

PRESUPPOSITION AND NEGATION
AS NONDISCRETE SEMANTIC AND SYNTACTIC
VARIABLES

THESIS FOR THE DEGREE OF M.A.
MICHIGAN STATE UNIVERSITY
GREGORY KARL SHENAUT

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PRESUPPOSITION AND NEGATION
AS NONDISCRETE SEMANTIC AND SYNTACTIC VARIABLES

By

Gregory Karl Shenaut

A THESIS

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ABSTRACT

The assumption that all presuppositions are of the same strength and that internal and external negation are discrete categories is examined empirically. Using evidence from judgments of degree of contradiction resulting from conjunction of a sentence and a denial of its presuppositions, it is established that presuppositions differ in strength depending upon the surface presupposer, upon depth in the presuppositional structure of the sentence, and upon the surface negator of the sentence. Also, it is shown that there is a range of negators along the continuum from internal to external.

The exposition takes the form of positing certain definitions for such commonly used semantic relations as negation and semi-entailment, then producing evidence which shows how the definitions must contain allowance for nondiscreteness to account for intuitions about language, and, finally, the definitions are altered to take such considerations into account.

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Chapter One

INTRODUCTION

During the development of the transformational approach to grammar, quite complicated arguments were often based upon certain assumptions held to be true by those involved. In more recent years, it has turned out that some of these assumptions were open to empirical testing, and now a large body of literature dedicated to their examination has been brought forth. This is very important to linguistic theory, since an immediate goal of endeavor is to describe what an adequate grammar must look like, and a grammar based upon false assumptions has no chance of achieving adequacy.

In this chapter, several areas are briefly discussed which indicate the shape this trend toward careful examination of assumptions has taken. This provides an orientation to the framework within which this thesis is written.

First is the observation that only declarative sentences have truth values. Sentences with other forces, such as questions, requests, and promises, do have sincerity conditions, but it is impossible to evaluate the truth of, say, a question. This seems obvious, yet the implications

for grammar are important. For example, one of the most common and most important tools used by grammarians in determining the derivation of sentences is the test of paraphrase. Chomsky (1965) characterizes this relation (using the euphemism cognitively synonymous) as (p. 22): "[Two sentences are mutual paraphrases if] one is true if and only if the other is true." If this characterization is adhered to in the grammar, then (1) and (2) would not be paraphrases:

(1) Did Jack call up Mary?

(2) Did Jack call Mary up?

Yet, intuitively, it seems obvious that (1) and (2) are related just as (3) and (4):

(3) Jack called up Mary.

(4) Jack called Mary up.

Most speakers agree that (3) and (4) are paraphrases (ignoring for present purposes differences in pragmatic information). Thus the grammar is weakened at the level of descriptive adequacy by the assumption that all sentences have truth values. Lakoff (1973b) has discussed a formal means of accounting for paraphrase (and other truth-based

relations) in sentences with nonassertive forces. In his system, the relevant value is felicity. That is, two sentences are paraphrases of one another if one is felicitous if and only if the other is felicitous. A sentence is uttered felicitously only when it is uttered sincerely and nondefectively. See Austin (1962) for an introduction to the concepts "felicity," "defective," and "sincere," as used by Lakoff.

Second, there are elements in the derivation of a sentence which have to do with its linguistic and nonlinguistic context or environment. Examples of such factors are: beliefs about the world on the part of the speaker,¹ social class of the speaker,² age,³ perceived social class of the addressee, formality of the situation, and so on. In many of these cases, decisions about the grammaticality of a sentence must be deferred until such information is known. That is to say, grammaticality judgments cannot be made (in some of these cases) on sentences out of context. Thus the grammar would be weakened at the level of descriptive adequacy if an assumption were maintained that context free judgments were sufficient.

Third, it is easy to demonstrate that not even all sentences of declarative form have bivalent truth values. Certain surface forms are conventionally used to indicate that the speaker presupposes that certain material is true. If it should be the case that these presuppositions are not

true, then it is impossible to evaluate the sentence for truth. For example, (5) and (6) both indicate, through their use of a proper name, that the speaker intends to mark (7) as presupposed:

(5) The present King of France is bald.

(6) The present King of France is not bald.

(7) There is presently a King of France.

That is to say, if it should not be the case that (7) is true, then clearly (5) is not true. A little reflection will show that (6) cannot be true either. In a bivalent logic, all propositions which are not true are false, and the negation of a false proposition is true. Thus if (7) is not true, then it is impossible to uniquely determine the truth of either (5) or (6). One way to remedy the problem is to introduce a third value for truth such that propositions with false presuppositions are neither true nor false, but void. In any case, a bivalent logic is inadequate to account for intuitions about the truth of sentences with presuppositional failure.

Fourth, John Robert Ross has been concerned with evidence suggesting that grammatical categories such as NP are nondiscrete. In Ross (1973), for example, evidence is given that there is a continuum of noun-phrasiness from real

to fake NP's. He shows that certain rules which refer to the category NP in their structural description result in sentences which are more acceptable when the NP in the sentence is more real than when the NP is more fake. One of his examples involves the rule PROMOTION, which relates sentences like

(8) Harpo's being willing to tune surprised me

to sentences like

(9) Harpo surprised me by being willing to tune.

Real NP's (like Harpo and other animates) allow PROMOTION to operate freely, but as NP's get faker (less like animate, concrete NP's), sentences produced by application of PROMOTION get progressively less grammatical:

- (10) a. My cat surprised me by knowing how to yodel.
 b. The heat surprised me by making the tar soft.
 c. The concert surprised me by lasting two weeks.
 d. This tack surprised me by being taken infrequently.

If the facts reported by Ross accurately reflect his intuitions, then this constitutes fairly strong evidence against making the a priori assumption that grammatical categories are discrete.

Another piece of evidence against the assumption of discrete grammatical categories is that certain generalizations about language use⁴ and also judgments of grammaticality⁵ must incorporate relative frequency in the description of what has been called free variation in the past. Changes in the frequency of such variation can be correlated with such factors as style, social context, and pragmatic conditions. A descriptively adequate grammar must have some means to include indications of relative frequency of use and grammaticality.

Both Ross (1973) and Labov (1972a) among many others have utilized the concept of serial implication to describe this kind of generalization. This involves listing sentences or other grammatical variables in order along some continuum. For example, the sentences of (10) are arranged along the continuum of grammaticality, such that each step down the continuum corresponds to a lessening of grammaticality. G. Lakoff (1973a) suggests a way to formally incorporate such generalizations into the theory of syntax.

G. Lakoff (1972) discusses another nondiscrete topic: fuzzy truth and presuppositional satisfaction values. Suppose we are interested in the set of all tall men. It seems clear that it is impossible to make a concrete decision about membership in such a set, since men are tall to different degrees. Thus the set TALL is a fuzzy set, a set in which membership is to a degree. Suppose there are three men, with the following height:

- (11) John: 5'2"
 Bill: 5'8"
 Chet: 6'4" .

Clearly, John is not a member of the set TALL to any significant degree, in fact, John is rather short. Bill is sort of a member, and Chet is definitely a member. This seems obvious. However, the interesting result is when membership in such a set is predicated upon individual members (or nonmembers):

- (12) a. John is tall.
 b. Bill is tall.
 c. Chet is tall.

How may we determine the truth of (12)? Suppose we decide that (12a) is false and (12c) is true. (12b) is clearly more true than (12a), but less true than (12c). To resolve this dilemma, Lakoff postulates a scale of truth values, from 0 (false) to 1 (true). Using this device, it is possible to assign truth values in such a way that the intuitive relations among the sentences in (12) are preserved. This has interesting grammatical implications.

One of the surface forms alluded to above which speakers use to indicate that they presuppose certain

material to be true is the factive verb, first discussed by the Kiparskys (1971), and worked on since by many others, including Karttunen (1970) and Givon (1972). Factive verbs mark their complement as presupposed by the speaker of the sentence. If sentences like those in (12) are embedded under factive verbs, then two interesting things happen.

First, sentences in which the presuppositions are relatively less true are relatively less grammatical. Second, sentences which have relatively untrue presuppositions have relatively lower maximum truth values. For example, consider

- (13) a. Sam knows that John is tall.
 b. Sam knows that Bill is tall.
 c. Sam knows that Chet is tall.

In (13), given the heights of John, Bill, and Chet listed in (11), sentences are ordered along two implicational continua. Example (a) has the lowest maximum truth value and is the least grammatical, example (c) is the highest on both scales, and (b) is in between.

To account for this observation, Lakoff postulates a nonsense value, again varying from 1 (failure of presuppositions) to 0 (presuppositions satisfied). The degree of nonsense depends on the truth of the presupposed proposition ($\text{nonsense} = 1 - \text{truth of presupposition}$). Once this value is determined, the maximum value of true (or false) is

equal to 1 minus the nonsense value. A possible valuation for (12) is given in (14), where the first element of the ordered pair is the truth value and the second is the nonsense value:

- (14) a. (.1, 0)
 b. (.5, 0)
 c. (.9, 0).

Given these valuations, the range of valuations for (13) is shown in

- (15) a. (0 to .1, .9)
 b. (0 to .5, .5)
 c. (0 to .9, .1).

As the nonsense value increases, sentences are progressively less grammatical, and vice-versa.

Labov (1972a) discusses the problem of using uncontrolled intuitions in justification of a grammar. He concedes that it would now be impossible to consider a methodology which did not allow the use of linguists' intuitions to treat the subtle distinctions and abstractions which hold the central position in contemporary linguistics. However, claims Labov, unless these intuitions are given support from the speech community, they are meaningless. He cites two studies in support of his position.

First, in a discussion of a paper by Grinder and Postal, Labov notes that grammaticality judgments made by two different groups of linguistics graduate students depended upon the theoretical position prevalent in their departments. This indicates that theoretical bias might influence the data upon which the theory is to be based.

The second study is that of Spencer (1972), in which 150 example sentences taken from the literature were given to 60 subjects: 20 graduate students in linguistics, 20 graduate students in other fields, and 20 non-university community members. Subjects were asked to make judgments of acceptability for the sentences. There was considerable disagreement with the original authors of the studies from which the sentences were taken: in 44 out of 150 cases, the author failed to get a majority of the subjects to agree with him. But when there was disagreement among the judges, the non-linguist graduate students regularly sided with the judges from town, leaving the linguistics students by themselves.

Labov concludes, "As linguists become more deeply involved in . . . theoretical issues, it is likely that their intuitions will drift further and further away from those of ordinary people and the reality of language as it is used in ordinary life (p. 199)." This possibility is strong reason to question any assumption that linguists may base their analyses upon their intuitions alone, with no reliable and valid means of outside verification. It seems

essential that linguists be trained in such methods, since it is now uncommon to find support for intuitions in theoretical papers in linguistics.

To sum up briefly, recent work in linguistics has often centered on demonstrations that language cannot be adequately described by a theory of grammar which assumes any of the following: (a) all sentences have truth values (and the paraphrase relation can be defined on the basis of truth values), (b) sentences may be analyzed out of context, (c) all declarative sentences have truth values, (d) truth is bivalent, (e) grammatical categories are discrete, (f) frequency data is irrelevant, (g) truth is discrete, (h) pragmatic information is not part of grammar, and (i) intuitions alone are an adequate source of basic data. Hopefully this thesis makes none of these assumptions.

The aim of this thesis is to demonstrate yet another area in which nondiscrete variation occurs: the interaction of presupposition and negation. Evidence is given which indicates that various of the surface markers of presupposition result in relatively stronger or weaker presuppositions. Also, evidence is given that different surface markers of negation result in different degrees of cancellation of presuppositions, and that strength of presupposition depends in part upon complex presuppositional relations in the sentence. An attempt is made to integrate the data into a descriptive (and hopefully explanatory) model.

In the next chapter, certain basic terms are defined in a way consistent with their current use. In later chapters, evidence showing the necessity for changing this usage (and the definitions) is given, and specific suggestions for the changes are made.

NOTES TO CHAPTER ONE

1. Borkin (1971) shows that beliefs of the speaker are necessary to account for the use of polarity items in questions. R. Lakoff (1969, 1970a, 1970b, 1971, 1972a, 1972b, 1973) discusses beliefs of the speaker in such cases as modality, politeness, questions, tense, polarity items, and passives.

2. In Labov (1972a), the effects of social class are discussed in many connections. One of the more interesting was the study of the pronunciation of /r/ on the different floors of Macy's department store in New York City. It was found that there is a correlation between the social status of a floor and the deletion of final /r/ by the people who worked there.

3. Stokes (1974), in a study dealing with sentences of the type discussed in Carden (1972), found that one predictor of ability to see more than one reading in potentially ambiguous sentences was age and educational level.

4. See Labov (1972a, b), Cedargren (1972), Cedargren and Sankoff (1974), and Laberge (1972) for other examples.

5. The literature on quantifier negation abounds with this. See Carden (1970, 1972) and Labov (1972b).

Chapter Two

SOME RELATIONS BETWEEN SENTENCES

If logic is the study of relations between sentences, then natural logic is the study of relations between sentences in natural language. This thesis is essentially an exploratory essay in natural logic. In this chapter, an orientation is given to some of the more important terms currently used by natural logicians. Since one of the more salient aspects of literature published in the field is the confusing proliferation of terms often used to describe the same (or very similar) concepts, the present chapter's aim is to provide a coherent, integrated account of certain of these concepts, rather than reviewing the literature per se. Specifically, the terms to be discussed are semi-entailment, internal and external negation, full entailment, presupposition, and pragmatic presupposition. (Note: throughout the thesis, "presupposition" means "logical presupposition.") In the Appendix, a listing is given of a large number of definitions for these terms, taken from the linguistic and philosophical literature.

SEMI-ENTAILMENT

The basic relation between sentences is semi-entailment:

- (1) Sentence A semi-entails sentence B if and only if for all speakers S who believe A to be true, S must believe B to be true, and B is synthetic.¹

Some examples of sentences between which this relation obtains are

- (2) a. A: All men are mortal
B: Some men are mortal
- b. A: John's wife has two apples
B: John's wife has at least one apple
- c. A: John's wife has two apples
B: John has a wife
- d. A: John sincerely said "The cat is on the mat"
B: John believes that the cat is on the mat.

A sentence which is analytic is true by definition, that is, it may, by valid rules of inference alone, be reduced to an identity. An example of this is

- (3) It is snowing or it is not snowing.

Regardless of the truth of "It is snowing," i.e., no matter whether it is true or not true, (3) is true. Thus (3) is a tautology, and analytic.

This is not the case in

(4) Chicago is in Illinois,

however. In order to determine the truth or untruth of (4), it is necessary to have knowledge about the world. For example, if the boundaries of the state of Illinois were changed, (4) might become false. Synthetically true sentences are different from analytic sentences, since (i) knowledge about the world is necessary to determine the truth value of the former, but not the latter, and (ii) the former are falsifiable, but not the latter.

The reason for the inclusion of the constraint on semi-entailment (that the semi-entailed sentence must be synthetic) is to make the relation conform more closely to intuitions about relatedness between sentences. As Katz (1973) observes, in a discussion of presupposition (which, as we shall see below, is a subset of semi-entailment), an analytic sentence is implied (in the logical sense, which is roughly equivalent to semi-entailment for present purposes, but without the restriction on syntheticity) by every sentence. Thus, if not for the restriction, (5) would be

Included as a semi-entailment:

- (5) A: John's wife has two apples
 B: If someone is rich, then someone is rich.

In order to constrain relations in the natural logic so that they correspond more closely to the intuition that the sentences in (5) have no relation to one another, the possibility that analytic sentences can be semi-entailed is excluded.

The relation semi-entailment is of such a fundamental nature that it may be used to define all of the other relations in this chapter, with the inclusion of the primitives true, false, and sincere.

INTERNAL AND EXTERNAL NEGATION

It is important to grasp the distinction between what has been called internal and external negation. The terms may be defined as

- (6) Sentence A is the internal negation of sentence B if and only if "A is true" semi-entails "B is false"
- (7) Sentence A is the external negation of sentence B if and only if "A is true" semi-entails "B is not true" and "B is false" semi-entails "A is true."

An example of internal negation is

- (8) A: John's wife doesn't have two apples
 B: John's wife has two apples.

If one believes that A is true, then one must believe that B is false. Thus "A is true" semi-entails "B is false."

An example of external negation is

- (9) A: The sentence "John's wife has two apples" is
 not true.
 B: John's wife has two apples.

If someone believes A to be true, then he must believe B to be not true, and if he believes B to be false, then he must believe A to be true. The reason for the inclusion of the second condition in internal negation is to exclude pairs like the following:

- (10) A: There is no present King of France
 B: The King of France is bald.

In the case of (10), one who believes A to be true must believe B to be not true, yet intuitively, while there is a relation between A and B, it is not the same relation that

is commonly thought of as negation. However, one who believes B to be false needn't believe that A is true, and this condition suffices to exclude such cases. This possibility does not arise for internal negation, for reasons which will become more clear after presupposition is discussed.

There are various surface means of marking a sentence as being internal or external negation. However, it should be made clear that internal and external negation as I have defined them here (and as they are usually defined elsewhere) are semantic and/or pragmatic concepts, and it is impossible to give an adequate surface-only characterization of them. This will become even more clear during the discussion of nondiscrete variation in negation. However, internal negation is usually indicated at the surface level by the presence of a negative particle (not, un-, in-, no, etc.) within the negated sentence, as in

$$\begin{array}{rcl}
 (11) \text{ a.} & \begin{bmatrix} X & Y \end{bmatrix} & \\
 & & \text{====> Internal Negation} \\
 & \begin{bmatrix} X & \text{not} & Y \end{bmatrix} &
 \end{array}$$

- b. Bill is a crook
 Bill isn't a crook
 Bill is no crook

- c. Bill stole some money
 Bill didn't steal any money
 Bill stole no money

- d. Bill is tall
 Bill is not tall
 Bill is short (lexical incorporation).

In (11b-c), the first sentence of each triple is to be viewed as an "A" sentence in the definition, and each of the others is to be viewed as a "B" sentence. (11d) shows that in some cases the negative particle is incorporated at the surface level in a lexical item with the meaning (roughly) "not X."

External negation, on the other hand, is characterized by the presence of a negative marker outside the negated sentence, usually in a higher sentence with internal negation:

(12) a. $\begin{bmatrix} X & Y \end{bmatrix}$
 =====> External Negation
 W not Z $\begin{bmatrix} X & Y \end{bmatrix}$

b. Bill is a crook

It is not the case that Bill is a crook

The sentence "Bill is a crook" is not true

c. Bill stole some money

It is not true that Bill stole some money

The sentence "Bill stole some money" is false.

Notice that the external negations in (12b&c) can be paraphrased as the internal negations of

(13) It is the case that ...

The sentence ... is true

It is true that

This indicates that the relation is functional rather than just syntactic.

FULL ENTAILMENT AND PRESUPPOSITION

The closest counterpart in the present system to the traditional logical relation called "entailment" or "implication" is full entailment:

- (14) Sentence A fully entails sentence B if and only if
 A semi-entails B and the internal negation of B
 semi-entails the internal negation of A.

Although this relation will not be discussed in detail, some examples are given in

- (15) A: John's wife has three apples
 B: John's wife has at least two apples
 C: John's wife has at least one apple
 -B: John's wife doesn't have at least two apples
 -A: John's wife doesn't have three apples.

Notice that A semi-entails B, since a believer of A must believe B as well, and also that the internal negation of B (-B) semi-entails the internal negation of A, (-A). Also notice that full entailment is transitive, since if A fully entails B and B fully entails C, then A fully entails C.

Perhaps the most important of natural logic relations for the present discussion is presupposition, which is

defined as

- (16) Sentence A presupposes sentence B if and only if
A semi-entails B and the internal negation of A
semi-entails B.

An example of presupposition is

- (17) A: John's wife has some apples
B: John has a wife
-A: John's wife has no apples.

If one believes A to be true, then one must believe B to be true, and if one believes -A to be true, then one must also believe that B is true.⁶

An important feature of presupposition is that presuppositions may be presupposed by other presuppositions. That is, presupposition is a transitive relation. This is illustrated in

- (18) A: Bill knows that John's wife has two apples
 B: John's wife has two apples
 C: John has a wife.

An examination of (18) will show that A presupposes B, B presupposes C, and A presupposes C, by way of B, so to speak. This will be discussed in more detail in Chapter 3.

PRAGMATIC PRESUPPOSITION

It is failure to distinguish between presupposition of the type defined in (16) and pragmatic presupposition which results in much of the confusion about presupposition which exists in the literature (see Katz 1973 for an example of this confusion). Pragmatic presupposition may be defined as in

- (19) Sentence A pragmatically presupposes sentence B if and only if "X sincerely says A" semi-entails "X believes B" and B is synthetic.⁷

Some examples of this relation are in

(20) a. Does John's wife have two apples?

John has a wife

b. Give John's wife an apple

John has a wife

c. John's wife is happy

John's wife is happy

d. The cat is on the mat

The cat is on the mat

e. Please give me an apple

I want an apple.

Notice that for declaratives, any sentence A pragmatically presupposes itself (c and d). Of course, all of the semi-entailments of A must be believed true for A to be believed true, including trivially all full entailments and presuppositions. Therefore, any sentence which is semi-entailed by A is pragmatically presupposed by A.

In the other cases (questions, requests, etc.), pragmatic presuppositions are what have been called sincerity conditions by Austin (1962), Searle (1971a&b), and Gordon and Lakoff (1971). Heringer (1971) makes use of this fact in a different vein.

One thing which is apparent throughout the present chapter is that all of the discussion has tacitly assumed that truth is discrete, as is falsity, that the relation presupposes is discrete, and that all negation is either

internal or external. Yet in the first chapter, much space was devoted to indicating that the trend in much of linguistics is to question such assumptions. In fact, the purpose of the present chapter was to set the stage for further discussion, to include careful examination of such assumptions. The terms introduced in the present chapter have been explained in a manner consistent with their present use in the literature. In the next chapter, an attempt is made to go beyond this level, by examination of facts which suggest that in an adequate natural logic, the definitions and conceptualizations as given here must be extended to account for nondiscrete variation.

NOTES TO CHAPTER TWO

1. For "must p" read "it is logically necessary that p" or "X is committed to the truth (belief in the truth) of p."

2. The idea of predicating "analytic" of a sentence can be traced to Carnap in Meaning and Necessity. Quine (1960) discusses analyticity and defines it interconnectedly with synonymy:

Sentences are synonymous if and only if their biconditional (formed by joining them with a biconditional) is analytic, and a sentence is analytic if and only if synonymous with self-conditionals ("if p then p"). (p. 65)

Quine states that the intuitive notion of analyticity is that a sentence is true (if analytic) purely by meaning and independent of collateral information, and gives "no bachelor is married" and "pigs are pigs" as examples.

3. As it happens, A must be synthetic as well, but it is unnecessary to include this in the definition, since it follows from the fact that if A is analytic, then all speakers must believe it, but since B is synthetic, not all speakers must believe it.

4. This condition may be too strong, since it blocks pairs like

A: John knows that it is either snowing or not snowing.

B: It is either snowing or not snowing.

There does seem to be some relation between A and B, at least more of one than in (5) in the text. But since any speaker must believe B regardless of his beliefs about A, this is probably properly excluded.

5. I mean to use the terms true and false in a way corresponding to the following tests:

- a. If the sentence may be used to make a sincere assertion, then it is believed true.
- b. If a sincere answer of "no" may be given to a simple yes-no question made of the sentence, then it is believed false.
- c. If a sentence cannot be used to make a sincere assertion, and if a simple yes-no question made

of it cannot be answered sincerely with "no,"
then the sentence is not true and not false.

An example is the following story. Suppose there are two people talking, John and Mary (who else?). John believes that Bill doesn't have a wife. Mary believes that Bill's wife is pregnant. The following statements are issued:

- d. Bill's wife is pregnant
- e. Bill's wife isn't pregnant
- f. Bill isn't married

For Mary, sentences (e) and (f) are false, and (d) is true. However, for John, (d) and (e) are not true, and (f) is true. For him, neither (d) nor (e) are false, while for her, both (e) and (f) are not true. Notice that to answer as in

g. Q: Is Bill's wife pregnant? A: No.

is insincere for both, but in addition for Mary it would be a lie. For a detailed discussion, see Shenaut (1974).

6. It may now be seen why it was unnecessary to include a condition like "B is false" semi-entails "A is true" in the definition of internal negation. The reason a similar condition was included for external negation is to block pairs like

A: There is no King of France
B: The King of France is bald.

This type of pair is blocked for internal negation, since whenever A is true, a presupposition of B is false, making B not true and not false.

7. The condition on syntheticity is included for the reasons mentioned during the discussion of semi-entailment.

Chapter Three

VARIATION IN PRESUPPOSITION AND NEGATION

In the previous chapter, several concepts of much current importance were introduced. In this chapter, two of these concepts will be focused upon in more detail: presupposition and negation. Obviously, these two concepts are related, since it is necessary to refer to negation to define presupposition. In fact, in much of the literature (e.g. Horn 1972), the distinction between internal and external negation is characterized as follows:

- (1) Internal negation shares the presuppositions of the unnegated sentence; external negation cancels the presuppositions of the unnegated sentence.

Clearly, there is a very intimate connection between the two relations.

This close interaction between the two has been pointed out before, and has even caused some linguists to question the usefulness of the notion "presupposition." One such linguist is Wilson (1972). We will have more to say

about this approach later.

FUZZY CONTRADICTION

In Chapter One, G. Lakoff's (1972) description of a fuzzy presuppositional logic was briefly introduced. In that system, truth and nonsense are nondiscrete, and vary along a continuum from 0 to 1. Nonsense is the degree to which the presuppositions of a sentence are not true. This framework will be extended here to describe another continuum, contradiction, which is dependent in part upon truth and presupposition.

In Lakoff's paper, "hedges" are described as predicates which decrease the degree of truth required of some proposition for some given degree of truth for the assertion. An "intensifier" has the opposite effect. For example:

- (2) a. John is 5'2" tall.
 Mack is 5'6" tall.
 Jim is 6'4" tall.

- b. John is tall.
 John is very tall.
 John is sort of tall.
- c. Mack is tall.
 Mack is very tall.
 Mack is sort of tall.
- d. Jim is tall.
 Jim is very tall.
 Jim is sort of tall.

Given the tallnesses of (2a), it can be seen that "sort of" can act to increase the truth of a sentence which was not very true, while "very" can serve to decrease the truth of relatively true sentences. In Lakoff's terms, "sort of" is a hedge and "very" is an intensifier.

Contradiction, in general, results from the conjunction of some proposition and its negation:

(3) p and (not p) (or "p but (not p)").

For example, consider the following contradictions:

- (4) a. It's snowing and it's not snowing.
- b. John is a bachelor but he's married.

In (4a), the contradiction is direct, since the first

conjunct is a proposition and the second its negation. The contradiction in (4b), however, is less direct, since the first conjunct semi-entails a proposition, and the second conjunct is the negation of the semi-entailed proposition. (4b) is contradictory due to application of modus ponens.

Now consider the effect of inclusion of hedges and intensifiers:

(5) a. It's sort of snowing and not snowing.

It's snowing like a bitch and not snowing at all.

b. John is sort of a bachelor, but technically he's married.

John is a strict bachelor, but is very married.

It seems clear that when hedges like "sort of" and "technically" are included, the previous contradiction is improved; that is, it becomes less contradictory. On the other hand, inclusion of intensifiers like "like a bitch," "at all," "strict," and "very" seems to increase the amount of contradiction. In Lakoff's system, this might be accounted for by simply adding the minimum degrees of truth for the contradictory propositions, so that the conjunction is contradictory to the degree that the sum exceeds 1. Using this measure, the scale of contradiction extends from 0 to 1, as do the scales of truth and nonsense. This fact can be used to examine the hypothesis that negation and

presupposition are not discrete.

CAUSAL CONJUNCTION

There is a test for presupposition involving contradiction. The test involves conjoining some proposition with some other proposition, and also conjoining the negation of the first proposition with the other proposition. If both of these conjunctions are contradictory, then the first proposition presupposes the second. (Note: although internal negation is used in the usual version of this test, any negation can of course be used if desired. However, failure to find contradiction with an external negation does not mean that the first proposition does not presuppose the second.) Here is an example with the factive predicate "resent":

(6) A: Mary resented that Fred left.

B: Fred left.

$A \& \neg B$: Mary resented that Fred left, and Fred
didn't leave.

$(\neg A) \& \neg B$: Mary didn't resent that Fred left,
and Fred didn't leave.

In the example, both of the conjunctions are contradictory,
so A presupposes B.

We are concerned here with a subset of sentential
conjunctions, namely, the set of "causal" conjunctions. In
application of the above test, one of the causal
conjunctions is substituted for "and." A causal conjunction
may be defined as follows:

(7) A conjunction C is causal if and only if for all pairs
of sentences (A, B) such that $C(A, B)$, B is a reason for
the truth of A, and $C(A, B)$ semi-entails "A and B."

Some examples of this are:

- (8) a. Ford is president because Nixon appointed him and then stepped down.
- b. Since all men are mortal and Socrates was a man, Socrates was a mortal.
- c. You've had too much to drink, so you should go home now.

Notice that all of these conjunctions have the flavor of the conditional in logic. In fact, there is some similarity, but

(9) If p, then q

does not semi-entail

(10) p and q.

That is, while material implication may connect any two well-formed sentences, causal conjunctions may only connect sentences which the speaker intends to indicate that he believes are true.

The interesting fact about this type of conjunction is that in sentences of the form $C(A', B')$, where A' is the negation of A, B' is the negation of B, and A presupposes B, B' is a reason for A' when A' is an external negation, but is not a reason (and is contradictory) if A' is an internal

negation of A. Example:

- (11) a. Tom didn't marry Fred's sister, because Fred doesn't have a sister.
 b. The sentence "Tom married Fred's sister" is not true, because Fred doesn't have a sister.

Example (11a), with internal negation, is contradictory, but (11b), with external negation, seems quite reasonable. We now turn to the use of this test to examine the discreteness of presupposition and negation.

DIFFERENCES IN TYPE OF PRESUPPOSER

Suppose we hypothesize that different surface markers of presupposition have different requirements for satisfaction. That is, marker m_1 requires that the presupposed proposition be true to degree d_1 , and marker m_2 requires that the presupposed proposition be true to degree d_2 . If d_1 is not equal to d_2 , then we would expect to find a difference in the degree of contradiction resulting from the causal conjunction test. In fact, this is what we find. Consider the following sentence:

- (12) a. Bill doesn't know that someone robbed the bank,
because no one robbed it.
- b. Bill doesn't realize that someone robbed the bank,
because no one robbed it.
- c. It wasn't Bill who robbed the bank, because no
one robbed it.
- d. Bill isn't the one who robbed the bank,
because no one robbed it.

All of the above sentences are of the form

- (13) A' because B'
- A presupposes B
- A' is an internal negation of A.

The only difference is in the surface means of marking the presupposition. (12a) uses a factive predicate, (12b) uses a semi-factive,¹(12c) uses a cleft sentence, and (12c) uses a pseudocleft sentence. Most informants agree that for the four surface markers of presupposition in (12), there is a decreasing degree of contradiction from (a) to (d). This may be seen as indicating that there are four different degrees of truth required by the presupposers of the presupposed proposition.

Another pair is seen in (14):

- (14) Bill's wife isn't the one who wrecked my car, because
- a. Bill doesn't have a wife.
 - b. my car hasn't been wrecked.

Again, most informants agree that possessives like (14a) are less contradictory in the test than pseudoclefts like (14b). This indicates that the surface possessive does not require as great a degree of truth. To sum up, we have shown some examples of presupposers which apparently demand different degrees of truth of their presuppositions. The order in terms of decreasing degree of truth required is:

- (15)
- a. factive predicates
 - b. semi-factives
 - c. cleft sentences
 - d. pseudocleft sentences
 - e. possessives.

That is, there seem to be at least five different levels of strength of presupposition shown by the results of the contradiction test. This is strong evidence that the relation "presupposition" obtains to a degree rather than categorically. In the next section, we apply the contradiction test to negation.

DIFFERENCES IN TYPES OF NEGATION

In Chapter Two, internal and external negation were defined, and examples of some of the more common surface markings of these categories were given. It was observed that the distinction is actually semantic and/or pragmatic, and that the surface form does not always match the predicted meaning. In this section, evidence is given that what may be going on is that it is the categories which are not useful, rather than the surface forms which are inconsistent. But first we introduce some more terminology.

Karttunen (1973b) explored the effects of different types of predicates on the presuppositions of complex sentences. He classified all of the predicates into the following categories:

- (16) a. Plugs: predicates which block off (cancel) all
of the presuppositions of the complement sentence
- b. Holes: predicates which let all of the
presuppositions of the complement sentence become
presuppositions of the matrix sentence

- c. Filters: predicates which, under certain conditions, cancel some of the presuppositions of the complement. (p. 174)

In this framework, internal negation is a hole, and external negation is a plug.

If we hypothesize that some negators approach the hole, and others approach the plug (rather than falling discretely into either), then we would expect differing results from the contradiction test depending on the negator present in the sentence. There is some evidence that this is indeed the case.

Consider the sentences of (17):

- (17) No one kicked my dog, so
 - a. The sentence "It was Bill who kicked my dog" is not true.
 - b. It is not the case that it was Bill who kicked my dog.
 - c. It isn't Bill who kicked my dog.

In all of the sentences in (17), the form is

(19) $\neg B$, so A'

A presupposes B

A' is a negation of A.

All of the presupposers are the same (cleft), and the presupposed proposition is the same. What varies is the negator. Both (a) and (b) are what we identified before as external negations, and (c) is an internal negation. As predicted, (c) is more contradictory than either (a) or (b). The unexpected result (if internal and external negations are discrete categories and all negations fit into one or the other) is that (b) is more contradictory than (a). That is, there are three levels of negation (in terms of cancellation of presuppositions) in (17) where there should be only two under the old classification.

Another example is shown in

(19) Bill isn't married, so

- a. It's not the case that Bill's wife has a Swiss bank account.
- b. Bill's wife doesn't have a Swiss bank account.
- c. Bill's wife has no Swiss bank account.

This time, (b) and (c) are internal negation and (a) is external negation. As expected under the traditional account, (a) is less contradictory than either (b) or (c),

but again we see a difference within a category. Example (b) is less contradictory than (c), even though both are in the traditional "internal" classification. Thus, there is reason to believe that neither internal nor external negation are discrete categories, and that negation, like presupposition, is nondiscrete.

To extend Karttunen's plumbing analogy, negation seems to function like a valve rather than as a plug or a hole. Of course, in plumbing, the limits of a valve are the hole and the plug (except in the case of drippy faucets when the plug limit is never reached), but there is plenty of room in between.

Another example will suffice to make the point. In Shenaut (1974), misleading evasion was discussed. Without going into detail about the content of that discussion, we observe that there are different degrees both of misleading and of evasion which are possible. This results in a nondiscrete category of speech act (one of the circumlocutionary acts) which is called "misleading evasion." It works like this. In order to make an evasion, the speaker must have been asked a question (or otherwise been requested to tell something). The speaker must say something (or do something) instead of responding to the request for information. If the speaker actually lies or issues (or attempts to issue) a misleading utterance, then he has not evaded the question, but has only answered it insincerely. However, since there are degrees of

misleading, it is possible for the speaker to both evade the question, sort of, and mislead the hearer, sort of, but do neither to a full degree. If either is done to a full degree (or not at all), then the act does not qualify as a misleading evasion. However, there is a range of degrees of misleading and evasion which do qualify. The following story should make this more clear:

(20) Bill and Mary are talking. Bill believes that Tom is not married, and never has been. Mary, on the other hand, thinks that the girl Tom lives with is his wife. Bill knows that Mary would be offended if she knew that Tom and his convivant were "living in sin." Mary thinks that Bill is trying to move on Tom's wife, and this is upsetting her. She wishes to find out for once and for all what Bill's intentions are. Bill, of course, wants to evade the question and at the same time indicate that he has no interest in the girl. There are several ways he could reply:

(Mary): You're interested in Tom's wife, aren't you?

- a. Tom isn't married. (truthful, evasive)
- b. I have no interest in Tom's wife. (misleading, not evasive)
- c. No, its not the case that I'm interested in Tom's wife. (less misleading, more evasive)
- d. No, it's not true that I'm interested in Tom's wife. (still less misleading, more evasive)
- e. No, it wouldn't be true for you to say that... (even less misleading, more evasive).

Notice that as one goes down the list from (b) to (e), the degree of misleading decreases, and the degree of evasion increases. This can be taken to show that the presuppositions of the possessive are weakened to different degrees by the different negators used in the replies. In other words, as one reads down the list of

replies, the valve becomes more closed, approaching a plug-like state. But even (e) is misleading to some extent, so some of the presupposition that Tom has a wife is present in all of them.

WILSON'S HYPOTHESIS

Wilson (1972) observed that in almost all cases of negative sentences with material marked as presupposed, it is possible to get the so-called external reading, cancelling the presuppositions of the sentence. This would imply that all negations are potentially external as far as presuppositions are concerned, and that therefore, the notion of presupposition as a relation maintained after negation is not correct. An example is the syllogism, which seems to force the external reading, at least for Wilson:

(21) If it was John who robbed the bank, then someone
robbed the bank.

No one robbed the bank.

⊥ It wasn't John who robbed the bank.

Wilson uses the relative acceptability of such syllogisms as evidence to support the hypothesis that there is no difference between what we have called semi-entailment and presupposition, since the only difference has to do with the maintenance of the relation under negation. If the

"external" reading is possible in every case, then clearly the distinction is not viable. Wilson suggests that certain forms mildly indicate that the speaker tends toward belief of the semi-entailed material even under negation, but the indication is not the same as the commitment or "necessary" belief as in semi-entailment.

The present account suggests another explanation of Wilson's facts.

If there is indeed a continuum of negation in terms of presuppositional cancellation, and if contradiction is nondiscrete, then one might expect to find differences in the amount of contradiction in the syllogisms, just as in the contradiction test. In fact, this seems to be the case:

(22) If it was John who robbed the bank, then

someone robbed the bank.

No one robbed the bank.

└

a. It wasn't John who robbed the bank.

b. It isn't the case that John robbed the bank.

c. The sentence "It was John who robbed the bank" is false.

There is an increase in acceptability as one proceeds down the list. This indicates that the speaker of cleft sentences commits himself to the truth of the complement even under negation, although to different degrees depending

on the type of negation used. This does not hold for all semi-entailment:

(23) If John is a bachelor, then he is not married.

John is married.

⊥

a. John is not a bachelor.

b. It is not the case that John is a bachelor.

c. The sentence "John is a bachelor" is false.

There is no difference in acceptability among the syllogisms of (23).

Under Wilson's account, there is no way to account for (a) differences in acceptability of syllogisms which depend upon the surface form of negation used, and (b) differences in degree of contradiction resulting from type of negation and type of presupposer. The present account handles both of these differences. This suggests that it is still meaningful to include the notion "presupposition" in linguistic analyses, but that it is merely a nondiscrete relation, as is negation. It is this nondiscreteness that results in the facts reported by Wilson.

In Chapter Two, it was pointed out that presupposition is a transitive relation, that is, presuppositions may be presupposed by presuppositions, resulting in complex presuppositional structure. The next section gives evidence that there are differences in the strength of

presuppositions due to their level in presuppositional structure.

DIFFERENCES DUE TO DEPTH OF PRESUPPOSITION

G. Lakoff (1970) claims that secondary presuppositions are impossible to qualify (i.e., suspend or cancel by means of an if- phrase), where a secondary presupposition is a sentence presupposed by a presupposition of the matrix sentence:

- (24) a. Few men have beaten their wives, if any men have beaten them at all.
- b. Few men have stopped beating their wives, if any have ever beaten them at all.

In (a), use of the quantifier "few" presupposes "some men have beaten their wives." This presupposition is qualified by the if- clause, which is sort of a hedge on the presupposition of the first clause. In (b), on the other hand, use of the verb "stopped" presupposes "a few men have beaten their wives," which in turn presupposes "some men have beaten their wives." This secondary presupposition is qualified by the if- clause, but only at the cost of a loss of grammaticality for the sentence. Lakoff concludes from this and other facts that only primary presuppositions may be qualified.

There is, however, another possibility, not considered by Lakoff, namely that there is a hierarchy such that secondary presuppositions are harder to qualify than primary ones, and tertiary presuppositions are harder to qualify than secondary ones, and so on. It is possible to use the contradiction test to determine whether this is true.

That is, it might be the case that the reason why the decrease in grammaticality occurs is that embedded presuppositions have more stringent requirements on truth for satisfaction. Therefore, use of a qualifier with a proposition marked as very true might not be able to diminish the truth requirements of the presupposition enough to avoid contradiction.

Consider the following examples:

- (25) John didn't know that it was Bill who married
Fred's sister, because
- a. it was Jack who married her.
 - b. no one married her.
 - c. Fred doesn't have a sister.

- (26) It isn't John who knows that Bill married Fred's sister, because
- a. no one knows it (yet).
 - b. Tom married her.
 - c. Fred doesn't have a sister.

In both cases, there is an increase in contradiction as one descends the list of alternatives. The presuppositional structures of the sentences are

(25') (NOT) FACTIVE>>CLEFT>>POSSESSIVE

(26') (NOT) CLEFT>>FACTIVE>>POSSESSIVE ,

where ">>" is to be interpreted "presupposes." There is a very obvious increase in the degree of contradiction when lower-level presuppositions are denied. This is in support of the hierarchy proposed above. For further support of this hypothesis, consider

- (27) Few feminists know that some men have stopped beating their wives, if
- a. any feminists know it at all.
 - b. any men have stopped beating their wives at all.
 - c. any men have ever beaten them at all.

This example, which seems very similar to that of Lakoff

(cited above), shows that the same increase in ungrammaticality obtains for qualification of n-ary presuppositions as for contradiction of them.

To sum up, in this chapter, we present evidence that (a) presupposers are of different strengths in terms of the degree of contradiction resulting from their direct denial, (b) negators act like valves in that they diminish the presuppositions of a lower sentence to different degrees, depending upon the surface form used, and (c) presuppositions appear to increase in strength as a result of being presupposed by a higher presupposition.² We have used this evidence to suggest changes in the hypotheses of Wilson (1972) and Lakoff (1970). In the next chapter, we shall discuss the definitions of Chapter Two in the light of the facts in the present chapter.

NOTES TO CHAPTER THREE

1. Karttunen (1970) divides factive predicates into two sub-classes:

- a. Semi-factives predicates are those for which the following relation obtains:

p is a semi-factive if and only if for all propositions A, p(A) semi-entails A and the internal negation of p(A) semi-entails A.

- b. True factives are defined as:

p is a true factive if and only if for all propositions A, "p(A) is possible" semi-entails A, and "the internal negation of p(A) is possible" semi-entails A.

Karttunen also suggests that something like the definition (b) is the proper definition for all presupposition, and that therefore semi-factives are not presupposers. Since all predicates meeting (b) also meet (a), and since (a) corresponds to the usual definition for presupposition, I do not see anything to be gained by this proposal.

2. As was noted in the Introduction, there is good reason to doubt linguists' intuitions when they are given as the sole support for an analysis. To this end, several attempts were made to gather support for the intuitions reported here. Some of this evidence is reported in Shenaut (1975) and Shenaut and Warren (1973). In general, it would be fair to say that all of the intuitions included here were supported by this experimental data.

Chapter Four

FUZZY RELATIONS BETWEEN SENTENCES

In the previous chapter, evidence supporting the hypothesis that the relations "negation" and "presupposition" are nondiscrete is presented. If this hypothesis is correct, then the definitions given in the first chapter must be altered in such a way as to maintain their original correspondence with intuitions, but at the same time account for the new data reported here. It is only necessary to amend the original definitions slightly to accomplish this. In the case of negation, it is possible to actually replace a concept (internal negation) with another one (value). Some of the changes are not explanatory, in that they allow a range of variation, but make no attempt to account for this variation. This is not true in the case of complex presuppositions, however, since it is possible to give a relatively straightforward explanation of the facts there. The order of presentation follows roughly that of Chapter Two.

SEMI-ENTAILMENT

Semi-entailment may be redefined as follows:

- (1) Sentence A semi-entails sentence B (to degree $d_0 = d_1 - d_2$) if and only if for all speakers S who believe A is true to degree d_2 , S must believe B is true to degree d_2 , and B is synthetic.

In other words, for a sentence to semi-entail another, the latter must be believed to be as true or more true than the former. The degree of semi-entailment is the extent that the minimum degree of truth of the latter sentence must exceed that of the former. Here are some examples:

- (2) a. John knows Bill is tall.
 Bill is tall.
 b. Bill just found out that Nixon is popular.
 Nixon is popular.

- c. $\left\{ \begin{array}{l} \text{Some} \\ \text{Quite a few} \\ \text{Most} \\ \text{All} \end{array} \right\} \quad \text{Arkkites are mothers.}$
- Some Arkkites are female.

- d. No Arkkites are female, but $\left\{ \begin{array}{l} \text{some} \\ \text{quite a few} \\ \text{most} \\ \text{all} \end{array} \right\}$
- Arkkites are mothers.

In (a), (b), and (c), the first sentence(s) semi-entail(s) the second. In (c), however, the strength of this semi-entailment varies as seen by the increase in contradiction resulting from the different surface markers of semi-entailment as one goes down the list in (d).

At this point, it is useful to note that, while for the relation "semi-entail" to obtain between two sentences, the degree of truth d_2 of the semi-entailed sentence must be greater than or equal to the degree of truth of the semi-entailing sentence, it is logically possible for another relation, which might be dubbed "sort-of entailment" to hold between two sentences:

- (3) Sentence A sort-of entails sentence B if and only if for all speakers S who believe that A is true to some degree d_1 greater than 0, S must believe that B is true to degree d_2 greater than 0, and B is synthetic.

That is, if A is believed to be even partially true, B must be believed at least partially true, but it is not necessary that d_2 be greater than or equal to d_1 . Extent of sort-of entailment is equal to d_2 . Clearly, sort-of entailment implies (in the logical sense) semi-entailment. Sort-of entailment might be what obtains between sentences which have had their presuppositions valved down by negation. For present purposes, we will not go into this distinction any further, but merely point it out as a possibility.

NEGATION

As was observed in Chapter Three, negation is a valve. At this point, we make that notion more explicit:

- (5) For all sentences T of the form $p(q)$ where q semi-entails r to degree d greater than or equal to 0, and p is some abstract predicate with surface realizations p', p'', \dots , and for all S who believe T to be true to degree t_1 S must believe r to be true to degree t_2 ;

- a. if $t_2=0$, then p is a plug.
- b. if $t_2 \geq 0$, then p is a hole.
- c. if for some T and for all p , $t_2=0$, and for some T and for all p , $t_2 \geq 0$, then p is a filter.
- d. if t_2 is located at several different points on either side of t_1 for different realizations of p , then p is a valve.

Since it is desirable to have the value of the valve vary in the same range as the other fuzzy variables, i.e., from 0 to 1, this value can be conceptualized as the difference between t_2 and t_1 , or

$$(6) \quad \min(t_2 - t_1, 0) .$$

In other words, the value of the valve is the extent to which the semi-entailment is reduced. When the value is equal to 1, then the predicate is a hole; when the value is equal to 0, then the predicate is a plug. Intermediate values are expressed by location along the interval.

As an example, consider

- (7) It wasn't John
 It's not true that it was John who robbed the bank.
 (etc.)

which has the following presuppositional structure:

- (8) T: p q r
 (NOT)(it was John who robbed the bank>>someone
 did)

When NOT is a plug, T may be true to any degree regardless of the truth of r. When NOT is a hole, r must be at least as true as T. And when NOT is in between, r must be at least partially true, but needn't be as true as when NOT is a hole.

Since on the initial definitions for internal and external negation, external negation implies (in the logical sense) internal negation, it is possible to define all negation by applying the definition for external negation. Once the set of all pairs of sentences (A, B) such that A is a negation of B has been so defined, the value of the negator for some subset of the pairs in terms of presupposition cancelling is determined by testing, as was carried out for several negators in the previous chapter. Since internal negation under this system reduces to a theoretical endpoint to the hypothetical value continuum, it

seems that there is no use to continue to maintain the distinction between it and external negation in the natural logic.

PRESUPPOSITION AND FULL ENTAILMENT

Since internal negation was used in our definitions of both presupposition and full entailment, and we have discarded internal negation from the natural logic, it now becomes necessary to redefine these definitions to include the changes. In the case of full entailment, this may be accomplished straightforwardly:

- (9) Sentence A fully entails sentence B if and only if A semi-entails B, and for all pairs (A', B') such that A' is a negation of A, B' is a negation of B, and value of the negators of A' and B' are equal (in terms of cancellation of presupposition), B' semi-entails A' .

Since it is probably impossible to determine the actual value of some surface negator, much less decide whether two such negators have the same value, in practice, the only cases which can be decided with any real confidence are those in which the surface negators are identical. Thus the test for semi-entailment involves comparison of sentences with the same surface form:

- (10) a. A: Mary's sister has two apples.
 B: Mary's sister has at least one apple.
- b. B': Mary's sister doesn't have at least one apple.
 A': Mary's sister doesn't have two apples.
- c. B': It's not the case that Mary has at least one
 apple.
 A': It's not the case that Mary has two apples.

The problem is somewhat more complicated for presupposition. There seem to be two alternatives. We could simply alter the old definition to read "negation with a value of 1" instead of "internal negation." This would preserve the old distinction exactly. The problem with this alternative is that it might be the case that some (or perhaps all) speakers are linguistic counterparts to leaky faucets; that is, their valves never open or close all the way. Thus, for these speakers, there might not exist negations with the value 1. Yet it would be stupid (in the sense of Ross 1972) to infer from this that for these speakers, presupposition does not ever obtain.

The second alternative involves quantifying over negations, as in

- (37) Sentence A presupposes sentence B if and only if A semi-entails B to some degree d_1 greater than 0, and there exists some A' such that A' is a negation of A and A' semi-entails B to some degree d_2 greater than 0.

This seems to correspond more closely to the facts.

A measure of the strength of a presupposition is the degree of semi-entailment which remains under some negation. Figure (1) sums up some relations between presupposers and negators in terms of this measure.

In Figure (1), the ordinate axis represents the values of the negators considered, running in order from 0 (plug) to 1 (hole). The relative position on this scale for various surface negators is in the key. The abscissa represents strength of semi-entailment resulting from the negated sentence. Plotted on the coordinates are several surface presupposers. It should be remarked at this point that not all of these combinations have been tested, and that the relation might be more complex than suggested here. Also, the relation might not be linear. However, Figure (1) represents my intuitions about the interaction of five surface negators and five surface presupposers.

So far, we have modified the definitions of semi-entailment and presupposition to allow for nondiscreteness, and have done away with the concept

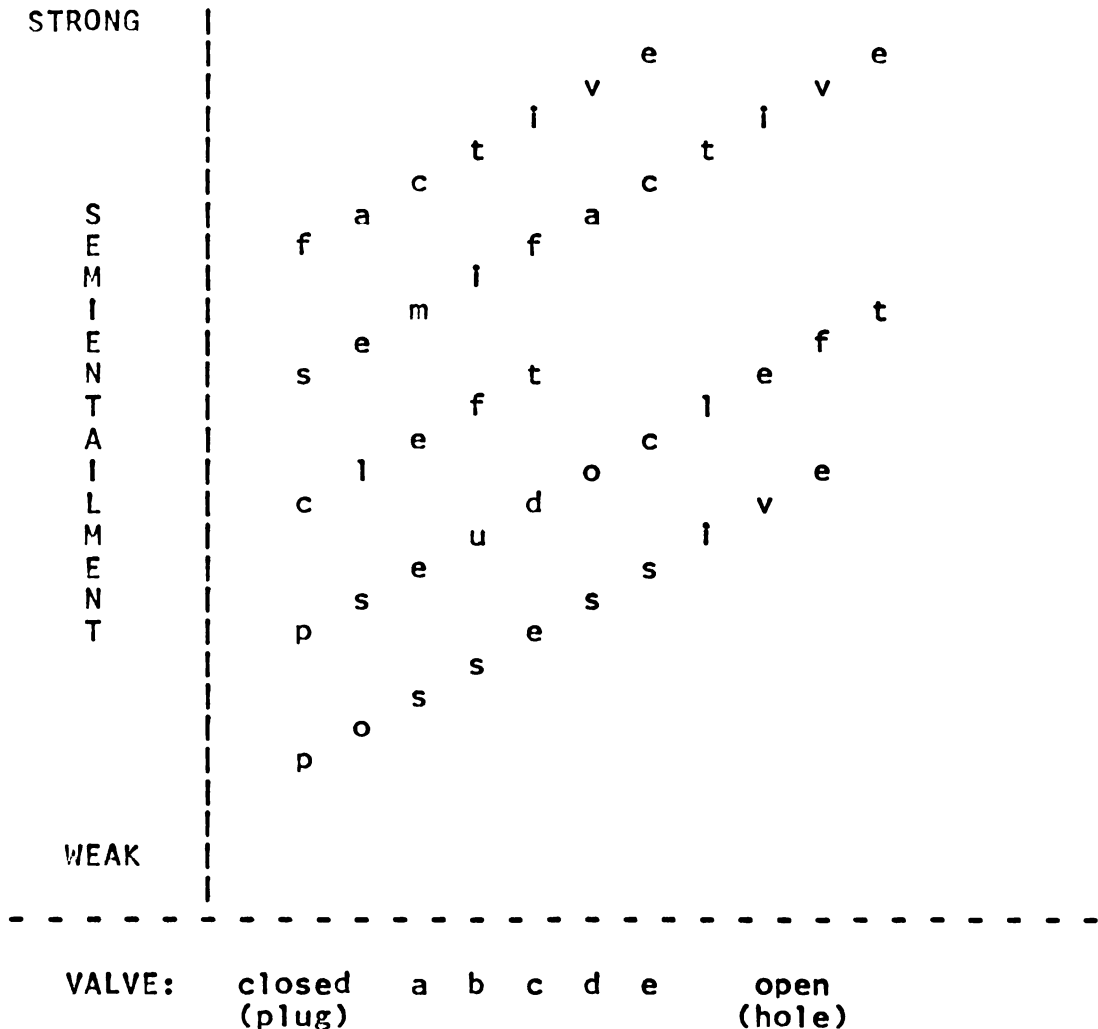


Figure (1): Chart summarizing the relation of negator and presupposer in terms of strength of semi-entailment under negation.

Key: a = The sentence X is false
 b = The sentence X is not true
 c = It's not true that X
 d = Internal negation (matrix verb)
 e = It's not the case that X.

"internal negation," replacing it with the more general "valve." This allows us the flexibility to represent certain empirical observations which were impossible (or difficult) to deal with under the old system.

One problem remains. As we have observed, presuppositions increase in strength as a result of being embedded in the presuppositional structure of a sentence. We have seen how surface negators and presupposers interact to give rise to different degrees of semi-entailment. The account we have given of this interaction suggests a natural explanation of the facts for complex presuppositions.

If we compute the increment of truth associated with the primary presupposer, use it to compute the minimum truth for its presuppositions, then compute the increment of truth for the secondary presupposer, use it to compute the minimum truth of its presuppositions, and so on, then the proper result is automatic. This follows because whenever the minimum truth of the presupposing sentence is higher, the minimum value of its presuppositions is higher, since the latter are lower bounded by the truth of the presupposer. Thus a simple recursive algorithm such as Figure (2) is capable of representing the observed facts.

In Figure (2), the matrix sentence is denoted $P(0)$, the primary presupposition as $P(1)$, and so on. The process represented in the flow diagram is: (1) determine the immediate presupposition; (2) using the truth of the presupposer as the lower bound, with regard to the strength

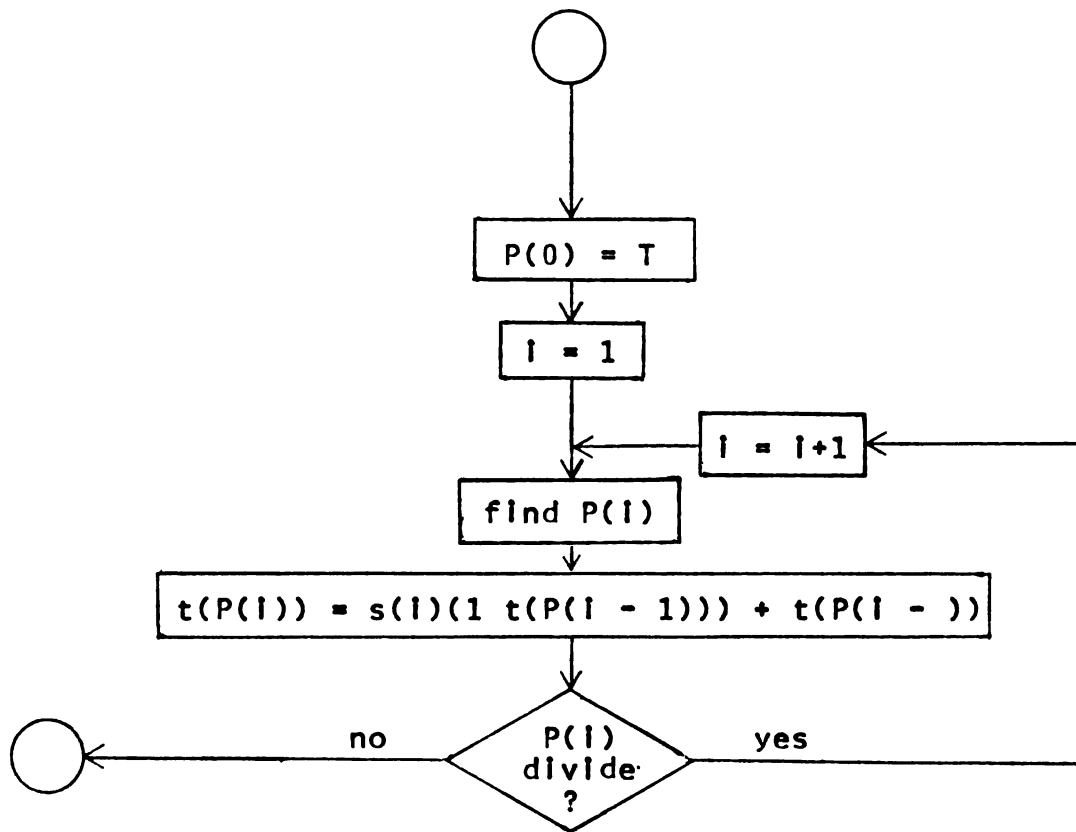


Figure (2): Hypothetical routine for computing the minimum truth for satisfaction of the presuppositions of a sentence T . " $t(x)$ " means "minimum truth of x "; " $s(i)$ " means "degree of semi-entailment at level i ."

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1861. It is a very important document, as it contains the President's message to the Congress at the beginning of his first term. The letter is written in a very formal and dignified style, and it is one of the most important documents in the history of the United States.

of the presupposer, compute the minimum truth of the immediate presupposition by adding a proportion of the difference between the minimum truth of the presupposer and 1 to the minimum truth of the presupposer; and (3) if the presupposition has presuppositions, go on to the the next level, otherwise exit.

In this chapter we have examined certain fuzzy relations between sentences. Motivated by evidence from Chapter Three, we changed the definition of semi-entailment, presupposition, and full entailment from the initial forms in Chapter One. We explicitly define the notion "valve," introduced in Chapter Three, and used this concept to motivate the abandonment of "internal negation" as a useful natural logic concept. Finally, we suggest a means of accounting for an increase in strength of semi-entailment for higher order presuppositions using a simple recursive process.

NOTES TO CHAPTER FOUR

1. This is based upon G. Lakoff's (1972) treatment of material implication in a fuzzy system:

" $P \rightarrow Q$ " will hold in all cases where there is a real logical implication relation between P and Q, that is, where it is necessarily the case that [the truth of P] \leq [the truth of Q] .

2. See Haviland and Clark (1974) for some remarks on real-time processing of simple presuppositions.

Chapter Five

SUMMARY AND DISCUSSION

The aim of this thesis has been to demonstrate that nondiscrete variation occurs in the interaction of the semantic relations "presupposition" and "negation." To do this, first the terms were defined in a manner roughly reflecting their current usage, but in a way which was internally consistent, allowing a careful examination of the interaction between them, and the theoretical implications of this interaction. Part of this defining involved making explicit the distinctions internal/external negation, full and semi-entailment, and pragmatic and logical presupposition.

Next, it was shown that contradiction can be indirect; that is, it can result from the conjunction of some proposition and the negation of some semi-entailment of the proposition. Also, it was shown that contradiction is not categorical; that is, it is possible for there to be different degrees of contradiction. Finally a test, called the causal contradiction test, was defined. This test involves conjoining a negated proposition and a negation of one of its presuppositions, using a "causal" conjunction (so, since, because). The resulting degree of indirect contradiction was used to examine the status of negation and presupposition as discrete phenomena.

The first result was the finding that there are differences between different surface presupposers (e.g. cleft, pseudocleft, factives, semi-factives, and possessives) in terms of the degree of contradiction resulting from the causal contradiction test. This result was interpreted as showing that there are differences in the strength of presuppositions resulting from different presupposers.

The next result was the similar finding that there are differences in degree of contradiction resulting from the test due to surface negator. That is, some negations seem to diminish the presuppositions of a sentence to a greater degree than do others. Following the plumbing analogy of Karttunen (1970), who referred to internal negation as a "hole" (presuppositions of the complement pass freely into the matrix sentence), and to external negation as a "plug" (presuppositions of the complement are blocked), the data were interpreted as indicating that negation seems to be more like a valve. This means that some negators are relatively open (to lower presuppositions) and some are relatively closed, but there are many degrees in between these two endpoints.

The final result was the finding that when a presupposition is presupposed by presuppositions, its strength is increased. This was accounted for formally by means of a top-to-bottom recursive process which determines the minimum degree of truth for each presupposition of a

sentence (Figure 2).

There might be disagreement with some of the facts presented in support of the analysis, but it is only necessary to find a single instance of nondiscrete variation concerning one of the variables to prove that such variation exists. It is believed that more than ample evidence has been presented to support this thesis.

What is interesting, especially in the light of a burgeoning trend toward functional explanation in linguistics, is to speculate about the role that this nondiscreteness might play in the actual use of language for communication.

One implication of the process in Figure 2 for assigning degrees of truth to the presuppositions of the sentence is that perhaps the truth value of presuppositions (and, one might add, especially of deeper presuppositions) is usually unimportant to the understanding of the sentence. That is, it might be the case that the normal function of presupposition is to identify the location of some mental storage so that the stored information might be accessed, allowing the new information (or, in the case of speech acts with other than declarative force, speaker propositional attitude), to be added to (or conflated with) the store. There is experimental evidence for this position (at least for simple presuppositions). For example, Haviland and Clark (1974) report that it takes less time to understand a sentence if the presuppositions are known than if they are

not. That is, if Tom happens to know that Sue has a brother, it would take him less time to understand the sentence (said by Sue) "My brother has red hair" than if he did not have this information. Haviland and Clark dub this (and other related phenomena) the "given-new contract." This implies that in normal conversation, the speaker follows a convention (or "contract") to mark as presupposed (by clefting, pseudoclefting, use of anaphora, etc.) only material which he believes is shared by both himself and the hearer. This contract allows the hearer to disregard the content of the presupposed portion of the utterance, except as an indication of reference and topic, speeding comprehension of the sentence. Given this analysis, the present results lead to several predictions.

First, it seems that the results with embedded presuppositions show that deeper presuppositions may be processed (for truth value) only after all less embedded presuppositions (and the nonpresupposed material). That is, when presuppositions are more deeply embedded in the presuppositional structure of the sentence, they are marked (in the above sense) as being believed more "given" (in some sense) by the speaker. Since the hearer is following the given-new strategy, he will tend to "take the speaker's word for it" unless there is some indication to the contrary. This prediction can be tested by application of the Haviland-Clark methodology, which involves measuring comprehension time tachistoscopically.

Second, there needs to be some way for the speaker to indicate to the hearer that he is not following the contract. That is, even though there is some presupposer in the sentence, it is not the speaker's intention to imply that he believes its presuppositions. This might be the function of what Karttunen (1970) calls "plugs." The present results on negation suggest that the function of the differences in presupposition-cancelling by the various negators might be to indicate the level of belief in the presuppositions of a sentence held by the speaker. For example, a relatively plug-like negator (like "It is not the case that...") would indicate that the speaker is saying the sentence, but does not necessarily go along with its presuppositions. The prediction in this case is that it would take longer to understand such sentences than sentences with relatively hole-like negators, and also for the former that pre-knowledge of the "presupposed" material would not speed comprehension time. This predication also seems amenable to testing using the Haviland-Clark paradigm.

Another area which seems relevant to the examination of the function of presuppositional nondiscreteness is politeness. Attempts have been made to develop semantic/pragmatic explanations of intuitions about level of conventional politeness in requests (see R. Lakoff 1973 and B. Mohan 1974). However, these attempts have not been totally satisfactory (in our opinion) due to the essential nondiscreteness of politeness judgments and the lack of a

fuzzy theoretical apparatus in semantics and pragmatics.

For example, consider the following indirect requests:

- (1) a. Can you sweep the floor?
- b. Can't you sweep the floor?
- c. You can sweep the floor.

Clearly, the conventional politeness decreases from (1a) to (1c). How is this fact to be accounted for?

Gordon and Lakoff (1971) state that one way to conversationally convey a request is by questioning a hearer-based sincerity condition (in our framework, sincerity conditions are pragmatic presuppositions). One such condition is

- (2) The hearer is able to carry out the request.

That is, a request cannot be sincere unless the speaker believes the hearer is able to carry it out. Both (1a) and (1b) question (2). Normally one does not ask questions about that for which he already knows the answer (or at least does not ask such questions sincerely). Thus since the speaker indicates by the question that he does not know the answer, and indicates by the fact that he is making a request that he does know it, it seems that (1a&b) are paradoxical. That is, they must be insincere if they are to be sincere. This account, which seems to follow from the

consideration of sincerity conditions on questions and on requests, is clearly flawed, since no one would judge (1a&b) as either necessarily insincere or as paradoxical. The explanation of this state of affairs comes from consideration of the function of asking questions to convey requests. Questions, as was pointed out above, normally pragmatically presuppose that the speaker does not know the answer. But it is possible for different types of questions to indicate different levels of sureness about the answer. This is shown by the different degrees of contradiction in

- (3) I don't think you can do it, but
 - a. you can sweep my floor.
 - b. can't you sweep my floor?
 - c. can you sweep my floor?

That is, (3a), a nonquestion, is more contradictory than (3b), and (3b) is more contradictory than (3c). Now, if (2) is false, it is possible for the hearer to refuse the request with no impoliteness at all. This suggests that the function of question-requests of the type in (1) could be to make the request less strongly, leaving the hearer a way (at least nominally) out of doing the request without actually refusing to cooperate. And further, the function of the negative question seems to be to weaken the pragmatic presuppositions of the requests, but not to the degree of nonnegative questions.

The research reported here, then, seems to provide a means to examine some of the traditional problems of linguistic description from a broader base. Now it appears possible to discuss questions and explanations which would have been much harder to consider under previous accounts. While this seems to represent genuine progress, it is not an endpoint, but only a rung in the ladder which hopefully will lead us to an adequate theory of grammar.

Appendix ALTERNATE DEFINITIONS

As was pointed out in the preliminary remarks to Chapter Two, there exists a certain amount of confusion concerning terminology in the literature. What follows is a list, by no means complete, of definitions given by various writers for some of the concepts we have been discussing here. The purpose of this Appendix is to allow the reader to relate the findings of the thesis to other viewpoints concerning semantic relations. Some of the definitions were garnered from secondary sources, as noted.

SEMI-ENTAILMENT

Horn (1972) p. 11

Semantic entailment: $P \models Q$ =df Q is true under every assignment of truth values (i.e., in every possible world) under which P is true.

Givón (1973) p. 99

An implicative verb is a verb implying the truth of its complement . . . a negative implicative verb implies the falsity of its complement.

Karttunen (1970) p. 58

$P \models Q$ iff whenever it is true that P , it is true that Q .

_____ (1971b) p. 6

P implies Q iff whenever P is asserted, the speaker ought to believe that Q .

_____ (1973b) p. 177

A semantically entails B iff B is true . . . whenever A is true.

Keenan (1971) p. 255

A sentence is a logical consequence of (logically implied by) a sentence S' just in case S is true under all the conditions under which S' is true.

FULL ENTAILMENT

Austin (1962) p. 47, 49

"All men blush" entails "some men blush" . . . if p entails q then $\neg q$ entails $\neg p$: if "the cat is on the mat" entails "the mat is under the cat," then "the mat is not under the cat" entails "the cat is not on the mat."

Horn (1969) p. 98

If $(S \rightarrow S')$ and $(\neg S' \rightarrow \neg S)$ then $S \models S'$.

PRESUPPOSITION (LOGICAL)

Austin (1962) p. 50

Both "John's children are bald" and "John's children are not bald" presuppose that John has children . . . the statement that "John's children are bald," if made when John has no children . . . (is usually said to be) not false because it is devoid of reference . . . the utterance is void.

Chomsky (1972) p. 100 ff

The truth of the presuppositions is a prerequisite for the utterance to have a truth value.

Givon (1973) p. 105

Neg-factive verbs . . . presuppose the falsity of their complements.

Horn (1969) p. 98

If $(S \dashv\vdash S')$ and $(\neg S \dashv\vdash S')$ then $S \gg S'$.

(1972) p. 12

$P \gg Q \text{ =df } (P \models Q) \ \& \ (\neg P \models Q)$. (see Horn's definition of " \models " above)

Frege (1892) p.69(*)

If anything is asserted there is always an obvious presupposition that the simple or compound proper names (i.e., all singular referring expressions or definite descriptions: Garner's note) used have a reference.

Karttunen (1970) p. 67 ff 8

A presupposes B iff $M(A) \models B$ & $M(\neg A) \models B$. (M is the modal possibility operator. See Karttunen's definition for \models above.)

Keenan (1971) p. 256

A sentence S is a logical presupposition of a sentence S' just in case S is a logical consequence of S' and also a logical consequence of the logical denial of S'. (See Keenan's definition for "logical consequence" above. No definition given for "logical denial.")

Van Fraassen (quoted in Karttunen 1973 p. 169)

Sentence A semantically presupposes another sentence B just in case B is true whenever A is true or false.

Strawson (1952) p. 207-8 (*)

A statement S presupposes a statement S' iff the truth of S' is a precondition on the truth or falsity of S.

PRAGMATIC PRESUPPOSITION

Austin (1962) p. 48

My saying "the cat is on the mat" implies that I believe it is.

Chomsky (1972) p.100

In many cases it seems that . . . the focus is a phrase containing the the information center, the presupposition is an expression derived by replacing the focus with a variable.

Fillmore (1971) p. 380

The presuppositions of a sentence . . . (are)
. . . those conditions which must be satisfied before the sentence can be used . . . (for asking questions, giving commands, making assertions, etc.)

Givon (1973) p. 105

A person using a factive verb presupposes the truth of its complement.

Heringer (1971) p. 73

. . . A speaker performing a propositional act presupposes . . . for a speaker to presuppose something is for him necessarily to believe that another proposition is true.

Jackendoff (1972) p.73

. . . Information in the sentence that is assumed by the speaker to be shared by him and the hearer (is the presupposition of the sentence).

Karttunen (1971b) p.3

P presupposes Q just in case that if P is asserted, denied or questioned, then the speaker ought to believe that Q.

_____ (1973a) p. 1

Sentence A pragmatically presupposes sentence B iff A can be felicitously uttered only in contexts that entail B.

_____ (1973b) p. 169-70

. . . "The sentence pragmatically presupposes B" can be understood as an abbreviation for ". . . whenever A is uttered sincerely, the speaker of A . . . assumes B and believes that his audience assumes B as well."

Keenan (1971) p. 49

A utterance of a sentence pragmatically presupposes that its context is appropriate.

G. Lakoff (1972) p. 14

SINCERE(x, STATE(x, y, P)) --> BELIEVE(x, P)

Sellars (1954) p. 207-8 (*)

An utterance of "the table over here is large" does indeed presuppose that there is one and only one table "over here." To say that the utterance presupposes this is to say that it is correct to make the utterance . . . only if one believes there is to be one and only one table "over here" and that this belief is shared by the listener. Furthermore, to say "that's false" when told that the table is large equally presupposes that the uniqueness condition is satisfied: where this in turn means that it is correct to say "that's false" only if one believes the uniqueness condition to be satisfied and that the original speaker shares this belief. But even though the original utterance and the reply presuppose that the uniqueness condition is satisfied, the utterance is nevertheless false if the uniqueness condition is not satisfied even though it is not correct to say it is false unless one believes that the condition is satisfied.

*Note: the quotations from Frege, Strawson, and Sellars were taken from Garner (1971).

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