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Non-Cooperative Communication and the Origins of Human Language

Steven M. Beighley
Georgia State University

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by

STEVE BEIGHLEY

Under the Direction of Andrea Scarantino

ABSTRACT

Grice (1982) and Bar-On and Green (2010) each provide 'continuity stories' which attempt to explain how a human-like language could emerge from the primitive communication practices of non-human animals. I offer desiderata for a proper account of linguistic continuity in order to argue that these previous accounts fall short in important ways. I then introduce the recent evolutionary literature on non-cooperative communication in order to construct a continuity story which better satisfies the proposed desiderata while retaining the positive aspects of the proposals of Grice and Bar-On and Green. The outcome of this project is a more tenable and empirically investigable framework chronicling the evolution of human-like language from communicative abilities currently found in non-human animals.

INDEX WORDS: Evolution of language, Speaker meaning, Natural meaning, Non-cooperative communication, Deception, Linguistic continuity, Theory of mind

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STEVE BEIGHLEY

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STEVE BEIGHLEY

Committee Chair: Andrea Scarantino

Committee: Michael Owren

George Graham

Electronic Version Approved:

Office of Graduate Studies

College of Arts and Sciences

Georgia State University

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INTRODUCTION

Language is widely held as a uniquely human phenomenon, but is it an entirely different *kind* of thing than the communication systems used by non-human animals? Grice (1982) and Bar-On and Green (2010) have each proposed theories which answer this question in the negative by sketching *continuity stories* to explain the emergence of language from more primitive communication systems. These stories offer insights about how human-like language might merely be a more complex version of, and thus lie on a continuum with, the communicative abilities of some non-human animals. This essay aims to demonstrate the shortcomings of previous attempts to explain linguistic continuity and develop a more satisfactory account.

I begin by introducing the notion of continuity and proposing a set of desiderata for a satisfactory continuity story in Chapter 1. Chapter 2 then argues that previous accounts of continuity by Grice and then Bar-On and Green fail to satisfy the crucial desiderata I have proposed. Chapter 3 then sketches a novel continuity story which differs from previous continuity stories in that it brings non-cooperative communication, a concept from the animal communication literature, into center stage. By arguing that non-cooperative communication provides a so far largely neglected explanation for the evolution of cognitive capacities prerequisite for language my account retains the benefits of Bar-On and Green's and Grice's theories while avoiding their shortcomings. Finally, I defend my proposed account of linguistic continuity against potential objections.

At the conclusion of this project I will have laid a general framework chronicling a plausible evolutionary path between the pre-linguistic abilities of non-human animals and the linguistic abilities of humans. Because this essay's goal is to introduce a more fruitful continuity story for the evolution of language, I will include discussion of empirical studies which weigh in on the question of linguistic continuity in order to ground my theory in observation. The final result is a satisfactory outline of linguistic continuity based on social pressures which is ready to be fleshed out by future findings regarding the development of language.

CHAPTER 1: HOW DID HUMAN LANGUAGE EMERGE FROM ANIMAL COMMUNICATION?

To claim that language is continuous between humans and animals is to hold that the communicative practices exhibited by non-human animals are of the same *kind* as human language. A common strategy for showing that two things are different in degree rather than kind is to demonstrate that one is merely a more complex version of the other. Continuity stories attempt this strategy by providing plausible ways in which the unique constituents of human-like language (henceforth 'language') might naturally develop out of more primitive communicative abilities.

1.1 Three Desiderata for a Continuity Story

As the purpose of this essay is to propose a satisfactory continuity story, the first order of business is to give an account of what a continuity story should strive to accomplish. According to Bar-On and Green (2010), a defense of *continuity* would "illuminate important and perhaps unexpected ways in which the linguistic and non-linguistic may lie on a natural continuum," and a successful continuity story would "undermine...others' commitment to a fundamental discontinuity between the non-human and the human" (2010, 1). To put flesh around these ideas, here I introduce and defend a number of minimal desiderata any continuity story should satisfy. I will then use these desiderata to argue against previous accounts of linguistic continuity.

(D1) The final step of a continuity story should provide an explanation for the emergence of a uniquely linguistic ability. This desideratum states that some ability unique to language must emerge at the end of a continuity story, thereby bridging the gap between human language and less complex forms of communication. Note that this requirement leaves open

what this "ability unique to language" is, so a satisfactory continuity story must provide some reasoning for why the outcome it hopes to achieve is actually unique to language proper. For instance, a continuity story explaining the emergence of the vocal production of glottal stop sounds (the ability to use the throat to make a particular sound, such as in the uttering of "uh-oh") would fall short of this desideratum; the mere production of the sounds used in language cannot constitute a uniquely linguistic ability, as many animals can mimic the sounds of human speech, yet these animals lack an understanding of how these sounds come together to form words, and moreover, how these words can reference things such as the future or the past. In contrast, a story for how modifiers such as prefixes and suffixes came into usage would be satisfactory, as they are uncontroversially considered unique to linguistic communication and betray an understanding of how minor additions to a word can alter its reference.

(D2) The first step of a continuity story should not presume abilities (or constituents thereof) which are not accepted as present in current non-human animals. This desideratum anchors the foundation of the human-animal linguistic continuum in empirical observation. It seems intuitive enough that a proper continuum between animals and humans should stem from the most promising abilities existent in known animals, as opposed to abilities simply posited to exist in theoretical creatures. In conjunction with (D1), it follows that a continuity story should begin from the communicative abilities we know to exist in animals and end with the emergence of some ability unique to human language users.

(D3) Transitions between stages of a continuity story should be accompanied by as comprehensive an explanation as possible while remaining compatible with current empirical evidence. This desideratum aims to keep the explanatory gaps between stages in the development of linguistic abilities as small as possible. According to Bar-On and Green, "A

natural reconstruction, as we think of it, does not explain the emergence of linguistic meaning...by merely locating increasingly complex stages on a continuum. It also tries to show how each stage develops from an earlier one in some intelligible way" (2010, 6). Thus, not only should each intermediate stage be thoroughly defined, but the nature and motivations of the transitions from one stage to the next should be explained with as much relevant detail as possible. Intuitively, this means that the greater the detail of the progression from animal communication to human language, the better the continuity story. Additionally, because proposals of continuity stories rely on empirical data about animal communication and evolution, the hypotheses put forth about continuity should strive to respect the relevant empirical data wherever possible. That is, while it may be possible that aliens gifted full-blown language to some evolutionary ancestor of humans (perhaps via a 1'x4'x9' obelisk, as in Stanley Kubrick's 2001: A Space Odyssey), a more satisfactory continuity story should adhere to the currently accepted theories of evolutionarily-motivated cognitive developments instead of positing such groundless hypotheses.

Though the above desiderata are not exhaustive of what a continuity story should achieve, they do provide a minimal set of normative criteria to evaluate proposals of continuity. By further articulating and defending these desiderata, I will go on to argue that Grice's account fails to satisfy (D2) by assuming an untenable foundation, while Bar-On and Green's account fails to satisfy (D1) by omitting any unique connection to language proper. However, before discussing these previous attempts at continuity, I must first introduce *speaker meaning* - a unique linguistic achievement, the explanation of which strikes me (and Grice (1982)) as a suitable final step of a continuity story.

1.2 The Final Step of a Continuity Story

If the goal of a continuity story is to connect primitive forms of communication with human language, we must first decide what makes some form of communication 'linguistic' in the correct sense. Previous continuity stories have drawn the distinction between primitive and linguistic forms of communication in terms of the type of meaning carried by signals (Grice, 1982; Bar-On and Green, 2010), and I will continue in this vein. This section provides a sketch of the proposed differences between language as used by humans and the communicative practices of animals by focusing on the distinction between *natural meaning , non-natural meaning,* and *speaker meaning*, as originally introduced by Grice (1957).

Natural meaning is said to be carried by some condition of the world *G* when the presence of *G* in some context is a reliable indicator of some other condition of the world *F* (Grice 1957, pp 384). For example, the presence of dark clouds naturally means that it will soon rain due to the reliable (and mind-independent) correlation between the co-occurrence of dark clouds and rain. A common application of natural meaning within animal communication is the assumption that the baring of teeth reliably indicates, and thus carries natural meaning about, an animal's willingness to fight (though, later on we will see that this is not necessarily the case).

Non-natural meaning, on the other hand, is a more complex type of meaning which can carry information about some condition without being a reliable indicator if it. For example, a hanging mistletoe can non-naturally mean that couples should kiss when they pass by, even in the case where no one follows this rule. There is no mind-independent correlation between mistletoe and kissing as there is between dark clouds and rain. Instead, the mistletoe carrying non-natural meaning about kissing would, in this case, be due to some convention that individuals have arbitrarily assigned to mistletoe – yet there is no reason to think that *any*

occurrence of mistletoe indicates that a passing couple will kiss, nor need it be the case that passing under mistletoe is more likely to cause couples to kiss. As seen in this example, non-natural meaning has the property of being arbitrarily assigned in much the same way that language arbitrarily maps words to meanings, and it is this connection which is further refined by Grice's introduction of *speaker meaning.*

Speaker meaning is a subspecies of non-natural meaning which relies on the intentions of an individual to assign meaning to an utterance, as opposed to assigning meaning via conventional norms as is the case for mere non-natural meaning (Grice, 1982).[1] According to Grice, for some utterance to carry speaker meaning it must be produced with the intention of being recognized as an attempt to communicate with an audience. Put more formally, a case of speaker meaning occurs when speaker S means something by an utterance U just in case S intends U to produce a certain effect in a hearer H by means of H's recognition of this intention (Grice, 1957, 383-384).[2] As proposed, a successful case of Grice's speaker meaning requires multiple complex abilities on the speaker's behalf, such as the intention that H recognize U as coming from S, the intention that H recognize that S intends to produce U, and the intention that H recognizes S's intention that U cause the appropriate belief in H. For example, when Suzy tells Henry that "Spring is coming!", Suzy's utterance will possess speaker meaning only if she intends to inform Henry that the season of spring is coming up, and she intends that Henry will recognize that it is her intent to inform him of this.

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[1] I focus on the uniquely linguistic notion of speaker meaning because non-natural meaning can be carried in multiple non-linguistic ways. For instance, content functionalists have argued that the communicative signals of organisms as primitive as insects might possess non-natural meaning (Stegmann, 2009), whereas they have not said the same of speaker meaning.

[2] Following Grice (1957), I will use 'utterance' as a neutral term to apply to any candidate for a vehicle of speaker meaning. Under this usage any communicative act will be counted as an utterance, whether it be the drop of a handkerchief, the drawing of a picture, or the reciting of a sonnet. However, I will use the more common term "signal" in cases where usage of "utterance", as defined by Grice, might yield confusion.

It follows from the above definition that in order to produce an utterance with speaker meaning the speaker must imbue the utterance with her intention that an audience recognize her intent to inform them. An important consequence of this is that speaker meaning requires both the speaker and the audience to possess a *theory of mind*, loosely defined as the ability to think about the thoughts of others, which will later be argued as problematic for Grice's theory (following Bar-On Green, 2010).

As shown in the above example, speaker meaning allows an utterance to be about X without being a reliable indicator of X (*i.e.* without depending upon the reliable correlation necessary for natural meaning). For an example of how Grice uses a speaker's intentions to imbue a signal with (speaker) meaning, take the following: by scratching his nose, a mafia boss means "kill this man". The only thing that allows this signal to carry any meaning related to killing is the intention of the mafia boss, as the scratching of a nose in virtually every other context instead would only carry natural meaning about an itch. Thus, speaker meaning serves as a way of explaining how an individual could (non-naturally) *mean* something by their producing some signal, whether that signal be the scratch of a nose or the writing of a sentence.

More central to the goal of this paper is that speaker meaning is necessary for a human-like language to emerge, as it allows the intentions of an individual to assign meanings to signals, and without the ability to assign (non-natural) meanings to particular signals, no signal can rise above the level of natural meaning.

For instance, the utterance "food" could never have come to hold the meaning it does in the English language if not for some original baptism linking the word with its current meaning – and such a baptism would require that an individual intend to reference something edible by uttering the word "food". Therefore, speaker meaning is not only a necessary prerequisite for

language, but is also necessary for utterances to carry false information by relying on the speaker's intentions to determine meaning, as in the statement "I have never eaten food". This ability for a statement to carry false information allows reference to non-actual states of affairs, including the past, the present and logically impossible entities such as 'round squares' (Grice, 1957).

Because speaker meaning is required for an individual to refer to non-actual states of affairs, and any successful use of speaker meaning entails that the speaker possess all of the previous discussed capacities required for speaker meaning, speaker meaning can be thought of as a uniquely linguistic phenomenon. Firstly, I have argued that newly generated signals (such as words) could not be assigned to their meanings without the use of a speaker's intentions to ground such a connection. Second, and more intuitively, in the case that any animal truly could refer to non-existent objects based on their intention that another would understand their own intent to inform, one could not deny their possession of some essential component of language.

Though I am very aware of the ongoing debate as to which features of human language are considered essential to language proper, the scope of this project is not to weigh in on this debate, but to sketch a path from primitive forms of communication towards a human-like language. Thus, my focus will be on the large and fundamental hurdle presented by speaker meaning, as opposed more particular issues like those debated by Hauser et al (2002) and others. As a consequence, the abilities emerging at the final step of my account of continuity might lack some of the refined peculiarities of human language such as defined syntactical rules (word order and sentence structure) and recursion (the ability for a sentence to be about a sentence), but nonetheless, a sufficiently linguistic checkpoint will have been reached.

By setting the emergence of speaking meaning as the final goal of a continuity story, one

will have satisfied (D1), which requires an appropriate endpoint connecting primitive

communication with language. With this goal set, Chapter 2 first examines the continuity

account proposed by Grice (1982) which aims to explain the emergence of speaker meaning,

then examines account proposed by Bar-On and Green (2010), each of which I argue are useful,

but ultimately unsatisfactory.

CHAPTER 2: ARE PREVIOUS CONTINUITY STORIES CONVINCING?

2.1 Gricean Continuity and its Problems

Recognizing that a successfully continuity story requires an explanation of how speaker

meaning emerges, Grice provides an account of how speaker meaning could arise from a

communicative system consisting of only natural meaning. Though Grice's original goal was

merely to display "non-natural [speaker] meaning as descendant [and]…derivative from…cases

of natural meaning" (1982: 232, additions in brackets), Bar-On and Green have interpreted his

account as explaining how non-human communication systems could yield human-like language.

As summarized by Bar-On and Green, Grice's account proceeds through the following steps:

1. [Some creature] X comes to produce voluntary behavior of the sort whose non-voluntary production would naturally indicate that X is in the relevant state (for example, X might emit a yelp to get his audience, Y, to come to think he's in pain). Y recognizes that X's performance is voluntary and can see it as open (or wholly overt). Although X's behavior is 'put on', he's letting Y see that it is a 'put on' and Y realizes it.

2. X and Y play a complicated game of transmitting and receiving information in which X not only intends Y to recognize his communicative intention, but also intends Y to take this intention to be a sufficient reason for believing that he, X, is in the relevant state.

3. At this final stage, X reverts to producing some vehicle of communication - a bit of behavior or device – which is not a natural sign, but is more loosely connected to the message to be conveyed, discernible by Y. At this final stage, we have a communicative vehicle invested with speaker meaning as Grice conceives it. (Bar-On and Green, 2010, pg 6-7, paraphrased)

The story then, as Grice tells it, begins with creature X deciding (for whatever reason)

that he will voluntarily produce some utterance which normally reliably co-occurs (involuntarily)

with some mental state – all the while intending his audience to recognize the utterance as

intentional. After a long back-and-forth interaction between X and his audience, Grice says that

X will have decoupled this utterance from what it has historically (naturally) meant and instead

use it to refer to some other state of the world, as determined by X's intention, which is meant to

be understood by his audience (and thus carry speaker meaning). An example case would be a monkey trying to signify some referent, perhaps a banana, by using the given steps to reassign some utterance, perhaps a 'coo' sound, from its historical 'happiness-indicating' meaning to a new, 'banana-indicating' meaning.

While Grice's account arguably provides a plausible step-by-step story by which speaker meaning might naturally emerge from natural meaning (and thus meets D1's requirement of a uniquely linguistic endpoint and D3's insistence that the intermediate transitions are adequately explained), Bar-On and Green argue that Grice's story is flawed, as it assumes that X and Y possess a theory of mind from the get-go. Additionally, X and Y are assumed to possess enough of an understanding of how reference works so that they can make the connection between an utterance and the thing that the utterance is supposed to refer to, not to mention the ability to recognize that one usage is merely a "put-on" as opposed to the other.

The concern Bar-On and Green raise is that these complex cognitive abilities have not been observed to exist in non-human animals (Cheney and Seyfarth, 1990, Tomasello et al, 2005), and thus the first step of Grice's story has already taken much of the continuity problem for granted. Because the foundation set by Grice's account of continuity requires complex theory of mind capacities it fails desideratum D2 by assuming a foundation of abilities unobserved in any non-human species.

2.2 Bar-On and Green's Expression-Based Foundation

After objecting to Grice's (1982) account of continuity, Bar-On and Green (2010) introduce a novel continuity story by appealing to a special type of animal behavior they call *natural expression*. Deemed 'natural' because each occurrence carries natural meaning about an individual's internal states, natural expressions are defined as observable behaviors (such as

vocalizations) "designed (in a biological sense) to show the presence, kind, degree and object of an expresser's states of mind to suitably endowed consumers so as to enjoin them to act in appropriate ways" (2010, 19). Natural expressions therefore function by broadcasting natural meaning about an individual's internal state. Relevant examples of natural expressions might be the bloodcurdling scream of an individual in intense fear or the growling of an enraged dog, as the expression in each case reliably indicates the present internal state of the expresser.

Natural expressions offer a promising foundation for a continuity story because they are involuntary forms of communication which are commonly observed in non-human animals, and as such satisfy D2 by providing a foundation which is anchored in empirical observations. However, Bar-On and Green also argue that natural expressions are special in that they are often "about" the cause of the animal's co-occurring mental state. For example, they argue that by following an animal's eye-gaze during a natural expression of fear one could recognize that animal's "fear of x", where x is whatever its gaze was locked to. This interpretation, however interesting, would require much more unpacking in order to be considered useful in explaining linguistic continuity, and in its current form seems no more relevant to communication than a spider's adverse reaction to bugspray (which would be taken to indicate its "hatred of bugspray", but wouldn't explain how this leads to robust communication). Though I will later return to this issue in my discussion of 'functional reference' in Chapter 4, for now it will suffice to say that this property of natural expression is not essential to the continuity story I will construct.

Nonetheless, the phenomenon of natural expression appears to provide a fruitful foundation for a continuity story, especially in comparison to the foundation assumed by Grice. However, Bar-On and Green do not explain how speaker meaning (or any other uniquely linguistic capacities) could evolve from a foundation of natural expression, nor do they provide

reasons for why such higher capacities would evolve. Thus, Bar-On and Green's account fails to satisfy (D1) because their story does not explain the emergence of a uniquely linguistic ability, nor does it satisfy (D3)'s requirement that progression between stages of continuity be explained whenever possible. Specifically, Bar-On and Green's account does not provide the next step towards language after natural expressions, and thus fails to motivate the movement from natural expressions to language proper.

An additional problem with Bar-On and Green's theory is their assumption that virtually all expressions are designed to reliably indicate the internal state of the expresser. Contra Bar-On and Green, proponents of the behavioral ecology theory of expression such as Fridlund (1997) instead argue that most (if not all) expressions do not simply broadcast one's internal states, but are instead "Machiavellian" in the sense that they are designed to enable the manipulation of others through strategic interactions. In the eyes of a behavioral ecologist, an individual's reliably broadcasting their mental states via expression is the strategic equivalent to showing one's hand in a game of poker – once competitors have this information, they attain the advantage. Given such a reliable indication of an opponent's mental state, one could use this information to size them up, as well to predict future actions and gain an advantage (e.g. an angry individual is very likely to attack; a sad individual is not). Evidence for the behavioral ecology view of expressions comes from the evolutionary theory of *non-cooperative communication*, which holds that evolutionary pressures are likely to encourage uncooperative communicative behaviors (such as deceiving others) because they often benefit individuals in the long run.[3]

To rebut the behavioral ecologist's concerns that natural expressions rarely occur in the

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[3]Though I have merely introduced the notion of non-cooperative communication to demonstrate an alternative to Bar-On and Green's view, Chapter 3 will provide an in-depth focus on justifying my application of non-cooperative communication.

wild, Bar-On and Green suggest that "[r]eliability in expressive behavior will...be secured in a 'crying wolf' way: those who are unreliable are eventually called out, whence those who have not been can be presumed reliable" (19). However, while this type of selection against unreliable communicators is a reality (Searcy and Nowicki, 2005), Bar-On and Green fail to acknowledge the potentially widespread nature of non-cooperative communication, and instead introduce it only to explain it away. Although natural expressions are very likely to occur in nature, Chapter 3 will argue that without accounting for widespread non-cooperative communication, Bar-On and Green cannot satisfactorily explain the emergence of speaker meaning.

In summary, this chapter has argued that Grice's account problematically assumes foundational abilities unobserved in animals (and thus failing D2). Bar-On and Green's account, on the other hand, introduces foundational abilities observed in animals (satisfying D2), but does not provide any steps towards an endpoint (failing D3), nor does it set any endpoint which can be considered a uniquely linguistic ability (failing D1). In what follows, I will create a hybrid account by combing the most promising features of these two theories. Specifically I argue that focusing on the role of non-cooperative communication in a continuity story will give us a way to articulate an account that satisfies D1, D2 and D3.

CHAPTER 3: NON-COOPERATIVE COMMUNICATION'S EVOLUTIONARY PUSH TOWARDS LANGUAGE

This chapter begins the construction of a hybrid account of linguistic continuity. This hybrid account will endorse Bar-On and Green's suggestion that utterances which naturally indicate the mental states of their expressers play a key foundational role along with Grice's suggestion that speaker meaning is the endpoint of a continuity story. However, this account differs from Bar-On and Green in that it will give pride of place to the notion of non-cooperative communication, as culled from the literature on animal signaling. By relying on non-cooperative communication, this hybrid account provides an evolutionary explanation for the emergence of certain abilities prerequisite to language. The account also differs from Grice in that it explains how the abilities necessary for language could have naturally come about, as well as why they would come together to yield speaker meaning. After providing a thorough explanation of how these pre-linguistic abilities naturally develop - as motivated by non-cooperative communication – I then integrate Grice's account of continuity, complete with my aforementioned explanatory additions. The result is a continuity story chronicling the evolutionary intermediate steps between natural expression and speaker meaning, supported by contemporary scientific evidence. I begin by introducing the theory of non-cooperative communication and explaining why it is centrally relevant to the emergence of linguistic communication.

3. 1 Non-Cooperative Communication

On the 'selfish gene' interpretation of Darwinian evolution (Dawkins, 1976), natural

selection occurs at the level of the individual.[4] One implication of this is that although groups of

individuals may often work together to achieve greater evolutionary fitness, sometimes the best

strategy for an individual is selfishness, such as stealing food from a conspecific in order to

avoid starvation. When carried over to the realm of communication, the evolutionary benefits of

selfish strategies suggest that communicative practices should often be selfish as well.

Specifically, because communication is used by individuals to interact with an audience, it

follows that social individuals will have a strong incentive to deceive their audience when their

interests are not completely shared (Dawkins and Krebs, 1978).[5] For instance, vervet monkeys

have been noted to withhold predator "alarm calls" in situations where higher-ranking

conspecifics could potentially be injured or killed by the predator, thus providing the withholder

a chance of moving up the social hierarchy (Cheyney and Seyfarth, 1985). Chimpanzees have

also been observed feigning ignorance to avoid competition, such as when a male chimp gave no

indication of his knowledge that experimenters had buried a cache of food until all of the other

chimps fell asleep, at which time he dug up and ate the food himself, a full three hours after

watching it being buried (De Waal, 1982).

More active instances of non-cooperative communication can also be found which rely

not on the omission of information, as in the above examples, but instead on the signaling of

misinformation used to lull a competitor into a false sense of security. For instance, chimpanzees

usually extend their arms as a reconcilatory gesture after a bout of aggression with another

individual, but in some cases, individuals have been observed extending their arm, yet turning

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[4] Techinically, Dawkins' account holds that selection occurs at the level of a single gene, but due to its interconnectedness with the other genes of an individual, the pressures are on the individual organism.

[5] While deception is prevalent throughout animal life, certain forms of deception are of a more complex nature than others. While I focus on the more complex and social forms here and provide a definition below, see Nahmias (2002) and Allen and Saidel (1990) for a discussion of different types of deception.

aggressive once their opponent gets close enough (de Waal via Cheney and Seyfarth, 1990). In

such a case, the deceptive individual can earn a great advantage on their unsuspecting opponent,

thus increasing their own chance of winning the fight.

Perhaps more relevant to language, there are multiple anecdotal cases where "predator"

alarms calls have been made outside of any dangerous context by individuals whose behavior

belies their belief that a predator is present. For example, Kitui, a male vervet monkey, was

observed to produce a leopard-indicating alarm call when approached by a rival, which then

caused the rival to run into a tree, where he would be safe from any leopards (Cheney and

Seyfarth, 1990). However, in this instance, Kitui was observed to continuously produce the

same alarm call while walking on the ground from tree to tree in plain sight of his rival. Thus,

Kitui was using the alarm call in a way that was purposefully out of context, as if it were instead

an accidental false alarm then he would not have set foot on the ground where leopards could

attack him. In addition to the above examples, many other incentives for non-cooperative

communication in the wild have been implicated across diverse social contexts, including

predator-prey and kin-kin interactions (Krebs and Davies, 1993).

As evidenced in the above examples, non-cooperative communication is distinguished

from cooperative communication by the employment of *deception*. Following Hauser (1996), I

define a case of deception as a situation in which a receiver registers some communicative act Y

from a signaler, the receiver responds in a way that is appropriate if Y has a history of indicating

X, the signaler is benefited from this response, and it is not true that X is the case. An example

of deceptive signaling would be the vocalization of a "tiger" warning call by a primate in a

context in which no predator has actually been detected, but instead a cache of food is available

for the taking. In such a case, the deceiver's audience would not recognize that the alarm call

does not, in this instance, carry natural information about a predator and would run away, allowing the deceiver full access to the food cache (and thus providing a benefit). By exploiting others in similar ways, deceivers can potentially reap significant benefits via non-cooperative communication, thus increasing their fitness over those who do not employ these deceptive means. A point of note is that this definition of deception does not require any *intention* to deceive, nor does it require any voluntary control of actions at all, thus allowing non-cooperative communication to occur in even relatively "unintelligent" populations.

But what does non-cooperative communication have to do with linguistic continuity? To see this, recall the foundation laid by Bar-On and Green in which expressions are rarely, if ever, used for deception (as defined above). Given this context within which individuals have evolved to rely on one another's expressions as reliable indicators of mental states, there would be no incentive for second-guessing the reliability of these expressions.[6] Thus, I propose that the largely cooperative groundwork proposed by Bar-On and Green provides a context within which non-cooperative communication could yield immense benefits. That is, in a predominantly cooperative community which has evolved to trust the communicative practices of others, the first individuals who send out unreliable signals will be able to easily manipulate their audience, and thus gain massive competitive advantages (Maynard Smith and Price, 1973; Andersson, 1980).

To further illustrate, take a more human example: The 2009 movie "The Invention of Lying" imagines a society of individuals who only speak truths, and having never been exposed to deception, never doubt the truth of any statements uttered – much like the cooperative society which Bar-On and Green are supposing. When this society is infiltrated by a man who *does* tell

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[6] While Bar-On and Green (2010) claim that natural expressions carry natural meaning about the expresser's mental state, I follow Fridlund (1997) and others in interpreting this not as a form of mind-reading, but instead as an indication of potential antecedent behaviors. Thus, an animal reacting after viewing some natural expression need not have any thoughts about the actual mental states of the expresser to benefit from them.

lies, he finds them to be very effective – so much so that when he tells others that they *should* give him their money, they unthinkingly hand him the contents of their wallets. The context set by Bar-On and Green is very much like that in the movie, as each population is in prime position to be swindled by deceivers due to a lack of skepticism. Indeed, I propose that it is this unique situation which motivates the transition from the cooperative communicative practices anchored by natural expression to the deceptive practices of non-cooperative communication.[7] Recalling the desiderata of a proper continuity theory, this move from cooperative to non-cooperative communication satisfies (D3) by explaining the transition between stages of continuity. However, this emergence of deception from natural expression is only a prelude to a much stronger set of evolutionary pressures which provide the real explanatory power of my continuity story.

Given the stark evolutionary advantages provided by deceptive communication over a completely gullible population, the proliferation of deceivers will increase. Eventually, this increased proliferation of deceivers could cause a large portion of the population to be non-cooperative communicators. However, the non-cooperative tactics used by these deceivers will not always be successful, and in such cases, it stands to reason that unfooled competitors will achieve greater evolutionary fitness than those who are deceived. As such, a direct consequence of the strong evolutionary drive for deceptive communication is a drive for the retention and development of counter-deceptive abilities (Dawkins and Krebs, 1978).

The type and extent of counter-deceptive abilities will differ greatly, ranging from recognizing certain utterances as inaccurate to recognizing suspicious omissions of signals, but

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[7] It should be noted that Dawkins and Krebs (1978) argue that where there is cooperation there is deception, so that the account I have provided is overgeneralizing by assuming a clean step between a completely cooperative society to a deceptive one. However, this is unproblematic, as the cyclical nature of deception and deception-detection will ebb and flow, yielding widely cooperative communities such as the one I have used, which will then incentivize an increase in deceptive communication.

the earliest forms will be tailored to those specific deceptive techniques present in a community - and because the earliest forms will be direct responses to specific forms of deception, these early abilities are unlikely to detect all types of deception. For instance, an individual who has come to ignore "tiger" warning calls due to the past deceptive usage of such calls will not automatically recognize false "pain" yelps as deceptive, as each form of deception will have to be learned (at least in the early stages). Consequently, the deceptive techniques which go undetected by counter-deceptive mechanisms will continue to thrive, resulting in the proliferation of only the most novel and complex forms of deception – all the while, driving the victims of these new forms of deception to evolve appropriate counter-deceptive abilities.

A theory of how deceptive signals will increase in novelty and complexity over time has been proposed by Andersson (1980). First, Andersson begins with a context in which some signal (such as a movement or posture) serves as a reliable predictor of subsequent behavior (such as an attack). Over time, the mere display of this signal can come to serve as a "bluff" because potential enemies will have associated it so tightly with the presence of an attack, which allows the signal to be used deceptively in order to avoid physical confrontations. As the usage of these bluffs becomes common, the evolution of counter-deceptive abilities will allow other individuals to recognize them as mere deception and ignore them. At this point either a new reliable signal is reinstated, or the old "bluff" signal may be altered in some way that allows it to retain its usefulness. Thus, the close nature of deceptive communication tactics and counter-deceptive communication tactics can form something of a vicious cycle, continually driving toward new and increasingly complex forms of deception and counter-deception.

If this much is correct, then over thousands of generations the back-and-forth competition of non-cooperative communication would create a deceptive 'arms race' – and it is this arms-race

analogy which I argue provides a plausible evolutionary explanation for the appearance of multiple pre-linguistic abilities such as theory of mind and an understanding of reference, both of which have already been implicated as prerequisite for speaker meaning.

In support of the hypothesis that the non-cooperative communication "arms-race" is the primary motivation for the emergence of complex cognitive abilities is recent research comparing the size of a primate's neo-cortex area of the brain with that individual's use of deception. Given the fact that the majority of brain-based differences across primates is the volume of the neo-cortex (Stephan et al. 1981), and that the neo-cortex is an area involved in controlling complex abilities such as planning and higher-level thought, Byrne and Corp (2004) set out to determine whether those primates who employ deception more often are also those with larger neocortices. According to their results, the volume of the neocortex positively correlates with increased observations of deception across eighteen different species of primate. Thus, this study supports the connection between the employment of deceptive abilities and an evolved increase in brain size, corroborating the hypothesis that non-cooperative communication is the driving factor in the evolution of complex cognitive abilities made possible by a large neo-cortex.

Having outlined the path from natural expressions to non-cooperative communication, the next section will connect non-cooperative communication to speaker meaning by arguing that it provides a strong explanation for the emergence of a theory of mind, as well as other complex cognitive abilities.

3.2 The Pre-Linguistic Products of a Deceptive Arms Race

Because ethology has recognized deception as a beneficial strategy for evolutionary success, it is plausible to believe that both deception and counter-deception have played a large

role in the evolution of socially oriented species (Searcy and Nowicki, 2005). Additionally, because in some populations a deceptive 'arms race' might result from this competition, the complexities of both deceptive and counter-deceptive capacities can plausibly extend far beyond those possessed by non-social individuals. Given this competitive context, one's cognitive abilities would play a large part in reproductive success, marking a stark contrast to the common "biggest animal wins" species of competition (Allen and Saidel, 1998). Below I argue that two key pre-linguistic capacities - theory of mind and an understanding of reference - are best explained as emerging due to the deceptive arms-race resulting from non-cooperative communication. Specifically, my goal is to satisfy D3, the desideratum calling for an empirically viable explanation as to why the transition between intermediate steps of linguistic continuity would come about.

Given the existence of the deceptive arms race, my goal is to explain how non-cooperative communication can provide a segue into Grice's account of linguistic continuity. Recalling that Grice's account was problematic because it is grounded in unrealistically complex cognitive abilities, I will demonstrate that the deceptive arms race provides a viable explanation as to how these abilities developed. After demonstrating deception's role in evolving theory of mind and an understanding of reference I will have completed a plausible continuity story spanning from natural expressions to speaker meaning.

Possession of speaker meaning requires that a speaker have thoughts about the thoughts of her audience, requiring that X intends for her audience to recognize an utterance as deriving its meaning from X's intention (in the same way that the mafia boss's nose scratch derived its meaning from the boss's intention). However, such an ability is not something that known primates are capable of (Seyfarth and Cheyney,1990; Tomasello et al, 2005). Although studies

do show that non-human primates may possess a weak understanding of the goals of others (Tomasello et al, 2005), this ability is not developed enough to fulfill Grice's requirements. However, a closer look at the "mindreading" abilities present in modern non-human primates does shed light on how a more complex theory of mind might have evolved.

Because the pressures of deception and counter-deception will have made blind trust in the communicative practices of other individuals a poor strategy, the prediction of another individual's actions via inferences about their internal states (e.g. whether or not they are currently angry; whether they believe that you are a reliable signaler) are of utmost importance, suggesting a strong incentive for the development of a theory of mind. Yet it is not only avoidance of being deceived that is important, as there are also detriments associated with being detected as a deceiver. An example of the important consequences of maintaining a reputation as a non-deceiver is found in the vervet social hierarchies which consist of privileged and unprivileged positions from which individuals can rise and fall (Seyfarth and Cheyney, 1990). Given the potential social punishments associated with being an outed deceiver, individuals have to be good at judging the mindset of their audiences in order for their selfish acts to go undetected, lest they spoil their reputation as an accurate communicator (Cheyney and Seyfarth, 1988). Therefore, possessing an understanding of the mindset of others can aid both in deception and counter-deception, and this provides a good reason for theory of mind abilities to not only begin to emerge, but to continuously become more complex (Byrne, 1996; Humphrey, 1983).

Though I am not committed to the claim that any current non-human animals possess a true theory of mind, allowing them to think about the thoughts of others, I will argue that the weak theory of mind-like abilities found in current chimpanzees provide a good example of a stage which is ripe for developing into a true theory of mind, as found in humans. Thus, I will

focus here on a case in which the abilities of a particular chimpanzee show a theory of mind-like understanding of the goals and actions of a conspecific. My appeal to this case is meant to introduce the types of pre-theory of mind abilities currently present in non-human animals, from which I believe the deceptive arms-race would incentivize more complex versions of theory of mind-like abilities, eventually leading to a true theory of mind.

One particular example of how chimpanzees' theory of mind-like abilities are currently employed (as well as a nice empirical demonstration of how deceptive and counter-deceptive abilities are applied in social contexts), is the interaction between Belle the chimpanzee and a higher ranking male, Rock. As recounted by Byrne and Whiten (1991, pp130-131), the following situation unfolded after an experimenter introduced Belle to scattered locations where hidden food was buried:

> 1. Belle stopped uncovering food if Rock was around. She sat on it until Rock left.
> 2. Rock figured this out and if Belle sat in any one place for more than a few seconds, he shoved her aside and searched where she was sitting, obtaining the food.
> 3. Belle stopped sitting right on the food. She sat close instead.
> 4. Rock expanded the radius of his search around the area where Belle was sitting.
> 5. Belle eventually sat far away, waiting until Rock looked in the opposite direction before going for the food.
> 6. Rock feigned disinterest until Belle started to move somewhere. On some occasions, Rock started to wander off only to wheel around suddenly precisely as Belle was about to uncover some food.
> 7. Belle started to lead the group away from the food, then double back to get it while Rock searched the bogus area.
> -In some trials, a single piece of food was hidden in a different place from the main pile, and Belle would lead Rock to the single piece before going for the big pile herself.
> 8. When Rock started to ignore the single piece and keep his eye on Belle, she had temper tantrums.

On top of the impressive human-like behavior exhibited by Belle and Rock above, Byrne and Whiten draw special attention to observation 6, which they argue is novel chimpanzee behavior that cannot be accounted for by behavioral learning methods, and is thus evidence of Rock's highly developed theory of mind (1991, 131). While Byrne and Whiten's conclusion supporting Rock's complex theory of mind in this case has many detractors (Scott, 2001;

Tomasello, et al 2005), these detractors would still have to admit that Rock and Belle's observed abilities can and do provide immense benefits to individuals who are constantly deceptively competing with one another, especially in cases where multiple layers of deception are being employed, as was the case above.

It is these types of social situations which constantly pit deceivers against one another and yield benefits to the most cunning of deceivers, which in this case are those who can accurately predict the mental states of competitors. That is, if the constant presence of deception is taken as a product of (and an influence on) the theory of mind-like abilities of chimpanzees, then more complex theory of mind abilities would be very likely to emerge over time within these populations. Thus, there is reason to believe that the non-cooperative evolutionary ancestors of humans moved past the weak theory of mind-like abilities found in current chimpanzees and onto a full-blown theory of mind, and that this development occurred primarily due to the pressures of non-cooperative social interaction.

Yet even if one accepts that humans' theory of mind is the product of non-cooperative communication, the first step of Grice's theory still requires an explanation of how pre-linguistic individuals could possess a complex understanding of how reference works - specifically, how they could recognize some utterance as a "put-on" (as Grice puts it). A put-on occurs when an individual produces an utterance which usually naturally indicates some state of the world (such as how screams correlate with fear) and it is not the case that the utterance co-occurs with its historical correlate in this instance. Thus, an example of a put-on would be an individual emitting fear screams when they are obviously not in a situation in which they are experiencing fear.

To recognize a put-on, an individual must understand how some utterance could decouple

from its natural meaning and instead be used to indicate something else, while also understanding that this something else is determined by the speaker's intention. That is, an individual must not only be able to judge an utterance as out of context, but must also decide that it is out of context due to the speaker's intention, as opposed to a mere mistake. To see what is really needed in order to fulfill Grice's requirement, it helps to look closer at what is going on in cases where an utterance is detected as deceptive.

The function of counter-deception is to assess whether or not a particular signal (such as an utterance) is accurate by comparing it against a history of its reliably correlating with the relevant condition of the world. That is, if an utterance is detected as inaccurate, that means some individual has recognized that the utterance has a history of reliably correlating with some feature of the world, but does not instantiate that correlation in the current case. Hence, in the observed instances wherein unreliable signalers are 'punished' by their communities, these enforcers are displaying a recognition that some utterance does not carry natural meaning. Because of the back-and-forth nature of deception and deception detection, it follows that over time this understanding will become more complex in order to detect more sophisticated forms of deception – ultimately moving on to deal with situations involving multiple layers of trickery, as in the case of Belle and Rock.

Eventually, the ability to recognize inaccurate signals can open the door to a rough understanding of the distinction between a vocalization qua noise, which cannot be false, and a vocalization qua vehicle of communication, which can be false. That is, highly-evolved perceivers may begin to recognize an utterance such as a yelp of fear as representing fear, as opposed to simply correlating with it. This step towards representation allows an utterance to misrepresent the world and thus carry "false information", as is the case in the sentence "two

plus two equals five". As argued earlier, speaker meaning allows utterances to misrepresent in this way, which means that the ability to understand how reference can connect utterances to representations is an important ability for the emergence of language.

So to satisfy Grice's steps - and thus reach the level of speaker meaning - an individual must be able to recognize some behavior as a put-on, which requires an ability more complex than mere inaccurate signal detection. Recall that a put-on must be recognized as the voluntary production of behavior which would usually be involuntary behavior. Thus, the audience must be able to recognize the voluntary behavior as intentional, and not merely accidental. That is, if X is continuously producing fear screams, but not acting as if she is in fear, then her audience must recognize that these fear screams are intentionally being produced, and that they are not being produced by mistake. This, then, would be the first step towards using the fear scream to represent some non-fear-related state of affairs, which would imbue the new usage with speaker meaning.

For examples of put-ons in animal communication, recall the examples of Belle and Rock (Byrne and Whiten, 1991), and Kitui (Cheney and Seyfarth, 1990). Through the lens of Grice's account, when Rock learned to treat Belle's sitting in one place for an extended period of time as an indication of her intent to dig for food there, Rock was able to see Belle's outward behavior as a mere 'put-on', as he (perhaps unconsciously) recognized that her sitting still was due not to usual involuntary causes, but was done for a different reason. [8]

Thus, Rock was observed to recognize a put-on, though it was not one which was done with cooperative communication in mind, as instead Belle was attempting to deceive him. On the other hand, Kitui's deceptive leopard alarm calls were not recognized as a put-on by his rival,

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[8]   Again, this is not to say that Rock does possess a proper theory of mind, but it does make the case that, given this type of interaction, it is plausible to think that the human theory of mind (and ability to see "put-ons") evolved due to similar pressures over long periods of time.

even though their production was indeed a put-on, as evidenced by Kitui walking around where the would-be predator could attack him.

While the above situations differ from Grice's requirement because none of the put-ons are intentionally meant to be recognized, the transition between non-cooperative and cooperative put-ons could likely come about given slightly different circumstances – such as when the individuals involved share evolutionary interests and thus have a reason to cooperate.

Given the cyclical nature of the deceptive arms-race, it is very likely that such a cooperative situation would arise, allowing 'put-ons' to be employed in a cooperative manner, as is required by Grice's first step. One context where this cooperation could arise would be among immediate genetic relatives, as the evolutionary theory of kin-selection (Dawkins, 1976) claims that families are more likely to cooperate with those genetically similar to them. Thus, provided that two or more individuals rise to this level of cooperation, their use of put-ons could be used cooperatively in order to assign an utterance to a referent, thus yielding an utterance with speaker meaning and completing the continuity story.

Given the above explanations of how theory of mind and an understanding of reference would both develop as products of non-cooperative communication, all the prerequisites to Grice's proposed story have been argued as satisfiable, mooting the objection that Grice's account problematically assumes unexplained capacities at its outset. Thus, we find ourselves at the first step of the Gricean continuity story, which requires that 1) X intentionally produce behavior of the sort whose non-voluntary production would naturally indicate that X is in some relevant state, when X is obviously not in such a state and 2) Y recognize that X's behavior is a 'put on', and X intends for Y to see that it is a 'put on'. [9]

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[9]   As proposed by Nahmias (2001), the capacity for theory of mind is also tied very closely to one's capacity for voluntary control. Specifically, he argues that a theory of mind is required for developing the introspective elements of voluntary action control (that is, the ability to consider one's own thoughts as potential options for action). Consistent with the theory proposed here, Nahmias argues that theory of mind is a product of non-

Step 1 can be seen as a case similar to Kitui's, where the individual is producing a behavior which usually carries natural meaning about some state of affairs (in Kitui's case, an alarm call which historically co-occurs with leopard predators), but the signal-producing individual is not convinced this signaled state of affairs is true (as displayed by Kitui's walking around where leopard predators would be). From this, I have argued that step 2 would be fulfilled in a situation where individuals have evolved complex deception-detection abilities and share an incentive to cooperate. Specifically, counter-deceptive abilities would allow Y to detect X's utterance as inaccurate, as it would not indicate what it has a history of naturally indicating, at which point, Y's theory of mind abilities would be required to understand that X is not attempting to deceive him, but is instead transparently misusing the utterance in order to communicate something to Y.

At this point, Grice's story relies on a constant back-and-forth interaction between these cooperative individuals, through which previous natural meaning-carrying utterances are reappropriated in order to refer to new entities, as mediated by Y's recognition of X's intention to communicate. An example of this would be a creature trying to signify some referent, perhaps a banana, by using the given steps to reassign some utterance, perhaps a 'coo' sound, from its historical 'happiness-indicating' meaning to a new, 'banana-indicating' meaning. If the 'coo' can come to represent a banana to X's audience, then speaker meaning will emerge, as X's utterance will represent the banana due to X's intent to communicate, as well as his intent that Y understand his attempt to communicate. As a result, non-cooperative communication provides a successful bridge between Bar-On and Green's foundation of natural expression and Grice's story for the emergence of speaker meaning, establishing a more complete story for the emergence of the uniquely linguistic ability from an extremely primitive form of non-human communication.

cooperative communication and will increase in complexity throughout the span of the deceptive arms race.

3.3 A More Complete Picture

Collected below is a concise layout of the account developed herein, as constructed by reconciling the accounts of Bar-On and Green (2010) and Grice (1982):

1. Naturally expressive behaviors lay an empirically viable groundwork which sets the stage for later steps by establishing expressions as generally reliable indicators of one's mental state.
2. The introduction of deceptive communicators drives selection for counter-deception abilities, creating a deceptive arms-race situation within which deceivers and their victims are in competition to continually one-up each other across multiple generations.
3. Due to the reliance on playing 'mind games' for evolutionary success, a strong incentive appears for evolving abilities such as theory of mind and an understanding of reference which affords the recognition of "put-ons".
4. At some point, a population shares enough evolutionary interests to participate in cooperative behavior, allowing them to satisfy the first step of Grice's continuity story.
5. Grice's stages continue with individuals cooperatively interacting by use of put-ons until speaker meaning develops, thus yielding a uniquely linguistic ability.

Finally, I apply my proposed desiderata to argue that this hybrid account of linguistic continuity is a satisfactory one.

(D1): The final step of a continuity story should provide an explanation for the emergence of a uniquely linguistic ability. As I have argued in Chapter 1, speaker meaning is an essential and unique feature of language, and thus any individual in possession of speaker meaning could be counted as possessing language. Therefore, although speaker meaning can emerge on this account lacking the bells and whistle of current human language (such as syntax), I have still provided an adequate final step for a continuity story. However, it is my hope that this continuity story will be drawn upon, and perhaps expanded, so that an explanation of how these more precise refinements of language have emerged can be found.

(D2): The first step of a continuity story should not presume abilities (or constituents thereof) which are not accepted as present in current non-human animals. By

adopting Bar-On and Green's notion of natural expression, the foundation of this hybrid continuity story begins at a relatively primitive level, requiring only that some socially-oriented animals rely upon the expressions of others to reliably predict future behaviors. Given that deception often relies upon exploiting a basis of trust, it is logical to begin from a context in which little to no deception is present, as is the case with natural expressions.

Moreover, I have provided multiple empirical cases of species and individuals who display both these and more complex abilities, and intentionally stretched back the roots of my story to include natural expressions, which pre-date the deceptive abilities found in modern chimpanzees. Thus, the foundation I have provided is a tenable one, as it relies on observations of current animals and not on the presumed abilities of theoretical creatures.

(D3): Transitions between stages of a continuity story should be accompanied by as comprehensive an explanation as possible while remaining compatible with current empirical evidence. Whether it be theoretical evidence of the drive for more complex forms of deception and counter-deception (Andersson, 1980; Byrne, 1996) or empirical observations of certain non-human primates' cognitive abilities at work (Byrne and Whiten, 1992; Cheney and Seyfarth, 1990) I have applied the literature in such a way as to motivate every transition between the steps of lingusitic continuity. Thus, ethe reasons for each move have been made clear and D3 has been fulfilled, thereby qualifying this hybrid account as satisfactory.

CHAPTER 4: OBJECTIONS

A foreseeable objection to my view would be a denial that social factors, specifically from non-cooperative communication, are the driving force behind the emergence of the cognitive abilities which I have argued constitute speaker meaning. However, this account is not original in implicating non-cooperative social interaction as a primary evolutionary drive (Humphrey,1983; Nahmias, 2001; Byrne and Corp, 2004). Instead, the importance of this account is the reconciliation and fleshing out of previous attempts at linguistic continuity in more satisfactory way. Thus, the empirically and theoretically viable deceptive arms-race which I have argued accounts for the emergence of multiple capacities necessary for language is no less tenable than other explanations as it stands, and therefore the burden of proof is on its detractors to argue for a better explanation.

Though some may argue that it is faulty to think that an explanation of linguistic continuity would occur in one fell (albeit general) swoop - as the phenomenon of the non-cooperative arms-race does within this account - only future empirical evidence can decide this issue.

Yet as it stands, this hybrid theory provides a simple and elegant explanation for the emergence of multiple distinct yet related complex abilities whose evolution might not be explained via other methods. Additionally, it should also be noted that I have made little to no commitments as to the exact details of how these abilities evolve, as my aim is for future work to fill in the particulars. I have merely provided a more cogent and complete account of linguistic continuity than previous attempts, and am only committed to non-cooperative communicative

pressures being a primary reason for the development of these abilities, as I am aware that other factors such as diet and other environmental constraints also play significant roles in evolutionary progress.

Another possible objection to the proposed account would be to reject the proposal that speaker meaning is necessary for language. However, my continuity story is not directed specifically at defining language, but is instead intended to provide a plausible means by which the linguistic abilities possessed by humans might lie on a continuum with the abilities possessed by more primitive animals. Therefore, even if some might define language in such a way that current animals do possess it (as some argue that symbolic communication in apes does), my continuity account still provides the benefit of outlining a means of why and how certain human abilities might have naturally emerged from the abilities of non-humans. That is, regardless of what other factors human language possesses, any animal which could rise to the level of speaker meaning would no doubt qualify as possessing a kind of primitive language, as the ability to reference occurrences out of place and time, including impossible entities such as round squares, would indicate a level of understanding only available to a language user. Thus, while I recognize that human language has many important intricacies, these all fall to the wayside if speaker meaning is not present. Additionally, this hybrid account allows that over time speaker meaning can (and likely will) be adorned with contemporary linguistic intricacies such as syntax, thus resulting in a more human-like language.

A final objection would be to argue that Bar-On and Green's allusion to 'functional reference' (as mentioned in Chapter 1) would provide an account alternative to (and perhaps more satisfactory than) the one I have proposed. Functional reference, as introduced by Evans (1997), is the ability for an individual to reference something without requiring her

intention to do so. An example that is often thought to display functional reference is the remarkable ability for vervet monkeys to produce and recognize three distinct predator alarm calls (snake/leopard/eagle), the recognition of which causes actions appropriate to the particular predator (hiding in the brush/staying in trees/avoiding open spaces) (Cheney and Seyfarth, 1990).

The relevance of functional reference to any continuity story is that it may provide an explanation for how utterances can transition from carrying mere natural meaning to becoming non-natural representations. However, the current debate over how much non-natural meaning (if any) is carried in these observed cases is still currently unresolved, and thus deferring to functional reference in its current form would be highly speculative (Scarantino, 2010; Rendall et al 2009; Dawkins and Krebs, 1978). Though I have purposely omitted discussion of functional reference within this paper, I am by no means implying that it is irrelevant to continuity. Instead, I see my account as a general outline of continuity within which functional reference may fit, and given the currently unsettled debate over the nature of functional reference, an inclusion of the topic would introduce too much confusion for too little payoff. However, it is plausible that the outcome of the debates over functional reference will provide the empirical detailing of a smaller step in the general communication-based path proposed here.

CONCLUSION

By reconciling two previous accounts of linguistic continuity into a more satisfactory theory I have opened the door for future work on linguistic continuity while also providing a new perspective on the similarities and differences between humans and non-humans. If my hybrid account of continuity captures the truth, it not only allows for a naturalistic explanation of language's emergence, but also provides important insights into the nature of human language. For instance, this account provides an explanation of how human language came to be, an explanation of how non-human animal communicative abilities came to be and gives a trajectory of where current non-human animal communicative abilities may end up if they continue to evolve over time.

Additionally, this account argues that many uniquely human cognitive abilities, including language, are actually by-products of non-cooperative communication. Applying this socially-oriented perspective yields interesting insights into the inner workings of humans, both at the individual and the societal level. For instance, our search for knowledge and ceaseless preference for the truth can be viewed not as mere interests, but instead as important evolutionary traits which have developed to avoid being deceived by others. Additionally, our uncanny ability to lie - and the ease at which children do so - can be seen not as an unfortunate side effect of socialization, but a deeply ingrained ability shaped by a long evolutionary history of social interactions. These insights and others serve as political and philosophical imports which can only be seen from the vantage point afforded by linguistic continuity.

On the other side of the continuity coin, we may be able to understand why certain

animals lack abilities classically defined as "intelligent". For instance, we have a good explanation for why certain cooperative societies such as ants seem to display a 'hive-mind' -- they have yet to develop, or would not benefit from, any deceptive practices which would lead them to evolve things like theory of mind or an understanding of reference. Applying this strategy to more complex animals, we see that just as we recognize that prairie dogs' absent fear of heights is a product of their historically living in flat environments, so we should too recognize that non-human primates' lack of human-like language is a product of their historical social environment.

It is my hope that the general outline of lingustic continuity I have presented here will be used by others who seek to explore the deep evolutionary history of language as well as those who question those abilities we are so quick to judge as uniquely human.

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