Experimental Pragmatics: Towards Testing Relevance-Based Predictions about Anaphoric Bridging Inferences

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Abstract. Critics of relevance theory have charged that relevance theory provides no testable predictions, hence is unfalsifiable. This paper is an attempt to identify some testable relevance-theoretic predictions about anaphoric bridging inferences, and to show possible ways of testing these predictions. A relevance-based model of utterance interpretation is compared with Levinson's GCI model, and their contrasting views on how to divide explicitly communicated content and implicitly communicated content of utterance are discussed. Moreover, predictions following each theory about derivation of bridging inferences are compared before possible ways to test these predictions are suggested.

1. Introduction

One of the main on-going issues in post-Gricean pragmatics has been how best to tease apart different layers of utterance meaning. The best-known dichotomy in the debate is the distinction between 'what is said' and 'what is implicated' originally proposed by Grice (1975). More recent inquiries into the subject have centred on elucidating the notion of 'what is said' (e.g. Bach 1994; Gibbs & Moise 1997; Levinson 2000; Recanati 1989, 1993). Within the framework of relevance theory (Sperber & Wilson 1986/95), Carston has progressively sharpened an alternative notion, namely, 'explicature' proposed by Sperber & Wilson (Carston 1988, 1998, 2000a, b). The notion of explicature departs from the notion of 'what is said' in that it is claimed that context-dependent information plays an equally significant role in its full functioning, as is the case in the derivation of implicatures. Furthermore, Carston's notion of explicature is crucially different from Grice's notion of 'what is said' where derivation involves no maxims. In Carston's view, functioning of explicature is governed by the same principles as those which govern the derivation of implicatures, namely, the principles of relevance.

Few existing treatments of the distinction between 'what is said' and 'what is implicated' take into account cognitive structures or psychological processing. The relevance-theoretic distinction between explicature and implicature, in contrast, has its roots in fundamental assumptions about human cognition. Moreover, the derivation of explicature/implicature is claimed to be consistent with utterance processing. In this sense, at least in theory, its predictions ought to be testable for psychological validity.

The case of bridging inferences – typically inferences that introduce unmentioned antecedents (Clark 1977) – can provide an interesting testing ground for

these predictions (Matsui 2000, Wilson & Matsui 1998). Before going into details of an experimental paradigm to show just how, brief explanation of the notion of relevance as it is understood in relevance theory and a presentation of the general outline of a relevance-based model of utterance processing are in order. My main aim in this research is to clarify predictions that the relevance-based model of utterance comprehension makes for generation and use of bridging inferences and contrast these predictions with those based on Levinson's GCI model (Levinson 2000). Furthermore, I hope to suggest ways of testing those contrasting predictions.

2. Relevance

Sperber & Wilson's relevance theory is a theory of ostensive communication, in which the recognition of a speaker's communicative intention is the starting point of the interpretation process. It inherits Grice's view that the nature of human communication is inferential, and at the same time, departs from Grice in claiming that what makes such inferential communication possible is some mechanism in our cognitive make-up that is responsive to 'relevant' inputs. 'Relevance' is a property of inputs to cognitive processes, and is assessed both by a positive function of cognitive benefit, i.e. improvements in one's knowledge, and a negative function of the mental cost of deriving such benefits. When an input contributes to improvements in one's knowledge, it interacts with the existing knowledge in one of the following three ways to yield cognitive effects: it may strengthen existing assumptions by providing further evidence for them; it may erase existing assumptions by providing contradicting evidence for them; or it may yield new implications, when combined with existing assumptions. Sperber & Wilson claim that the human cognitive system has a tendency to pursue inputs which are likely to maximise cognitive benefits and use its resources for processing such inputs. This is expressed as the First, or Cognitive, Principle of Relevance:

> *Cognitive Principle of Relevance*
> Human cognition tends to be geared to the maximisation of relevance.

Furthermore, it is claimed that this tendency is manifest enough to enable us to predict fairly well which inputs are likely to be perceived as relevant by an individual, and that we exploit such predictability in ostensive communication. For example, in verbal communication, a speaker should be aware that he needs to use an utterance which is relevant enough to attract the hearer's attention. But how relevant is relevant enough to attract the audience's attention? Sperber & Wilson provide the following definition of 'optimal' relevance:

> *Optimal relevance of an utterance*
> An utterance is optimally relevant to the hearer iff:
> (a) it is relevant enough to be worth the hearer's processing effort;
> (b) it is the most relevant one compatible with the speaker's abilities and
>   preferences.

Thus, if an utterance successfully attracts the audience's attention, it means that it has been perceived by the audience as conveying information likely to be optimally

relevant. This idea is spelled out in the Second, or Communicative, Principle of Relevance:

> *Communicative Principle of Relevance*
> Every utterance communicates a presumption of its own optimal relevance.

The Communicative Principle of Relevance, together with the definition of optimal relevance, in turn suggests the following comprehension procedure:

> *Relevance-theoretic comprehension procedure*
> (a) test interpretive hypotheses (e.g. reference assignments, disambiguation, concept enrichment, implicature derivation) in order of accessibility, i.e. follow a path of least effort;
> (b) stop when the expected level of relevance is achieved.

In what follows, this comprehension procedure will be illustrated in detail.

3. A Relevance-Based Comprehension Model and Bridging Inference

3.1. Mutual Parallel Adjustment of Explicature and Implicature

Utterance interpretation involves decoding of linguistically encoded information. The output of decoding is subpropositional and the process of developing this level to a fully propositional level has been the focus of recent pragmatic investigation (see, for example Carston 1998 for a detailed survey of different approaches). In relevance theory, the output of the decoding phase is called the 'logical form' of an utterance, and the enriched logical form to the level of full-fledged proposition is called 'explicature'. Explicature is thus related to the notion of 'what is said', but different from it in the following two ways. First, the derivation of 'what is said' typically involves reference assignment and disambiguation according to Grice, but it now looks likely that there are further pragmatic processes in explicature derivation, as Carston suggests (Carston ibid., 2000a, b). Second, both explicatures and implicatures of an utterance are seen as the output of the same pragmatic processes driven by the pursuit of relevance. This view is quite different from the standard view, taken, for example, by Grice, Levinson (2000) and Recanati (1989, 1993), in which the process of deriving an explicitly communicated proposition is distinct from that of deriving implicatures. According to Carston (ibid.), the only difference between explicature and implicature is derivational: explicatures are communicated propositions derived from both decoded information (the logical form) and inferences, whereas implicatures are communicated propositions derived from inferences alone. Typically, the standard view also assumes that explicature derivation precedes implicature derivation, and thereby, commits holders of this view to a sequential processing model. By contrast, a relevance-based comprehension model is not a sequential model: in relevance-driven processes, the implicature derivation may coincide with, precede, or follow, the explicature derivation, and the content of derived implicatures may affect the way explicatures are developed. In

other words, a relevance-based comprehension model allows for parallel processing of explicatures and implicatures.

3.2. Bridging Inference as Implicated Premise

Sperber & Wilson (1986/95) claim that newly presented information is relevant if it improves one's belief, i.e. mental representation of the world. They go on to suggest that in the mind, new information is processed in a deductive device that yields a set of non-trivial implications. These non-trivial implications are standardly called 'implicatures' in pragmatics. However, Sperber & Wilson point out that some implicit assumptions are used as premises of deductive process rather than as a conclusion, and that it is equally important to include implicit assumptions which act as premises in the description of utterance understanding. Thus, they call an implicit assumption derived as the result of deduction an 'implicated conclusion', and an implicit assumption used as a premise of deduction to yield a conclusion an 'implicated premise'. In relevance theory, both types of implicit assumption are called 'implicature'. Both contribute to the relevance of an utterance, but they are qualitatively different in their contribution: while implicated conclusions directly yield cognitive effects, implicated premises are merely the means to bring about such effects, hence their contribution to the relevance of an utterance is rather indirect.

A bridging inference is regarded as an implicit premise in relevance theory. Typically, a bridging inference does not directly yield expected cognitive effects in its own right, but contributes to relevance by providing access to the intended explicature, which in turn yields cognitive effects. Recently, Wilson & Sperber (2000) and Carston (2000a) put forward schematic representations of a relevance-theoretic comprehension procedure. As they seem to be rather effective means to illustrate the details of the comprehension procedure, drawing on their approach, I will present a relevance-based comprehension model by using a simple conversational example below which involves the generation of a bridging inference. In particular, the illustration below provides a relevance-theoretic view of Peter's comprehension of Jane's second utterance in (1):

(1)   Peter: Did you enjoy the New Year's party at the Fairmont Hotel?
           Jane: No. The champagne was flat, and the music was awful.

Following Sperber & Wilson, I assume that new information communicated by an utterance is processed with a set of contextual assumptions intended by the speaker. In (1), it is assumed that the intended set of contextual assumptions, which are likely to have become highly accessible to Peter by the time he processes Jane's second utterance, includes the assumptions about the cerebration of the New Year and about a typical party, and most crucially, the assumption that Jane did not enjoy the New Year's party at the Fairmont Hotel, which was provided by the immediately preceding utterance. The last assumption may be considered as the trigger for the expectation of a particular cognitive effect generated in Peter's mind which is illustrated in (c) below. Note that no processing sequence is implied by the ordering of items in the illustration:

(a)   Jane has said to Peter "The champagne was flat, and the music was awful."
             [Linguistic decoding of Jane's utterance]
(b)   Jane's utterance is optimally relevant to Peter. [Presumption of relevance]
(c)   Jane's utterance achieves relevance by explaining why Jane didn't enjoy
             the New Year's party at the Fairmont Hotel.[Expectation of relevance
             raised by Jane's negative answer to Peter's question]
(d)   i. A party may involve the serving of champagne and the playing of music.
             ii. A good reason why someone may not enjoy a party is that the
             champagne served there is flat and the music played there is awful.
             [First accessible assumptions which might contribute to satisfying the
             expectation raised at (c). Accepted as *implicated premises* of Jane's
             utterance]
(e)   The New Year's party at the Fairmont Hotel involved the serving of
             champagne and the playing of music. [First accessible assumption which
             might combine with Mary's utterance to satisfy the expectation in (c).
             Accepted as an *implicated premise* of Jane's utterance]
(f)   The champagne served at the New Year's party at the Fairmont Hotel was
             flat and the music played there was awful. [First accessible *enrichment*
             of Jane's utterance which might combine with (dii) to satisfy the expectation
             of relevance in (c). Accepted as an *explicature* of Jane's utterance]
(g)   Jane didn't enjoy the New Year's party at the Fairmont Hotel because the
             champagne offered there was flat and the music played there was awful.
             [Inferred from (d), (e) and (f), and satisfying (c), and accepted as *an
             implicated conclusion* of Jane's utterance]
(h)   One shouldn't go to a New Year's party at the Fairmont Hotel in the
             future.
             [From (g) and background knowledge. One of several possible *weak
             implicatures* of Jane's utterance, which, together with (g) satisfy
             expectation (b)]

Notice here that a bridging inference is generated at (e), and is considered as an
'implicated premise' in this model. What is most significant in this processing model,
however, is that the derivation of bridging inference in (e) is complementary to the
derivation of another implicated premise in (dii) which is the assumption as to how
the utterance can achieve relevance. In other words, an expectation of particular
cognitive effects to be achieved by the utterance seems to have influenced generation
of the necessary bridging inference. It is worth pointing out here that in Levinson's
processing model, implicatures of the type illustrated by (dii) above are crucially
missing. This difference will also lead to different predictions about the processing of
anaphoric bridging implicatures.

3.3.   Expectation of Cognitive Effects and Assumption Schemata

In the illustration of the comprehension procedures presumably involved in fully
understanding Jane's second utterance above, it was taken for granted that Peter has
easy access to the assumption, or expectation, that her utterance will achieve
relevance by giving explanation for why Jane didn't enjoy the New Year's party at
the Fairmont Hotel. This, however, may raise several questions which require rather

careful consideration: Does the hearer *always* have an expectation of particular cognitive effects to be achieved by incoming utterances? Can such expectation of cognitive effects be strong or weak, and if so, what influences the strength of the expectation? Does the hearer expect one particular effect or several different effects for an incoming utterance?

There are several speculations one can make about these issues. For example, the hearer may not always have a strong expectation of particular cognitive effects to be achieved by an incoming utterance, as there are utterances which do not strongly discriminate the way the subsequent utterance may achieve relevance. However, recall here that relevance theory predicts that a good communicator and a good audience are more likely to exploit the fact that ostensive communication is relevance-based, rather than to ignore it. What follows from this are the following: (a) that it is natural for the speaker to formulate an utterance so that the hearer has easy access to the intended cognitive effects of the utterance; and (b) that it is natural for the hearer to infer the intended cognitive effects of the utterance at the earliest point possible.

Recently, Carston has offered an interesting discussion on this issue with regard to interpretation of juxtaposed utterances (Carston 1998:146-52) such as the following.

(2)   a. Max didn't go to school. He got sick.
         b. Max fell over. He slipped on a banana skin.
         c. Max can't read. He is a linguist.

Carston comments that the second utterances in (2) are understood as 'providing an explanation of some sort for the state of affairs described in the first, as if answering an implicit 'why?' or 'how come?' (146). It is striking that her comment is right even in the case of (2c), provided that we know well the fact that Max is a linguist is not an obvious explanation for his being poor at reading. Drawing on, for example, many psychological studies on text comprehension which suggest that causal inferences play the central role in understanding and remembering a text as a coherent whole, she concludes that this tendency to expect the explanation interpretation first for the second utterances in (2) stems from the organisational mechanism of our cognitive system: the mechanism 'requires that representation of individual states of affairs be embedded in a mesh of (broadly speaking) causal relations with other representation' (151). Relevant information for a cognitive system with such an organisational mechanism, therefore, is the information which can improve one's knowledge by being combined with other causally-linked representations in the system. She further speculates that our cognitive system may be equipped with some sort of assumption schemata (incomplete representations) ready to be filled/completed by relevant information. For example, she suggests that when we receive a new piece of information, P, typically, we construct an assumption schema, 'P because _____'. This assumption schema in turn creates the expectation that the missing information should be supplied.

While an explanation interpretation is seen as an answer to an 'implicit' question in the cases of the juxtaposed utterances discussed above, an assumption schema may be explicitly encoded in the case of wh—questions. In relevance theory, wh--questions have been analysed as an instance of assumption schema which (interpretively) represent missing information which the speaker considers relevant

(Sperber & Wilson 1988). For example, a 'why P?' question is understood as an assumption schema like 'P because _____'. Such an assumption schema is considered to indicate the expectation that an explanation of P would be relevant. On the other hand, yes-no questions are considered to express complete propositions for which confirmation or disconfirmation would be relevant. Note that this relevance-theoretic view of questions strongly suggests that questions are explicit ways of communicating the cognitive effects to be achieved by an incoming utterance. This, in turn, suggests that the person who asks a question is entitled to have rather strong expectation of particular cognitive effects to be achieved by the incoming utterance: namely, that it achieves relevance by providing an answer to his question. Later, I will return to these points when discussing the need to test these ideas.

4. Comparison: Levinson's GCI (Generalised Conversational Implicature) Model

The relevance-based model of the comprehension process illustrated above represents a clear contrast with the comprehension procedures envisaged in Levinson's neo-Gricean approach (Levinson 2000), which I call here the 'GCI model'. The GCI model differs from the relevance-based model in many ways, but here I will concentrate on the three following points. First, Levinson's model makes a sharp distinction between pragmatic processes of deriving the proposition expressed (i.e. explicature in relevance theory) and pragmatic processes of implicature derivation. As such, it commits to a theory of sequential processing rather than a theory of parallel processing as endorsed by relevance theory. Second, according to the GCI model, the initial, subpropositional, processes (our primary concern here), involve derivation of 'generalised conversational implicatures', which are context-independent, and hence, default, inferences based on streotypical assumptions stored in one's general knowledge. These are quite different from the inferences required to enrich the logical form to yield explicatures as envisaged in relevance theory. Relevance theory posits fully context-dependent, hence, non-default, inferences. Notice also that, being default inferences, generalised conversational implicature would be generated automatically across contexts, and would have to be cancelled when some contradiction arises during subsequent processing of the utterance. The third point is related to the second point: for Levinson, the derivation of generalised conversational implicatures is governed by default rules, and the derivation of particularised conversational implicatures, which are involved in post-propositional pragmatic processes, are governed by totally distinct rules. Here, the contrast with a relevance-based model, where both explicatures and implicatures are derived in the pursuit of relevance, is obvious.

Although bridging inferences are not the most typical GCIs (a prototypical GCI is scalar Q(Quantity)-implicature, which won't be discussed here), Levinson categorises them as examples of 'I(Informativeness)-implicature', which are inferences used to enrich the given information. I-implicatures are also characterized as 'minimum assumptions' to yield 'maximally informative' interpretation (Levinson 2000:183). Bridging inference is viewed as one of the prominent I-implicatures, required to preserve coherence when sentences are joined by parataxis (i.e. without being explicitly conjoined). The following are his examples of bridging I-implicature:

(3)   a. Harold bought an old car. The steering wheel was loose.
                     I-implicature: The steering wheel of the car.
             b. Patience walked into the dining room. The French windows were open.
                     I- implicature: The dining room had French windows.

Levinson says that typically, as in (3a) and (3b), the derivation of bridging I-implicaures is guided by stereotypical assumptions and highly accessible scripts or frames. He also suggests that even without such assumptions, bridging I-implicature can be derived (Levinson ibid. 127), although Levinson does not spell out exactly how it is derived. This at least indicates that there is more to his notion of 'minimal assumptions' than the accessibility of stereotypical assumptions. For the sake of argument, however, I will assume here that the existence of stereotypical assumptions is the necessary condition for derivation of bridging I-implicature.

5. Predictions of Two Pragmatic Models and Other Processing Models

Here, I will spell out concrete predictions regarding the derivation of bridging inferences which I believe follow from the assumptions of both pragmatic theories presented above. Let me start with relevance theory. As illustrated in Peter's comprehension procedure of Jane's second utterance above, relevance theory predicts that an expectation of particular cognitive effects influences the generation of implicated premises [(di) and (dii) in the illustration above] and that this is tested prior to, or concurrent with, the derivation of the bridging inference [(e) in the illustration], and that derivation of those two implicated premises [(di) and (dii)] precede or coincide with bridging reference assignment, which is part of the overall explicature construction. Thus, in the relevance-based comprehension model, the expectation of particular cognitive effects may constrain derivation of bridging inferences so that a bridging inference which contributes to deriving the expected cognitive effects will be generated.[1]

    Levinson's GCI model, in contrast, predicts that when two juxtaposed utterances require a bridging inference, the most stereotypical one is always generated as a default, and 'tested' before finally being accepted or rejected. One of the reasons why I have chosen Levinson's GCI model as an alternative to a relevance-based model is

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[1] One can take this position further and predict that a highly stereotypical bridging inference will not be generated if it will not be used as a premise in the deductive process. That is if the inference is not used to derive the intended implicature as a conclusion to yield the expected cognitive effects. However, the relevance-based model does not have to take this strong position, as it allows parallel activation of several competing assumptions, the most accessible one (in terms of both effort and effects) of which will be ultimately chosen. At the same time, it is also quite likely that even when such a highly accessible bridging inference is not used as a premise to derive the intended implicature, there may still be some sort of activation between the two (or more) semantically or encyclopaedically related concepts. If so, it will be an interesting challenge for the experimenter to come up with a way of distinguishing between such activation between closely related concepts and 'proper' bridging inferences in a relevance-theoretic sense which are generated and represented as the communicated proposition.

that the predictions his model makes are quite similar to other well-evidenced and widely-supported views on bridging inference in psycholinguistic research, and therefore, testing his predictions has wider implications. For example, Sanford & Garrod claim that subpropositional processing, which is the primary task of the language processor, is carried out via direct mapping between language input and background knowledge (Sanford & Garrod 1998). This direct mapping process is called 'primary processing'. It is automatic and rapid and is contrasted with more time-consuming 'secondary processing' which is only instigated after the primary processing fails (Sanford & Garrod 1981) (for a critical assessment of their approach, see Matsui 1998, 2000). Thus, both Levinson's model and Sanford & Garrod's model predict that when there is no obvious, stereotypical, route for mapping between linguistic input and background knowledge, the processor has to resort to secondary processing which is time-consuming.

To summarise, Levinson's model, as well as Sanford & Garrod's, envisages at least two possible stages in utterance processing: one is quick, automatic and default-based, and the other slow, conscious and strategy-based. This contrasts with a relevance-theoretic model, which claims that there is only a single overall "stage", which is quick, automatic and relevance-based. It seems that the major difference between the two models can be captured by two factors: first, the number of assumptions involved in constructing bridging implicature, and second, the expected time to construct bridging implicature. Recall that in the relevance-theoretic illustration of Peter's comprehension of Jane's second utterance in (1) above, the bridging implicature (e) had to be licensed by two other general assumptions, namely (di) and (dii). In Levinson's model, no such auxiliary assumptions are generated, and the bridging implicature alone is generated as the 'minimum' I-implicature. Hence, a relevance-theoretic model requires at least two more implicit assumptions in order to understand the second utterance in (1) than Levinson's. Generally, one may assume that the more assumptions are required to understand an utterance, the longer it takes to process it. However, the relevance-theoretic model predicts that no extra time is needed to understand the second utterance in (1). The question is how to test the prediction of the two models. In what follows, I will make some suggestions.

6.   Testing the Predictions

Here, I will discuss the design of some of the experiments which Ray Gibbs and I have started in order to test predictions made by the two processing models discussed above. Although the experiments are still at the preliminary stage and the results are yet to be analysed fully, I will illustrate the expected experimental results according to the two contrasting models.

6.1. Testing the Effect of Expectation of Particular Cognitive Effects

Let us first consider one assumption in the relevance-based model which requires experimental scrutiny: namely, that the hearer tends to generate an expectation of particular cognitive effects to be achieved by an incoming utterance. Testing this assumption, which is completely ignored in the GCI model, is crucial in carrying out subsequent experiments to test the validity of relevance-theoretic predictions

regarding the derivation of bridging inferences, since it is claimed that it is this expectation of particular cognitive effects that instigates a parallel explicature-implicature adjustment.

The best way to start testing the predicted effect of expectation of particular cognitive effect may be to observe the way answers to wh-questions are processed. If we adopt the view taken by Sperber & Wilson and Carston, which was briefly discussed above, a question is represented as an incomplete assumption schema in the speaker's mind which will be filled with the information provided by the relevant answer. An incomplete assumption schema then should be seen as being closely related to the strong expectation of particular cognitive effects. One can generalise that it is highly likely that the speaker who has asked a question has a very strong expectation of the cognitive effects to be achieved by what the hearer says next: namely, the relevant answer to his question. Compare the following two utterances both of which involve a classic example of bridging inference, namely, the beer was part of the picnic:

(4)   Mary: How was the picnic?
        John: The beer was warm.
(5)   John: I unpacked the picnic. The beer was warm.

It will be interesting to see if the comprehension of the utterance 'the beer was warm' is faster in (4) than (5), which would be the case if the relevance-theoretic view of questions are on the right track. Thus, our first experiment is designed to test this prediction by measuring the comprehension latency of two types of utterance pair such as (4) and (5), namely, the question-answer utterance pair and the narrative-utterance pair. If the expected difference in processing time is confirmed, it may be explained in terms of how highly accessible the implicature of each utterance is, which possibly facilitates explicature derivation as well as the overall interpretation process. Peter's utterance in (4), combined with other assumptions and Mary's expectation that Peter is providing an answer to her question, straightforwardly yields an implicature that the picnic was not totally successful (which provides an answer to Mary's question). By contrast, the second utterance in (5) does not seem to yield any strong implicature. Consequently, only in (4), the interpretation of the second utterance is likely to be facilitated by implicature/explicature adjustment. It is thus important to see if and when implicature is generated during reading for both types of utterance pair illustrated in (4) and (5). For this purpose, our first experiment includes a verification task in which subjects are asked questions, for example, "was the picnic successful?" for (4) and (5), and answers are assessed in terms of both latency and accuracy (see also Revlin & Hegarty 1999).

6.2. Bridging Implicature and Auxiliary Implicatures

The illustration of Peter's interpretation of Jane's second utterance in (1) shown above includes two implicated premises (di) and (dii) which support/warrant the bridging inference (e). These implicated premises are generated on the basis of what has been uttered, i.e. "the champagne was flat, and the music was awful", the given context, and the expectation of relevance raised by Jane's negative answer to Peter's question, namely, that Jane's utterance achieves relevance by explaining why Jane

didn't enjoy the New Year's party at the Fairmont Hotel. In other words, the derivation of these implicated premises crucially depends on the existence of the expectation of this particular cognitive effect. Thus, by testing if the reader generates during comprehension an implicated premise such as (dii) in the illustration above, we may be able to confirm/disconfirm that the expectation of a particular cognitive effect which leads to the derivation of such implicated premises was actually raised or not. Thus, our first experiment also includes verification tasks in which subjects are asked to read statements such as "if the beer is warm, the picnic is not a success" and to choose whether they agree or disagree. A relevance-theoretic model predicts higher accuracy and shorter latency for the question-answer utterance pair than for the narrative-utterance pair. According to Levinson's GCI model, there are no auxiliary implicatures such as (di) and (dii) which lead to the bridging implicature such as (e), hence it should predict equally longer latency for both two types of utterance pair.

6.3. Bridging Cases with No Obvious Stereotypical Assumptions Available

Compare the following with (4) and (5):

(6)   Mary: How was the job interview?
          John: The beer was warm.
(7)   John: I had a job interview. The beer was warm.

Arguably, (6) and (7) are a less likely variation of (4) and (5). The crucial difference between (4) and (6), and (5) and (7), respectively, lies in the strength of association between the concept referred to by the bridging reference (i.e. 'beer') and another concept to be linked with it via bridging inference (i.e. 'picnic' or 'job interview'). While the relationship between 'picnic' and 'beer' is rather strong for most people, the connection between 'job interview' and 'beer' is extremely weak. As most existing accounts of utterance comprehension would predict, both the relevance-theoretic model and the GCI model predict that it will take longer to process (6) and (7) than (4) and (5) respectively. However, the predictions differ on another point concerning the related (i.e. (4) and (5)) and the unrelated (i.e. (6) and (7)) set. The GCI model predicts that there will be equal increase in comprehension latency for (6) and (7) in comparison with (4) and (5). The relevance-theoretic model, on the other hand, predicts that the increase in comprehension latency for (6) will be smaller than for (7). In other words, this model predicts that the influence of the weak connection of the two concepts linked via a bridging inference is relatively small in the question-answer utterance pairs. This would be explained along the following lines: the effect of the expectation of particular cognitive effect raised in the question-answer utterance pairs including (7) is strong enough to enable the hearer to construct the required bridging inference, e.g. 'the beer was offered during the job interview' for (7), even when the relation between the two concepts linked via such an inference is distant. In order to test the two predictions, the comprehension latency for the unrelated set including (6) and (7) are measured, and compared with the latency for the related set including (4) and (5).

6.4. Cases with Two Potential Bridging Inferences

Finally, let me discuss another experiment which we are currently planning. It involves examples where potentially more than one bridging inference can be made, one of which is stereotypical and the other much less so (Matsui 2000) as illustrated in (8) and (9). The pertinent questions are: which the two bridging inferences is chosen by the hearer, and why. An answer to the 'which' question is provided in Matsui (ibid.), where the results of an off-line experiment involving the utterance pairs such as (8) and (9) are reported. In the experiment, the subjects' final interpretation of the second utterance was elicited, and 100 percent of the subjects opted for the final interpretation which requires a non-stereotypical bridging inference, despite their judgment (which was also elicited) that the bridging inference is much less stereotypical than the more stereotypical alternative:

(8)   Mary moved from Brixton to St. John's Wood. The rent was less expensive. (NB. St. John's Wood is a upper-class residential area in London, and Brixton is the direct opposite)

Stereotypical bridging inference: The rent in Brixton is less expensive than that in St. John's Wood.
Non-stereotypical bridging inference: The rent in St. John's Wood is less expensive than that in Brixton.

(9)   I prefer the restaurant on the corner to the student canteen. The cappuccino is less expensive.

Stereotypical bridging inference: The cappuccino in the student canteen is less expensive than that in the restaurant on the corner.
Non-stereotypical bridging inference: The cappuccino in the restaurant on the corner is less expensive than that in the student canteen.

Notice that the GCI model would predict that for examples such as (8) and (9), the most stereotypical possibility should always be tested first, and accepted unless there is obvious conflict raised by the bridging inference in a later processing phase. Also, it seems reasonable to assume that the model predicts that the other, non-default, bridging inference, will be generated and tested only after the default option fails. Thus, this model predicts substantially longer latency for examples such as (8) and (9). By contrast, the relevance-based model predicts that the one which contributes to derivation of intended implicature will be tested first, independent of consideration of degree of stereotypicality, and that therefore such interpretations would require no extra processing time. The results of Matsui's off-line experiment indicate that it is possible that both bridging inferences are generated and tested in parallel, and that one was subsequently suppressed. However, this point remains to be tested by further on-line experiments.

7.   Final Remarks

Critics have charged that relevance theory is an unfalsifiable theory. In this paper, as

the title suggests, I have tried to move us towards a specific experimental paradigm that would permit testing claims made by relevance theory about processing of anaphoric bridging inferences. The work, of course, remains to be completed, but I hope that the present discussion helps further my ultimate goal of firmly placing relevance theory in the domain of cognitive science.

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