

On Belief-Contexts

— A Discussion of the Syntactic and Semantic
Aspects of Belief-sentences —

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Abstract

The raising system of grammar advanced in *generative semantics* is not tenable in its entirety despite its supporting evidence produced in abundance.

1.

Problems concerning beliefs expressed in sentences with *believe* as main predicate have been discussed from various points of view by both logicians and linguists. Under his general theory of language acquisition, Quine (1960) provided a logically standard formulation of the principles governing the construction of sentences expressing beliefs, especially those beliefs attributed to nonfirst persons. More recently Patee in her paper (1972) discussed the problem, among others, of whether belief is a relation between a person and a sentence or between a person and a proposition, assuming that this problem can reasonably be related to the other problem of what is the proper condition to be imposed on the substitutivity of identity within a belief context.

Of the linguists who have contributed a great deal in this specific field of study, the first to be mentioned is the Kiparskys who characterized epistemic predicates like *believe*, *seem*, etc. as semantically non-factive in contrast with factive predicates like *regret*, *resent*, etc., on the assumption that the semantic factor *factivity* plays a decisive role in determining the applicability or non-applicability of a certain set of transformational rules. This thesis seems to be still viable in its fundamentals. Lindholm (1969) gives us a clear understanding of the two separate senses of *believe*, but left us many interesting problems to be explored along the lines he suggested. Cushing (1972), however, does not treat *believe* as having different senses. Instead, he characterizes the sentential complement to *believe* as having a definite or indefinite value assigned by the matrix subject, not by the speaker, depending on whether or not the subject person takes a definite stance with respect to the truth or the falsity of the complement proposition. Kimball (1972) also notes that there are two kinds of beliefs, *expressive* and *reportive*, but he argues that the difference in meaning should be regarded as the property of a belief sentence as a whole.

These arguments or assumptions, though motivated independently, should be relativized, if correct, to a generalization of those principles underlying the

use of belief sentences. Consideration of a wider range of problems anticipated about beliefs seems to point to the possibility of a grammatically parallel treatment of the first and the nonfirst person belief sentences. In this paper I first recapitulate Quine (1960) concerning his principled ways of constructing belief sentences, including subsequent discussions developed in Partee (1972), and then try to present a syntactically and semantically consistent way of approaching those facts many linguists have taken up to verify their own views on the syntax and semantics of belief sentences.

2.

First observe how the indefinite pronoun in the following sentence (2) is taken as ambiguous in referentiality.

- (1) Someone denounced Catiline.
- (2) Tom believes that someone denounced Catiline.
- (3) Someone is such that Tom believes him to have denounced Catiline.
- (4) Someone is such that Tom believes that he denounced Catiline.
- (5) Tom is someone whom Tom believes to have denounced Catiline.
- (6) Tom believes someone to have denounced Catiline.

The *someone* in (1) is not ambiguous, having only the sense of a 'particular individual'. Because of this, Quine argues, the occurrence of the same indefinite pronoun in (2) can be taken as referential, even if it is in an opaque construction like (2). This referential use of *someone* necessarily involves the transparent sense of the belief. On the other hand, it is also possible to interpret the indefinite as non-referential in this construction depending on the opaque sense of the belief. On these grounds, (2), as against (1), is claimed to be ambiguous as between referential and non-referential use of *someone*.

Now consider (3) and (4) as alternative approaches to the logical structure of (2) interpreted in the transparent sense. (4), but not (3), is inappropriate for (2) because of the cross-reference involved in it with respect to the referential interpretation of the personal pronoun *he*; that is, a coreferential relation must be stipulated between *someone* and *he*, which should be prohibited. The point in Quine's argument for these matters is that it is impossible to quantify into a belief context from the outside. (3) can also serve as a logical structure representation for (5) and (6), which are paraphrases according to Quine.

Observe next the oddity of the transparent sense of belief with respect to the following (7)~(10).

- (7) "Tully," Tom insists, "did not denounce Catiline. Cicero did."
- (8) Tom believes that Cicero denounced Catiline.
- (9) Tom believes that Tully denounced Catiline.
- (10) Tom believes that Tully did and that he didn't denounce Catiline.

From (7), that is, from Tom's insistence that it was not Tully but Cicero who

denounced Catiline, Tom seems to accept (8) as true but reject (9) as false. This inference from (7), which itself represents a transparent belief of Tom's, is possible only within the belief contexts given by (8) and (9). If (10), on the other hand, doesn't count as a contradiction on the part of the speaker or even on the subject's, it is because of the transparent sense of belief, which does have the effect of having Tom believing that Tully denounced Catiline.

The above, especially those facts about (8) and (9), led Quine to his claim that it is not a proper treatment of belief to speak of terms occurring in opaque constructions invariably as transparent disregarding cross-reference. Then he proposes that failure of transparency of reference can be localized regularly in certain positions in belief sentences. This proposal also makes a point of indicating selectively and changeably which positions in sentences of the types he discusses are to "shine through" as referential on any particular occasions. Quine's conventions to bring this theoretical move into effect are as follows.

Convention (1): if the speaker intends to bring *Cicero* and *Catiline* into non-referential positions, he uses the following (11).

(11) Tom believes that Cicero denounced Catiline.

Convention (2): if the speaker intends to get only *Cicero* into referential position leaving *Catiline* non-referential, he uses (12).

(12) Tom believes Cicero to have denounced Catiline.

Convention (3): if the speaker intends to bring both *Cicero* and *Catiline* into referential positions, he uses (13) or he is driven to something like it.

(13) Tom believes Cicero and Catiline to be related as denouncer and denounced.

Terms placed inside the *that*-construction or the *to*-construction are unequivocally opaque and these syntactic domains are reserved only for intensional objects such as a proposition as in (11), or an attribute as in (12), or a relation as in (13). In terms of the predicate-first logic, *believe* in (11) figures as a dyadic relative term predicated of Tom and a proposition; in (12) as a triadic relative term predicated of Tom, Cicero and an attribute; and in (13) as a tetradic relative term predicated of Tom, Cicero, Catiline and a relation. (Details are omitted here, but the above suffices for our purposes.) These relations are symbolically represented as *Fab*, *Fabc* and *Fabcd* respectively. (11)~(13) can further be rewritten so as to give prominence to intensions by the use of bound variables and brackets of intensional abstraction.

(11)' Tom believes that [Cicero denounced Catiline]. ...(*Fab*)

(12)' Tom believes Cicero *x* [*x* denounced Catiline]. ...(*Fabc*)

(13)' Tom believes Cicero *x* and Catiline *y* [*x* denounced *y*]. ...(*Fabcd*)

What is important about these reinterpretations is that the positions the arguments of the *F*'s occupy respectively in (11)'~(13)' can be clearly shown to be referential and that the bracketed objects can be asserted to designate some concrete and nameable entities just as the argument noun phrases designate Tom, Cicero

and Catiline. The question, then, is what kind of entity an argument 'sentence' designates, for it doesn't count so simply as a term as a noun phrase though both of them are claimed to function equally as such. Quine's answer to this question involves another important question of what can qualify as the object of belief. As is somewhat clear by now, the objects of those beliefs attributed to Tom by belief sentences (11)~(13) are the argument 'sentences' bracketed in (11)'~(13)', closed or open. These arguments were first identified as intensions and also as nameable entities because they are referential. Now compare the following.

(14) Tom said, "The door is open."

(15) Tom believes that [the door is open].

Direct quotation is one of the means of producing opacity. The directly quoted speech in (14) stays fixed in some sense but the associated proposition can vary depending upon circumstances of utterance. The meaning of such a sentence is not a proposition. Generally the meaning of a non-eternal sentence never counts as a nameable entity. The bracketed object in (15), according to Quine, is a sentence of a special kind, related to but distinct from the quoted sentence in (14), which names a proposition specified by elaboration or by eternalization of "The door is open" without making any appeal to contexts of utterance. The truth value of the proposition so obtained stays fixed through time and independent of the believer. Quine, however, argues that the object of Tom's belief expressed in (15) is not that proposition but the sentence itself or more strictly an eternalized paraphrase of the quoted sentence in (14), though he admits that calling the meaning of such an eternal sentence a proposition is logically reasonable. Other examples qualifying as propositions are reports and predictions of specific single events which can be eternalized when times, places or persons concerned are objectively indicated rather than left to vary with the references of names, descriptions and indicator words.

From this sentence as object view of belief, Quine draws a natural conclusion that belief sentences are indirect quotations. The schema he gives for this kind of quotation is given by the following.

(16) X believes S in Z's sense. Here X is a nonfirst person and Z the quoting speaker.

Schema (16) reads as stating, to quote from Quine (1960), that 'in indirect quotation we project ourselves into what, from his remarks and other indications, we imagine the quoted speaker's state of mind to have been, and then we say, in our language, what is natural and relevant for us in the state thus feigned (switching of muses).'

2.2. The above is only what is relevant for our purposes. A few remarks need to be added even to this oversimplification of the points made in Quine (1960). Quine treats *believe* as a single predicate and this accords with his treatment of the objects of belief as logically uniform entities as exemplified above. But later in his paper (1966) Quine distinguishes two senses of the predi-

cate, the *notional* sense in which the *believe* in (11)' is used and the *relational* sense in which the *believe* in (12)' or (13)' is used. (11)' expresses a belief relation between a believer and a proposition as an unanalysable linguistic unit. The relational sense needs no further explanation, for it is too explicit already. The following (17), depending on the two senses of *believe*, is ambiguous between transparent and opaque interpretations of Ralf's belief, which is shown in (18).

(17) Ralf believes that someone is a spy.

(18)a. Ralf believes that (Ex) (x is a spy).

b. (Ex) (Ralf believes z(z is a spy) of x).

Even (11), in spite of Convention (1), is ambiguous in similar ways. Admittedly, some more principles than just the convention must be working as semantic reasons underlying the use of (11). (This point will be considered later in section 5.) Assuming that Conventions (2) and (3) are still viable, it is instructive to point out the difference between Quine's view of belief sentences of the types shown in (19 a) and (19 b) and the current views of the same structure types taken by linguists.

(19)a. NP believe that ($\overline{\text{NP}}$) VP

b. NP believe ($\overline{\text{NP}}$) to VP

As argued above, what underlies the *that*-clause as the object of belief in (19 a) is a sentence or an eternal paraphrase of it, and also it is a sentence that underlies the *to*-VP constituent in (19b). What is of greater importance in this analysis of the structures in question is that both sentences logically function as *terms* in exactly the same way as NP's. This implies that the *to*-VP structure as well as the *that*-clause is underlyingly also an NP. Thus it is easy to see a striking similarity between Quine's logical treatment of the *to*-VP constituent and Postal's syntactic treatment of the same constituent structure. However, Quine doesn't discuss the grammatical relations the circled NP's bear to the other constituents in (19). He refers emphatically to the position of the circled NP in (19 b) as purely referential while he doesn't deny the referential occurrence of an NP in the position of the circled NP in (19 a).

Chomsky (1973) argues that the circled NP's in (19) both function syntactically as subjects of the complement sentences. He calls these NP's *specified subjects*, subject NP's specified by lexical items or by non-anaphoric pronouns. According to him, (19a) and (19b) differ from each other in that the complement sentence in the former is tensed while that in the latter is non-tensed. In Quine's view, the argument sentences taken as the objects of belief in (19) are tenseless as suggested above.

I do not discuss these differences but the only thing to be stressed here is that Quine seems to hold a neutral position on the issue of the grammatical statuses of the circled NP's in the sentences in (19).

Quine's schema (16) enables the speaker Z to construct sentences with *believe* taking two arguments one of which is a speechless animal like a dog. Thus the

schema can naturally explain a peculiarity of the predicate. Sentences like the following are permissible only with predicates of the *believe* type.

- (20) The dog believes that his master is still in the store.

What can be said for such a belief sentence as (20) is that the dog's behavior of relevance for the speaker is such that the animal has a non-verbal disposition to the truth of the sentence he provides to explain it. This kind of belief is explanatory as well as attributive in nature and is unambiguously transparent in sense, admitting of no opaque interpretation whatever. This example seems to have some important bearings on the problem of where to look for the sources from which the transparency vs. opacity of belief results.

3.

The contributions made in Partee (1972) are of supplementary value to our work of clarifying some more problems about belief sentences not touched upon in the previous section.

Partee first casts some doubts on a logician's (Carnap's) view that a person's beliefs should be treated as theoretical constructs. What led her to argue against this view is her observation that logical equivalence cannot be sufficient for two belief sentences to be synonymous, or for two sentences to be interchangeable in a belief context. Her arguments for allowing inconsistent beliefs in a person seem to be borne out by empirical evidence indicating that a person can have logically inconsistent beliefs without thereby believing everything. One such example from Partee (1972) is the following.

- (21) Smith believed that all the women at the party were accompanied by their (monogamous) husbands, and that there were more women at the party than men.

This seems to be a case where a person sincerely asserts two incompatible beliefs, but the sentence as a whole as normally understood couldn't be rendered necessarily false. Partee says persuasively that a situation where (21) counts as true comes about as a result of the fact that 'the logical consequences of a person's beliefs are not automatically also beliefs of his ... certainly at least not consciously so.'

The condition to be imposed on any two sentences in order for them to be interchangeable in a belief context is extremely difficult to define, and logical equivalence, as suggested above, is indefensible if it is to be taken as the only criterion defining the condition. In this connection, another problem remains to be considered. Usually a proposition corresponds to many sentences. So the substitution problem necessarily involves the problem of which sentences are to be included in the set of sentences which can express a belief of a person's. The solution to the latter problem is by no means trivial. Partee, for example, argues that not everyone who believes that all Greeks are Greeks believes that all Greeks are Hellenes.

Consideration of these and many other semantic phenomena concerning a person's beliefs led Partee to the claim analogous to Quine's that the object of belief is a sentence, not a proposition. Eventually she proposes that the following (23) represents the object of the belief expressed by (22).

(22) John believes that my father was an only child, and that you are my first cousin on my father's side.

(23) $(\exists x) (\exists y)$ (I am x and you are y and John believes: x 's father was an only child, and y is x 's first cousin on x 's father's side.

(23) is a semantic structure obtained by quantificational extracion of all the deictic items out of John's belief content to the purely referential positions. Notice that (22) can be interpreted only in the transparent sense of belief because of the occurrence of the personal pronouns in the complement. This semantic representation of John's belief, as it is shown in (23), is of the same nature as the logical one that Quine gives for a similar belief; for example, see (18) discussed in the previous section. What is characteristic of these representations is that it is only *general* terms and bound variables that figure in them as the exponents of beliefs. Notice also that in the case of beliefs representable only by the use of general terms, these beliefs are interpretable only in the transparent sense.

Now returning to the substitution problem, it is reasonable to argue under the sentence as object view of belief that the condition required for substitution in a belief context must be both semantic and syntactic. For general terms to be substitutable, it must be the case that the terms have a synonymy relation of that kind which is transparent to the subject of belief. And sentences constructed with these alternative general terms and with or without bound variables must be strictly identical in syntactic structure in order to avoid any arbitrary application of logical processes. This solution to the substitution problem, if correct, implies that there is no possibility of substitution in an opaque belief context, though Partee doesn't consider beliefs of this type at all.

3.2. Partee discusses Quine's examples (11) and (12) which we repeat here in (24) and (25).

(24) Tom believes that Cicero denounced Catiline.

(25) Tom believes Cicero to have denounced Catiline.

As explained earlier (24) and (25) are not completely synonymous, or cannot be equally interpreted with respect to the reference of *Cicero* because of the ambiguity of (24) between referential and non-referential use of *Cicero*. Quine argues that (24) and (25) are independently *generated* and seems to assert that the two belief sentences are not related either syntactically or semantically. However, Partee regards them as related transformationally by a syntactic rule, Subject-raising, under her view of the following facts about (26) and (27).

(26) Tom believes there to have been an earthquake recently

(27) Tom believes it to be likely that no one will show up.

She observes (1) that *there* and *it* cannot be taken as referential and (2) that her not very strong feeling about (25) tends to regard the *Cicero* as referentially ambiguous but slightly more referential than the *Cicero* in (24). Observation (1) presents an interesting but no serious problem. The explanation will be in order. Observation (2) seems to me to derive from some confusion on the part of Partee. If the two belief sentences (24) and (25) are to be so related as she asserts, it is only on the interpretation that these sentences represent the same type of beliefs, namely transparent beliefs, but they are not relatable by any syntactic operations if (24) is interpreted opaquely, for quantificational logic cannot work into an opaque belief as noted earlier. Another way of accounting for this logico-semantic fact is by pointing out a reasonable assumption that the *that*-clause represents such an *assertion* as can be quoted only in full sentential form. (See section 5.) Syntactic reduction of (24), for example, to an infinitival construction is not available in an opaque context. If (25) should be derived from (24) by Subject-raising regardless of the referentiality of the word *Cicero* ... such an application of the rule to the *there* and the *it* in the respective embedded subject positions to derive (26) and (27) would be *only apparently* plausible ... this unwarranted derivation would explain Partee's semantic intuition, weak or strong, that led her to regard the *Cicero* in (25) as referentially ambiguous.

Partee's Observation (1) presents a problem which is essentially different from the above in that no logical consideration is relevant to the matter she concerns herself with, for neither of the words *there* and *it* exists in its occurring form in the respective logical structures of (26) and (27); in other words, there are no logical structures corresponding to these morphemes. So this problem seems to involve facts about the syntax of English sentences. Compare (27) with the following (27)' to examine the syntactic derivation of the *it* under a raising theory.

(27)' Tom believes that it is likely that no one will show up.

It is quite easy to see that (27) and (27)' share a logical structure whose subpart is the following.

(28) likely (no one will show up)

The complement sentence in (27)' is one of the surface realizations of (28). *Likely* is one of those predicates which take only one sentential argument. Now it is clear under a hypothesis that the deep structure takes a logical form that the *it* in (27)' results from the sentential argument in (28) and that this *it* ensures the NP status of an argument sentence. This is implicit in Quine (1960), and Postal and others, as against Chomsky, assume that complement sentences have in deep structure the following syntactic configuration.

(29) $_{np}[s[\quad]_s]_{np}$

and that the complement sentence in (27)' should derive from the following (30) by applying to it Extraposition, which rule has the effect of extraposing the S to the right and leaving *it* behind as a reflex of the NP status of the deep structure (29).

(30) likely_{np}[_s[no one will show up]_s]_{np}

So much for the syntactic derivation of *it*. Clearly there is no truth value contrast between (27) and (27)' and so Subject-raising may be assumed to apply optionally in sentences like this. All that has been said for the *it* in (27) can also be true of the *there* in (26). The logical structure for (26) contains the following subpart.

(31) exist (earthquake), or
($\exists x$) (x is an earthquake)

Thus *there* can be taken to function as a linguistic alternative to the existential operator or quantifier in logic, and I can agree to Partee's argument that the *there* in (26) and the *it* in (27) cannot be taken as referential. However, the only thing I should like to suggest here is that the semantic function these 'empty' morphemes assume in the respective sentences is *presentational* to the arguments in question, quite independent of their being referential or not. This presentational sense seems to come about as a result of the application of Extraposition to deep structure (29). It seems that the presentational sense of the *it* in (27) is more emphatic than in (27)', and that of the *there* in (26) seems to be more presentational to the argument in question than merely existential.

4.

The Kiparskys, in their pioneering work (1969), pointed out a general principle of syntactic-semantic interrelationship in deriving complement structures, stating that a semantic factor determines the syntactic form a complement sentence can take in the surface structure. They argue on this principle that *factivity* is one such factor and is clearly distinguishable from the literal meaning of a factive complement sentence, a complement to a predicate like *regret*, *resent*, etc., and that factivity results from the speaker presupposition that a complement sentence expresses a true proposition.

Complement sentences to *believe*, one of the non-factive predicates, are all of the structure shown in (29) in deep structure, but those to a factive predicate have in common a deep structure representation of the following type. (These are the essential points made and discussed in Kiparskys (1969).)

(32) $np[np[\quad]_{np} s[\quad]_s]_{np}$

(32) differs from (29) by an embedded NP, which, being combined with the immediately following S, constitutes a complex NP structure. The semantic factor *factivity* represented by this embedded NP is asserted to have overt reflections as in *the fact that* or to occur vacuously in surface structure. The Kiparskys also argue that the *it* in the following (33) is the reduced form of *the fact*,

(33) Bill resents it that people are always comparing him to Mozart.

and that this *it* must be distinguished from the expletive *it*, the *it* in (27)' discussed in the previous section. However, a semantic factor quite similar to that

carried by the *it* in (33) is also present in the *it* in the following (34), which will become clearer when compared with (35), a sentence without *it* but otherwise identical with (34).

(34) I had expected *it* that there would be a big turnout.

(But this is ridiculous, ... get more chairs.)

(35) I had expected that there would be a big turnout.

(But only three people came.)

What is interesting here is that the complement in (33) can be interpreted as factive with or without *it* but this is not the case with the sentential complements to *expect* as shown in (34) and (35). *Expect* should be basically non-factive like *believe* in spite of the Kiparskys' characterization of the predicate indifferent as to factivity. If correct, this presents a problem of how to explain the occurrence of *it* in (34). I suggest that the *it* also comes about as a result of the application of Extraposition based on some semantic assumption. What is the exact nature of this assumption is not very clear but it seems to be closely related to the speaker preferring the NP status to the S status of the underlying complement structure exactly like the one shown in (29) in order to produce the desired semantic effect according to his presupposition. Syntactic operations of this kind are not unusual. For example, Topicalization operates only on NP's as in the following (36) while Right-Dislocation only on S's as in (37).

(36) That Bob is a werewolf I find *(it) difficult to believe.

(37) Bob believe it, that Mary didn't kiss the boy she kissed.

Notice that (37) allows only the contradictory interpretation of the dislocated complement. (These observations are due to Postal.) Now observe the following sentences with *report*.

(38) Tom reported *it* that John plagiarized.

(39) Tom reported that John plagiarized.

(38) means that the speaker, presupposing the truth of the complement proposition, asserts that it was Tom who reported it, while in uttering (39) the speaker does not commit himself to the truth of the complement. This may disconfirm the Kiparskys' claim that the *it* in (34) as well as the *it* in (38) is the reduced form of *the fact*, for these sentences, according to them, must be synonymous with the following (40) and (41) respectively.

(40) I had expected the fact that there would be a big turnout.

(41) Tom reported the fact that John plagiarized.

However, it is clear that (41) doesn't convey the exact meaning of (38) and that (40) is semantically anomalous while (34) is perfectly grammatical syntactically and semantically.

Before pursuing this line of reasoning, it is necessary for our purposes to turn to the other syntactic facts correlated with the factive-nonfactive contrast.

4.2. The greatest point made by the Kiparskys is that the semantic difference between factivity and non-factivity of predicates can be related to the choice between the two paradigms of their surface object complement structures, gerundial and infinitival, if these two are assumed to be derived from the different deep structures (29) and (32). Only factive complements can appear on the surface in the form of some of the gerundial constructions, which is a striking grammatical fact, for constructions of this sort are permissible only with factive predicates but never with non-factive predicates. On the other hand, infinitival constructions are permissible only with non-factive predicates but not with factive ones. Compare the following two pairs of sentences.

(42) a. I regret having agreed to the proposal.

*b. I believe having agreed to the proposal.

(43) a. I believe Mary to have done it.

*b. I regret Mary to have done it.

Then observe the following in view of the undisputed facts about the above.

(44) They reported the enemy's having suffered a defeat.

(45) They reported the enemy to have suffered a defeat.

(44) implies that the report was true while (45) leaves open the possibility that the report would be false. These different implicatures can be explained without positing different deep structures for these sentences as suggested by the Kiparskys. *Report*, being a verb of saying, can be assumed to be a non-factive whose complements are invariably of type (29) in deep structure. This means that (44) and (45) have been derived from the same deep structure, which itself was unspecified as to factivity. In accordance with his presupposition the speaker selects the NP of the complement, by which he was led to (44) or optionally to the following (46).

(46) They reported it that the enemy suffered a defeat.

The derivation of (45) seems to have been partially motivated by the selection of the S of the deep complement: this selection seems to result from the speaker's intention that the complement proposition be interpreted as non-factive, and the syntactic form appropriate for this purpose should be a full sentence. (This point will be taken up later in detail.) The explanation given for (45) is not sufficient, and it seems that still another speaker assumption must have been responsible for the derivation of it.

4.3. The utilities of (29) and (32) discussed in terms of a theory of *assumption*-linked transformations can be extended to include the availability of the sentential proforms *it* and *so*. Factive complements are NP's, which is clear from (32), and so get pronominalized with the definite proform *it*, while non-factive complements can be taken optionally as NP's or S's, which (29) guarantees. This explains the occurrence of the definite proform *it* or the indefinite proform *so*, as is shown in the following pair of examples.

- (47) a. John supposed that Bill had done it, and Mary supposed it, too.
 b. John supposed that Bill had done it, and Mary supposed so, too.

However, it is still not very clear what makes for the choice between *it* and *so* as in the above sentences, for these proforms are not mere alternatives because of the definite-indefinite contrast between them. The Kiparskys do not extend their theory of syntactic-semantic interrelationships to this pronominalization problem. But their theory will implicitly show that the selection of NP's are closely related to factivity, which causes the speaker to use the proform *it*, and our discussions given in the previous section will also indicate that the *it* in (47) comes from the same semantic source as the *it* in (46). The selection of the proform *so* in (47), then, seems naturally to be dependent on the non-factivity of the antecedent proposition which the speaker presupposes. If these extensions from the Kiparsky's theory are correct, it is unnecessary to postulate two different deep structures similar to the ones in (29) and (32) for those complement sentences to non-factives like *believe*, *expect*, *report*, *suppose*, etc., only on the ground that the complements are pronominalizable *optionally* with *it* or *so*. (29) can be assumed to be the deep structure underlying all the complement sentences to predicates except *true* factives.

5.

In this section I'll elaborate on some generalizations from those facts about the first-person belief-sentences which led Lindholm (1969) to distinguish two senses of *believe*, and suggest the need to restate some of them so as to keep them in line with the generalizations that can be offered in terms of the transparent vs. opaque sense of belief.

Lindholm's distinction between two senses of *believe* is primarily based on the following data.

- (48) I just saw John shoot Max, but the people I informed of this don't believe it.
 (49) A: Was Caesar a Jew?
 B: I believe so.
 (50) I believe that Lincoln was a great man.
 a) Because I believe whatever my teacher tells me.
 b) Because he had a beard.

In (48), the sentence serving as antecedent of the proform *it* represents the speaker's assertion. It is normal to respond to someone's assertion by accepting or rejecting the proposition being asserted. On the other hand, to a question in which the questioner asks about someone's opinion as in (49) it is usual for the questioned to react by presenting his own opinion. From these facts Lindholm concludes that *believe* differs in meaning as suggested by (48) and (49). According to him, the *believe it* in (48) means 'accept the claim' and the *believe so* in (49) means 'hold the opinion'. Now observe (50) as it is used in the different contexts

(a) and (b). (50) is ambiguous by itself. Under context (a) where the complement can be construed as representing a statement by a person other than the speaker, *believe* is used in the sense of the *believe it*-type and *it* will be used wherever the complement is to be pronominalized, while, under context (b) when the complement can only be taken to represent the speaker's own assertion, *believe* is used in the sense of the *believe so*-type and *so* will be used if the complement gets pronominalized.

Lindholm, then assuming that all instances of *believe it* and *believe so* are semantically consistent, postulates for *believe*-sentences two different (semantic) deep structures representative of the two senses of *believe*. However, as expected, this treatment of *believe* raises the same problems as discussed earlier with *expect*, *report*, *suppose*, etc. But let's put this point aside to be discussed later together with other syntactic points made by Lindholm.

5.2. Quine seems to characterize the reference of the *Lincoln* in (50) as existing eternalized and capable of being indicated objectively. (50), as it is used in context (a), may be regarded under Quine's theory as expressing an opaque belief, for his Convention (1) must have been brought into play with respect to the referential interpretation of *Lincoln* and obviously the complement as a whole can be taken to represent a point of view quoted from someone. Quine also may regard the belief expressed in (50), as it is used in context (b), as transparent, for in this case the speaker must be said to be referring to the Lincoln which exists eternalized and to be attributing to him the property of greatness from his own point of view. However, his Convention (2) must be blocked in an opaque context like (a) but not in a transparent context like (b), despite the theoretical possibility that it will be made operative in both contexts on the assumption that Lincoln is capable of being indicated objectively. So we need to further clarify the transparent-opaque contrast of belief in its essential aspects. In so doing we have to refer to some important views of a logician and a linguist on these matters.

In Frege's view, the reference of a noun phrase is an individual in the real world and its sense is a set of conditions that pick out the reference. This assumption that a noun phrase is related to a real object via its sense, however, doesn't hold in belief contexts. (The reasons will be in order.) Jackendoff (1975) argues this point in detail in the framework of his interpretive semantics. He introduced into his explication of the transparent-opaque distinction new entities, *images*, which are separated from but relatable to real objects by the semantic or cognitive process *X purports to refer to Y*. Thus he, rejecting Frege's view, argues that the possession of a sense and a reference is the property of an image and not of a real object. Observe his examples (51) and (52) supposing it is the case that Mary has blue eyes, but that John mistakenly paints her with brown eyes.

- (51) John painted ^{Mary.}
(a girl with blue eyes).

- (52) John painted ^{Mary}
(a girl with brown eyes).

The sentence *John painted Mary* is ambiguous with respect to the reference of *Mary* as is indicated in (51) and (52). The reference of *Mary*, in Frege's view, is the real *Mary* on the transparent reading, but it is extremely hard to realize what kind of entity is being referred to by *Mary* on the opaque reading according to his view. It could be said mysteriously that *Mary* on the latter reading doesn't refer to the real *Mary* but to something else, e.g. to itself, or to the usual meaning of the word *Mary*, or perhaps to the mental word *Mary*. (Quine resolves this problem by treating *Mary* as non-referential and as a quoted word ... this solution is very similar to that given by Jackendoff.) According to Jackendoff the *Mary*'s in (51) and (52) refer to different images of *Mary* and not to the real *Mary*. Consequently *Mary* can be ambiguous as to its reference depending on whether *Mary* purports to refer to the image of *Mary* in the speaker's mind, a girl with blue eyes, (hence transparency), or to refer to the image of *Mary* in John's painting, a girl with brown eyes, (hence opacity).

Thus it is by now clear under Jackendoff's theory of reference that the transparent-opaque distinction is a function of the speaker intention. Where transparency matters, the speaker uses *Mary* in order to enable the hearer to identify the real *Mary*. So the reference of *Mary* relevant for this purpose must be an image which purports to refer to the real *Mary* and even in the presence of *Mary* the word *Mary* doesn't necessarily refer to her. On the other hand, where opacity matters, the speaker uses *Mary* so that his hearer can pick out the image of *Mary* represented mistakenly in John's picture. So on this occasion the reference of *Mary* has nothing to do with the real *Mary*. Thus Jackendoff gives a most clearcut explanation of the difference between transparent (referential) and opaque (non-referential) use of a noun phrase. Noun phrases, either on the transparent reading or on the opaque, have referents ... this is a point that was not made clear in the traditional theories of reference.

Returning to the problem raised above concerning (50), it is now possible to argue that the reference of *Lincoln* in context (a) is not such an entity as exists eternalized objectively but the purported image of *Lincoln* which figures in the belief attributed to someone. From this theory of reference it follows quite naturally that the reference of *Lincoln* varies from speaker to speaker and through time with different properties attached to it. Kaplan (1972) speaks of the non-existence of logically necessary truths. Thus Convention (2) must be blocked in context (a), for it will disturb the truth conditions purely internal to the purported referent of *Lincoln*.

5.3. As pointed out in section (4), the Kiparskys treat *believe* as non-factive but not as one of the type they characterize as indifferent as to factivity, and its complement sentences are pronominalizable optionally with *it* or *so*, for which they give no semantic reasons. Lindholm, however, as has already been explained in this section, correlates the two senses of *believe* with the pronominalization

of its complements with *it* and *so*. As is also clear already, factive complements differ from non-factive complements in their syntactic behaviors, and the Kiparskys argue that this difference results from the difference in the (semantic) deep structures they posit for them, namely (29) and (32) given above. (29) is the deep structure underlying all the complement sentences to *believe*, but Lindholm notes that the complements to the *it*-type of *believe*, in contrast to those to the *so*-type of *believe*, behave syntactically like factive complements in being subject to the Extraction Constraint, and argues (1) that Neg-raising and Subject-raising are blocked by the presence of the semantic factor "the claim" in the deep structure just as these rules cannot apply to the complements to factive predicates such as *regret*, *resent*, etc. He also argues (2) that these raising rules are allowed to apply to the complements to the *so*-type of *believe* just as they apply to the complements to *think*, a predicate to which this type of *believe* has a close semantic resemblance. Observe the following examples with respect to Neg-raising.

(53) Bill believes that John won't come until later

a. and I don't ^{believe}_(think) so either.

b. and I don't ^{believe}_{(think)} it either.

(54)a. I can't believe that he'd take the exam until he's ready.

b. I can believe that he wouldn't take the exam until he's ready.

(53) may provide evidence for the legitimacy of his arguments (1) and (2), for Neg-raising can be said to have occurred in (a) and the inapplicability of the same rule to (b) can explain its ungrammaticalness. However, it seems to be the case, as suggested by Lindholm, that not Neg-raising but Neg-lowering has applied to the sentences in (54) involving higher S's, for *can* requires the *believe it* sense of *believe* and (a) and (b) are not paraphrases. And the ungrammaticality of (53 b) can be accounted for by the inapplicability of Neg-lowering to the complement. Lindholm argues persuasively that *until* is not diagnostic of the scope of Neg, giving many examples similar to (54). If this is correct, what can be said for (54 a) is simply that the ungrammatical sentence *He'd take the exam until he's ready*. becomes grammatical when it is embedded as a complement as in (54 b) and that the negative force can extend into the complement. (54 a) is not synonymous with the following sentence.

(55) I can't believe that John wouldn't take the exam until he's ready.

The ungrammaticality of (53 b) is due to the conjunction by *and ... either*. Observe the unpronominalized version of it.

* (53b) Bill believes that John won't come until later and I don't believe either that he won't come until later.

The conjunction must be *but* to make it grammatical.

If these explanations given for (53) and (54) are correct, (54 a) still presents

another problem for Lindholm, because, if Neg-raising is to be subject to the Extraction Constraint, it must also be the case that no negative elements can be inserted into the complements to the *it*-type of *believe*. This means that the negative force in (54 a) can not be extended into the complement. This will contradict his analysis of this sentence in terms of Neg-lowering and his semantic argument that *believe it* means the acceptance of a previous or presupposed claim, for the complement, to be so taken, must express a proposition but would not under his syntactic and semantic analysis of (54 a).

I only suggest from the above discussions that the complements to the *it*-type of *believe* do not form a barrier to syntactic operations like Neg-movement which is so strong as the complements to predicates of the true factive type. A comparison between (a) and (b) in (54) will show that the speaker's attitude toward the reported claim expressed in (a) seems not to be so strongly negative as in (b).

There is another counterexample to his argument (1) which he himself produced but left unexplained.

- (56) Warren claims that Oswald shot Kennedy. Mary believes₍₁₎ it and I believe₍₂₎ Oswald to have shot Kennedy, too.

I try to show a solution to the problem raised by (56) first by comparing it with the following.

- (57) Warren claims that Oswald shot Kennedy. Mary believes₍₃₎ so and I believe₍₂₎ Oswald to have shot Kennedy, too.

For ease of exposition, I differentiate (the *believe*'s of) type (2) as involved by Quine's Convention (2) from either of the other two types... *believe it* type and *believe so* type. There may be two or more alternative explanations for (56) and (57), but the following two are of relevance for our purposes.

(A) According to Lindholm, *believe*₍₁₎ and *believe*₍₂₎ are assumed to be synonymous or of the same *it*-type because of the acceptability of coordination of the two belief sentences by *and...too*. One problem then is that *believe*₍₁₎ must be assumed to allow Subject-raising, which should be blocked by the same constraint that is assumed to prevent the removal of Neg from the embedded complements of (54). Another problem is that the raised NP, *Oswald*, in (56) is the subject of the complement as it was before the application of the rule. This is clearly inferable from the way Lindholm introduced his semantic distinction of *believe*; that is, the complement to *believe*₍₁₎ represents someone's claim, Warren's claim that Oswald shot Kennedy, which the speaker *quotes* and is asserting that he can accept it.

However, I tend to doubt the validity of these discussions of the problems raised above. First, *Oswald* in this belief context is referentially opaque and so, as often argued for in the previous sections, the speaker is required to refer to Oswald just as he is identified by Warren. This suggests that Subject-raising is inapplicable in opaque contexts like this. Secondly, the coordination permitted

in (56) doesn't seem to have depended on complete equivalence between the two beliefs.

Now compare (56) and (57). (57) must be grammatical if *believe*₍₂₎ is to be taken as having the sense of *believe*₍₃₎ by reason of the coordination as in (56) and another reason for this grammaticality must be that, as well established by Lindholm and others, *believe* in the *believe so* sense allows Subject-raising (as well as Neg-raising) to apply without disturbing the truth conditions of the complement propositions being asserted. However, this way of characterizing the *believe*₍₂₎-type is dubitable from a semantic point of view, for the *Oswald* in the second conjunct, either in (56) or in (57), is more *specific* with respect to its reference and this is the only source of the semantic difference between the coordinately conjoined two beliefs. And I've shown the impossibility, in an opaque context, of extracting *Oswald* out of the complement corresponding to that of *believe*₍₁₎. If I'm right in suggesting that *believe*₍₂₎ is semantically distinct from *believe*₍₁₎ or from *believe*₍₃₎, the acceptability of the coordination in these cases is quite irrelevant to the exact specification of *believe*₍₂₎.

(B) It is not easy to correctly characterize *believe*₍₂₎ along the lines suggested by Lindholm. But it seems to be an indisputable fact that the *it* in (56) is definite in value representing Warren's claim and the *so* in (57) is indefinite in value representing the proposition asserted by Mary herself. (This observation is partially due to Cushing (1972).) It is worthy of note that the *it* and the *so* both replace assertions because all tokens of *believe* are essentially non-factive and their complements always represent assertions, weak or strong.

Besides *factivity*, *assertion* as a semantic factor plays a definite part in a theory of syntactic-semantic interrelationships. Hooper-Thompson (1973) and Hooper (1975) pursue this line of investigation into the nature of the applicability or non-applicability of Emond's root-transformational rules, ... rules definable as emphasis-producing rules moving nodes into non-phrase-structure positions. A prime example is Complement Preposing. One of the generalizations from their work is that these emphasis-producing rules can operate only on full S's that are assertions but not on any syntactically reduced S's, which are not capable of being assertions. Before examining the applicability of Complement Preposing to belief sentences it is necessary to briefly explain their characterization of *believe* in terms of the parenthetical-nonparenthetical sense distinction. Observe the following.

(58) He says John is here, and I believe it, too. (nonparenthetical)

(59) He says John is here, and I believe so, too. (parenthetical)

The *believe* in (58) has that literal meaning which it has when followed by a simple NP as in the following.

(60) I believe the report.

This meaning they call the nonparenthetical sense of *believe*, and argue that *I believe X* in this case has an assertion independent of the other assertion em-

bodied in *the report*. It is also easy to see that the first conjunct of (58) or of (59) contains two assertions: he says X and simply X (X represents the assertion that John is here). A similar analysis, however, cannot be extended to the second conjunct of (59), for the *I believe* is 'practically meaningless' by itself, doesn't denote a mental process nor make any independent assertion. They characterize its function as parenthetical, indicating that the speaker has no positive commitment to the truth of the proposition being asserted, or weakening his assertion because of his mild reservations about the truth.

Now observe the following pair of sentences.

(61)a. John believes that Peter is fat.

b. Peter is fat, John believes.

(61b) is assumed to derive from (61a) by the application of Complement Preposing, an emphasis-producing rule as explained above. (61a) must be interpreted as having only one assertion expressed in the complement in order for the rule to apply and furthermore, that assertion must have been made by the subject John. These seem to be the necessary and sufficient conditions on the applicability of the rule in question, but observe the following in order to see that they are not contrary to the general assumption given above.

(62) John believes that Peter is fat, but I don't believe $\begin{pmatrix} \text{it} \\ \text{so} \end{pmatrix}$.

?(63) Peter is fat, John believes, but I don't believe $\begin{pmatrix} \text{it} \\ \text{so} \end{pmatrix}$.

(61a) allows both of the continuations given in (62), which is predictable from the foregoing discussions. This suggests that the fact that the complement in (61a) is an assertion on the one interpretation can be shown otherwise than by Complement Preposing. On the other hand, the fact that (61b) doesn't allow either of the same continuations as shown in (63) indicates that in the proposed complement is the speaker's point of view put forward in addition to the original assertion made by the subject. This subjective process of association has been operative in (61b) as the necessary condition on the applicability of Complement Preposing.

Now recall the problematical examples (56) and (57), which are repeated here in (64) and (65).

(64) Warren claims that Oswald shot Kennedy. Mary believes₍₁₎ it and I believe₍₂₎ Oswald to have shot Kennedy, too.

(65) Warren claims that Oswald shot Kennedy. Mary believes₍₃₎ so and I believe₍₂₎ Oswald to have shot Kennedy, too.

In view of these backgrounds we can argue that the same kind of semantic process of subjective association must have occurred in the belief sentences in (64) and (65). In the second conjunct in either case the speaker is expressing his own assertion; that is, an assertion independent of the one he ascribes to Mary but which he associates with his own. This may also explain the applicability of

Subject-raising, for the complement to *believe*₍₂₎, is the speaker assertion in the belief context reinterpreted as *transparent*. And this raising rule may be assumed to apply freely in a transparent belief context but never in an opaque belief context.

According to Hooper-Thompson (1973), syntactically reduced clauses are not assertions, but this generalization doesn't seem acceptable in all cases. The following sentences (66) and (67) certainly do not contain sufficient structures to express the exact force of assertion that the corresponding unreduced clauses have.

(66) Mary believes Oswald to have shot Kennedy.

(67) I believes Oswald to have shot Kennedy.

(66) and (67) do have assertions expressed therein and it is the structure underlying the *to have shot Kennedy* that express them, the reference of *Oswald* being presupposed or understood by the people concerned and excluded from the assertion component in both cases. The Kiparskys also argue that sentences with this construction leave open the possibility that the complements will be interpreted as true or false.

From all the discussions given above it will naturally follow that there is no theoretical need to relate *believe*₍₂₎ to *believe*₍₁₎ or to *believe*₍₃₎ in terms of a raising hypothesis.

To summarize, I think I've established the correspondence between transparency and expressiveness of a belief on one hand and between opacity and reportiveness of a belief on the other hand. These correspondences hold equally for the first-person beliefs and for nonfirst-person ones, which can serve as a theoretical basis on which to give syntactically and semantically parallel treatments to belief sentences. I tend to regard the accusative-infinitive construction permissible with *believe* rather as a basic structure than as a derived structure because of the difference in logical structure ... in the number of arguments this predicate takes ... between *believe*-sentences with this syntactic structure and those having unreduced sentences as object complements. Transparent beliefs can be expressed by using both constructions, which may have led linguists to the claim that Subject-raising exists as a rule relating these two syntactic structures. This I do not deny, but these linguists often do not bring the two distinct types of belief ... transparent and opaque ... in order in their treatments of belief sentences. It is highly reasonable to assume on semantic grounds that syntactic reduction of the complements to *believe* is impossible at least in opaque contexts and is not necessarily possible even in transparent cases.

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