The Canadian Journal of Linguistics
La Revue canadienne de Linguistique

Fall/Automne 1980—25:2

(Continued/voir au verso)

The positional tendencies of sentential noun phrases in universal grammar

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1. The sentential noun phrase position hierarchy

This paper is concerned with sentential subjects and sentential objects, subordinate clauses which function as subject or object of their sentence. The clause *that John is tall* is a sentential subject in (1) and a sentential object in (2):

(1) *That John is tall* is obvious.

(2) Bill knows *that John is tall.*

This paper is concerned in particular with the clause positions in which such sentential subjects and objects, henceforth sentential noun phrases (or NP's), tend to occur in different languages.[1] In (1), the sentential subject is in clause-initial position. In (2), the sentential object is in clause-final position. More precisely, this paper is concerned with the differences between the position of sentential NP's and the position of simple NP's (i.e. nonsentential NP's). For example, the position of the sentential subject in (1) is also the normal position for simple NP subjects. If we replace the sentential subject in (1) by the simple NP *the conclusion*, we get (3):

(3) The conclusion is obvious.

On the other hand, a natural paraphrase of (1) is to put the sentential subject at the end of the sentence and insert *it* in subject position, as in (4):

(4) It is obvious *that John is tall.*

It is not possible, however, to do this with (3), as shown in (5):[2]

(5) *It is obvious the conclusion.

This fact is expressed in standard transformational grammar by saying that there is a transformation of *extraposition* which moves sentential NP's, but not simple NP's, to the end of the clause. The difference between (4) and (5) is evidence of a difference in English between the positional tendencies of sentential NP's and those of simple NP's. Because sentential subjects can be extraposed, they will have a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

It is shown in this paper that this tendency is not an idiosyncratic fact about English, but rather a fact of universal grammar, since the same tendency shows up in a number of unrelated languages. For example, in Kinyarwanda (a Bantu language), simple subjects normally occur in clause-initial position, as in (6), whereas sentential subjects normally occur in clause-final position, as in (7):[3]

(6) Umwaana a-ra-lira.
child he-pres-cry
'The child is crying.'

(7) Bi-ra-shoboka *ko abaana ba-gu-ha ibitabo.*
it-pres-possible comp children they-you-give books
'It is possible *that the children will give you the books.*'

Similarly, in Woleaian (an Austronesian language), the unmarked position for simple subjects is clause-initial, as in (8), while sentential subjects must occur in clause-final position, as in (9):

(8) Mele la-i ye temwaaiu.
this child-my 3sg sick
'My child is sick.'

(9) Ye tiwegil *be ye be mmwel.*
3sg true comp 3sg possible
'It is true *that it is possible.*'

Evidence like this supports the following hypothesis:

FINAL-OVER-INITIAL-POSITION HYPOTHESIS
Whenever sentential NP's and simple NP's of the same grammatical relation differ in their relative tendencies to occur in clause-final position as opposed to clause-initial position, the difference will be that sentential NP's will exhibit a greater tendency than simple NP's to occur in clause-final position rather than clause-initial position.

Evidence is presented for this hypothesis and the following two hypotheses:

INITIAL-OVER-INTERNAL-POSITION HYPOTHESIS
Whenever sentential NP's and simple NP's of the same grammatical relation differ in their relative tendencies to occur in clause-initial position as opposed to clause-internal position, the difference will be that sentential NP's will exhibit a greater tendency than simple NP's to occur in clause-initial position rather than clause-internal position.

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a greater tendency than simple NP's to occur in clause-final position rather than clause-internal position.

An example of one piece of evidence supporting the Final-Over-Internal-Position Hypothesis is the following. In Malagasy, the unmarked word order is VOS, as in (10):

(10) Na-mono an-dRabe Rakoto.
past-hit acc-Rabe Rakoto
'Rakoto hit Rabe.'

When the object is sentential, VSO word order is used, as in (11):

(11) Mihevitra Rabe fa mitady ny zaza Rasoa.
thinks Rabe comp look.for the child Rasoa
'Rabe thinks *that Rasoa is looking for the child.*'

In other words, simple objects normally occur in clause-internal position, while sentential objects occur in clause-final position.

The three hypotheses given above combine to give the following universal hierarchy of preferred positions for sentential NP's:

Sentential NP Position Hierarchy

clause-final position > clause-initial position > clause-internal position

The arguments given in support of the three hypotheses take the same general form. The crucial data is evidence of *differences* between the position of sentential NP's and that of simple NP's. In most cases, the evidence will be stated in terms of differences between the surface distribution of sentential NP's and that of simple NP's. Suppose, for example, that simple subjects in a language are permitted in clause-initial position but not in clause-final position, and that sentential subjects are permitted in both positions. The effect of this is that sentential subjects will exhibit a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position. Such evidence would provide support for the Final-Over-Initial-Position Hypothesis.

Suppose, on the other hand, that simple subjects in a language are permitted in both clause-final position and clause-initial position and that sentential subjects are only permitted in clause-initial position. The effect of this would be that sentential subjects would exhibit a greater tendency than simple subjects to occur in clause-initial position rather than clause-final position. Such a case would constitute a counterexample to the Final-Over-Initial-Position Hypothesis.

In some cases, evidence for the tendencies is based on frequency, as determined by text counts. Suppose that a count of the frequency of simple subjects and sentential subjects in clause-initial position and clause-final position in texts in some language reveals that the percentage of sentential subjects occurring in clause-final position is *greater* than the percentage of simple subjects occurring in clause-final position, and that the percentage of sentential subjects occurring in clause-initial position is *less* than the percentage of simple subjects occurring in clause-initial position. Such evidence would provide support for the Final-Over-Initial-Position Hypothesis. The opposite situation would provide a counterexample to that hypothesis.

Evidence from text counts is perhaps the strongest evidence for the hypotheses; for it is my intention that the hypotheses be interpreted as referring to tendencies in *actual language use*. I cite evidence expressed in terms of rules and constraints on the assumption that such constraints will have certain effects on tendencies in actual language use. For example, my argument that extraposition in English provides support for the Final-Over-Initial-Position Hypothesis assumes that one effect of extraposition will be that sentential subjects will occur more often than simple subjects in clause-final position rather than clause-initial position. The hypotheses, therefore, are not generalizations about grammars, but about languages (as reflected in actual language use); this reflects an underlying assumption of mine, that some language universals are not expressible as universals about grammars but only as universals about languages (as reflected in actual language use).

In some cases, the evidence will be judgements of relative markedness. Suppose, for example, that sentences with simple subjects in clause-initial position are judged unmarked, while the corresponding sentences with the subject in clause-final position are judged acceptable but marked. Suppose, however, that sentences with *sentential* subjects are judged marked if the sentential subject occurs in clause-initial position, and unmarked if the sentential subject occurs in clause-final position. If we assume that such judgements of relative markedness reflect the relative frequencies of the different sentence types, then these judgements would suggest that sentential subjects would exhibit a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position, thereby providing support for the Final-Over-Initial-Position Hypothesis.

A few points should be emphasized so that these hypotheses are not misunderstood. First, in comparing the position of sentential NP's with that of simple NP's, only NP's of the same

grammatical relation are compared: sentential subjects with simple subjects, or sentential objects with simple objects. The reason for this is that one factor determining the position of, say, sentential subjects is the fact that they are subjects. So, other things being equal, we would expect them to occur in the same position as simple subjects. Metaphorically, one "force" influencing the position of sentential subjects is a tendency for them to occur in the same position as simple subjects. Evidence of *differences* between the positional tendencies of sentential subjects and those of simple subjects is thus evidence about "forces" influencing the position of sentential subjects other than their tendency to occur in the same position as simple subjects. My claim is that one such force is a tendency to conform to the Sentential NP Position Hierarchy. In other words, if we control other variables influencing the position of sentential NP's, such sentential NP's will exhibit a tendency to conform to the Sentential NP Position Hierarchy. The hierarchy does not claim that the positional tendencies will be true *independent of* the position of simple NP's. Thus it does not claim that in every language sentential NP's will tend to occur in clause-final position. In Japanese, sentential subjects are not permitted in clause-final position, but rather occur in clause-initial position. This is not a counterexample to the Final-Over-Initial-Position Hypothesis, because simple subjects reflect the same constraints. (If Japanese were to allow simple subjects in clause-final position, but not sentential subjects, then the language *would* provide a counterexample to the Final-Over-Initial-Position Hypothesis.)

A number of proposals similar to mine have been made in the literature (e.g. Grosu and Thompson (1977)). These proposals are deficient, however, in failing to cover all cases covered by my hypotheses; they assume that the positional tendencies apply only to sentential NP's bearing initial complementizers (or subordinators). I present evidence that the tendencies apply more strongly to sentential NP's bearing initial complementizers, but that they do apply as well to sentential NP's not bearing initial complementizers.[4]

One goal of this paper is to provide evidence in support of the Sentential NP Position Hierarchy and the three hypotheses it comprises. A further goal is to offer deeper explanations for the hierarchy. My intent is not to argue for a particular explanation, but to discuss a number of possible explanations and evaluate the evidence supporting these different hypotheses. Most of these explanations are in terms of syntactic processing.

I discuss one explanation for the fact that clause-internal position is apparently preferred least, namely that sentences with clause-internal sentential NP's are difficult to process because such sentences involve centre-embedding. I discuss a number of proposals in the literature (by Yngve, Kimball, Bever, Kuno, Grosu and Thompson, and Klaiman) that attempt to explain generalizations about the position of sentential NP's similar to the Final-Over-Initial-Position Hypothesis, the hypothesis that clause-final position is apparently preferred over clause-initial position as a position for sentential NP's. I argue that some of these proposals would explain some of the facts, but that they leave a number of cases unexplained. Some of the proposals are deficient in reflecting an English bias: although they would account for the facts in English, they are inconsistent with other languages, particularly languages with extensive left-branching, like Japanese. Other proposals are deficient in assuming that the positional tendencies apply only to sentential NP's bearing initial complementizers. They fail to account for instances in which the positional tendencies apply to sentential NP's not bearing initial complementizers.

2. The positional tendencies

In section 2.1, I present the evidence for the three hypotheses comprising the Sentential NP Position Hierarchy. In section 2.2, I review previous proposals about the position of sentential NP's.

2.1 Evidence for the Sentential Noun Phrase Position Hierarchy

2.1.1 Evidence for the Final-Over-Internal-Position Hypothesis. In this section, I present the evidence for the Final-Over-Internal-Position Hypothesis, first stated in Section 1:

FINAL-OVER-INTERNAL-POSITION HYPOTHESIS
Whenever sentential NP's and simple NP's of the same grammatical relation differ in their relative tendencies to occur in clause-final position as opposed to clause-internal position, the difference will be that sentential NP's will exhibit a greater tendency than simple NP's to occur in clause-final position rather than clause-internal position.

The arguments for the Final-Over-Internal-Position Hypothesis take the following form: in each case, it is shown that sentential NP's in a particular language exhibit a greater tendency than simple NP's in the language to occur in clause-final position rather than clause-internal position.[5]

ARGUMENT 1: WAPPO (Yukian; from Li, Thompson, and Sawyer (1977)). The most common source of evidence for the Final-Over-Internal-Position Hypothesis is SOV languages.

Some SOV languages (like Japanese) are rigidly verb-final, and do not allow sentential objects to occur in clause-final position. The majority of verb-final languages are not so rigidly verb final, however; in such languages, sentential objects (and subjects) are frequently the constituents that occur most naturally after the verb. In Wappo, for example, simple objects cannot follow the verb, but sentential objects can follow the verb. Thus (12) is unacceptable, whereas (13) is acceptable:

(12) *ʔah haṭiskhiʔ ce kew.
I know that man
'I know that man.'

(13) ʔah haṭiskhiʔ *ce kew ʔew ḷoh-taʔ*.
I know that man fish catch-past
'I know *that that man caught the fish*.'

Since the normal word order is SOV, the normal position for simple objects is clause-internal. Thus sentential objects exhibit a greater tendency than simple objects to occur in clause-final position rather than clause-internal position. This provides support for the Final-Over-Internal-Position Hypothesis.

ARGUMENT 2: HOPI (Uto-Aztecan; from Langacker (1977) and Susan Steele, personal communication). Hopi presents a paradigm similar to that for Wappo. The language is fairly rigidly verb-final in that simple objects are not normally permitted after the verb. Sentential objects, however, often occur in clause-final position, as in (14):

(14) Pas ni qa navota iŋ *hiroro-ta-q'ö*.
very I neg hear you snore-dur-sub, ds
'I certainly didn't hear *you snore*.'

ARGUMENT 3: PERSIAN (Indo-European). The paradigm for Persian is similar to that for Wappo and Hopi, except that sentential objects *must* occur in clause-final position. The normal word order is SOV, and SVO order is not normally permitted with simple objects. When the object is sentential, SOV order (as in (15)) is unacceptable, and SVO order (as in (16)) is necessary:

(15) *An zan *ke an mard sangi partab kard* mi danat.
that woman comp that man rock threw cont know,3sg
'The woman knows *that the man threw a rock*.'

(16) An zan mi danat *ke an mard sangi partab kard*.
that woman cont know,3sg comp that man rock threw
'The woman knows *that the man threw a rock*.'

ARGUMENT 4: YAQUI (Uto-Aztecan; from Lindenfeld (1973)). The paradigm for Yaqui is similar to that for Persian: simple objects must precede the verb, while sentential objects must follow it. Yaqui has two possible constructions for sentential objects, one with a subordinate verb, as in (17), and one with an initial complementizer plus a finite verb, as in (18):

(17) aapo hunen hia *hu-ka hamut-ta tutuʔuli-tia*.
he thus say this-dep woman-dep pretty-quot
'He says *that this woman is pretty*.'

(18) aapo hunen hia *ke hu hamut tutuʔuli*.
he thus say comp this woman pretty
'He says *that this woman is pretty*.'

Apparently, the SVO order is necessary with either construction. Again, sentential objects will exhibit a greater tendency than simple objects to occur in clause-final position rather than clause-internal position.

ARGUMENT 5: TURKISH (Altaic). Turkish has two possible constructions for sentential objects, one with a nonfinite form of the verb, as in (19), the other with an initial complementizer *ki* with a finite form of the verb, as in (20):

(19) Adam ban-a *Ayse-nin kitab-ı oku-duğ-u-nu* söyle-di-ø.
man I-dat Ayse-gen book-def, acc read-nom-3sg,poss-acc tell-past-3sg
'The man told me *that Ayse read the book*.'

(20) Adam ban-a söyle-di-ø *ki Ayse kitab-ı oku-du-ø*.
man I-dat tell-past-3sg comp Ayse book-def, acc read-past-3sg
'The man told me *that Ayse read the book*.'

The discussion here applies only to the finite construction.

The normal word order in Turkish is SOV, although SVO order is permitted. With finite sentential objects, only the SVO order is possible, as in (20) above. SOV order, as in (21), is not acceptable:

(21) *Adam ban-a *ki Ayse kitab-ı oku-du-ø* söyle-di-ø.
man I-dat comp Ayse book-def,acc read-past-3sg tell-past-3sg
'The man told me *that Ayse read the book*.'

The fact that simple objects can occur either in clause-internal or in clause-final position while sentential objects can only occur in clause-final position provides support for the Final-Over-Internal-Position Hypothesis.

ARGUMENT 6: WICHITA (Caddoan; from Rood (1973, 1976)). The most common word orders in Wichita are SOV and OVS, so that the normal position for objects is before the verb. Sentential objects, however, usually occur in clause-final position, as in (22):

(22) tac-iʔíːkhi::taw *kiri-ʔiːs-ʔirʔiːsti-s*.
I-know neg-neg,3-steal-impf
'I know *that he did not steal it*.'

ARGUMENT 7: LATIN (Indo-European). The most common word order in Latin is SOV, although SVO is a possible alternative. When the object is sentential, the more common order is SVO. See Appendix 3 for details.

ARGUMENT 8: MOJAVE (Hokan; from Munro (1974)). The basic word order in Mojave is SOV; however, object NP's often occur after the verb. According to Munro, this position is especially common for sentential complements.

ARGUMENT 9: LAKOTA (Siouan; from Pat Shaw, personal communication, and Rood (1973)). The normal word order in Lakota is SOV. Sentential objects exhibit a greater tendency than simple objects to follow the verb, as in (23):

(23) Toha slolyáya he *wakpála ektá ohihpaye ki.*
when you,know Q creek to fall comp
'When did you find out *that he fell in the creek*?'

ARGUMENT 10: FINNISH (Uralic). The basic word order in Finnish is SVO. SOV order is an acceptable alternative word order when the object is a simple NP, but not when it is a sentential NP. Thus (24) is acceptable, but (25) is not:

(24) Pekka toivo-o *että sa-at työpaika-n.*
Pekka hope-pres,3sg comp get-pres,2sg job-gen
'Pekka hopes *that you will get the job.*'

(25) *Pekka *että sa-at työpaika-n* toivo-o.
Pekka comp get-pres,2sg job-gen hope-pres,3sg
'Pekka hopes *that you will get the job.*'

ARGUMENT 11: LITHUANIAN (Indo-European). Lithuanian presents a paradigm similar to that just given for Finnish: SVO is the basic word order; SOV is an acceptable alternative word order when the object is simple, but not when it is sentential.

ARGUMENT 12: MALAGASY (Austronesian; from Keenan (1976b)). VOS languages also provide evidence in support of the Final-Over-Internal-Position Hypothesis. I have not found any case of a VOS language which allows the VOS word order when the object is sentential. Malagasy, for example, requires VSO order when the object is sentential, as in (26):

(26) Mihevitra Rabe *fa mitady ny zaza Rasoa.*
thinks Rabe comp look.for the child Rasoa
'Rabe thinks *that Rasoa is looking for the child.*'

ARGUMENT 13: TONGAN (Austronesian; from Harry Feldman, personal communication). The normal word orders in clauses with simple objects in Tongan are VSO and VOS. When the object is sentential, only the VSO order is acceptable, as in (27):

(27) 'Oku 'ilo'i 'e he finemotu'á *na'e tolongi 'e he sianá 'a e fo'i maká.*
pres know erg the woman past throw erg the man abs the rock
'The woman knows *that the man threw the rock.*'

ARGUMENT 14: TOBA BATAK (Austronesian; from Liberty Sihombing, personal communication). The normal word order in Toba Batak is VOS. Again, however, this word order cannot be used when the object is sentential. Either the subject occurs at the beginning of the sentence yielding SVO word order, as in (28), or else the sentence is passivized so that the underlying sentential object becomes a superficial subject ,as in (29):

(28) Si Bill man-dok *man-embak ursa si Jon.*
ptcl act-say act-hunt deer ptcl John
'Bill said *that John is hunting deer.*'

(29) Di-dok si Bill *man-embak ursa si Jon.*
pass-say ptcl act-hunt deer ptcl John
'It was said by Bill *that John is hunting deer.*'

ARGUMENT 15: OJIBWA (Algonkian; from Rich Rhodes, personal communication). Ojibwa allows considerable freedom of word order; however, Tomlin and Rhodes (1979) argue that the basic word order is VOS. The normal word order when the object is sentential, however, is VSO, as in (30):

(30) w-gikenmaan Zhaabdis *aakzi-d Maaniinh.*
he-knows,her John sick-sub,she Mary
'John knows *that Mary is sick.*'

ARGUMENT 16: VARIOUS LANGUAGES. Many languages allow a certain amount of freedom of word order among constituents after the verb. In a number of languages, a sentential object must be the last of such constituents. Such is the case in Jacaltec (Craig 1977), Kinyarwanda (Kimenyi 1976), Old English (Gardner 1971), and Welsh (Awbery 1976).

POSSIBLE COUNTEREVIDENCE: JACALTEC (Mayan). Jacaltec presents a possible weak counterexample to the Final-Over-Internal-Position Hypothesis.[6] This case is discussed in Appendix 2.

2.1.2 Evidence for the Initial-Over-Internal-Position Hypothesis. The arguments summarized in the last section show how languages avoid clause-internal sentential NP's by placing the sentential NP's in clause-final position. This section discusses evidence for a second strategy: placing them in clause-initial position:

INITIAL-OVER-INTERNAL-POSITION HYPOTHESIS
Whenever sentential NP's and simple NP's of the same grammatical relation differ in their relative tendencies to occur in clause-initial position as opposed

to clause-internal position, the difference will be that sentential NP's will exhibit a greater tendency than simple NP's to occur in clause-initial position rather than clause-internal position.

This strategy is far less common; the arguments supporting the Initial-Over-Internal-Position Hypothesis are quite limited.

ARGUMENT 1: JAPANESE. The normal word order in Japanese is SOV. Thus the expected position for sentential objects is clause-internal. Many SOV languages exhibit a tendency to place the sentential object in clause-final position instead. Japanese, however, is rigidly verb-final. Although Japanese freely allows sentential objects to occur in clause-internal position, there is apparently a tendency to place the sentential object in clause-initial position, especially when the sentential object is long. Since sentential objects apparently exhibit a greater tendency than simple objects to occur in clause-initial position rather than clause-internal position, these facts support the Initial-Over-Internal-Position Hypothesis.

ARGUMENT 2: HARE (Athapaskan; from Keren Rice, personal communication). Hare, like Japanese, is rigidly verb-final. Like Japanese, it also exhibits a tendency to use OSV word order when the object is sentential, as in (31):

(31) *Mary Inuvik wheda* John yodįhshǫ.
be.in knows
'John knows *that Mary is in Inuvik.*'

ARGUMENT 3: LITHUANIAN (Indo-European). As discussed above, Lithuanian allows both SVO and SOV word order when the object is simple, but does not allow SOV word order when the object is sentential. The language also allows OVS word order regardless of whether the object is simple or sentential. Since OVS order is allowed in either case, while SOV order is allowed only when the object is simple, sentential objects will exhibit a greater tendency than simple objects to occur in clause-initial position rather than clause-internal position, thereby providing support for the Initial-Over-Internal-Position Hypothesis.

ARGUMENT 4: ENGLISH. Since the normal word order in English is SVO, the normal position for subjects is clause-initial. There are a number of constructions, however, in which other material precedes the subject, so that the subject occurs in clause-internal position. Thus, corresponding to the (a) sentences in (32) to (34), in which the subject occurs in clause-clause-initial position, are the (b) sentences, in which the subject occurs in clause-internal position:

(32) a. *Your story* amazed Steve.
b. Steve, *your story* amazed.

(33) a. *The answer* is obvious.
b. Is *the answer* obvious?

(34) a. *Myron* saw who?
b. Who did *Myron* see?

Unacceptable sentences arise, however, if we try to use these constructions in sentences with sentential subjects in subject position. This is illustrated in (35) to (37):

(35) a. *That Jim would go swimming in February* amazed Steve.
b. *Steve, *that Jim would go swimming in February* amazed.

(36) a. *That Debbie fooled everyone* is obvious.
b. *Is *that Debbie fooled* everyone obvious?

(37) a. *That Jerry discovered the solution* amazed who?
b. *Who did *that Jerry discovered the solution* amaze?

The effect of these facts is that sentential subjects will exhibit a greater tendency than simple subjects to occur in clause-initial position rather than in clause-internal position, thereby providing support for the Initial-Over-Internal-Position Hypothesis.

2.1.3 Evidence for the Final-Over-Initial-Position Hypothesis. An initial fact suggestive of this hypothesis is that I have found more evidence for the Final-Over-Internal-Position Hypothesis than I have for the Initial-Over-Internal-Position Hypothesis:

FINAL-OVER-INITIAL-POSITION HYPOTHESIS
Whenever sentential NP's and simple NP's of the same grammatical relation differ in their relative tendencies to occur in clause-final position as opposed to clause-initial position, the difference will be that sentential NP's will exhibit a greater tendency than simple NP's to occur in clause-final position rather than clause-initial position.

This suggests that it is more natural to avoid having sentential NP's in clause-internal position by placing them in clause-final position than by placing them in clause-initial position.

The most common argument for the Final-Over-Initial-Position Hypothesis comes from sentential subjects of intransitive predicates. In a large number of SOV and SVO languages it is normal for sentential subjects to follow the predicate while simple subjects precede the predicate. Most of the arguments given are of this form.

ARGUMENT 1: PERSIAN (Indo-European). As noted above, the normal word order in Persian is SOV. However, sentential subjects, like sentential objects, obligatorily occur in clause-final position, as in (38):

(38) Dorost ast *ke mard sangi partab kard.*
true is comp man rock threw
'It is true *that the man threw the rock.*'

Since the normal position for simple subjects is clause-initial, sentential subjects clearly exhibit a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

ARGUMENT 2: TURKISH (Altaic; from Robert Underhill, personal communication). The paradigm for Turkish is similar to that for Persian. Simple subjects normally occur in clause-initial position, while sentential subjects (with a complementizer plus finite verb) obligatorily occur in clause-final position, as in (39):

(39) Belli *ki Mehmet sarhoş-tur.*
obvious comp Mehmet drunk-is
'It is obvious *that Mehmet is drunk.*'

ARGUMENT 3: WOLEAIAN (Austronesian; from Sohn (1975)). In intransitive clauses in Woleaian, both clause-initial position and clause-final position are normal positions for simple subjects. Sentential subjects, however, obligatorily occur in clause-final position, as in (40):

(40) Ye far gach *be ye sa buutog Field Trip.*
3sg good comp 3sg perf come Field Trip
'It is good *that the Field Trip ship came.*'

ARGUMENT 4: KINYARWANDA (Bantu; from Alexandre Kimenyi, personal communication, (1976)). The normal word order in Kinyarwanda is SVO, although simple subjects can occur in clause-final position in certain circumstances. Sentential subjects, however, occur obligatorily in clause-final position if they are not presupposed, as in (41):

(41) Bi-ra-shoboka *ko abaana ba-gu-ha ibitabo.*
it-pres-possible comp children they-you-give books
'It is possible *that the children will give you the books.*'

Since there is no class of simple subjects that obligatorily occur in clause-final position, it is likely that sentential subjects will exhibit a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

ARGUMENT 5: THAI (Kam-Tai; from John Grima, personal communication). The normal position for simple subjects in Thai is clause-initial. Sentential subjects occur with one of two complementizers, *waâ* or *thîî*. Sentential subjects with *thîî* occur either in clause-final position or in clause-initial position. Sentential subjects with *waâ* obligatorily occur in clause-final position, as in (42):

(42) Kə̀ət khŵn *waâ khon nán paa kɔ̂ɔn hĭn.*
happen comp man that threw rock
'It happened *that the man threw the rock.*'

ARGUMENT 6: YAQUI (Uto-Aztecan; from Lindenfeld (1973)). As noted above, Yaqui is SOV. Sentential subjects obligatorily occur in clause-final position, whether they occur with a clause-initial complementizer, as in (43), or with a subordinating suffix on the verb, as in (44):[7]

(43) tuisi tuʔi *ke hu hamut bwiika.*
very good comp this woman sing
'It is very good *that this woman sings.*'

(44) tuisi tuʔi *hu hamut bwika-kai.*
very good this woman sing-sub
'It is very good *that this woman sings.*'

ARGUMENT 7: TUSCARORA (Iroquoian; Marianne Mithun Williams, personal communication, (1976)). The most common word order in Tuscarora is SVO. Sentential subjects, however, always occur in clause-final position, as in (45):

(45) v-yoʔrihwàyvʔθ hè:ní:kv: *saʔkáhneʔ kè:ní:kv: ù:-yé:nv:t.*
fut-necessary this someone this fut-feed
'It will be necessary *that someone feed it.*'

ARGUMENT 8: WICHITA (Caddoan; from Rood (1976)). Both clause-initial and clause-final position are normal positions for simple subjects in Wichita. Sentential subjects, however, usually occur in clause-final position, as in (46):

(46) wickhéʔes t-o:kha:rʔi *na:-ʔá-skih.*
funny 3-be 3,ptcpl-come-sub,impf
'It is funny *that he came.*'

ARGUMENT 9: ENGLISH. Simple subjects in English normally occur in clause-initial position, whereas sentential subjects normally occur in clause-final position, as in (47):

(47) It is obvious *that Bill loves Mary.*

ARGUMENT 10: COLLOQUIAL EGYPTIAN ARABIC (Semitic; from Wise (1975)). The normal position for simple subjects in Colloquial Egyptian Arabic is clause-initial. Wise describes the language as having an optional rule of extraposition that applies only to sentential subjects, moving them to clause-final position, as in (48):

(48) miš mumkin *inni aruuħ iskindriyya.*
not possible comp go Alexandria
'It is not possible *that I go to Alexandria.*'

ARGUMENT 11: LAKOTA (Siouan; from Pat Shaw, personal communication). The normal word order in Lakota is SOV. Sentential subjects apparently exhibit a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

ARGUMENT 12: INDONESIAN (Austronesian; from Patricia Henry, personal communication). Both simple and sentential subjects can either precede or follow the predicate in intransitive clauses in Indonesian. However, when the subject is simple, the unmarked word order is that in which the subject occurs before the predicate, in clause-initial position. When the subject is sentential, the unmarked word order is that in which the sentential subject occurs after the predicate, in clause-final position, as in (49):

(49) Betul *bahwa laki-laki itu melempar batu.*
true comp man that threw rock
'It is true *that the man threw the rock.*'

ARGUMENT 13: LITHUANIAN (Indo-European). In clauses with a simple subject and predicate, the order predicate-subject is highly marked, and often unacceptable. In clauses with just a sentential subject and a predicate, the two orders subject-predicate and predicate-subject, as in (50), are judged equally acceptable:

(50) a. *Kad Jonas myli Marytę* yra aišku.
comp John loves Mary be clear
'*That John loves Mary* is clear.'
b. Yra aišku *kad Jonas myli Marytę.*
be clear comp John loves Mary
'It is clear *that John loves Mary.*'

ARGUMENT 14: MARATHI (Indo-European; from Peter Hook, personal communication). Marathi allows two constructions with sentential subjects, one in clause-final position with an initial complementizer, as in (51), the other in clause-initial position, without an initial complementizer, as in (52):

(51) (he) khara aahe *ki maaNsaana dagaR maarla.*
it true is comp man rock threw
'It is true *that the man threw the rock.*'
(52) *maaNsaana dagaR maarla* he khara aahe
man rock threw it true is
'It is true *that the man threw the rock.*'

(51) and (52) are judged equally natural. Simple subjects, however, normally occur before the predicate.

ARGUMENT 15: BLACKFOOT (Algonkian; from Don Frantz, personal communication). Both orders of subject and predicate in simple intransitive clauses are normal in Blackfoot; however, when the subject is sentential, it must follow the predicate, as in (53):

(53) Iksipisata'piwa *ot-sspiy'-ssi nitąkkaawa.*
very,surprising,inan,3sg 3sg-dance-sub my,friend
'It is very surprising *that my friend is dancing.*'

ARGUMENT 16: OJIBWA (Algonkian; from Rich Rhodes, personal communication). The Ojibwa facts are similar to those in Blackfoot; namely, simple subjects are common both before and after the predicate, whereas sentential subjects normally follow the predicate, as in (54):

(54) Eshkam znagad *wiidebnaming iw boodweng.*
more.and.more expensive fut,get that burn
'It is getting more and more expensive *to get fuel.*'

ARGUMENT 17: TARAHUMARA (Uto-Aztecan; from Langacker (1977)). It is not clear what positions are natural for simple subjects in Tarahumara; however, Langacker cites Tarahumara as exemplifying a Uto-Aztecan tendency to postpose sentential subjects, as in (55):

(55) aca ga'ra u *wa'ru ba'wi bahi'a*?
Q good be much water drink,nom
'Is it good *to drink a lot of water*?'

ARGUMENT 18: WAPPO (Yukian; from Li, Thompson and Sawyer (1977)). The remaining two arguments for the Final-Over-Initial-Position Hypothesis are based on the position of sentential objects. As discussed above, simple objects in Wappo cannot occur in clause-final position, while sentential objects can. Since simple objects can occur in clause-initial position, sentential objects exhibit a greater tendency than simple objects to occur in clause-final position rather than clause-initial position. Similar arguments could probably be constructed for a number of other SOV languages.

ARGUMENT 19: LATIN. As discussed in greater detail in Appendix 3, sentential objects in Latin exhibit a greater tendency than simple objects to occur in clause-final position rather than clause-initial position.

COUNTERARGUMENT 1: MANDARIN (Chinese). Mandarin provides the only clear counterexample to the Final-Over-Initial-Position Hypothesis. The unmarked word order in Mandarin is SVO, but simple subjects can follow intransitive verbs (when they are indefinite). Sentential subjects, however, cannot follow the predicate, as illustrated in (56):

(56) a. *Tā shēng bìng* shì dàshì.
3sg fall sick be big.matter
'*That he fell sick* is a big matter.'
b. *Shì dàshì *tā shēng bìng*.
be big.matter 3sg fall sick
'It is a big matter *that he fell sick*.'

The effect of these facts is that simple subjects will exhibit a greater tendency than sentential subjects to occur in clause-final position rather than clause-initial position, contrary to the Final-Over-Initial-Position Hypothesis.

COUNTERARGUMENT 2: ENGLISH AND JACALTEC. Two other possible counterexamples are discussed in Appendices 1 and 2 based on the construction used in English sentences like (57) and similar sentences in Jacaltec:

(57) It's going to rain, John says.

If *It's going to rain* is a sentential object in (57), then this construction would appear to have the effect that sentential objects will exhibit a greater tendency than simple objects to occur in clause-initial position rather than clause-final position.

This completes the evidence for and against the Sentential NP Position Hierarchy. In the next section, I examine related proposals that have appeared in the literature.

2.2 Previous Proposals

In this section I discuss three previous proposals regarding the position of sentential NP's: Grosu and Thompson (1977), Kuno (1974) and Klaiman (1976). I will limit discussion to the *generalizations* these writers propose or assume about the position of sentential NP's. Later, in section 3, I will discuss the explanations they offer for the generalizations.

2.2.1 Grosu and Thompson's Proposals. The proposals of Grosu and Thompson (1977) are similar to those argued for in this paper. Grosu and Thompson discuss the nature of constraints on internal sentential NP's and survey the empirical inadequacies of earlier proposals. Their proposals are based primarily on facts of English, but are heavily influenced by facts from a number of other languages. They summarize the facts in the following principle (1977: 136–37):

(58) A surface structure of the form $_{\alpha}[XAY]_{\alpha}$, where α is the lowest S-node dominating A, A is a sentential or verb-phrasal NP/argument (of α) exhibiting an initial subordinating particle, and Y is an obligatory (but possibly phonologically null) subpart of α, is (i) 'marked' (and sometimes unacceptable) if X is null, and (ii) more 'marked' (and almost invariably unacceptable) if X is non-null.

I will refer to (58) as Grosu and Thompson's principle.

Grosu and Thompson's principle incorporates a version of the Sentential NP Position Hierarchy. Their principle states that a clause containing a sentential NP (A) is marked if A is clause-initial but even more marked if A is clause-internal; implicitly, a clause containing a sentential NP is unmarked if the sentential NP occurs in clause-final position. This corresponds to a final-initial-internal position hierarchy. The evidence they offer for this is similar to the evidence I offer for the Sentential NP Position Hierarchy.

Their principle incorporates a number of further proposals, the most important of which for present purposes is the restriction of their principle to sentential NP's "exhibiting an initial subordinating particle". They note that in langugaes without initial subordinators, sentential NP's occur freely in clause-internal position, but that such is not the case in languages with initial subordinators. They further claim that "only sentential arguments with initial subordinating particles can in principle reduce acceptability and/or naturalness when in clause-initial position." That the presence of an initial indicator of subordination (or complementizer, in my terminology) is an important variable governing the positional tendencies of sentential NP's is unquestionable. Grosu and Thompson cite the following examples of sentences, from other languages, containing clause-internal sentential NP's *without* initial complementizers:

(59) a. *Japanese*
John wa *Mary ga sinda to* sinzinakatta.
topic subj died comp believed,not
'John did not believe *that Mary died*.'
b. *Korean*
Kim sensaying i *kaca ko* mäl hayssey yo.
Kim teacher he go,we comp speech made ptcl
'Mr. Kim suggested *that we go*.'
c. *Nama (Hottentot)*
Tita ge *ti aribob xa ta go gāhe !keisa* ti !gasaba
I subj my little.dog by I past be.gone comp my brother
ganube miba tama ha.
yet say.to not past
'I haven't told my brother yet *that I lost my little dog*.'
d. *Wappo*
ah *ce k'ew ʔew t'ohta*ʔ hatiskhiʔ.
I dem man fish caught know
'I know *that that man caught a fish*.'
e. *Mojave*
John-č *Mary-č iva:-m* su:paw-m.
John-subj Mary-subj arrive-ds know-tense
'John knows *that Mary arrived*.'

Many other languages, including Carrier, Hare, Hopi, Lakota and Tamil, allow clause-internal sentential NP's without initial

complementizers. Grosu and Thompson would also appear to be generally correct in claiming that clause-internal sentential NP's with initial complementizers are almost invariably unacceptable. They are less accurate, however, in their implication that the tendency to avoid clause-internal position applies only to sentential NP's with initial complementizers. Many languages provide evidence that the same tendency applies as well (albeit to a weaker extent) to sentential NP's without initial complementizers. A number of the arguments for the Final-Over-Internal-Position Hypothesis given in section 2.1.1 above are based on sentential NP's *without* initial complementizers, namely those from Hopi, Lakota, Latin, Mojave, Ojibwa, Toba Batak, Tongan, Wappo, Wichita, and Yaqui. Similarly, the arguments for the Initial-Over-Internal-Position Hypothesis from Hare and Japanese are based on sentential NP's without initial complementizers.

Grosu and Thompson also appear to be correct in so far as the tendency to prefer clause-final position over clause-initial position is strongest for sentential NP's with initial complementizers. As far as I can determine, sentential NP's with initial complementizers always exhibit a tendency to occur in clause-final position. On the other hand, a similar tendency is exhibited by sentential NP's *without* initial complementizers in a number of languages. The arguments for the Final-Over-Initial-Position Hypothesis from Blackfoot, Latin, Lakota, Ojibwa, Tarahumara, Tuscarora, Wappo, Wichita and Yaqui are based on sentential NP's without initial complementizers.[8]

In summary, Grosu and Thompson's principle is generally accurate as a description of the available data. Its main inadequacy lies in its restriction of the tendency to sentential NP's with initial complementizers; in fact, the tendency applies to all sentential NP's, but is stronger for sentential NP's with initial complementizers.

2.2.2 Kuno's Proposals. The discussion in Kuno (1974) is directed at explaining a number of typological facts, including (60):

(60) SVO languages have rules of extraposition that move sentential subjects to the end of sentences.

(60) is relevant here because the effect of such rules is that sentential subjects will have a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

Kuno offers an explanation for the existence of rules of extraposition in SVO languages (discussed later in section 3), but gives no evidence for the existence of such rules, except for citing English, German and French. Many SVO languages exhibit a tendency for sentential subjects to occur in clause-final position; however, it is often not clear whether there is a rule of extraposition involved, and often there is reason to say that there is not. For example, in Old English, sentential subjects always occur in clause-final position, while other subjects most commonly occur in clause-initial position. The dominant word order in Old English is SVO but much freedom of word order is allowed; as a result, simple subjects *can* occur in clause-final position. The most natural way to describe such facts is in terms of a scrambling rule (or a linearization rule allowing any of the possible word orders) plus a surface constraint specifying that sentences containing sentential NP's are grammatical only if the sentential NP occurs in clause-final position. Thus, technically speaking, Old English is an example of an SVO language without a rule of extraposition. Nevertheless, it is intuitively similar to SVO languages with rules of extraposition, in exhibiting a tendency for sentential subjects to occur in clause-final position. For this reason it seems better to talk in terms of positional tendencies rather than rules of extraposition. (61) is a restatement of (60) in terms of positional tendencies:

(61) In SVO languages, sentential subjects have a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

However, (61) is inadequate as an approximation of (60) in that Kuno's explanation for (60) assumes that SVO languages use initial complementizers. Hence a closer approximation to Kuno's claim would be (62):

(62) In SVO languages with initial complementizers, sentential subjects have a greater tendency than simple subjects to occur in clause-final position rather than clause-initial position.

Kuno observes that his arguments also predict that sentential NP's with initial complementizers in SOV languages should also display a tendency to occur in clause-final position rather than clause-initial or clause-internal position. In fact, his arguments would predict that sentential NP's with initial complementizers in *any* language should display a tendency to occur in clause-final position rather than clause-initial or clause-internal position. As documented above, this prediction is borne out. However, Kuno's proposals share the deficiency of those of Grosu and

Thompson in failing to predict that sentential NP's *without* initial complementizers should exhibit the tendencies in question.

2.2.3 Klaiman's Proposals. Klaiman (1976) discusses the relationship between the position of sentential NP's and the position of complementizers. She presents evidence from Hindi, Marathi, Persian, and Japanese supporting the following principle (1976:10):

(63) Complement sentences with initial complementizers shift rightward, if at all, in natural languages. Complement sentences with final complementizers shift leftward, if at all, in natural languages.

Klaiman proposes that the movement typology in (63) is a reflection of the principle in (64):[9]

(64) Complementizers will tend to occur *between* the sentential NP and the main clause.

Klaiman's proposals (63) and (64) can be combined, as in (65):

(65) Sentential NP's will shift, if at all, into a position in which the complementizer occurs between the sentential NP and the main clause.

Principle (65) is somewhat difficult to test because it is frequently difficult to determine whether a given set of facts should be described in terms of a rule *shifting* sentential NP's or not. However, (65) can be restated in terms of positional tendencies, as in (66):

(66) Where sentential NP's differ in their positional tendencies from other NP's of the same grammatical relation, they will show a greater tendency to occur in a position in which the complementizer occurs between the sentential NP and the main clause.

Principle (66) predicts that the Final-Over-Initial-Position and Final-Over-Internal-Position Hypotheses should apply only to sentential NP's with *initial* complementizers and that the Initial-Over-Internal-Position Hypothesis should apply only to sentential NP's with *final* complementizers. As documented in the discussion of Grosu and Thompson's proposals above, however, the Final-Over-Initial-Position and Final-Over-Internal-Position Hypotheses also apply to sentential NP's *without* initial complementizers. In fact, in at least one case, namely Lakota, sentential NP's with final complementizers exhibit a tendency to occur in clause-final position.[10] Furthermore, two of the arguments for the Initial-Over-Internal-Position Hypothesis are based on sentential NP's with initial complementizers (and without final complementizers), namely those from English and Lithuanian. Such cases are exhibiting precisely the opposite tendency from what Klaiman's principle would predict.

In summary, all three previous proposals are inadequate since they fail to capture the fact that the tendencies apply to all sentential NP's, regardless of the presence and position of complementizers. As a result, the explanations offered by these writers are also inadequate as explanations for the Sentential NP Position Hierarchy in failing to explain all the cases.

3. Explanations for the sentential noun phrase position hierarchy

In this section I discuss various possible explanations for the Sentential NP Position Hierarchy and the three hypotheses it incorporates. In section 3.1, I review various proposals in the literature that might provide an explanation or partial explanation for the Sentential NP Position Hierarchy. Most of the proposals are seriously flawed, as we shall see, and none of them provides an adequate explanation for the Final-Over-Initial-Position Hypothesis. In section 3.2, I offer some suggestive comments towards that end.

3.1 Previous Proposals

3.1.1 Yngve's Proposals. The proposals of Yngve (1960) were an early attempt to explain facts about the structure of language in terms of cognitive mechanisms underlying language use. Yngve devised a production model that generated phrase structure trees and showed that his model, plus certain assumptions about memory limitations, accounts for a number of facts about the syntax of English.

According to Yngve's proposal, it is necessary to store in temporary memory a list of constituents still to be generated. He proposed that the temporary storage in his model be equated with short term memory, as discussed by psychologists like Miller (1956), who posited that there is a limit of seven items plus or minus two that can be held in short term memory. Yngve proposed that speakers would not be able to produce sentences with a depth greater than the limit on short term memory, where the depth of a sentence is defined as the maximum number of items that must be held in temporary storage while generating the sentence. He further proposed that languages would provide means to avoid structures with excessive depth.

Yngve discussed a number of examples of features of English syntax that his proposals would account for. One of these is the tendency for "heavy" constituents to occur in a clause-final position rather than clause-internal position. He also showed that sentences with sentence-initial sentential subjects, like (68a), have greater depth than sentences with extraposed sentential subjects, like (68b):

(68) a. That it is obvious isn't clear.
b. It isn't clear that it is obvious.

His proposal predicts that right-branching structures should be easier to process than left-branching or centre-embedded structures: in processing left or centre branches, it is necessary to store a reference to right branches; in processing right branches, no such reference need be stored.

Yngve's proposal can be criticized on two grounds. First, as noted by Chomsky (1965), it fails to distinguish left-branching structures from centre-embedded structures by implying that the two should be equally difficult to process. It thus fails to provide an account for the Initial-Over-Internal-Position Hypothesis. Second, as noted by Binnick (1977), it fails to account for the fact that many languages, like Japanese and Mongolian, are predominantly left-branching, and apparently do not provide processing difficulty for speakers. Thus, many of the facts Yngve claims his proposal account for are simply reflections of the tendency for English to avoid left-branching structures. However, any account of that tendency must be consistent with the fact that there are languages which freely allow left-branching structures; this, Yngve fails to do.[11]

3.1.2 Proposals of Bever and his Associates. In this section, I discuss some relevant proposals made in Bever (1970), Bever and Langendoen (1971), and Fodor, Bever, and Garrett (1974).

3.1.2.1 Perceptual Strategies. Bever has proposed that speakers of English use a number of "perceptual strategies" in sentence processing. The perceptual strategy most relevant here is the strategy given in (69), which Fodor, Bever, and Garrett use as the basis for explaining extraposition (1974:356):

(69) Take the verb which immediately follows the initial noun of a sentence as the main verb unless there is a surface structure mark of an embedding.

Fodor, Bever, and Garrett cite a number of experimental facts which they claim the strategy in (69) accounts for (1974:356–57):

> For example, Clark and Clark (1968) reported that sentences in which a subordinate clause preceded a main clause were more poorly recalled than those with the reverse order ... Weksel and Bever (1966) found that nominals in subject position ("That Mary was happy surprised Max") are rated as harder to understand than nominals in object position ("It surprised Max that Mary was happy"); that preposed adverbials ("When Mary left, Max was happy") are rated as harder than normally positioned adverbials ("Max was happy when Mary left"); ... [These results] may be tentatively taken as an indication that the surface order of main and subordinate structures is significantly related to their ease of comprehension, and that the order *main + subordinate* is easier than the order *subordinate + main.*

It should first be noted that it is not clear how these facts provide evidence for the strategy in (69); in a sentence like (70), for instance, the initial verb is subordinate, but it follows a marker of subordination, so (70) is fully consistent with the strategy:

(70) That Mary was happy surprised Max.

The experimental results cited by Fodor, Bever, and Garrett do, however, suggest a slightly different strategy:

(71) *Main Clause Strategy*
Take the initial clause in a sentence to be the main clause.

The argument cited above from Fodor, Bever, and Garrett might appear to provide an explanation for the Final-Over-Initial-Position Hypothesis: sentences with sentential NP's in initial position employ the order *subordinate + main*; if sentences with the order *main + subordinate* are easier to comprehend, then we might appear to have experimental evidence that the Final-Over-Initial-Position Hypothesis is due to relative ease of comprehension.

There is a crucial ambiguity, however, in the notion of "ease of comprehension", and the related notion "processing difficulty." There are two senses in which a sentence might be said to be a source of processing difficulty. The first sense is illustrated by (72), which contains multiple centre-embedded relative clauses:

(72) The rat the cat the dog bit chased ran away.

Following Chomsky (1965), we can say that sentences like (72) are grammatical but unacceptable. In other words, such sentences are unacceptable for performance reasons, not for competence reasons. They are well-formed, as far as the rules of grammar are concerned: *the dog bit* is a relative clause modifying *the cat* and corresponds to *the dog bit the cat*; similarly, *the cat the dog bit chased* is a relative clause modifying *the rat* and corresponds to (73):

(73) The cat the dog bit chased the rat.

However, although (73) is relatively easy to understand, (72) is not; it can only be interpreted if examined carefully. The processing difficulty involved in (72) is an example of processing difficulty due to performance factors. A second example of this processing difficulty is illustrated by any sentence that is well-formed according to the rules of grammar but consists of over a thousand words. Any such sentence will cause processing difficulties.

The second sense of the notion "processing difficulty" is illustrated by (74), a string of English words that do not form a grammatical English sentence:

(74) *Me likes she.

(74) is difficult to process in that there will be a certain amount of difficulty associating a meaning with it. At best, we might speculate after close examination that a speaker of (74) might mean either *I like her* or *She likes me*. A second example of this processing difficulty is shown by (75), again a string of English words that do not form a grammatical English sentence:

(75) *Likes John Mary.

Again (75) is a source of processing difficulty in the sense that a speaker of English will have difficulty associating a meaning with it. However, this difficulty is due to the fact that English does not permit VSO or VOS word order. A speaker of a language permitting VSO or VOS word order would have no difficulty assigning a meaning to a sentence in their language corresponding to (75).

How does the difficulty in these last two examples differ from that involved in the first two examples? Since the first two examples involve grammatical but unacceptable structures, the difficulties arise for purely performance reasons. The difficulty in processing the last two examples, however, is at least partly due to competence factors. Expressed differently, the processing difficulty involved in the first two examples arises due to the nature of cognitive mechanisms that are independent of the speaker's knowledge of a specific language. The difficulty in processing the last two examples, however, *is* due to the nature of the speaker's knowledge of a specific language. Expressed a third way, the processing difficulty involved in the first two examples is due to the nature of *innate* knowledge or abilities, while the difficulty in processing the last two examples is due to the nature of *acquired* knowledge or abilities. I will refer to the former as processing difficulty in the *innate* sense, the latter as processing difficulty in the *acquired* sense. In an analogous way we can distinguish ease of comprehension in the innate sense from ease of comprehension in the acquired sense.[12]

The examples I have given illustrating processing difficulty in the acquired sense are both examples of ungrammatical sentences. However, grammatical sentences in a language can differ in their relative ease of comprehension in the acquired sense. It seems likely that one factor governing the relative ease of comprehensibility of sentences of a particular structural type will be the relative frequency in language use of sentences of that type. Consider the hypothetical case of two languages L_1 and L_2 with the following properties. Suppose L_1 is a language in which the dominant word order is SOV but in which SVO is a grammatical but far less common word order. L_2 is a language in which the dominant word order is SVO but in which SOV is a grammatical but less common word order. One would expect that, other things being equal, speakers of L_1 would find SOV sentences easier to comprehend than SVO sentences, and speakers of L_2 would find SVO sentences easier to comprehend than SOV sentences. Clearly, the relative ease of comprehension here could not be ease of comprehension in the innate sense because speakers of L_1 have the same innate abilities as speakers of L_2. The relative ease of comprehension here must be of the acquired sort.

Now I would claim that much if not most of the experimental results bearing on ease of comprehension may reflect ease of comprehension in the *acquired* sense. Experimental results (e.g. by McMahon (1963) and Gough (1965)) indicating that subjects have slower reaction times to passive sentences than they do to active sentences may reflect no more than the fact that subjects are more used to hearing active sentences, because they are far more common in language use. Similarly, the experimental results cited above indicating that *main* + *subordinate* order is easier to comprehend than *subordinate* + *main* order may simply be due to the former order being more common in English than the latter. This is particularly plausible as an explanation for the fact that subjects judge sentences with initial sentential subjects, like (76a), to be more difficult to comprehend than sentences with extraposed sentential subjects, like (76b), as reported by Weksel and Bever (1966):

(76) a. That Mary was happy surprised Max.
b. It surprised Max that Mary was happy.

Sentences like (76b) are far more common in English than sentences like (76a). Hence it is hardly surprising that sentences like (76b) are easier to comprehend *in the acquired sense*. But if the order *main* + *subordinate* is easier to comprehend than the order *subordinate* + *main* only in the acquired sense, then we do not have an explanation for the Final-Over-Initial-Position Hypothesis. For that hypothesis refers to a *universal* tendency. A

functional explanation for a universal tendency in terms of sentence processing must refer to processing difficulties or relative ease of comprehension in the *innate* sense.[13]

In terms of perceptual strategies, the Main Clause Strategy given in (71) may be universal. However, the experimental facts cited by Fodor, Bever, and Garrett are consistent with a much weaker hypothesis, namely that the Main Clause Strategy is a strategy employed only by speakers of English (and similar languages).

3.1.2.2 Clauses as Processing Units. Bever and his associates have produced experimental evidence that clauses play a special role in language processing, distinct from that of smaller phrasal units. The nature of this evidence is complex and controversial, too much so for me to go into it at any depth here, but a brief summation will be useful.

The evidence derives from experiments in which subjects were presented with sentences during which they heard a superimposed click, and subjects then reported where in the sentence they believed the click to have occurred. It was found that subjects have a tendency to report the position of clicks that were close to constituent boundaries as being *at* the constituent boundaries, i.e., to displace clicks towards constituent boundaries. Significantly, this tendency is particularly strong at clause boundaries. This is taken as evidence that the clause is an important unit in sentence processing.

Other studies reported by Fodor, Bever and Garrett have shown that the reaction times to clicks are slowest just before the end of clauses, and fastest just after the beginning of clauses. This is taken as evidence that processing load is heaviest near the end of clauses and lightest at the beginning of clauses. A natural interpretation of these results is that as sentences are received, they undergo a preliminary analysis in short term memory, and then at the end of each clause, the partially processed material is passed on to a less temporary type of memory. Thus the amount of material in short term memory will be *highest* immediately before clause boundaries, and *lowest* immediately after clause boundaries. Additional studies provide further support for this hypothesis. They show that subjects recall material from the last clause heard considerably better than material from previous clauses, but recall material from early in the last clause as accurately as material from late in the last clause.

Fodor, Bever, and Garrett (1974) use these results to explain the difficulty involved in sentences with multiple centre-embedded relative clauses, like (77a), compared to sentences with multiple right-branching relative clauses, like (77b):

(77) a. The boy [the girl [the man liked] hated] died.
b. The man liked the girl [who hated the boy [who died]].

Their discussion is brief, but would seem to amount to the following. In processing a right-branching structure like (77b), the hearer will process *the man liked the girl* and transfer it to more permanent memory, process *who hated the boy* and transfer it to more permanent memory, and finally do the same for *who died*. In processing (77a), however, the hearer will run into difficulty. After processing *the boy*, the hearer cannot transfer it to more permanent memory, because *died*, the verb of which *the boy* is the subject, has not yet been received. Nor can the hearer empty short term memory after processing *the girl* because the verb *hated* has not been received. It would not be possible to empty short term memory until after *the man liked*. But this would place too much burden on short term memory. This account certainly provides at least a partial explanation for the Final-Over-Internal-Position Hypothesis. I will discuss its extension to sentential NP's in section 3.1.4.1.

3.1.3 Kuno's Proposals. Kuno (1974) offers explanations in terms of perceptual difficulties for a number of language universals or near universals. Two of these universals (or universal tendencies, as I will call them) are relevant here:

1. The tendency for conjunctions (including complementizers) to occur in clause-final position in SOV languages and in clause-initial position in VSO languages.
2. The tendency for SVO languages to have rules of extraposition.

The first tendency is relevant to the positional tendencies of sentential NP's because, as discussed in section 2.2, the positional tendencies are different for sentential NP's *with* clause-initial complementizers than for sentential NP's *without* clause-initial complementizers. The second tendency is also clearly relevant because rules of extraposition are reflections of the Final-Over-Initial-Position Hypothesis.

Kuno's explanations for the position of complementizers are based on situations in which one sentential NP is embedded within a second sentential NP.[14] He makes the following assumptions:

1. Centre-embedding is bad in general;
2. Successive centre-embedding of clauses or phrases of the same grammatical function or of the same shape is worse;

3. Centre-embedding of clauses or phrases of the same shape or grammatical function with conjunctions [or complementizers] next to each other is worst (Kuno, 1974, p. 125).

He argues that SOV languages will tend to involve less centre-embedding and less juxtaposition of complementizers if they have clause-final complementizers rather than clause-initial complementizers. He supports this position with the following schematic examples ('C' indicates centre-embedding; 'J' indicates juxtaposition of complementizers):

(78) SOV with *Clause-Initial* Complementizers
  a. Sentential subject embedded in sentential subject
  That [*that* [the world is round] is obvious] is dubious. (C + J)
  b. Sentential subject embedded in sentential object
  John *that* [*that* [the world is round] is obvious] says. (C + J)
  c. Sentential object embedded in sentential subject
  That [everyone *that* [the world is round] knows] is obvious. (C)
  d. Sentential object embedded in sentential object
  John *that* [everyone *that* [the world is round] knows] says. (C)

(79) SOV with *Clause-Final* complementizers
  a. Sentential subject embedded in sentential subject
  [[The word is round] *that* is obvious] *that* is dubious.
  b. Sentential subject embedded in sentential object
  John [[the world is round] *that* is obvious] *that* says. (C)
  c. Sentential object embedded in sentential subject
  [Everyone [the world is round] *that* knows] *that* is obvious. (C)
  d. Sentential object embedded in sentential object
  John [everyone [the world is round] *that* knows] *that* says. (C)

Kuno's explanation for the fact that SOV languages have clause-final complementizers rather than clause-initial complementizers rests on the fact that there is more centre-embedding and juxtaposition of complementizers in the sentences in (78) than in those in (79). Careful examination of (78) and (79) reveals, however, that the only difference lies in the (a) and (b) sentences, which contain a sentential subject embedded in another sentential NP; no difference exists in the (c) and (d) sentences. My research suggests that sentential subjects appear to be fairly uncommon, both cross-linguistically and in language use. If this is correct, sentences containing a sentential subject embedded in a second sentential NP will probably be quite rare. Kuno's explanation, however, rests entirely on such sentences. It seems unlikely that the position of complementizers would be determined by processing difficulties involved in such a rare class of sentences.

A further problem with Kuno's argument is that it implies that languages would be better off without complementizers at all. If we remove the complementizers from the sentences in (78), the resulting situation is no worse than that in (79). Kuno's argument implies that complementizers are a source of processing difficulty. Why then do so many languages have complementizers? Complementizers appear to serve as signals of syntactic structure. As such, they ought to contribute to processing ease, not processing difficulty. Fodor, Bever, and Garrett (1974) cite experimental evidence (from Hakes (1972)) that English sentences are easier to process when optional complementizers are present than when they are not. We should question, therefore, any explanation that implies that complementizers are largely a source of processing difficulty.

Kuno's explanation for the fact that VSO languages have clause-initial complementizers rather than clause-final complementizers is somewhat more convincing because complementizer position makes a greater difference in such languages. He uses the schematic examples given in (80) and (81):

(80) VSO with *Clause-Initial* Complementizers
  a. Is dubious *that* [is obvious *that* [is round the world.]]
  b. Says John *that* [is obvious *that* [is round the world.]]
  c. Is obvious *that* [knows everyone *that* [is round the world.]]
  d. Says John *that* [knows everyone *that* [is round the world.]]

(81) VSO with *Clause-Final* Complementizers
  a. Is dubious [is obvious [is round the world] *that*] *that*. (C + J)
  b. Says John [is obvious [is round] the world *that*] *that*. (C + J)
  c. Is obvious [knows everyone [is round the world] *that*] *that*. (C + J)
  d. Says John [knows everyone [is round the world] *that*] *that*. (C + J)

As these examples show, clause-final complementizers in VSO languages would always result in centre-embedding and juxtaposition of complementizers, whereas clause-initial complementizers never do so.

Once again, however, it should be pointed out that neither centre-embedding nor juxtaposition of complementizers would occur if there were no complementizers at all. Thus, Kuno's arguments at most explain why VSO languages do *not* use clause-final complementizers; they do not explain why VSO languages *do* use clause-initial complementizers.

The explanation offered by Kuno for the existence of rules of extraposition in SVO languages suffers from the same drawbacks as his explanation for the position of complementizers. Kuno observes that SVO languages will have considerable centre-embedding and juxtaposition of complementizers, whether the

complementizers are clause-initial, as in (82), or clause-final, as in (83):

(82) SVO with *Clause-Initial* Complementizers
a. *That* [*that* [the world is round] is obvious] is dubious. (C + J)
b. John says *that* [*that* [the world is round] is obvious.] (C + J)
c. *That* [everyone knows *that* [the world is round]] is obvious. (C)
d. John says *that* [everyone knows *that* [the world is round.]]

(83) SVO with *Clause-Final* Complementizers
a. [[The world is round] *that* is obvious] *that* is dubious.
b. John says [[the world is round] *that* is obvious] *that*. (C)
c. [Everyone knows [the world is round] *that*] *that* is obvious. (C + J)
d. John says [everyone knows [the world is round] *that*] *that*. (C + J)

Kuno argues that rules of extraposition allow SVO languages to avoid centre-embedding and juxtaposition of complementizers. Applying extraposition within the subordinate clause in (82a) yields (84a), which involves no juxtaposition of complementizers and less centre-embedding; applying extraposition to the main clause as well yields (84b), which involves neither centre-embedding nor juxtaposition of complementizers:

(84) a. That [it is obvious that [the world is round]] is dubious.
b. It is dubious that [it is obvious that [the world is round.]]

Once again, however, the explanation depends on sentences with one sentential subject embedded in a second sentential subject. It is unlikely that a rule like extraposition would exist solely to cope with such a rare class of sentences. It seems far more likely that extraposition exists for reasons that arise in sentences that involve only one level of embedding, as in (85):

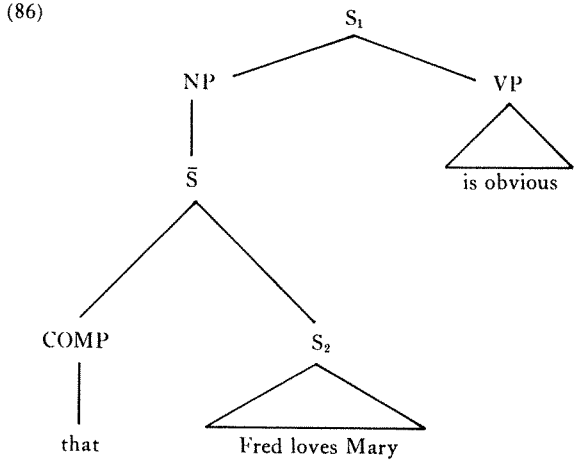
(85) a. That [Fred loves Mary] is obvious.
b. It is obvious that [Fred loves Mary].

It is, in fact, possible to construct an explanation of this sort if one accepts Kuno's assumptions. According to Kuno, *Fred loves Mary* is centre-embedded in (85a). Thus, following Kuno, one might argue that (85a) is more difficult to process than (85b) because (85a) involves centre-embedding, while (85b) does not. Although there is a sense in which *Fred loves Mary* is, formally speaking, centre-embedded in (85a), there is reason to doubt that it provides the sort of processing difficulty normally associated with centre-embeddings.

The basic issue is whether or not the complementizer should be included in determining the position of the clause. If we include the complementizer, then (85a) has a sentence-initial clause *that Fred loves Mary*. If we exclude the complementizer, then (85a) has an internal clause *Fred loves Mary*. Using the distinction between $\bar{S}$ and S, where $\bar{S}$ is COMP S, the question is whether it is the position of the $\bar{S}$ that is relevant, or the position of the S.

Consider (86), a plausible tree structure for (85a):

(86)



In claiming that sentences with initial *that*-clauses involve centre-embedding, Kuno is implying that it is the position of the S, not the $\bar{S}$, that is relevant. However, the processing difficulty that is generally assumed to be involved in processing centre-embedded structures (see 3.1.2.2 and 3.1.4.1) is not involved in processing sentences with initial sentential NP's with initial complementizers. To see this, consider the sentences in (87):

(87) a. That Fred loves Mary is obvious.
b. *Is that Fred loves Mary obvious?

If it is the position of the S (i.e. *Fred loves Mary*) that is relevant, then (87a) and (87b) should be equally difficult to process, since in both (87a) and (87b) *Fred loves Mary* is clause-internal. If, on the other hand, it is the position of the $\bar{S}$ (i.e., *that Fred loves Mary*) that is relevant, then (87b) should be more difficult to process than (87a). The fact that (87b) is unacceptable while (87a) is acceptable argues that it is the position of the $\bar{S}$, *that Fred loves Mary*, that is relevant.[15]

The processing difficulty involved in (87b) is presumably due

to the fact that the *is* in the main clause must be "remembered" while the subordinate clause is being processed. This is the typical problem caused by centre-embeddings: the processing of the lower clause interrupts the processing of the higher clause. If (87a) involves the processing difficulty of centre-embedding, then it must be that the *that* must be remembered while processing the subordinate clause. But what would be involved in remembering the word *that*? The word *that* is only a function word, it lacks content; all it does is signal the subordinate status of the clause that follows it. In other words, there is no reason to believe that sentences like (87a) should produce the sort of processing difficulty normally involved in processing centre-embeddings.

The hypothesis that sentences like (87a) involve centre-embedding further implies that such sentences would be easier to process if there were no complementizer present, as in (88):

(88) *Fred loves Mary is obvious.

However, the complementizer can only be deleted when it is *not* sentence-initial, as in (89) and (90):

(89) a. It is obvious that Fred loves Mary.
b. It is obvious Fred loves Mary.

(90) a. Bill knows that Fred loves Mary.
b. Bill knows Fred loves Mary.

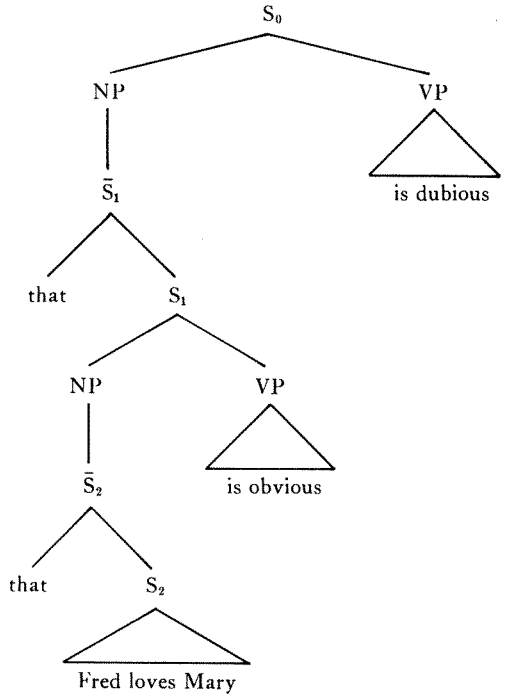
It has often been suggested (for example by Chomsky and Lasnik (1977)) that the complementizer is obligatory in sentence-initial position precisely because it signals the subordinate status of the initial clause. In other words, the presence of the complementizer in (87a) makes the sentence easier to process than it would be if there were no complementizer, as in (88). But Kuno's claim that sentences like (87a) involve centre-embedding implies that the complementizer makes the sentence *more difficult* to process, since only the complementizer would make *Fred loves Mary* in (87a) centre-embedded. There thus seems ample reason to reject Kuno's position and to conclude that it is the position of $\bar{S}$'s, not S's, that is relevant in determining whether a clause is centre-embedded.

I would also claim that it is the position *within* $\bar{S}$'s, not the position within S's, that is relevant in determining the position

of a clause. Consider the sentence in (91a), with the structure in (91b):

(91) *That that Fred loves Mary is obvious is dubious.

b.



The unacceptability of (91) is probably partly due to the juxtaposition of two occurrences of the complementizer *that*. However, it is not entirely due to this, as can be seen from the unacceptability of (92), in which different complementizers are used:

(92) *That for Fred to love Mary is disgusting is dubious.

The unacceptability of (91) is due to the position of $\bar{S}_2$ (in (91b)); the sentence becomes acceptable if we apply extraposition within S_1, as in (93):

(93) That it is obvious that Fred loves Mary is dubious.

Referring to (91b), the question is whether it is the position of $\bar{S}_2$ within S_1, within $\bar{S}_1$, or within S_0, that creates the unacceptability of (91a). If it is the position of $\bar{S}_2$ within S_1, then the unacceptability of (91a) is difficult to explain, since $\bar{S}_2$ is the first constituent in S_1. On the other hand, if it is the position of $\bar{S}_2$

within $\bar{S}_1$, then the unacceptability of (91a) is easy to explain, since $\bar{S}_2$ is internal to $\bar{S}_1$. $\bar{S}_2$ is also internal to S_0, but that is not the source of the unacceptability of (91a): $\bar{S}_2$ is also internal to S_0 in (93), but (93) is fully acceptable. Hence, in determining whether a clause is internal or not, and therefore a potential source of processing difficulty, what matters is whether an $\bar{S}$ is internal to the next highest $\bar{S}$.

Applying this principle to (91a), (91a) involves a centre-embedding in that the $\bar{S}$ *that Fred loves Mary* is internal to the $\bar{S}$ *that that Fred loves Mary is obvious*. This conclusion may seem inconsistent with my previous arguments since the centre-embedded clause is preceded only by a complementizer and I previously argued that sentences like (87a) (*That Fred loves Mary is obvious*) do *not* involve centre-embedding because *Fred loves Mary* is preceded only by a complementizer. The two cases are different, however. In (87a), the *that* simply signals that *Fred loves Mary* is a subordinate clause. In (91a), however, the initial *that* signals that *that Fred loves Mary* is embedded in yet another subordinate clause. What I am claiming, therefore, is that knowing that one is in a subordinate clause will not obstruct sentence processing, and in fact will likely aid it, but knowing that one is in a subordinate clause embedded in yet another subordinate clause *will* obstruct sentence processing.

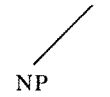
There is an alternative interpretation of the facts, and at present I see no strong basis for choosing between this alternative position and the position just presented. If we assume that sentence processing involves (among other things) constructing a syntactic tree for the sentence, and that, other things being equal, a sentence will be easier to process the "simpler" the tree that need be constructed (given an appropriate definition of simplicity), then sentential subjects with no initial complementizers, as in the Japanese sentence (94), should be easier to process than sentential subjects with an initial complementizer, as in the English sentence (95):

(94) *John ga kekkon tyokugo sinde simatta koto* wa higeki da.
subj marriage right.after died comp topic tragedy is
'*That John died right after his marriage* is a tragedy.'

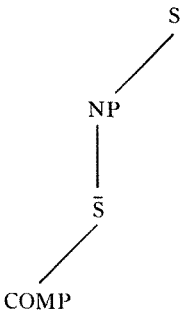
(95) *That John died right after his marriage* is a tragedy.

Processing (94) would initially involve constructing the tree in (96a); processing (95) would initially involve constructing the tree in (96b):

(96) a.



b.



In other words, knowing that an initial clause is subordinate requires the more elaborate tree in (96b), thereby suggesting that knowing that the initial clause is subordinate makes processing slightly more difficult. This suggests, however, that (97), if grammatical, would be easier to process than (95):

(97) *John died right after his marriage is a tragedy.

But if (97) were easier to process than (95), why is it that complementizers are *obligatory* in sentence-initial position in English but optional in other positions (as in *It is a tragedy John died right after his marriage*)?

Suppose English allowed complementizers to be optional in sentence-initial position; i.e. suppose sentences like (97) were grammatical. If this were the case, then sentences like (97) would be the *only* sentences in English with initial subordinate clauses unmarked for subordination. Subordinate clauses in English always bear initial markers of subordination: this is why Bever's perceptual strategy of assuming the first clause is the main clause, unless otherwise marked for subordination, works for speakers of English. But if sentences like (97) were allowed in English, they would be the only sentences for which the perceptual strategy would fail. Hence sentences like (97) would be difficult to process because they would belong to a small class of sentences for which an otherwise well-motivated perceptual strategy would fail.

In Japanese, on the other hand, other types of subordinate clauses are not marked initially as subordinate, as in (98):

(98) a. *John ga yonde ita* hon wa Shakespeare datta.
subj reading was book topic was
'The book *that John was reading* was Shakespeare.'
b. *Kodomo ga nete iru uti ni* hon o yomimasyoo.
children subj sleeping is while book obj let's.read
'*While the children are sleeping*, let's read books.'

Hence there is no motivation in Japanese for a perceptual strategy like the one proposed by Bever for English. Sentences like (94) are easy to process for speakers of Japanese, while sentences like (97), if grammatical, would provide processing difficulty for speakers of English. Thus it is possible to maintain the position that (94) is easier to process than (95), and still maintain the position that (95) is easier to process than (98) would be if it were grammatical. In other words, it is possible to maintain the position that initial complementizers on clause-initial sentential NP's in English make processing *easier*, and still maintain the position that, other things being equal, initial complementizers on clause-initial sentential NP's make processing more difficult.

While I think the above account is probably correct as an explanation for why English requires initial complementizers on clause-initial sentential NP's, I am not convinced that clause-initial sentential NP's are, other things being equal, easier to process if they do not bear initial complementizers. Let us consider the reasons for believing that they are. The argument was that they involve constructing a simpler tree: i.e. (96a) is simpler than (96b). More generally, if an initial clause is marked as subordinate, the hearer must in some way store the fact that it is subordinate. If processing difficulty is a function of the amount the hearer must store, then an initial clause should be easier to process if the hearer does not have to store the information that it is subordinate.

On the other hand, there are other assumptions that lead to precisely the opposite conclusion. Namely, a clause should be easier to process from a *semantic* point of view if the hearer knows whether or not the clause is a subordinate clause or a main clause. Why? It seems likely that sentence processing involves extensive interaction between syntax and semantics. For example, syntactic parsing decisions are probably influenced very heavily by considerations of semantic plausibility. Knowing whether a clause is a main clause or not (and hence, in general, whether it involves the primary assertion of the sentence or not) will increase semantic predictability and thereby help motivate decisions in the syntactic processing.

Thus it seems that intuitive considerations lead to contradictory conclusions about the value of knowing whether an initial clause is subordinate or not. Resolution of these issues must await a better understanding of the nature of sentence processing.

3.1.4 Grosu and Thompson's Proposals. In Section 2.2.2, I discussed Grosu and Thompson's principle, given in (58) above. Their principle states that a clause containing a sentential NP bearing an initial subordinator is marked if the sentential NP is clause-initial and even more marked if it is clause internal. I have argued already that the chief inadequacy in Grosu and Thompson's principle lies in its restriction to sentential NP's with initial subordinators (or complementizers). The positional tendencies apply more strongly to sentential NP's with initial complementizers, but do apply as well to sentential NP's without initial complementizers.

I will restrict my attention here to three parts of Grosu and Thompson's proposal for which they offer explanations:

1. The fact that clause-internal position is avoided.
2. The fact that clause-final position is preferred over clause-initial position.
3. The fact that the constraint in question applies only (supposedly) to sentential NP's bearing initial subordinators.

3.1.4.1 Clause-Internal Sentential NP's. The explanation offered by Grosu and Thompson for the almost universal unacceptability of sentences containing clause-internal sentential NP's bearing initial complementizers is rather similar to the explanation of Fodor, Bever, and Garrett (1974) for the unacceptability in English of multiple centre-embedded relative clauses discussed in section 3.1.2.2. Namely, if we assume that clauses are the fundamental units of sentence processing, and that material is emptied from short term memory at clause boundaries, clause-internal sentential NP's will interrupt the processing of the main clause. The difficulties involved in processing sentences containing clause-internal sentential NP's can be seen from consideration of some example sentences from English. (Note that nothing in this explanation depends on either the SVO word order in English or the clause-initial position of complementizers.) Suppose the sentential NP is in clause-final position, as in (99):

(99) Mike knows *that Bill likes artichokes.*

If we assume that it is possible to clear a clause from short term memory when its last constituent is entered, then it will be possible to clear *Mike knows* from short term memory when the

sentential NP is encountered. Similarly, if the sentential NP is clause-initial, as in (100), it will be possible to process the initial *that*-clause and clear it from short term memory when it is completed:

(100) *That Bill likes artichokes* is obvious.

On the other hand, if the sentential NP is clause-internal, as in (101), processing the sentential NP would interrupt the processing of the main clause:

(101) *Is *that Bill likes artichokes* obvious?

This seems an adequate explanation for the fact that both clause-initial position and clause-final position are preferred over clause-internal position as positions for sentential NP's.

3.1.4.2 Clause-Initial Sentential NP's. It is difficult to extract from Grosu and Thompson's paper their explanation for the Final-Over-Initial-Position Hypothesis. The explanation they offer is expressed in terms of the more general tendency for "heavy" constituents to be more acceptable in clause-final position than in clause-initial position. They illustrate this tendency with the examples in (102), where the '(?)' on (102a) is theirs:

(102) a. (?) *The book which you found on your table yesterday* is blue.
b. I like *the book which you found on your table yesterday.*

It should first be pointed out that it is not obvious that the slight unacceptability of (102a) is due to its having a heavy NP in clause-initial position rather than its having a relative clause in clause-internal position. If the latter explanation is correct, the slight unacceptability of sentences like (102a) is not the same phenomenon as the unnaturalness of sentence-initial *that*-clauses. In fact, I argue below that the slight unacceptability of sentences like (102a) *is* due to their having a relative clause in clause-internal position.

In offering an explanation for the putative preference for "heavy" NP's to occur in clause-final rather than clause-initial position, Grosu and Thompson first cite psycholinguistic evidence that a basic task in processing a clause is that of identifying the verb and its obligatory arguments. They make the very interesting observation that this process should be easier when the arguments are endocentric (i.e. possessing a nucleus which has the same privileges of occurrence as the entire construction) than when the arguments are exocentric (i.e. lacking such nuclei): namely, "in order to determine the main sentoid relations, it is sufficient to determine them with respect to predicates and THE HEADS of ENDOCENTRIC arguments [Grosu and Thompson's capitalization]" (1977:144); such is less possible with exocentric constructions. They use this hypothesis to explain the fact that constraints on internal and initial sentential NP's are much stricter than constraints on other internal and initial heavy NP's: namely, heavy NP's like *the book which you found on your table yesterday* are endocentric while sentential NP's like *that you found the book on your table yesterday* are not.

The hypothesis that identification of main sentoid relations is crucial to sentence processing underlies Grosu and Thompson's explanation for their claim that heavy NP's are more acceptable in clause-final position than in clause-initial position. Their hypothesis is that initial heavy NP's are less acceptable because they delay identification of main sentoid relations, while final heavy NP's are more acceptable because they "occur at a point where the main sentoid relations have already been established" (p. 145). In other words, internal heavy NP's are worst because they interrupt processing of the main clause. Initial heavy NP's do not interrupt processing of the main clause, but they *delay* it. Final heavy NP's neither interrupt nor delay processing of the main clause.

This explanation, like a number of those discussed already, is difficult to reconcile with the nature of left-branching structures in Japanese, as in (103):

(103) a. [[[John ga katte-iru] neko ga korosita] nezumi ga tabeta] tiizu
subj keeps cat subj killed rat subj ate cheeze
wa kusatte ita.
topic rotten was
'The cheese that the rat that the cat that John keeps killed ate was rotten.'
b. [[John ga hon o yonda to] Bill ga itta koto] o Mary wa
subj book obj read comp subj said comp obj topic
sitte-imasu.
knows
'Mary knows that Bill said that John read the book.'

If we assume that the need to identify the main sentoid relations in the main clause begins at the beginning of (103a) and (103b), then the heavy initial NP delays it, just as in English. Grosu and Thompson anticipate this objection in a footnote, however (1977:145):

It is interesting to compare Japanese and English in this respect; Kuno (1972) points out that sentences with MEDIAL long clause-modified nouns have low acceptability, but sentences with INITIAL long clause-modified nouns are fully acceptable, just like English sentences with long FINAL clause-modified nouns. This difference between the two languages can be understood in terms of the different positions of noun-modifying clauses (postnominal in English

and prenominal in Japanese): since the modifying clause is initial in Japanese, it can be processed and recoded BEFORE the element crucially needed for the processing of the matrix (i.e. its head noun) is encountered, so that the processing of the subordinate clause and that of the matrix in no way 'interfere' with each other. In English, on the other hand, the modifying clause occurs AFTER the processing of the matrix (which starts with the head noun of that clause) has begun.

This provides a plausible explanation for the difference between Japanese sentences with initial heavy NP's like (103a) and English sentences with initial heavy NP's like (102a), repeated here:

(102a) The book which you found on your table yesterday is blue.

However, what this explanation says in effect is that the relative clause in English sentence (102a) (but not in the Japanese sentence (103a)) *interrupts* processing of the main clause. This is equivalent to saying that the English sentence (102a) is more difficult to process than the Japanese sentence in (103a) because the relative clause in (102a) is clause-internal while the relative clause in (103a) is clause-initial. Hence, Grosu and Thompson in effect explain the "low acceptability" of sentences like (102a) in terms of the clause-internal position of the relative clause, not in terms of the clause-initial position of the heavy NP.

So far, Grosu and Thompson's explanation seems quite plausible. It goes astray, however, in their implicitly extending it to explain the "low acceptability" of clause-initial *sentential NP's*. For although sentences with initial heavy NP's like (102a) contain a clause-internal subordinate clause, sentences with initial sentential NP's like (104), do *not* contain any clause-internal subordinate clause, unless one claims that *Fred loves Mary* is a clause-internal subordinate clause:

(104) That Fred loves Mary is obvious.

I argued in 3.1.3 that the marked status of sentences like (104) is not due to their containing a clause-internal subordinate clause. Furthermore, it is clear from their paper that Grosu and Thompson would not want to make such a claim, for such a claim would be tantamount to claiming that the complementizer is the head of the sentential NP; but the headless exocentric character of sentential NP's is crucial to their arguments. Thus I conclude that they have not succeeded in explaining the fact that sentential NP's (with initial complementizers) occur more naturally in clause-final position than in clause-initial position.

In summary, Grosu and Thompson attempt to explain the fact that sentential NP's (with initial complementizers) occur more naturally in clause-final position than in clause-initial position by offering a plausible explanation for why heavy NP's consisting of a head NP followed by a relative clause occur more naturally in clause-final position than in clause-initial position, and then implicitly extending this explanation to the position of sentential NP's. However, their explanation for the position of heavy NP's depends crucially on characteristics of endocentric heavy NP's not shared by sentential NP's. Thus their explanation fails to account for the positional tendencies of sentential NP's.

3.1.4.3 The Role of Initial Complementizers. Grosu and Thompson offer an explanation for the fact that the positional tendencies supposedly apply only to sentential NP's with initial complementizers. Their explanation is embedded in a complicated explanation of certain differences between sentential NP's and other heavy NP's. Sentences in English with clause-internal heavy NP's (other than sentential NP's) that are unacceptable when the heavy NP is followed by a *short* constituent are acceptable when the heavy NP is followed by a second heavy constituent, as in (105):

(105) a. ?*I gave the book which you put on my table yesterday to her.
b. I gave the book which you put on my table to the girl who had been asking for it for a week.

In contrast, sentences with clause-internal sentential NP's are unacceptable regardless of whether the sentential NP is followed by a heavy constituent, as in (106):

(106) a. *I regard that you are in love with Mary as strange.
b. *I regard that you are in love with Mary as too scandalous to even be discussed in public.

In other words, the constraint against clause-internal sentential NP's is a categorical constraint, whereas that against other heavy NP's is noncategorical.

Grosu and Thompson observe (1977:147) that it is natural to assume that

the hearer's decision to accept or reject a sentence is made (i) for sentences with long constituents of any type, AFTER THE ENTIRE SENTENCE HAS BEEN RECEIVED, and (ii) for sentences with NP-clausal arguments, AT THE POINT AT WHICH THE NOUN CLAUSE IN QUESTION BEGINS TO BE RECEIVED.

Their claim that the constraint on internal and initial clauses is restricted to sentential NP's exhibiting initial markers of subordination follows from this assumption. They argue for this in the following way:

The exocentricity (and therefore the potentially disruptive load) of [a sentential NP] can be known at its very beginning only if it is initiated by some essentially unambiguous marker of exocentricity, such as a subordination morpheme signalling the beginning of a headless clause.

In other words, sentences with clause-internal sentential NP's with initial subordinators are difficult to process because the subordinator signals that the sentence is difficult to process. Only when there is an initial subordinator will hearers know that the sentence is difficult to process before it is too late to make the decision to reject the sentence, since (by assumption) decisions whether to accept or reject sentences containing sentential NP's must be made at the point at which the sentential NP begins to be received.

There are many problems with this explanation. First, even if it explained the unacceptability of clause-*internal* sentential NP's with initial subordinators, it is not clear how it might explain the "low acceptability" of clause-*initial* sentential NP's with initial subordinators. We would somehow have to construct an explanation in terms of decisions by a hearer as to whether a sentence is of low acceptability or not.

Second, their explanation is based entirely on the (assumed) nature of decisions as to whether to accept or reject sentences, a task which is different from the task of processing sentences in actual language use. For their explanation to have any force, it would be necessary to translate it into an explanation based on processing in actual language use. However, it is not clear how that could be done. In processing sentences in actual language use, hearers do not make decisions to accept or reject incoming sentences. Rather, they presumably assume that the incoming sentence is acceptable. If the incoming sentence is unacceptable, they will assume either that they have misheard the sentence or that the speaker made a performance error. If they have reason to believe that the speaker uttered an unacceptable sentence, they will not reject the sentence; rather they will attempt to reconstruct what the speaker intended to say. In this way they will attempt to assign meaning to the sentence. Even if they are unsuccessful in assigning a meaning to the sentence, they will not likely give up their attempt until after the sentence has been completed. Thus it is unlikely that hearers in actual language use will reject sentences with clause-internal sentential NP's at the point at which the sentential NP begins to be received. It is only plausible that hearers might do such when their primary task is to decide whether to accept or reject sentences. For this reason, it seems unlikely that Grosu and Thompson's explanation could be translated into an explanation based on processing in actual language use.

A final problem with Grosu and Thompson's explanation is that it implies that sentences with clause-internal sentential NP's with initial complementizers are more difficult to process because the presence of the complementizer warns the hearer that the sentence is difficult to process, and that the sentence would be easier to process if there were no initial complementizer. Surely, however, the clause-internal sentential NP will provide, if anything, less processing difficulty if there is a signal to the hearer to prepare for it. A sign on a road that says "slippery when wet" will not make the road any more dangerous to drive on; it will more likely make the road less dangerous to drive on because drivers will drive more carefully. As with Kuno's proposals, Grosu and Thompson's proposed explanation implies that complementizers are a source of processing difficulty. It seems more likely that they are a source of processing ease in signalling structure.

For these reasons, I conclude that Grosu and Thompson have failed to explain the fact that the tendencies expressed in the Sentential NP Position Hierarchy are stronger with sentential NP's bearing initial complementizers.

3.1.5 Klaiman's Proposals. In 2.2.3, I discussed the proposal of Klaiman (1976) that sentential NP's will tend to conform to the principle in (107):

(107) Complementizers will tend to occur between the sentential NP and the main clause.

She proposes a functional explanation for (107): complementizers serve as "buffers" between the main clause and the subordinate clause. In effect, complementizers signal clause boundaries and thereby help sentence processing. This proposal is highly plausible in light of the psycholinguistic evidence of the importance of clause boundaries in processing sentences. One merit of Klaiman's proposal, in contrast to those of Kuno (1974) and Grosu and Thompson (1977), is that it implies that complementizers are a source of processing ease rather than a source of processing difficulty. The difference between her proposal and that of Grosu and Thompson's can be seen by considering the examples in (108):

(108) a. That Fred loves Mary is obvious.
b. It is obvious that Fred loves Mary.

Grosu and Thompson's proposed explanation for the fact that (108b) is more natural than (108a) maintains that the complementizer *that* is a potential source of processing difficulty in both (108a) and (108b), but a greater source of processing difficulty in (108a) because the *that*-clause in (108a) is not in clause-final position. Klaiman's proposed explanation maintains that complementizers help sentence processing in signalling clause boundaries; the *that* in (108b) serves this function, but the *that* in (108a) does not, at least in any helpful way, since it occurs at a sentence boundary. The internal clause boundary in (108a), between *Mary* and *is*, is not marked, while the internal clause boundary in (108b) is marked, by the complementizer *that*. For these reasons, (108b) is easier to process than (108a).

3.1.6 Summary. In this section, I summarize the extent to which other people have succeeded in providing explanations for the following facts:

(109) FINAL-OVER-INTERNAL-POSITION HYPOTHESIS

(110) INITIAL-OVER-INTERNAL-POSITION HYPOTHESIS

(111) FINAL-OVER-INITIAL-POSITION HYPOTHESIS

(112) The tendency in (109) is stronger for sentential NP's with initial complementizers.

(113) The tendency in (111) is stronger for sentential NP's with initial complementizers.

The tendencies in (109) and (110) seem the easiest to explain, and I accept the explanation offered by Grosu and Thompson discussed in 3.1.4.1., namely, that these tendencies are due to the processing difficulty presented by centre-embedded sentential NP's: such sentential NP's interrupt processing of the main clause.

I have discussed a number of possible explanations for (111). The proposals of Kuno, Grosu and Thompson, and Klaiman apply only to sentential NP's bearing initial complementizers, however, and thus are at best possible explanations for (113). A number of proposals of Yngve, Kimball, and Bever et al. suggest possible explanations for (111), but these proposals are difficult to evaluate because they are based entirely or largely on English, either on syntactic facts about English, or on results of experiments using speakers of English. This English bias is a problem in two ways. First, many of the proposals are inconsistent with the nature of left-branching structures in languages such as Japanese; they imply that such structures should be sufficiently difficult to process that they would not be acceptable in any

language. Second, the proposals fail to distinguish processing difficulties in the innate sense from processing difficulties in the acquired sense; thus, although some of the proposals may accurately reflect parsing strategies used by speakers of English, they cannot be used to explain facts of universal grammar. The tendency in (111) is thus unexplained.

I have argued that the explanation offered by Grosu and Thompson for (112) and (113) and the explanation offered by Kuno for (113) are unsuccessful. Klaiman provides the basis for a plausible explanation for (113), namely that it reflects a tendency for complementizers to occur at clause boundaries internal to the sentence and hence at positions where material can be released from short term memory. This explanation can be extended to (112).

3.2 Further Explanations for the Final-Over-Initial-Position Hypothesis. The only tendency for which we have no explanation is (111), the Final-Over-Initial-Position Hypothesis. In this section, I explore some possible explanations for it: in section 3.2.1, I pursue the possibility of a universal Main Clause Strategy; in section 3.2.2, I present an explanation in terms of analogy.

3.2.1 Some Speculative Remarks About a Universal Main Clause Strategy. Any explanation for the Final-Over-Initial-Position Hypothesis must be consistent with the nature of left-branching structures in languages like Japanese. In other words, it must explain why sentential NP's prefer clause-final position over clause-initial position without implying that every language will try to avoid having sentential NP's in clause-initial position. The tendency to prefer clause-final position over clause-initial position is a *weak* one, and any explanation must not imply that it is stronger than it is. Some of the proposals (e.g. those of Yngve) are inadequate simply because they imply that the tendency should be stronger than it apparently is. It is possible, however, that there is some universal perceptual strategy, something like the Main Clause Strategy, to assume that the first clause in a sentence is a main clause. Any proposal along these lines would have to be consistent with the nature of left-branching structures in Japanese. It is possible that the majority of sentences in Japanese (in actual language use) do begin with a main clause. I have no evidence that this is so, but if it is, then speakers of Japanese will likely process each incoming sentence under the assumption that the first clause is more likely to be a main clause. If so, then the Main Clause Strategy would be a natural but very weak perceptual strategy for speakers of Japanese.

Even if the Main Clause Strategy cannot be used at all by speakers of some languages, it is still possible that the strategy is universal in the sense that there might be a universal "force" on languages to conform to the strategy in that languages might be more likely to change in a way that would allow them to adopt the strategy. Languages which cannot incorporate the strategy may be slightly more difficult to process than languages which can, and experimental evidence might show that, although Japanese freely allows left-branching structures, speakers of the language have greater difficulty processing such structures than speakers of English have processing right-branching structures. At the present time, we simply do not have any evidence that these are more than possibilities.

3.2.2 An Explanation in Terms of Analogy. There is another positional tendency of sentential NP's which I gave not yet mentioned, but which might provide a partial explanation for the Final-Over-Initial-Position Hypothesis. Namely, in every language for which I have the relevant data, with the exception of Mandarin, sentential subjects exhibit a tendency to occur on the same side of the verb that sentential objects occur on.[16] In rigidly verb-final languages like Japanese, both sentential subjects and sentential objects precede the verb. Other verb-final languages, like Persian, "leak", permitting certain constituents to follow the verb. Typically, sentential NP's (and other heavy NP's) are the constituents that most easily follow the verb. But in all such languages in my data, sentential subjects exhibit the same tendency as sentential objects to follow the verb. For obvious reasons, both sentential subjects and sentential objects in verb-initial languages tend to follow the verb.

SVO languages present the most interesting cases, since the normal position for subjects is on the opposite side of the verb from objects. However, in every SVO language in my data, except for Mandarin, sentential subjects exhibit a tendency to follow the verb, i.e. to occur on the same side of the verb that sentential objects occur on.[17] If we could explain this tendency, we would have a partial explanation for the Final-Over-Initial-Position Hypothesis.[18] I argue below that the postverbal position of sentential subjects in SVO languages might be explained in terms of analogy with the position of sentential objects.

My claim that every SVO language in my data (except Mandarin) exhibits a tendency for sentential subjects to follow the verb is misleading in that all but two of the SVO languages in my data employ initial complementizers. Hence Klaiman's principle (see 2.2.3, 3.1.5) accounts for the facts in all but two of the SVO languages, namely Mandarin and Tuscarora. But Mandarin does not exhibit the tendency under discussion; so my explanation accounts for only one SVO case that Klaiman's principle does not account for, namely Tuscarora. My explanation also accounts for the facts in at least two verb-initial languages: Ojibwa and Blackfoot. Although verb-initial, both languages employ SVO as a very common alternate word order. In both languages sentential subjects obligatorily follow the verb and do not bear initial complementizers. Thus both languages are languages without initial complementizers that support the Final-Over-Initial-Position Hypothesis; the position of sentential subjects in these languages is accounted for by my explanation, but not by Klaiman's. Nevertheless, both of these languages are Algonkian, so my explanation would account for facts in only two language families. Without more data on VO languages without initial complementizers, it is difficult to evaluate my proposed explanation.

A final problem with my explanation is that it does not explain instances of the preference of sentential NP's for clause-final position over clause-initial position in SOV languages: since both subjects and objects precede the verb in unmarked word order, why should sentential NP's show a tendency to follow the verb? Klaiman's principle accounts for this tendency as exhibited by sentential NP's *with* initial complementizers in SOV languages, but neither explanation accounts for the same tendency as exhibited by sentential NP's *without* initial complementizers in SOV languages. Languages of this sort include Hopi, Lakota, Latin, Mojave, Wichita, and Yaqui.

A tempting line of explanation is the following. We explain the use of SVO rather than SOV order when the object is sentential in terms of the tendency for sentential objects to avoid clause-internal position; we then explain VS rather than SV order when the subject is sentential in terms of a tendency for sentential subjects to occur in the same position as sentential objects. The flaw in this account is that it does not explain why these languages avoid SOV order with a clause-internal sentential object by putting the object in clause-final position rather than by putting it in clause-initial position. Putting it in clause-initial position would avoid a clause-internal sentential object, and it would also leave sentential subjects and sentential objects on the same side of the verb. Yet this strategy is employed in the relatively few SOV languages which are rigidly verb-final, like

Japanese and Hare. SOV languages tend to solve the problem of clause-internal sentential NP's by putting them in clause-final position if at all possible; they are put in clause-initial position only if putting them in clause-final position would violate the rigid verb-final word order. It is *this* fact which my explanation does not account for.

Note that the problem of explaining the Final-Over-Initial-Position Hypothesis thus comes down to explaining why an SOV language is more likely to employ SVO order than OSV order in clauses containing a sentential object. One explanation might be that SVO is a far more natural word order then OSV. However, although OSV is very rare as a basic word order, it is quite common as an alternate word order, both in SOV and in SVO languages. OSV order is often used when the object is old information. If we could show that sentential objects are less likely to be old information (and more likely to be new information), then we could explain why SVO is more natural than OSV when the object is sentential. Although I believe that it is true that sentential objects tend to be new information, showing that such is true is beyond the scope of this paper.

The discussion above assumes that I can provide some explanation for the tendency for sentential subjects to occur on the same side of the verb that sentential objects occur on. In the remainder of this section, I will make some speculative suggestions along these lines.

Let us first look at English. Sentence-initial sentential NP's in English represent one of the few left-branching constructions in the language, and virtually the only case in which left branches involve elaborate subtrees.[19] English is otherwise largely right-branching, notably in the normal position of sentential objects and relative clauses. Adverbial clauses are the only subordinate clauses that occur freely in sentence-initial position. The examples in (114) illustrate various kinds of subordinate clauses in English in different positions:

(114) a. It is obvious *that Fred loves Mary.*
b. *That Fred loves Mary* is obvious.
c. Everyone knows *that Fred loves Mary.*
d. *That Fred loves Mary* everyone knows.
e. The book *which John gave to Sally* was interesting.
f. Here is the book *which John gave to Sally.*
g. John left the party *because he was bored.*
h. *After John left the party*, everyone had a lot of fun.

The only examples in (114) in which a subordinate clause occurs at the beginning of the sentence are (114b) with a sentential subject, (114d) with a sentential object, and (114h) with an adverbial clause. However, adverbial clauses are sufficiently different from sentential NP's and relative clauses that I need not consider them. Adverbial clauses, like adverbs in general, have considerable freedom of position, a fact which is related to their loose syntactic connection to the main clause. Sentential subjects and objects are more closely bound to the clausal 'core': they are obligatory constituents and they bear a grammatical relation to the main verb, in contrast to the purely semantic relation borne by adverbial clauses. Relative clauses embedded in subject or object NP's are also part of the clausal core: they bear a grammatical relation to the head noun, and are contained in NP's that bear a grammatical relation to the main verb. For these reasons, adverbial clauses do not present the same sorts of potential processing difficulties as sentential NP's or relative clauses. One basis for believing this can be seen by contrasting (114b), with an initial sentential subject, with (114h), with an initial adverbial clause. The sentential subject in (114b) is part of the main clause in a way that the adverbial clause in (114h) is not: the part of the sentence in (114b) following the sentential subject, namely *is obvious*, is not a complete clause; the part of the sentence in (114h) following the adverbial clause, namely *everyone had a lot of fun*, *is* a complete clause. For this reason, I will restrict the discussion to sentential NP's and relative clauses.

Given that sentential objects and relative clauses are normally right-branching in English, putting sentential subjects in clause-final position makes the language more consistently right branching. We might speculate that languages are easier to process if they are consistently right-branching or consistently left-branching. However, there are many languages with mixed right-branching and left-branching, e.g. German, Mandarin, and Marathi. A more plausible explanation is that languages are more difficult to process if they are predominantly right-branching but allow some left-branching (or vice-versa). The right-branching motivates perceptual strategies geared to right-branching, perhaps something like the Main Clause Strategy, in which initial clauses are assumed to be main clauses. The infrequent left-branching would then 'upset' the perceptual strategy.

Sentential subjects are probably far less common than either sentential objects or relative clauses. Thus, a language in which sentential objects and relative clauses are right-branching but

sentential subjects left-branching would present perceptual problems of the sort just outlined. Placing sentential subjects in the position in which sentential objects occur (as in English) solves this problem.

This explanation makes an interesting prediction: it predicts that a language in which relative clauses are left-branching but sentential objects right-branching is more likely to tolerate left-branching sentential subjects than one in which both relative clauses and sentential objects are right-branching. Crucially, the one language in my data in which sentential subjects are left-branching, but sentential objects right-branching, namely Mandarin, has left-branching relative clauses, as in (115). (115a) illustrates the left-branching nature of relative clauses, (115b) the left-branching nature of sentential subjects, and (115c) the right-branching nature of sentential objects:

(115) a. *nǐ péngyou gěi wǒ de* hwàr.
you friend give me mod painting
'the painting *that your friend gave me*'
b. *Tā shēng bìng* shì dàshì.
he fall sick be big.matter
'*That he fell sick* is a big matter.'
c. Wǒ zhīdào *tā xǐhuan nǐ*.
I know he like you
'I know *that he likes you*.'

This provides additional plausibility to my explanation for the Final-Over-Initial-Position Hypothesis.

The basic thrust of my explanation is that sentential subjects tend to occur in clause-final position by analogy to the position of sentential objects. Sentential subjects are like simple subjects in their *external* syntactic properties, that is, in their grammatical relation to the verb of the clause in which they are embedded. They are like sentential objects, however, in their *internal* syntactic properties, that is, their clausal construction. An underlying assumption of syntax is that constituents tend to share the positional properties of constituents to which they are syntactically similar. My explanation is just a special instance of this principle.

4. Further possibilities

The possible explanations for the Sentential NP Position Hierarchy discussed in the previous section are all in terms of syntactic processing. Two alternative approaches which one might take are explanations in terms of discourse factors (such as the distribution of old and new information), or explanations in terms of the nature of grammars (the approach taken in conventional transformational theory). I devote the remainder of this paper to brief discussion of these possibilities.

In the last section, I suggested that the tendency for sentential objects to occur in clause-final position in some verb-final languages might be due to a tendency for them to involve new information. This suggestion was offered in an attempt to account for the positional tendencies in a number of languages which no other proposal accounts for, including my explanation in terms of analogy. In fact, one might offer a general explanation along these lines for the tendency for sentential NP's to occur in clause-final position: if there is a universal tendency for new information to occur in clause-final position, and if sentential NP's tend to be new information, then one would expect that sentential NP's would tend to occur in clause-final position. Although this is a potentially fruitful line of explanation, there are certain considerations that cast some doubt on it.

Neither of the premises of the explanation are demonstrably true. Although the premise that sentential NP's tend to be new information has intuitive plausibility, it is not a premise that can be established until discourse theory provides a definition of new information based on objective criteria rather than subjective and impressionistic intuitions. In fact, impressionistic intuitions can cast doubt on the premise that sentential subjects in particular tend to be new information. It is too easy to imagine English sentences with extraposed sentential subjects which are most likely to be old information in the most natural contexts, as in (116):

(116) a. It is true that he was once a follower of the Communist Party.
b. It is impossible that Tim would claim that water causes cancer.
c. It's odd that Margaret didn't leave a message.

Impressionistically, the most likely contexts for the sentences in (116) are ones in which the content of the complement clause was discussed in the previous discourse. Yet each of these sentences seem more natural than their nonextraposed versions, given in (117):

(117) a. That he was once a follower of the Communist Party is true.
b. That Tom would claim that water causes cancer is impossible.
c. That Margaret didn't leave a message is odd.

Furthermore, Creider (1975) and Tomlin and Rhodes (1979) present evidence that the tendency for new information to occur late in sentences may not be universal. Tomlin and Rhodes argue that the opposite tendency exists in Ojibwa. This is sig-

nificant in view of the fact that Ojibwa provides evidence *for* the Final-Over-Initial-Position Hypothesis. The hypothesis that the Final-Over-Initial-Position Hypothesis is due to the distribution of old and new information would predict that Ojibwa should provide, if anything, evidence *against* the Final-Over-Initial-Position Hypothesis.

A final line of explanation I have not explored is one that would account for the facts in terms of the nature of grammars. Some of the facts might be accounted for by postulating an innate rule of extraposition, for example. There are a number of reasons why I have not taken this approach. As discussed in section 1, the tendencies are generalizations about languages, rather than generalizations about grammars. Some of the evidence is based on text counts, and thus reflects facts about linguistic performance that are independent of grammars. In other words, the Sentential NP Position Hierarchy expresses a generalization that is reflected both in performance and in competence.

Furthermore, any explanation in terms of the nature of grammars is at best a shallow explanation. For any such explanation, one can ask further why it is that languages conform to the generalization. For example, suppose one proposed a universal surface filter that marked as unacceptable clause-internal sentential NP's bearing initial complementizers. Such a filter would account for many cases of the Final-Over-Internal-Position Hypothesis. The explanations discussed in section 3, however, would provide a deeper explanation for the existence of such a filter. The facts discussed in this paper are precisely the sort of facts which call for a deeper explanation, in terms of general cognitive principles or the function of language. Admittedly, the price to be paid for seeking such explanations is that one enters a more speculative realm. It is much easier to propose deeper explanations than it is to prove or disprove them. It is for this reason that the bulk of my discussion of possible explanations for the Sentential NP Position Hierarchy is devoted to the shortcomings of previous explanations. Although what I have offered in their place remains quite speculative, I hope to have contributed to our understanding of how general cognitive capacities are reflected in language.

Appendix #1 A possible counterexample from English to the final-over-initial-position hypothesis

IN THIS APPENDIX, I discuss an apparent counterexample to the Final-Over-Initial-Position Hypothesis from English and argue that it provides at most a weak counterexample.[20] The apparent counterexample arises due to the construction illustrated in (118):

(118) a. It's going to rain, I think.
b. Adults should not drink a lot of milk, they claim.
c. We shouldn't go swimming here, John says.
d. Bill is totally incompetent, I realize, but he's the only person available.
e. I was too tired to walk any further, I announced.
f. Max had forgotten the party, Sheila conjectured.
g. He had had a flat tire, John explained to the police.

Such sentences have been discussed in the literature as being derived by a rule called *slifting* by Ross (1973a) and *complement preposing* by Hooper and Thompson (1973). This rule would derive the sentences in (118) from those in (119):

(119) a. I think it's going to rain.
b. They claim that adults should not drink a lot of milk.
c. John says we shouldn't go swimming here.
d. I realize that Bill is totally incompetent, but he's the only person available.
e. I announced that I was too tired to walk any further.
f. Sheila conjectured that Max had forgotten the party.
g. John explained to the police that he had had a flat tire.

For expository purposes, I will follow Ross in assuming that the sentences in (118) are derived from those in (119) by the rule of slifting.[21] Such an analysis captures the fact that the slifted clause in the sentences in (118) bears the same semantic relationship to the verb in the second clause that the sentential object bears to the main verb in the sentences in (119). For this reason, the slifted clauses in (118) would appear to be sentential objects. Crucially, however, there is no comparable construction in English in which simple objects occur as naturally in clause-initial position. Sentences like those in (120) are, intuitively, more highly marked than those in (118):

(120) a. Beans I like.
b. John she knows.
c. Your answer we believe.

The assumption that the slifted clauses in (118) are sentential objects, plus the assumption that the sentences in (120) are more marked than those in (118), leads to the conclusion that sentential objects will exhibit a greater tendency than simple objects to occur in clause-initial position rather than clause-final position.[22] Thus, English would appear to provide a counterexample to the Final-Over-Initial-Position Hypothesis. In what follows, I argue that slifted clauses possess a number of special characteristics that justify my describing English as a weak counterexample.

As noted by Hooper and Thompson (1973), many slifted clauses are asserted. Thus, (118a) to (118d) are quite close in meaning to (121a) to (121d):

(121) a. It's going to rain.
b. Adults should not drink a lot of milk.
c. We shouldn't go swimming here.
d. Bill is totally incompetent, but he's the only person available.

In each case, the difference in meaning between the sentences in (121) and the corresponding sentences in (118) can be viewed as follows. All of these sentences assert the proposition in question; however, the sentences (118a) to (118c) weaken, or qualify, the assertion by "adding" the parenthetical *I think*, *they say*, or *John says*. *I think* weakens the assertion by emphasizing that the

speaker is not positive about the truth of the proposition being asserted. *They claim* and *John says* weaken the assertion by partly shifting responsibility for the claim to other people. These parentheticals are similar to sentence adverbs like *perhaps*, *probably*, *of course*, *frankly* and *undoubtedly*, as in (122):

(122) a. It's going to rain, probably.
b. Adults should not drink a lot of milk, of course.
c. We shouldn't go swimming here, perhaps.

The parenthetical *I realize* in (118d) does not weaken the assertion; however, its effect is similar to that of the adverb *admittedly* in (123):

(123) Bill is totally incompetent, admittedly, but he's the only person available.

Thus, although there is a sense in which such slifted clauses behave like subordinate clauses (namely in bearing an object relation to an underlying matrix verb), in other ways, they behave like main clauses: they constitute the main assertion of their sentences, and they can stand by themselves. It seems likely that they are processed like main clauses; since they are being asserted, there is no reason why they should not be. The parentheticals, on the other hand, despite being matrix clauses syntactically, are subordinate semantically, as the name "parenthetical" implies. In derivational terms, the rule of slifting is better treated as *lowering* the matrix verb, rather than *lifting* the complement clause. Such a view is necessary to account for sentences in which the parenthetical occurs in internal position, as in (124):

(124) a. Adults, they claim, should not drink a lot of milk.
b. We can assume, John says, that there will always be enough money to meet our needs.
c. It was John, I think, who told us not to eat the purple berries.

The positions in which parentheticals occur are in fact the same positions in which sentence adverbs occur, as in (125):

(125) a. Adults, of course, should not drink a lot of milk.
b. We can assume, perhaps, that there will always be enough money to meet our needs.
c. It was John, undoubtedly, who told us not to eat the purple berries.

In short, parentheticals behave syntactically and semantically like adverbs. In effect, slifting reverses the main/subordinate status of the two verbs.

It appears, therefore, that, at least for slifted clauses like those in (118a) to (118c), the slifted clause is the main assertion, and will be processed like a main clause. Slifted clauses like these are therefore very different from sentence-initial sentential NP's. This can be seen from the difference between (126a), with an initial slifted clause, and (126b) and (126c), which involve a passive subject and a topicalized object clause respectively:

(126) a. Jerry is sick today, I believe.
b. That Jerry is sick today is believed by everyone.
c. That Jerry is sick today, I believe.

In (126a), the proposition that Jerry is sick is asserted. In (126b) and (126c), this proposition is not asserted. In fact, according to my intuitions, (126b) and (126c) are most natural in contexts in which reference is made in the previous discourse to the question of Jerry being sick, or some similar question. For these reasons, slifting of asserted clauses presents a very weak counterexample to the Final-Over-Initial-Position Hypothesis.

Although many cases of slifted clauses are asserted, other slifted clauses are not; for example, (118e), (118f), and (118g) above all contain slifted clauses

which are not asserted, as can be seen when they are followed by a 'contradictory' sentence as in (127):

(127) a. I was too tired to walk any further, I announced. Fortunately, everyone believed my ruse.
b. Max had forgotten the party, Sheila conjectured. It turned out, however, that she was mistaken.
c. He had had a flat tire, John explained to the police. We had no difficulty, however, showing that John was lying.

The added sentence in (127) shows that the slifted clause is not asserted, since, in fact, the speaker does not believe the proposition expressed in that clause. Further examples of sentences with nonasserted slifted clauses are given in (128):

(128) a. Tadpoles turn into frogs, I explained to Jill.
b. It was too late to phone Mary, Bob realized.
c. The convict had been captured, the police reported.
d. He would return tomorrow, Bill said.

The slifted clauses in (128) resemble direct quotations in many respects. For one thing, I suspect that they are restricted, like direct quotations, to story-telling, although perhaps to a broader range of story-telling styles than direct quotations are. Asserted slifted clauses are not so restricted.

A second point of resemblance between nonasserted slifted clauses and direct quotations is the possibility of using OVS word order, as in (129) and (130):[23]

(129) a. Max had forgotten the party, conjectured Sheila.
b. He had a flat tire, explained John.
c. He had made a mistake, admitted Bill.

(130) a. "I haven't seen John anywhere," said Bill.
b. "Maybe we should go home now," suggested Alice.

Slifted clauses like those in (129) are very like direct quotations, but they are clearly not, as can be seen from the choice of pronouns and verb forms. For example, compare (129c) to (131).

(131) "I have made a mistake," admitted Bill.

It is often possible, however, to use 'direct quotation' pronouns and verb forms in slifted sentences, as in (132).

(132) a. I am really stupid, Bill thought.
b. Max has forgotten the party, Sheila conjectured.
c. I will go home tomorrow, John decided.

These cases are not direct quotations, since they may involve unverbalized thoughts, but they show the resemblance between certain slifted clauses and direct quotations. The natural conclusion is that sentence-initial direct quotations and slifted clauses are instances of the same phenomenon.

Slifted clauses that are not asserted constitute a stronger counterexample to the Final-Over-Initial-Position Hypothesis than asserted ones. For they are less like main clauses, in having less of an existence of their own, and in not being asserted. Nor are they as independent from their governing verb as direct quotations are, since they may employ the pronouns and verb forms of indirect quotations, and since they may not be of unbounded length.

Nevertheless, even nonasserted slifted clauses resemble main clauses in many ways. Most important is the fact that they do not occur with an initial subordinator. As discussed in section 3.2, sentence-initial subordinate clauses in English otherwise always occur with an initial subordinator. Slifted indirect

questions, as in (133), are particularly revealing about the main clause status of slifted clauses:

(133) a. What is Margaret eating, I wonder.
b. Did Richard lie to us all, I'd like to know.
c. Would he ever see her again, he wondered.
d. Who did you see, he asked.

The initial clauses in these sentences are like indirect questions in that they are semantically the objects of the final verbs in these sentences. However, they have the form of direct questions rather than indirect questions. The examples in (134) show the unacceptability (in standard English) of the slifted clauses in (133) in object position.[24] The examples in (135) show these examples in the normal form for indirect questions. The examples in (136) show the unacceptability of using the normal form for indirect questions if they are slifted:

(134) a. *I wonder what is Margaret eating.
b. *He wondered would he ever see her again.
c. *I'd like to know did Richard lie to us all.
d. *He asked who did you see.

(135) a. I wonder what Margaret is eating.
b. He wondered whether he would ever see her again.
c. I'd like to know whether Richard lied to us all.
d. He asked who you saw.

(136) a. *What Margaret is eating, I wonder.
b. *Whether he would ever see her again, he wondered.
c. *Whether Richard lied to us all, I'd like to know.
d. *Who you saw, he asked.

The examples in (134) to (136) reflect certain differences in standard English between direct questions and indirect questions: subject auxiliary inversion applies (in standard English) only in direct questions, and the word *whether* occurs in indirect yes-no questions, but not in direct yes-no questions.

Given these differences between direct questions and indirect questions, it is significant that the slifted clauses in (134) take the form of direct questions. In each sentence, the auxiliary precedes the subject. In (134b) and (134c), *whether* is not used. On the other hand, none of these sentences is clearly functioning as a direct question. (134a) and (134b) might be used as direct questions, but they need not be. Thus these clauses have the syntactic properties of main clauses, but the semantic properties of subordinate clauses. In so far as they are like subordinate clauses, they constitute counterexamples to the Final-Over-Initial-Position Hypothesis. However, in so far as they possess the syntactic properties of main clauses, they constitute weak counterexamples.

The fact that slifted clauses possess the syntactic properties of main clauses suggests that hearers will tend to interpret them as main clauses, especially if they employ a perceptual strategy like the Main Clause Strategy (see 3.1.3.1). But if slifted clauses are really subordinate clauses semantically, then this suggests that speakers will be led to misanalyse them as main clauses. I have argued above that such is not a problem if the slifted clause is asserted, since in such cases it is functioning like a main clause. Similarly, slifted "indirect questions" which are functionally similar to direct questions, such as those in (137), should not present a problem:

(137) a. What is Margaret eating, I wonder.
b. Did Richard lie to us all, I'd like to know.

More serious are slifted clauses that are *not* functioning as assertions or questions, like those in (138):

(138) a. Would he ever see her again, he wondered.
b. What would I like to eat, he asked.
c. Tadpoles turn into frogs, I explained to Jill
d. Max had forgotten the party, Sheila conjectured.

If my intuition is correct, however, sentences of this sort (in contrast to sentences with slifted clauses functioning as assertions or questions) are restricted, like direct quotations, to story-telling. Such a restriction makes the construction a particularly weak counterexample, since only one style of the language would provide the counterexample. Furthermore, there are probably special circumstances surrounding story-telling which alter the nature of sentence processing.

It should be noted that sentence-initial direct quotations have the potential of providing the same sort of processing problem provided by slifted clauses. Namely, they might be misanalysed as main clauses. Consider the example in (139):

(139) "The wolf is dead," said the rabbit.

A person hearing (139) might initially misanalyse the direct quotation as a statement by the narrator. However, in most such cases, little misunderstanding would result, since statements by characters will normally be true. Furthermore, as suggested above, the hearer may employ different perceptual strategies when listening to stories. Finally, there may be a tendency to avoid placing direct quotations in sentence-initial position in cases in which misunderstanding might result. It is plausible that these remarks are equally applicable to slifted clauses. All of these considerations support my claim that slifting sentences provide only a weak counterexample to the Final-Over-Initial-Position Hypothesis.

Appendix #2 A possible counterexample from Jacaltec to the final-over-initial-position and final-over-internal-position hypotheses

PHENOMENA LIKE SLIFTING in English are probably universal, or nearly so. Nevertheless, there is relatively little discussion in the literature of such phenomena in other languages. In this appendix, I discuss a construction in Jacaltec (a Mayan language) described by Craig (1977) that presents an apparent counterexample to the Final-Over-Initial-Position and Final-Over-Internal-Position Hypotheses. I argue that the construction is similar to slifting in English and therefore that the arguments that slifting sentences in English present only a weak counterexample to the Final-Over-Initial-Position-Hypothesis apply as well to the construction in Jacaltec. On the other hand, there are differences between the construction in Jacaltec and slifting in English that suggest that Jacaltec may provide a stronger counterexample than English.

The basic word order in Jacaltec is VSO, as in (140):

(140) slok naj pel no' cheh c'ej'iñ.
bought the Peter the horse black
'Peter bought the black horse.'

The normal position for sentential objects is clause-final as in (141):

(141) x-ø-(y)-al naj *chubil xc-ach y-il naj.*
compl-abs,3-erg,3-say he comp compl-abs,2 erg,3-see he
'He said *that he saw you.*'

Craig describes a rule she calls "inversion" which moves sentential objects to clause-initial position. This rule applies to (142), yielding (143).[25]

(142) x-al naj j-et an *tato x-'apni ya' cumi'*.
compl-say he lpl-to l comp compl-arrive the lady
'He told us *that the lady had arrived.*'

(143) *x-'apni ya' cumi'* y-alni naj j-et an.
compl-arrive the lady erg,3-say he lpl-to l
'*The lady arrived*, he told us.'

Since the rule apparently applies only to sentential objects as opposed to simple objects, its effect would appear to be that sentential objects will exhibit a greater tendency than simple objects to occur in clause-initial position rather than clause-final position, thereby providing an apparent counter-example to the Final-Over-Initial-Position Hypothesis.

Although Craig has little to say about the functional effect of the rule of inversion in Jacaltec, she notes that it shares a number of formal properties with slifting in English. If the formal properties of slifting in English are due to the function of the rule, then it seems reasonable to expect that the formal similarity between the two rules reflects a functional similarity. I have argued in Appendix 1 that the functional nature of slifted clauses in English is such that they present at most a weak counterexample to the Final-Over-Initial-Position Hypothesis. If the functional nature of inversion in Jacaltec is similar, then the same argument applies to Jacaltec. Thus my argument here is that there are such striking formal similarities that there must also be functional similarity.

The first relevant formal property of inversion in Jacaltec is that it is governed by only three verbs: *hala* 'say, tell', *ay-ala* 'desire', and *ham-alni* 'think'. The fact that inversion only occurs with these three verbs is significant, since the verbs *think* and *say* are two of the verbs that occur most naturally in slifting sentences in English, as in (144):

(144) a. It's going to rain, I think.
b. It's very beautiful in Iceland, Pete says.

Furthermore, *hala* 'say, tell' governs inversion only when its subject is third person. Slifting in English seems most natural when the matrix subject is third person, as in (144b) above.

I argue in Appendix 1 that the functional effect of slifting in English is to reverse the main/subordinate status of the two clauses. Strikingly, there is morphological evidence in Jacaltec that inversion also results in such a reversal. The form of the verb *yalni* 'say' in the inversion sentence in (143) is a form of the verb that can only be used in subordinate clauses. Thus, one effect of inversion is to convert the main verb to a subordinate verb.

There are three additional formal similarities between the two rules in the two languages. First, the clause loses its complementizer when moved to the front of the sentence. Second, neither rule applies when the matrix verb is negative, as in (145):[26]

(145) **w-et ye te' nah* mat yalnoj naj.
erg,l-to is the house not say he
**'The house is mine*, he did not say.'

And third, neither rule applies to indirect questions with the verb *tell*, as in (146):

(146) **bakin ch-ulu-j ix* y-alni naj w-et an.
when incompl-come-fut she erg,3-say he erg,l-to l
**'When she will be coming*, he told me.'
**'When will she be coming*, he told me.'

Thus the functional effect of inversion in Jacaltec appears to be similar to that of slifting in English; hence inversion in Jacaltec provides at most a weak counterexample to the Final-Over-Initial-Position Hypothesis.

Nevertheless, despite the clear similarities between the two rules, there are also some differences. For example, one of the three verbs governing inversion in Jacaltec is the verb for 'want'; however *want* does not govern slifting in English, as shown in (147):

(147) a. *I will go to the store, she wants.
b. *She will go to the store, she wants.

Contrast (147) with (148), which involves inversion.

(148) *ch-in to* w-alni.
incompl-erg,l go erg,1-want
**I will go*, I want.

Craig notes, however, that the effect of inversion with the verb for 'want' is to express a stronger desire. Thus the effect may not be unlike that of slifting in English *I will go, I hope*, which seems to express a stronger hope than *I hope I will go.*

A second and more serious difference between the two rules is that inversion is obligatory when the "main" verb is itself embedded under certain verbs. Thus (149a) is obligatorily converted to (149b):

(149) a. *x'ichic'oj heb ya' y-alni *swa'*.
started pl they 3-want 3,eat
'They began to want *to eat.*'
b. x'ichic'oj heb ya' *swa'* y-alni.
started pl they 3,eat 3-want
'They began to want *to eat.*'

In (149), *swa'* 'eat' is the underlying object of *yalni* 'want', so the rule of inversion is obligatorily moving a sentential object from sentence-final to sentence-internal position. This is a counterexample, at least in spirit, to the Final-Over-Internal-Position Hypothesis.[27] It is particularly difficult to argue that this is a weak counter-example on the basis of analogy to slifting in English, because the operation of inversion in (149) is quite unlike the operation of slifting in English. For one thing, as already noted, *want* in English does not govern slifting. For another, *swa'* is clearly not being asserted in (149). Finally, slifting in English is in general not applicable in complement clauses, where inversion in Jacaltec is, in certain circumstances, obligatory. The unacceptability of the examples in (151) demonstrates that slifting cannot apply within the subordinate clauses in (150).[28] (Some of the sentences in (151) are acceptable, but not with the meaning in (150).)

(150) a. John says that Mary thinks it is cold outside.
b. Mary knows that I think she is being silly.
c. It is unlikely that Paul hopes I will return.
d. If John says it is snowing, then I am not going outside.

(151) a. *John says that it is cold outside, Mary thinks.
b. *Mary knows that she is being silly, I think.
c. *It is unlikely that I will return, Paul hopes.
d. *If it is snowing, John says, then I am not going outside.

The fact that inversion is obligatory in (149), therefore, stands as a counterexample to the spirit of the Final-Over-Internal-Position Hypothesis. At best, a number of arguments can be given that it is not a strong counterexample. First, the rule of inversion in general appears to convert the complement

clause to a main clause. Thus, in some sense, *yalni* is presumably subordinate to *swa'* in (149b), in which case *swa'* is not really a sentential NP. Second, in the only example available, the putative sentential NP consists of a single word, in fact one which shares the same semantic subject with both *yalni* 'want', the verb of which it is the underlying object, and *x'ichic'oj* 'started', the matrix verb. We would have to see examples with longer sentential NP's which do not share the same subject with their matrix verb to determine whether Jacaltec really does provide a counterexample to the Final-Over-Internal-Position Hypothesis.

It should be noted, however, that even if the rule of inversion does freely move sentential objects from sentence-final position to sentence-internal position, there are other rules in Jacaltec that have precisely the opposite effect. According to Craig, indirect objects and oblique NP's normally follow the direct object, as in (152):

(152) a. xa' ix te' hum w-et an.
gave she the book erg,1-to 1
'She gave the book to me.'
b. xal naj s-kumal ix t-et anma.
said he 3-criticism her erg,3-to people
'He said criticisms of her to people.'

Craig reports, however, that sentential objects are obligatorily extraposed past indirect objects and oblique NP's, as in (153):

(153) a. xal naj t-et anma *chubil xil naj ix.*
said he erg,3-to people comp saw he her
'He said to people *that he saw her.*'
b. xal naj t-et anma y-ul parce ewi *chubil chim huluj*
said he erg,3-to people erg,3-in park yesterday comp may come
naj presidente coñob.
the president village
He said to the people yesterday in the park *that the President may come to the village.*

As a result, sentential objects in Jacaltec may still exhibit a greater tendency than simple objects to occur in sentence-initial position rather than sentence-internal position, in which case Jacaltec would not provide a counterexample to the Final-Over-Internal-Position Hypothesis. However, it would appear to provide a weak counterexample to the Final-Over-Initial-Position Hypothesis.

Appendix 3: Evidence from Latin for the sentential noun phrase position hierarchy

THE PURPOSE OF THIS APPENDIX is to present evidence from Latin for the Sentential NP Position Hierarchy, based on text counts. Latin is an especially suitable language for the use of evidence from text counts. Since it is a language with relatively free word order, many different orders are grammatical, and text counts provide a means of determining the relative naturalness of the different orders. It is also, obviously, impossible to use native speaker intuitions about grammaticality or relative markedness. On the other hand, it is a language with extensive texts. In fact, these texts have provided a long tradition of text counts in studying Latin syntax (e.g. Smiley (1913), Walker (1918) and Wilkins (1940)).

To say that Latin is a language with "free word order" is misleading in a number of ways. First, it suggests that there are no principles governing word order in the language. However, although all orders of subject, verb, and object are found, the choice of word order is heavily influenced by discourse factors. Second, one order of subject, verb, and object is dominant, namely SOV. Walker (1918) reports that a text count of Caesar revealed 90% of the main clauses and 95.8% of the subordinate clauses to be verb-final.

My own text count of Caesar's *Gallic War*, Book I, Chapters 1-4, revealed that 79 out of 92 clauses were verb-final, and that of 15 clauses with subject, direct object and verb, 11 were SOV, 3 OSV and 1 OVS. This reflects a strong tendency for the direct object to precede the verb. Of 30 clauses with a direct object (excluding sentential objects) and a verb, all 30 have the object before the verb.

Sentential NP's in Latin occur in one of three forms: *quod* plus finite verb; *ut* plus finite verb in subjunctive mood; subject in accusative case with an infinitive. The discussion here will be restricted to the latter two of these, the first being relatively uncommon.

Ut-clauses occur either as subjects, as in (154), or as objects, as in (155):

(154) Accidit *ut Marcus iret.*
happen,3sg comp Marcus go,past,3sg
'It happened *that Marcus went.*'

(155) Volo *ut Marcus eat.*
want,1sg comp Marcus go,pres,3sg
'I want *Marcus to go.*'

An example of an argument for the object status of *ut*-clauses with *persuadeo* 'persuade' is the fact that pronouns used in place of such clauses occur in the accusative case, as in (156):

(156) Id hoc facilius eis persuasit. ...
this,acc this easier 3pl,dat persuade,perf,3sg
'He persuaded them of this more easily. ...'

The most common type of sentential NP is that of an accusative plus an infinitive, as in (157):[29]

(157) Dicunt *te exire.*
say,3pl 2sg,acc leave,inf
'They say *that you are leaving.*'

Turning to the positional tendencies of sentential NP's, Taylor and Prentice (1966) report that the more usual position for a sentential object consisting of an accusative plus an infinitive is after the matrix verb, as in (157) above. Since simple objects show a strong tendency to precede the verb Latin provides support for the Final-Over-Internal-Position Hypothesis.

My text count of Caesar's *Gallic War*, Book I, Chapters 1-17, revealed 38 cases of infinitive object complements and 12 cases of *ut*-clauses apparently functioning as objects. The frequency of the different word orders is given in (158) where '#' indicates a clause boundary, 'X' anything other than subject, verb, and object, and parentheses optionality:

(158)	Infinitives	*Ut*-clauses
Clause-initial sentential objects		
#OV#	15	0
#OSV#	0	0
Total	15	0
Clause-internal sentential objects		
#(X)S(X)OV#	3	0
#XO(X)V#	1	2
Total	4	2
Clause-final sentential objects		
#V(X)O#	5	4
#(X)S(X)V(X)O#	5	2
#XV(X)O#	3	3
Total	13	9
Split sentential objects		
Part of object before the verb, part clause-final	6	1
Grand Total	38	12

As (158) shows, in the text examined, object *ut-* clauses tend to occur in clause-final position. Infinitives show a similar though much weaker tendency to occur in clause-final position. Of the 38 infinitive clauses, 19 (including the 6 cases in which part of the clause occurs after the verb) occur in clause-final position. By contrast, other objects occur most often in clause-internal position: of the 30 simple NP objects in Caesar's *Gallic War*, Book I, Chapters 1-4 (excluding those in relative clauses), 17 occur in clause-internal position, 13 occur in clause-initial position, and *none* occur in clause-final position. Latin thus shows strong support for the Final-Over-Internal-Position Hypothesis.

Latin also provides support for the Final-Over-Initial-Position Hypothesis. Among the 30 simple NP objects in the text mentioned above, 8 occur in #OV(X)# clauses, but none in #V(X)O# clauses. Among the sentential objects in the longer text, 15 occur in #OV(X)# clauses (all of them infinitives), and 9 occur in #V(X)O# clauses (5 infinitive clauses and 4 *ut*-clauses). These 9 #V(X)O# clauses are significant because the sentential object is occurring in final position when the position expected of it as an object would be clause-initial position, in an #OV(X)# clause. This provides support for the Final-Over-Initial-Position Hypothesis.

NOTES

* I am indebted to the following people for comments or discussion regarding this paper: Ann Borkin, Deborah Keller-Cohen, John Lawler, Ernest McCarus, Gary Prideaux, Sandy Thompson, and Russ Tomlin. I am also indebted to the following people for contributing data from various languages: Clive Ansley, Gail Dreyfuss, Harry Feldman, Don Frantz, John Grima, Irene Hashimoto, Pinky Henry, Peter Hook, Alex Kimenyi, Sarunas Lisauskas, Marianne Mithun Williams, Sumru Oszoy, Rich Rhodes, Keren Rice, Pat Shaw, Liberty Sihombing, Ulla Tuominen, Robert Underhill, Farzin Yazdanfar, and Ken Yoshida. I bear full responsibility for any errors in form or interpretation. Finally, I am indebted to the Canada Council and the Social Sciences and Humanities Research Council of Canada for doctoral fellowships that supported this research.

1 I apply the term *sentential NP* in the conventional way to subordinate clauses functioning as subjects or objects. Most languages have a number of different constructions that might be so described. This study focuses attention on these clauses which most resemble main clauses, like *that*-clauses in English, as opposed to constructions like those illustrated in (i) to (iv):

(i) *The fact that John is a genius* is very annoying.
(ii) *John's being a genius* is very annoying.
(iii) Sally asked *who I was talking to.*
(iv) *Playing the violin* is very difficult.

In a few cases the data I cite will involve verb phrases functioning as noun phrases, as in (iv). I assume in such cases that similar facts will hold for true sentential NP's.

I employ the terms "subject" and "object" in much the same way they are employed in most recent work in syntactic typology (e.g. Greenberg, 1963, and papers in such anthologies as Li, 1976, and Lehmann, 1978). However, my use of the terms more closely approximates "underlying", "initial", "semantic", or "logical" subjects and objects. For example, I refer to the clause *that Bill loves Mary* in (v) as a sentential subject, on the assumption that it is the "logical" subject, although presumably not the "surface" subject:

(v) It is obvious *that Bill loves Mary*.

It should be emphasized, however, that the claims of this paper do not depend on an analysis in which (v) is derived from (vi), and are consistent with an analysis in which *that Bill loves Mary* in (v) is base-generated in clause-final position:

(vi) *That Bill loves Mary* is obvious.

Any such analysis would have to capture the fact that the clause *that Bill loves Mary* in (v) bears the same semantic relationship to *is obvious* that *the answer* bears in (vii):

(vii) The answer is obvious.

Thus, even under such an analysis, there will be a class of constituents consisting of clause-final *that*-clauses and underlying subjects. It is the members of that class which I refer to as "subjects".

2 Sentence (5) is acceptable with an intonation break after *obvious*:

(i) It is obvious, the conclusion.

Such sentences have been derived in transformational grammar by a rule of right dislocation. Although there are cases in which there is some difficulty distinguishing right dislocation from extraposition, the intonation break usually distinguishes the two rules. (See Postal, 1974, pp. 15-16, footnote 10, for some further differences.) Since right dislocation applies both to simple NP's, as in (i), and to sentential NP's, as in (ii), its effects are irrelevant here.

(ii) It is obvious, that Bill loves Mary.

3 The following abbreviations are used in this paper in morpheme-by-morpheme glosses:

1	1st person	incompl	incompletive
2	2nd person	indef	indefinite
3	3rd person	inf	infinitive
abs	absolutive	masc	masculine
acc	accusative	neg	negative
act	active	nom	nominalization
comp	complementizer	obj	object
compl	completive	pass	passive
cont	continuous	perf	perfect
dat	dative	pl	plural
dep	dependent	poss	possessive
ds	different subject	pres	present
		ptcl	particle
dur	durative	ptcpl	participle
erg	ergative	Q	question
fem	feminine	quot	quotative
fut	future	refl	reflexive
gen	genitive	sg	singular
impf	imperfect	sub	subordinate
inan	inanimate	subj	subject

4 I define a complementizer to be a morpheme which occurs at the beginning or end of sentential NP's and whose primary function is apparently to signal the subordinate status of the sentential NP. I do not count as complementizers subordinating morphemes which can occur in positions other than clause boundaries.

5 I use the term *argument* here for lack of a better term. The arguments given here for the different hypotheses have a very different logical status from arguments in conventional generative syntax. Arguments of the latter sort are deductive and a single such argument is in principle sufficient to

establish the conclusion. (The motivation for multiple arguments in conventional generative syntax is largely political: a number of deductive arguments are more persuasive than a single one; furthermore, if one argument is rejected because its assumptions prove questionable, the other arguments may still stand.)

What I refer to as "arguments" in this paper are really no more than pieces of evidence that form part of an inductive argument. No single argument provides much reason to conclude that the hypotheses are true. Rather, it is the conjunction of these 'arguments' that provides an inductive argument for each of the hypotheses.

6 I use the term *weak counterexample* to refer to a counterexample which has special properties that suggest that the hypothesis in question could be refined in a way that would circumvent the counterexample. Such cases are contrasted with real counterexamples, which are apparently true exceptions to generalizations which hold in most cases. I assume that the existence of real counterexamples weakens a generalization, but does so minimally if they are rare. I assume that generalizations that are true of most languages are no less interesting and just as much in need of explanation as generalizations that are true of all languages.

7 I do not know whether the suffix *-kai* in (44) meets my criteria for being a complementizer, (i.e. whether it always occurs in clause-final position). If it does, then Yaqui is unusual in providing one of the few arguments for the Final-Over-Initial-Position Hypothesis based on sentential NP's bearing final complementizers (see 2.2.3).

It should be noted that there exists a third form for sentential NP's with both the initial complementizer *ke* and the suffix *-kai* on the verb, as in (i):

(i) tuisi tu?i ke hu hamut bwika-kai.
very good comp this woman sing-sub
'It is very good that this woman sings.'

If the suffix *-kai* is a complementizer, then Yaqui is unusual in allowing clauses to be marked simultaneously with both an initial complementizer and a final complementizer (cf. Kuno 1974: 128).

8 The arguments from Yaqui and Latin are based both on sentential NP's with initial complementizers and on sentential NP's without initial complementizers.

9 My own wording of Klaiman's proposal is given as (64). She cites evidence from other types of subordinate clauses supporting a more general tendency, namely that subordinators in general will tend to occur between the subordinate clause and the main clause (or head noun in the case of relative clauses).

10 Yaqui may be a second case. See footnote 7 above.

11 Kimball (1973) proposed a formal parsing model to explain certain facts of English syntax, including the tendency of sentential subjects to occur in clause-final position; however, his model suffers from the same defect as Yngve's, in predicting that left-branching structures should be as difficult to process as centre-embedded structures.

12 In referring to innate knowledge or abilities, I run the risk of implying notions associated with this term that I do not intend. The term *innate* is normally associated with the hypothesis that children are born with an *innate* specifically linguistic language-learning capacity, a theory associated with Chomsky. This hypothesis can be contrasted with two alternative hypotheses. The first is the behaviourist theory according to which the child learns language on the basis of simple stimulus-response mechanisms and evidence available from the language they hear. Chomsky has presented what I accept to be convincing arguments against this theory in his various writings.

A second hypothesis is that children learn language on the basis of more sophisticated cognitive abilities than those postulated by the behaviourists but not ones which are specifically linguistic. According to this hypothesis, the child is able to construct a grammar (to use Chomsky's metaphor) using general cognitive abilities and limited data. Since this hypothesis does not require the child to have the amount of language data required by the behaviourist theory, it survives most of Chomsky's arguments against that theory.

As Chomsky (1975) points out, it is misleading to refer to the first of these three hypotheses as the "innateness hypothesis". All three theories postulate innate knowledge; they differ only in the nature of the innate knowledge postulated. Even the behaviourist theory postulates innate knowledge, in the form of innate stimulus-response mechanisms.

The distinction I make here between *innate* knowledge or abilities and *acquired* knowledge or abilities is thus a distinction required by any theory of language acquisition. Processing difficulty in the innate sense may thus refer to processing difficulty that is due to innate cognitive capacities which are not specifically linguistic. The processing difficulty involved in multiple centre-embeddings would appear to be an example of this kind of processing difficulty.

13 I have been assuming that it is easy to distinguish ease of comprehension in the acquired sense from ease of comprehension in the innate sense. In principle this may be true, but in practice it is probably not. Suppose a grammatical constraint in a language is a reflection of innate perceptual factors. Ungrammatical sentences violating the constraint will be difficult to process in the *acquired* sense since the sentences will be ungrammatical. But if the constraint is due to innate perceptual factors, the sentences will also be difficult to process in the *innate* sense. Hence both sorts of processing difficulty may be present.

Similarly, one class of sentences in a language may be less common than another class because the first class provides greater processing difficulty in the innate sense. However, the fact that the first class is less common will make them more difficult to process in the acquired sense. It is possible, for example, that sentences like (76a) with sentence-initial sentential subjects *are* more difficult than sentences like (77b) in the innate sense, and that their relative frequency is a reflection of this. My point, however, is that there is no evidence that such is the case; the experimental results can be explained solely in terms of the relative ease of comprehension in the acquired sense.

14 Actually, he offers explanations for what he calls conjunctions. This includes complementizers, subordinate conjunctions introducing adverbial clauses, and relativizers.

15 It should be noted that I am not claiming that (87b) is unacceptable solely for performance reasons; rather, I accept the position of Kuno (1973b) according to which (87b) is ungrammatical because it violates a grammatical constraint in English on clause-internal sentential NP's. That constraint is presumably motivated by the processing factors under discussion: if so, then the fact that the constraint refers to the position of $\bar{S}$'s (or actually NP's over $\bar{S}$'s) rather than S's supports my contention that it is the position of $\bar{S}$'s, not S's which is important.

16 Note that I am not referring to clauses with both a sentential subject and a sentential object, like (i):

(i) That Fred loves Mary proves that Fred is stupid.

Rather, I am saying that in clauses with just a sentential subject, the sentential subject will occur on the same side of the verb that sentential objects occur on in clauses with just a sentential object.

An interesting property of sentences like (i), observed by Ross (1973b), is that they do not allow extraposition:

(ii) *It proves that Fred is stupid that Fred loves Mary.

Ross proposes that sentences like (ii) be blocked by the filter in (iii):

(iii) *The Same Side Filter*
No surface structure can have both complements of a bisentential verb on the same side of that verb.

More likely, however, (iii) is simply a special case of the more general constraint of Kuno (1973b) against clause-internal sentential NP's in English.

17 Mandarin might be analysed as basically SOV, but such is irrelevant here; for whatever its basic word order is, sentential objects still normally follow the verb, while sentential subjects normally precede it.

18 I call it a "partial" explanation because it would fail to explain the tendency in SOV languages, as discussed below.

19 Possessive constructions in English can involve extensive left-branching, as in (i):

(i) John's father's girlfriend's brother's car is blue.

Such cases do not involve *elaborate* left branches, however. Processing (i) involves putting phrases together rather than putting clauses together. Given the evidence (see 3.1.2.2) that clausal units are fundamental to sentence processing in that short term memory is emptied at clause boundaries, processing (i) apparently involves putting together constituents which are still in short term memory, which is quite different from processing sentences containing sentential NP's, which involves putting together constituents some of which have already been emptied from short term memory.

20 See footnote 6 above.

21 An alternative approach to such sentences not involving a movement rule is discussed by Emonds (1976), according to which a sentence like (118c) would be derived by a "proform deletion" rule from (i):

(i) We shouldn't go swimming here; John says that.

The arguments in this appendix do not depend on Ross's slifting analysis; in fact, many of the facts discussed here are accounted for more naturally by Emonds' analysis. Arguments similar to those given here could be given if we were to assume Emonds' analysis.

22 My assumption that the sentences in (120) are more marked than those in (118) is an assumption about the relative frequency of the respective constructions. Thus, on the basis of intuitive judgments, I am predicting that a study of the frequency in English of sentential and simple objects in clause-initial and clause-final position would reveal that the ratio of sentences with clause-initial sentential objects to sentences with clause-final sentential objects would be greater than the ratio of sentences with clause-initial simple objects to sentences with clause-final simple objects. This prediction is made, not only on the basis of my intuitive judgments of the relative frequency of the constructions in (118) and (120), but also because the clause-initial object in slifting sentences can only be sentential, while the clause-initial object in sentences like those in (120) can be either simple, as in (120), or sentential, as in (i) to (iii):

(i) That Bill is smart, no one denies.
(ii) That Smith is incompetent, everyone admits.
(iii) That you would like to have a better job, I can understand.

23 In many cases, OVS word order does not seem acceptable, as in the following:

(i) *It was too late to phone Mary, realized Bob.
(ii) ?*They had gone for a walk, supposed John.
(iii) ?*He probably should have come earlier, thought John.

I suspect that OVS word order is more natural with verbs of saying rather than with verbs of thinking. Note that (129a) is acceptable even if the conjecture is not verbalized.

24 Note, however, that the examples in (134) are acceptable with a pause after the underlying matrix verb, as in (i):

(i) I wonder, what is Margaret eating.

In (i), as in (133a), *I wonder* is parenthetical, and *what is Margaret eating* has the properties of a main clause.

25 The particle *an* occurs at the end of clauses which include a reference to the speaker. This particle is discussed at length by Craig (1977, chapter 9).

26 There are cases of slifting in English discussed by Ross (1973a) and Lawler (1974) where the matrix verb is negated, as in (i) and (ii):

(i) You'll find a job, I don't doubt.
(ii) It's not going to rain, I don't think.

Both of these are special cases, however. The verb *doubt* is an inherently negative verb; thus (i) is doubly negative and hence affirmative. In fact, *doubt* does not allow slifting when it is not negated, as shown in (iii):

(iii) *You'll find a job, I doubt.

The case in (ii) is more intriguing, since it is not synonymous with (iv), which the slifting analysis would predict it would be:

(iv) I don't think it's not going to rain.

Significantly, it is synonymous with the most natural reading of (v), which the analysis of Emonds (1976) (see footnote 21 above) relates it to:

(v) It's not going to rain; I don't think so.

Note that the antecedent of *so* in (v) is a constituent in logical structure, but not in syntactic structure.

27 Strictly speaking, *swa'* is being moved into clause-initial position, since *swa' yalni* is a clause, object of the main clause. *ya'* is the subject of the main clause, but it is also semantically the subject of *swa'* and *yalni*, so the clause boundary between *ya'* and *swa'* is a very weak one. In so far as this clause boundary is weak, *swa'* might be considered to be clause-internal. For this reason, the facts under discussion constitute a counterexample, in spirit, to the Final-Over-Internal-Position Hypothesis, although strictly speaking, they may only be a counterexample to the Final-Over-Initial-Position Hypothesis.

28 Some of the sentences in (151) are acceptable, but not with the meaning in (150).

It is worth commenting at this point on sentences like (i), noted by Ross (1973a), which involve multiple application of slifting:

(i) Frogs have souls, Osbert feels, I realize.

According to Ross's analysis, (i) would be derived from (ii) via (iii):

(ii) I realize that Osbert feels that frogs have souls.
(iii) Osbert feels that frogs have souls, I realize.

The fact that slifting applies within the slifted clause in (iii) provides

evidence for the nonsubordinate status of slifted clauses, since slifting normally applies only in nonsubordinate clauses.

29 There are two possible analyses for sentences like (157). The fact that the subject of the lower verb occurs in the accusative case suggests that raising to object has occurred. Further support for this hypothesis comes from the fact that the underlying subject of the lower verb in such sentences can advance to subject by passive, as in (i):

(i) Themistocles suasisse existimatur Atheniensibus
Themistocles,nom persuade,perf,inf think,3sg,pass Athenian,dat,pl
ut ....
comp
'Themistocles is thought to have persuaded the Athenians that ....'

An alternative analysis (and the traditional one) is to say that the accusative case is simply used for the subjects of infinitives. Such an analysis seems necessary for cases like (ii):

(ii) Aequum est Marcum ire.
right is Marcus,acc go,inf
'It is right for Marcus to go.'

In (ii), *Marcum ire* is apparently functioning as the subject of *aequum est*. The use of the accusative case on *Marcum* cannot be accounted for by raising; rather it is analogous to the use of the object form *him* in the English sentence *For him to go would be right*. But if such an analysis is possible for sentences like (ii), it is also available for sentences like (157). Fortunately, the correct analysis of such sentences is not crucial here. I will treat the accusative plus infinitive as a sentential NP. In fact, in the text counts discussed here, I include infinitival clauses with no accusative subject, as in (iii) and (iv]):

(iii) Discedere volebant.
leave,inf want,impf,3pl
'They wanted to leave.'

(iv) Vocare dubito.
call,inf hesitate,1sg
'I hesitate to call.'

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