Psychology,* edited by Michele J. Gelfand, Chi-yue Chiu, Ying-yi Hong, 5–51. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195380392.003.0001

Tomasello, Michael. 2014. *A Natural History of Human Thinking.* Cambridge, Mass.: Harvard University Press.

Tomasello, Michael. 2019. *Becoming Human: A Theory of Ontogeny.* Cambridge, Mass.: Belknap Press.

Wellman, Henry M, David Cross, Julanne Watson. 2001. "Meta-nalysis of theory-of-mind development: The truth about False Belief." *Child Development* 72 (3): 655–84. https://doi.org/10.1111/1467-8624.00304

Wilson, Deirdre. 2017. "Relevance Theory." In *The Oxford Handbook of Pragmatics*, edited by Yan Huang, 79–100. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199697960.013.25