*Lexical acquisition and pragmatics**

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Abstract

This paper considers the extent to which lexical acquisition is an exercise of an associationist ability, a general mind-reading ability or a specifically pragmatic ability. Particular attention is paid to the role played in word-learning by natural communicative phenomena—gaze direction, facial expression, tone of voice etc.—and to the question of how such behaviours might be accommodated within a pragmatic theory. Some possible directions in which future research into the pragmatics of lexical acquisition might proceed are also sketched.

1 Introduction

Ask any non-specialist what they imagine the main focus of the study of meaning to be, and the reply (personal experience tells me) will almost certainly be 'words'. Words, after all, are the paradigmatic vehicles of meaning. What else could there be to the study of meaning than the study of words?

There are a variety of ways in which the linguist might respond. In the first instance, it might be pointed out that while the study of meaning of course involves the study of words, what a *speaker* might mean by their utterance of a particular word on a particular occasion may differ—to a greater or lesser extent—from what the word itself is usually said to mean. So the study of meaning inescapably also involves the study of what speakers do with words and how they do it. This observation lies at the heart of a distinction central to the study of meaning as it exists today: the distinction between semantics and pragmatics.

We might then go further. We would be in good company (Grice 1968, 1969; Schiffer 1972) if we were to suggest that there is a sense in which what speakers mean by their uses of words is—in some way—prior to what the words themselves mean, or at least that the latter notion might ultimately be dependent on the former. Grice's aim, for example, was to characterise the meanings of words in terms of the beliefs, desires and intentions of the speakers who utter them. As he later put it: '…what words mean is a matter of what people mean by them' (1989, p. 340). Although aspects of this view have fallen out of favour, its flavour still lingers in

*Thanks to Deirdre Wilson for comments on earlier drafts of this paper. This work is supported by A.H.R.B. research grant MRG-AN9291/APN16356 'A unified theory of lexical pragmatics'.

accounts which seek to set the evolution of language within the evolution of cognition generally (Dunbar 1998, Origgi & Sperber 2000, Sperber 2000). Such accounts propose that words could not have evolved in the absence of speakers equipped with the requisite cognitive sophistication to mean something by them. People meant things by their actions before they had words to mean things for them.

This is a paper about words. However, I wanted to stress early on that it considers words very much from the perspective of what speakers do with them, and how speakers do things with them. It treats words as tools with which we communicate *our* meanings, rather than solely as objects that mean in and of themselves. My primary consideration, then, will not be the linguistic properties of words (though something will have to be said about how those words map onto the concepts they communicate). Instead, I will consider words in the light of the broader human cognitive abilities—and in particular the ability to recognise the mental states of others, known as 'mind-reading' or 'theory of mind'—that underlie the way that children acquire them and adult speakers use them.

The perspective adopted here also involves treating words as only one element in a whole *set* of tools we use to communicate our meanings. What may well be vestiges of a pre-linguistic human communicative repertoire still remain in those largely natural, non-verbal behaviours which accompany speech—often known as 'paralinguistic' phenomena—and while the extent to which the meanings we convey rely on words should not, of course, be underestimated, neither should the extent to which it relies on behaviours such as these. As Abercrombie (1968, p. 55) puts it: 'We speak with our vocal organs, but we converse with our whole body'. Nor should we underestimate the role played by these behaviours in the way children acquire words and their meanings. What follows, then, will also involve considering words in the light of (what I have called) *natural pragmatic* factors (Wharton 2003*b*).

In the next section I consider lexical acquisition in the light of two competing accounts. The first of these proposes that lexical acquisition is an exercise of an *associationist* ability, the second that a general *mind-reading* ability is involved. I present arguments that suggest there is more to lexical acquisition than the ability to make a simple association between words and objects. Acquiring the meanings of words is largely a matter of working out—using natural, non-verbal cues—what it is that people are referring to when they use them. In Section 3 I introduce the pragmatic theory adopted in this paper—relevance theory (Sperber & Wilson 1986/1995). I show that the same clues that children use during the acquisition process play a role in regular adult comprehension, and propose that lexical acquisition and adult comprehension are an exercise of the same specifically *pragmatic* ability. In Section 4 I turn in more detail to natural pragmatics. Here, I revisit earlier work of my own on the 'showing-meaning$_{NN}$' continuum (Wharton

2003*abc*), which concerns itself with how natural, non-verbal behaviours might be accommodated within a pragmatic theory. In the final section I consider some of the implications adopting this framework might have for future research into the pragmatics of lexical acquisition.

2 Lexical acquisition and mind-reading

The remarkable precocity that children exhibit in their ability to learn words is well documented. According to Bloom, *P*. (2000), from the age of 12 months children acquire roughly ten new words a day. By the time they are 17 they will have attained a vocabulary of (on a conservative estimate) 60,000 words. In the absence of any formal training, very young children 'fast-map' words to meanings—with hardly any errors—after only one or two exposures. Sometimes (in the case of many verbs, for example) not even the virtual absence of explicit naming by carers affects the child's ability to map new words onto actions.

Central to Bloom's thesis is the claim that the child's sensitivity to the mental states of others plays a hugely important role in the process of lexical acquisition. In his 2001 précis, Bloom elaborates:

> This proposal is an alternative to the view that word learning is the result of simple associative learning mechanisms, and it rejects as well the notion that children possess constraints, either innate or learned, that are specifically earmarked for word learning. (Bloom 2001, p. 1094)

The view that word learning *is* the result of associative learning mechanisms (see, for example, Bloom, *L*. 1994, p. 91) can be traced back to the empiricist philosophers Mill, Locke and Hume. Under this view, children form reliable associations between words and their meanings as a result of their sensitivity to statistical co-occurrences between what they see and what they hear. In many ways this approach is similar to the model of acquisition championed by Skinner (1957). Bloom's alternative view involves adopting a mind-reading approach. Rather than just being sensitive to statistical correlations, children are sensitive to the referential intentions of speakers. Under this view, acquiring the meanings of words is largely as a matter of working out—using natural, non-verbal cues—what it is that people intend to refer to when they use them. In short, the child seems to be sensitive to what people mean before learning what words mean: ontogeny recapitulates phylogeny once more.

Bloom does not deny the existence of other factors in word learning, such as evidence from syntactic structure, or innate dispositions to form certain kinds of concepts. Indeed, it is widely agreed in the literature that children rely on a variety

of different cues when learning words (Diesendruck 2004). Bloom does, however, provide a whole range of convincing arguments to support a mind-reading model over an associationist one.

In the first place, the input the child receives is flawed in key regards. In some cultures, for example, parents and carers do not overtly name objects for children at all, yet word-learning proceeds at the same rate as in cultures where they do. Even in cultures (such as ours) where objects *are* overtly named by parents and carers, it is not always the case that a child will be looking at the object being named at the time they hear the word for that object. If word learning were simply a matter of associationist correlation, then on the basis of the input they receive we would expect the child to make many mapping errors in the course of word learning. The fast-mapping by children of words onto meanings is conspicuously error-free.

Secondly, there is experimental evidence to favour a mind-reading model over an associationist one. In a series of experiments, Baldwin (1991, 1993) effectively tested the two models. A child was given an object to play with while another, different, object was put into a bucket in front of the experimenter. Whilst the child was looking at the object she was playing with, the experimenter looked at her object and said a novel word—'It's a *modi*'. As Bloom reports:

> This gives rise to a perfect Lockean correspondence between the new word and the object the baby was looking at. But 18-month-olds don't take *modi* as naming this object. Instead, they look at the experimenter and redirect their attention to what she is looking at… [T]hey assume that the word refers to the object the experimenter was looking at when she said the word—not the object that the child herself was looking at. (2000, p. 64)

Thirdly and finally, a mind-reading model predicts that autistic individuals, who have impaired mind-reading abilities (Leslie 1987, Happé 1994, Baron-Cohen 1995, Scholl & Leslie 1999) and have problems with pragmatic tasks generally, should show impaired word learning abilities. This is indeed the case. Baron-Cohen *et al.* 1997 replicated Baldwin's experiments with autistic children. As predicted by the mind-reading model, these children assumed that the word *modi* referred to the object they—rather than the experimenter—were looking at. Autistic children do not monitor gaze direction (Mundy *et al.* 1986) and the autistic child remains unaware that the experimenter is intending to refer to something other than the object the child herself is looking at.

If mind-reading is so centrally implicated in the way children learn words, then natural pragmatic factors will play a crucial role. Facial expression, gesture and gaze direction all provide an audience with vital clues as to the mental states of the others. Gaze direction is clearly one of the most important factors at play and in

Baldwin's experiments, it is the most crucial piece of evidence that the child has as to the experimenter's intentions. Indeed, gaze direction is such a reliable indicator of aspects of another's intentions that it seems plausible to suggest that humans have an evolved, dedicated mechanism to monitor it. Baron-Cohen (1995) proposes that there is an 'Eye Direction Detector', which might form a *sub*-module of the wider mind-reading module. Infants are disposed at a very early age to monitor eyes: Barrera & Maurer (1981) showed that two-month-old infants look significantly more at an adult's eyes than at other regions of their face; Papousek & Papousek (1979) suggest that six-month-old infants look up to three times longer at a face that is looking at them than at one that is looking away.

Of course, at this very early stage in development, the child may just be 'tuning-in' to gaze direction, rather than attributing complex mental states (such as intentions) on the basis of it. Nonetheless, it appears that gaze direction quickly comes to be perceived as the main way adults indicate objects to children in the naming process. At a similarly early age, children follow adults' pointing gestures. By the age of one the child herself begins pointing, and monitors the gaze direction of the adult to check whether she has been successful in changing the focus of their attention. As well as the problems autistic individuals have tracking gaze direction, Sigman & Kasari (1995) show how even basic acts of showing such as pointing are problematic for autistic individuals, predicting precisely the results found in Baron-Cohen *et al.* (1997).

At a later stage in her development, the child tracks not just gaze direction in word learning tasks, but also emotional expression as evidenced by facial expression and tone of voice. Tomasello and Akhtar (1994) report that children tracked not only the gaze but also the facial expression and tone of voice of experimenters while they searched for an object being named with a novel word ('toma'). When the experimenter had clearly found her goal, the child recognised this was so by interpreting her emotional expression, and understood the word accordingly. Interjections and other expressions of emotion also play a role. In Tomasello & Kruger (1992) an experimenter uttered an unfamiliar verb when telling the child what action she was about to perform. She then performed two actions, one accompanied by an expression such as 'whoops', which indicated the action was accidental, and the other accompanied by a word indicating the action was intended. The child monitored the experimenter's reactions and took the verb to refer to the intended action, rather than the apparently accidental one. Since autistic individuals also have problems interpreting emotional states (Hobson, Ouston and Lee 1988; Muris, Meesters, Merckelbach and Lomme 1995) the prediction would be that they would fail in experiments such as these.

Bloom attributes the often somewhat bizarre use of words by autistic individuals to the fact that they only have associationist, rather than mind-reading strategies to resort to in lexical acquisition. Diesendruck (2004) suggests that those non-human

animals that acquire limited vocabularies (such as trained bonobos) also do so by using associationist abilities. However, as Sperber (2004) notes in response to Diesendruck, it is not the case that autistic children have *no* interpretive abilities at all. An alternative possibility is that their interpretive abilities are limited by their failure to comprehend natural pragmatic cues such as gaze direction, tone of voice, facial expressions of emotion, etc., but that they are still performing recognisably pragmatic inferences in comprehension, and in particular in word learning. In the next section, I take up this proposal and consider the extent to which lexical acquisition might be an exercise of a *pragmatic*, as opposed to a general mind-reading ability.

3 Lexical acquisition and relevance

3.1 Relevance theory

Relevance theory (Sperber & Wilson 1986/1995) takes its lead from Chomskyan and Fodorian insights into language and mind, and combines a broadly Gricean intention-based pragmatics with aspects of cognitive science and modern psychological research to provide a cognitive-inferential pragmatic framework.

Relevance theory is built around two principles. The *Cognitive Principle of Relevance* makes a fundamental assumption about human cognition: the human cognitive system is geared to look out for *relevant* information, which will interact with existing mentally-represented information and bring about positive cognitive effects based on a combination of new and old information. Relevance itself is a property of inputs to cognitive processes, and is defined in terms of cognitive effects gained and processing effort expended: other things being equal, the more cognitive effects gained, and the less processing effort expended in gaining those effects, the greater the relevance of the input to the individual who processes it.

The human disposition to search for relevance is seen as an evolved consequence of the tendency toward greater efficiency in cognition (Sperber & Wilson 2002). It is, furthermore, a disposition that is routinely exploited in human communication. Since speakers know that listeners will pay attention only to stimuli that are relevant enough, in order to attract and hold an audience's attention, they should make their communicative stimuli appear at least relevant enough to be worth processing. More precisely, the *Communicative Principle of Relevance* claims that by overtly displaying an intention to inform—producing an utterance or other ostensive stimulus—a communicator creates a presumption that the stimulus is at least relevant enough to be worth processing, and moreover, the most relevant one compatible with her own abilities and preferences. This Communicative Principle motivates the following relevance-theoretic comprehension procedure—taken from Wilson & Sperber (2002, p.13):

Relevance theoretic comprehension procedure

(a) Follow a path of least effort in computing cognitive effects:
Test interpretive hypotheses (disambiguations, reference resolutions, implicatures, etc.) in order of accessibility

(b) Stop when your expectations of relevance are satisfied

In the simplest case, an interpreter using the relevance-theoretic comprehension procedure would follow a path of least effort in interpreting an utterance, and stop at the first interpretation that he found relevant enough. For more complex cases, see below.

The inferential processes required by this account are unconscious and fast, and the comprehension procedure can be seen as a 'fast and frugal heuristic' of the kind currently gaining much currency in cognitive science (Gigerenzer & Todd 1999). In this respect, the relevance theoretic approach diverges from more traditional Gricean accounts of comprehension (see Grice 1989, pp. 30-31)—indeed, from philosophical characterisations generally—which rationally reconstruct the comprehension process in the form of conscious and reflective inferences about the mental states of others. This raises the question of the precise relationship between the mechanisms responsible for the latter kind of inferences, which (mature) individuals are certainly *capable* of, and those deployed in spontaneous comprehension.

Sperber & Wilson (2002) present arguments to suggest that there is more to the interpretive processes that underlie verbal comprehension than general mind-reading abilities of the type evoked by Grice. Their proposal is that the processes that underlie verbal comprehension might be performed by a domain-specific 'comprehension' mechanism or module[1] (Sperber 1994*b*, 2000). The function of such a mechanism would be to interpret ostensive stimuli using the relevance-based comprehension procedure. They justify this conclusion on the following lines. Firstly, the types of 'meaning' that a speaker can convey by producing an utterance are generally much more complex than the types of intention normally attributed to someone in order to explain their observed behaviour. Specialised mechanisms for the interpretation of speakers' meanings appear therefore to be necessary. Secondly and relatedly, we often attribute intentions to others by observing the effects of their actions, deciding which of those effects they might have desired, and attributing to them the intention to achieve those desired effects: for example, observing someone climb a tree and pick an apricot, we may infer that his intention in climbing the tree was to pick an apricot. However, a speaker will achieve very

[1] I use the term 'module' in the sense of Sperber (1994*b*) and, indeed, much of the literature on evolutionary psychology: that is, in a somewhat 'looser' sense than the one originally proposed by Fodor (1983).

few effects by producing an utterance unless she is first understood, so the normal procedures for recognising the intentions behind ordinary non-communicative actions won't work: the hearer can't *first* observe the effect of an utterance and *then* infer what it meant. Third, on broadly Gricean accounts of communication, in order to understand intentional communication—as opposed to ordinary non-communicative behaviour—it is necessary to be able to attribute several layers of metarepresentations; yet young children below the age of 4—the same children who (as do autistic subjects) fail standard mind-reading tests—master verbal communication quickly and effortlessly well before this age. Moreover, they acquire words effortlessly too.

A fully developed mind-reading ability—or 'first-order' theory of mind—is often equated with ability to pass a first-order version of the false-belief test (see Baron-Cohen 1995, Scholl & Leslie 1999). In this test, a child and an experimenter watch while an object is placed in a certain location. The experimenter then leaves the room and the object is moved to a new location (now unknown to the experimenter). When the experimenter returns to the room, the child is asked where she will look for the object. If the child can attribute a belief to the experimenter about the location of the object which differs from the belief she herself holds (i.e. one that is false), she will say that the experimenter will look in the wrong place. This presents a problem for an account which claims that general mind-reading abilities are put to use in word learning (which is under way well before children can pass the false-belief task). Why, when they acquire words so successfully, do children fail the false-belief task? [2]

One solution would be to propose that word learning is facilitated by the same comprehension module that is responsible for intentional communication. This module is capable of generating complex, multi-layered metarepresentations specifically in communicative situations. Happé & Loth (2002) provide experimental evidence that supports this claim. They show that young children below the age of 4, who regularly fail basic first order theory of mind tests, are able

[2] One answer would be to suggest that the false-belief task is testing for something more complex than the ability to attribute mental states (see Bloom & German 2000). There is a growing literature on the question of how it is that children can be adept interpreters of utterances before they can read minds (in the sense of pass regular false-belief tasks), and a variety of different camps are emerging. In the first camp, there are those (Tomasello & Barton 1994; Akhtar, Carpenter & Tomasello 1996; Happé & Loth 2002) who warn against underestimating the inferential abilities of young children. In another there are those (Breheny forthcoming, Recanati 2002) who claim that we *over*estimate the degree to which the inferential attribution of intentions is a prerequisite to verbal communication. Very recent research puts an interesting new slant on the debate. Baillargeon (2004) suggest that on the basis of results from a new experimental paradigm, children as young as *18 months* can pass a non-verbal variant of the false-belief task.

to track false beliefs if the task is adapted so that it becomes a word-learning task. Akhtar (2002) provides experimental evidence suggesting that expectations of relevance play a role in lexical acquisition, and in particular that children's hypotheses about word meaning seem to be produced by following a path of least effort, as described in the relevance-theoretic comprehension procedure. There is evidence from pathology too. Individuals with Asperger's Syndrome—an autism-related condition (Frith 1991)—show typically impaired mind-reading abilities, but 'normal' language acquisition. Again this suggests a degree of dissociation between the mind-reading skills underlying social interaction, which autistic individuals and people with Asperger's Syndrome find hugely problematic, and those underlying language acquisition.

In contrast to Bloom's proposal that autistic individuals bring simple associative mechanisms to bear on the word-learning process, the relevance-theoretic position suggested by Sperber (2004) is that they—just like normal children—are using the relevance-theoretic comprehension procedure and following a path of least effort, but on the basis of impoverished input caused by their inability to interpret 'natural pragmatic' clues such as gaze direction, pointing, facial expressions, etc.. More generally, autistic individuals typically use the least sophisticated of three interpretive strategies proposed by Sperber (1994*a*). When they can find the right interpretation by following a path of least effort and accepting the first interpretation that they find relevant enough ('Naive Optimism'), comprehension will succeed. However, they will fail in cases requiring. more sophisticated strategies: for example, where the speaker is mistaken about what they will find relevant enough ('Cautious Optimism'), or is engaged in some forms of deceit ('Sophisticated Understanding') (see Sperber 1994*a*, Wilson 2000). By contrast, normal children become capable of Cautious Optimism (and hence of adjusting their interpretations to take account of the speaker's mistaken beliefs) at around the same time as they pass standard first-order belief tests.

3.2 Comprehension and mind-reading

The basic proposal I want to make is this: since understanding utterances is as a matter of working out the intentions behind them, those same skills that Bloom sees as crucial to the way children acquire the meanings of words, are centrally implicated in the way adult speakers use and understand them. Just as children are required to attribute intentions and interpret natural cues in order to acquire word meanings, so adult hearers must do so in order to interpret successfully the words they hear. Indeed, the way children acquire words may provide them with clues as to how they are used.

One of the parallels between relevance theory and Grice's pragmatic framework is that both distinguish (in different ways, and using different terminology) between

the *explicit* and the *implicit* content of an utterance. The relevance-theoretic distinction between *explicatures* and *implicatures* bears some similarity to Grice's distinction between *saying* and *implicating*, the distinction which—together with his Co-operative Principle and Maxims—provided the first systematic way of distinguishing what a speaker says from the wider meaning she might intend to convey. However, the two pairs of notions are certainly not identical (see Carston 2002). In Grice's framework, pragmatic inference contributes mainly to implicatures. In relevance theory, by contrast, explicatures are recovered via a mixture of linguistic decoding *and* pragmatic inference, and are also a matter of degree: the greater the degree of linguistic encoding, the *more explicit* the explicitly communicated content of the utterance.

A second difference between Gricean pragmatics and relevance theory, and a central claim of relevance-theoretic pragmatics, is that explicatures and implicatures are developed in parallel, with the explicit content being adjusted or 'fine-tuned' in various ways in order to yield the implicatures required to satisfy the audience's expectations of relevance. In particular, encoded lexical meanings may have to be narrowed or loosened (assigned a narrower or broader denotation) in order to yield the expected level of implicatures (Carston 1997, 2002; Sperber & Wilson 1998; Wilson & Sperber 2002). Just as natural cues play a central role in lexical acquisition, so they also play a role in *lexical pragmatics*, the adjustment of encoded conceptual content. Indeed, the same cues that children use in the acquisition of words play a regular role in adult comprehension. Consider examples (1), (2) and (3) below:

(1) Jack: Shall we sit out here?
Lily (shivering ostensively): I'm *cold*.
(2) Lily (furiously): That makes me *angry*!
(3) Lily (smiling broadly): I feel *happy*.

In (1), Lily and Jack meet outside a café. Lily's ostensive shiver accompanying her utterance of 'I'm cold' should be picked up by the relevance-theoretic comprehension procedure and used in interpreting the degree term 'cold'. The nature of the shiver will be treated as commensurate with the degree of coldness she feels, and, in effect, will *calibrate* the degree of coldness Jack understands her to feel and to be expressing as part of her meaning. The fact that Lily has shivered ostensively motivates Jack's search for the 'extra' meaning Lily intends to convey. Clearly in this case, implicatures may depend on it; thus, Jack might be entitled to infer that Lily is definitely cold enough to want to go inside. In a parallel example, Lily's ostensive shiver accompanying her utterance of 'It's lovely out here on the terrace, isn't it?' might provide Jack with a clue that she is being ironic, that actually she hates it on the terrace and that she would prefer to go inside. In both

cases, shown natural behaviours feed into the interpretive process, guiding the hearer to a certain range or type of conclusions.

Notice, too, that the natural behaviours produced by Lily not only help Jack establish the implicit content of her utterance, but also contribute to the proposition he takes her to be expressing (or the basic-level explicature of her utterance). The truth conditions of her utterance of 'I'm cold'—and the truth-conditions of (2) and (3), which also contain degree terms—will vary according to the type or degree of 'coldness' (or 'anger' or 'happiness') she intends to communicate, and hence reflects in her natural behaviour.

What Lily linguistically encodes by using the word 'angry', for example, is some quite general concept, which encompasses a considerable range of degrees and types of anger that may have to be narrowed during the comprehension process in order to satisfy Jack's expectations of relevance. The linguistically encoded content is calibrated by Lily's furious tone of voice and enriched by Jack to a concept—ANGRY*—that he takes to be commensurate with the degree and type of anger Lily intends to convey. What she encodes by the use of the word 'happy' is also a quite general concept; again the occasion-specific sense is calibrated by reference to Lily's natural behaviours—in this example by features of her tone of voice and smile.

Relevance theory also distinguishes between the proposition expressed by an utterance and a range of *higher-level explicatures*. These are constructed by embedding the basic truth-conditional content under a speech-act or propositional-attitude description, which, like other aspects of explicit content, may be encoded or pragmatically inferred. Consider utterances (4) and (6) below, which would lead a hearer to construct the higher-level explicatures in (5) and (7):

(4) Regrettably, your application has been unsuccessful.
(5) The speaker regards it as regrettable that my application has been unsuccessful.
(6) Frankly, you haven't got the job.
(7) The speaker is telling me frankly that I haven't got the job.

Notice, now, that this kind of attitudinal information can also be conveyed by entirely natural behaviours. So a speaker of (4) might convey her attitude by speaking in a regretful tone of voice, and a speaker of (6) might convey that she is speaking frankly simply by adopting a frank manner. An ostensive stimulus is typically a composite of natural as well as linguistic signals.

In everyday communication we take for granted how a speaker naturally displays a certain degree of emotional intensity or attitude, and how (equally naturally) an audience has the ability to discriminate subtle variations in tone of voice and facial expression. In the case of human natural communicative behaviours, certainly, a

great many appear to work along *analogue* lines, and in this way can be directly contrasted with the *digital* code of language. We read such behaviours much as the engineer studies the needle on an analogue pressure gauge, in which the needle's movement is analogous to the rising and falling of the pressure, and continuous pressure fluctuation is reflected in the continuous movement of the needle. In Lily's utterance, her frown and angry tone of voice are in a similarly proportional or analogous relationship to the amount of affect she intends to convey. Depending on the gravity of her frown and the tone of voice she uses, Jack might decide she is mildly annoyed, quite angry or absolutely furious. The extent to which Jack can interpret these degrees of her annoyance or anger or happiness depends not on his knowledge of any *digital* code, but on his ability to discriminate among tiny variations in her facial expression and tone of voice, much as the engineer reads the quivering needle; we have already seen how such behaviours help speakers and hearers calibrate the appropriate sense of a given concept and feed into the relevance-theoretic comprehension procedure.

For autistic individuals, rather than providing important clues to the speaker's intended meaning, these subtle variations in pitch, and constantly shifting facial expressions, are nothing more than an irritating distraction. Consider the following, taken from the writings of Donna Williams, an author with autism:

> 'Speak to me through my words,' I asked Dr. Marek. I wanted to cut down the struggle in putting mental pictures into words. 'Can you take the dancing out of your voice and not pull faces so you don't distract me from what you're saying?' (1994, p. 95)

For those with autism, the 'natural' side of communication remains totally alien, and this affects not only their regular interpretation of utterances such as (1)-(3) but also their lexical acquisition.

4 Natural pragmatics and the showing-meaning$_{NN}$ continuum

When I speak of 'natural' communicative phenomena, I have in mind phenomena that *mean* naturally, in the sense of Grice (1957). In Grice's terms, 'means naturally' is roughly synonymous with 'naturally indicates', so in the same way that black clouds might be said to mean rain or spots mean measles, Lily's smile might be said to mean she is happy, or Jack's frown mean he is displeased. This can be contrasted with the kind of meaning inherent in language (often referred to as 'arbitrary' or 'conventional'), which Grice called non-natural; so the word *pluie* means 'rain'; *Lily esta feliz* means 'Lily is happy', or what that remark meant was 'Jack is displeased'.

It might be suggested that recourse to philosophical notions such as Grice's could be avoided by adopting—rather than 'natural'—the terms 'paralinguistic' and 'non-linguistic', familiar from the linguistic literature. I'm not convinced. For one thing, there is disagreement over what these terms mean. There are those for whom 'paralanguage' includes only those *vocal* aspects of language use that are not strictly speaking language: intonation, stress, affective tone of voice, rate of speech, hesitation (if that can be considered to be vocal) etc. On this construal, facial expression and gesture are non-linguistic rather than paralinguistic phenomena. There are others for whom the paralinguistic lines up with just about all those aspects of linguistic communication that are not language *per se*, but are nonetheless somehow involved with the message or meaning a communicator conveys. On the first construal, notice that while the set of paralinguistic phenomena intersects with the set of natural phenomena as described in this paper, there exist both paralinguistic phenomena that are not natural—*deliberate* frowns or *fake* smiles—and natural phenomena which might be co-opted for communicative use but which would not normally be called paralinguistic on any conception—a bruise or a pale complexion, for example. In many ways, the second construal makes more sense to me; rising pitch is so often linked with rising eyebrows, for example, that I'm not sure why we would want to say that while the former is part of a paralanguage, the latter is not.

In Wharton (2003*b*), I propose that behaviours which carry natural meaning in Grice's sense fall into two classes. The distinction is based on the ethological distinction between *signals* and *signs* made in Hauser (1996, pp. 9-10). In the first class there are those natural behaviours that have a signalling function[3]: the reason that these behaviours have propagated in our species is that they convey information to others about an individual's mental state (van Hooff 1972, Fridlund 1994, Ekman 1999). In the class of *signals* I include smiles and other facial expressions: 'These expressions have been selected and refined over the course of evolution for their role in social communication' (Ekman 1999, p. 51).

In the second class there are phenomena which carry natural meaning but do not have a signalling function: *signs*. In the class of signs I include, for example, shivering and bruises. Consider gaze direction as another example. The fact that someone's gaze is directed to a particular object lets others know what he is seeing; however, this is not its function but merely a by-product of the way the human visual system works. Although signs do not have a communicative function—in the sense that that is not the reason they have propagated in our species—they can be put to use in intentional communication. Indeed, all these natural behaviours, whether they be signs or signals, may be *deliberately shown* to an audience to provide evidence of an intention to inform.

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[3] For discussion of various senses of the word 'function' see Sperber (forthcoming).

In any act carried out with the intention of providing evidence of an *informative* intention there are two layers of information to be retrieved. The first, basic layer is the information being pointed out: if Jack nudges Lily and gazes ostensively at Bill's feet as he walks into the room, the basic layer of information he is pointing out to Lily might be that Bill is wearing odd socks. This basic layer of information is something that Lily might have directly observed for herself. The second layer is the information that the first layer is being pointed out intentionally: Jack's intention to point something out to Lily—together with her assumption that he would only bother pointing something out if he thought it worth her attention—is Lily's justification for bothering to attend to Bill's feet in the first place, and hence discovering that Bill is wearing odd socks (and that this is what Jack intends to communicate to her). Grice was interested primarily in cases where all the evidence provided for the first layer is indirect—a linguistic utterance, for example. Such cases he called cases of non-natural meaning ('meaning$_{NN}$'). So if Jack and Lily are speaking on the phone, Jack cannot directly show Lily that Bill is wearing odd socks, he will utter something that means$_{NN}$ that 'Bill is wearing odd socks'.

Relevance theorists (Sperber & Wilson 1986/95, p. 53, Wharton 2003*b*, pp. 460-464) have argued that there is a continuum of cases between (indirect) cases of Gricean meaning$_{NN}$ and cases of 'showing', where the evidence provided for the first layer is relatively direct. (Grice didn't think that cases of showing qualify as cases of meaning$_{NN}$, since the first layer of information can be derived without reference to the second layer.) This idea that there is a continuum of cases has implications for the domain of pragmatic principles or maxims, for it suggests that they are best seen as applying to the domain of intentional communication as a whole, rather than to the domain of meaning$_{NN,}$ as is generally assumed in Gricean accounts.

Among other things, the idea that there is a continuum of cases allows us to accommodate natural communicative behaviours within a pragmatic theory. The 'showing-meaning$_{NN}$' continuum provides a snapshot of the types of evidence used in intentional communicative acts. Such acts are typically a composite of inter-related behaviours which fall at various points along the continuum. At one extreme of the continuum lie clear cases of spontaneous, natural display; at the other extreme lie clear cases of linguistic coding, where all the evidence provided for the first, basic layer of information is indirect. In between lie a range of cases in which more or less direct 'natural' evidence and more or less *in*direct coded evidence mix to various degrees (natural signals, for example). Gussenhoven & Chen (2000), Gussenhoven (2002) propose that the 'meaning' inherent in intonation may be either arbitrary or based on universal 'biological codes'. In the framework proposed here, intonation (indeed, prosodic elements generally) would occupy various positions along the continuum.

5 Conclusion and future directions

It seems clear that there is more to word learning than simple associationism, and that the attribution of mental states plays a crucial role in lexical acquisition. This paper has proposed, however, that just as there is more to human communication than general mind-reading abilities, so there is more to lexical acquisition than these abilities. Instead, lexical acquisition, in both normal and autistic children, is best viewed as an exercise of the relevance-theoretic comprehension procedure, governed by a dedicated module, which forms a sub-module of the wider mind-reading ability. Both normal and autistic children use this comprehension procedure, but autistic children have impoverished access to clues because of their independently well-attested inability to interpret gaze direction, pointing, emotional expressions, tone of voice, etc., as well as their general inability to think about what the speaker *might* have meant if their first-pass interpretation goes wrong.

As far as cognitive architecture goes, the picture that emerges is a complex one, in which rather than comprising one general mechanism, the human 'mind-reading' ability might be better characterised as involving a whole range of individual sub-modules, each interacting with natural coding-decoding mechanisms. Recall that Baron Cohen's (1995) proposal is that theory of mind is comprised of (at least) four mechanisms, each of which is subject to breakdown. In the case of autism, his hypothesis is that autistic individuals exhibit a deficit in the *Shared Attention Mechanism*, which in turn disrupts the development of the *Theory of Mind Mechanism*. This, it is claimed, is the mechanism underlying the ability to attribute complex epistemic mental states (or propositional attitudes) such as 'believe' and 'think': the mental states typically lacking in autistic individuals.

In Wharton 2003*b*, I suggest that the fact that some natural cues are signals would predict that they too are interpreted by specialised, perhaps dedicated, neural machinery. This prediction appears to be borne out. Both non-human primates and humans have neural mechanisms dedicated to both recognising faces and processing facial expressions (Gazzaniga and Smiley 1991). Baron-Cohen, Spitz and Cross (1993) examined the recognition of emotion in autistic children in more detail. Based on the observation that autistic individuals have problems in recognising beliefs, they speculated about the extent to which this would manifest itself in the recognition of 'cognitive' emotions. These are emotions such as surprise which, since they are caused by beliefs, presume some sort of understanding of beliefs. Baron-Cohen *et al.* regard these as distinct from 'simple' emotions—those emotions (such as happiness and sadness) caused by situations. As predicted, the autistic children had more difficulty recognising surprise. To the extent that these findings (and the suppositions on which they are based) are correct, it might be taken to suggest that while the meta-communicative and meta-psychological abilities in these subjects are impaired, certain of the mechanisms

that decode signals remain intact. In current paradigms, lexical acquisition experiments do not recognise the sign-signal distinction, and potentially interesting questions are overlooked. Can the ability to interpret natural signals be impaired independently of other parts of the mind-reading ability?

Lexical acquisition experiments also do not recognise the distinction between ostensive and non-ostensive use of natural cues. Notice that in these experiments gaze direction is *not* (or at least not always) used ostensively in the way it is in the example in Section 4. As we have seen, though, children are disposed from a very early age to monitor gaze direction (indeed, may have a sub-module dedicated to it), and since the fact that the adult is uttering words to the child is good evidence that he/she is communicating, the child's comprehension module (which presumably is not immune to false positives anyway) is activated. Happé & Loth (2002, p. 31) suggest that it would be interesting to monitor brain activity during observation of ostensive and non-ostensive acts in mental attribution tasks. It would also be interesting to see whether the fact that a natural cue is used ostensively or non-ostensively would make any difference in a word-learning task.

References

Abercrombie, D. (1968) Paralanguage. *British Journal of Disorders of Communication* 3; 55-59.

Akhtar, N. (2002) Relevance and early word learning. *Journal of Child Language 29*; 677-686.

Akhtar, N., M. Carpenter & M. Tomasello (1996) The role of discourse novelty in children's early word learning. *Child Development, 67*; 635-645.

Baillargeon, R. (2004) Paper presented at the *European Science Foundation Exploratory Workshop: Understanding Actions and Minds.* Budapest, 4th-8th July 2004.

Baldwin, D. (1991) Infant contribution to the achievement of joint reference. *Child Development 62*; 875-890.

Baldwin, D. (1993) Infants' ability to consult the speaker for clues for word reference. *Journal of Child Language 20*; 395-418.

Baron-Cohen, S. (1995) *Mindblindness: An Essay on Autism and Theory of Mind*. Cambridge, MA: MIT Press.

Baron-Cohen, S., D. Baldwin & M. Crowson (1997) Do children with autism use the speaker's direction of gaze strategy to crack the code of language? *Child Development*, 68: 48-57.

Baron-Cohen, S., A. Spitz & P. Cross (1993) Do children with autism recognise surprise? A research note. *Cognition and Emotion*. *7(6)*; 507-516.

Barrera, M. & D. Mauer (1981) The perception of facial expressions by the three-month-old. *Child Development, 52*; 203-206.

Bateson, M-C. (1996) On the naturalness of things. In Brockman, J. & K. Matson (eds.) *How Things Are: A Science Tool-kit for the Mind*. Phoenix: London.

Bloom, L. (1994) Meaning and expression. In Overton, W. & D. Palermo (eds.) *The Ontogenesis of Meaning*. Hillsdale, New Jersey: Erlbaum.

Bloom, P. (2000) *How Children Learn the Meanings of Words*. Boston, MA: MIT Press.

Bloom, P. (2001) Précis of 'How Children Learn the Meanings of Words'. *Behavioral and Brain Sciences*, 24: 1094-1103.

Bloom, P. & T. German (2000) Two reasons to abandon the false belief task as a test of theory of mind. *Cognition, 77*; B25-B31.

Carston, R. (1997) Enrichment and loosening: complementary processes in deriving the proposition expressed? *Linguistische Berichte* 8:1 03-127.

Carston, R. (2002) *Thoughts and Utterances: The Pragmatics of Explicit Communication.* Oxford: Blackwell.

Chomsky, N. (1988) *Language and Problems of Knowledge: The Managua Lectures*. Cambridge, MA: MIT Press.

Diesendruck, G. (2004) Word-learning without Theory of Mind: Possible, but useless. Contribution to the online discussion on *Coevolution of Language and Theory of Mind*. Downloadable from www.interdisciplines.org.

Dunbar, R. (1998) Theory of mind and the evolution of language. In Hurford, J., Studdert-Kennedy, M & C. Knight (eds.) *Approaches to the Evolution of Language*. Cambridge: Cambridge University Press; 92-111.

Ekman, P. (1999) Emotional and conversational nonverbal signals. In Messing, L. and R. Campbell (eds.) *Gesture, Speech and Sign*. Oxford: Oxford University Press; 45-57.

Fodor, J. (1983) *The Modularity of Mind*. Cambridge, MA: MIT Press.

Fridlund, A. (1994) *Human Facial Expression: An Evolutionary View*. San Diego: Academic Press.

Frith, U. (ed.) (1991) *Autism and Asperger Syndrome*. Cambridge: Cambridge University press.

Gazzaniga, M. & C. Smiley (1991) Hemispheric mechanisms controlling voluntary and spontaneous facial expressions. *Journal of Cognitive Neuroscience 2*; 239-245.

Gigerenzer, G. & P. Todd (1999) Fast and frugal heuristics: the adaptive toolbox. In Gigerenzer, G., P. Todd & the ABC Research Group. *Simple Heuristics That Make Us Smart*. Oxford: Oxford University Press.

Grice, H. P. (1957) Meaning. *Philosophical Review 66*; 377-88.

Grice, H. P. (1968) Utterer's meaning, sentence meaning and word-meaning. *Foundations of Language 4*; 225-242.

Grice, H. P. (1969) Utterer's meaning and intentions. *Philosophical Review 78*; 147-177.

Grice, H. P. (1989) *Studies In The Way of Words*. Cambridge, MA: Harvard University Press.

Gussenhoven, C. (2002) Intonation and interpretation: Phonetics and Phonology. Speech Prosody 2002: *Proceedings of the First International Conference on Speech Prosody*. Aix-en-Provence, ProSig and Universite de Provence Laboratoire Parole et Language. 47-57.

Gussenhoven, C. & A. Chen (2000) Universal and language-specific effects in the perception of question intonation. *International Conference on the Processing of Spoken Language* 6. Vol. 2 Beijing: 01-04.

Happé, F. (1994) *Autism: An Introduction to Psychological Theory*. Cambridge MA: Harvard University Press.

Happé, F. (1992) The autobiographical writings of three Asperger syndrome adults: Problems of interpretation and implications for theory. In Frith, U. (ed.) *Autism and Asperger Syndrome.* Cambridge: Cambridge University Press; 207-242.

Happé, F. & E. Loth. (2002) Theory of mind and tracking speakers' intentions. In *Mind and Language, Vol. 117, Nos. 1 and 2*. Oxford: Blackwell; 24-36.

Hauser, M. (1996) *The Evolution of Communication.* Cambridge, MA: MIT Press.

Hobson, P.; Ouston, J. & A. Lee (1988) What's in a face? The case of autism. *British Journal of Psychology*. *Vol. 79, (4)*; 441-453

van Hooff, J. (1972) A comparative approach to the phylogeny of laughter and smiling. In Hinde, R. (ed.) *Non-verbal Communication*. Cambridge: Cambridge University Press; 209-238.

Leslie, A. (1987) Pretense and representation: The origins of 'theory of mind'. *Psychological Review 94*; 412-426.

Leslie, A. (1994) ToMM, ToBY and Agency: core architecture and domain-specificity. In Hirschfeld L. & S. Gelman (eds.) *Mapping the Mind: Domain Specificity in Cognition and Culture*. Cambridge: Cambridge University Press; 119-148.

Leslie, A. & F. Happé (1989) Autism and ostensive communication: The relevance of metarepresentation. *Development and Psychopathology 1*; 205-212.

Mundy, P., Sigman, C.,Ungerer, J. & T. Sherman (1986) Defining the social deficits in autism: The contribution of nonverbal communication measures. *Journal of Child Psychology and Psychiatry*: 657-669.

Muris, P., Meesters, C., Merckelbach, H. & M. Lomme (1995) Knowledge of basic emotions in adolescent and adult individuals with autism. *Psychological Reports. Vol. 76(1), Feb 1995*; 52-54.

Origgi, G. & D. Sperber (2000) Evolution, communication and the proper function of language. In Carruthers, P. & A. Chamberlain (eds.), *Evolution and the Human Mind: Modularity, Language and Meta-cognition*. New York: Cambridge University Press; 140-169.

Ozonoff, S., Pennington, B. & S. Rogers (1990) Are there emotion perception deficits in young autistic children? *Journal of Child Psychology and Psychiatry and Allied Disciplines. Vol. 31 (3), Mar 1990*; 343-361.

Papousek, H. & M. Papousek (1979) Early ontogeny of human social interaction: its biological roots and social dimensions. In von Cranach, M. (ed.) *Human Ethology: Claims and Limits of a New Discipline*. Cambridge: Cambridge University Press.

Recanati, F. (2002) Does linguistic communication rest on inference? *Mind and Language, Vol. 117, Nos. 1 and 2*. Oxford: Blackwell; 105-126.

Schiffer, S. (1972) *Meaning*. Oxford: Clarendon Press.

Scholl, B. & A. Leslie (1999) Modularity, development and 'theory of mind'. *Mind and Language 14*; 131-153.

Sigman, M. & C. Kasari (1995) Joint attention across contexts in normal and autistic children. In C. Moore & P Dunham (eds.) *Joint Attention: Its Origins and Role in Development*. Hillsdale, NJ: Lawrence Erlbaum.

Skinner, B. (1957) *Verbal Behavior*. New York: Appleton-Century-Crofts.

Sperber, D, (1994*a*) Understanding verbal understanding. In Khalfa, J. (ed.) (1994) *What is Intelligence?* Cambridge: Cambridge University Press; 179-198.

Sperber, D. (1994*b*) The modularity of thought and the epidemiology of representations. In Hirschfeld, L. and S. Gelman (eds.) *Mapping the Mind: Domain Specificity in Cognition and Culture*. Cambridge: Cambridge University Press; 39-67.

Sperber, D. (2000) Metarepresentations in an evolutionary perspective. In D. Sperber (ed.) *Metarepresentations: A Multidisciplinary Perspective*. Oxford: Oxford University Press; 117-137.

Sperber, D. (2004). Reply to Diesendruck. Contribution to the online discussion on *Coevolution of Language and Theory of Mind*. Downloadable from www.interdisciplines.org.

Sperber, D. (forthcoming) Seedless Grapes: Nature and Culture. To appear in Laurence, S. & E. Margolis (eds.) *Creations of the Mind: Theories of Artifacts and their Representation*, Oxford: Oxford University Press

Sperber, D. & D. Wilson (1986/1995) *Relevance*: *Communication and Cognition*. Oxford: Blackwell.

Sperber, D & D. Wilson (1998) The mapping between the mental and public lexicon. In Carruther, P. & J. Bouchers (eds.) *Language and Thought: Interdisciplinary Themes*. Cambridge: Cambridge University Press; 184-200.

Sperber, D & D. Wilson (2002) Pragmatics, modularity and mind-reading. In *Mind and Language*, *Vol. 17*. Oxford: Blackwell; 3-23.

Tomasello, M. & N. Akhtar (1995) Two-year-olds use pragmatic cues to differentiate reference to objects and action. Cognitive Development 10; 201-224.

Tomasello, M. & M. Barton (1994) Learning words in non-ostensive contexts. *Cognitive Development, 10*; 201-224.

Wharton, T. (2003*a*) Interjections, language and the 'showing'/'saying' continuum. *Pragmatics and Cognition*. *Vol. 11-1*; 39-91.

Wharton, T. (2003*b*) Natural pragmatics and natural codes. *Mind and Language* 18: 447-477.

Wharton, T. (2003*c*) *Pragmatics and the 'Showing-Saying' Distinction*. Doctoral Dissertation, University of London.

Williams, D. (1992) *Nobody Nowhere: The Remarkable Autobiography of an Autistic Girl.* London: Jessica Kingsley.

Wilson, D. (2000) Metarepresentation in linguistic communication. In D. Sperber (ed.) *Metarepresentations : A Multidisciplinary Perspective*. Oxford: Oxford University Press; 411-448.

Wilson, D. (2004) Lexical pragmatics. In *UCL Working Papers in Linguistics* 16.

Wilson, D. & D. Sperber (2002) Truthfulness and relevance. *Mind, Vol. 111-442* July 2002; 583-632.