ABSTRACT

This paper offers a non-movement account of Mandarin Chinese Unbounded Dependencies, including topicalization and relativization. The theory of Functional Uncertainty (Zaenen and Kaplan 1989) in Lexical-functional Grammar is adopted. It is shown that various predictions of movements accounts, such as island constraints, are not borne out in Mandarin. In contrast, the seemingly problematic contrasts between Mandarin and languages observing island constraint can be straightforwardly accounted for with our functional uncertainty analysis. We also observe that dependencies involving Mandarin object controllers are not allowed, contrary to the prediction of multiple path resolutions in the theory of functional uncertainty. We argue that this is due to a language specific parameter requiring that a dependency ends in a unique function. Formal revisions of theoretical definitions are proposed to account for this parameter as well to reconcile the potential conflict between the functional uniqueness condition and the theory of functional uncertainty.

The study of long-distance dependencies motivates the postulation of COMP-to-COMP movements in classical transformational grammar (TG) and an elaborated typology of empty categories in the Government and Binding (GB) theory. However, it has never been ascertained that the accounts of constructions such as topicalization and relativization depend crucially on the postulation of movements. Even some of the linguists who adopt the transformational theories question the
necessity of movements. For example, J. Huang (1982) postulates base-generated topics and Xu and Langendoen (1985) deem movement analyses impossible for some of the Mandarin topicalization structures and otiose for the others. It is non-trivial, then, to ask what are the alternatives. In fact, non-transformational theories have been rather successful in accounting for long-distance dependencies. Gazdar (1981), accounting for long distance-dependencies in terms of local conditions on the percolation of grammatical features, is one of the best-known cases. It is also interesting to observe that Xu (1990), though adopting the transformational theory of GB, argues that a semantic account better explains the data involving Mandarin interrogatives and that the Mandarin data do not lend support to either abstract LF movement or the existence of the level of LF. Recent new proposals to treat long-distance dependencies in terms of grammatical relations include Kaplan and Zaenen’s (1989) Lexical-Functional Grammar (LFG) account and Hudson’s (1988) Word Grammar (WG) account. We will adopt the grammatical relation approach in order to account for Mandarin Chinese topicalization in this paper. Specifically, we will adopt the LFG theory of Functional Uncertainty proposed in Kaplan and Zaenen (1989). The LFG convention of referring to grammatical relations as grammatical functions will also be followed. In the first section, we will introduce the Mandarin Chinese data, especially those posing problems to a movement-based account. In the second section, the theory of Functional Uncertainty is explicated to demonstrate some of its advantages over a category-based account of long-distance dependencies. In the third section, we will present a first formulation of a Functional Uncertainty account of Mandarin Chinese topicalization. Facts concerning the interaction of long-distance dependencies and functional control in Chinese will be discussed in the fourth section. The discussion will lead to our proposed revision of the theory of LFG and the formal definition of such revisions in the fifth section. Discussion of predictions and implications, as well as some recalcitrant problems, concludes this paper.

1. SOME INTERESTING FACTS CONCERNING MANDARIN TOPICALIZATION.

It has been argued and shown that Mandarin Chinese topicalization may violate well-known island constraints on movements (e.g. Xu and Langendoen 1985). However, syntacticians working on Chinese, with the exception of Xu and Langendoen (1985), have tried to adhere to the transformationalist approach by maintaining certain versions of movements (e.g. the Top-to-Top movement in Liu
1986) while conceding that other topics are base-generated (e.g. J. Huang 1982). Even Xu and Langendoen (1985) stop short of ruling out a movement account. It is, therefore, illustrative to examine some of the data posing problems for movement accounts.

Mandarin topicalization violates the Sentential Subject Constraint. A topic in Mandarin can usually be linked to a grammatical relation within a sentential subject, as in (1).4

(1) zhege wenti, [ [ ni zheyang huida [ ] ]
    this question you this-way return-answer
    hen deti]
    very gain-body

*‘This question, that you replied [ ] in this way is very appropriate.’

However, the prediction of the Sentential Subject Constraint is sometimes borne out with similar Mandarin sentences. Contrary to (1), the following sentence seems to support the Sentential Subject Constraint.

(2) *zhuxi, [[ ta dang-xuan [ ]] hen gong-ping]
    chairperson s/he act-elect very just-fair

*‘Chairperson, that s/he got elected [ ] is just and fair.’

Similarly, there are cases of clear violation of the Complex NP Constraint, such as in (3).

(3) zheijian shi, [wo bu zancheng [[ni chuli [ ]]]
    this-CLASS issue I NEG consent you deal-with
    de shiji]]
    DE timing

*‘This issue, I do not consent to the timing you [chose to]
    deal with [ ].’

The Complex NP Constraint, however, seems to aptly explain the grammaticality of sentences such as the following one.
*neiben shu, [wo bu xiangxin [kan-guo [de ren]]]

*‘That book, I don’t trust the kind of people who have read [ ].’*

Still another fact which poses problems for any structurally-based account is that sentences with apparently identical constituent structures behave differently with regard to topicalization. It is postulated in Xu and Langendoen (1985.20) that VPs cannot be topics. The postulation is well-supported by sentence pairs such as in (5). The pair of sentences in (6), however, counter-exemplify the postulation.

(5) a. wo dasuan xue yuyanxue
I plan study linguistics
‘I plan to study linguistics.’

b.* xue yuyanxue, wo dasuan
study linguistics I plan

(6) a. wo xihuan xue yuyanxue
I fond-of study linguistics
‘I am fond of studying linguistics.’

b. xue yuyanxue, wo xihuan
study linguistics I like

[compare] *‘Of studying linguistics, I am fond.’

Similarly, taking a category-based approach, Xu and Langendoen (1985) postulate that sentential categories are allowed as topics. Their prediction is borne out with (7) but contradicted by (8).

(7) a. wo zhidao ni yijing biye-le
I know you already graduate-PERF
‘I know that you have already graduated.’

b. ni yijing biye-le, wo zhidao
you already graduate-PERF I know

[compare] *‘That you have already graduated, I know.’
(8) a. wo yiwei ni  yijing  biye-le  
   I  think you already graduate-PERF  
   ‘I (mistakenly) thought that you had already graduated.’  
   b. *ni  yijing  biye-le,      wo yiwei  
   you already graduate-PERF  I  think

To sum up, we have shown in this section that general category-based analyses with or without movements of Mandarin topicalization are certain to make seemingly incoherent predictions. We will show how a function-based account resolves most of these seemingly contradicting facts. Our account starts with an outline of the functional theory of long-distance dependencies which we are adopting.

2. FUNCTIONAL UNCERTAINTY.

The introduction of the concept of functional uncertainty, explicated in Kaplan and Zaenen (1989) and Kaplan et al. (1987), succinctly accounts for long-distance dependencies in LFG. The basic idea is that long-distance dependencies are dependencies between functions which cannot be broken down to local dependencies. It is observed that efforts to characterize long-distance dependencies through the mediation of local dependencies, such as COMP to COMP movements in TG or the FOOT feature SLASH in GPSG, lack concrete evidence for these proposed local dependencies. Crucially, assuming the LFG premise that functions are primitives, the following rule provides an adequate schema for all long-distance dependencies, with the crucial stipulation that the path between a gap and a non-canonical representation must be described by a regular expression.

\[
\begin{align*}
\text{(9a)} & \quad S' \rightarrow \Omega \Sigma \quad (\uparrow \text{DF}) = \downarrow \quad \uparrow = \downarrow \\
& \quad (\uparrow \text{DF}) = (\uparrow \text{BODY BOTTOM}) \\
\text{b. (9b)} & \quad S' \rightarrow \quad \text{XP or S'} \quad S \\
& \quad (\uparrow \text{TOPIC}) = \downarrow \quad \uparrow = \downarrow \\
& \quad (\uparrow \text{TOPIC}) = (\uparrow \{\text{COMP, XCOMP}\}^* (\text{GF-COMP}))
\end{align*}
\]

(9a) is the general rule introducing the uncertainty expression, while (9b) is the instance for English topicalization. In (9), DF stands for discourse functions, including TOPIC and FOCUS; and GF stands for grammatical functions. In general, a BODY is a path defined in terms of a regular expression of grammatical functions and
BOTTOM is a grammatical function representing the gap. The rule (9b) stipulates that, in English, long-distance dependency occurs between a TOPIC function and a grammatical function other than COMP (a semantic proposition). Such a dependency is not restricted by distance, but by the requirement that there be an identifiable path (i.e. BODY) which consists of a regular expression defined in terms of two functions: COMP and XCOMP. In other words, topics in English can be linked to any grammatical function other than COMP as long as all the functions containing that function, other than the matrix, are either COMP or XCOMP.

In this theory, neither nodes with null content nor empty categories need to be postulated. Instead, since a TPOIC is a discourse function, it must be integrated into the predicate-argument structure of the sentence to satisfy the Extended Coherence Condition. The Extended Coherence Condition is satisfied by finding a solution to the functional equation introducing Functional Uncertainty. Take (9b) and the English sentence ‘Mary, Max loves’, for example. The predicate ‘to love’ takes as arguments the two grammatical functions SUBJ and OBJ. The sentence ‘Max loves’, however, does not contain a representation of the OBJ function. On the other hand, the topic ‘Mary’ does not by itself represent any function governed by a predicate. Functional Uncertainty elegantly and precisely formalizes the conditions under which a discourse function could be linked to a governed but unrepresented function of a predicate. When the conditions are met, i.e. the uncertainty is resolved, the discourse function, such as the TOPIC, will be unified with the unrepresented function to satisfy the grammaticality conditions of Functional Uniqueness, Coherence, and Completeness. Cases where the uncertainty relation is not resolved will be ruled out by the same conditions.

The function-based theory of Functional Uncertainty nicely account for asymmetries of topicalization in English and Icelandic. In Icelandic, unlike English, both PP’s and S’s are allowed as topics. Kaplan and Zaenen (1989), however, observe that not all PP’s are allowed as topics.

(10) a. *Hvaða verki för hann alltaf eftir
   Which job went he always after
   að eðg lauk?
   that I finished?

   ‘Which job did he always go after I finished?’
(10a) and (10b) are structurally identical. They all have a NP in a sentence-initial topic position and both NP’s have a corresponding canonical position within a PP sister of the matrix verb. The generalization made by Kaplan and Zaenen (1989) and other linguists studying Icelandic is that long-distance dependencies of topicalization into a PP adjunct are not allowed, while long-distance dependencies into a PP argument are.

Since the two sentences are structurally identical, a structure-based account of topicalization cannot predict their grammaticality without further stipulation. The function-based theory of Functional Uncertainty, however, can easily capture the generalization by postulating that the function ADJUNCT is not a member of the regular set characterizing the body of a long-distance dependency.

An even more interesting fact concerning topicalization problematic for structural accounts is the fact that, in English, S’ topicalization is only possible from NP positions, as illustrated below.

(11) a. Kevin persuaded Roger that these hamburgers were worth buying.
    b. *That these hamburgers were worth buying Kevin persuaded Roger.

(12) a. Louise told me (already) that Danny was mean to her.
    b. That Danny was mean to her Louise told me (already).

(13) a. *Kevin persuaded Roger the news.
    b. Louise told me the story.

The sentences in (11) through (13) show that S’ topics are allowed only when the verb governing it alternatively subcategorizes for a NP to express the same thematic role. Descriptively in LFG terms, an S’ topic governed by the verb ‘tell’ is possible since the verb also subcategorizes for an OBJect NP. Since ‘persuade’ does not subcategorize for an OBJect NP, S’ topics are not allowed with it. This structural
anomaly receives a straightforward functional account. Recall Kaplan and Zaenen’s (1989) formal account of topicalization of English, repeated here as (14).

\[
\begin{align*}
S' &\rightarrow XP \text{ or } S' \\
\text{TOPIC} &\rightarrow \{\text{COMP, XCOMP}\}^* \text{ (GF-COMP)}
\end{align*}
\]

The rule stipulates that a topic is represented by a sentence-initial phrasal category, including an S’. In addition, the grammatical function represented by this category is not assigned locally. It is determined by linking the TOPIC function to an unrepresented subcategorizable within-clause grammatical function other than a COMPlement. Also recall that the grammatical function COMP is defined as a non-SUBJect sentential argument representing a propositional role. In other words, the account captures the fact that sentential complements are generally not allowed as topics by excluding COMPs from legal BOTTOMs in a long-distance dependency. On the other hand, due to the dual representations of f-structures and c-structures in LFG, the account allows an S’ to occur in the topic position. Since the resolution of Functional Uncertainty is divorced form the usual c-structure-annotated assignment of grammatical functions in English, the topic phrase could be assigned to any function as long as the syntactic and semantic features do not clash. (12b) is grammatical because ‘tell’ subcategorizes for an OBJ2 (second object) bearing a propositional role. Since an OBJ2 is a legitimate BOTTOM in English long-distance dependencies, the theory allows the S’ topic to be linked to that function, which results in a grammatical sentence. Since ‘persuade’ subcategorizes for a COMP but not an OBJ2, such a resolution is not possible and thus (16b) is ungrammatical.

The asymmetries in English and Icelandic discussed above show that the difficulties observed with structurally-based theories in fact turn out to be functionally straightforward. I will next extend the account to Mandarin Chinese to see if the functional predictions hold.

3. A FUNCTIONAL ACCOUNT OF MANDARIN CHINESE TOPICALIZATION.

Following the general uncertainty schema of (9a), we will first determine the set of syntactic constituents allowed as topics. The set of grammatical functions allowed to be topicalized, i.e. the BOTTOMs of functional uncertainties, will then be studied. The path, referred to as BODY in (9a), which is the intervening grammatical functions between a topic and the subcategorized grammatical function it represents, will be
accounted for last.9

3.1. Possible syntactic categories of topics.

(15) =7b ni yijing biye-le, wo zhidaoyou already graduate-PERF I know

[compare] ‘That you have already graduated, I know.’

(16) =6b xue yuyanxue, wo xihuanstudy linguistics I like

[compare] ‘Of studying linguistics, I am fond.’

(17) =1 zhege wenti, [[ni zheyang huida [ ]]]this question you this-way return-answer
hen deti]very gain-body

*‘This question, that you replied [ ] in this way is very appropriate.’

The three above sentences show that S’ (15), VP (16), and NP (17) are allowed as topics in Mandarin Chinese respectively. We will discuss whether PP’s can be topics in terms of the grammatical functions they represent. Within the theory of LFG, since c-structures define only the general configuration of a language while f-structures are responsible for encoding the grammaticality condition, we are able to maintain a set of very simple and general PS rules without reducing the explanatory power of the grammar. More specifically, it is no longer necessary to stipulate disjunctive conditions, such as island conditions, on the categories allowed as topics. We now pose a simple schema that allow all phrasal categories to occupy the sentence-initial topic position as we anticipate that independently motivated functional restrictions will rule out the seeming exceptions. Thus we propose that, as in English, all phrasal categories, including S’, are allowed in the topic positions in Mandarin Chinese.

3.2. The Set of BOTTOM in Functional Uncertainty.

We have demonstrated that NP’s can occur as topics. However, not all sentences with NP topics are grammatical. We will argue that this fact is due to functional restrictions on topicalization.

(18) neige mimi ta toutoude gaosu-le Lisi
that secret s/he stealthily tell-PERF Lisi
‘That secret, s/he stealthily told Lisi [ ].’

(19) *Shagua, ta toutoude jiao ni
fool s/he stealthily call you
[compare] ‘A fool, s/he secretly calls you.’

(20) a. gaosu, v. ↑ PRED = ‘TELL<SUBJ, OBJ, OBJ2>’
b. jiao, v. ↑ PRED = ‘CALL<SUBJ, OBJ, NCOMP>’

Sentences (18) and (19) share identical surface forms but differ with each other in grammaticality. In LFG terms, the matrix verbs of both sentences subcategorize for three NP’s but differ critically with each other in that the verb ‘gaosu, to tell’ subcategorizes for a SUBJ, an OBJ, and an OBJ2 while the verb ‘jiao, to call’ subcategorizes for a SUBJ, an OBJ, and an NCOMP (nominal complement), as indicated by the predicate-argument structures in (20). Although both topics are represented by a surface NP, they are linked to an OBJ2 and an NCMOP respectively. Based on the contrast of (18) and (19), we may postulate, in terms of the theory of Functional Uncertainty, that NCOMP is excluded from the set of accepted BOTTOM functions in Mandarin topicalization, while OBJ2, as well as the well-attested cases of SUBJ and OBJ, are included.

Since the theories of LFG posit grammatical function GF instead of grammatical categories as the a priori basis of grammatical clarification, it is theoretically motivated to rid the based predicate-argument structures of categorical stipulations. Hence, a category-free GF of XCOMP (i.e. an open complement of any major category) is preferred over the category-specific GFs such as NCOMP. Following this category-free generalization, we would exclude XCOMP from possible BOTTOMs and predict that all controlled phrasal complements are not allowed to be linked to a topic. This prediction is borne out with the following example.

(21) a. *manpao, wo quan ta
slow-run I advise s/he
[compare] *‘To jog, I advised him/her [ ].’

So far, we have shown that the set of GF’s a topic can be linked to include SUBJ, OBJ, and OBJ2, but not XCOMP. The inclusion of OBJ2 is based on sentences like
(18) and the assumption that an OBJ2 in Mandarin, like its English counterparts, follows an OBJ in c-structure. The following c-structure rule is given in Kaplan and Bresnan (1982.184) for the double object construction of English

\[
\text{(22) } \text{VP} \rightarrow \text{V NP} \quad \text{NP} \quad \text{NP} \quad \text{(↑ OBJ = ↓) \quad (↑ OBJ2 = ↓)}
\]

The rule (22) stipulates that, in English, the NP immediately following a verb is assigned the grammatical function OBJ and the NP following the first NP is assigned the grammatical function OBJ2. Applying this rule to Chinese sentences such as (18) means that OBJ2’s can be BOTTOMs in a Functional Uncertainty. But it also entails some anomalies for topicalizations involving OBJ’s.

\[
\begin{align*}
\text{(23) a. } & \text{*Lisi ta gaosu-le neige mimi} \\
& \text{Lisi s/he tell-PERF that secret} \\
& \text{[compare] ‘To Lisi, s/he told the secret [ ].’} \\
\text{b. } & \text{*Lisi ta gei-le neige liwu} \\
& \text{Lisi s/he give-PERF that present} \\
& \text{[compare] ‘To Lisi, s/he gave the present [ ].’}
\end{align*}
\]

\[
\begin{align*}
\text{(24) a. } & \text{Zhangsan ta rensi} \\
& \text{Zhangsan s/he know} \\
& \text{‘Zhangsan, s/he knew [ ].’} \\
\text{b. } & \text{Neige pingguo ta chi-le} \\
& \text{that apple s/he eat-PERF} \\
& \text{‘That apple, s/he ate [ ].’}
\end{align*}
\]

Contrary to the prediction that topics can be associated with within-clause OBJ’s, as supported by sentences in (24), topics in double object constructions are not allowed to represent within-clause OBJ’s.\(^{10}\) This anomaly reminds us of some well-known facts concerning BEI and BA sentences in Mandarin.

\[
\begin{align*}
\text{(25) a. } & \text{*Lisi bei ta gei-le neige liwu} \\
& \text{Lisi BEI s/he give-PERF that present} \\
& \text{[compare] ‘Lisi was given that present by her/him.’} \\
\text{b. } & \text{neige liwu bei ta gei-le Lisi}
\end{align*}
\]
The BEI construction, with necessary qualifications, has been regarded as the passive construction in Mandarin Chinese. In GF-based theories such as LFG and RG (Relational Grammar), passivization is defined as the change (advance in RG) of the grammatical relation from OBJECT to SUBJECT. That is, a canonical OBJECT relation becomes the SUBJECT of a passive construction. If (22) is the c-structure rule for the Chinese double object construction, then Lisi should be the canonical OBJ in (18) and should be allowed as the SUBJ of the passive (25a). On the other hand, liwu in (25) should be an OBJ2 in a canonical structure and should not be allowed as a passive SUBJ in (25b). The above predictions based on (22), however, are contradicted by the data. Furthermore, the BA PP’s in the Mandarin BA construction generally correspond to the OBJs of a canonical sentence. Assuming the simplistic lexical rule (27), we predict that canonical OBJ’s are allowed as BA OBJ’s, supported by the pair of sentences in (28). The prediction of this generalization, again, is contradicted by (26) if (22) were the annotated c-structure rule assigning GF’s for Mandarin double object constructions.

(27) OBJ - - > (BA OBJ)

(28) a. Lisi du-le neiben shu
   Lisi read-PERF that-volume book
   ‘Lisi read that book.’

b. Lisi ba neiben shu du-le
   Lisi BA that-volume book read-PERF
   ‘Lisi read that book.’

Thus, generalizations about BA constructions, BEI constructions and topicalization
would all be lost if (22) were the annotated c-structure rule for Mandarin Chinese. Interactions of the double object constructions with the generalizations strongly suggest that the assignment of the grammatical functions is different in Chinese and in English. This offers another piece of evidence for the LFG premise that linguistic generalizations should be captured in terms of grammatical functions rather than configurations. With an identical configuration, the linear order of OBJ and OBJ2 is the opposite in the two languages. We will adopt the following c-structure rule, first suggested in C. Huang (1990), for the Mandarin double object construction.  

\[(29)\]  
\[\text{VP} \rightarrow \text{V} \quad \text{NP} \quad \text{NP} \]

\[\left(\uparrow \text{OBJ2} = \downarrow \right) \quad \left(\uparrow \text{OBJ} = \downarrow \right)\]

With (29) replacing (22) as a c-structure rule for Mandarin Chinese, the topics in sentences like (18a) will be linked to OBJ’s, representing another well-attested case of a topic linked to an OBJ. In contrast, OBJ2’s will not be allowed as a BOTTOM of a topicalization uncertainty, as exemplified by (23a). Thus we have so far been able to generalize that SUBJ and OBJ are grammatical functions allowed as a BOTTOM of functional uncertainties of Mandarin topicalization, while OBJ2 and XCOMP are not. The only grammatical functions yet to be examined are OBL(ique) and COMP.

\[(30)\]  
a. *ba neiben shu Lisi du-le  
BA that-volume book Lisi read-PERF  
b. *gen neige ren Lisi shuohua  
with that person Lisi talk

\[(31)\]  
a. zai zuo-shang Lisi fang-le yi-ben shu  
at desk-top Lisi put-PERF one-volume book  
‘On the desk, Lisi put a book.’

Even though oblique PP’s are generally not allowed in the sentence-initial topic positions, as exemplified in (30), the locative PP in (31) is an exception. This fact seems to suggest that even though the BOTTOMs of functional uncertainties are functionally defined, they are subject to thematic restrictions, at least when the grammatical function involved is OBL. This is an unhappy scenario and begs the question of whether all the GF-based syntactic characterizations should be reduced to
thematic terms. Since many theoretical implications are involved, long-distance dependencies involving locative OBL should be more closely scrutinized.

(31) b. zai zuo-shang wo kanjian Lisi fang-le
    at desk-top I see Lisi put-PERF
    yi-ben shu
    one-volume book
    ‘I, on the desk, saw Lisi put a book (down, away etc.).’

(32) a. zai banama wo kanjian [dianshi baodao [noruijia
    at Panama I see t.v. report Noriega
    de dashou gongji zongtong houxuanren]]
    DE hit-hand attack president candidate
    ‘In Panama, I watched T.V. [news] reports that Noriega’s thugs attacked presidential candidates.’

≠ b. wo kanjian [dianshi zai banama baodao [noruijia
    I see t.v. at Panama report Noriega
    de dashou gongji zongtong houxuanren]]
    ‘I watched the T.V. [news] reports from Panama that Noriega’s thugs attacked presidential candidates.’

≠ c. wo kanjian [dianshi baodao [noruijia de dashou
    I see t.v. report Noriega DE hit-hand
    zai banama gongji zongtong houxuanren]]
    at Panama attack president candidate
    ‘I watched T.V [news] reports that Noriega’s thugs attacked presidential candidates in Panama.’

Without contrastive emphasis, (31b), though grammatical, has the semantically anomalous reading of the speaker being situated on a desk. The locative PP the verb fang subcategorizes for will be suppressed in this reading. What the fact suggests is that a sentence-initial PP can only be a local ADJUNCT instead of a topic. It is local because it can only modify the matrix predicate and cannot be linked to an embedded predicate.13 This position is vividly illustrated and supported by the sentences in (32).
With (32a), the sentence-initial topic can only be interpreted as a matrix ADJUNCT modifying location where the speaker watched the T.V. report. It cannot have the topicalization reading with embedded locative PP’s. Thus we can safely conclude that sentence-initial PP’s are matrix ADJUNCT’s and that OBL’s are excluded from the set of possible BOTTOMs of Functional Uncertainty.

The above discussion also entails that there are no long-distance ADJUNCT’s and that the function of ADJUNCTS must be locally assigned. In terms of Functional Uncertainty, ADJUNCT is not a possible BOTTOM in uncertainties involving Mandarin topicalization.

The last grammatical function to be considered is COMP, a closed complement equivalent to an S’ containing no controllee in LFG.

(33) a.=7b ni yijing biye-le, wo zhidao
    you already graduate-PERF I know
    *‘That you have already graduated, I know.’

b.=8b *ni yijing biye-le, wo yiwei
    you already graduate-PERF I think

As illustrated by the sentences in (33), Mandarin sentences with S’ topics vary with respect to their grammaticality, just like their English counterparts discussed in section II. Hence we posit that a similar account can be given in Chinese. In other words, COMP will not be allowed as a BOTTOM of a Functional Uncertainty. The instances with grammatical S’ topics, however, will be sanctioned by the fact that a topic can be linked to any legal BOTTOM, regardless of its syntactic category. Leaving a more detailed discussion for section V, we conclude this sub-section by summarizing the allowed BOTTOM functions in Mandarin topicalization. It has been shown that only SUBJ and OBJ are included in the set of BOTTOMs in uncertainties involving Mandarin topicalization.

3.3 The Regular Set of BODY in Functional Uncertainty.

First, it should be straightforward to show that COMP’s and XCOMP’s can freely occur along an uncertainty path of topicalization.

(34) Lao-Li [ni zhidao [wo renwei [wo jianguo]]]
    Lao-Li you know I think I see-EXP
    ‘Old-Li, you know I thought I have met (him).’
(35) yan  [wo qing Lisi [quan Zhangsan [jie-le]]]
   smoking I ask Lisi advise Zhangsan quit-PERF
   ‘Smoking, I have asked Lisi to advise Zhangsan to quit (it).’

(36) yan  [ni zhidaow [wo quan Zhangsan [jie-le]]]
   smoking you know I advise Zhangsan quit-PERF
   ‘Smoking, you know that I have advised Zhangsan
   to quit (it).’

(37) a. ↑TOPIC = ↑ (COMP COMP) OBJ
    b. ↑TOPIC = ↑ (XCOMP XCOMP) OBJ
    c. ↑TOPIC = ↑ (COMP XCOMP) OBJ

(34) through (36) suggest that a TOPIC can be linked to a GF through any number of
COMP’s any number of XCOMP’s or any number of the combination of the two, as
formally represented by the functional equations of (37a), (37b) and (37c) respectively.
Following the theory of Functional Uncertainty, this means that the BODY of
uncertainty will be a regular expression on a set of grammatical functions, including
COMP and XCOMP.

(38) zhege wenti, [wo renwei [ni zheyang huida [ ]]
   this question I think you this-way reply
   hen deti]
   very gain-body
   *‘This question, I think that you replied [ ] in this way
   is very appropriate.’

(39) zhejian shi, [wo bu zancheng [[ni chuli [ ]]
   =3 this-item issue I NEG consent you deal-with
   de shiji]]
   DE timing
   *‘This issue, I do not consent to the timing you [chose to]
   deal with (it).’

(40) a. ↑TOPIC = ↑ (COMP SUBJ) OBJ
b. ↑ TOPIC = ↑ (OBJ RELMOD) OBJ

(38) and (39) show since that both functions SUBJ and OBJ can interact with other grammatical functions to form the BODY of uncertainty, they should be included in the regular set of grammatical functions defining the uncertainty path. The functional equations linking the two topics to its within-clause governed functions are given in (40). (40b), explicating the functional relation in (39), also involves the grammatical function RELMOD, or a relative clause modifier. RELMOD is the function assigned to a relative clause, based on the following rule taken from Hu (1989).15

\[
\begin{align*}
S & \rightarrow \text{XP} \quad de \quad \text{NP} \\
\uparrow \text{RELMOD} & = \downarrow \quad \uparrow = \downarrow
\end{align*}
\]

Other than the grammatical functions discussed so far, namely SUBJ, OBJ, COMP, XCOMP and RELMOD, the remaining two governable grammatical functions OBJ2 and OBL are not members of the regular set. This fact is demonstrated by the two ungrammatical sentences (42) and (43).

(42) *Zhangsan ni gei [yujian [ ] de ren]
Zhangsan you give meet DE person
yi-ben shu
one-volume book

(43) *taida ta zai [ ] dushu
Taiwan-University s/he at study

The uncertainty path of (42) is (OBJ2 RELMOD). Since we have shown that RELMOD is a member of the regular set defining the uncertainty path, the ungrammaticality must be attributed to the presence of the function OBJ2. In (43), the well-known fact that prepositions cannot be stranded in Mandarin Chinese translates into the functional account that the grammatical function OBL is not a member of the uncertainty path. It also suggests that the function ADJUNCT is not a member of the path.

To conclude this section, our investigation of Chinese topicalizations has produced the following schema of Functional Uncertainty.16 Discussion of Mandarin topicalization and the theory of Functional Uncertainty in the following sections will
be based on this schema.

\[
(44) \quad S' - - - > \quad XP \quad S \\
\uparrow \text{TOPIC} = \downarrow \\
\uparrow = \downarrow \\
\uparrow = (\uparrow \{\text{SUBJ, OBJ, RELMOD, COMP, XCOMP}\}^* \\
\{\text{SUBJ, OBJ}\})
\]

4. FUNCTIONAL UNCERTAINTY AND CONTROL IN MANDARIN CHINESE.

In Mandarin Chinese, the interaction of long-distance dependencies with functional control yields interesting results. Chinese and English sentences with control verbs have identical surface structures, as shown in both (45a) and (46a). As expected, (45b) shows that topicalization with \text{SUBject} controllers is allowed in both languages. However, unlike corresponding English sentences, topicalization with \text{OBJect} controllers is not allowed in Chinese (46b). This asymmetry poses a problem for structurally defined accounts, such as Xu and Langendoen’s (1985) GB account to be discussed below.

(45) a. wo tingshuo Wangwu daying mingtian  lai
   I hear-say Wangwu promise tomorrow come
   ‘I heard that Wangwu promised to come tomorrow.’

   b. Wangwu wo tingshuo daying mingtian  lai
      Wangwu I hear-say promise tomorrow come
      ‘Wangwu, I heard, promised to come tomorrow.’

(46) a. wo quan    Lisi mingtian lai
      I advise  Lisi tomorrow come
      ‘I advised Lisi to come tomorrow.’

   b. *Lisi wo quan mingtian lai
      Lisi I advise tomorrow come
      [compare] Lisi, I advised to come tomorrow.’

The Mandarin data also pose seeming difficulties for our GF-based theory of Functional Uncertainty. This theory accounts for English topicalization of a functional controller (Kaplan and Zaenen 1989) and coordination with gaps of mismatching
grammatical functions (Saiki 1986) by allowing an uncertainty to be multiply resolved.

(47) Kim, John expected to see and give the book to.

For sentences such as (47), the uncertainty equation (48), attached to a topic, will be resolved by (49a) and (49b) respectively, in two conjuncts. The multi-solutions to one uncertainty equation nicely capture the fact that the topic phrase is representing two different functions within the two conjuncts.

(48) ↑ TOPIC = (↑ {COMP, XCOMP}* (GF-COMP))

(49) a. ↑ TOPIC = ↑ XCOMP OBJ
    b. ↑ TOPIC = ↑ XCOMP OBJTO

Thus we observe that Mandarin Chinese does not behave like other languages that have been analyzed with the theory of Functional Uncertainty (e.g. English and Icelandic in Kaplan and Zaenen 1989 and Japanese is Saiki 1986) with regard to the interaction of long-distance dependencies with functional control. If we allow multiple resolutions of an uncertainty in Mandarin, we would be wrongly predicting that (46b) is grammatical. If we simply posit that multiple resolutions of uncertainties are simply not allowed in Mandarin, however, we would be incorrectly ruling out sentences like (45b).

However, mediated by the control equation (50a), there are two ways to solve the uncertainty involving the topic in (46), i.e. (50b) and (50c). On the other hand, mediated by the control equation (51a), the uncertainty of (45) can be resolved as either (51b) or (51c). English allows both multiple resolutions while Mandarin Chinese, though admitting multi-dominances like (51), rules out the ones in (50). The question to answer is of course what differs the pair of (50b) and (50c) from the pair of (51b) and (51c).

(50) a. ↑ OBJ = ↑ XCOMP SUBJ
    b. ↑ TOPIC = ↑ XCOMP SUBJ
    c. ↑ TOPIC = ↑ OBJ
(51) a. ↑ SUBJ = ↑ XCOMP SUBJ  
b. ↑ TOPIC = ↑ COMP XCOMP SUBJ  
c. ↑ TOPIC = ↑ COMP SUBJ  

Our observation is, in Functional Uncertainty terms, that the kind of multi-dominances allowed in Mandarin Chinese shares an identical BOTTOM while the kind ruled out doesn’t. This observation is stated in terms of a condition in Chen (1989). We will quote the condition here (52) and try to give a formal account of this condition as well as a well-formedness condition on uncertainty equations in the next section.

(52) BOTTOM-Uniqueness Condition (Chen 1989) 
For all solutions to a given Functional Uncertainty equation (↑ TOPIC) = (↑ BODY BOTTOM) [in Mandarin Chinese], the value of the BOTTOM must be identical and unique.

5. REVISION OF THE THEORY AND ALGORITHM. 
In this section, we will incorporate a formal account of the Mandarin topicalization uncertainty facts into a parameterized definition of Functional Uniqueness in LFG. Functional Uniqueness is the constraint proposed originally to guarantee that every attribute in an f-structure has at most one value (Kaplan and Bresnan 1982.181). The Functional Uncertainty relations, however, seem to violate the spirit if not the formulation of this constraint. We propose the revision both to accommodate uncertainty relations and to account for the contrast between Chinese and other languages discussed above. (53a) is the statement of the definition while (53b) is the formalization of it. In (53b), the first part of the definition specifies how an attribute satisfies the condition. The first premise formalizes the original Functional Uniqueness condition. It requires that there to be one unique value for every length-one application of an attribute. It is simply a more general way to state that each attribute has at most one value, be it an atom or a complex feature-value matrix (i.e. another f-structure). The condition is extended form attributes to all functional application sequences headed by each attribute in order to cover cases governed by the second premise. The second premise within square brackets is parameterized. The current study shows that this condition applies in Mandarin but not in English, Japanese or Icelandic. Languages including this premise in their Functional Uniqueness condition would require that, in addition to length-one
descriptions, all functional descriptions headed by a discourse function and ending in a grammatical function must have a unique ending. In other words, we have extended Functional Uniqueness to cover all length-one suffixes of functional descriptions. The general, though trivial, case which applies to all languages is when the value is directly assigned, through no mediation of path. The parameterized case involves multi-dominances of Functional Uncertainty. Specifically, Chinese requires all application strings satisfying an uncertainty relation to have an identical suffix, while English doesn’t. The ‘uniqueness’ condition applies in English only with trivial cases without long-distance uncertainties.

(53) **Extended Functional Uniqueness**

An f-structure F is functionally unique if and only if every attribute in it is functionally unique.

a. An attribute \( f \) is functionally unique if and only if the values of each and every pair of sequences of functional applications describing it are equivalent when the length of application is one [and when \( f \) is a discourse function and the values are grammatical functions].

b. An attribute \( f \) is functionally unique iff \( v_n = v_m \) for all \( v_n \) and \( v_m \) where ‘\( f = (g f_1 \ldots g f_i ) v_n \)’ and ‘\( f = (g f_1 \ldots g f_j ) v_m \)’

when i) \(|g f_1 \ldots g f_i | = |g f_1 \ldots g f_j | = 0 \)

[and ii) \( f \in DF, v_n \in GF^*, \) and \( v_m \in GF^* \)]

With (53), the previously unaccounted for fact that (46b) is ungrammatical can be easily explained in terms of functional uniqueness. (46b) is not functionally unique because the uncertainty paths, mediated by the control equation, end in two different functions.

Another revision of definition needed to accommodate Functional Uncertainty in LFG involves the Functional Locality Principle. Proposed in Kaplan and Bresnan (1982.278), the principle postulates that no functional equation may specify more than
two functional applications. Although this principle seems to reflect a theoretically motivated hypothesis that linguistic process be local, as observed in Sells (1985), it has also been observed, e.g. in Shieber (1987), that the formal constraint limiting the number of functional application to two seems to be ad hoc. Indeed, the proposal of the theory of Functional Uncertainty makes such a constraint unattainable. To accommodate both the fact that locality seems to be linguistically desirable and that the upper limit of two is neither formally and nor factually attainable, we propose the following disjunctive condition on well-formed functional equations as a first approximation towards a solution.

(54) **Well-formedness Condition of Functional-equations**

For \(d\) a domination meta-variable (i.e. ↑ or ↓), \(f\) any attribute, \(df\) a discourse function, and \(gf\) a member of the set of grammatical functions GF, then

\[
\begin{align*}
\text{‘}d (f_1 \ldots f_i) = (f_1 \ldots f_j)\text{‘} \text{ is a well-formed functional equation only if} \\
i) & \left| f_1 \ldots f_i \right| \leq 2 \text{ and } \left| f_1 \ldots f_j \right| \leq 2, \text{ or} \\
\text{ii) } f_i \text{ is a df and } (f_1 \ldots f_j) \in \text{GF*}
\end{align*}
\]

To maintain linguistic felicity, we keep the length-two condition as one of the disjunctive requirements to meet the well-formedness condition. We also posit the other disjunctive condition to admit functional uncertainties. The position we are taking, then, is exactly the one suggested in Shieber (1987). That is, theoretically, it is unmotivated to randomly limit one’s grammar formalism. Within a well-defined formalism, however, considerations of linguistic facts may impose substantive constraints, which may well be disjunctive in nature.

6. PREDICTIONS, IMPLICATIONS AND PROBLEMS FOR FURTHER STUDY.

Armed with the schema for Functional Uncertainty in (44) and the two conditions (53) and (54), we are now ready to account for the seeming anomalies involving Mandarin Chinese topicalization introduced in the first section.

(55) =1 zhege wenti, [[ni zheyang huida [ ]]]
**This question, that you replied [ ] in this way is very appropriate.’

(56) =2 *zhuxi [[ta dang-xuan [ ]] hen gong-ping]
chairperson s/he act-elect very just-fair
‘Chairperson, that s/he got elected [ ] is just and fair.’

The topic in (55) is linked to the OBJ of its sentential SUBJ. In other words, the uncertainty is resolved as (SUBJ OBJ). This is a legal path with a BODY consisting of SUBJ and a BOTTOM of OBJ. The topic in (56), on the other hand, is intended to be linked to the nominal complement of its sentential SUBJ. That is, the uncertainty path is (SUBJ XCOMP). Since XCOMP is not an allowed BOTTOM in Mandarin topicalization, (56) is ruled out in our account. The seeming anomaly in categorical terms is easily explained in functional terms.

(57) =5
a. wo dasuan xue yuyanxue
   I plan study linguistics
   ‘I plan to study linguistics.’

b. *xue yuyanxue, wo dasuan
   study linguistics I plan

(58) =6
a. wo xihuan xue yuyanxue
   I fond-of study linguistics
   ‘I am fond of studying linguistics.’

b. xue yuyanxue, wo xihuan
   study linguistics I like
   [compare] *‘Of studying linguistics, I am fond.’

For the contrast between (57b) and (58b), we will adopt the strategy outlined in section II. Take note that the grammaticality of (59a) and (59b) is parallel to that of (57b) and (58b).
a. *wo dasuan zhemen ke
   I plan this-discipline study
b. wo xihuan zhemen ke
   I fond-of this-discipline study
   ‘I am fond of this discipline.’

The sentences in (59) demonstrate that the verb *dasuan* ‘to plan’ does not subcategorize for an OBJ, while the verb *xihuan* ‘to be fond of, to like’ does. Based on the uncertainty schema and the mapping between c- and f- structures, a topic of a sentence headed by *xihuan*, regardless of its syntactic category, can be linked to a governed OBJ, while a topic of *dasuan* cannot be. Thus we straightforwardly account for the contrast of (57b) and (58b) despite their identical surface form.

Similarly the contrast of (60b) and (61b) can be accounted for by whether a verb subcategorizes for a possible BOTTOM or not.

(60) =7
a. wo zhidao ni yijing biye-le
   I know you already graduate-PERF
   ‘I knew that you had already graduated.’
b. ni yijing biye-le, wo zhidao
   you already graduate-PERF I know
   *‘That you had already graduated, I knew.’

(61) =8
a. wo yiwei ni yijing biye-le
   I think you already graduate-PERF
   ‘I (mistakenly) thought that you had already graduated.’

b. *ni yijing biye-le wo yiwei
   you already graduate-PERF I think

(62) a. wo zhidao zhejian shi
   I know this-item event
   ‘I knew this event / matter.’
b. *wo yiwei zhejian shi
I think this-event

Again, the grammaticality contrast in (60b) and (61b) is mirrored in (62a) and (62b). The verb *zhidao* ‘to know’ subcategorizes for an OBJ while the verb *yiwei* ‘to (mistakenly) think’ does not. Since OBJ is a legal BOTTOM, a topic introduced by the verb *zhidao* can be linked to it through an uncertainty path. However, a topic introduced by the verb *yiwei* has no legal BOTTOM to be linked to and thus is ruled out.

Furthermore, it has been observed in C. Huang (1990) that the post-verbal NP argument in the possessive object (POBJ) construction cannot be topicalized, as exemplified by (63).

(63) a. ta chi Zhangsan (de) cu s/he eat Zhangsan DE vinegar ‘S/he is jealous of Zhangsan.’

b. *Zhangsan ta chi (de) cu Zhangsan s/he eat DE vinegar

The above fact poses another puzzle for any category-based account of topicalization because a governed NP is a category typically allowed in a topic position. But following C. Huang’s (1987 and 1990) argument that the post-verbal argument in a POBJ construction plays an OBL role, its unacceptability in the topic position can be accounted for without further stipulation, as a topic is not allowed to be linked to an OBL function in Mandarin Chinese.

C. Huang (1990) also observes that when the whole possessive NP occurs in the topic position, the POBJ idiomatic reading is not available, and therefore it has only the plain possessive reading, as in (64).

(64) Zhangsan (de) cu ta chi Zhangsan DE vinegar s/he eat ‘Zhangsan’s vinegar, s/he used.’ [the only possible reading]

In a POBJ construction, the string *Zhangsan de cu* does not represent a single grammatical function. It contains the OBL argument together with the idiom chunk part of the predicate. Since functional uncertainties must be resolved in terms of
grammatical functions, it is not possible to have an uncertainty path linked to it. The real genitive NP, however, represents the OBJ of the verb *chi* ‘to eat’ and is therefore an allowed topic.

Similarly, our accounts offer a straightforward explanation as to why neither a relative clause nor a modified NP head can be linked to a topic. Relative clauses cannot be linked to topics, as in (65), simply because RELMOD does not belong to the set of BOTTOMs in Mandarin. The NP head, on the other hand, does not represent any single function according to the annotated c-structure rule (41), and therefore cannot be linked to the topic, as in (66).

(65) *ta mai (de) wo xihuan yifu*  
s/he buy DE I like clothing

(66) *neiben shu wo bu xihuan [ta xie de [ ]]*  
that-volume book I NEG like s/he write DE

We have so far shown that our function-based account satisfactorily explains facts concerning Mandarin topicalization. We will now compare our function-based account with a category-based account. In particular, we will take Xu and Langendoen’s (1985) work because it offers one of the most detailed accounts of Mandarin topicalization. Their account consists of two parts: a general description of allowed topic structures and a set of disjunctive conditions ruling out ungrammatical cases included in the general description.

(67) The Representation of Topic Structure [Xu and Langendoen 1985.20.(76)]

[ s’ X [ s …Y…]], where X is a major category and Y, possibly empty, is related to X.

(68) Ungrammaticality Restrictions on (67) [Xu and Langendoen (1985.20)]

(i) X is understood as an individual, and Y is an empty predicate complement;
(ii) X = VP and Y is an empty non-argument;
(iii) X is a modifier phrase and Y is its head;
(iv) Y is an empty complement of a preposition or a postposition.
We will not argue against the general description (67), since its possible defects of not being precise enough can be easily remedied while maintaining the outlook of the original formulation.\footnote{17} We will, however, discuss the four disjunctive conditions in (68). Our Functional Uncertainty account, based on the schema of (44), predicts the same restrictions as those above (with the exception of (i)) without further stipulation.\footnote{18} Recall that Functional Uncertainty accounts for long-distance dependencies in terms of grammatical functions. The theory stipulates the kind of grammatical functions a ‘displaced’ constituent is allowed to be linked to. Both (ii) and (iii) are ruled out simply because the grammatical functions the topics are intended to be linked to, XCOMP and RELMOD respectively, are forbidden BOTTOMs of uncertainties. (iv) is ruled out simply because an uncertainty path cannot include the function OBL in Mandarin. Thus the uncertainty theory uniformly accounts for the facts individually stipulated in (68). Note that Xu and Langendoen (1985) claim that ‘of all the restrictions, only (iii) must be imposed specifically on topic structure,…the others follow directly from the requirement that the comment clause must itself be well-formed as independent sentences.’ It is not clear to us how their claim stands. Topicalization by definition involves a comment clause with unrepresented or unexpressed functions and can hardly be considered well-formed in either structural or functional representation. However, if by ‘well-formed’ they are referring identical strings that can stand alone, regardless of their structural or functional representation, then there are clear counterexamples to their claim.

\begin{enumerate}
\item\textbf{Zhangsan bei da-le}
\begin{verbatim}
Zhangsan BEI beat-PERF
\end{verbatim}
\end{enumerate}
\begin{itemize}
\item ‘Zhangsan was beaten.’
\end{itemize}

\begin{enumerate}
\item\textbf{*Lisi Zhangsan bei da-le}
\begin{verbatim}
Lisi Zhangsan BEI beat-PERF
\end{verbatim}
\end{enumerate}
\begin{itemize}
\item Sentences like (69a) are perfectly grammatical. But the fact that they are grammatical does not allow them to be comment clauses, as shown by (69b). Thus (68)(iv) cannot be derived from the fact that a comment clause must be independently well-formed.
\item Other facts not accounted for in Xu and Langendoen (1985) include the fact that a VP can be a topic when it is linked to a within-clause OBJ as in (60), that sentential
complements are allowed only when they are linked to a within-clause OBJ as in (66), that PP’s are not allowed as topics (30-32), and that topics can be linked to SUBJ controllers but not OBJ controllers (45-46).

In contrast, the Functional Uncertainty account of Mandarin topicalization correctly predicts all the above facts without further stipulation. This fact strongly suggests that a function-based theory is better-suited for long-distance dependencies than a category-based theory. In our account of Mandarin topicalization, we have also proposed two formal definitions, one of Extended Uniqueness and one of Well-formed Functional Equations. The definition of Extended Uniqueness is parameterized. We have argued that Extended Uniqueness requires that length-one suffixes of all functional descriptions of an attribute be identical under 1) the universal condition when the length of the path is zero and 2) the language specific condition (for Mandarin) that the attribute is a discourse function. Implications of this parameterized Uniqueness Condition on Mandarin language parsing are discussed in C. Huang et al. (1989). The Well-formedness Condition on Functional Equations offers a formal premise to admit uncertainty equations in the grammar.

Last but not the least, we should bring attention to the fact that TOPIC’s are discourse functions. This fact means that behaviors of topics are governed by discoursal factors as well as by syntactic and semantic rules. Careful readers must have noticed that we have yet to give an account of the contrast between (3) and (4). In Xu and Langendoen (1985), it is suggested that the ungrammaticality of (4) is due to the fact that a topic cannot be linked to a name referring to an individual. This seems to be the best account available at this moment. But such a condition is clearly supra-syntactic. Our position is, then, that a function-based syntactic account should account for all grammatical instances of topic sentences, while additional semantic and pragmatic conditions rule out the ungrammatical ones included in this set. Such a position points to the need of further studies on topicalization in light of semantic and discoursal effects, such as Xu’s (1990) recent arguments in favor of semantic conditions over abstract movements.

NOTES

1 Earlier versions of this paper were presented at La Cinquième Journée de Linguistique de l’Asie Orientale in France and at City Polytechnic of Honk Kong in 1989. I am indebted to the participants for their comments. I have also benefited from discussions with Wan-Pei Chen and comments form Ronald Kaplan, Annie Zaenen, and Joan Bresnan. I would also like to thank Kathleen Ahrens for her editorial
assistance. Responsibility for any remaining error is mine.

2 For easy and explicit references, I will refer to C.-T. James Huang as J. Huang and Chu-Ren Huang as C. Huang in this article.

3 It is noteworthy that Xu and Langendon (1985) also seem to be sympathetic to this approach in the sense that they regard TOP as a ‘grammatical function’ instead of a ‘category’ (Xu and Langendon 1985.fn.6), despite of the fact that grammatical functions are secondary linguistic objects defined in terms of categories and/or structures in the GB theory.

4 I am using the pair of brackets with no content, i.e. [ ], to represent the canonical position of the grammatical function represented by the topic. It should not be interpreted as any type of abstract null element.

5 The Coherence Condition, as stated in Kaplan and Bresnan (1982), does not cover discourse functions like TOPIC and FOCUS; however, the Extended Coherence Condition, proposed by Fassi Feheri (1988) does. We adopt the more succinct version presented in Sells (1985.182).

(i) Extended Coherence
An f-structure is locally coherent if and only if all the governable grammatical functions that it contains are governed by a local predicate. In addition, the functions TOPIC and FOCUS must be linked to predicate-argument structure either by being functionally identified with subcategorized functions or by anaphorically binding subcategorized functions. An f-structure is coherent if and only if it and all its subsidiary f-structures are locally coherent.

6 The Completeness Condition requires that an f-structure contain all the governable grammatical functions specified in the predicate-argument structure. In other words, it requires that all the ‘subcategorized’ grammatical functions be represented at f-structure level. The Coherence Condition requires that all the functions contained in an f-structure be governed by a local predicate. In other words, it requires that all the ‘subcategorizable’ functions present in an f-structure be specified by the predicate-argument structure. Last, the Functional Uniqueness Condition requires that every function be assigned one and only one value.
Readers are referred to Kaplan and Zaenen (1989) for references of works on Icelandic.

Again, the sentences are taken from Kaplan and Zaenen (1989). Readers are referred to that article for more discussion.

In the following section, we draw freely from facts observed in studies such as Chao (1968), Chen (1989), T. Tang (1988), Tsao (1979), and Xu and Langendoen (1985). Unless explicitly marked, however, the examples and judgments are my own.

Grammatical judgments on this set of data seem to very among native speakers, as observed in Xu and Langendoen (1985.16.fn.21). They adopt the judgment where topics are allowed to be linked to both indirect and direct objects. Our more discriminating judgments lend support to the account of OBJ2 preceding OBJ in Mandarin Chinese, as will be clear from the following discussion. It will also become clear that this difference can be formally parameterized in our account by whether OBJ2 is included in the set of possible BOTTOMs of the Functional Uncertainty involving topicalization or not. In contrast, a parameter account of variations does not automatically follow Xu and Langendoen’s (1985) unrestricted topicalization account.

We, of course, do not believe that this simple rule accounts for the complicated facts of BA constructions in Mandarin. A detailed study, however, is beyond the scope of this paper. For an account of the BA constructions in the recently developed lexical Mapping Theory of LFG, please see Wu (1988).

Take note that this rule does not apply to all Chinese languages. Cantonese, for example, has the word order of verb-direct object-indirect object, and data available to us at this moment suggest that the GF’s are assigned in the order of verb-OBJ-OBJ2.

Although we only get the semantically anomalous reading of the locative ADJUNCT predicating the location of the act of knowing with sentences like (i), there are a few speakers who claim that they do get the reading that the locative PP is governed by the embedded verb fang.

(i) zai zuo-shang wo zhidao Lisi fang-le yi-ben shu
At this moment, we can only suggest that the variation in judgment is due to the speaker’s strategy in assigning a semantically plausible reading to an ill-formed sentence. In other words, although sentence-initial ADJUNCT’s are only allowed to modify the matrix phrase, semantic selection of the verb zhidaò ‘to know’ does not allow this reading, as shown by (ii). Hence some speakers look deeper into the sentence to find a place to attach the ADJUNCT to. We do not pretend that this hypothesis is valid account but invite further studies on related data and topics.

14 C. Tang (1988) also observes that adjuncts cannot function long-distance in Mandarin Chinese with the following data.

(i)  a. wo zhidaò [Zhangsan [yinwei tianchi buhao] 
    I know Zhangsan because weather NEG-good
    bu xiang chu] 
    NEG want go
    ‘I know that because the weather is bad Zhangsan does not
    want to go.’

b. *[yinwei tianchi buhao] wo zhidaò 
   because weather NEG-good I know
   [Zhangsan [ ] bu xiang chu] 
   Zhangsan NEG want go

   [compare with the only possible reading]
   ‘Because the weather is bad I know that Zhangsan does not
   want to go.’

Take note that C. Tang’s terms of global (e.g. ia) vs. local (e.g. ib) are confusing when compared with my terms of local vs. long-distance. Also note that I refer to Ting-chi Tang with T. Tang and to Chi-chen Jane Tang with C. Tang.

15 Take note that this rule accounts for more than relative clauses in the strictest sense, and that it also covers all pre-nominal modifiers. That all pre-nominal phrases
modifying a de-marked head NP should be accounted for uniformly is argued for in C. Huang (1987). And that all pre-de modifier phrases should be accounted for as relative clauses is argued for in Sproat and Shi (1987).

16 The following rule in effect captures the most important formal properties involved in the final version of Xu and Langendoen’s (1985) proposed representation of Mandarin topic structures. A topic is a constituent which is a sister of S according to both formulations. We propose that a topic is functionally dependent on a within-clause governed function. However, Xu and Langendoen (1985), relying on a structural definition, postulate that the topic is ‘related’ to a within-clause position. We pose a more restricted structural definition in that we require the topic to be a phrasal category while Xu and Langendoen only require the topic to be a major category.

\[
= \text{Xu and Langendoen (1985.20.(76))}
\]

\[
[\_ s. X[ \_ s \ldots Y\ldots]], \text{where } X \text{ is a major category and } Y, \text{possibly empty, is related to } X.
\]

17 Possible improvements include further restricting the topic to be represented by a phrasal category, rather than simply a major category, and spelling out what is mean by being ‘related to.’

18 It is not clear to me what kind of sentences is ruled out by (68i). The only example given in Xu and Langendoen (1985) is (i), which I found to be perfectly acceptable. If it were meant to cover cases where topics are linked to nominal complements, such as (2), i.e. ‘*Chairperson, that s/he got elected [ ] is just and fair’, then the restriction that the topics should not be individuals is vacuous. It is semantically impossible to be an individual and a predicate at the same time. Our account that a topic cannot represent a controlled complement covers both the nominal complement data and the fact that VP’s cannot be topics, which is an independent restriction according to Xu and Langendoen (1985).

\[
= \text{Xu and Langendoen (1985.4.13b)}
\]

*Li Qinyu wo zhi de jiu shi
Li Qinyu I refer DE precisely be

REFERENCES


