

COGNITION AND COMMUNICATION

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Abstract (50-150 words)

Communication is a critical type of interaction for all social species, but especially so for humans. This is because it is a major means by which humans interact with one another, and the main means by which cultural items propagate through a community. Humans, and likely only humans, have evolved a type of communication – ostensive communication – that has an essentially unlimited expressive potential. Canonical examples include points, shrugs, and grunts. The expressive potential of this type of communication is further enhanced by the use of words, grammars, and other communicative conventions that collectively comprise a language. The emergence of this type of communication likely had several important evolutionary consequences for the human animal.

Introduction

Communication, linguistic or otherwise, is the single most frequent type of human interaction, and the most important too. This importance stems from the fact that human communication is uniquely expressive, and as such can be employed to serve a broad range of derived functions (e.g. gossip, sex, coalition forming, collaboration, etc). Communication also plays a critical role in the spread of ideas and culture, since it is the main means by which cultural items propagate through and between communities. For all these reasons, communication is critical to the study of humans, and human culture.

An intuitive way to define communication is to say that it is a process of information transfer. However, many things are informative but not communicative. You might simply notice something about somebody's behavior, even though they did not mean to communicate it; this is called a cue. A better way to define communication is in terms of functionality, or design (Scott-Phillips, 2008; 2014). Specifically, we can say that communication occurs where one action causes another, and where this cause-and-effect is the proper function of *both* action and reaction. If only the original action has this cause-and-effect as its proper function, then it is coercive, and if only the reaction does, then the action was simply a cue (see Scott-Phillips, 2014 for further discussion and examples). Here, "proper function" means the task that a behaviour performs that is historically responsible for its reproduction. Hearts, for example, make noise, contribute to body weight, and pump blood, but it is only the last of these that explains why hearts are reproduced from one generation to the next, and so this is their proper function (see Origg & Sperber, 2010 for further discussion of functionality in the context of human communication).

1. Communication and pragmatics

One intuitive way of thinking about communication is in terms of coding and decoding. Coding and decoding both involve mappings between inputs and outputs: coding involves a mapping between the state of the world and a behaviour (a signal); and decoding involves a corresponding mapping between that first behaviour and another one (a response). If the algorithms for coding and decoding are appropriately calibrated to one another, we can say that communication has occurred. This way of thinking about communication is usually called the code model. The code model is intuitive, easy to understand, and, to the best of our knowledge, is an accurate way to describe most, perhaps all, instances of non-human communication.

However, the code model is not enough, on its own, to describe many cases of human communication. That is to say: we often communicate without the sort of mappings described above. This is most obvious in cases where we invent a signal on the fly. Such signals are, by definition, new, and so mappings between them and a given response cannot yet exist. Yet communication can still occur. Imagine, for example, that you are asked if you agree with the rest of your friends that should all go to the new Thai restaurant for dinner. You are, however, currently drinking a glass of water, and so are temporarily unable to voice your agreement, and so you instead knock the knuckles of your spare hand on the table, intending to indicate your agreement. Your friends understand this. This is an entirely everyday case of communication. Note, however, that there is no pre-existing mapping between knocking the table and the meaning “Yes, I agree”. (Such a mapping may exist in some social circles, but it need not: if it did not exist, we still expect communication to succeed). In short, your behaviour *underdetermines* your intended meaning. Enquiry into the human mind’s capacity to engage in this type of communication, and how we use it in everyday use, is the domain of pragmatics.

Most theoretical work in pragmatics takes as its starting point the pioneering work of Paul Grice (see Grice, 1989 for a collection of his work). Among his most important and influential ideas is that in order to identify a speaker’s intended meaning, listeners are guided by an expectation that the utterance in question will meet certain standards. He also made the further, specific proposal that speakers are guided by a Cooperative Principle, which states that they should make their utterance “such as it is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged”. He broke down this overarching principle into four maxims: Quantity (do not say too much or too little), Quality (be truthful), Relation (be relevant), and Manner (be polite) (the summaries here are paraphrases). Grice’s idea was that speakers tend to choose to adhere to these maxims, and this fact allows listeners to make correct inferences about the intended meaning. Here is an example:

A: Where’s Bill?

B: There’s a yellow VW outside Sue’s house.

Taken literally, B’s utterance fails to address A’s question. It appears, on the surface, to violate the maxims of Quantity (the presence of the yellow VW is more information than was requested) and Relation (what has the yellow VW to do with where Bill is?). According to the Gricean analysis, A assumes that this is not what has occurred and instead searches for implications that can enrich his interpretation, such that B’s utterance does satisfy the four maxims. This course of reasoning leads him to conclude that Bill owns a yellow VW, and so may be in Sue’s house at the moment, and that this was A’s intended meaning. Subsequent discussion has highlighted many problematic cases for this approach, many to do with cognitive and psychological plausibility. As such, an important goal for pragmatics since Grice has been to improve on the original Gricean formulation.

In distinguishing between the several projects that attempt to meet this challenge, arguably the most important point of difference is between neo-Gricean and post-Gricean approaches. Neo-Griceans retain Grice's core idea that the expectations about how speakers behave, which guide listener's comprehension, are norms of behaviour that speakers are expected to adhere to but from which they may depart, if needed or necessary. In order to address problematic cases like the example above, additional and/or alternative maxims and principles are proposed (see any pragmatics textbook for examples). A recurrent problem for neo-Gricean approaches is that they leave open the question of how a listener should or would even know in the first place that a maxim or principle is being violated, and hence that some non-literal interpretation should be sought. Post-Griceans, in contrast, reject the idea that the expectations that guide comprehension are norms or rules that speakers adhere to as a matter of choice. Instead, these expectations are argued to be fundamental facets of how human communication works, which speakers could not violate even if they wished to. The most prominent such approach is Relevance Theory (see Clark, 2013 for an introduction). In fact, Relevance Theory is arguably the single most important and influential pragmatic theory of any sort since Grice. This importance derives from several factors, among the most important of which is its development of a model of communication that offers a proper alternative to the code model, and which complements Gricean analyses of comprehension (whether neo- or post-Gricean).

This alternative to the code model is called ostensive-inferential communication, or often just ostensive communication, for short. Ostensive communication involves the expression and recognition of communication and informative intentions. In order to unpack this, let me walk through a series of scenarios in which one character, Peter, watches another, Mary, eat berries (see Scott-Phillips, 2014 for a elaborated version). Each scenario will involve the addition, to what went before, of either an intention or a belief, and in this way the complexity of the scenarios will increase at each stage. In this way, we will be able to clearly see what informative and communicative intentions are, and the roles that they play in human communication.

Scenario one. Mary is picking and eating berries. She does this because the berries are edible.

Scenario two. Mary is picking and eating berries. Peter watches her. Peter hence believes that the berries are edible (because otherwise Mary would not be eating them). Note that Mary may or may not know that Peter is watching.

Scenario three. Mary is picking and eating berries. Peter is watching her. Mary knows that Peter is watching her, and she wants him to believe that the berries are edible. In

other words, Mary intends that Peter believes that the berries are edible. Mary's intention is called an *informative intention*.

Scenario four. Mary is picking and eating berries. Peter is watching her. Mary knows that Peter is watching her, and she wants him to believe that the berries are edible. Furthermore, Peter knows that Mary knows that he is watching her and he has reason to believe that she would like to him to believe that the berries are edible. Thus, Peter believes that Mary intends that he believes that the berries are edible. In other words, Peter believes, correctly, that Mary has an informative intention.

Scenario five. Mary is picking and eating berries. Peter is watching her. Mary knows that Peter is watching her, and she wants him to know that the berries are edible. Furthermore, Peter knows that Mary knows that he is watching her. Mary also knows, in addition, that Peter knows that Mary knows that he is watching her. In other words, Mary intends that Peter believes that Mary has an informative intention. This intention is called a *communicative intention*. In this scenario, an important behavioural change occurs. Previously, Mary could satisfy her only intention – an informative intention – simply by picking and eating berries. Here, however, she has not only an informative intention, but also a communicative intention, that Peter recognises that she has an informative intention. To satisfy this communicative intention, Mary picks and eats the berries in a particularly stylised, exaggerated manner. This reveals to Peter not only that the berries are edible, but also that Mary intends to reveal as much to him. In other words, it expresses Mary's communicative intention. This behaviour is called *ostensive*.

Scenario six. As per scenario five, including the fact that Mary picks and eats the berries in an ostensive way. Because of this, Peter believes that Mary has a communicative intention, the content of which is an informative intention, that he (Peter) believes that the berries are edible. This is ostensive-inferential communication proper.

The jargon here – ostensive-inferential communication – is cumbersome but accurate. Ostension is the expression of communicative and informative intentions; and inference is recognition of the same. Note that the informative intention alone is insufficient. The communicative intention is equally necessary. The communicative intention is a speaker's intention to make manifest the fact that they have an informative intention, and without this, there would be material difference between eating berries simply because you want to, and eating berries to actually communicate to me that they are edible. Another way to make this point is to say that it is not simply "intentional communication" that is being described here. Human communication is not only intentional, it is *overtly* intentional (see Scott-Phillips, 2015 for a concise discussion). Mary's behaviour in scenario three is intentional, but it is not overtly so (i.e. it is not ostensive), and so Peter has no reason to

believe that it is communicative. Mary's behaviour is overtly intentional only in scenario five, when she eats the berries in an ostensive way. Correspondingly, it is only when this overtness is detected (in scenario six), we can see that communication has occurred.

Even without language (for discussion of which, see below), humans use ostensive communication extensively. However, there is presently no good evidence that any species other than humans engages in ostensive communication (Scott-Phillips, 2014). There is ample evidence that several non-human primate species communicate intentionally, but none yet that they communicate ostensively. In contrast, human children engage in it from 12 months of age, and are remarkably competent at doing so (Tomasello, 2008).

2. Communication and language

Language and (ostensive) communication are not synonyms. We can communicate without language (consider again the example of Mary eating berries for Peter). We can also use language without communicating (in thought, for instance). What, then, is the relationship between the two?

An intuitive and commonly-held idea is that the linguistic code makes linguistic communication possible in the first place, and that pragmatic factors make it more expressive. In other words, that that linguistic communication operates according to the code model (see above), and that ostension and inference can be used to enhance this code, where necessary. This view of linguistic communication is implicit in a great deal of research, both within and outside of linguistics, although its influence is often unacknowledged and/or unnoticed, even by those that adopt it.

This intuitive idea may sometimes be useful, but it is also false. Consider as an example the utterance "It's late", overheard at an airport (example from Sperber, 1995). What idea is the speaker trying to convey? Possibly that it is late in the day, and as way to explain why the speaker is tired. Another possibility is that the speaker has found out that the plane is delayed. There are further possibilities too: perhaps an email she is waiting for has not yet arrived. I could go on. In fact, that is the point: it is always possible to suggest new, plausible meanings that the speaker could have meant. This is the cold reality of underdeterminacy. You may understand perfectly well the words that speakers produce, but that is not enough, on its own, to determine what they mean. Put bluntly, the linguistic code is, on its own, insufficient for communication to succeed.

Consequently, pragmatic factors cannot be merely a bonus add-on to the linguistic code. They must play a more fundamental role than that – since without them, it would be impossible to determine between all the different possible speaker meanings. This point is the single most

important finding of pragmatics as a discipline (see Sperber, 1995 for a concise, introductory discussion of this point).

In fact, the intuitive idea that the linguistic code makes communication possible, and that pragmatic factors make it more expressively powerful, is not only false, it is exactly upside down. What makes communication possible in the first place is the human capacity for ostensive-inferential communication, described above. Natural languages – English, Hebrew, Xhosa, Tamil, etc – are the sets of communicative conventions developed by a community in order to enhance the expressive capacity of ostensive communication. Without languages, but with ostensive communication, we can relatively easily point to nearby objects, and indicate our general dispositions towards our surroundings. But with languages we can use ostensive communication in a far more precise and expressive way. Linguistic communication is, in short, a very special type of ostensive communication.

As such, a description of a language is, in effect, a description of the set of communicative conventions that a given community uses to enhance the expressive capacity and potential of ostensive communication (Scott-Phillips, 2014). These conventional codes exist at all levels of linguistic analysis: phonetic (the specific sounds used in a language), phonological (the ways in which those sounds are combined), semantic (the meanings of component parts of a language), morphosyntactic (the ways in which different combinations of sounds can be combined together), and even pragmatic (the different norms around how different parts of speech are used e.g. politeness conventions). The defining intellectual task for linguistics is to explain how and why particular sets of conventions are common within and between languages, while others are not.

Given their expressive power, languages can be used for a wide range of ends: gossip, sex, coalition forming, collaboration, and indeed all the other ways in which humans may wish to influence each other. These are all derived functions of human communication. The study of how linguistic communication can and is used in these ways, and the effect it has on others, either directly or through political and cultural institutions, is the domain of linguistic anthropology and sociolinguistics. One example is the use of accent as a marker of group membership. There are several reasons why accents are particularly effective way to identify who is and is not a member of a given group (Cohen, 2012). Foremost among these are the fact that accents are salient, socially transmitted, hard to acquire unless one truly is a member of the group in question, and emerge early in development. Few, if any, other possible markers of group membership possess all these qualities (*ibid.*).

The evolutionary emergence of ostensive communication and languages likely had a number of significant consequences for humans, especially evolutionarily. Most immediately, there would have been selection for mental modules that are functionally specialised for the various subtasks involved in ostensive communication. It is also plausible that humans have evolved cognitive mechanisms specifically designed to make language acquisition and language use easier and quicker than it would otherwise be. Such mechanisms typically go by the names Universal Grammar, and Language Acquisition Device. Some researchers argue that mechanisms of this sort must exist, since the natural language children are exposed to does not contain sufficient data for them to actually acquire their native language. Others argue that this is simply not true i.e. that in order to acquire their native language, children need no more linguistic input than that which they naturally encounter. These debates are vexed, complex, and long-running (see Pullum & Scholtz, 2002). Ultimately, the debate is about whether or not there exist cognitive mechanisms that are functionally specialised to enhance language acquisition and use. If such mechanisms do exist, they are evolutionary adaptations to the ubiquity and utility of ostensive communication in human life (Pinker & Bloom, 1990).

The evolutionary emergence of communication and languages would likely have had evolutionary effects in other domains too. Let me here highlight two, one anatomical, the other cognitive. The emergence of ostensive communication also has a profound effect on human culture; I will discuss this in the next section.

First, an anatomical effect. Ostensive communication, linguistic or otherwise, often involves the use of the eyes. This is because gaze direction is an important source of information about attention, and hence about mental states. Consequently, being able to reveal and identify gaze direction is a productive way to express and recognise informative and communicative intentions i.e. to communicate ostensively. White sclera (the opaque, protective outer layer of the eye) make this task far easier than do dark sclera, since they maximise the contrast between the eye itself, and its immediate surroundings (Kobayashi & Kohshima, 2001). It is likely that white sclera are an evolutionary adaptation that was selected for in order to maximise the efficacy of ostensive communication in humans (*ibid.*). This may be why, of all primate species, only humans have white sclera (other primate species' sclera are dark in colour).

Now, a possible cognitive effect. In communication, listeners are not blindly trusting. That is to say, there is a distinction between comprehension and acceptance: if you tell me that there is cake for dessert, I can comprehend that you want me to believe that there is cake for dessert, but I do not actually have to believe you. This vigilance towards communicated information presents a barrier to speakers achieving what they aim to, since vigilant listeners will not just accept what they are

told indiscriminately (Sperber et al., 2010). Instead, they have to believe that there are good reasons to accept what speakers say. There is one way in particular that speakers can encourage this: they can provide the listener with good reasons to accept what they have to say – and the best way to do that may be to be good at generating good reasons in the first place. This is the argumentative theory of reasoning: that the proper function of human reasoning skills is to devise and evaluate arguments intended to persuade others in communication (Mercier & Sperber, 2011). In other words, that human reasoning skills evolved, as white sclera did, as an adaptation to enhance the efficacy of ostensive communication. This does not, of course, mean that reasoning is not used to improve one's own knowledge and make better decisions, or that it is not good for this. The claim is simply that using reasoning in this way is like using a chair to hold open a door: it works, most of the time, and often very well, but not always, and that is not its proper function.

3. Communication and culture

Communication is critical for culture in several ways. The first and most obvious is that it is the main means by which cultural information propagates through a community. That is to say: it is the main way in which beliefs, norms, knowledge and other mental states are expressed in the public sphere, such that they influence the mental states of other individuals (which may in turn lead to further public expressions). There are other forms of cultural propagation (imitation, for instance), but none is used as often as communication is, or to propagate as much cultural information as communication does.

Communication is also critical, in several ways, for the study of which mental states and public expressions become common in a population, why they do (or do not), and what maintains their persistence over time. The importance of communication for cultural stability can be observed experimentally: several studies show that cultural artefacts (for instance, tools) are copied with a far higher degree of fidelity – high enough to maintain stability – when communication is used as the means of propagation, but not when alternative modes of propagation, such as imitation (trying to copy actions) or emulation (trying to copy end-states), are used. The likely reason for this result is that, unlike the alternatives, communication facilitates the creation of precise mental representations of what the artefacts should look like. In this way, communication is an important means by which some cultural items remain stable. This is, of course, especially true of linguistic communication.

That is not to say that ostension and inference always aim at high fidelity replication. On the contrary, they typically do not. When we communicate using ostension and inference, we often transform the communicated information, as part of the normal process of comprehension. A

speaker repeating a previously heard story may alter the story in some way (perhaps to remove irrelevant information, or to add an interesting twist). Similarly, the listener may reinterpret new information in a way that makes it compatible with her already existing knowledge. Critically, when such transformations are repeated many times over, in a great many individual instances of cultural propagation, they can have a causal effect on which items become widely shared in a population, and which do not (Claidière et al., 2014). Many examples of this process have been studied in detail, under the various labels ‘epidemiology of representations’, ‘cultural epidemiology’, and ‘cultural attraction’.

By way of illustration, consider languages themselves. As discussed above, languages are sets of conventions that are shared by a community, and stable over time. These conventions can take several forms. Why do they take the forms that they do? There is a long tradition in linguistics of arguments to the effect that languages take the forms that they do because of competing trade-offs of informativeness and clarity. That is to say, many schools of thought argue that these two competing communicative needs together cause languages to gravitate towards forms that best balance the trade-off between them. A specific grammatical example is systematicity, which is a ubiquitous feature of the world’s languages. Taken as a set, the phrases ‘red shoe’, ‘red hat’, ‘blue shoe’ and ‘blue hat’ are systematic, since the component parts of each phrase do the same job in other phrases: the word ‘red’ does the same job in both ‘red shoe’ and ‘red hat’. Several experimental studies show that if pairs or group of individuals learn a mutually unknown language that is not systematic in this way, and then attempt to use it in multiple episodes of communication, they will transform the language such that over time it acquires systematicity. The same thing does not happen in a non-communicative but otherwise comparable setting. In other words, experimental studies show that the fact that the languages have to be used for communication can cause languages to acquire systematic structure. In this way, communication is critical for the cultural epidemiology of systematicity. Semantic aspects of language show the same effect (Regier et al., 2015).

One final way in which communication is critical for culture is that it is the main way by which newborns acquire the traditions – words, beliefs, conventions, fashions, etc – that distinguish one cultural group from another, and hence become members of the group(s) into which they have been born. So important is this process that there may be functionally specialised cognitive adaptations that allow adults to communicate this culture-specific information to infants, before the infants have developed the social cognitive capacities necessary to engage in ostensive-inferential communication. This is the thesis of natural pedagogy (Csibra & Gergely, 2009). Specifically, natural pedagogy proposes that adults are adapted to use certain behaviours – in particular eye-contact and motherese (the distinctive higher-pitched prosody used to communicate with infants) –

when communicating with young infants, and that infants are primed to attend to these behaviours, and to assume that they carry information that is of specific cultural relevance. Consistent with this claim, these behaviours appear to be a cross-cultural universal.

In sum, there are several reasons why communication is critical for understanding human culture. First, it is the most important means by which cultural information propagates through a community. Especially when enhanced by linguistic conventions, it allows for communication to be both expressive and precise, and hence makes a critical contribution to cultural stability. Second, since both ostension and inference are transformative processes, they are often causally responsible for why cultural information gravitates in particular directions, and not in others. There are many examples of this process, in a variety of domains. Third, communication is the main means by which newborns acquire the cultural traditions that define their community, and it is possible that both infants and adults possess functionally specialised cognitive mechanisms directed at this goal.

See also: Cultural Epidemiology; Cultural Transmission; Language; Mental Representations; Pedagogy; Relevance; Theory of Mind

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