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How do human beings communicate with one another? For verbal communication at least, there is a sort of folk answer, suggested by a variety of metaphors in everyday use: 'putting one's thoughts into words', 'getting one's ideas across', 'putting one's thoughts down on paper', and so on. These make it sound as if verbal communication were a matter of packing a content (yet another metaphor) into words and sending it off, to be unpacked by the recipient at the other end. The power of these figures of speech is such that one tends to forget that the answer they suggest cannot be true. In writing this book, we have not literally put our thoughts down on paper. What we have put down on paper are little dark marks, a copy of which you are now looking at. As for our thoughts, they remain where they always were, inside our brains.

Suppose it were physically possible to transport thoughts from one brain to another, as programs and data stored on a magnetic disk can be transported from one computer to another: then communication would be unnecessary (whether it might still be useful for reasons of speed or economy, is another matter). But thoughts do not travel, and the effects of human communication cannot be achieved by any other means.

Communication is a process involving two information-processing devices. One device modifies the physical environment of the other. As a result, the second device constructs representations similar to representations already stored in the first device. Oral communication, for instance, is a modification by the speaker of the hearer's acoustic environment, as a result of which the hearer entertains thoughts similar to the speaker's own. The study of communication raises two major questions: first, what is communicated, and second, how is communication achieved? Meanings, information, propositions, thoughts, ideas, beliefs, attitudes, emotions, are some of the answers which have been proposed. More than one of them may well be true.
Certainly, what is communicated by a religious ritual is quite different from what is communicated by a list of stock-exchange rates. Even within the domain of verbal communication, a poem and a legal document seem to communicate profoundly different things. Nonetheless, we will argue in section 11 of this chapter that there is a general answer to this question.

For the time being, we will talk quite informally of the communication of thoughts, assumptions, or information. By thoughts, we mean conceptual representations (as opposed to sensory representations or emotional states). By assumptions, we mean thoughts treated by the individual as representations of the actual world (as opposed to fictions, desires, or representations of representations). Some authors (e.g. Dretske 1981) use the terms ‘information’ and ‘inform’ to talk only of the representation and transmission of facts; for them, all information is by definition true. We will use the terms more broadly, treating as information not only facts, but also dubious and false assumptions presented as factual. In section 8, we will characterise information more precisely. In chapter 2, we will consider the structure of thoughts and assumptions in some detail.

Even more important than the question of what is communicated is the question of how communication is achieved. How can a physical stimulus bring about the required similarity of thoughts, when there is no similarity whatsoever between the stimulus and the thoughts it brings into correspondence? Here again, it is worth considering whether there is a single, general answer. Should there be - can there be - a general theory of communication? Most authors, insofar as they are aware of the issue at all, seem to think that there can, and should.

Let us approach this question in terms of another. Clearly, no one would waste much time trying to invent a general theory of locomotion. Walking should be accounted for in terms of a physiological model, plane flight in terms of an engineering model. While it is true that both walking and plane flight fall under the same physical laws, these laws are much too general to constitute a theory of locomotion either. Thus, locomotion is either too general or not general enough to be the object of an integrated theory. It is worth considering whether this might not be the case for communication too.

There seems to be a general agreement that there can, and should, be a general theory of communication. From Aristotle through to modern semioticians, all theories of communication were based on a single model, which we will call the code model. According to the code model, communication is achieved by encoding and decoding messages. Recently, several philosophers, notably Paul Grice and David Lewis, have proposed a quite different model, which we will call the inferential model. According to the inferential model, communication is achieved by producing and interpreting evidence.

The code model and the inferential model are not incompatible; they can be combined in various ways. The work of pragmatists, philosophers of language and psycholinguists over the past twenty years has shown that verbal communication involves both coding and inferential processes. Thus both the code model and the inferential model can contribute to the study of verbal communication. However, it is usually assumed that one of the two models must provide the right overall framework for the study of communication in general. Most authors take for granted that a proper theory of communication should be based on the familiar code model; a few philosophers seem tempted to develop the inferential model into an inferential theory of communication.

Against these reductionist views, we maintain that communication can be achieved in ways which are as different from one another as walking is from plane flight. In particular, communication can be achieved by coding and decoding messages, and it can be achieved by providing evidence for an intended inference. The code model and the inferential model are each adequate to a different mode of communication; hence upgrading either to the status of a general theory of communication is a mistake. Both coded communication and inferential communication are subject to general constraints which apply to all forms of information processing, but these are too general to constitute a theory of communication either.

Some modes of locomotion involve the interaction of quite different mechanisms: bicycle riding, for instance, involves both physiology and engineering. Similarly, verbal communication involves both code and inferential mechanisms. In trying to construct an adequate description of these two types of mechanism and their interaction, it is important to realise that they are intrinsically independent of one another, and that communication in general is independent of either.

In sections 1 to 3 of this chapter and in sections 4 to 7, the inferential theory. In discussing the views of code and inferential theorists, our aim is to contrast two extreme approaches so as to map out the full range of available choices; it is not to do justice to those who have defended subtly qualified, or cautiously vague, versions of either. In sections 8 to 12 of this chapter and in chapters 2 and 3, we will propose what we hope is an improved inferential model. However, we do not regard this model as the basis for a general theory of communication. In chapter 4, we will show instead how it can be combined with a code model to provide an explanatory account of verbal communication.

1 The code model and the semiotic approach to communication

A code, as we will use the term, is a system which pairs messages with signals, enabling two information-processing devices (organisms or
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A message is a representation internal to the communicating devices. A signal is a modification of the external environment which can be produced by one device and recognised by the other. A simple code, such as the Morse code, may consist of a straightforward list of message-signal pairs. A more complex code, such as English, may consist of a system of symbols and rules generating such pairs.

A widely quoted diagram of Shannon and Weaver (1949), slightly adapted in figure 1, shows how communication can be achieved by use of a code:

![Communication Diagram](image)

**Figure 1**

This diagram shows how a message originating in an information source can be duplicated at a destination as the result of a communication process. For instance, the source and the destination could be telecommunications employees, the encoder and the decoder telegraph machines, the channel an electric wire, the message a text, i.e. a series of letters, and the signal a series of electrical impulses. The message is typed by the source on the encoder's keyboard. The encoder contains a code which associates each letter to a distinctive pattern of electrical impulses. The encoder sends these impulses through the channel to the decoder. The decoder contains a duplicate of the encoder's code, and uses it to deliver to the destination the series of letters and signs associated by the code to the electrical impulses it has received.

Communication is achieved by encoding a message, which cannot travel, into a signal, which can, and by decoding this signal at the receiving end. Noise along the channel (electrical disturbances in our example) can destroy or distort the signal. Otherwise, as long as the devices are in order and the codes are identical at both ends, successful communication is guaranteed.

In this example, the communicating devices are neither the telecommunications employees nor the telegraph machines but the man-machine pairs

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on both sides. This apparent complication is, in fact, illuminating. It shows what the relevant internal structure of any device capable of coded communication would have to be. Consider the case of honey bees. Von Frisch (1967) has shown that bees can encode into flight patterns (their 'dance') what they have learnt about the location of nectar, so that other bees can decode the information and find the nectar in their turn. To account for this communicative ability, bees must be seen as containing two information-processing sub-devices: a memory (which constitutes the 'source' on the one side and the 'destination' on the other) in which plans for flying towards a supply of nectar can be stored, and an encoder-decoder device which pairs messages consisting of flight plans with signals consisting of dances.

It may seem that a similar model could be proposed for human verbal communication, as shown in figure 2:

![Language Diagram](image)

**Figure 2**

Here the source and the destination are central thought processes, the encoder and the decoder are linguistic abilities, the message is a thought, and the channel is air which carries an acoustic signal. There are two assumptions underlying this proposal: the first is that human languages, such as Swahili or English, are codes; the second is that these codes associate thoughts to sounds.

While Shannon and Weaver's diagram is inspired by telecommunications technology, the basic idea is quite old, and was originally proposed as an account of verbal communication. To give just two examples: Aristotle claimed that 'spoken sounds are symbols of affections in the soul', which are themselves 'likenesses of actual things' (Aristotle, De Interpretatione: 43). In our terms, he claimed that utterances encode assumptions. Arnauld and Lancelot in their famous Grammaire de Port-Royal describe language as
the marvellous invention of composing out of 25 or 30 sounds that infinite variety of words, which tho' they have no natural resemblance to the operations of the mind, are yet the means of unfolding all its secrets, and of disclosing unto those, who cannot see into our hearts, the variety of our thoughts, and our sentiments upon all manner of subjects.

Words therefore may be defined, distinct and articulate sounds, made use of by men as signs, to express their thoughts. (Arnauld and Lancelot, Grammaire de Port-Royal: 22)

The view of linguistic communication as achieved by encoding thoughts in sounds is so entrenched in Western culture that it has become hard to see it as a hypothesis rather than a fact. Yet the code model of verbal communication is only a hypothesis, with well-known merits and rather less well-known defects. Its main merit is that it is explanatory: utterances do succeed in communicating thoughts, and the hypothesis that they encode thoughts might explain how this is done. Its main defect, as we will shortly argue, is that it is descriptively inadequate: comprehension involves more than the decoding of a linguistic signal.

The semiotic approach to communication (as Peirce called it and we will call it ourselves), or the semiological approach (as Saussure and his followers called it), is a generalisation of the code model of verbal communication to all forms of communication. Todorov (1977) dates it back to Augustine, who approached the study of grammar, logic, rhetoric and hermeneutics within the unifying framework of a theory of signs. Systems of signs were seen as governing not just the ordinary verbal communication of thoughts, but also the poetic effects of tropes, communication by gestures, religious symbols and rites, and the interpretation of sacred texts.

From a semiotic point of view, the existence of an underlying code is the only possible explanation of how communication is achieved. Here is how the psychologist Vygotsky formulated this 'axiom':

That understanding between minds is impossible without some mediating expression is an axiom for scientific psychology. In the absence of a system of signs, linguistic or other, only the most primitive and limited type of communication is possible. Communication by means of expressive movements, observed mainly among animals, is not so much communication as spread of affect. Rational, intentional conveying of experience and thought to others requires a mediating system, the prototype of which is human speech. (Vygotsky 1962: 6)

Whenever communication is observed, an underlying system of signs is postulated, and the task of the semiotician is seen as that of reconstructing it. Saussure's formulation of the programme is well known:

Language is a system of signs that express ideas, and is therefore comparable to a system of writing, the alphabet of deaf-mutes, symbolic rites, polite formulas, military signals, etc. But it is the most important of all these systems.

A science that studies the life of signs within society is conceivable . . .
I shall call it semiology. (Saussure 1974: 16)

The semiotic programme has been enthusiastically adopted by a number of linguists, literary theorists, psychologists, sociologists and anthropologists. Here is an anthropologist's endorsement:

I shall assume that all the various non-verbal dimensions of culture, such as style in clothing, village lay-out, architecture, furniture, food, cooking, music, physical gestures, postural attitudes and so on are organised in patterned sets so as to incorporate coded information in a manner analogous to the sounds and words and sentences of a natural language. I assume therefore it is just as meaningful to talk about the grammatical rules which govern the wearing of clothes as it is to talk about the grammatical rules which govern speech utterances. (Leach 1976: 10)

The recent history of semiotics has been one of simultaneous institutional success and intellectual bankruptcy. On the one hand, there are now departments, institutes, associations, congresses and journals of semiotics. On the other, semiotics has failed to live up to its promises; indeed, its foundations have been severely undermined. This is not to deny that many semioticians have done invaluable empirical work. However, it does not follow that the semiotic framework has been productive, let alone theoretically sound; merely that it has not been entirely sterilising, or that it has not been strictly adhered to in practice.

Saussure expected that 'the laws discovered by semiology will be applicable to linguistics, and the latter will circumscribe a well-defined area within the mass of anthropological facts' (1974: 16). What actually happened was that for the few decades in which structuralist linguistics flourished, the semiotic program was taken seriously and spelled out in more detail. Linguists such as Hjelmslev (1928, 1959) and Kenneth Pike (1967) developed ambitious terminological schemes as tools for carrying it out. However, no semiotic law of any significance was ever discovered, let
alone applied to linguistics. After the publication in 1957 of Noam Chomsky's *Syntactic Structures*, linguistics took a new turn and did undergo remarkable developments, but these owed nothing to semiotics. As the structure of language became better understood, its *sui generis* nature became more and more striking. The assumption that all systems of signs should have similar structural properties became more and more untenable. Without this assumption, however, the semiotic programme makes little sense.

Saussure made a further prediction:

By studying rites, customs, etc. as signs, I believe that we shall throw new light on the facts and point up the need for including them in a science of semiology and explaining them by its laws. (1974: 17)

Here again, valiant attempts were made by anthropologists such as Lévi-Strauss or literary theorists such as Barthes to approach cultural or artistic symbolism in semiotic terms. In the course of these attempts, they certainly shed new light on the phenomena, and drew attention to many interesting regularities; but they never came near to discovering an underlying code in the strict sense: that is, a system of signal-message pairs which would explain how myths and literary works succeed in communicating more than their linguistic meaning, and how rites and customs succeed in communicating at all.

This failure is instructive. What a better understanding of myth, literature, ritual, etc., has shown is that these cultural phenomena do not, in general, serve to convey precise and predictable messages. They focus the attention of the audience in certain directions; they help to impose some structure on experience. To that extent, some similarity of representations between the artists or performers and the audience, and hence some degree of communication, is achieved. However, this is a long way from the identity of representations which coded communication is designed to guarantee. It is not clear how the type of communication involved in these cases could be explained in terms of the code model at all.

A semiotician might reply as follows. Granted that the best models we have of human languages are generative grammars: since a generative grammar is a code which pairs phonetic and semantic representations of sentences, it follows that the code model is applicable to verbal communication. Other forms of communication, say those involving Morse signals or traffic lights, are also adequately described in terms of the code model. As for rites, customs and the arts, although the semiotic approach is unable to deal with them yet, there is no well-developed alternative approach either. Hence, the code model is still the only available explanation of how communication is possible at all.

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*We* will try to show that this line of argument is invalid. It is true that a language is a code which pairs phonetic and semantic representations of sentences. However, there is a gap between the semantic representations of sentences and the thoughts actually communicated by utterances. This gap is filled not by more coding, but by inference. Moreover, there is an alternative to the code model of communication. Communication has been described as a process of inferential recognition of the communicator's intentions. We will try to show how this description can be improved and made explanatory.²

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**Decoding and inference in verbal comprehension**

As already mentioned, a generative grammar is a code which pairs phonetic and semantic representations of sentences. Since an utterance can generally be perceived as a realisation of the phonetic representation of a single sentence (or in the case of phonetic ambiguity, two sentences), it is reasonable to regard the phonetic representations of sentences as corresponding closely to the actual sounds of speech. By contrast, since most sentences can be used to convey an infinite number of different thoughts, the semantic representations of sentences cannot be regarded as corresponding very closely to thoughts. In constructing a general picture of verbal communication, it is thus a legitimate idealisation (though phoneticians might not agree) to ignore the differences between phonetic representations of sentences and acoustic realisations of utterances. However, it is not legitimate to ignore the differences between the semantic representations of sentences and the thoughts that utterances are used to convey.

Crucial here is the difference between sentences and utterances. An utterance has a variety of properties, both linguistic and non-linguistic. It may contain the word 'shoe', or a reflexive pronoun, or a trisyllabic adjective; it may be spoken on top of a bus, by someone with a heavy cold, addressing a close friend. Generative grammars abstract out the purely linguistic properties of utterances and describe a common linguistic structure, the sentence, shared by a variety of utterances which differ only in their non-linguistic properties. By definition, the semantic representation of a sentence, as assigned to it by a generative grammar, can take no account of such non-linguistic properties as, for example, the time and place of utterance, the identity of the speaker, the speaker's intentions, and so on.

The semantic representation of a sentence deals with a sort of common core of meaning shared by every utterance of it. However, different utterances of the same sentence may differ in their interpretation; and indeed they usually do. The study of the semantic representation of
sentences belongs to grammar; the study of the interpretation of utterances belongs to what is now known as 'pragmatics'.

To illustrate, consider sentences (1)-(3):

(1) I'll come tomorrow.
(2) Bill is tall.
(3) Betsy's gift made her very happy.

A generative grammar cannot determine who 'I', 'Bill' and 'Betsy' refer to, and which day 'tomorrow' picks out. It can only provide some very general indications. It might state, for example, that 'I' always refers to the speaker, that 'Bill' and 'Betsy' refer to people or other entities with those names, and that 'tomorrow' picks out the day after the utterance. This is not enough to determine which thought is expressed when sentences such as (1)-(3) are uttered. For instance, if John says (1) on 25 March, it expresses the thought that John will come on 26 March; if Ann says (1) on 30 November, it expresses the thought that Ann will come on 1 December. The grammar can say nothing about how the hearer, using non-linguistic information, determines on a particular occasion what the time of utterance actually is, who the speaker is, which Bill or Betsy the speaker has in mind, etc., and hence which thought is actually being expressed. These aspects of interpretation involve an interaction between linguistic structure and non-linguistic information, only the former being dealt with by the grammar.

Other aspects of the interpretation of (1)-(3) left unspecified by the grammar are where the speaker of (1) is planning to come, by what criteria Bill is tall (since, for instance, a tall dwarf is not a tall person), and in what sense the ambiguous word 'gift' is to be taken. In every case, the grammar can only help determine the possibilities of interpretation. How the hearer sets about narrowing down and choosing among these possibilities is a separate question. It is one that grammarians, but not pragmatists, can ignore: an adequate theory of utterance interpretation must answer it.

Examples (1)-(3) show that as a result of referential indeterminacy such as that of 'Bill', semantic ambiguity such as that of 'gift', and semantic incompleteness such as that of 'tall', a single sentence, with a single semantic representation, can express an unbounded range of thoughts. There are still other factors widening the gap between sentence meaning and utterance interpretation.

The same sentence, used to express the same thought, may sometimes be used to present this thought as true, sometimes to suggest that it is not, sometimes to wonder whether it is true, sometimes to ask the hearer to make it true, and so on. Utterances are used not only to convey thoughts but to reveal the speaker's attitude to, or relation to, the thought expressed; in other words, they express 'propositional attitudes', perform 'speech-acts', or carry 'illocutionary force'.

To illustrate, consider sentences (4) and (5):

(4) You're leaving.
(5) What an honest fellow Joe is.

It makes a difference to the interpretation of (4) whether the speaker is informing the hearer of a decision that he is to leave, making a guess and asking him to confirm or deny it, or expressing outrage at the fact that he is leaving. It makes a difference to the interpretation of (5) whether the speaker is being sincere or ironical, making a literal claim or speaking figuratively. Often, the linguistic structure of the utterance suggests a particular attitude, as, for example, interrogative form most naturally suggests that the utterance is a request for information. However, as examples (4)-(5) show, the hearer is generally left a certain latitude, which he must make up on the basis of non-linguistic information.

Moreover, an utterance which explicitly expresses one thought may implicitly convey others. Whereas a thought that is explicitly expressed must be in some kind of correspondence to the semantic representation of the sentence uttered, those that are implicitly conveyed are under no such constraint. Consider utterances (6) and (7):

(6) Do you know what time it is?
(7) Coffee would keep me awake.

The speaker of (6), while explicitly asking whether the hearer knows the time, might be implicitly suggesting that it is time to go. The speaker of (7), while making an explicit assertion about the effect of coffee, might be implicitly refusing or forestalling an offer of coffee (or in other circumstances, implicitly soliciting or accepting such an offer).

Examples (1)-(7) show a variety of ways in which the semantic representation of the sentence uttered may fall short of being a complete interpretation of an utterance in context. As we have seen, code theorists must show which code it is that makes verbal communication possible. On closer examination, the claim that human languages, as described by grammars which pair phonetic and semantic representations of sentences, are codes of the required type is not borne out. This is not the end of the code model of verbal communication, however. One might still assume that the code involved is more complex than a grammar: rather than being a grammar, it might merely contain a grammar as a sub-part.

To justify the code model of verbal communication, it would have to be shown that the interpretation of utterances in context can be accounted for by adding an extra pragmatic level of decoding to the linguistic level
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provided by the grammar. Much recent work in pragmatics has assumed, largely without question, that this can be done. Pragmatics has been treated, on the analogy of phonology, syntax and semantics, as a code-like mental device, underlying a distinct level of linguistic ability. It is widely accepted that there are rules of pragmatic interpretation much as there are rules of semantic interpretation, and that these rules form a system which is a supplement to a grammar as traditionally understood.

There are certainly pragmatic phenomena which lend themselves to this sort of approach. For example, a pragmatic device might contain rules of interpretation such as (8) and (9):

(8) Substitute for ‘I’ a reference to the speaker.
(9) Substitute for ‘tomorrow’ a reference to the day after the utterance.

Imagine a hearer equipped with such rules and able to recognise that the speaker of (1) is Ann and the date of utterance is 30 November. He could automatically interpret utterance (1) as conveying the thought in (10):

(10) Ann will come on 1 December.

However, most aspects of utterance interpretation cannot be handled so easily. Consider (11) and (12):

(11) He’s got egg on his tie.
(12) That’s interesting.

It presumably follows from the grammar of English that the referent of ‘he’ must be male and the referent of ‘that’ must be non-human. However, (11) and (12) are unlike (1) in that on virtually every occasion of utterance, there is more than one referent meeting these conditions. The assignment of actual referents in these cases must clearly involve something much more complicated than rules (8) and (9).

To substantiate the code model of verbal communication, it would have to be shown that every case of reference assignment can be dealt with by rules which automatically integrate properties of the context with semantic properties of the utterance. It would also have to be shown that disambiguation, the recovery of propositional attitudes, figurative interpretations and implicit import can be handled along similar lines. Nothing approaching such a demonstration has ever been given.

While still assuming that the code model provides the framework for a general theory of communication, and hence for a theory of verbal communication, most pragmatists have described comprehension as an inferential process. Inferential and decoding processes are quite different. An inferential process starts from a set of premises and results in a set of conclusions which follow logically from, or are at least warranted by, the premises. A decoding process starts from a signal and results in the recovery of a message which is associated to the signal by an underlying code. In general, conclusions are not associated to their premises by a code, and signals do not warrant the messages they convey.

To illustrate the difference between coding and inferential processes, consider (13)–(15):

(13) (a) Either Mary is early or Bob is late.
(b) Bob is never late.
(14) [mesri:123:hi]
(15) Mary is early.

That Mary is early, i.e. (15), can be either inferred from the premises in (13) or decoded from the phonetic signal in (14), but the converse is not true: (15) can be neither decoded from (13) nor inferred from (14). It cannot be decoded from (13) because there is no code identifying (13) as a signal and (15) as its associated message. It cannot be inferred from (14) because signals do not by themselves warrant the messages they encode (otherwise any absurdity could be transformed into a warranted assumption merely by uttering it).

The view that utterance interpretation is a largely inferential process squares well with ordinary experience. Consider (16)–(18), for instance:

(16) Jones has bought the Times.
(17) Jones has bought a copy of the Times.
(18) Jones has bought the press enterprise which publishes the Times.

Sentence (16) is ambiguous, and can be understood as conveying either (17) or (18). Ordinary hearers in ordinary circumstances have no trouble choosing one of these two meanings, usually without even realising that they have made a choice. When the ambiguity is pointed out and they are asked to explain how they know which interpretation is correct, they generally offer something that looks like a truncated logical argument: the speaker must have intended this interpretation rather than that, because this is the only interpretation that is true; or the only one that gives the required information; or the only one that makes sense.

For instance, hearers asked why they understood ‘Jones has bought the Times’ to mean ‘Jones has bought a copy of the Times’ rather than ‘Jones has bought the press enterprise which publishes the Times’ might answer: ‘because the other interpretation could not be true’, or ‘because the question was whether I should buy a copy of the Times myself’. The assumption behind these truncated arguments is that speakers set themselves certain standards, of truthfulness, informativeness, comprehensibility, and so on, and only try to communicate information that meets the standards set. As long as speakers systematically observe the
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standards, and hearers systematically expect them to, a whole range of linguistically possible interpretations for any given utterance can be inferentially dismissed, and the task of communication and comprehension becomes accordingly easier. The same types of truncated argument, based on implicit standards, are invoked by hearers to justify their interpretation of referential expressions, illocutionary force, figures of speech and implicit import.

Modern pragmatists, inspired by the work of Grice, have tried to describe these implicit standards of verbal communication more explicitly and show how they are used in comprehension. The mental processes involved have not been described in any detail, but everybody agrees that they are inferential. As we have said, inferential processes are quite different from decoding processes. Does it follow that pragmatists who hold to the code model, and yet describe comprehension in inferential terms, are being inconsistent? Not necessarily: an inferential process can be used as part of a decoding process.

Let us use an artificial example to show how inference can double as decoding. Imagine two partners who know (when nobody else around them knows) that (19) is true, who want to let one another know whether (20) is true, and who do not want bystanders to benefit from the information:

(19) Bob is in Miami.
(20) The speaker will leave the party.
They can use the standard inference rule (21) as a decoding rule, treat utterances (22) and (23) as signals, and thus convey by use of these signals messages (24) and (25) respectively:

(21) Premises: If P then Q
    \[ P \]
    Conclusion: Q
(22) If Bob is in Miami, I'll leave the party.
(23) If Bob is in Miami, I won't leave the party.
(24) The speaker will leave the party.
(25) The speaker will not leave the party.

In this example, we have an inferential process simultaneously functioning as a decoding process. However, for this to be possible several conditions have to be fulfilled: first, speaker and hearer must share the tacit premise (19); second, they must share the inference rule (21); and third, they must use that premise and that rule to the exclusion of any other tacit premise or inference rule at their disposal. Otherwise, the signal will not be properly decoded.

Do speakers and hearers in ordinary verbal communication generally achieve a similar parallelism of premises and inference rules? If not, the inferential processes involved in verbal comprehension cannot qualify as decoding processes. To defend the code model of verbal communication, it must be shown, then, how speaker and hearer can come to have not only a common language, but also common sets of premises, to which they apply identical inference rules in parallel ways.

For language, the demonstration is fairly straightforward. The evidence suggests that speakers with quite different linguistic histories may end up with very similar grammars. Any number of different examples will do to illustrate a particular aspect of linguistic structure – say, the relative clause – so that it does not much matter which utterances of the language the child actually hears. It is also clear that after a certain point, the structure of the language has essentially been mastered, so that as new utterances are encountered, the grammar of an adult speaker will hardly change at all. The requirement of a common language thus presents no real difficulty for the code model.

Although the question of inference rules has not been dealt with in the pragmatic literature, it is arguable that the development of inferential abilities is similar in relevant respects to that of linguistic abilities. That is, any application of an inference rule will give grounds for its adoption. Thus different experiences with inferential processes may nevertheless converge on the same logical system. A more serious problem is that logical systems, as described by logicians, allow infinitely many different conclusions to be derived from the same premises. How, then, is the hearer to infer just those conclusions intended by the speaker? A solution to this problem will be proposed in the next chapters.

However, as we will show in the next section, the claim that speaker and hearer can and do restrict themselves to a set of common premises is much harder to maintain.

3 The mutual-knowledge hypothesis

The set of premises used in interpreting an utterance (apart from the premise that the utterance in question has been produced) constitutes what is generally known as the context. A context is a psychological construct, a subset of the hearer’s assumptions about the world. It is these assumptions, of course, rather than the actual state of the world, that affect the interpretation of an utterance. A context in this sense is not limited to information about the immediate physical environment or the immediately preceding utterances: expectations about the future, scientific hypoth-
I cognitive abilities in developing their representation of the world, and all interpretations, beliefs about the mental state of the speaker, may all play members of the same cultural group individuals tend to be highly idiosyncratic. Differences in life history same inferential abilities, the same is not true of their assumptions about these or religious beliefs, anecdotal memories, general cultural assumptions. While grammars neutralise the differences between dissimilar experiences, cognition and memory superimpose differences even on common experiences. Grammars and inferential abilities stabilise after a learning period and remain unchanged from one utterance or inference to the next. By contrast, each new experience adds to the range of potential contexts. It does so crucially in utterance interpretation, since the context used in interpreting a given utterance generally contains information derived from immediately preceding utterances. Each new utterance, while drawing on the same grammar and the same inferential abilities as previous utterances, requires a rather different context. A central problem for pragmatic theory is to describe how, for any given utterance, the hearer finds a context which enables him to understand it adequately. A speaker who intends an utterance to be interpreted in a particular way must also expect the hearer to be able to supply a context which allows that interpretation to be recovered. A mismatch between the context envisaged by the speaker and the one actually used by the hearer may result in a misunderstanding. Suppose, for example, that the speaker of (7) wants to stay awake, and therefore wants to accept his host's offer of coffee, whereas the host assumes that the speaker does not want to stay awake, and thus interprets (7) as a refusal:

(7) Coffee would keep me awake.

Clearly, this difference between actual and envisaged contexts will lead to a misunderstanding. Of course such misunderstandings do occur. They are not attributable to noise in the acoustic channel. The question is whether they happen because the mechanisms of verbal communication are sometimes improperly applied, or because these mechanisms at best make successful communication probable, but do not guarantee it. We will pursue this second alternative. Most pragmatists opt for the first: they try to describe a failsafe mechanism which, when properly applied and not disrupted by noise, would guarantee successful communication.

The only way to make sure that misunderstandings such as the one described above could not arise would be to make sure that the context actually used by the hearer were always identical to the one envisaged by the speaker. How can this be done? Since any two people are sure to share at least a few assumptions about the world, they should use only these shared assumptions. However, this cannot be the whole answer, since it immediately raises a new question: how are the speaker and hearer to distinguish the assumptions they share from those they do not share? For that, they must make second-order assumptions about which first-order assumptions they share; but then they had better make sure that they share these second-order assumptions, and that calls for third-order assumptions. Some pragmatists stop here (e.g. Bach and Harnish 1979) and consider it of no practical importance that in principle, as noticed by others (Schiffr 1972; Clark and Marshall 1981), the same problem arises for third-order assumptions, calling for fourth-order assumptions, and so on indefinitely.

Consider a relevant example from the literature on reference assignment:

On Wednesday morning Ann and Bob read the early edition of the newspaper, and they discuss the fact that it says that A Day at the Races is showing that night at the Roxy. When the late edition arrives, Bob reads the movie section, notes that the film has been corrected to Monkey Business, and circles it with his red pen. Later, Ann picks up the late edition, notes the correction, and recognizes Bob's circle around it. She also realizes that Bob has no way of knowing that she has seen the late edition. Later that day Ann sees Bob and asks, 'Have you ever seen the movie showing at the Roxy tonight?' (Clark and Marshall 1981: 13)

The question is, which film should Bob take Ann to be referring to? As Clark and Marshall point out, although Ann and Bob both know that the film showing at the Roxy is Monkey Business, and Ann knows that Bob knows that it is, this degree of shared knowledge is not enough to guarantee successful communication. Bob might reason that although he knows that the film actually showing is Monkey Business, Ann might still think it is A Day at the Races, and be referring to that. Or he might decide that she must have seen the marked correction, have realised that he knows
the film is *Monkey Business*, and be referring to that. Or perhaps he might think that though she must have seen the correction, she will realise that he has no way of knowing that she has, so she will in fact be referring to *A Day at the Races*. Or maybe she has seen the correction and expects him to realise that she has seen it, but is not sure he will realise that she will realise that he will realise that she has seen it; and so on ad infinitum.

Clark and Marshall conclude that the only way to guarantee successful communication is for Ann not only to know what the film showing at the Roxy actually is, but to know that Bob knows what it is, and that Bob knows that she knows what it is, and that she knows that he knows what it is, and so on indefinitely. Similarly, Bob must not only know what the film showing at the Roxy actually is, but know that Ann knows what it is, and that she knows that he knows what it is, and that he knows that she knows what it is, and so on indefinitely. Knowledge of this infinitely regressive sort was first identified by Lewis (1969) as *common knowledge*, and by Schiffer (1972) as *mutual knowledge*. The argument is that if the hearer is to be sure of recovering the correct interpretation, the one intended by the speaker, every item of contextual information used in interpreting the utterance must be not only known by the speaker and hearer, but mutually known.

Within the framework of the code model, mutual knowledge is a necessity. If the only way to communicate a message is by encoding and decoding it, and if inference plays a role in verbal communication, then the context in which an utterance is understood must be strictly limited to mutual knowledge; otherwise inference cannot function as an effective aspect of decoding. But as virtually everyone who has touched on the topic has noticed, it is hard to see how the requirement of mutual knowledge could ever be built into a psychologically adequate account of utterance production and comprehension. Someone who adopts this hypothesis is thus inevitably forced to the conclusion that when human beings try to communicate with each other, they are aiming at something they can never, in fact, achieve.

If mutual knowledge is necessary for communication, the question that immediately arises is how its existence can be established. How exactly do the speaker and hearer distinguish between knowledge that they merely share, and knowledge that is genuinely mutual? To establish this distinction, they would have, in principle, to perform an infinite series of checks, which clearly cannot be done in the amount of time it takes to produce and understand an utterance. Hence, even if they try to restrict themselves to what is mutually known, there is no guarantee that they will succeed.

Many pragmatists have accepted this conclusion and argued that mutual knowledge is not a reality but 'an ideal people strive for because they ... want to avoid misunderstanding whenever possible' (Clark and Marshall 1981: 27). Now while it is true that people sometimes go to great lengths to avoid misunderstanding, such efforts are the exception and not the rule. In legal proceedings, for instance, there really is a serious attempt to establish mutual knowledge among all the parties concerned: all laws and precedents are made public, all legitimate evidence is recorded, and only legitimate evidence can be considered, so that there is indeed a restricted domain of mutual knowledge on which all parties may call, and within which they must remain. There is no evidence of any such concern in normal conversation, however serious or formal it is. All sorts of risks are taken, assumptions and guesses made. There is no indication that any particular striving after mutual knowledge goes on.

Enormous energy has been spent on trying to develop an empirically defensible approximation to the mutual knowledge requirement. It has been argued that in certain circumstances, speaker and hearer are justified in assuming that they have mutual knowledge, even though its existence cannot be conclusively established. For example, if two people can see each other looking at the same thing, they have grounds for assuming mutual knowledge of its presence. If some information has been verbally given in their joint presence, they are justified in assuming mutual knowledge of it. If some fact is known to all members of a community, two people who think they recognise each other as members of that community have grounds for assuming mutual knowledge of that fact. In none of these cases, though, can there be any certainty of mutual knowledge. People may look at the same object and yet identify it differently; they may impose different interpretations on information that they are jointly given; they may fail to recognise facts. In all these cases, the individual would be wrong in assuming mutual knowledge.

There is a paradox here. Since the assumption of mutual knowledge may always be mistaken, the mutual-knowledge hypothesis cannot deliver the guarantees it was set up to provide. If Bob may be mistaken in assuming that he and Ann have mutual knowledge of the fact that the film playing at the Roxy is *Monkey Business*, he cannot be sure of having correctly understood which film she is referring to. Bob's painstaking but inconclusive attempt at ascertaining mutual knowledge does not really protect him from the risk of misunderstanding. So why go to all that trouble?

There is yet another paradox in the idea that speaker and hearer might reasonably come to assume, but with something less than certainty, that they have mutual knowledge of some fact. By the very definition of mutual knowledge, people who share mutual knowledge know that they do. If you do not know that you have mutual knowledge (of some fact, with someone), then you do not have it. Mutual knowledge must be
certain, or else it does not exist; and since it can never be certain it can
never exist.

The apparent fallback position for the code theorist would be to replace
the requirement of mutual knowledge by that of mutual probabilistic
assumptions. This more realistic proposal raises an obvious problem. In
general, the higher the order of the assumptions involved in such a scheme,
the less likely they are to be true. Bob may know for a fact that Monkey
Business is the film playing tonight; in the absence of compelling evidence,
he should feel less certain that Ann assumes that he knows it, and even less
certain that she assumes that he assumes that he knows it, and so on. The assumption of mutuality itself, which is the highest ordered
one, will have the weakest probability. How, then, could restricting the
context to mutual assumptions ensure the identity or near-identity of
premises which the code model requires?

Another problem with the mutual-knowledge hypothesis is that even if
it defines a class of potential contexts for use in utterance interpretation, it
says nothing about how an actual context is selected, nor about the role of
context in comprehension. Take the following utterance:

(26) The door's open.

Speaker and hearer might have shared knowledge of hundreds of different
doors; the mutual-knowledge requirement does nothing to explain how
the choice of an actual referent is made.

Bach and Harnish (1979: 93) spend some time justifying their particular
version of the mutual-knowledge hypothesis, but add that their pragmatic
theory says little about 'the specific strategy the hearer uses to identify a
particular communicative intent. It gives no indication of how certain
mutual beliefs are activated or otherwise picked out as relevant, much less
how the correct identification is made.' But in that case, the adoption of
the mutual-knowledge hypothesis is just whistling in the dark. Until we
know something about how contexts are actually selected and used in
utterance interpretation, the belief that they must be restricted to mutual
knowledge has no justification apart from the fact that it follows from the
code model.10

Pragmatists have no positive argument that individuals engaging in
verbal communication can and do distinguish mutual from non-mutual
knowledge. Their only argument is a negative one: if mutual knowledge
does not exist in the form required by the code model of verbal
communication, then the code model is wrong. Since they see the code
model as the only possible explanation of communication, they cling to
the mutual-knowledge hypothesis.

Instead of adopting the code model, seeing that it commits us to the
mutual-knowledge hypothesis, and then having to worry about how this
hypothesis can be empirically justified, we want to approach things the
other way around. We see the mutual-knowledge hypothesis as unten-
able. We conclude, therefore, that the code theory must be wrong, and
that we had better worry about possible alternatives.

4 Grice's approach to 'meaning' and communication

In 1957, Paul Grice published an article, 'Meaning', which has been the
object of a great many controversies, interpretations and revisions.11 In
this article, Grice proposed the following analysis of what it is for an
individual S to mean something by an utterance x (where 'utterance' is to
be understood as referring not just to linguistic utterances but to any form
of communicative behaviour):

'S means something by x' is (roughly) equivalent to '[S] intended
the utterance of x to produce some effect in an audience by means of
the recognition of this intention'. (Grice 1957/1971: 58)

Strawson's reformulation of this analysis (Strawson 1964a/1971: 155; see
also Schiffer 1972: 11) separates out the three sub-intentions involved. To
mean something by x, S must intend

(27) (a) S's utterance of x to produce a certain response r in a certain
audience A;
(b) A to recognise S's intention (a);
(c) A's recognition of S's intention (a) to function as at least part of
A's reason for A's response r.

This analysis can be developed in two ways. Grice himself used it as the
point of departure for a theory of 'meaning', trying to go from the analysis
of 'speaker's meaning' towards such traditional semantic concerns as the
analysis of 'sentence meaning' and 'word meaning'. For reasons which
should become apparent, we doubt that very much can be achieved in this
direction. However, Grice's analysis can also be used as the point of
departure for an inferential model of communication, and this is how we
propose to take it. In the rest of this section we will show how this analysis
applies to the description of communication. In the next three sections we
will consider some of the objections and reformulations which have been
proposed. Finally, in the last five sections of this chapter, we will develop
our own model.

There are situations in which the mere fact that an intention is
recognised may lead to its fulfilment. Suppose that Mary intends to please
If Peter becomes aware of her intention to please him, this may in itself be enough to please him. Similarly, when the inmates of a prison recognise their warder’s intention to make them fear him, this may be enough in itself to make them fear him. There is one type of intention for which this possibility, rather than being exceptional, is regularly exploited: intentions to inform are quite generally fulfilled by being made recognisable: intentions to inform are quite generally fulfilled by being made recognisable.

Suppose that Mary intends to inform Peter of the fact that she has a sore throat. All she has to do is let him hear her hoarse voice, thus providing him with salient and conclusive evidence that she has a sore throat. Here, Mary’s intention can be fulfilled whether or not Peter is aware of it: he could realise that she has a sore throat without also realising that she intends him to realise that she has one. Suppose now that Mary intends, on 2 June, to inform Peter (truly or falsely) that she had a sore throat on the previous Christmas Eve. This time she is unlikely to be able to produce direct evidence of her past sore throat. What she can do, though, is give him direct evidence, not of her past sore throat, but of her present intention to inform him of it. How can she do this, and what good will it do? One way she can do it is by uttering (28), and the good it will do is to give Peter indirect, but nevertheless strong, evidence that she had a sore throat on the previous Christmas Eve:

(28) I had a sore throat on Christmas Eve.

In our first example, Mary’s hoarse voice is most likely to have been caused by her sore throat. The fact that she has spoken hoarsely is thus direct evidence for the assumption that she has a sore throat. Mary’s utterance of (28) on 2 June is not directly caused by her having had a sore throat on the previous Christmas Eve. Hence her utterance is not direct evidence for the assumption that she had a sore throat on the previous Christmas Eve. However, her utterance is directly caused by her present intentions. Although she might have had various intentions in uttering (28), it is most likely that she intended to inform Peter that she had a sore throat on the previous Christmas Eve. This makes Mary’s utterance direct evidence of her present intention to inform Peter of her past sore throat.

Suppose now that Peter assumes that Mary is sincere and is likely to know whether or not she had a sore throat on the previous Christmas Eve. Then for Peter, the fact that Mary intends to inform him that she had a sore throat on that date provides conclusive evidence that she had. In these quite ordinary conditions, Mary’s intention to inform Peter of her past sore throat can be fulfilled by making Peter recognise her intention. This is not an exceptional way of fulfilling an intention to inform an audience. Let us assume that it is precisely how Mary intends to have her intention fulfilled. Then she does have all three sub-intentions of the Grice–Strawson definition (27), as shown in (29):

(29) Mary intends

(a) her utterance (28) to produce in Peter the belief that she had a sore throat the previous Christmas Eve;

(b) Peter to recognize her intention (a);

(c) Peter’s recognition of her intention (a) to function as at least part of his reason for his belief.

Mary’s intentions in this example are quite similar in structure to those we all have when we communicate, verbally or otherwise.

We have shown two different ways of conveying information. One way is to provide direct evidence for the information to be conveyed. This should not be regarded as a form of communication: any state of affairs provides direct evidence for a variety of assumptions without necessarily communicating those assumptions in any interesting sense. Another way of conveying information is to provide direct evidence of one’s intention to convey it. The first method can only be used with information for which direct evidence can be provided. The second method can be used with any information at all, as long as direct evidence of the communicator’s intentions can be provided. This second method is clearly a form of communication; we will call it, for the time being, inferential communication (and, in section 10, ostensive–inferential communication): it is inferential in that the audience infers the communicator’s intention from evidence provided for this precise purpose.

The description of communication in terms of intentions and inferences is, in a way, commonsensical. We are all speakers and hearers. As speakers, we intend our hearers to recognise our intention to inform them of some state of affairs. As hearers, we try to recognise what it is that the speaker intends to inform us of. (Hearers are interested in the meaning of the sentence uttered only insofar as it provides evidence about what the speaker means.)

Communication is successful not when hearers recognise the linguistic meaning of the utterance, but when they infer the speaker’s ‘meaning’ from it. This is shown by the following easily verifiable observation: when hearers realise that the speaker has misused a word or made a slip of the tongue, they generally discount the wrong meaning. The meaning they discount, however, need not be ill-formed or undecodeable; it is ‘wrong’ only in that it provides misleading evidence about the speaker’s intentions.

From a psychological point of view, the description of communication in terms of intentions and inferences also makes good sense. The attribution of intentions to others is a characteristic feature of human
cognition and interaction. Humans typically conceptualise human and animal behaviour, not in terms of its physical features, but in terms of its underlying intentions. For instance, an ordinary-language concept such as *give, take, attack or defend* applies to various forms of behaviour which do not fall under any characteristic physical description, and have in common only the kind of intention which governs them. Human interaction is largely determined by the conceptualisation of behaviour in intentional rather than physical terms. The idea that communication exploits this ability of humans to attribute intentions to each other should be quite intelligible, and even appealing, to cognitive and social psychologists.

So it seems that we all know -- semioticians included -- that communication involves the publication and recognition of intentions. Yet until Grice, the significance of this truism was generally ignored.\(^{10}\) Attempts to describe and explain communication continued to be based on one form or another of the code model. Grice's original idea, as presented in his 1957 paper, can thus be seen as an attempt to rehabilitate a commonsense view of communication and spell it out in theoretically acceptable terms. However, the elaboration of this idea in the work of Grice himself, Strawson, Searle, Schiffer and others has often taken the form of a move away from common sense, away from psychological plausibility, and back to the code model. This unfortunate development resulted from the discovery of part spurious, part genuine problems with Grice's original formulation.

5 Should the code model and the inferential model be amalgamated?

We have now looked at two models of communication. According to the code model, communication is achieved by encoding and decoding messages. According to the inferential model, communication is achieved by the communicator providing evidence of her\(^{14}\) intentions and the audience inferring her intentions from the evidence. Several questions come to mind. Are these two different models of the same thing? If so, must we choose between them, or can they be amalgamated in some way? Or are they, as we have hinted, models of two quite different things? If so, how are these things related?

Most theorists see communication as a unitary phenomenon, to be described by a single model. The code model is very well entrenched in the Western scholarly tradition. The inferential model appeals to common sense. When an appealing new approach is put forward, the temptation is to treat it not as an alternative to the old approach but as an elaboration of it. This is what most pragmatists have done, almost unconsciously, with Grice's analysis. John Searle at least takes the trouble to justify this reaction.\(^{30}\) He claims that Grice's analysis fails to account for the extent to which meaning can be a matter of rules and conventions. This account of meaning does not show the connection between one's meaning something by what one says, and what that which one says actually means in the language. (Searle 1969: 43)

Searle wants to improve on Grice's account by showing the connection between speaker's meaning and linguistic meaning. His first step is to restrict the application of this account to the domain of 'literal meaning'. This he defines in terms of the speaker's intentions, including the intention to have her intentions recognised, but adds a rider: the speaker should intend the hearer to recognise her intentions 'in virtue of his knowledge of the rules for the sentence uttered' (Searle 1969: 48). In other words, the speaker should intend the hearer to understand her by *decoding* her utterance.

This reduces Grice's analysis to a commonsense amendment of the code model. The code model is reintroduced as the basic explanation of communication, but in the case of human communication, the message that is encoded and decoded is regarded as a communicator's intention. If Searle's revision is justified, then Grice's analysis is not a genuine alternative to the code model after all.

Grice's greatest originality was not to suggest that human communication involves the recognition of intentions. That much, as already pointed out, is common sense. It was to suggest that this characterisation is sufficient: as long as there is some way of recognising the communicator's intentions, then communication is possible. Recognition of intentions is an ordinary human cognitive endeavour. If Grice is right, the inferential abilities that humans ordinarily use in attributing intentions to each other should make communication possible even in the absence of a code. And of course it is possible.

For example, Peter asks Mary,

(30) *How are you feeling today?*

Mary responds by pulling a bottle of aspirin out of her bag and showing it to him. Her behaviour is not coded: there is no rule or convention which says that displaying a bottle of aspirin means that one is not feeling well. Similarly, her behaviour affords only the weakest kind of direct evidence about her feelings: maybe she always carries a bottle of aspirin in her bag.

On the other hand, it is strong direct evidence of her intention to inform...
Peter that she does not feel well. Because her behaviour enables Peter to recognise her intention, Mary successfully communicates with him, and does so without the use of any code.\textsuperscript{13}

Even Searle does not deny the existence of purely inferential communication. However, he insists that it is rare, and that most human communication crucially involves the use of a language or code:

\begin{quote}
Some very simple sorts of illocutionary acts can indeed be performed apart from any use of conventional devices at all, simply by getting the audience to recognize certain of one's intentions in behaving in a certain way. . . . One can in certain special circumstances 'request' someone to leave the room without employing any conventions, but unless one has a language one cannot request of someone that he, e.g., undertake a research project on the problem of diagnosing and treating mononucleosis in undergraduates in American universities. (Searle 1969: 38)
\end{quote}

It may be true that most human communication involves the use of language, that cases of communication clearly achieved without the use of a code are rare, and that the thoughts so communicated tend to be rather simple. But the very existence of such cases is incompatible with the code model. On the other hand, it is predicted by the inferential model. Searle's dismissal of these cases as unimportant misses the point. They may be unimportant as examples of human interaction, but they are important as evidence for or against theories.

Since purely inferential communication exists, the inferential model is adequate by itself to account for at least some forms of communication. On the other hand, there is no doubt that most cases of communication involve the use of a code. Someone who takes the strong view that all human communication must be accounted for in inferential terms is then faced with the task of redescribing coding and decoding in inferential terms. Here is how it might be done. Regard a code as a set of conventions (in the sense of Lewis 1969) shared by all participants in the communication process. Members of the audience use their knowledge of these conventions on the one hand, and their knowledge of the signal and of the context on the other, to infer the message. This is a reasonably good description of what often happens when artificial codes are devised and used.

For example, Romeo and Juliet agree between them that a white kerchief tied to the rail of her balcony means that he can come up. Romeo sees the white kerchief, uses as a premise his knowledge of the convention they have devised, i.e. his knowledge that a white kerchief means that he can come up, and indeed \textit{infers} that he can come up. When this account is also taken into account, it is seen that Searle's formulation of the alternative picture is not so simple.

\begin{quote}
The code and inferential models
\end{quote}

\begin{quote}
We believe, and will argue in a later chapter, that the strong inferential theory of communication is empirically inadequate. There are coding-decoding processes, and there are inferential processes, and the two types of process are essentially distinct (even though, under rather artificial conditions, inference can mimic decoding, or decoding can mimic inference). A variety of species, from bees to humans, have codes which are to a greater or lesser extent genetically determined. These differ from inferential systems in two main respects: first, the representations they relate need not be conceptual, and second, the rules relating these representations need not be inferential. Human natural languages are cases in point. If we are right, then linguistic knowledge does not contribute to the comprehension process in the way described above: by providing premises for inference.

We maintain, then, that there are at least two different modes of communication: the coding-decoding mode and the inferential mode. If we are right, from the fact that a particular communication process involves the use of a code, it does not follow that the whole process must be accounted for in terms of the code model. Complex forms of communication can combine both modes. Inferential communication, for example, might involve the use of coded signals which fall short of encoding the communicator's intentions and merely provide incomplete evidence about them. It becomes an empirical question whether the code model can provide a full account of a given communication process. It is not enough to show that a code is being used; one must also be able to show that what is communicated is actually being encoded and decoded. Otherwise, all that can be reasonably maintained is that the use of a code plays some role in this particular communication process, without perhaps wholly explaining it.

Verbal communication is a complex form of communication. Linguistic coding and decoding is involved, but the linguistic meaning of an uttered sentence falls short of encoding what the speaker means: it merely helps the audience infer what she means. The output of decoding is correctly treated by the audience as a piece of evidence about the communicator's intentions. In other words, a coding-decoding process is subservient to a Gricean inferential process.

Searle saw the fact that almost all human communication involves the use of codes as an objection to Grice's analysis. However, this fact is easy to explain on the assumption that the code and inferential modes of communication can combine. People who are in a position to communicate with one another usually share a language (and various minor codes);
as a result, they can produce much subtler and stronger evidence about their intentions than they could in the absence of a shared code. They are unlikely, then, to go to the trouble of communicating inferentially without these powerful tools, just as modern humans are unlikely to go to the trouble of making fire without matches or lighters. Still, just as no one would want to define fire as necessarily produced by the use of matches or achieved by the use of codes, it would be unreasonable to define communication as necessarily achieved by the use of codes.

The reduction of Grice's analysis to an amendment of the code model destroys not just its originality, but also many of its empirical implications and justifications. The elevation of the inferential model into a general theory of communication ignores the diversity of forms of communication, and the psychological evidence that much decoding is non-inferential (to be discussed in chapter 4).

6 Problems of definition

Most discussions of Grice's 1957 article have had to do with the definition of 'meaning' or 'communication' and have been highly philosophical. In this section, we will single out two genuinely empirical issues for discussion. Our aim is simply to highlight these relevant issues, not to write a history or an evaluation of the surrounding debates.

Grice characterises 'meaning' in terms of a communicator's intentions. Conversely, an act of communication (in an appropriately restricted sense of the term) might be characterised as one that fulfils these Gricean intentions. However, as Searle (1969: 46-8; 1971: 8-9) points out, a communicator can mean something, and successfully communicate it, without all these Gricean intentions being fulfilled. Recall Strawson's reformulation (27) of Grice's analysis. To mean something by an utterance x, an individual S must intend

(27) (a) S's utterance of x to produce a certain response r in a certain audience A;
(b) A to recognise S's intention (a);
(c) A's recognition of S's intention (a) to function as at least part of A's reason for A's response r.

Now it is easy to see that once intention (b) is fulfilled, the communicator has succeeded in communicating what she meant, whether or not intentions (a) and (c) are also fulfilled. For example, when Mary utters (28), her specific intention (29a) is to produce in Peter the belief that she had a sore throat on the previous Christmas Eve. Suppose Peter recognises this intention, but does not believe Mary. Then only her intention (29b) is fulfilled; intentions (29a) and (29c) are not. Nonetheless, although Mary has failed to convince Peter, she has succeeded in communicating to him what she meant.

Since communication can succeed without intention (27a) being fulfilled, intention (27a) is not an intention to communicate at all. It is better described as an intention to inform, or as we will call it, an informative intention. The true communicative intention is intention (27b); that is, the intention to have one's informative intention recognised.

What about intention (27c): that the recognition by the audience of the communicator's intention (27a) shall function as at least part of the audience's reason for fulfilling intention (27a)? By definition, intention (27c) cannot be fulfilled when the informative intention (27a) is not. Since the fulfilment of (27a) is not necessary for successful communication, the fulfillment of (27c) cannot be necessary either. What Grice has convincingly shown is that the recognition of an informative intention can lead to its fulfilment. Very often, it is because this possibility exists that the communicator engages in communication at all. However to turn this possibility into a definitional necessity requires some justification. For the time being, we will drop intention (27c) from the characterisation of inferential communication without further discussion, and re-examine Grice's motivations on this point in section 10.

We are now almost ready to propose a modified version of Grice's analysis, highlighting the difference between the informative and communicative intentions. However, we must first get rid of a confusing terminological idiosyncrasy. Grice and Strawson use the term 'utterance' to refer not just to linguistic utterances, or even to coded utterances, but to any modification of the physical environment designed by a communicator to be perceived by an audience and used as evidence of the communicator's intentions. This usage seems to us to introduce a bias into the identification of communicative behaviour. It encourages the view that utterances in the usual linguistic sense can be taken as the paradigm of communicative behaviour in general. Psychologists use the term 'stimulus' for any modification of the physical environment designed to be perceived. We will do the same. An utterance in the usual sense is, of course, a special case of a stimulus. Let us say, then, that communication involves producing a certain stimulus intending thereby

(31) Informative intention: to inform the audience of something;
Communicative intention: to inform the audience of one's informative intention.

Note that the communicative intention is itself a second-order informative intention: the communicative intention is fulfilled once the first-order informative intention is recognised. In ordinary situations, if all goes well,
the recognition of the informative intention will itself lead to the fulfilment of that intention, so that as a result of an act of communication, both the communicative and the informative intention will be fulfilled. However, a communicative intention can be fulfilled without the corresponding informative intention being fulfilled. Hence our reformulation is not open to the objections to Grice's and Strawson's reformulation.

While Grice's conditions on communication are too restrictive in some respects, in others they are not restrictive enough. One tends to think of communication as something done overtly: either your behaviour makes it clear that you are communicating, or else you are not truly communicating at all. In other words, communication should be distinguished from covert forms of information transmission.

Suppose, for instance, that Mary wants Peter to mend her broken hair-drier, but does not want to ask him openly. What she does is begin to take her hair-drier to pieces and leave the pieces lying around as if she were in the process of mending it. She does not expect Peter to be taken in by this staging; in fact, if he really believed that she was in the process of mending her hair-drier herself, he would probably not interfere. She does expect him to be clever enough to work out that this is a staging intended to inform him of the fact that she needs some help with her hair-drier. However, she does not expect him to be clever enough to work out that she expected him to reason along just these lines. Since she is not really asking, if Peter fails to help, it will not really count as a refusal either.

This example fits both Grice's original analysis of speaker's meaning and the reformulations in (27) and (31). Mary does intend Peter to be informed of her need by recognising her intention to inform him of it. Yet there is an intuitive reluctance to say that Mary meant that she wanted Peter's help, or that she was communicating with Peter in the sense we are trying to characterise. This reluctance, which we believe is well-founded, has to do with the fact that Mary's second-order intention to have her first-order informative intention recognised is hidden from Peter.

To deal with such counterexamples, Strawson (1964a), who first drew attention to the problem, argued that the Gricean analysis must be enriched: true communication must be characterised as wholly overt. The question then is how to modify the analysis of inferential communication to include this requirement of overtness; in other words, how should the intuitive and rather vague notion of overtness be made more precise? Answers to this question have been highly technical.

Strawson's own solution was to add to the analysis of speaker's meaning a third-order intention to have the second-order intention recognised by the audience; a meta-communicative intention, so to speak, was added to the informative and communicative intentions. As Strawson envisaged, and as Schiffer (1972: chapter 2) showed, this is not enough: examples can be constructed where the third-order meta-communicative intention is present but hidden from the audience, and the resulting interaction lacks the required overtness. Adding a fourth-order meta-meta-communicative intention that the third-order meta-communicative intention should itself be recognised by the audience may not be enough either: in principle, for any nth-order intention of this type, you need an n+1th-order intention to the effect that the nth-order intention be recognised. In other words you need an infinity of such intentions to explicate the intuitive notion of overtness along those lines.

There are ways of making logical sense of an infinity of intentions, and of analysing speaker's meaning or communication in terms of such an infinity. But the results have little psychological plausibility. From the psychological point of view, intentions are mental representations capable of being realised in the form of actions. No psychologist would want to analyse an utterance as the realisation of an infinity of intentions so understood.

The intuitive idea that communicative intentions must be overt can be worked out in another way, using the notion of mutual knowledge. This solution, proposed by Schiffer (1972), essentially involves the assumption that a true communicative intention is not just an intention to inform the audience of the communicator's informative intention, but an intention to make the informative intention mutually known to the communicator and the audience. By this criterion, the counterexample of Mary trying to get Peter to repair her hair-drier without openly asking him is not a case of true communication. Although Mary wants Peter to recognise her informative intention, she does not want this informative intention to become mutually known to both of them. More complex examples built on the same pattern would similarly be ruled out by this mutual-knowledge requirement.

We have already argued (in section 3) that the appeal to 'mutual knowledge' lacks psychological plausibility. Hence to rely on it in explicating the notion of overtness is to turn one's back on psychology once more. Thus, all the solutions to the overtness problem proposed so far replace vagueness by one inadequate formalism or another. What we believe is a satisfactory solution will be proposed in section 8 and developed in section 12. In the meantime, we turn to further problems with Grice's analysis, problems this time not of definition but of explanation.

7 Problems of explanation: Grice's theory of conversation

The Gricean analysis of communication has been discussed almost exclusively by philosophers, whose main concern has been to define the
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terms 'meaning' or 'communication'. From our current, more psychological point of view, defining communication is not a primary concern. For one thing, communication does not necessarily involve a distinct and homogeneous set of empirical phenomena. Our aim is to identify underlying mechanisms, rooted in human psychology, which explain how humans communicate with one another. A psychologically well-founded definition and typology of communication, if possible at all, should follow from a theoretical account of these underlying mechanisms. We see Grice's analysis as a possible basis for such a theoretical account. From this perspective, the main defect of Grice's analysis is that it defines communication too vaguely, but that it explains communication too poorly.

The code model has the merit of explaining how communication could in principle be achieved. It fails not on the explanatory but on the descriptive side: humans do not communicate by encoding and decoding thoughts. The inferential model, despite the technical problems discussed in the last section, provides a description of human communication which rings true. By itself, however, it explains very little. The temptation to return to the code model will remain powerful as long as the inferential model is not developed into a plausible explanatory account of communication. However, the basis for such an account is suggested by another work of Grice's, his *William James Lectures*, in which he puts forward the view that communication is governed by a 'co-operative principle' and 'maxims of conversation'.

According to the inferential model, communication is achieved by the audience recognizing the communicator's informative intention. However, it is not enough to point out, as we have done, that recognizing intentions is a normal feature of human cognition. The recognition of informative intentions presents problems which the recognition of other human intentions does not.

How does one recognize another individual's intentions? One observes his behaviour; using one's knowledge of people in general and of the individual in particular, one infers which of the effects of this behaviour he could have both predicted and desired; one then assumes that these predictable and desirable effects were also intended. In other words, one infers the intention behind the behaviour from its independently observed or inferred effects. This pattern of inference is generally not available to an audience trying to recognize a communicator's informative intention. As we have seen, the informative effects of communication are normally achieved, if at all, via recognition of the informative intention. Hence, it seems, the audience cannot first observe or infer these effects, and then use them to infer the informative intention.

However, the problem is not that it is hard to come up with hypotheses about what the communicator might have intended to convey: it is that too many hypotheses are possible. Even a linguistic utterance is generally full of semantic ambiguities and referential ambivalences, and is open to a wide range of figurative interpretations. For non-coded behaviour there is, by definition, no predetermined range of information it might be used to communicate. The problem, then, is to choose the right hypothesis from an indefinite range of possible hypotheses. How can this be done? First, it is easy enough to infer that a certain piece of behaviour is communicative. Communicative behaviour has at least one characteristic effect which is achieved before the communicator's informative intention is recognized: it overtly claims the audience's attention.

Grice's fundamental idea in his *William James Lectures* is that once a certain piece of behaviour is identified as communicative, it is reasonable to assume that the communicator is trying to meet certain general standards. From knowledge of these general standards, observation of the communicator's behaviour, and the context, it should be possible to infer the communicator's specific informative intention. Grice, talking only of verbal communication, argues,

Our talk exchanges ... are characteristically, to some degree at least, cooperative efforts; and each participant recognizes in them, to some extent, a common purpose or set of purposes, or at least a mutually accepted direction. ... at each stage, some possible conversational moves would be excluded as conversationally unsuitable. We might then formulate a rough general principle which participants will be expected (ceteris paribus) to observe, namely: Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged. (Grice 1975: 45)

This Grice calls the co-operative principle. He then develops it into nine maxims classified into four categories:

**Maxims of quantity**
1. Make your contribution as informative as is required (for the current purposes of the exchange).
2. Do not make your contribution more informative than is required.

**Maxims of quality**
Supermaxim: Try to make your contribution one that is true.
1. Do not say what you believe to be false.
2. Do not say that for which you lack adequate evidence.

**Maxim of relation**
Be relevant.
Maxims of manner

Supermaxim: Be perspicuous.
1 Avoid obscurity of expression.
2 Avoid ambiguity.
3 Be brief (avoid unnecessary prolixity).
4 Be orderly.

This account of the general standards governing verbal communication makes it possible to explain how the utterance of a sentence, which provides only an incomplete and ambiguous representation of a thought, can nevertheless express a complete and unambiguous thought. Of the various thoughts which the sentence uttered could be taken to represent, the hearer can eliminate any that are incompatible with the assumption that the speaker is obeying the co-operative principle and maxims. If only one thought is left, then the hearer can infer that it is this thought that the speaker is trying to communicate. Thus, to communicate efficiently, all the speaker has to do is utter a sentence only one interpretation of which is compatible with the assumption that she is obeying the co-operative principle and maxims.

Recall, for instance, our example (16)-(18):

(16) Jones has bought the Times.
(17) Jones has bought a copy of the Times.
(18) Jones has bought the press enterprise which publishes the Times.

There might be situations where only interpretation (17) of the utterance in (16) would be compatible with the assumption that the speaker does not say what she believes to be false (first maxim of quality). There might be situations where only interpretation (18) would be compatible with the assumption that the speaker is being relevant (maxim of relation). In those situations, the intended interpretation of (16) can easily be inferred. Hence the maxims and the inferences they give rise to make it possible to convey an unambiguous thought by uttering an ambiguous sentence.

Grice's approach to verbal communication also makes it possible to explain how utterances can convey not just explicit but also implicit thoughts. Consider dialogue (32):

(32) Peter: Do you want some coffee?
    Mary: Coffee would keep me awake.

Suppose that Peter is aware of (33). Then from the assumption explicitly expressed by Mary's answer, together with assumption (33), he could infer conclusion (34):

(33) Mary does not want to stay awake.
(34) Mary does not want any coffee.

In just the same way, if Peter is aware of (35), he could infer conclusion (36):

(35) Mary's eyes remain open when she is awake.
(36) Coffee would cause Mary's eyes to remain open.

Now in ordinary circumstances, Mary would have wanted to communicate (34) but not (36), although both are inferable in the same way from the thought she has explicitly expressed. This is easily explained on the assumption that Mary obeys Grice's maxims. The explicit content of her utterance does not directly answer Peter's question; it is therefore not relevant as it stands. If Mary has obeyed the maxim 'be relevant', it must be assumed that she intended to give Peter an answer. Since he can obtain just the expected answer by inferring (34) from what she said, she must have intended him to draw precisely this conclusion. There is no parallel reason to think that she intended Peter to infer (36). Hence, just as the Gricean maxims help the hearer choose, from among the senses of an ambiguous sentence, the one which was intended by the speaker, so they help him choose, from among the implications of the explicit content of an utterance, the ones which are implicitly conveyed.

Suppose now that the exchange in (32) takes place in the same circumstances as before, except that Peter has no particular reason beforehand to assume that Mary does not want to stay awake. Without this assumption, no answer to his question is derivable from Mary's utterance, and the relevance of this utterance is not immediately apparent. One of Grice's main contributions to pragmatics was to show how, in the event of such an apparent violation of the co-operative principle and maxims, hearers are expected to make any additional assumptions needed to dispose of the violation. Here Peter might first adopt (33) as a specific assumption jointly suggested by the utterance, his knowledge of Mary, and the general assumption that Mary is trying to be relevant. He might then infer, as in the previous example, that she does not want any coffee. To eliminate the apparent violation of the maxims, Peter would have to assume that Mary had intended him to reason just as he did: that is, that she was intending to convey implicitly both assumption (33) and conclusion (34).

Grice calls additional assumptions and conclusions such as (33) and (34), supplied to preserve the application of the co-operative principle and maxims, implicatures. Like his ideas on meaning, Grice's ideas on implicature can be seen as an attempt to build on a commonsense view of verbal communication by making it more explicit and exploring its implications. In his William James Lectures, Grice took one crucial step away from this commonsense view towards theoretical sophistication;
but of course one step is not enough. Grice’s account retains much of the
vagueness of the commonsense view. Essential concepts mentioned in the
maxims are left entirely undefined. This is true of relevance, for instance:
hence appeals to the ‘maxim of relation’ are no more than dressed-up
appeals to intuition. Thus, everybody would agree that, in ordinary
circumstances, adding (33) and (34) to the interpretation of Mary’s answer
in (32) makes it relevant, whereas adding (35) and (36) does not. However,
this fact has itself to be explained before it can be used in a genuine
explanation of how Mary’s answer is understood.

Grice’s view of implicature raises even more basic questions. What is
the rationale behind the co-operative principle and maxims? Are there just
the nine maxims Grice mentioned, or might others be needed, as he
suggested himself? It might be tempting to add a maxim every time a
regularity has to be accounted for. However, this would be entirely ad
hoc. What criteria, then, do individual maxims have to meet? Could the
number of maxims be not expanded but reduced?

How are the maxims to be used in inference? Grice himself seems to
think that the hearer uses the assumption that the speaker has observed the
maxims as a premise in inference. Others have tried to reinterpret the
maxims as ‘conversational postulates’ (Gordon and Lakoff 1975), or even
as code-like rules which take semantic representations of sentences and
descriptions of context as input, and yield pragmatic representations of
utterances as output (Gazdar 1979). The flavour of such proposals can be
seen from the following remarks:

The tactic adopted here is to examine some of the data that would, or
should be, covered by Grice’s quantity maxim and then propose a
relatively simple formal solution to the problem of describing the
behaviour of that data. This solution may be seen as a special case of
Grice’s quantity maxim, or as an alternative to it, or as merely a
conventional rule for assigning one class of conversational meanings
to one class of utterance. (Gazdar 1979: 49)

The pragmatic phenomena amenable to this sort of treatment are rather
limited; they essentially arise when the utterance of a certain sentence is so
regularly correlated with a certain pragmatic interpretation that it makes
sense to set up a rule linking the one to the other. For example, the
utterance of (37) regularly suggests (38), the main exception being when it
is already assumed that (38) is, or might be, false:

(37) Some of the arguments are convincing.
(38) Not all of the arguments are convincing.

The proposal is to deal with this by setting up a general rule associating

(37) with the pragmatic interpretation (38), and effectively blocking its
application in contexts where it is assumed that (38) is, or might be, false
(Gazdar 1979: 55–9). However, in most cases of implicature, as for
instance in example (32)–(34), the context does much more than filter out
inappropriate interpretations: it provides premises without which the
implicature cannot be inferred at all. The translation of Grice’s maxims
into code-like rules would thus reduce them to dealing with a narrow set
of interesting but quite untypical examples of implicature.

What, then, are the forms of inference involved in the normal operation
of the maxims? If, as seems plausible, non-demonstrative (i.e. non-
deductive) inference is involved, how does it operate? Without pursuing
these questions in any depth, most pragmatists have adopted one form or
another of the Gricean approach to implicatures, and are otherwise
content to explain the explicit core of verbal communication in terms of
the code model. The results are as can be expected. Although based on an
insight which seems quite correct, and although somewhat more explicit
and systematic than the intuitive reconstructions supplied by unsophisti-
cated speakers, the analyses of implicature which have been proposed
by pragmatists have shared with these intuitive reconstructions the defect of
being almost entirely ex post facto.

Given that an utterance in context was found to carry particular
implicatures, what both the hearer and the pragmatic theorist can do, the
latter in a slightly more sophisticated way, is to show how in very intuitive
terms there was an argument based on the context, the utterance and
general expectations about the behaviour of speakers, that would justify
the particular interpretation chosen. What they fail to show is that on the
same basis, an equally convincing justification could not have been given
for some other interpretation that was not in fact chosen. There may be a
whole variety of interpretations that would meet whatever standards of
truthfulness, informativeness, relevance and clarity have been proposed or
envisioned so far. The theory needs improving at a fundamental level
before it can be fruitfully applied to particular cases.

In his William James Lectures, Grice put forward an idea of funda-
mental importance: that the very act of communicating creates
expectations which it then exploits. Grice himself first applied this idea
and its elaboration in terms of the maxims to a rather limited problem of
linguistic philosophy: do logical connectives (‘and’, ‘or’, ‘if . . . then’) have
the same meaning in natural languages as they do in logic? He argued that
the richer meaning these connectives seem to have in natural languages can
be explained in terms not of word meaning but of implicature. He then
suggested that this approach could have wider applications: that the task
of linguistic semantics could be considerably simplified by treating a large
array of problems in terms of implicatures. And indeed, the study of
We believe that the basic idea of Grice's William James Lectures has even wider implications: it offers a way of developing the analysis of inferential communication, suggested by Grice himself in 'Meaning' (1957), into an explanatory model. To achieve this, however, we must leave aside the various elaborations of Grice's original hunches and the sophisticated, though empirically rather empty debates they have given rise to. What is needed is an attempt to rethink, in psychologically realistic terms, such basic questions as: What form of shared information is available to humans? How is shared information exploited in communication? What is relevance and how is it achieved? What role does the search for relevance play in communication? It is to these questions that we now turn.

8 Cognitive environments and mutual manifestness

We have argued that mutual knowledge is a philosopher's construct with no close counterpart in reality. This is not to deny that humans do, in some sense, share information. In the first place, the communication process itself gives rise to shared information; in the second place, some sharing of information is necessary if communication is to be achieved. Any account of human communication must thus incorporate some notion of shared information. In this section, we want to go beyond both the empirically inadequate notion of 'mutual knowledge' and the conceptually vague notion of 'shared information'. We will discuss in what sense humans share information, and to what extent they share information about the information they share.

All humans live in the same physical world. We are all engaged in a lifetime's enterprise of deriving information from this common environment and constructing the best possible mental representation of it. We do not all construct the same representation, because of differences in our narrower physical environments on the one hand, and in our cognitive abilities on the other. Perceptual abilities vary in effectiveness from one individual to another. Inferential abilities also vary, and not just in effectiveness. People speak different languages, they have mastered different concepts; as a result, they can construct different representations and make different inferences. They have different memories, too, different theories that they bring to bear on their experience in different ways. Hence, even if they all shared the same narrow physical environment, what we propose to call their cognitive environments would still differ.

To introduce the notion of a cognitive environment, let us consider a parallel case. One human cognitive ability is sight. With respect to sight, each individual is in a visual environment which can be characterised as the set of all phenomena visible to him. What is visible to him is a function both of his physical environment and of his visual abilities.

In studying communication, we are interested in conceptual cognitive abilities. We want to suggest that what visible phenomena are for visual cognition, manifest facts are for conceptual cognition. Let us define:

39 A fact is manifest to an individual at a given time if and only if he is capable at that time of representing it mentally and accepting its representation as true or probably true.

40 A cognitive environment of an individual is a set of facts that are manifest to him.

To be manifest, then, is to be perceptible or inferable. An individual's total cognitive environment is the set of all the facts that he can perceive or infer: all the facts that are manifest to him. An individual's total cognitive environment is a function of his physical environment and his cognitive abilities. It consists of not only all the facts that he is aware of, but also all the facts that he is capable of becoming aware of, in his physical environment. The individual's actual awareness of facts, i.e. the knowledge that he has acquired, of course contributes to his ability to become aware of further facts. Memorised information is a component of cognitive abilities.

We want to elaborate the notion of what is manifest in two ways: first, we want to extend it from facts to all assumptions; and second, we want to distinguish degrees of manifestness. Our point of view here is cognitive rather than epistemological. From a cognitive point of view, mistaken assumptions can be indistinguishable from genuine factual knowledge, just as optical illusions can be indistinguishable from true sight. Just as illusions are 'visible', so any assumption, whether true or false, may be manifest to an individual. An assumption, then, is manifest in a cognitive environment if the environment provides sufficient evidence for its adoption, and as we all know, mistaken assumptions are sometimes very well evidenced.

Anything that can be seen at all is visible, but some things are much more visible than others. Similarly, we have defined 'manifest' so that any assumption that an individual is capable of constructing and accepting as true or probably true is manifest to him. We also want to say that manifest assumptions which are more likely to be entertained are more manifest. Which assumptions are more manifest to an individual during a given period or at a given moment is again a function of his physical environment on the one hand and his cognitive abilities on the other.

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Human cognitive organisation makes certain types of phenomena (i.e. perceptible objects or events) particularly salient. For instance, the noise of an explosion or a doorbell ringing is highly salient, a background buzz or a ticking clock much less so. When a phenomenon is noticed, some assumptions about it are standardly more accessible than others. In an environment where the doorbell has just rung, it will normally be strongly manifest that there is someone at the door, less strongly so that whoever is at the door is tall enough to reach the bell, and less strongly still that the bell has not been stolen. The most strongly manifest assumption of all is the assumption that the doorbell has just rung, the evidence for which is both salient and conclusive. We will have more to say, in chapter 3, about the factors which make some assumptions more manifest than others in a given situation. For the moment it is the fact rather than the explanation that matters.

Our notion of what is manifest to an individual is clearly weaker than the notion of what is actually known or assumed. A fact can be manifest without being known; all the individual's actual assumptions are manifest to him, but many more assumptions which he has not actually made are manifest to him too. This is so however weakly the terms 'knowledge' and 'assumption' are construed. In a strong sense, to know some fact involves having a mental representation of it. In a weaker sense, to say that an individual knows some fact is not necessarily to imply that he has ever entertained a mental representation of it. For instance, before reading this sentence you all knew, in that weak sense, that Noam Chomsky never played billiards together, although until now the thought of it had never crossed your mind. It is generally accepted that people have not only the knowledge that they actually entertain, but also the knowledge that they are capable of deducing from the knowledge that they entertain.

However, something can be manifest without being known, even in this virtual way, if only because something can be manifest and false, whereas nothing can be known and false.

Can something be manifest without being actually assumed? The answer must again be yes. Assumptions are unlike knowledge in that they need not be true. As with knowledge, people can be said to assume, in a weak sense, what they are capable of deducing from what they assume. However, people do not assume, in any sense, what they are merely capable of inferring non-demonstratively — that is, by some creative process of hypothesis formation and confirmation — from what they assume. Although it presumably followed non-demonstratively from what you knew and assumed before you read this sentence that Ronald Reagan and Noam Chomsky never played billiards together, this was not, until now, an assumption of yours: it was only an assumption that was manifest to you. Moreover, something can be manifest merely by being perceptible, and without being inferable at all from previously held knowledge and assumptions. A car is audibly passing in the street. You have not yet paid any attention to it, so you have no knowledge of it, no assumptions about it, even in the weakest sense of 'knowledge' and 'assumption'. But the fact that a car is passing in the street is manifest to you.

We will now show that because 'manifest' is weaker than 'known' or 'assumed', a notion of mutual manifestness can be developed which does not suffer from the same psychological implausibility as 'mutual knowledge' or 'mutual assumptions'.

To the extent that two organisms have the same visual abilities and the same physical environment, the same phenomena are visible to them and they can be said to share a visual environment. Since visual abilities and physical environments are never exactly identical, organisms never share their total visual environments. Moreover, two organisms which share a visual environment need not actually see the same phenomena; they are merely capable of doing so.

Similarly, the same facts and assumptions may be manifest in the cognitive environments of two different people. In that case, these cognitive environments intersect, and their intersection is a cognitive environment that these two people share. The total shared cognitive environment of two people is the intersection of their two total cognitive environments: i.e. the set of all facts that are manifest to them both. Clearly, if people share cognitive environments, it is because they share physical environments and have similar cognitive abilities. Since physical environments are never strictly identical, and since cognitive abilities are affected by previously memorised information and thus differ in many respects from one person to another, people never share their total cognitive environments. Moreover, to say that two people share a cognitive environment does not imply that they make the same assumptions: merely that they are capable of doing so.

One thing that can be manifest in a given cognitive environment is a characterisation of the people who have access to it. For instance, every Freemason has access to a number of secret assumptions which include the assumption that all Freemasons have access to these secret assumptions. In other words, all Freemasons share a cognitive environment which contains the assumption that all Freemasons share this environment. To take another example, Peter and Mary are talking to each other in the same room: they share a cognitive environment which consists of all the facts made manifest to them by their presence in this room. One of these facts is the fact that they share this environment.

Any shared cognitive environment in which it is manifest which people share it is what we will call a mutual cognitive environment. In a mutual

\[ \text{mutual cognitive environment} \]
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cognitive environment, for every manifest assumption, the fact that it is
manifest to the people who share this environment is itself manifest. In
other words, in a mutual cognitive environment, every manifest assump-
tion is what we will call mutually manifest.

Consider, for example, a cognitive environment $E$ shared by Peter and
Mary, in which (41) and (42) are manifest:

(41) Peter and Mary share cognitive environment $E$.

(42) The phone is ringing.

In this environment, (43)–(45) and indefinitely many assumptions built on
the same pattern are also manifest:

(43) It is manifest to Peter and to Mary that the phone is ringing.

(44) It is manifest to Peter and to Mary that it is manifest to Peter and to
Mary that the phone is ringing.

(45) It is manifest to Peter and to Mary that it is manifest to Peter and to
Mary that it is manifest to Peter and to Mary that the phone is ringing.

The more complex assumptions of type (43)–(45) get, the less likely they
are actually to be made. However, in such a series, assumption $n$ does not
have to be actually made by the individuals it mentions for assumption
$n+1$ to be true. There is therefore no cut-off point beyond which these
assumptions are likely to be false rather than true; they remain manifest
throughout, even though their degree of manifestness tends asymptotically
toward zero. (41)–(45) and all the assumptions in $E$ are not only
manifest to Peter and Mary; they are mutually manifest.

The notion of a mutually manifest assumption is clearly weaker than
that of a mutual assumption (and a fortiori than that of mutual
knowledge). Consider assumptions (46)–(48) and all the further assump-
tions that can be built on the same pattern:

(46) Peter and Mary assume that the phone is ringing.

(47) Peter and Mary assume that Peter and Mary assume that the phone is
ringing.

(48) Peter and Mary assume that Peter and Mary assume that Peter and
Mary assume that the phone is ringing.

As before, the more complex assumptions of type (46)–(48) get, the less
likely they are actually to be made. In this case, however, assumption $n$
does have to be made by Peter and Mary for assumption $n+1$ to be true.
Moreover, there is sure to be some point – quite soon actually – at which
Mary does not assume that Peter assumes that she assumes that she
assumes, etc. At this point and beyond, all the assumptions in this series are false, and
mutuality of assumptions is not achieved. Another way of seeing that mutu-
ality of assumptions is stronger than mutual manifestness is to notice that

(43) may be true when (46) is not, (44) may be true when (47) is not, (45)
may be true when (48) is not, and so on, while the converse is not possible.

Mutual manifestness is not merely weaker than mutual knowledge or
mutual assumption; it is weaker in just the right way. On the one hand, it
is not open to the same psychological objections, since the claim that an
assumption is mutually manifest is a claim about cognitive environments
rather than mental states or processes. On the other hand, as we will show
in section 12, the notion of mutual manifestness is strong enough to give a
precise and interesting content to the notion of overtness discussed in
section 6. However, by rejecting the notion of mutual knowledge and
adopting the weaker notion of mutual manifestness, we deprive ourselves
of a certain type of explanation in the study of communication.

Communication requires some degree of co-ordination between commu-
nicator and audience on the choice of a code and a context. The notion
of mutual knowledge is used to explain how this co-ordination can be
achieved: given enough mutual knowledge, communicator and audience
can make symmetrical choices of code and context. A realistic notion of
mutual manifestness, on the other hand, is not strong enough to explain
such symmetrical co-ordination. However, before concluding that mutual
manifestness is too weak after all, ask yourself what are the

reasons for assuming that responsibility for co-ordination is equally
shared between communicator and audience, and that both must worry,
symmetrically, about what the other is thinking. Asymmetrical co-
ordination is often easier to achieve, and communication is an asymm-
trical process anyhow.

Consider what would happen in ballroom dancing if the responsibility
for choosing steps was left equally to both partners (and how little help the
mutual knowledge framework would be for solving the resulting co-
ordination problems in real time). Co-ordination problems are avoided,
or considerably reduced, in dancing, by leaving the responsibility to one
partner who leads, while the other has merely to follow. We assume that
the same goes for communication. It is left to the communicator to make

correct assumptions about the codes and contextual information that the
audience will have accessible and be likely to use in the comprehension
process. The responsibility for avoiding misunderstandings also lies with
the speaker, so that all the hearer has to do is go ahead and use whatever
code and contextual information come most easily to hand.

Suppose Mary and Peter are looking at a landscape where she has
noticed a distant church. She says to him,

(49) I've been inside that church.

She does not stop to ask herself whether he has noticed the building, and
whether he assumes she has noticed, and assumes she has noticed he has
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noticed, and so on, or whether he has assumed it is a church, and assumes she assumes it is, and so on. All she needs is reasonable confidence that he will be able to identify the building as a church when required to: in other words, that a certain assumption will be manifest in his cognitive environment at the right time. He need not have accessed this assumption before she spoke. In fact, until she spoke he might have thought the building was a castle: it might be only on the strength of her utterance that it becomes manifest to him that the building is a church.

Inspired by the landscape, Mary says,

(50) It's the sort of scene that would have made Marianne Dashwood swoon.

This is an allusion to Jane Austen's Sense and Sensibility, a book she knows Peter has read. She does not stop to think whether he knows she has read it too and knows she knows he has read it, and so on. Nor is she unaware of the fact that they may well have reacted to the book in different ways and remember it differently. Her remark is based on assumptions that she does not mention and that he need never have made himself before she spoke. What she expects, rightly, is that her utterance will act as a prompt, making him recall parts of the book that he had previously forgotten, and construct the assumptions needed to understand the allusion.

In both these examples Mary makes assumptions about what assumptions are, or will be, manifest to Peter. Peter trusts that the assumptions he spontaneously makes about the church and about Sense and Sensibility, which help him understand Mary's utterances, are those she expected him to make. To communicate successfully, Mary had to have some knowledge of Peter's cognitive environment. As a result of their successful communication, their mutual cognitive environment is enlarged. Note that symmetrical co-ordination and mutual knowledge do not enter into the picture at all.

The most fundamental reason for adopting the mutual-knowledge framework, as for adopting the code model, is the desire to show how successful communication can be guaranteed, how there is some failsafe algorithm by which the hearer can reconstruct the speaker's exact meaning. Within this framework the fact that communication often fails is explained in one of two ways: either the code mechanism has been imperfectly implemented, or there has been some disruption due to 'noise'. A noiseless, well-implemented code mechanism should guarantee perfect communication.

In rejecting the mutual-knowledge framework, we abandon the possibility of using a failsafe algorithm as a model of human communication. But since it is obvious that the communication process takes place at a risk, why assume that it is governed by a failsafe procedure? Moreover, if there is one conclusion to be drawn from work on artificial intelligence, it is that most cognitive processes are so complex that they must be modelled in terms of heuristics rather than failsafe algorithms. We assume, then, that communication is governed by a less-than-perfect heuristic. On this approach, failures in communication are to be expected: what is mysterious and requires explanation is not failure but success.

As we have seen, the notion of mutual manifestness is not strong enough to salvage the code theory of communication. But then, this was never one of our aims. Instead of taking the code theory for granted and concluding that mutual knowledge must therefore exist, we prefer to look at what kind of assumptions people are actually in a position to make about each other's assumptions, and then see what this implies for an account of communication.

Sometimes, we have direct evidence about other people's assumptions: for instance, when they tell us what they assume. More generally, because we manifestly share cognitive environments with other people, we have direct evidence about what is manifest to them. When a cognitive environment we share with other people is mutual, we have evidence about what is mutually manifest to all of us. Note that this evidence can never be conclusive: the boundaries of cognitive environments cannot be precisely determined, if only because the threshold between very weakly manifest assumptions and inaccessible ones is unmarked.

From assumptions about what is manifest to other people, and in particular about what is strongly manifest to them, we are in a position to derive further, though necessarily weaker, assumptions about what assumptions they are actually making. From assumptions about what is mutually manifest to all of us, we are in a position to derive further, and weaker, assumptions about the assumptions they attribute to us. And essentially, this is it. Human beings somehow manage to communicate in situations where a great deal can be assumed about what is manifest to others, a lot can be assumed about what is mutually manifest to themselves and others, but nothing can be assumed to be truly mutually known or assumed.

The situations which establish a mutual cognitive environment are essentially those that have been treated as establishing mutual knowledge. We have argued that assumptions of mutual knowledge are never truly warranted. Examples (49) and (50) are anecdotal evidence that they are unnecessary. The detour via mutual knowledge is superfluous: mutual cognitive environments directly provide all the information needed for communication and comprehension.

The notions of cognitive environment and of manifestness, mutual or otherwise, are psychologically realistic, but by themselves shed little light...
on what goes on in human minds. A cognitive environment is merely a set of assumptions which the individual is capable of mentally representing and accepting as true. The question then is: which of these assumptions will the individual actually make? This question is of interest not only to the psychologist, but also to every ordinary communicator. We will argue that when you communicate, your intention is to alter the cognitive environment of your addressees; but of course you expect their actual thought processes to be affected as a result. In the next section we will argue that human cognition is relevance-oriented, and that as a result, someone who knows an individual's cognitive environment can infer which assumptions he is actually likely to entertain.

9 Relevance and ostension

An individual’s cognitive environment is a set of assumptions available to him. Which particular assumptions is he most likely to construct and process? There may, of course, be no general answer to this question. We want to argue that there is. This book is essentially an exploration of the idea that there is a single property — relevance — which makes information worth processing for a human being. Chapter 3 will contain a relatively technical discussion of relevance. In this section, we simply want to characterize the notion in very general, informal terms, and to make some suggestions about the role of relevance in communication.

Human beings are efficient information-processing devices. This is their most obvious asset as a species. But what is efficiency in information processing?

Efficiency can only be defined with respect to a goal. Some goals, such as catching a prey, winning a game or solving a problem, are absolute: they consist in bringing about a particular state of affairs which at any given moment either exists or does not exist. Other goals, such as multiplying one’s offspring, improving one’s backstroke, or understanding oneself, are relative: they consist in raising the value of some variable, and can thus only be achieved to a degree. Efficiency with respect to absolute goals is simply a matter of reaching them with the smallest possible expenditure of whatever resource (time, money, energy ...) it takes. Efficiency with respect to relative goals is a matter of striking a balance between degree of achievement and expenditure. In the special case where the expenditure is fixed — say all the time available is going to be spent anyhow — efficiency consists in achieving the goal to the highest possible degree.

Most discussions of information processing, whether in experimental psychology or in artificial intelligence, have been concerned with the realization of absolute goals. ‘Problem solving’ has become the paradigm of information processing. The problems considered have a fixed solution; the goal of the information-processing device is to find this solution; efficiency consists in finding it at the minimal cost. However, not all cognitive tasks fit this description; many tasks consist not in reaching an absolute goal, but in improving on an existing state of affairs. Hence, cognitive efficiency may have to be characterized differently for different devices.

Simpler information-processing devices, whether natural, such as a frog, or artificial, such as an electronic alarm system, process only very specific information: for example, metabolic changes and fly movements for frogs, noises and other vibrations for alarm systems. Their information-processing activity consists in monitoring changes in the values of a few variables. They could be informally described as engaged in answering a few set questions: ‘Is there a fly-like object within reach?’ ‘Is there a large body moving in the room?’ More complex information-processing devices, by contrast, can define and monitor new variables or formulate and answer new questions.

For the simpler devices, efficiency consists in answering their set questions at the minimal processing cost. Efficiency cannot be so easily defined for more complex devices such as human beings. For such devices, efficient information processing may involve formulating and trying to answer new questions despite the extra processing costs incurred. Formulating and answering specific questions must then be seen as subservient to a more general and abstract goal. It is in relation to this general goal that the efficiency of complex information-processing devices must be characterized.

On the general goal of human cognition, we have nothing better to offer than rather trivial speculative remarks. However, these remarks have important and non-trivial consequences. It seems that human cognition is aimed at improving the individual’s knowledge of the world. This means adding more information, information that is more accurate, more easily retrievable, and more developed in areas of greater concern to the individual. Information processing is a permanent life-long task. An individual’s overall resources for information processing are, if not quite fixed, at least not very flexible. Thus, long-term cognitive efficiency consists in improving one’s knowledge of the world as much as possible given the available resources.

What, then, is short-term cognitive efficiency — efficiency, say, in the way your mind spends the next few seconds or milliseconds? This is a more concrete question, and one that is harder to answer. At every moment, many different cognitive tasks could be performed, and this for two reasons: first, human sensory abilities monitor much more information than central conceptual abilities can process; and second, central
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Abilities always have plenty of unfinished business. The key problem for efficient short-term information processing is thus to achieve an optimal allocation of central processing resources. Resources have to be allocated to the processing of information which is likely to bring about the greatest contribution to the mind’s general cognitive goals at the smallest processing cost.

Some information is old: it is already present in the individual’s representation of the world. Unless it is needed for the performance of a particular cognitive task, and is easier to access from the environment than from memory, such information is not worth processing at all. Other information is not only new but entirely unconnected with anything in the individual’s representation of the world. It can only be added to this representation as isolated bits and pieces, and this usually means too much processing cost for too little benefit. Still other information is new but connected with old information. When these interconnected new and old items of information are used together as premises in an inference process, further new information can be derived: information which could not have been inferred without this combination of old and new premises.

When the processing of new information gives rise to such a multiplication effect, we call it relevant. The greater the multiplication effect, the greater the relevance.

Consider an example. Mary and Peter are sitting on a park bench. He leans back, which alters her view. By leaning back, he modifies her cognitive environment; he reveals to her certain phenomena, which she may look at or not, and describe to herself in different ways. Why should she pay attention to one phenomenon rather than another, or describe it to herself in one way rather than another? In other words, why should she mentally process any of the assumptions which have become manifest or more manifest to her as a result of the change in her environment? Our answer is that she should process those assumptions that are most relevant to her at the time.

Imagine, for instance, that as a result of Peter’s leaning back she can see, among other things, three people: an ice-cream vendor who she had noticed before when she sat down on the bench; an ordinary stroller who she has never seen before, and her acquaintance William, who is coming towards them and is a dreadful bore. Many assumptions about each of these characters are more or less manifest to her. She may already have considered the implications of the presence of the ice-cream vendor when she first noticed him; if so, it would be a waste of processing resources to pay further attention to him now. The presence of the unknown stroller is new information to her, but little or nothing follows from it; so there again, what she can perceive and infer about him is not likely to be of much relevance to her. By contrast, from the fact that William is coming her way, she can draw many conclusions from which many more conclusions will follow. This, then, is the one truly relevant change in her cognitive environment; this is the particular phenomenon she should pay attention to. She should do so, that is, if she is aiming at cognitive efficiency.

Our claim is that all human beings automatically aim at the most efficient information processing possible. This is so whether they are conscious of it or not; in fact, the very diverse and shifting conscious interests of individuals result from the pursuit of this permanent aim in changing conditions. In other words, an individual’s particular cognitive goal at a given moment is always an instance of a more general goal: maximising the relevance of the information processed. We will show that this is a crucial factor in human interaction.

Among the facts made manifest to Mary by Peter’s behaviour is the very fact that he has behaved in a certain way. Suppose now that she pays attention to this behaviour, and comes to the conclusion that it must have been deliberate: perhaps he is leaning back more rigidly than if he were merely trying to find a more comfortable position. She might then ask herself why he is doing it. There may be many possible answers; suppose that the most plausible one she can find is that he is leaning back in order to attract her attention to some particular phenomenon. Then Peter’s behaviour has made it manifest to Mary that he intends to make some particular assumptions manifest to her. We will call such behaviour - behaviour which makes manifest an intention to make something manifest – ostensive behaviour or simply ostension. Showing someone something is a case of ostension. So too, we will argue, is human intentional communication.

The existence of ostension is beyond doubt. What is puzzling is how it works. Any perceptible behaviour makes manifest indefinitely many assumptions. How is the audience of an act of ostension to discover which of them have been intentionally made manifest? For instance, how is Mary to discover which of the phenomena which have become manifest to her as a result of Peter’s behaviour are the ones he intended her to pay attention to?

Information processing involves effort; it will only be undertaken in the expectation of some reward. There is thus no point in drawing someone’s attention to a phenomenon unless it will seem relevant enough to him to be worth his attention. By requesting Mary’s attention, Peter suggests that he has reason to think that by paying attention, she will gain some relevant information. He may, of course, be mistaken, or trying to distract her attention from relevant information elsewhere, as the maker of an assertion may be mistaken or lying; but just as an assertion comes with a tacit guarantee of truth, so ostension comes with a tacit guarantee of relevance.
This guarantee of relevance makes it possible for Mary to infer which of the newly manifest assumptions have been intentionally made manifest. Here is how the inference process might go. First, Mary notices Peter’s behaviour and assumes that it is ostensive: i.e. that it is intended to attract her attention to some phenomenon. If she has enough confidence in his guarantee of relevance, she will infer that some of the information which his behaviour has made manifest to her is indeed relevant to her. Then she pays attention to the area that has become visible to her as a result of his leaning back, and discovers the ice-cream vendor, the stroller, this dreadful William, and so on. Assumptions about William are the only newly manifest assumptions relevant enough to be worth her attention. From this, she can infer that Peter’s intention was precisely to draw her attention to William’s arrival. Any other assumption about his ostensive behaviour is inconsistent with her confidence in the guarantee of relevance it carries.

Mary has become aware not only that there is someone coming who she wants to avoid, but also that Peter intended her to become aware of it, and that he is aware of it too. On the basis of his observable behaviour, she has discovered some of his thoughts.

Ostensive behaviour provides evidence of one’s thoughts. It succeeds in doing so because it implies a guarantee of relevance. It implies such a guarantee because humans automatically turn their attention to what seems most relevant to them. The main thesis of this book is that an act of ostension carries a guarantee of relevance, and that this fact – which we will call the principle of relevance – makes manifest the intention behind the ostension. We believe that it is this principle of relevance that is needed to make the inferential model of communication explanatory.

10 Ostensive-inferential communication

Ostension provides two layers of information to be picked up: first, there is the information which has been, so to speak, pointed out; second, there is the information that the first layer of information has been intentionally pointed out. One can imagine the first layer being recovered without the second. For example, as a result of Peter’s leaning back, Mary might notice William coming their way, even if she paid no attention to Peter’s intentions. And as for Peter, he might not care much whether Mary recognises his intention, as long as she notices William.

In general, however, recognising the intention behind the ostension is necessary for efficient information processing: someone who fails to recognise this intention may fail to notice relevant information. Let us modify our example slightly and suppose that William is in the distance, barely visible in a crowd. If Mary pays no attention to the fact that Peter’s behaviour is ostensive, she might well look in the right direction and yet not notice William. If she pays attention to the ostension, she will be inclined to take a closer look and find out what information Peter thought might be relevant to her.

In our modified example, what Peter’s ostension mostly does is manifest much more manifest some information which would have been manifest anyhow, though very weakly so. Sometimes, however, part of the basic information will not be manifest at all unless the intention behind the ostension is taken into account. Suppose a girl is travelling in a foreign country. She comes out of the inn wearing light summer clothes, manifestly intending to take a stroll. An old man sitting on a bench nearby looks ostensively up at the sky. When the girl looks up, she sees a few tiny clouds, which she might have noticed for herself, but which she would normally have paid no further attention to: given her knowledge – or lack of knowledge – of the local weather, the presence of these tiny clouds is not relevant to her. Now, however, the old man is drawing her attention to the clouds in a manifestly intentional way, thus guaranteeing that there is some relevant information to be obtained.

The old man’s ostensive behaviour opens up for the girl a whole new strategy of processing. If she accepts his guarantee of relevance, she has to find out what makes him think that the presence of the clouds would be relevant to her. Knowing the area and its weather better than she does, he might have reason to think that the clouds are going to get worse and turn to rain. Such an assumption is of a very standard sort and would probably be the first to come to mind. The old man can thus be reasonably confident that, prompted by his behaviour, she will have no difficulty in deciding that this is what he believes. If it were not manifest to the old man that it was going to rain, it would be hard to explain his behaviour at all. The girl thus has reason to think that in drawing her attention to the clouds, he intended to make manifest to her that he believed it was going to rain. As a result of this act of ostension, she now has some information that was not available to her before: that he thinks it is going to rain, and hence that there is a genuine risk of rain.

In this example, the state of affairs that the old man drew the girl’s attention to had been partly manifest to her, and partly not. The presence of the clouds and the fact that clouds may always turn to rain had been manifest and merely became more so. However, until that moment she had regarded the fact that the weather was beautiful as strong evidence that it would not rain. The risk of rain in that particular situation was not manifest to her at all. In other words, the clouds were already evidence of
oncoming rain, but evidence that was much too weak. The old man made
evidence much stronger by pointing it out; as his intentions became
manifest, the assumption that it would rain became manifest too.

Sometimes, all the evidence displayed in an act of ostension bears
directly on the agent's intentions. In these cases, only by discovering the
agent's intentions can the audience also discover, indirectly, the basic
information that the agent intended to make manifest. The relation
between the evidence produced and the basic information conveyed is
arbitrary. The same piece of evidence can be used, on different occasions,
to manifest different assumptions, even mutually inconsistent
assumptions, as long as it makes manifest the intention behind the
ostension.

Here is an example. Two prisoners, from different tribes with no
common language, are put in a quarry to work back to back breaking
rocks. Suddenly, prisoner A starts putting some distinct rhythm into the
sound of his hammer – one-two-three, one-two, one-two-three, one-
two – a rhythm that is both arbitrary and noticeable enough to attract
the attention of prisoner B. This arbitrary pattern in the way the rocks are
being broken has no direct relevance for B. However, there are grounds
for thinking that it has been intentionally produced, and B might ask
himself what A's intentions were in producing it. One plausible
assumption is that this is a piece of ostensive behaviour: that is, that A intended B
to notice the pattern. This would in turn make manifest A's desire to
interact with B, which in the circumstances would be relevant enough.

Here is a more substantial example. Prisoners A and B are at work in
their quarry, each with a guard at his shoulder, when suddenly
the attention of the guards is distracted. Both prisoners realise that they have a
good chance of escaping, but only if they can co-ordinate their attack
and overpower their guards simultaneously. Here, it is clear what information
would be relevant: each wants to know when the other will start the
attack. Prisoner A suddenly whistles, the prisoners overpower their
guards and escape. Again, there is no need for a pre-existing code
conventionalising the whistle with the information that now is the moment to
attack. The information is obvious enough: it is the only information
that A could conceivably have intended to make manifest in the circumstances.

Could not the repetition of such a situation lead to the development of a
code? Imagine that the two prisoners, caught again, find themselves in the
same predicament: again a whistle, again an escape, and again they are
caught. The next time, prisoner B, who has not realised that both guards
are distracted, hears prisoner A whistle: this time, fortunately, B does not
have to infer what the whistle is intended to make manifest: he knows. The
whistle has become a signal associated by an underlying code to the
message 'Let us overpower our guards now!'
assumptions about himself: for instance, that he is aware of the basic information involved, and that he is trying to be relevant. Peter’s ostension might make it manifest not just that William is approaching, but also that Peter expects Mary to be concerned, and that he is concerned too.

Would we want to say, though, that Peter ‘meant something’ by his behaviour? Like most English speakers, we would be reluctant to do so; but this is irrelevant to our pursuit, which is not to analyse ordinary language usage, but to describe and explain forms of human communication. Our argument at this stage is this: either inferential communication consists in providing evidence for what the communicator means, in the sense of “meaning” which Grice calls “non-natural meaning”, and in that case inferential communication is not a well-defined class of phenomena at all; or else showing something should be considered a form of inferential communication, on a par with meaning something by a certain behaviour, and inferential communication and ostension should be equated.

There are two questions involved here. One is substantive: which domains of facts are to be described and explained together? Our answer is that ostension is such a domain, and that inferential communication narrowly understood (i.e. understood as excluding cases of ostension where talk of “meaning” would be awkward) is not. The second question is terminological (and hence not worth much argument): can the term ‘communication’ be legitimately applied to all cases of ostension? Our answer is yes, and from now on we will treat ostensive communication, inferential communication, and ostensive-inferential communication as the same thing. Inferential communication and ostension are one and the same process, but seen from two different points of view: that of the communicator who is involved in ostension and that of the audience who is involved in inference.

Ostensive-inferential communication consists in making manifest to an audience one’s intention to make manifest a basic layer of information. It can therefore be described in terms of an informative and a communicative intention. In the next two sections, we want to reanalyse the notions of informative and communicative intention in terms of manifestness and mutual manifestness, and to sketch in some of the empirical implications of this reformulation.

11 The informative intention

We began this chapter by pointing out that any account of communication must answer two questions: first, what is communicated; and second, how is communication achieved? Up to now, we have considered only the second question. In this section, we return to the first. The generally accepted answer is that what is communicated is a meaning. The question then becomes, what is a meaning? And there is no generally accepted answer any more.

However much they differ, all answers to the what-is-a-meaning question share the view that the paradigm example of meaning is what is explicitly expressed by a linguistic utterance. The verbal communication of an explicit meaning is then taken as the model of communication in general. This is true of semiotic approaches, which are not only generalisations of a linguistic model, but are also based on the assumption that to communicate is always, in Saussure’s terms, to transmit a ‘signified’ by use of a ‘signifier’. It is true of inferential approaches, which regard all communicative acts as ‘utterances’ in an extended sense, used to convey an ‘utterer’s meaning’.

We believe that the kind of explicit communication that can be achieved by the use of language is not a typical but a limiting case. Treating linguistic communication as the model of communication in general has led to theoretical distortions and misperceptions of the data. The effects of most forms of human communication, including some of the effects of verbal communication, are far too vague to be properly analysed along these lines. Moreover, there is not a dichotomy but a continuum of cases, from vaguer to more precise effects.

Let us first illustrate this point with two examples of non-verbal communication. Mary comes home; Peter opens the door. Mary stops at the door and sniffs ostensively; Peter follows suit and notices that there is a smell of gas. This fact is highly relevant, and in the absence of contextual counterevidence or any obvious alternative candidate, Peter will assume that Mary intended to make it manifest to him that there was a smell of gas. Here, at least part of what is communicated could be reasonably well paraphrased by saying that there is a smell of gas; and it could be argued that this is what Mary means. She could indeed have achieved essentially the same result by speaking rather than sniffing ostensively.

Contrast this with the following case. Mary and Peter are newly arrived at the seaside. She opens the window overlooking the sea and sniffs appreciatively and ostensively. When Peter follows suit, there is no one particular good thing that comes to his attention: the air smells fresh, fresher than it did in town, it reminds him of their previous holidays, he can smell the sea, seaweed, ozone, fish; all sorts of pleasant things come to mind, and while, because her sniff was appreciative, he is reasonably safe in assuming that she must have intended him to notice at least some of them, he is unlikely to be able to pin her intentions down any further. Is there any reason to assume that her intentions were more specific? Is there
a plausible answer, in the form of an explicit linguistic paraphrase, to the question, what does she mean? Could she have achieved the same communicative effect by speaking? Clearly not.

Examples like the one of Mary smelling gas, where it is reasonable to impute a meaning to the communicator, are the only ones normally considered in discussions of communication; examples like the one of Mary at the seaside — clearly communicating, but what? — are generally ignored. Yet these examples do not belong to distinct classes of phenomena, and it is easy enough to imagine intermediate cases: say, a guest sniffing appreciatively and ostensively when the stew is brought to the table, etc.

The distortions and misperceptions introduced by the explicit communication model are also found in the study of verbal communication itself. Some essential aspects of implicit verbal communication are overlooked. Pragmatists assume that what is communicated by an utterance is a speaker's meaning, which in the case of an assertion is a set of assumptions. One of these assumptions is explicitly expressed; the others (if any) are implicitly conveyed, or implicated. The only difference between the explicit content of an utterance and its implicatures is supposed to be that the explicit content is decoded, while the implicatures are inferred. Now we all know, as speakers and hearers, that what is implicitly conveyed by an utterance is generally much vaguer than what is explicitly expressed, and that when the implicit import of an utterance is explicitly spelled out, it tends to be distorted by the elimination of this often intentional vagueness. The distortion is even greater in the case of metaphor and other figures of speech, whose poetic effects are generally destroyed by being explicitly spelled out.

In an effort to minimise the distortion, pragmatists have tended to focus on examples such as (32), where the implicit import is fairly precise, and to ignore equally ordinary cases of implicit vagueness such as (51):

(32) Peter: Do you want some coffee?
   Mary: Coffee would keep me awake.

(51) Peter: What do you intend to do today?
   Mary: I have a terrible headache.

In (32), Mary implicates that she doesn't want coffee (or, in some circumstances, that she does) and that her reason for not wanting it is that it would keep her awake. Here the implicatures can be spelled out without distortion. In (51), what does Mary implicate? That she will not do anything? That she will do as little as possible? That she will do as much as she can? That she does not yet know what she will do? There is no precise assumption, apart from the one explicitly expressed, which she can be said to intend Peter to share. Yet there is more to her utterance than its explicit content: she manifestly intends Peter to draw some conclusions from what she said, and not just any conclusions. Quite ordinary cases such as (51) are never discussed in the pragmatic literature.

Pragmatists tend to take for granted that a meaning is a proposition combined with a propositional attitude, though they may diverge considerably in the way they present and develop this view. In other words, they treat the communicator's informative intention as an intention to induce in an audience certain attitudes to certain propositions. With assertions, often taken to be the most basic case, the informative intention is treated as an intention to induce in an audience the belief that a certain proposition is true.

There is a very good reason for anyone concerned with the role of inference in communication to assume that what is communicated is propositional: it is relatively easy to say what propositions are, and how inference might operate over propositions. No one has any clear idea how inference might operate over non-propositional objects: say, over images, impressions or emotions. Propositional contents and attitudes thus seem to provide the only relatively solid ground on which to base a partly or wholly inferential approach to communication. Too bad if much of what is communicated does not fit the propositional mould.

At first sight, it might look as if semioticians had a more comprehensive view. They have an a priori account of how any kind of representation, propositional or not, might be conveyed: namely, by means of a code. However, studies by semioticians of what they call 'connotation', i.e. the vaguer aspect of what is communicated, are highly programmatic and do not offer the beginnings of a psychologically adequate account of the type of mental representation involved. The semiotic approach is more comprehensive only by being more superficial.

The only people who have been quite consistently concerned with the vaguer aspects of communication are the Romantics, from the Schlegel brothers and Coleridge to I. A. Richards, and their many acknowledged or unacknowledged followers, including many semioticians such as Roman Jakobson in some of his writings, Victor Turner, or Roland Barthes. However, they have all dealt with vagueness in vague terms, with metaphors in metaphorical terms, and used the term 'meaning' so broadly that it becomes quite meaningless.

We see it as a major challenge for any account of human communication to give a precise description and explanation of its vaguer effects. Distinguishing meaning from communication, accepting that something can be communicated without being strictly speaking meant by the communicator or the communicator's behaviour, is a first essential step — a step away from the traditional approach to communication and most modern...
intention when sniffing the seaside air might be that all the assumptions which became manifest to her when she opened the window and took a deep breath should, as a result of her ostensive behaviour, become manifest or more manifest to Peter. She need not intend to communicate any particular one of these assumptions.

If asked what she wanted to convey, one of the best answers Mary could give is that she wanted to share an impression with Peter. What is an impression? Is it a type of mental representation? Can it be reduced to propositions and propositional attitudes? What we are suggesting is that an impression might be better described as a noticeable change in one’s cognitive environment, a change resulting from relatively small alterations in the manifestness of many assumptions, rather than from the fact that a single assumption or a few new assumptions have all of a sudden become very manifest. It is quite in line with common sense to think of an impression as the sort of thing that can be communicated, and yet this intuition is unexplainable within current theories of communication. In the model of ostensive-inferential communication we are trying to develop, impressions fall squarely within the domain of things that can be communicated, and their very vagueness can be precisely described.

In many—perhaps most—cases of human communication, what the communicator intends to make manifest is partly precise and partly vague. She may have in mind a characterisation of I based on a representation of some but not all of the assumptions in I. For instance, in (51), Mary’s informative intention in saying that she has a headache might be described as follows: she intends to make manifest to Peter the assumption that she has a headache and all the further assumptions manifestly required to make this a relevant answer to Peter’s question. Similarly, Mary’s informative intention when sniffing the smell of gas might be to make manifest to Peter not only the assumption that there is a smell of gas, but also all the further assumptions that this initial assumption makes mutually manifest.

Instead of treating an assumption as either communicated or not communicated, we have a set of assumptions which, as a result of communication, become manifest or more manifest to varying degrees. We might think of communication itself, then, as a matter of degree. When the communicator makes strongly manifest her informative intention to make some particular assumption strongly manifest, then that assumption is strongly communicated. An example would be answering a clear ‘Yes’ when asked ‘Did you pay the rent?’ When the communicator’s intention is to increase simultaneously the manifestness of a wide range of assumptions, so that her intention concerning each of these assumptions is weakly manifest, then each of them is weakly communicated. An example would be sniffing ecstatically and ostensively at the fresh seaside air. There is, of
course, a continuum of cases in between. In the case of strong communication, the communicator can have fairly precise expectations about some of the thoughts that the audience will actually entertain. With weaker forms of communication, the communicator can merely expect to steer the thoughts of the audience in a certain direction. Often, in human interaction, weak communication is found sufficient or even preferable to the stronger forms.

Non-verbal communication tends to be relatively weak. One of the advantages of verbal communication is that it gives rise to the strongest possible form of communication; it enables the hearer to pin down the speaker's intentions about the explicit content of her utterance to a single, strongly manifest candidate, with no alternative worth considering at all. On the other hand, what is implicit in verbal communication is generally weakly communicated: the hearer can often fulfill part of the speaker's informative intention by forming any of several roughly similar but not identical assumptions. Because all communication has been seen as strong communication, descriptions of non-verbal communication have been marred by spurious attributions of 'meaning'; in the case of verbal communication, the difference between explicit content and implicit import has been seen as a difference not in what gets communicated but merely in the means by which it is communicated, and the vagueness of implicatures and non-literal forms of expression has been idealised away. Our account of informative intentions in terms of manifestness of assumptions corrects these distortions without introducing either ad hoc machinery or vagueness of description.

12 The communicative intention

When we introduced the notion of a communicative intention in section 6, we drew attention to a problem first discussed by Strawson (1964a). Strawson pointed out that a communicator's intentions must be 'overt' in a sense which is easy enough to illustrate and grasp intuitively, but hard to spell out precisely. One type of solution, proposed by Strawson himself, is to regard an intention as overt when it is backed by a series of further intentions, each to the effect that the preceding intention in the series should be recognised. Schiffer (1972) proposed another solution: he analysed 'overt' as meaning mutually known. We argued that both types of solution are psychologically implausible.

Our solution, which is closer to Schiffer's than Strawson's, though without suffering from the defects of either, is to replace the vague 'overt' by the more precise 'mutually manifest'. We therefore redefine a communicative intention as follows. To communicate intentionally by

ostension is to produce a certain stimulus with the aim of fulfilling an informative intention, and intending moreover thereby

(54) Communicative intention: to make it mutually manifest to audience and communicator that the communicator has this informative intention.

This takes care of the types of example which Strawson and Schiffer used to show that, in order to communicate, it is not quite enough to inform an audience of one's informative intention. For instance, in our example in section 6, Mary leaves the pieces of her broken hair-drier lying around, intending thereby to inform Peter that she would like him to mend it. She wants this informative intention to be manifest to Peter, but at the same time, she does not want it to be 'overt'. In our terms, she does not want her informative intention to be mutually manifest. Intuitively, what she does is not quite communicate. Our redefinition of a communicative intention accounts for this intuition.

What difference does it make whether an informative intention is merely manifest to the audience or mutually manifest to audience and communicator? Should this really be a criterion for distinguishing communication from other forms of information transmission? Is it more than a technicality designed to take care of implausible borderline cases dreamed up by philosophers? Our answer is that there is indeed an essential difference.

Consider first a more general question: why should someone who has an informative intention bother to make it known to her audience that she has this intention? In other words, what are the reasons for engaging in ostensive communication? Grice discussed only one of these reasons: sometimes, making one's informative intention known is the best way, or the only way, of fulfilling it. We have shown that people sometimes engage in ostensive communication even though the informative intention could be fulfilled without being made manifest: for example, by providing direct evidence for the information to be conveyed. However, even in these cases, ostension helps focus the attention of the audience on the relevant information, and thus contributes to the fulfiment of the informative intention. This is still the Gricean reason for engaging in communication, just slightly extended in scope.

However, we want to argue that there is another major reason for engaging in ostensive communication, apart from helping to fulfil an informative intention. Mere informing alters the cognitive environment of the audience. Communication alters the mutual cognitive environment of the audience and communicator. Mutual manifestness may be of little cognitive importance, but it is of crucial social importance. A change in the mutual cognitive environment of two people is a change in their
possibilities of interaction (and, in particular, in their possibilities of further communication).

Recall, for instance, the case of Peter leaning back to let Mary see William coming their way. If, as a result of his behaviour, it becomes mutually manifest to them that William is coming, that they are in danger of being bored by his conversation, etc., then they are in a position to act efficiently: i.e. promptly. All Mary may have to do is say, 'Let's go!'; she can feel confident that Peter will understand her reasons, and, if he shares them, will be ready to act without question or delay.

In the case of the broken hair-drier, if Mary had made mutually manifest her wish that Peter would mend it, one of two things would have happened. Either he would have mended it, thus granting her wish and possibly putting her in his debt; or he would have failed to mend it, which would have amounted to a refusal or rejection. Mary avoids putting herself in his debt or meeting with a refusal by avoiding any modification of their mutual cognitive environment. If Peter mends the hair-drier, he is being kind on his own initiative, and she does not owe him anything. If Peter decides not to mend the hair-drier, he might reason as follows: she doesn't know I know she intended to inform me of her wish, so if I ignore it, she will attribute this to her failure to inform me; she may find me stupid, but not unkind. As for Mary, she may have intentionally left this line of reasoning open to Peter. If he does not mend her hair-drier, she will find him unkind, but not hostile. His failure to grant her wish will not be in the nature of a rebuff. They will stand in exactly the same social relationship to each other as before. This shows how ostensive communication may have social implications that other forms of information transmission do not.

By making her informative intention mutually manifest, the communicator creates the following situation: it becomes mutually manifest that the fulfilment of her informative intention is, so to speak, in the hands of the audience. If the assumptions that she intends to make manifest to the audience become manifest, then she is successful; if the audience refuses to accept these assumptions as true or probably true, then she has failed in her informative intention. Suppose - we will soon see how this may happen - that the audience’s behaviour makes it mutually manifest that the informative intention is fulfilled. Then the set of assumptions I that the communicator intended to make manifest to the audience becomes, at least apparently, mutually manifest. We say 'at least apparently' because, if the communicator is not sincere and some of the assumptions in I are not manifest to her, then by our definition of mutual manifestness, these assumptions cannot be mutually manifest to her and others.\(^{32}\)

A communicator is normally interested in knowing whether or not she has succeeded in fulfilling her informative intention, and this interest is mutually manifest to her and her audience. In face-to-face communication, the audience is generally expected to respond to this interest in fairly conventional ways. Often, for instance, the audience is expected to communicate its refusal to accept the information communicated, or else it becomes mutually manifest that the communicator’s informative intention is fulfilled.

Where communication is non-reciprocal, there are various possible situations to be taken into account. The communicator may be in a position of such authority over her audience that the success of her informative intention is mutually manifest in advance. Journalists, professors, religious or political leaders assume, alas often on good grounds, that what they communicate automatically becomes mutually manifest. When the communicator lacks that kind of authority, but still wants to establish a mutual cognitive environment with her audience, all she has to do is adapt her informative intentions to her credibility. For instance, in writing this book we merely intend to make mutually manifest that what we have developed certain hypotheses and have done so on certain grounds. That is, we take it as mutually manifest that you will accept our authority on what we actually think. The mutual cognitive environment thus created is enough for us to go on to communicate further thoughts which we would otherwise have been unable to communicate. (Of course, we would also like to convince you, but we hope to do this by the force of our arguments, and not by making you recognise our informative intentions.)

We began this chapter by asking how human beings communicate with one another. Our answer is that they use two quite different modes of communication: coded communication and ostensive-inferential communication. However, the two modes of communication are used in fundamentally different ways. Whereas ostensive-inferential communication can be used on its own, and sometimes is, coded communication is only used as a means of strengthening ostensive-inferential communication. This is how language is used in verbal communication, as we will argue in chapter 4.

Ostensive-inferential communication can be defined as follows:

\((55)\) **Ostensive-inferential communication**: the communicator produces a stimulus which makes it mutually manifest to communicator and audience that the communicator intends, by means of this stimulus, to make manifest or more manifest to the audience a set of assumptions \(I\).

As this definition stands, it does not exclude the possibility of unintentional communication: that is, a stimulus merely intended to inform might make mutually manifest the intention to inform, and this, by our
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definition, would count as communication. For instance, suppose Mary yawns, intending to inform Peter that she is tired, and hoping that her yawn will look natural. She does not do it too well: it is all too obvious that her yawn is artificial — and her informative intention becomes mutually manifest. We see no reason for refusing to call this a case of unintended ostensive communication. It would be easy enough, though, to modify definition (55) and make intentionality a defining feature of communication.

In any case, most human communication is intentional, and it is intentional for two good reasons. The first reason is the one suggested by Grice: by producing direct evidence of one's informative intention, one can convey a much wider range of information than can be conveyed by producing direct evidence for the basic information itself. The second reason humans have for communicating is to modify and extend the mutual cognitive environment they share with one another.

What we have offered so far is a good enough description of ostensive-inferential communication. However, we have not explained how it works. We have suggested that the explanation is to be sought in a principle of relevance. To make this principle truly explanatory, we must first make the notion of relevance much more explicit, and to do this we must consider how information is mentally represented and inferentially processed. This, then, is the programme for the next two chapters.

2

Inference

1 Non-demonstrative inference

In the last chapter, we outlined a model of ostensive-inferential communication, looking more closely at the ostensive nature of the communicator's behaviour than at the inferential nature of comprehension. In this chapter, we will outline a model of the inferential abilities involved in comprehension. Here, we have already made two broad hypotheses on which we hope to build. First, we implicitly assumed that the process of inferential comprehension is non-demonstrative: even under the best of circumstances, we argued, communication may fail. The addressee can neither decode nor deduce the communicator's communicative intention. The best he can do is construct an assumption on the basis of the evidence provided by the communicator's ostensive behaviour. For such an assumption, there may be confirmation but no proof.

Second, we explicitly assumed that any conceptually represented information available to the addressee can be used as a premise in this inference process. In other words, we assumed that the process of inferential comprehension is 'global' as opposed to 'local': where a local process (e.g. deductive reasoning from fixed premises or auditory perception) is either context-free or sensitive only to contextual information from some set domain, and a global process (e.g. empirical scientific reasoning) has free access to all conceptual information in memory.

A non-demonstrative inference process with free access to conceptual memory: this sounds, appropriately enough, like an ordinary central thought process. A distinction between 'central' processes and 'input', 'perceptual' or 'peripheral' processes is assumed in much of current cognitive psychology. Roughly speaking, input processes are relatively specialised decoding processes, whereas central processes are relatively un specialised inferential processes. The distinction will be discussed and illustrated below.