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Language and Communication

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Even by primate standards, humans are a hugely social species. We live in large, highly interactive groups, in which various forms of both competition and collaboration are daily, routine activities. Indeed, this is why social psychology is such a major branch of psychology. Among the most important ways in which we navigate this social environment (if not the most important ways) are communication and language. We use them to lead, persuade, coax, guide, misguide, deceive, argue, promise, organize, liaise, coordinate, and manage almost all our social interactions.

There is a healthy and growing community of researchers studying the origins of language (see, e.g., Christiansen and Kirby 2003; Fitch 2010; Hurford 2007, 2011; Scott-Phillips 2014; Tomasello 2008). The central questions here are how and why language evolved in our species, and why only we have it. Less research asks, as its main focus, how an evolutionary perspective, and in particular an adaptationist perspective, can inform traditional questions about the social cognition and other proximate mechanisms involved in language and communication. This state of affairs is in contrast to, say, evolutionary psychology, whose principle concern is not to study the evolutionary history of the human mind, per se, but rather to use an evolutionary, adaptationist approach as a tool to understand how the human mind works (Cosmides and Tooby 2013).

In this chapter, I outline what an evolutionary perspective can tell us about human communication and language. The coverage is necessarily brief, but sufficient to highlight the main questions and possible answers, and bring attention to some important unanswered questions. In Sect. 2, I distinguish between two different types of communication, and explain why understanding this distinction is critical to understanding the nature of human communication, and, in Sect. 3, I discuss how the distinction relates to language in particular. In Sect. 4, I discuss possible evolutionary explanations of why languages are structured in the ways that they are. In Sect. 5, I explain what human communication should look like if it is adaptive, and survey evidence to show that it is. Finally, in Sects. 6 and 7, I focus on the possibility of misinformation and the associated problem of evolutionary stability: Section 6 is concerned with proximate mechanisms; Sect. 7 with ultimate explanations.

Section 2: Two Models of Communication

Communication is often conceptualized as information that is encoded into a message, which is then transmitted through some communication channel to be decoded at the other end. This approach is called the *code model*

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of communication. The idea at the core of the code model is that communication is made possible by mechanisms of association: between the state of the world and a signal (for signalers); and between a signal and a response (for receivers). The code model has a deep intuitive appeal, and a great deal of research on the evolution of communication, in both humans and animals, uses it as a default background assumption about how communication works (e.g., Skyrms 2010). Indeed, the terminology of codes and information transmission is common in the vast majority of work on the evolution of communication, human or otherwise. Here, for instance, is a description of human linguistic communication, taken from a highly influential paper: "the vocal-auditory *channel* has some desirable features as a medium of communication: it has a *high bandwidth*… however it is essentially a *serial interface*…the basic tools of a *coding scheme* employing it are *an inventory of distinguishable symbols and their concatenation*" (Pinker and Bloom 1990, p. 713, italics added).

However, there is another way of thinking about the very possibility of communication, called the *ostensive-inferential model*. Here, communication is not about encoding and decoding messages, but about expressing and recognizing intentions (Scott-Phillips 2014; Sperber and Wilson 1995, 2002). Specifically, the signaler must express both communicative and informative intentions. An informative intention is an intention to change the mental state of the receiver: When I use my leg to point to the door, I express an informative intention that you believe that I would like you to open the door. A communicative intention is an intention that you recognize that I have an informative intention. When I use my leg to point to the door, I express not only the informative intention described above but also a communicative intention that I have an informative intention; in other words, that you believe that I am trying to communicate with you in the first place. After all, legs point in particular directions all the time. I need to show in some way that the direction my leg is pointing is not just incidental but is in fact a signal that has meaning for you. The technical term is *ostension:* I point my leg in an ostensive way, and in so doing I express my communicative and informative intentions. Similarly, when I tilt my mug to nonverbally ask my waiter for more coffee, I do so in an ostensive way. (I do not simply tilt it and do nothing more.) The flip side of this is *inference:* the recognition, by the receiver, that the signaler has these communicative and informative intentions.

Because it is ultimately about the expression and recognition of intentions, communication of this sort is only possible if the individuals involved possess mechanisms of metapsychology: Signalers must entertain beliefs about the intentions and mental states of listeners, and listeners must do the same for signalers. Pointing is a particularly productive instance of ostensive communication, but any behavior (e.g., shrugs, nods, gestures, facial contortions, burps) can, in principle, be used ostensively so long as it expresses a communicative intention, and hence an informative intention too.

The fundamental difference between the code model and the ostensive-inferential model is, then, a difference about the mechanisms that make each type of communication possible. On the one hand, code model communication is made possible by mechanisms of association. On the other, ostensive-inferential communication is made possible by mechanisms of metapsychology.

As such, ostensive-inferential communication is ultimately a tool for social navigation (Scott-Phillips 2014). For signalers, ostensive-inferential communication is a tool to (more or less) directly influence others' minds; for receivers, it is a tool to more or less directly read others' minds. Both of these objectives obviously require the assistance and acquiescence of the other party, and indeed that is, from both an evolutionary and a social psychology perspective, what linguistic and other forms of ostensive-inferential communication ultimately are: mutually assisted mind reading and mental manipulation. One seminal paper in the history of animal communication theory used mind reading and manipulation as a metaphor to describe the adaptive payoffs available in communication to, respectively, the receivers and the signalers (Krebs and Dawkins 1984). In

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the case of human ostensive communication, that insight is not metaphorical, but literal: Ostensive communication is a form of extended social navigation. Signalers mentally manipulate their audience, and audiences mind read signalers. These direct functions give rise to numerous derived functions of communication and language, such as gossip, courtship, hunting, and all the other ends we use them for (for the difference between direct and derived functions, see Millikan 1984; Origgi and Sperber 2000).

Ostensive-inferential communication is likely uniquely human (Scott-Phillips 2014; Tomasello 2008). We can divide ostensive-inferential communication into four distinct behaviors: (1) the expression of communicative intentions, (2) the expression of informative intentions, (3) the recognition of communicative intentions, and (4) the recognition of informative intentions. There is clear experimental evidence that children have command of the first three behaviors, and it would be very surprising if they did not have command of the fourth too: The only reasons why such studies have not yet been conducted are methodological (Scott-Phillips 2014). In contrast, there is as yet no evidence that any nonhuman primate has command of any of these four behaviors, and although there are also methodological challenges involved here, the main reason for the lack of studies on these questions seems to be a general skepticism that nonhuman primates will succeed at such tasks. Nonhuman primates communicate intentionally, but intentionality is not sufficient for ostension and inference (for detailed discussion, see Scott-Phillips 2014).

Section 3: Language

Where does linguistic communication fit into this distinction between coded and ostensive-inferential communication? The immediate intuition is that it operates according to the code model. After all, there are clearly reliable associations between signals and their meanings: The word "dog" is reliably associated with canine animals, for example. Yet this is equally clearly not the whole story. Metaphors, allusions, and other figurative expressions express far more than the literal, "decoded" meanings of what is said, and these are not atypical uses. On the contrary, they are entirely quotidian. Moreover, listeners use more than just language to determine a speaker's intended meaning. Other aspects of production, such as intonation and body language, are important too. Even an utterance as simple as "How are you?" can express a range of speaker meanings, depending on how it is expressed. To determine between these readings, and to express them appropriately in the first place, speakers and listeners must reason about each other's mental states. Linguistic communication clearly involves some use of ostension and inference.

What, then, is the relationship between ostension, inference, and the linguistic code? One common answer to this question—indeed, the dominant one in mainstream linguistics—is that the linguistic code makes language possible, and ostension and inference make it especially flexible and expressively powerful. There is, however, a long tradition in the philosophy of language which shows that the code model is insufficient as a description of how linguistic communication actually works. The basic point can be illustrated rather simply. Consider the following exchange:

Mary: What are you doing later?
Peter: Sally has invited me to dinner.

If it is understood purely in terms of the linguistic code, Peter's utterance does not, *on its own,* answer Mary's question. It is only when context, shared knowledge, and other pragmatic considerations are taken into account that Peter's intended meaning becomes clear. In the jargon of linguistics, literal meaning underdetermines speaker meaning (Carston 2002). The fact of underdeterminacy means that the linguistic code is not, on its own, enough for communication to succeed.

Instead, the linguistic code augments our capacity for ostensive-inferential communication (Sperber and Wilson 2002). I can point to the door with my leg, but with the linguistic code I can be more explicit, and actually ask you to open it. In this way, linguistic communication is an instance of ostensive-inferential communication, one that

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makes use of a rich set of culturally shared conventions that we call languages. Put another way, ostension and inference make human communication possible, and what the linguistic code does is make it expressively powerful.

Section 4: Mechanisms of Language Structure

These linguistic codes—languages—are structured in interesting, nonrandom ways. Why? Just as the *raison d'être* of, say, biology is to enquire about why nature is the way it is, and not some other way, the *raison d'être* of linguistics is to investigate why languages take the form that they do, and not some other form.

One prominent hypothesis is that we have an innate mechanism—typically called a universal grammar (UG)—that effectively and adaptively prespecifies the form that languages take, and in doing so allows us to acquire language. Central to this claim is the argument that the natural language that children are exposed to does not contain sufficient data for them to actually acquire the whole of (what is to be) their native language. Hence, there must be some cognitive mechanism that primes them to do so (Berwick et al. 2011; Chomsky 1980). Any such mechanism should be recognized as an evolutionary adaptation (Pinker and Bloom 1990).

However, the existence of UG is disputed. In particular, many researchers have argued, against the nativist view, that language acquisition is possible in a purely data-driven way (i.e., that in order to learn their native tongues, children need no more linguistic input than that to which they are naturally exposed; e.g., Goldberg 2006; Tomasello 2003). This is a vexed, contentious, and unresolved debate (Pullum and Scholz 2002)—and if the antinativists are correct, then the question of why languages take the forms that they do reasserts itself.

Cultural evolution provides a potential answer to this question, and hence an alternative to nativist explanations of language structure. The basic suggestion is that, as they propagate through a community, languages gravitate towards forms that match the dispositions of the human mind, and the behavior of language users (Christiansen and Chater 2008; Evans and Levinson 2009). If so, this would be an instance of cultural attraction, in which cultural traits (languages, fashions, religious beliefs, etc.) spread through a population to the extent that they fit the natural dispositions of human behavior and the human mind (Claidière et al. 2014; Sperber 1996). The idea is best illustrated with an example.

In one influential experiment, participants were asked to learn an "alien" language of 27 meaning-word mappings. Each "meaning" comprised one of three different shapes (square, triangle, circle), which could each be in one of three different colors (red, blue, black), and which were associated with one of three different types of movement (straight, rotation, bounce). The words associated with these meanings were randomly created, and without meaning in English (e.g., "nohu," "gatuha"). Such languages are effectively sets of 27 distinct associations, between meanings and previously unknown words. Having been shown the language, the first participant was then tested on it: shown all the shapes again, and asked to type the corresponding word. The language the participant produced was then used as the language that the next participant had to learn, and this process was repeated for ten generations, in two different experimental conditions. What happened was that, as they were passed from one participant to another in this way, the languages became more structured. In one condition in particular, each word acquired distinct parts for each part of the meaning: One part described the color (say, black is "ne"), another part described the shape (say, a square is "ho"), and a third part the movement (say, bounce is "pilu"). These different component parts (the technical term is "morphemes") can then be combined in various ways to describe all the different shapes uniquely. The black bouncing square, for instance, was now labeled "nehopilu" (i.e., the combination of "ne," "ho," and "pilu"; Kirby et al. 2008). In short, the meaning of the terms is now given by the meaning of the component parts and the way they are combined. This property is called *compositionality,* and it is a distinctive and basic feature of linguistic structure.

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There are many similar findings of this sort. That is, numerous models and experiments illustrate how various features of language, such as compositionality, can emerge as languages propagate through a community (Scott-Phillips 2014). These findings provide good arguments to be skeptical about the existence of an innate mechanism for language, because they explain how it is possible for languages to take the form without any such innate mechanism (Evans and Levinson 2009). In other words, the proximate mechanism involved in the generation of linguistic structure may not be a UG, but rather the process of cultural propagation, which tends to morph languages into structural forms. Of course, these two explanations are not mutually exclusive: It is possible that both play a role.

Section 5: Adaptive Behavior in Ostensive-Inferential Communication

In ostensive-inferential communication, the individual goals of the two distinct parties are not always aligned. In particular, there may be things that I, as a speaker, want you to believe, but which you, the listener, have no interest in, or which you simply do not wish to know or believe. Similarly, there may be aspects of my mind that you want to infer, but which I have no interest in revealing. Interactive, social behaviors of this sort present the adaptationist with a host of interesting questions that involve how the interests of the different parties play off against one another in evolution (Davies et al. 2012).

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First, we must understand how the interests of speakers and receivers play off against one another in ostensive communication. For listeners, the main issue is to avoid attending to irrelevant stimuli, since to do otherwise is a waste of time and energy. In short, listeners must filter the stimuli they are exposed to for relevance. If I say to you, "this is a pipe," one thing that follows is that the object I am holding is conventionally referred to as a pipe. But other things logically follow too, for example, that it is not a knife. Or a fork. Or a house, a field, an idea, a lobster, a picture of a pipe…and so on. What this random list illustrates is that the potential new beliefs that follow from even the most simple of stimuli are infinite (this is a serious philosophical problem in computer science, where it goes by the name of the frame problem). Even for the most simple of utterances, listeners must have some way to limit exactly what conclusions they draw. More specifically, they should seek to extract as much worthwhile information from the stimulus as they can, while not wasting undue energy (Sperber and Wilson 1995).

Speakers must also limit their efforts. We do not inform our audiences of everything we have ever known or thought. After all, if listeners filter for relevance, as discussed above, then unnecessary verbosity is just a waste of energy. Moreover, if we are consistently irrelevant, we will lose friends and influence. These are serious consequences in a highly social species like humans. Instead, a speaker should tend to produce stimuli that are as relevant for the listener as possible, given the speaker's own goals and preferences.

In sum, the design features for adaptive ostensive communication are that (1) listeners' cognitive systems should tend to maximize the relevance of incoming stimuli, and (2) speakers should tend to produce ostensive stimuli that are optimally relevant for the intended audience (where optimally relevant means as relevant as possible, given the speaker's own goals and preferences; Scott-Phillips 2010). That human communication actually exhibits both of these qualities is the central claims of *Relevance Theory,* a prominent approach to pragmatics, the branch of linguistics concerned with how languages are used and the cognitive mechanisms behind linguistic communication. The two qualities are called, respectively, the cognitive and the communicative principles of relevance, and they are, in effect, claims that we use ostensive-inferential communication adaptively (Sperber and Wilson 1995).

Both principles of relevance have been subject to empirical testing (reviewed in van der Henst and Sperber 2004). Probably the most well-known and cleanest test of the communicative principle (that speakers will tend to produce optimally relevant stimuli) concerns telling the time. When approached on the street and asked

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for the time by somebody who says they have an appointment soon, people will round their answer (e.g., to say "5 to 3" instead of "2:56", or "4 min to 3") if the appointment is between 15 and 30 min from now, but they will give a precise, nonrounded answer if the appointment is within the next 15 min (Gibbs and Bryant 2008; van der Henst et al. 2002). This is because the precise, nonrounded answer is only relevant if the appointment is immediate. This is just one of several experiments whose results are consistent with the predictions of the communicative principle of relevance.

The cognitive principle of relevance (that human cognition will maximize the relevance of incoming stimuli) has also been tested in a variety of ways. One way is with relational reasoning tasks (van der Henst and Sperber 2004). Relational reasoning tasks come in determinate and indeterminate forms. In the determinate form, participants are given premises such as "A is taller than B" and "B is taller than C," and asked about the relation between A and C. Indeterminate forms are the same, except that the premises are indeterminate about the relation between the terms. The most straightforward example is "A is taller than B" and "A is taller than C." Here, nothing follows about the one unstated relationship between these three terms (i.e., the one between B and C). To test the communicative principle of relevance, instead of asking "What is the relationship between B and C?" we can ask a question more like "What conclusions, if any, follow from these premises?" The point here is that many things (in fact, an infinite number) logically follow from these premises, many of them trivial and obvious. For example, and most immediately, the conjunction "A is taller than both B and C" follows. A series of experiments show, however, that participants tend to say that no conclusions follow. In other words, the question they seem to answer is not the one they were literally asked, but this one: "What relevant conclusions, if any, follow from these premises?" (van der Henst and Sperber 2004). In short, the participants interpret the question in a way that it is relevant in the context (of a relational reasoning task, where many of the conclusions are trivial and obvious, and hence irrelevant), just as predicted by the cognitive principle of relevance.

In sum, experimental data suggest that human communicative behavior is indeed adaptive, given the different interests of signaler and receiver. Signalers tend to produce optimally relevant stimuli, and receivers maximize the relevance of the stimuli they receive.

Section 6: Vigilance and Argumentation

From an evolutionary perspective, there is one type of irrelevance that is of particular importance: dishonesty. A dishonest signal is one that is presented as having useful (relevant) information, but which in fact does not, because that information is false. Why is deception not widespread? After all, deceiving others can be very beneficial. If it pays a signaler to signal dishonestly, at least on average, then we should expect dishonest signals to evolve. If this occurs, the receiver's best reaction is, again on average, simply to ignore signals from these signalers, and so we should expect this indifference to evolve too. The end result is that the system has collapsed, and no further communication takes place. Under what circumstances does this outcome not come to pass? This question is the defining problem of signaling theory (Maynard Smith and Harper 2003). In this and the next section, I shall address it from both an ultimate and, first, a proximate perspective.

From the receiver's perspective, communication, linguistic or otherwise, is a potentially rich source of useful information. However, there is always the risk of deception and other forms of misinformation. This information must therefore be filtered; false and otherwise useless information should be rejected. Listeners able to do this effectively will make the best use of communication as a source of information.

This filtering of information is called *epistemic vigilance* (Sperber et al. 2010). A critical

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component of epistemic vigilance is the distinction between comprehension and acceptance: We can comprehend what others say without accepting it (i.e., without changing our mental states in the way that the signaler intends). There are two reasons why we might reject information in this way: because we think the signaler is either (1) malevolent (i.e., liable to deceive) or (2) incompetent (i.e., liable to be misinformed themselves). To the extent that it is possible to detect malevolence and incompetence in advance, we are cautious about accepting information from such sources.

Epistemic vigilance is specific to ostensive communication. Exercising epistemic vigilance involves the listener satisfying the speaker's communicative intention, while at the same time holding open the possibility of not satisfying the corresponding informative intention. In other words, the listener can accept that the speaker intends that the listener understands that the speaker has a particular informative intention, while at the same time the listener can choose not to accept the content of that informative intention. Since there are, by definition, no such similar intentions in code model communication, no such epistemic vigilance is possible there.

Whether the mechanisms involved in epistemic vigilance are adaptive or not is presently unclear. Whether and how we are able to detect misinformation is a much-studied topic in social psychology. There are also sizable literatures on the dissemination and persistence of misinformation, and on how accent and other paralinguistic features of dialects are sometimes used as heuristic markers of group identity, and hence of who one should or should not trust and cooperate with (reviewed in Cohen 2012). In contrast, whether we filter information acquired via ostensive communication as usefully as possible, given the inherent uncertainties involved, is far less studied (Sperber et al. 2010). Given the central role that ostensive communication plays in human life, it is quite plausible that the mechanisms involved in epistemic vigilance are adaptive—but, to the best of my knowledge, we do not have good data on this question at present. In short, nobody has yet done quantitative empirical work on the effectiveness of epistemic vigilance. This is an important topic for future research.

Let us now look at things from the perspective of the signaler. Doing so sheds surprising new light on an aspect of our cognition that does not immediately seem to be of direct relevance to communication. Signalers signal in order to influence others' mental states (Sect. 2). However, epistemic vigilance poses a barrier to this goal: Vigilant listeners, alert to the possibility of deception, will not simply adjust their mental states willy-nilly, just as they are told. This means that signalers must find ways to overcome this barrier. They cannot literally force listeners to adjust their mental representations, so they must instead persuade, argue, and otherwise provide good reasons why listeners really should adopt their point of view. As such, crucial to this signaler's goals is the ability to generate good arguments and other forms of persuasion in the first place; in other words, to reason well. This insight motivates the argumentative theory of reasoning, which states that the proper function of human reasoning skills is not, as is commonly assumed, to improve knowledge and make better decisions, but rather to devise and evaluate arguments intended to persuade (Mercier and Sperber 2011). This does not mean, of course, that reasoning is not used to improve one's own knowledge and make better decisions, or that it does not sometimes serve this purpose; the claim is simply that using reasoning in this way is like using a chair to hold open a door: It works, and often very well, but that is not what it is designed for. The function of reasoning is instead to persuade others in ostensive communication.

The argumentative theory makes a number of specific and otherwise counterintuitive predictions that are supported by the empirical data, and which are hard to account for under the more traditional view (that the proper function of reasoning is to improve knowledge). The most salient example of this is confirmation bias. It is well known that people tend not to systematically evaluate both of the arguments in favor and those against existing beliefs or new ideas. Instead,

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they interpret new data in a partial way, considering only or predominantly those data that support already existing beliefs (for a review, see Nickerson 1998). If human reasoning is about improving one's own knowledge and making better decisions, confirmation bias is simply a flaw: It hinders rather than aids the purported goal. However, from the perspective of the argumentative theory, it is exactly what should be expected. If the goal of reasoning is to provide listeners with reasons to accept your claims, then our reasoning skills should be designed to seek arguments in favor of our existing view, because it is these arguments that are most useful for the persuasion of others (Mercier and Sperber 2011).

This section looks at the proximate mechanisms associated with deception and other forms of misinformation in human ostensive-inferential communication. Doing so has highlighted how mechanisms for epistemic vigilance and mechanisms for reasoning are two sides of the same communicative coin. I turn now to ultimate questions.

Section 7: Honesty and Reputation

The theoretical literature contains several possible ultimate-level explanations of evolutionary stability in communication. In this section, I briefly review these and discuss which apply to human communication.

One possibility is indices. With indices, there is a causal relationship between signal form and signal meaning. Dark clouds, for example, are indexical of rain. A biological example is red deer roars, whose acoustic properties are indexical of the deer's size. This is due to the physical constraints of deer vocalization (Fitch and Reby 2001). Specifically, when red deer roar, their larynx descends as far as possible, and this maximizes their apparent size. The deer cannot evolve to descend the larynx any further because this would require a change in the fundamental anatomy of the deer. Another possibility is deterrents, where the payoffs associated with honesty outweigh the payoffs associated with dishonesty.

One special type of index is a handicap: Costs paid to produce a signal, which have no function except as a way to advertise the fact that the signaler can actually produce the signal in the first place. It is critical to the mathematics of handicaps that these costs are differential: The costs of signal production must be greater for dishonest rather than honest signalers (Grose 2011; Számadó 2011). This quality is hard to measure, and hence real-world examples are hard to find: "there is not a single biological example that could be claimed as handicap beyond doubt" (Számadó 2012, p. 281). Nevertheless, the peacock tail is often put forward as a possible example (discussed in Maynard Smith and Harper 2003).

Students of human behavior have been far too keen to argue that human communication uses handicaps (Grose 2011). One example is blood donation (Lyle et al. 2009). Another is costly apologies (e.g., gifts), which signal a sincere desire to repair a relationship (Ohtsubo and Watanabe 2009). A third example is self-harm among prisoners, which some researchers argue is used to signal psychological volatility ("if I am crazy enough to do this to myself, what might I do to you?!"; Gambetta 2009). All these examples are costly to some degree or another, but in no case is there good reason to think that they are differentially costly. As such, these proposals all ignore a key requirement for a signal to qualify as a handicap. There are further examples still (Grose 2011; Scott-Phillips 2014).

While it is possible that some instances of human communication are kept stable by other means, most are kept stable by deterrents, and in particular by reputation (Lachmann et al. 2001; Scott-Phillips 2008a). Individuals who lie are likely to be ignored or ostracized in the future, and this possibility stops people from lying. The loss of reputation that can result from dishonesty is a major cost in a highly social species like humans, who continually monitor and gossip about each other's behavior. Indeed, Aesop's fable of the boy that cried wolf is designed to illustrate the importance of a reputation for honesty. The importance of reputation for the evolution of human cooperation was recognized some time

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ago (e.g., Milinski et al. 2002). Its importance for the evolution of human communication is less widely recognized, but should be.

Section 8: Summary

When we study human communication from an evolutionary or zoological perspective, the most important point to keep in mind is that human communication is ostensive-inferential (Sect. 2). What this means is that human communication involves the expression and recognition of intentions. Specifically, these intentions are communicative intentions, the content of which are informative intentions.

As such, human communication is ultimately a form of mutually assisted social navigation. Its direct functions are mind reading (for receivers) and mental manipulation (for signalers). Several researchers have suggested other functions for human communication, such as grooming, courtship, and so on, but these are all derived functions, and should not be confused with its direct functions (Origgi and Sperber 2000; Scott-Phillips 2014). Linguistic communication is a type of ostensive-inferential communication (Sect. 3).

In asking what an adaptationist perspective might tell us about human communication and language, it is important to recognize that communication systems are not psychological traits, nor biological traits of any other sort. Communication is instead the product of two interactive traits, namely mechanisms for signal production and mechanisms for signal reception (Scott-Phillips 2008b; Scott-Phillips et al. 2012). When we consider how the interests of signaler and receiver play off against one another, we derive the following predictions: (1) listeners' cognitive systems should tend to maximize the relevance of incoming stimuli, and (2) speakers should tend to produce ostensive stimuli that are optimally relevant for the intended audience. These are the central claims of relevance theory, and they have stood up to empirical scrutiny (Sect. 5).

It is possible that humans have adaptations for language acquisition, which constrain the possible forms that languages can take. If so, this can help explain why languages take the forms that they do. However, an alternative proximate explanation of this is cultural attraction: It is possible that languages take the forms that they do because as they propagate through a community they change in nonrandom ways, and in doing so they gravitate towards certain forms and away from others (Sect. 4). Which of these explanations is correct (or whether a combination of them is) is a central question for contemporary linguistics, and will remain so for some time.

Communication is of course a social phenomenon, and as such a classic problem is evolutionary stability. What prevents widespread dishonesty? In most human communication, the answer is social reputation: The potential benefits of dishonesty are outweighed by the potential costs of being discovered or known as a liar (Sect. 7). At a proximate level, we have a suite of mechanisms that help to defend themselves against the possibility of misinformation (Sect. 6). This is called epistemic vigilance. An adaptationist approach suggests that our ability to reason may be the flip side of this: A mechanism adapted to persuade others to accept the information we present to them.

This brief survey of what an evolutionary perspective can tell us about human communication and language has highlighted several important questions that require further investigation. Among the most prominent are: How good are we at epistemic vigilance? (This is not the same question as "How good are we at detecting liars?"; Sperber et al. 2010). How widespread are handicaps in human communication? To what extent, exactly, does human communicative behavior satisfy the principles of relevance? Within evolutionary linguistics, adaptationist questions of this sort have received relatively little attention in comparison to questions about the evolutionary origins of language. Research on language origins is certainly to be welcomed, but we should not neglect to study how an evolutionary, adaptationist perspective can inform questions about the nature of language and communication themselves.

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AQ2

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Chapter 22: Author Query

AQ1. The following authors are cited in the text but are not given in the reference list: “Davies et al. 2012” and “Grose 2011.” Please provide full references.

AQ2. The following authors are not cited in the text: “Shannon 1948” and “Zahavi and Zahavi 1997.” Please provide the citations.