MICHAEL T. WESCOAT AND AKIKO YOSHIMURA

NEGATIVE POLARITY PHENOMENA IN ADVERSATIVE CONSTRUCTIONS*

1 INTRODUCTION

In the present study we shall amplify and expand a proposal set forth by Yoshimura (1992, 1993) on the conditions for the felicitous use of negative polarity items (NPIs), such as *any* and *ever*. Our goal will be to present a natural application of Yoshimura's ideas to the analysis of NPIs in the compelements of ADVERSATIVE PREDICATES like *doubt* and *regret*. These considerations lead us to propose a hierarchical structure on the cognitive representation of beliefs.

Since the earliest generativist studies, it has been emphasized that NPIs can occur only in constructions involving certain licensing expressions called TRIGGERS, such as *not*, *if*, *before*, etc.

(1) **Before** you do *any* work, **if** you have *any* questions, don**'t** *ever* admit it.

Yoshimura adopts Ladusaw's (1979, 1980) downward-entailment condition to capture these basic structural distribution facts.

(2) DOWNWARD-ENTAILMENT (DE) CONDITION ON NPIS
A negative-polarity item is acceptable only if it is interpreted in the scope of a downward-entailing expression. (Ladusaw 1980:13)

Downward entailing (DE) expressions license implications from supersets to subsets. Note that the denotation of *father* is a subset of the denotation of *man*. Now, *If a man dies, he is missed* implies *If a father dies, he is missed*, so *if* is DE with respect to its antecedent clause. However, *If I call, a man will answer* does not imply *If I call, a father will answer*, so *if* is not DE with respect to its consequent. Thus, (2) predicts the basic facts about the distribution of NPIs in (3) and other examples.[1]

(3) If *any* parts *ever* fail, (**any*) problems will (**ever*) arise.

*The research reported in this paper was originally presented at the 4th International Pragmatics Conference on July 30, 1993. We wish to express our gratitude to all those who offered their comments to us on that occasion. Our thanks also go to Andrea and Shravan Vasishth for kindly proofreading this paper. Of course, all responsibility for errors remains strictly with us.

[1] Certain problematic cases remain. For a review of some genuine and perceived problems, see Yoshimura (1993).

S. Kawakami et al. (eds.), Osaka Univ. Papers in English Linguistics, 2, 1995, 211–221.

Yoshimura then builds upon this analysis, taking into account some subtle pragmatic effects that determine the felicitous use of NPIs.

Yoshimura's pragmatic analysis of NPIs emphasizes a property that these forms share with negation and the conjunction *but*: all impose a felicity requirement to the effect that they be used only in contexts where the clauses containing them contradict previously established assumptions. More details about the analysis will be given shortly. Yoshimura shows that this approach works to predict various data regarding the most frequently discussed NPI triggers (1992, 1993) and also to predict the theoretically troublesome fact that NPIs are incompatible with metalinguistic negation (this volume). However, until this time it has not been obvious how Yoshimura's analysis could be successfully applied to the phenomenon of NPIs occurring in the complement clauses of adversative predicates, such as those listed in (4).

(4) ADVERSATIVE PREDICATES
doubt
regret
be sorry
be surprised

(5) I **doubt/am surprised** that John has *ever* made friends with *any* of his co-workers.

(6) I **regret/am sorry** that Mary *ever* had *anything* to do with John.

The present paper shows that a close examination of the word meanings of these predicates, along with a more articulated version of the basic relevance-theoretic view of cognitive processing leads the conclusion that the data fall naturally in line with Yoshimura's proposals.

We begin with an exposition of some background notions, then we proceed with an examination of adversative predicates. We will see that these predicates split into two groups with similar but distinct semantic characteristics. In both cases, Yoshimura's proposals will be shown to apply correctly.

2 SOME THEORETICAL PRELIMINARIES

Let us begin the discussion by laying out certain assumptions and previous research that underlie the present study.

2.1 The Relevance-Theoretic View of Cognition

Our approach rests fundamentally on the assumptions of relevance theory, as set forth by Sperber and Wilson (1986). They claim that hearers process utterances to achieve OPTIMAL RELEVANCE. The intention of speakers is to modify the COGNITIVE ENVIRONMENT (CE) of hearers, i.e., their representation of the world. The CE consists of a group of logical forms representing ASSUMPTIONS,

each of which is associated with a confidence rating. The form of the CE will be discussed shortly. By 'assumptions,' Sperber and Wilson mean representations of the actual world, as opposed to fictions, desires, or representations of representations. The present paper offers some ideas on the treatment of the latter classes of non-assumptions. The CE can be modified by deleting or adding logical forms or altering confidence ratings: such changes are called CONTEXTUAL EFFECTS and result from the interaction of old and new information. This interaction is handled by the CENTRAL SYSTEM, comparable to the processor of a computer. The central system compares new logical forms delivered to it with the logical forms already contained in the CE. The goal is to fill the CE with logical forms representing the most trustworthy assumptions available, while maintaining consistency, in the sense of preventing the CE from ever containing two logical forms that contradict each other. RELEVANCE is a function of contextual effects and the PROCESSING EFFORT which is needed to produce them. The more contextual effects information produces, the more relevant it is; and the more processing effort it requires, the less relevant it becomes. Hence, achieving optimal relevance is a matter of finding the best balance between contextual effects and processing effort.

2.2 A New Perspective on the Cognitive Environment

In this paper we will be especially concerned with the form of the CE. Recall that Sperber and Wilson (1986) exclude fictions, desires, and representations of representations from the class of assumptions. However, for our purposes it will be necessary to consider the closely related notions of alternative possible worlds and representations of other people's belief systems. We will have to devise some way of accommodating such matters within the model of the CE. We propose to do this by assuming that the CE is a more articulated structure than Sperber and Wilson suppose. Whereas for their purposes it suffices to assume that the CE is a simple set, we suggest that it would be more appropriate to view the CE as a structured database with recursively embedded sub-databases. Such a proposal has been advanced in the linguistics literature by Gabbay and Kempson (Gabbay & Kempson 1992) and by numerous researchers in other disciplines. Let us first establish the form of the CE, in order better to explain its function.[2]

(7) COGNITIVE ENVIRONMENT
A cognitive environment (CE) is a structured database containing propositions. The database takes the form of a graph-theoretic directed tree, where the interior nodes are all recursively embedded sub-databases and the leaves are all propositions.

Such a structure could be visualized as in figure 1. The nodes marked Δ represent databases.

[2]For simplicity, we omit any representation of confidence ratings for propositions in the CE.

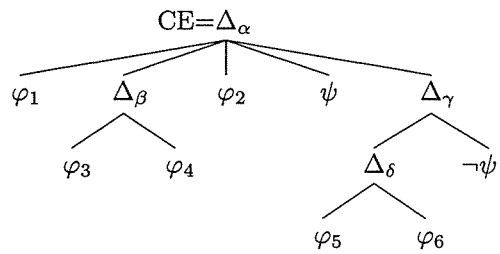

Figure 1: A Structured Cognitive Environment

We will use this tree structure to model locality effects in information. Specifically, the subordinated databases will represent possible worlds and other people's belief systems, among other conceivable uses. The subordination of such databases serves to segregate information and thereby prevent it from clashing with assumptions stored elsewhere. It is easy to see that this capability is essential when considering such notions as possible worlds. Suppose that the CE contains information about two possible worlds, one where a proposition φ obtains, and one where it does not. If the information about these two worlds were allowed to mingle, one would have a conflict in the form of the contradiction $\varphi \wedge \neg\varphi$. One or the other of the propositions would have to be ejected from the CE in order to restore consistency, thus impairing the ability of the CE to represent the two possible worlds adequately. Under our proposal, information about two different possible worlds could be segregated by inclusion within distinct (sub-)databases. The cognitive processor would be charged with ensuring that the information within a given database is all optimally consistent and trustworthy, but disagreements on assumptions across database boundaries would never be cause for rejection of a proposition from the CE.

The tree representation of the CE does more than merely afford a means of keeping conflicting information separated: it provides a hierarchical organization which we may use to model default effects. The database represented by the root node of the tree contains the individual's assumptions about the real world, i.e., the contents that Sperber and Wilson attribute to the CE in their simpler account. Subordinate databases represent possible worlds and the like. Hence, when considering the real world, the database at the root node will be 'current' in the sense of being the source of usable propositions, and when considering some possible world, the relevant sub-database will become 'current.' Now it seems plausible that when consulting one's assumptions about the real world, one should never mix in information from an alternative possible world. We can model this effect by stipulating that information for use in reasoning may never be drawn out of a database subordinated to or dominated by the 'current' database. Now consider the converse situation: in reasoning about a possible world, is it reasonable to suppose that in addition to using information specific to that possible world one borrows assumptions from one's

beliefs about the real world, for instance? Compare this hypothesis to a standard model-theoretic approach to possible world semantics: the model specifies truth values for all combinations of relations, individuals and worlds. This is fine in the realm of mathematics, but it doesn't translate plausibly to the domain of cognition. There it is more palatable to construct models in terms of partial information. Our CE would reflect this line of thought if we stipulate that when reasoning with respect to a given current database one may borrow information from superordinate or dominating databases, subject to the constraint that the borrowed information not conflict with assumptions from the current database. In other words, information from the current databases supersedes that from superordinate databases; however, in the absence of a clash, assumptions from superordinate databases metaphorically 'bleed' through into subordinate databases.

The tree-structured CE also lets us model default effects. The root database lists one's own beliefs, while sub-databases describe possible worlds and the like. When one considers a possible world, its database becomes CURRENT, determining what propositions are available for reasoning, according to (8):

(8) DYNAMIC AVAILABILITY
All propositions in the current database are available for reasoning. A proposition in an ancestral database is available unless it contradicts available propositions with priority; one proposition takes priority over another iff the former's database is a descendant of the latter's. No proposition in any other database is available.

Let Δ_γ in figure 1 be current: $\neg\psi$, φ_1, and φ_2 are then available. Since Δ_β andΔ_δ are not ancestors of Δ_γ, $\varphi_3, \ldots, \varphi_6$ are unavailable; ψ would be available, if it did not contradict $\neg\psi$. One plausible result is that when one considers one's own assumptions, the root database is current, and no information about alternative worlds from descendant databases is available for reasoning.

The hierarchization effect on the availability of information described above lends itself to some elegant solutions to traditional problems. Take the example of the notion of causation as discussed by Dowty (1979:91ff.) and the researchers he cites. The various analyses offered of forms like φ *causes* ψ generally give rise to paraphrases like 'in a world just like the real world except that φ doesn't hold, and any minimal changes necessary to accommodate the falsity of φ have been made, ψ would not obtain.' Traditional model-theoretic approaches not only fully specify alternative possible worlds but also have to face up to the difficult theoretical task of providing a means of finding the minimally different possible world called for in the analysis of causation. Our revised notion of the CE as a structured database provides a much simpler solution. We can make a subordinated database for the relevant, minimally different possible world 'on the fly.' First a database is created and inserted into the tree as a child of the current database. The new database, which initially contains only the proposition $\neg\varphi$ as its contents, becomes current. The information from superordinate databases bleeds into the current database. Thus, all non-conflicting assump-

tions from the previous current database are available from within the new one. This facet of our approach conveniently models the 'just like the real world' part of the analysis of causatives, because all usable information from the real world would be *automatically* made available for consideration in the alternative possible world. Any assumption ϱ borrowed from superordinate databases would, furthermore, be checked for consistency with $\neg\varphi$. If adopting ϱ would lead to a logical contradiction, then by reductio ad absurdum, $\neg\varrho$ may be added to the new current database. In this way we make sure that the minimal changes necessary to accommodate $\neg\varphi$ are effected. The fact that our revised CE provides the basis for a simple, procedural rendering of the notion of minimally different possible worlds that underlies the analysis of causation may be taken as a major argument in favor of our proposal.

2.3 Conceptual vs. Procedural Semantics

Using relevance theory, Blakemore (1987) points out the need for a non-unitary theory of linguistic semantics to account for expressions like *after all* and *you see*. Such forms don't represent concepts—i.e., they don't contribute to the truth-conditional meaning. Blakemore envisages a split in semantics between the CONCEPTUAL THEORY, which deals with the way in which elements of linguistic structure map onto traditional truth-conditional meanings, and the PROCEDURAL THEORY, which deals with the way in which elements of linguistic structure constrain the computations that determine utterance interpretation. The former theory is concerned with the mental representation of information, while the latter deals with the mental processing of information.

The conceptual/procedural dichotomy is readily visible through an examination of the difference between *and* and *but*. It is a commonplace in formal logic studies to note that the two English words correspond to the same logical connective. For example, *he is poor but he is honest* has the same truth conditions as *he is poor and he is honest*. Blakemore would attribute this similarity to a shared conceptual semantic meaning. However, there is a well-known difference between *and* and *but*. Blakemore would analyze it as arising from an additional procedural semantic component in the meaning of *but*:

> [T]he hearer is instructed to process the proposition *but* introduces in a context in which she can derive a proposition logically inconsistent with one assumed to have been derived from the proposition expressed by the utterance of the first clause. (Blakemore 1987:130)

2.4 The Cognitive Structure of Negation

Now we come to the actual statement of the constraint on NPIs. Yoshimura (1992, 1993) notes that the procedural constraint imposed by Blakemore on *but* is echoed in prior work by Givón on negation:

> [N]egatives are uttered in a context where corresponding affirmatives have already been discussed, or else where the speaker assumes the hearer's belief in—and thus familiarity with—the corresponding affirmative. (Givón 1978:109)

Furthermore, she notices the same sort of phenomenon with regard to NPIs. NPIs, like *but* and negation, require that the clause containing them be processed in a context where it will yield some contradiction when combined with current assumptions. This is brought out rather strikingly in the following examples. Note that manipulating the discourse in (9) and (10) either makes *but* and *ever* simultaneously acceptable or else causes both to be rejected.

(9) I know you rarely come around here. But if you *ever* come this way, be sure to visit me.
(10) I hear you often come around here. (*But) If you (**ever*) come this way, be sure to visit me.

Yoshimura states her constraint on NPIs in the following manner. First, she applies the term COGNITIVE STRUCTURES to pairs (φ, E) where φ is a proposition in the central system, and E is a given state of the CE. Yoshimura's analysis is stated in terms of a particular class of cognitive structures:

(11) THE COGNITIVE STRUCTURE OF NEGATION (CSN)
$(\varphi, \{\ldots\psi\ldots\})$ where the logical forms φ and ψ lead to a contradiction. (Yoshimura 1993:171)

This brings us to the constraint on NPIs.

(12) THE COGNITIVE STRUCTURE OF NEGATION (CSN) CONDITION
A negative polarity item is acceptable only if the proposition of the utterance containing it is processed in the cognitive structure of negation. (Yoshimura 1993:172)

Similar statements implementing procedural constraints based on the notion of CSN could be made with regard to *but* and negation.

This concludes the discussion of theoretical preliminaries. In the next section we take an empirical examination of adversative predicates.

3 ADVERSATIVE PREDICATES AND CSN

In this section we bring together Yoshimura's CSN-based analysis of the conditions on NPIs and the new structured CE proposed in the previous section to provide an account of some previously problematic data concerning NPIs in the complements of adversative predicates.

3.1 Predicates That Refer to Possible Worlds

Let us begin by examining two adversatives, *regret* and *be sorry*, which seem to form a natural pair, since they are near synonyms and more significantly are subject to a common semantic analysis. The following example demonstrates that *regret* and *be sorry* do indeed take NPIs in their complements.

(13) I **regret/am sorry** that John *ever* met *anyone* from that organization.

Now, the supposition that CSN arises with regard to the content of the complements of *regret* and *be sorry* is problematic if we consider only the assumptions held by the speaker or hearer. The reason for this is simple. *Regret* and *be sorry* are factive verbs, so the speaker commits herself to the position that the content of the complement clause is factual. Furthermore, (13) can clearly be uttered in the expectation that the hearer too believes the content of the complement clause. There is no hint of strangeness in the following discourse fragment.

(14) I know you know that John has started hanging around with people from that ultra-nationalist group. I **regret/am sorry** that John *ever* met *anyone* from that organization.

Where then does CSN arise?

We propose that a sentence of the form *X regrets that* φ or *X is sorry that* φ be treated as a statement to the effect that X finds her assumptions about the real world, where φ obtains, less desirable than a possible world just like the real world, except that φ does *not* hold, and any other *minimal* changes necessary to accommodate the falsity of φ have been made. Obviously this is the same sort of relationship between real and alternative possible worlds as was called for in the case of the causative analysis briefly discussed in the previous section. Hence, the foregoing comments on how our revised version of the CE could readily accommodate this kind of minimally different possible world are also relevant here. Crucially the introduction of the possible world induced by the word meaning of the adversative predicates causes a sub-database to be constructed in the CE, immediately subordinate to the root database, which, it will be recalled, is the repository of assumptions about the real world. Now, since *regret* and *be sorry* are factive predicates, the speaker is obviously representing φ as a factual statement. Thus, φ will be introduced with some appropriate confidence rating into the root database as an assumption about the real world. The newly created sub-database, however, will contain the converse proposition $\neg\varphi$, since this is the focal point around which the minimally different possible world induced by the adversative predicate is formed. This state of affairs is sketched out in figure 2. The construction of this sub-database will be mandated by procedural-semantic instructions in the meaning of the two adversative predicates under consideration. The sub-database called for here is the key to the application of Yoshimura's CSN-based analysis of NPIs in the complements of *regret* and *be sorry*, since it is in that sub-database that the state of CSN arises.

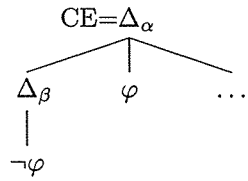

Figure 2: Representation of a Possible World

According to Yoshimura's analysis of NPIs the clauses in which they are contained must give rise to CSN when they enter the central system. In other words, these clauses must combine with assumptions in the CE to form a contradiction. In the particular case of the *regret/be sorry that* φ constructions, Yoshimura's analysis predicts that the entry of φ into the central system should give rise to CSN. Under prior assumptions, this prediction seemed questionable, but given the refined analysis of the word meaning of the two predicates in question, we see that φ will give rise to CSN with respect to the sub-database induced by the adversative: we may state this with confidence, because the sub-database will invariably contain the proposition $\neg\varphi$, and that suffices for CSN to arise. Hence, the new assumptions introduced in this paper with regard to the structure of the cognitive environment provide the previously missing link which allows Yoshimura's existing CSN-based analysis of NPI distribution to apply correctly in the case of the adversative predicates *regret* and *be sorry*.

3.2 Predicates That Refer to Beliefs of the Subject

The remaining adversatives, *doubt* and *be surprised*, are subject to an analysis only slightly different from that just proposed for *regret* and *be sorry*. First let us note that *doubt* and *be surprised* both allow NPIs in their complements:

(15) John **doubts/is surprised** that Mary *ever* said *anything* like that.

Now, given (16), it is clear that the complement of these adversatives need not contradict assumptions of the speaker and hearer about the real world.

(16) Not knowing her shocking behavior the way we do, John **doubts/is surprised** that Mary *ever* said *anything* like that.

Just as in the previous examination of *regret* and *be sorry*, these facts were hard to accommodate in Yoshimura's CSN-based analysis of NPI distribution under the standard notion about the structure of the CE. However, a close examination of the word meanings of *doubt* and *be surprised* will lead us to an analysis that takes advantage of the structured CE introduced in this study, and that shift

in perspective will make the CSN analysis of NPIs in the complements of *doubt* and *be surprised* go through unproblematically.

Sentences with *doubt* and *be surprised* are clearly about the contradiction of assumptions held by the designatum of the subject NP. A sentence of the form X *doubts that* φ means that φ contradicts the assumptions of X at the time designated by the tense of the verb. Similarly, a sentence of the form X *is surprised that* φ means that at some time prior to that designated by the tense of the verb, X held assumptions that were contradicted by φ, although X subsequently accepted φ as a new assumption. Let us suppose that information about the beliefs of other persons is contained in the CE in the form of embedded databases dominated by the root database, which holds real-world assumptions. This sub-database may be created on the fly, or it may already exist in the CE. Now, sentences with *doubt* and *be surprised* indicate that the complement clause contradicts the subject's assumptions, and that in turn implies under our assumptions that the complement clause leads to a contradiction when combined with the assumptions held in the sub-database that contains the beliefs of the subject's designatum. In other words, the word meanings of *doubt* and *be surprised* actually tell us explicitly that the state of CSN is arising with respect to the complement clause of the adversative predicate and the sub-database where the assumptions held by the designatum of the subject are stored. Thus, given a careful examination of the semantics of *doubt* and *be surprised* and our new notion about the structure of the CE, Yoshimura's CSN condition on NPIs is seen to obtain without further stipulation in the case of NPIs in the complement clauses of the adversative predicates *doubt* and *be surprised.*

4 Conclusion

In this study, we have undertaken the task of showing that Yoshimura's analysis of the distribution of NPIs based on the notion of CSN successfully applies to the case of complement clauses of adversative predicates, although it was not entirely obvious that it did so under previously held assumptions. We accomplished this task, not by adding any sort of stipulation to the CSN-based analysis of NPI distribution, but rather by providing a new, independently motivated view of the CE, where assumptions are stored. Recall that the new proposals opened the possibility for an insightful implementation of some existing notions about the analysis of causatives. We then proceeded to a careful examination of the word meanings of the various adversative predicates and found that they took advantage of the facilities that our new view of the CE afforded for the modeling of possible worlds and other individuals' belief systems. This semantic analysis showed that CSN naturally arises with respect to the complement clauses of the adversative predicates and sub-databases referred to in the word meanings of those predicates. Since Yoshimura's CSN-based analysis could be accommodated simply by enhancing the analyses of ancillary phenomena, the observations in this study may be taken as evidence supporting the robustness of this approach to negative polarity phenomena.

References

Blakemore, Diane: 1987, *Semantic Constraints on Relevance*, Blackwell, Oxford.

Dowty, David R.: 1979, *Word Meaning and Montague Grammar*, Kluwer, Dordrecht.

Gabbay, Dov M., and Ruth M. Kempson: 1992, 'Labelled Abduction and Relevance Reasoning', *SOAS Working Papers in Linguistics and Phonetics* **2**, 41–84.

Givón, Talmy: 1978, 'Negation in Language: Pragmatics, Function, Ontology', in Peter Cole (ed.), *Syntax and Semantics*, vol. 9, Academic Press, New York, 69–112.

Ladusaw, William A.: 1979, *Polarity Sensitivity as Inherent Scope Relations*, Ph.D. thesis, University of Texas, Austin.

——: 1980, 'On the Notion *Affective* in the Analysis of Negative-Polarity Items', *Journal of Linguistic Research* **1**, 1–16.

Sperber, Dan, and Deirdre Wilson: 1986, *Relevance: Communication and Cognition*, Blackwell, Oxford.

Yoshimura, Akiko: 1992, 'The Cognitive Structure of Negation as an NPI-Licensing Condition', *English Linguistics* **9**, 244–264.

——: 1993, 'Pragmatic and Cognitive Aspects of Negative Polarity', *Osaka University Papers in English Linguistics* **1**, 141–173.

Michael T. Wescoat
Faculty of Letters
Osaka University
1–5 Machikaneyama
Toyonaka, Osaka 560
Japan
wescoat@lisa.lang.osaka-u.ac.jp

Akiko Yoshimura
2–15–11–602 Masago
Ibaraki, Osaka 567
Japan
akikoy@center.osaka-gu.ac.jp