New directions for research on pragmatics and modularity[*]

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Abstract

This paper considers the relation between the pragmatic abilities used to interpret communicative behaviour and more general mind-reading abilities used to interpret ordinary actions. According to the classical Fodorian view (Fodor 1983), pragmatics and mind-reading are central cognitive systems which are used to attribute mental states to others on the basis of general-purpose reasoning abilities. I will outline an alternative, relevance-theoretic account on which mind-reading is a dedicated inferential module, and pragmatics is a sub-module of the mind-reading module, with its own special-purpose principles and mechanisms.

1 Introduction

In the last half of the twentieth century, two clear trends with implications for pragmatics emerged from research in the cognitive sciences. The first was towards an increasingly inferential view of pragmatics, and the second towards an increasingly modular view of the mind. For a time, these trends seemed to pull in opposite directions. According to the classical version of the modularity thesis outlined in Fodor (1983), cognitive systems are of two main types: input modules, which are inferential only in the broadest sense, and central systems, which are properly inferential but not modular at all.[1] Within this framework, pragmatics could be seen as *either* modular (e.g. as part of a Chomskyan language faculty) *or* inferential (e.g. as part of a Gricean ability for inferential intention-recognition), but not both.

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[1] Fodor (1983) describes all computations (whether modular or central) as inferential in a broad sense. In a narrower sense, a process is inferential only if it takes conceptual representations as premises and yields conceptual representations as conclusions, and moreover the conclusions are deducible from, or at least warranted by, the premises (Sperber & Wilson 1986/95: 12-13). In Fodor's framework, only central systems are inferential in this narrower sense.

Fodor himself combined a broadly Chomskyan view of language with a broadly Gricean view of pragmatics. On this approach, language is an autonomous, domain-specific modular system and pragmatics is a domain-general central system. What makes the crucial difference is not just that pragmatics is inferential while language is not, but that pragmatic inferences are heavily context-dependent, and there is no principled limit on the type of contextual information that may be required or the source from which it may come (the interpretation of prior discourse, observation of the physical environment, encyclopaedic memory, knowledge of the speaker, cultural, scientific or religious assumptions, exercise of the imagination, and so on). For Fodor, pragmatic interpretation is a central process because its outcome depends on 'global' factors such as free access to memorised information. Modular processes, by contrast, are 'local', 'encapsulated' and heavily restricted in the type or source of contextual information on which they may draw. Accounts of pragmatics compatible with this view of mental architecture are outlined in Sperber & Wilson (1981a, 1986; Wilson & Sperber 1986).

While Fodor was developing his classical version of the modularity thesis, research in linguistics was providing strong support for Grice's view of pragmatic interpretation as a properly inferential process, and suggesting, moreover, that the scope of pragmatics was much wider than Grice had thought. Grice was mainly concerned with the role of inferential intention recognition in implicit communication, but it is now increasingly seen as playing a substantial role in explicit communication too (Sperber & Wilson 1986/95, 2002; Carston 1988, 1997, 2000, 2002a; Levinson 2000; Marmaridou 2000). To illustrate, consider the examples in (1)-(11):

Identification of explicit content (explicatures):

(1) John left *the party*. ('political group', 'festive gathering')
(2) The teachers told the students *they* needed more holidays. (reference resolution)
(3) I met *no-one* in town. ('no-one I knew', 'no-one interesting')
(4) Your father will be here *soon*. (resolution of vagueness)
(5) The sky is *blue*. ('partly/totally', 'blue of a certain shade/blueish')
(6) You will be there tomorrow. (request, bet, prediction)

Implicit content (implicatures):

(7) This book is as good as any the author has written. (good? mediocre? bad?)
(8) Some of the lectures were interesting. (scalar implicatures)
(9) a. *Jim:* Have you read *Relevance*?
b. *Sue*: I don't read difficult books. (indirect answers)
(10) I'm hungry. (indirect speech acts)
(11) Bill is a giant. (literal/metaphorical/ironical)

In order to decide what proposition the speaker intended to assert, the hearer may have to disambiguate and assign reference, as in (1) and (2), fix the domain of quantifiers, as in (3), resolve the interpretation of vague expressions, as in (4), and narrow or loosen lexical meaning, as in (5). In order to decide what direct speech act the speaker intended to perform, he may have to resolve illocutionary indeterminacies, as in (6) (which may be intended as a request, a bet or a prediction, for example). Many utterances also convey implicatures (intended implications): thus, (7) may implicate that the book was good (or not so good), (8) may implicate that not all the lectures were interesting, (9) may convey an indirect request and (10) an indirect answer, while (11) may be literally, metaphorically or ironically intended. In each case, the hearer's goal is to find not some arbitrary interpretation but the interpretation intended by the speaker. For this, he needs to use contextual information, and, as noted above, there seems to be no principled limit on the type of information he may be expected to supply, or the source from which it may come.[2]

Fodor himself was notoriously sceptical about the prospects for progress in the study of central processes:

> the reason that there is no serious psychology of central processes is the same as the reason there is no serious philosophy of scientific confirmation. Both exemplify the significance of global factors in the fixation of belief, and nobody begins to understand how such factors have their effects. (Fodor 1983: 129)

In later work (e.g. Fodor 2000), he has continued to emphasise the need for a distinction between local and global processes, modular and central systems. Fodor's First Law of the Non-Existence of Cognitive Science states that 'the more global ... a cognitive process is, the less anybody understands it' (Fodor 1983: 107). One effect of combining the classical version of the modularity thesis with an increasingly inferential view of communication was to suggest that pragmatics was unlikely to be a worthwhile domain for investigation using the methods of cognitive science.

More recently, a growing interest in evolutionary approaches to cognition has led to a reconsideration of the nature of modules and a questioning of Fodor's sharp distinction between modular input processes and relatively undifferentiated central

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[2] It is sometimes claimed that the context for comprehension is restricted to what is *mutually known* by participants. For arguments that mutual knowledge is neither necessary nor sufficient for comprehension, see Sperber & Wilson 1986/95: chapter 1, sections 3, 8; chapter 3, sections 3-4; Sperber & Wilson 1990.

processes.[3] From an evolutionary perspective, what characterises a module is not so much the cluster of properties that Fodor (1983: 47-101) ascribed to input systems (being fast, mandatory, local, encapsulated, etc.), but the presence of dedicated mechanisms (typically biological adaptations to regularities in some domain) which cannot be seen as special cases of more general mechanisms operating in broader domains (Sperber 1996, 2002). To illustrate, consider the mind-reading ability which enables humans to predict and explain the behaviour of others in terms of mental states (beliefs, desires, intentions, etc.) (Astington, Harris & Olson, 1988; Davies & Stone, 1995a; 1995b; Carruthers & Smith, 1996). According to the classical version of the modularity thesis, mind-reading should be a central rather than a modular process because its outcome depends on global factors: there is no principled restriction on the type of contextual information that may be required to predict and explain someone's actions.[4] From an evolutionary perspective, the question is not so much whether the processes involved are global or local, but whether they are carried out by general-purpose mechanisms or by autonomous, special-purpose mechanisms attuned to regularities existing only in the domain of intentional behaviour. To the extent that mind-reading involves such special-purpose inferential mechanisms, it would be modular in this new, broader sense.

Grice's main contribution to pragmatics was to show that utterance interpretation is essentially an exercise in mind-reading (Grice 1957, 1967, 1969, 1989). Understanding an utterance involves constructing a hypothesis about the speaker's meaning (the set of propositions, some explicit, others implicit, that the speaker overtly intended to convey). Recognising a speaker's meaning amounts to recognising the intention behind the speaker's communicative behaviour, and this is a special case of the more general problem of explaining an individual's behaviour in terms of attributed mental states. On this approach, utterance interpretation is a variety of mind-reading, and the question of whether mind-reading is a modular or a central system should have direct implications for pragmatics.

This paper has two main aims. First, I will consider some of the reasons for thinking that mind-reading is not a Fodorian central system but a domain-specific inferential module (or set of modules), using the term in its recent, broader sense. Second, I will argue that the trend towards an increasingly modular view of the mind can be taken one stage further. Just as there is good reason to think that mind-reading is not merely an application of general reasoning abilities to a particular (behavioral) domain, so there is good reason to think that pragmatic interpretation is not merely an application

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[3] See, for example, Hirschfeld & Gelman 1994; Barkow, Cosmides & Tooby 1995; Pinker 1997; Jackendoff 1997; Plotkin 1997; Carruthers & Chamberlain 2000. For reservationsd, see Fodor 2000.

[4] For Fodor's later views on mind-reading, see Fodor 1992, 2000.

of general mind-reading abilities to a particular (communicative) domain. Verbal communication presents special challenges, and exhibits certain regularities, not found in other domains, and these may have led to the development of a dedicated comprehension module with its own special-purpose principles and mechanisms.[5] The existence of such a module would have interesting implications for pragmatics. It would also give grounds for thinking that the two main twentieth-century research trends in the cognitive sciences with implications for pragmatics may now be converging rather than pulling apart.

2 Pragmatics as a variety of mind-reading

The inferential approach to pragmatics treats understanding an utterance as a special case of understanding intentional behaviour: the hearer explains the speaker's communicative behaviour by identifying the intention behind it. The link between mind-reading and communication is confirmed by a wealth of developmental and neuropsychological evidence. However, as noted above, mind-reading itself has been analysed in rather different ways, with different implications for pragmatics.

Traditionally, philosophers have described mind-reading as an exercise in reflective reasoning (a central process, in Fodor's terms), involving the application of general reasoning abilities to premises based on explicit assumptions about the relations between mental states and behaviour. Many of Grice's remarks about pragmatics fit well with this approach. For example, his 'working-out schema' for the derivation of conversational implicatures is a straightforward exercise in standard belief-desire psychology:

> He said that P; he could not have done this unless he thought that Q; he knows (and knows that I know that he knows) that I will realise that it is necessary to suppose that Q; he has done nothing to stop me thinking that Q; so he intends me to think, or is at least willing for me to think, that Q. (Grice, 1989: 30-31)

A hearer following this Gricean route would have to go through a complex discursive reasoning process in order to identify a single implicature, and the greater the element of inference involved in verbal comprehension, the more such processes there would be. One problem with this traditional account is that children as young as two or three seem to be capable of deriving implicatures and tailoring their utterances to the mental

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[5] These arguments, many of which were first put forward by Dan Sperber, are developed in more detail in Sperber 2000; Wilson 2000; Sperber & Wilson 2002; Wilson & Sperber 2002, forthcoming.

states of their audience, and it is hard to believe that they are going through complex discursive processes of this type (Newcombe & Zaslow 1981; Tomasello, Farrar & Dines 1983; O'Neill 1996; Papafragou 2002).

Recent developmental and neuropsychological evidence suggests a more modular approach. Much of this evidence comes from standard tests of mind-reading such as the Sally-Anne ('false-belief') task, which tests the participant's ability to keep track of the beliefs of others (Leslie 1987; Astington, Harris & Olson 1988; Perner, Frith, Leslie & Leekam 1989; Fodor 1992; Baron-Cohen 1995; Smith & Tsimpli 1995; Scholl & Leslie 1999). In a typical Sally-Anne task, the participant (often a child) watches as Sally plays with a ball, puts it away in a covered basket and leaves the room. While Sally is out, Anne removes the ball from the basket, puts it in a nearby box and closes the lid. When Sally returns and wants to play with her ball, the child is asked, 'Where will Sally look for the ball?' To pass the test, the child must realise that Sally does not know the ball has been moved, and will therefore look in the basket, where she left it, rather than the box, where it now is.

There is a now a substantial body of work on how this mind-reading ability develops and how it may break down. It may be present to varying degrees. For example, by correctly answering the question 'Where will Sally look for the ball?', the child displays a first-order mind-reading ability to track Sally's beliefs about the world; by correctly answering the question 'Where does Anne think Sally will look for the ball?' the child displays a second-order mind-reading ability to track Anne's beliefs about Sally's beliefs, and so on. Children generally pass first-order mind-reading tests towards the end of the fourth year, while people with autism are typically said to be lacking in first- or second-order mind-reading abilities of this type (Baron-Cohen, Leslie and Frith 1985; Leslie 1991; Baron-Cohen, Tager-Flusberg & Cohen 1993; Happé 1993, 1994; Baron-Cohen 1995).

This developmental and neuropsychological research is often informed by a Gricean view of pragmatics: it treats inferential communication as a variety of mind-reading, and provides clear evidence of a link between the two. For example, Bloom (2000, 2002) surveys a range of experiments which suggests that word learning in children typically involves monitoring the speaker's referential intentions by checking the direction of her gaze (a particular sub-type of mind-reading ability). Thus, a normally-developing 18-month-old child who is playing with an unfamiliar object and hears an adult say 'It's a modi' does not simply make a mechanical association between the word 'modi' and the object he is playing with, but checks to see what the adult is looking at, and interprets the word accordingly (Baldwin 1991, 1993). By contrast, autistic children, who are typically said to lack mind-reading abilities of this type, fail to monitor the adult's gaze direction and make a purely mechanical association between the name 'modi' and the object that happens to be in the forefront of their attention at the time.

Happé & Loth (2002) use a variant of the Sally-Anne task to test the child's ability to track the speaker's false beliefs in word learning. Sally shows the child an unfamiliar object A, puts it in a box, closes the lid and leaves the room. While Sally is out, Anne brings in unfamiliar object B, shows it to the child, removes A from the box, replaces it with B, and closes the lid. Sally returns, holds up the box and says to the child 'Do you want to see the modi? There's a modi in this box. Let's see the modi' (where 'modi' is a made-up word that the child could not have heard before). Later, the experimenter puts A and B in front of the child, and says, 'Show me the modi'. To pass the test, the child must realise that Sally intended to refer to object A, which she left in the box, rather than object B, which was in the box she was holding up when she spoke. A comparison of performance on the standard Sally-Anne task and the word-learning variant shows that children go through similar developmental stages in word-learning and regular mind-reading, but pass the word-learning test significantly earlier than the standard Sally-Anne task.

Happé and Loth's experiment involves a combination of word learning and reference resolution. There is some evidence that reference resolution in general goes through similar developmental stages. For example, Mitchell, Robinson & Thompson (1999) use a variant of the Sally-Anne task to test the child's ability to track the speaker's false beliefs in assigning reference to regular definite descriptions (e.g. 'the car in the garage'), where another object has been substituted for the intended referent in the speaker's absence. Their results, like those of Happé and Loth, show a link between the development of inferential comprehension and general mind-reading, although here the standard Sally-Anne task appears to be slightly easier than the reference-resolution task (for related results on reference resolution, see Bezuidenhout & Sroda 1998).

There are also parallels between the breakdown of mind-reading abilities and the breakdown of abilities for inferential communication. For example, autistic children have difficulty not only with mind-reading but with pointing and other acts of non-verbal communication (Sigman & Kasari 1995). In word learning, as noted above, they appear to make mechanical associations between word and object rather than monitoring the speaker's referential intentions by checking the direction of her gaze. Happé (1993) compared the interpretation of metaphor and verbal irony in normally developing children and people with autism, and showed a link between metaphor comprehension and first-order mind-reading ability, and irony comprehension and second-order mind-reading ability. Similar results were obtained by Langdon, Davies & Coltheart (2002) from studies of metaphor and irony in people with right-hemisphere damage.[6]

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[6] These results, which are not predicted by standard Gricean accounts of metaphor and irony, provide some confirmation of the relevance theoretic account, on which irony involves the expression of a dissociative attitude to an attributed thought. On this approach, the extra layer of mental-state

While there is are clear developmental and neuropsychological parallels between mind-reading and inferential communication, there are clear dissociations between mind-reading and general reasoning abilities, which are not explained by the traditional philosophical account of mind-reading as an exercise in general-purpose reasoning. For example, Williams Syndrome is a rare genetic disorder resulting in an average IQ of around 50, combined with good linguistic abilities and relatively high social skills. People with Williams Syndrome have good abilities for mind-reading and communication but poor general reasoning abilities. They pass the Sally-Anne task with ease, while their general ability to acquire theoretical, explanatory knowledge is seriously impaired (Segal 1996). This suggests that mind-reading cannot be a conscious, reflective process of the type illustrated in Grice's working out schema for implicatures, but depends on dedicated inferential mechanisms which may remain intact while general-purpose reasoning abilities are impaired.

Dissociations are also possible in the opposite direction. For example, people with Asperger's syndrome may have good general reasoning abilities combined with serious impairments in mind-reading abilities. If anything, these people show what it is like to use general-purpose reflective reasoning to make up for a lack of dedicated, special-purpose skills. Here is an illustration from the autobiography of someone with Asperger's syndrome describing a conscious attempt to resolve a lexical vagueness that most people would deal with spontaneously and unreflectively in a way more characteristic of modular skills (cf. examples (4) and (5) above):

> If [my husband] were to tell me he was disappointed he had missed me at lunch, I would wonder if he meant to say he was sad – which is simply regretfully sorry; unhappy – which is somewhere between mad and sad; disheartened – which is a lonely sad; mad – which makes you want to argue with someone over what they had done; angry – which makes you want to ignore the person you are feeling this way towards; furious – which makes you want to spit; or none of the above. In order for me really to understand what people are saying I need much more than a few words mechanically placed together. (Willey 1999: 63)

While we are all capable of carrying out reflective inferences of this type when spontaneous comprehension fails, utterance interpretation is in general a spontaneous, intuitive process which takes place below the level of consciousness. What seems to be lacking in people with Asperger's syndrome is this spontaneous, intuitive ability rather than a conscious, reflective one (Wilson 2000; Sperber & Wilson 2002).

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attribution required by irony should presuppose a higher degree of mind-reading ability (see Sperber & Wilson 1981b, 1986, 1998; Wilson & Sperber 1992).

Grice himself might not have been opposed to the idea of an intuitive mind-reading ability. What mattered to him was that this ability – whether intuitive or reflective – was not code-like but properly inferential:

> The presence of a conversational implicature must be capable of being worked out; for even if it can in fact be intuitively grasped, unless the intuition is replaceable by an argument, the implicature (if present at all) will not count as a CONVERSATIONAL implicature; it will be a CONVENTIONAL implicature. (Grice 1989: 31)

Grice's working-out schema for conversational implicatures is best seen as a rational reconstruction designed to show that the process is genuinely inferential, with the conclusion properly warranted by the premises, rather than an empirical hypothesis about how the inference is actually performed.[7] However, an empirically plausible pragmatic theory should also be concerned with the nature of the inferential mechanisms involved. Here, the developmental and neuropsychological evidence seems to favour a view of mind-reading as a domain-specific modular system rather than a central, reflective one.

3 Pragmatics, modularity and mind-reading

Evolutionary approaches to psychology treat cognition as a biological function and cognitive mechanisms, in general, as adaptations. The mind is seen as an 'adaptive toolbox', a set of dedicated cognitive mechanisms which are likely to have evolved in small incremental steps, typically involving the selection of a variant that performed more efficiently (yielding greater benefits, for smaller costs) than other variants available at the time (Hirschfeld & Gelman 1994; Barkow, Cosmides & Tooby 1995; Sperber 1996, 2002; Gigerenzer et al. 1999).

One way a dedicated cognitive mechanism can contribute to overall efficiency is by providing special-purpose inferential procedures ('fast and frugal heuristics', in the terms of Gigerenzer et al. 1999) attuned to regularities in some particular domain, which yield reliable conclusions only when applied to input from this domain. Modular accounts of mind-reading, for example, appeal to special-purpose inferential procedures which work reliably in the domain of intentional behaviour, yielding the same conclusions derivable by general-purpose reasoning mechanisms, but in a less effort-demanding way. In procedures of this 'fast and frugal' type, regularities in the relations between mental states and behaviour need not be represented and used as

[7] This interpretation is confirmed by the discussion of reasoning in Grice (2001).

explicit premises in an inference process, as in standard belief-desire psychology (cf. Grice's working-out schema), but function merely as tacit underpinnings for the working of the device. The result should be an intuitive ability to draw valid conclusions in the domain of intentional behaviour, but without any reflective awareness of how these conclusions are drawn.

In fact, given the complexity of mind-reading, the variety of tasks it has to perform and the particular sub-regularities they exhibit, it is reasonable to assume that mind-reading is not a single, relatively homogeneous system but a collection of autonomous mechanisms or sub-modules articulated together in some way. One example of a sub-module investigated in the literature on mind-reading is the Eye Direction Detector which is seen as underlying the ability, already present in infants, to infer what people are seeing or watching from the direction of their gaze (Baron-Cohen 1995). Presumably, an infant who performs this sort of inference is not using a relatively general and internally undifferentiated mind-reading module to derive conclusions such as (14) on the basis of explicit premises such as (12) and (13):

(12) If person P is looking in the direction of object O, then P is seeing O.
(13) Daddy is looking in the direction of the cat.
(14) Daddy is seeing the cat.

It is more reasonable to assume that humans are equipped from infancy with a dedicated Eye Direction Detector, which exploits the de facto strong correlation between direction of gaze and visual perception and directly attributes perceptual and attentional states on the basis of direction of gaze (moving directly from premises such as (13) to conclusions such as (14)). This attribution may itself provide input for other dedicated devices, such as those involved in word learning (see above and Bloom, 2000, 2002). In infants at least, such attributions need not be available at all for general-purpose inference or verbal expression.

Despite this evidence that the mind-reading ability may be broken down into a set of specialised sub-modular abilities, most approaches to mind-reading, whether modular or non-modular, have tended to take for granted that there is no need for a special-purpose inferential comprehension procedure: the standard assumption has been that the mental-state attributions required for comprehension will be automatically generated by more general mind-reading mechanisms which apply across the whole domain (see Bloom 2002 for an explicit defence of such a view). However, there are serious problems with the view that speakers' meanings can be inferred from utterances using the same general mind-reading mechanisms which attribute intentions on the basis of regular, non-communicative behaviour. In the first place, the range of ordinary, non-communicative actions an individual can reasonably intend to perform in a given situation is in practice quite limited. When I reach out my

hand, there is a relatively restricted set of objects I could reasonably be intending to grasp, and this makes it much easier for an observer to identify the intention behind my action. By contrast, the gap between sentence meaning and speaker's meaning is so great that the range of meanings a speaker can reasonably intend to communicate by uttering a sentence in a given physical setting is virtually unlimited. It is simply not clear how the standard procedures for attributing intentions on the basis of regular, non-communicative behaviour could yield adequate attributions of speakers' meanings, except in easy and trivial cases (Sperber 2000; Sperber & Wilson 2002).

In the second place, Grice was concerned with a type of communication ('meaning$_{nn}$'), which requires a particular, overt form of intention expression not found in ordinary actions (Grice 1957, 1967, 1969, 1989). For communication to be overt, the speaker must not merely intend to convey certain information, but must intend her audience to recognise that she has this intention. In the terms of Sperber & Wilson (1986/95), overt communication involves not only an informative but a communicative intention: the communicator must *intend* her audience to *believe* that she *intends* them to *believe* a certain set of propositions (Sperber 1994). The interpretation of overt communication therefore involves several orders of mind-reading ability, whereas in explaining ordinary actions, a single level is generally enough. It is hard to believe that two-year-old children, who fail, for instance, on regular first-order false belief tasks, can recognise and understand the peculiar multi-levelled representations required in overt communication, using nothing more than a general ability to attribute intentions to others in order to predict and explain their behaviour (Sperber 2000; Wilson 2000; Sperber & Wilson 2002).[8]

A third problem with the view that utterance interpretation is simply an exercise in general mind-reading is that the standard procedures for inferring the intentions behind ordinary actions don't seem to work for overt communication. On standard accounts of mind-reading (cf. Davies and Stone 1995b; Carruthers and Smith 1996), the procedure for inferring the intention behind an action should be as follows: first, identify an effect of the action that the agent might have both predicted and desired; second, assume that this was the effect the agent intended to achieve. However, this procedure would not account for utterance interpretation, because here the desired effect just *is* the recognition of the speaker's intention. In order to first identify a desirable effect of an utterance and then assume that this was the intended meaning, the hearer would have to have a pretty good advance idea of what the speaker would be wanting to convey. This sometimes happens, of course, but speakers often say unexpected things, and hearers still manage to understand them. In these cases, the

[8] This has led some commentators to question whether two- or three-year-old children are engaging in genuine overt communication at all. For discussion, see Breheny 2002, forthcoming; Carston 2002b; Papafragou 2002; Recanati 2002.

standard procedures for inferring intentions would not help with utterance interpretation: the hearer cannot *first* identify a desirable effect of the utterance, and *then* infer that the speaker's intention was precisely to achieve this effect (Sperber 2000; Sperber & Wilson 2002).

In this section, I have considered some reasons for thinking that mind-reading is not a single, homogeneous module but a set of special-purpose mechanisms or sub-modules attuned to regularities in narrower domains. I have argued that these may include a dedicated comprehension mechanism, an evolved 'mental organ' with its own special-purpose inferential principles or procedures. The workings of such a mechanism should be tacitly underpinned by regularities in the domain of overt intentional communication. What might such regularities be? In the next section, I will outline the relevance-theoretic view that overt intentional communication creates expectations of relevance not raised by ordinary actions, which a dedicated comprehension mechanism might exploit. (For discussion and elaboration of the arguments of this section, see Sperber 1996, 2000, 2002; Origgi & Sperber 2000; Wilson 2000; Carston 2002a; Sperber & Wilson 2002.)

4 Pragmatics as a sub-module of the mind-reading module

Relevance theory (Sperber and Wilson 1986/1995, 2002; Carston 2002a; Wilson & Sperber 2002, forthcoming) is an account of human communication and cognition based on a definition of relevance and two general principles: a First, or Cognitive, Principle of Relevance and a Second, or Communicative, Principle of Relevance. Relevance is characterised as a property of inputs to cognitive processes and analysed in terms of the notions of cognitive effect and processing effort. When an input (for example, an utterance) is processed in a context of available assumptions, it may yield some cognitive effect (for example, by strengthening these assumptions, contradicting and eliminating them, or combining with them to yield contextual implications). Other things being equal, the greater the cognitive effects achieved, the greater the relevance of the input to the individual who processes it. However, the processing of the input, and the derivation of these effects, involves some effort of perception, memory and inference. Other things being equal, the smaller the processing effort required, the greater the relevance of the input to the individual who processes it. On this account, relevance is a cost-benefit notion (the cost being the mental effort required, and the benefits the cognitive effects achieved), and a tendency towards increasing the efficiency of the cognitive system by maximising relevance would fit well with the evolutionary approach to cognition outlined in section 3. This tendency is described in the *First*, or *Cognitive, Principle of Relevance*:

(15) **Cognitive principle of relevance:**
Human cognition tends to be geared to the maximisation of relevance.

It follows from the Cognitive Principle of Relevance that human attention and processing resources tend to be automatically allocated to information that seems relevant enough to be worth processing. This is not because we have a choice in the matter, but because of the way our cognitive systems have evolved. As a result of constant selection pressure towards increasing efficiency, the human cognitive system has developed in such a way that our perceptual mechanisms tend automatically to pick out potentially relevant stimuli, our memory retrieval mechanisms tend automatically to activate potentially relevant contextual assumptions, and our inferential mechanisms tend spontaneously to process them in the most productive way. It is against this cognitive background that communication takes place.

This universal cognitive tendency to maximise relevance makes it possible (at least to some extent) to predict and manipulate the mental states of others. Knowing that you are likely to pick out the most relevant stimuli in your environment and process them so as to maximise their relevance, I may be able to produce a stimulus which is likely to attract your attention, prompt the retrieval of certain contextual assumptions and point you towards an intended conclusion. For example, I may take out my wallet, intending you to notice and conclude that I am about to pay for our drinks. As Grice pointed out, this is not yet a case of overt communication because, although I did intend to affect your thoughts in a certain way, I gave you no evidence that I had this intention. Overt communication involves both an informative and a communicative intention:

(16) **The informative intention**:
The intention to inform an audience of something.

(17) **The communicative intention**:
The intention to inform the audience of one's informative intention.

How does the communicator indicate to the audience that she is trying to communicate with them in this overt, intentional way? Instead of unostentatiously taking out my wallet, I might touch your arm and point to it, wave it at you, ostentatiously put it down in front of you, catch your eye and stare at it, or say 'I'll pay for the drinks'. More generally, overt communication involves the use of an *ostensive stimulus*, designed to attract an audience's attention and focus it on the communicator's meaning. According to the *Second*, or *Communicative*, *Principle of Relevance*, use of an ostensive stimulus triggers expectations of relevance not raised by ordinary actions,

which may be enough on their own to guide the audience towards the communicator's meaning:

(18) **Communicative principle of relevance:**
Every utterance (or other act of overt communication) communicates a presumption of its own optimal relevance. (Sperber and Wilson 1986/1995: 260)

It follows from the Communicative Principle of Relevance (and the definition of optimal relevance, cf. Sperber and Wilson 1986/1995: 266-78) that the speaker, by the very act of addressing someone, communicates that her utterance is the most relevant one compatible with her abilities and preferences, and is at least relevant enough to be worth his processing effort:

(19) **Presumption of optimal relevance**
(a) The utterance will be at least relevant enough to be worth processing;
(b) The utterance will be the most relevant one (i.e. yielding the most effects for the smallest effort) compatible with the speaker's abilities and preferences.

As illustrated in (1)-(11) above, inferential comprehension starts from the recovery of a linguistically encoded meaning, which is typically quite fragmentary and incomplete. The goal of pragmatic theory is to explain how the hearer, using available contextual information, develops this into a full-fledged speaker's meaning. The regularity in overt communication described in the Communicative Principle of Relevance motivates the following special-purpose comprehension procedure which, according to relevance theory, is automatically applied to the on-line processing of attended verbal inputs. The hearer takes the linguistically decoded meaning; following a path of least effort, he uses available contextual information to enrich it at the explicit level and complement it at the implicit level until the resulting interpretation meets his expectation of relevance; at which point, he stops:

(20) **Relevance-theoretic comprehension procedure**
(a) Follow a path of least effort in computing cognitive effects. Consider interpretations (disambiguations, contextual assumptions, implicatures, etc.) in order of accessibility.
(b) Stop when your expectation of relevance is satisfied.

The mutual adjustment of explicit content and implicatures, constrained by expectations of relevance, is the central feature of relevance-theoretic pragmatics (Carston 2002a; Wilson & Sperber 2002, forthcoming).

The relevance-theoretic comprehension procedure may be seen as a fast and frugal heuristic: a special-purpose inferential procedure justified by the regularity described in the Communicative Principle of Relevance, which yields reliable conclusions only when applied to inputs from the domain of overt communication. In general, an observer is not entitled to expect the actions of others to be relevant enough to be worth his attention; in interpreting utterances addressed to him, he *is* entitled to such an expectation (though this expectation, like any other, may be disappointed). The relevance-theoretic comprehension procedure may thus be seen as automatically constructing a hypothesis about the speaker's meaning on the basis of a description of the utterance plus available contextual information, in much the same way as the Eye Direction Detector automatically constructs a hypothesis about what the individual is seeing on the basis of the direction of her gaze. Since there is no principled restriction on the type or source of contextual information used in constructing hypotheses about the speaker's meaning, the process would be global in Fodor's sense. However, it does not follow that all the available contextual information has to be actively taken into consideration as the interpretation proceeds. The relevance-theoretic comprehension procedure simply follows a path of least effort, using whatever contextual information is most highly activated by the automatic workings of the cognitive system at the time. Given the universal cognitive tendency to maximise relevance, the speaker should be able to predict, at least to some extent, what this most highly activated information will be. On this approach, the regularities described in the Cognitive and Communicative Principles of Relevance should thus provide an adequate basis for a dedicated comprehension mechanism, a sub-module of the mind-reading module.

Although many aspects of relevance theory have been experimentally tested (see e.g. Sperber, Cara & Girotto 1995; van der Henst, Sperber & Politzer 2002; van der Henst, Carles & Sperber 2002), the arguments for a dedicated comprehension procedure outlined in the last two sections have been largely theoretical. In the next section, I will consider briefly some lines of experimental investigation that might provide further evidence for or against this approach.

5 Conclusion

An obvious source of evidence for the modularity of pragmatics would be dissociations between the general mind-reading ability and the ability for inferential communication. Several researchers have reported that such dissociations exist in people without autism who have 'pragmatic language impairment', involving difficulties in verbal communication combined with satisfactory linguistic and general mind-reading abilities (Bishop 1997; Botting & Conti-Ramsden 1999; Rinaldi 2000). So far, this research has focused mainly on the production rather than the

comprehension side (which may be harder to study because general mind-reading abilities might compensate to some extent for specifically pragmatic impairments). Studies of comprehension in people with pragmatic language impairment might shed some light on which interpretive abilities are specifically pragmatic and which are linked to more general mind-reading skills.

On the developmental side, the discrepancies found by Happé & Loth (2002) and Mitchell, Robinson & Thompson (1999) in the times at which children pass the false-belief task in word-learning, reference resolution and general mind-reading suggest a further line of research. Happé & Loth see their results as providing some confirmation of the existence of a dedicated comprehension mechanism, and it would be interesting to compare performance on the standard false-belief task with performance on variants designed to test the full range of pragmatic abilities illustrated in (1)-(11). Pragmatic impairments resulting from right-hemisphere damage in adults might shed further light on the relation between specifically pragmatic abilities and general mind-reading skills (e.g. Paradis 1998; Langdon, Davies & Coltheart 2002). The results of these developmental and neuropsychological studies might help to distinguish the relative contributions of pragmatic abilities and general mind-reading abilities in word learning (cf. Bloom 2000, 2002; Akhtar 2002).

Sperber (1994) proposes a theoretical framework in which the relation between pragmatic abilities and mind-reading abilities might be investigated and explained. He discusses three increasingly sophisticated strategies which the hearer might use in interpreting an utterance, each requiring an extra order of mind-reading ability. The simplest strategy is one of Naïve Optimism. A Naively Optimistic hearer looks for an interpretation that seems relevant enough: if he finds one, he assumes that it was the intended one and attributes it as a speaker's meaning; if he does not, he has no further resources, and communication will fail. In Sperber's terms, a Naively Optimistic hearer assumes that the speaker is both competent and benevolent: competent enough to avoid misunderstanding, and benevolent enough not to lead him astray. Suppose a mother nods in the direction of a group of children and tells her son:

(21) It's his turn.

'His turn' could mean the turn of any boy in this group the mother has in mind. The mother has spoken competently if the first overall interpretation her son finds relevant enough (via mutual adjustment of context, content and implicatures) is the intended one; she has spoken benevolently if this interpretation not only seems relevant but is genuinely so (i.e. his mother is not lying or trying to distract him from something happening elsewhere). A Naively Optimistic hearer has no need to think about the speaker's mental states in order to identify her meaning: the only time he needs to represent the speaker's thoughts is when, having found an acceptable interpretation,

he concludes that it is the intended one.

A more complex strategy, which requires an extra layer of mind-reading ability, is one of Cautious Optimism. A Cautiously Optimistic hearer assumes that the speaker is benevolent, but not necessarily competent. Instead of taking the first interpretation he finds relevant enough and attributing it as the speaker's meaning, he can ask himself on what interpretation the speaker *might have thought* her utterance would be relevant enough to him. This extra layer of mind-reading ability allows him to avoid misunderstanding in two types of case where a Naively Optimistic hearer would fail.

The first is the case of *accidental relevance*. An utterance is accidentally relevant when the first interpretation the hearer finds relevant enough is not the intended one. Suppose the mother in (21) is looking in the direction of her son's best friend, and failed to notice the boy beside him, who is highly salient to her son because they have just been quarrelling behind her back about whose turn it was. In this case, the first interpretation of (21) that the child finds relevant enough might be the one on which his mother is saying that it is this boy's turn. A Naively Optimistic hearer would accept this as the intended interpretation. A Cautiously Optimistic hearer would be able to consider whether his mother could have expected her utterance, on this interpretation, to be relevant enough to him. Notice the parallels with the 'false-belief' task as applied to reference resolution (e.g. Bezuidenhout & Sroda 1998; Mitchell, Robinson & Thompson 1999).

An utterance may also be *accidentally irrelevant*. An obvious case is when someone makes a slip of the tongue, or mistakenly tells you something you already know. Another arises when an intended reference fails. Suppose a mother tells her child:

(22) Bring me the book on the kitchen table.

When the child goes into the kitchen, there is no book on the table but one lying near it on the floor. A Naively Optimistic hearer would restrict himself to the linguistically encoded meaning, would be unable to find an acceptable interpretation, and communication would fail. By adopting a strategy of Cautious Optimism, and asking himself which book his mother *might have thought* was on the kitchen table, the child may succeed in identifying the intended interpretation despite the speaker's mistaken belief. Clearly, most ordinary hearers are capable of this.

While a Cautiously Optimistic hearer can deal with speaker incompetence, his assumption of speaker benevolence may still lead him astray. The strategy of Sophisticated Understanding allows hearers to cope with the fact that speakers are sometimes deceptive: they may intend an interpretation to *seem* relevant enough without in fact being so. For example, in saying (21), as noted above, the mother may be lying or attempting to distract her child from something happening elsewhere. Using the strategy of Sophisticated Understanding, the child may be able to identify

his mother's meaning even if he knows she is lying, by asking himself under what interpretation she *might have thought he would think* her utterance was relevant enough. In identifying the intended interpretation, he therefore has to represent the speaker's thoughts about his thoughts. Most adult speakers are capable of this (for survey and discussion of deceptive communication, see Kleisouras 2002).

To sum up. A Naively Optimistic hearer need not represent the speaker's mental states at all in identifying the speaker's meaning: he simply takes the first interpretation that seems relevant enough and treats it as the intended one. A Cautiously Optimistic hearer considers what interpretation the speaker *might have thought* would be relevant enough: at the cost of an extra layer of mind-reading, he can cope with cases where the speaker tries to be relevant enough, but fails. Finally, a hearer using the strategy of Sophisticated Understanding considers what interpretation the *speaker might have thought he would think* was relevant enough; at the cost of a further layer of mind-reading, he can cope with deceptive cases in which nothing more than the appearance of relevance is attempted or achieved (see Sperber 2000; Wilson 2000 for discussion).

These strategies have implications for the development of inferential comprehension. A child starting out as a Naive Optimist should make characteristic mistakes in comprehension (in disambiguation and reference resolution, for example), and as noted above, there is some experimental evidence for this. Roughly speaking, the move from Naive Optimism to Cautious Optimism coincides with the acquisition of first-order mind-reading ability, and this is predictable from the account of Naive Optimism given above. It also coincides with the age when children no longer simply trust what adults tell them, becoming what Harris et al. (2003) call Cautious Disciples, weighing conflicting evidence and monitoring the reliability of speakers in deciding what to believe.

The trend towards increasingly inferential views of pragmatics, the wide range of pragmatic abilities illustrated in (1)-(11) and the increasing sophistication of experimental techniques should provide a fertile testing ground for investigating the move from Naive Optimism to Cautious Optimism and comparing the results with performance on the standard 'false-belief' task. The appearance of Sophisticated Understanding, with its links to second-order mind-reading and the ability to cope with different types of deception (communicative and non-communicative, overt and covert) should yield further evidence on how the comprehension mechanism is articulated with other sub-modules of the mind-reading mechanism – an obvious subject for future research.

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