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THE PREFERRED ARGUMENT STRUCTURE IN MANDARIN CHINESE AND ITS COGNITIVE IMPLICATIONS*

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Introduction. Studies of late, such as D. Payne (1987), K. Lambrecht (1987), and J. Du Bois (1985); (1987), have shown that there is a strong statistical tendency for certain grammatical properties, or clusters of properties, to recur in a discourse sample as a result of information flow. Therefore, word order in some languages can be most insightfully accounted for by pragmatic constraints, rather than by syntactic roles[1]. Du Bois (1987) demonstrates that, in connected discourse, some argument structures are preferred over others, and that this preference is highly consistent. In other words, the word order of connected discourse is *not* random variation, but a highly *preferred* pattern. This is what has been characterized as the *Preferred Argument Structure* (henceforth PAS) of a language. In this paper, I will, through the analysis of natural conversations, test whether such a preferred argument structure exists in Mandarin Chinese. Du Bois (1987) claims that the overwhelming majority of the languages he and others investigated appear to exhibit a PAS. The result of this paper will, therefore, further examine the generality of the PAS, which, if confirmed to exist in Mandarin Chinese and, further, found to be universally established, would shed some light on the human cognitive motivation of word ordering.

We will examine the existence of the PAS against the four constraints proposed by Du Bois (1987), namely:

1) *the One Lexical Argument Constraint;*
2) *the Non-Lexical A Constraint;*
3) *the One New Argument Constraint; and*
4) *the Given A Constraint.*

Following the analysis of the data, we will discuss the overall results from an information processing point of view and try to determine what they all have to do with human cognition.

The Data and Coding Principles. The data reported in this study consist of two conversations, which, together, take about an hour's time. Both are multi-party conversations: one takes place at a dinner table, the other is an after-dinner talk, taking place at approximately the same location.

How one analyzes the data is as important as the data themselves. The approach to the discourse evidence could significantly determine the outcome of the analysis. Past research on language has tended, for a variety of reasons, to take the sentence as the basic unit of description and theoretical generalization; however, the most likely candidate for the status of basic information-flow units for spoken discourse are smaller than the sentence. The clause, defined grammatically, and the 'intonation unit', defined prosodically, have each been proposed by different discourse researchers. Givón hypothesized (1983: 7) that the clause is 'the basic information processing unit in human discourse' (cf. also Chafe (1980, 1987)). Other dicourse researchers have proposed a similar role in spoken discourse for the intonation unit, defined as a stretch of speech uttered under a single coherent intonation contour, it is frequently demarcated by an initial

pause. Chafe has hypothesized that the units so delineated represent 'linguistic expressions of focuses of consciousness' (1980: 15).

According to Du Bois, the clause and the intonation unit often coincide, even though the positions of their respective supporters seem to be far apart (Du Bois 1987: 812). By the same token, my data are analyzed into clauses with special consideration for intonation contour. The working definition of a clause, in the present study, is *any stretch of speech containing a verb (cf. pp. 44-45 for a detailed discussion) and its arguments that is uttered under a single coherent intonation contour.* To illustrate, consider the following extract from the data:

(1) wǒ gāng lái de shíhou,
I just came NOM[2] time
'When I first (just) came'

sān ge yuè méi yoǔ huó gàn ne.
three Cl month not have work do REx[3]
'for three months I had nothing to do.'

wǒ shénmo gōngzuò yě méi zhǎodào.
I what work neither not find
'I could not find any work to do.'

wǒ yíxiàzi nàge mèn ne
I suddenly so lonesome REx
'I suddenly became so lonesome.'

zěnmo shénmo huó dōu zhǎo bù dào ne.
how what work all find not RVC[4] REx
'How come I can not find any work to do?'

This sequence is divided into the following clauses:

(2) wǒ gāng lái de shíhou
'When I first came'

(3) sān ge yuè méi yoǔ huó gàn ne
'For three months I had no work to do.'

(4) wǒ shénmo gōngzuò yě méi zhǎodào
'I couldn't find any work to do.'

(5) wǒ yíxiàzi nàge mèn ne
'I suddenly became so lonesome.'

(6) zěnmo shénmo huó dōu zhǎo bù dào ne.
'How come I couldn't find any work to do?'

The corpus of my data has a total of 276 clauses containing 447 arguments. All the referring expressions, the NP's, independent pronouns, and zero forms, have been singled out from the texts. These reference forms are termed *mentions*, following Du Bois (1987). Each mention is then analyzed according to a) Dixonian roles; b) lexicality; and c) information status.

Under Dixonian roles, a mention is analyzed as one of what he refers to as the three major types of arguments, the 'universal semantic-syntactic primitives'[5], *A*, *S*, *O*, and *Oblique* (Dixon 1979: 59). *A* is the argument which prototypically would be the agent of a transitive verb; *S* is the single argument of an intransitive verb; and *O* is the argument which prototypically would be the patient of a transitive verb. *A*, *S* and *O* constitute the *direct* arguments in a clause. The argument that follows a coverb is coded as Oblique, which is considered an *indirect* argument.

Clauses are divided into intransitive clauses and transitive clauses. An *intransitive clause* has a verb and its nucleus, in which case an intransitive verb may be classified according to whether its nucleus is 1) an adjectival verb, 2) the copula, or 3) neither of these.

The first type of intransitive clause is that which takes an adjectival verb. An example would be as follows:

(7) nǐ pàng le
you fat CRS[6]
'You have gotten fat.'

The vast majority of adjectives may function as verbs in Mandarin Chinese. That is, they may be the nucleus of a verb phrase, as in the above example, where the adjectival verb is followed by a sentence-final particle.

Another type of intransitive clause in Mandarin Chinese is clauses that contain a subject noun phrase linked to a nonreferential noun phrase by the copula. The nonreferential noun phrase serves to characterize or identify the referent of the subject noun phrase. The copula verb serves as a link between the two. Thus, the nonreferential noun phrase following the copula (otherwise known as predicate nominative) is not an object of the copula verb. The verb phrase in the clause is intransitive.

In dealing with such clauses, we code *S* for the referential subject. The nonreferential noun phrases are not referring expressions and are therefore not singled out from the text, since they are not relevant to the present study. As an illustration of what is regarded as a predicate nominative, consider the following example:

(8) tā bàba shì wǒ dìdi de lǎoshi
SUBJ PRED NOM
3sg father be I brother GEN teacher.
'His/her father is my brother's teacher.'

The third type of intransitive clause is that which contains an intransitive verb that is neither an adjectival verb nor a copula. This type of intransitive clause may contain a coverb[7] phrase or an adverbial phrase. For example:

(9) wǒ gēn tā hé - bù - lái
I with 3sg can't:get:along
'I can't get along with him/her.'

There is no object in such a clause and the subject in this case is coded *S*.

When the meaning of the verb in the clause requires two participants and one of them is doing something to or directing some behavior at the other one, such a clause is called a *transitive clause*.

Nouns and/or pronouns that follow a coverb are coded as *Obl*(ique), except in the case of *bǎ* constructions and *bèi (jiào, ràng, gěi)* constructions. In the *bǎ* construction, the

direct object is placed immediately after *bǎ* and before the verb; in the *bèi (jiào, ràng, gěi)* construction, the agent is marked by being placed immediately after *bèi* (or its variants) and before the verb. To recapitulate, look at the following example:

(10) tā zài táshuguǎn kàn bào
S OBL O
3sg at library read newspaper
'S/he at the library reading newspaper.'

Admittedly, topicality is an important phenomenon in Mandarin Chinese. It should be revealing to find out what role topics play in relation to the PAS. For the purpose of this study, however, we will not examine topics as part of the analysis. The magnitude of such a study would require separate effort. Nonetheless, we will bring up our speculation about topicality in relation to the PAS in the discussion.

Under lexicality, a mention is analyzed in terms of what the code element is that conveys the information; i.e., how marked it is grammatically and how prominent and distinct or large the coding device is. The parameters are:

1) NP (for fully lexicalized mentions);
2) pronominal (for pronouns as reference) and
3) zero (for ellipsis).

Under information status, the activation state of the information that the mention carries is examined. The states of activation are categorized into 1) identifiable; 2) inferable; 3) generic; 4) brand new; and 5) brand new anchored. Notice that we have not used the category 'given', choosing instead a) identifiable; b) inferable; and c) generic, to make a richer set of distinctions.

Identifiable, or definite, information is that for which the speaker assumes that the hearer can pick out and establish reference. It is information that is already available within the universe of discourse. Non-identifiable, or indefinite, information, on the other hand, is that for which the speaker assumes the hearer will not be able to pick out and establish reference based on information already available within the universe of discourse (cf. Chafe (1976), Du Bois (1980)). When introducing information which is indefinite and referential, speakers are most commonly requesting their hearers to open an active discourse file for it; i.e., to activate related information. Afterwards, it is treated as identifiable.

Inferable mentions are those whose referents were at one time active but, although no longer activated in the participants' memories, are still retrievable. The identification of the referents are therefore accessible by inference. Such inferences are usually made by virtue of commonly shared cultural knowledge: schemas, scripts, and conventional situations.

Generic mentions are those that can be immediately identified because of the shared generic-cultural context and the world view that members of the same culture/speech community hold roughly in common, such as general truth about the world.

Brand new information is that which may not have previously been in the hearer's memory at all, or that which may be in long-term memory, or in peripheral consciousness. Information of this status is not immediately accessible within the hearer's active consciousness.

Brand New Anchored refers to mentions that are brand new to the hearer but which are linked or 'anchored' to some other discourse entity that the hearer has already known.

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According to Prince, "a discourse entity is Anchored if the NP representing it is LINKED, by means of another NP, or 'anchor', properly contained in it, to some other discourse entity". (1981: 236)

In analyzing sentences into clauses, one construction stands out as demanding special attention. That is the pivotal construction. The defining characteristic of the pivotal construction is that it contains a noun phrase that is simultaneously the subject of the second verb and the direct object of the first verb. The noun phrase functions as a 'pivot' relating the two verbs.

In dealing with pivotal constructions, we further divided them into clauses, the 'pivotal' noun/pronoun therefore gets two sets of codings. The coding can be illustrated as follows:

(11) nǐ bié lǎo ràng tā chī bīngqilín
PRO **PRO/PRO** NP
A **O/A** O
IDEN **IDEN/IDEN** Generic
you not always let (3sg) eat ice-cream
'You shouldn't always let him eat ice-cream.'

Analysis and Results. We will, following Du Bois's methodology, examine the validity of each and all of the four constraints (cf. page 42) using the data.

The *One Lexical Argument Constraint*. Du Bois's study of Sacapultec shows that, in connected discourse, clauses with zero or one lexical argument are common and that it is rare to have clauses with two lexical arguments. Lexical arguments are meant to be mentions that are realized by full NP's, as opposed to pronominals or zero forms. The results of this study confirm the validity of the *one lexical argument constraint.* Such a constraint is found to exist in Mandarin Chinese.

Out of the 276 clauses in the data, 126 contain zero lexical arguments; 136 contain one lexical argument, and only 14 are found to contain two lexical arguments. The frequency of these three types of clauses is illustrated in Figure 1.

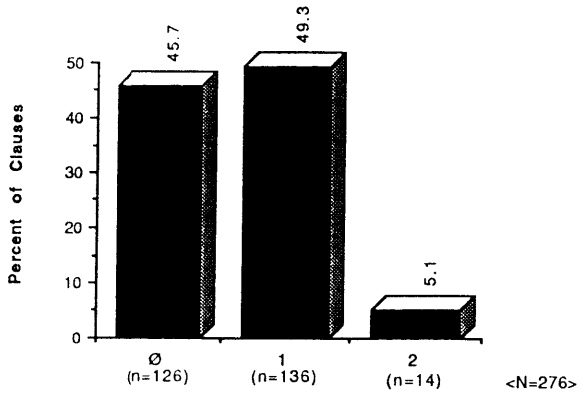

Figure 1. Frequency of clauses with zero, one and two lexical arguments.

Let us now compare the results from mandarin Chinese with those from Sacapultec (Du Bois 1987: 818).

	% of clauses w/0 lex arg.	% of clauses w/1 lex arg.	% of clauses w/2 lex arg.
Sacapultec	47.6	51.2	1.1
Mandarin	45.7	49.3	5.1

Table (1). Frequencies of clauses with zero, one, and two lexical arguments in Sacapultec and Mandarin Chinese compared.

The percentages look strikingly similar. The only thing that is somehow different is that in Mandarin Chinese there is a relatively higher percentage of clauses with two lexical arguments (5.1% vs. 1.1%). Still, the statistics overwhelmingly support Du Bois's claim that in connected discourse there is a tendency for speakers to avoid using more than one lexical argument per clause.

The lesser degree of similarity (5.1% vs. 1.1%) should not be taken to be significant. What is really significant is that the overall tabulations are similar. One thing that does become clear from these statistics is that the tendency to avoid more than one lexical argument per clause apparently exists in connected discourse, whether Sacapultec or Mandarin Chinese.

To further examine this claim, let us also look at the frequency of clauses with zero, one, and two arguments with intransitive and transitive clauses considered separately. This will clear up the possibility that the observed infrequency of clauses with two arguments realized lexically is simply a consequence of the infrequency of clauses with two argument positions; that is, the infrequency of transitive clauses. The data show the results as follows:

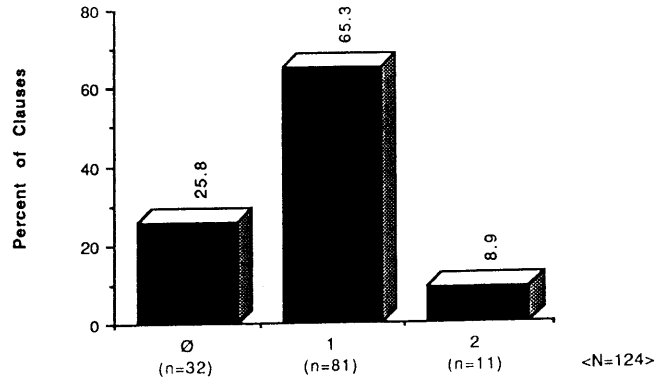

Figure 2. Frequency of transitive clauses with zero, one and two lexical arguments.

Intransitive clauses, of course, can not take more than one argument. The following graph demonstrates the frequency of intransitive clauses with zero and one lexical argument.

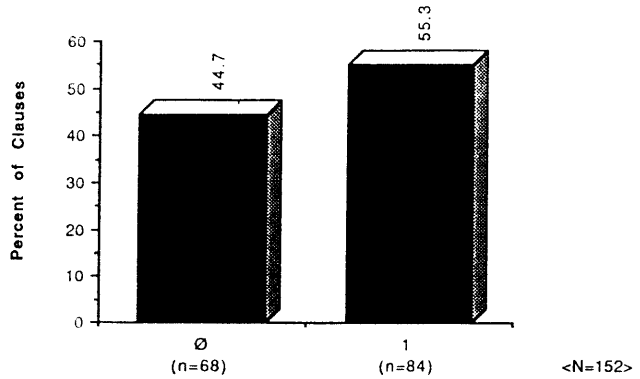

Figure 3. Frequency of intransitive clauses with zero and one lexical argument.

Again, we find the results to be surprisingly similar to Du Bois's study. In the use of intransitive clauses, even the percentages look alike.

	% of clauses w/0 lex. arg	% of clauses w/1 lex.arg.
Sacapultec	48.1	51.9
Mandarin	44.7	55.3

Table (2) Frequencies of intransitive clauses with zero and one lexical arguments: Sacapultec and Mandarin Chinese compared.

With transitive clauses, Mandarin has a relatively higher percentage of clauses with two lexical arguments (2.8% vs. 8.9%). Look at the following table to compare.

	% of clauses w/0 lex arg.	% of clauses w/1 lex arg.	% of clauses w/2 lex arg.
Sacapultec	46.9	50.3	2.8
Mandarin	25.8	65.3	8.9

Table (3) Frequencies of transitive clauses with zero, one, and two lexical arguments: Sacapultec and Mandarin Chinese compared.

These results, even with some differences, can once again strongly support the *One Lexical Argument Constraint.*

The *Non-Lexical A Constraint.* Now we come to an examination of the distribution of overt lexical mentions among the structural positions of surface syntax.

The data contain a total of 185 lexical mentions. Out of these 185 lexical mentions, 15 are A's, 50 are S's, 90 are O's and 30 are Obliques. Figure 4 shows the distribution of these lexical mentions among Dixonian roles.

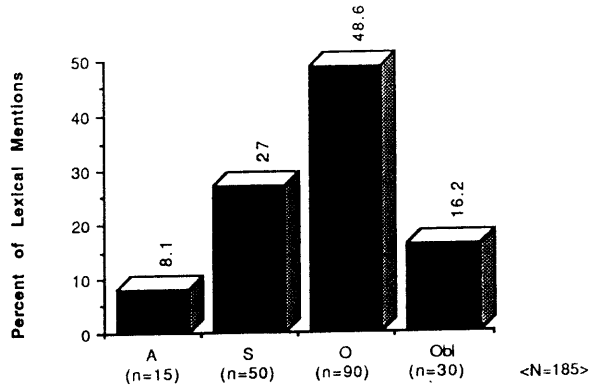

Figure 4. Distribution of Lexical mentions among Dixonian roles.

This shows that, similar to Sacapultec, a substantial portion of the number of lexical arguments appear in the *S* or *O* roles and a relatively smaller portion in the *A* role. This, again, is in agreement with Du Bois's results and supports his argument that when a speaker has a referent that needs to be mentioned lexically, either the *S* or the *O* role (among argument positions) may be freely selected, but the *A* role is not freely employed for the lexical mentions. Once again, we may compare the results from the two languages in table (4).

	% of all lexical mentions in *A*	% of all lexical mentions in *S*	% of all lexical mentions in *O*
Sacapultec	2.9	32.8	21.1
Mandarin	8.1	27.0	48.6

Table (4) Percentages of lexical mentions for grammatical roles: Sacapultec and Mandarin Chinese compared.

In Mandarin Chinese we find that the percentage of all lexical mentions for *A* is slightly higher than that in sacapultec. Why? To answer this question, let us first take a look at the information status of these lexical mentions for *A*'s. Here is what we fine:

Brand New	Brand New Anchored	Identifiable	Inferable	Generic
2	0	7	2	4

Table (5) Distribution of information status of lexical mentions for *A*.

A substantial part of these lexical mention *A*'s take the information status as *identifiable* (almost half). Out of these 7 mentions, almost all of them (6 out of 7) refer to culturally specific things, which are, in the meantime, common to the knowledge of the par-

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ticipants of the conversation--a group of students from China studying in the U.S. Among these mentions are *zǒngtǒng* (the President), *guóhuì* (the Congress), *cānyìyuán* (Senator), *měiguó zhèngfu* (the U.S. Government). These terms are culturally specific and there is a need in such conversations to realize them lexically: they are almost all proper nouns. However, they are also readily retrievable from the participants' knowledge base because they are part of (their) American life. Such may be considered a peculiarity of these conversations and an ultimate cause for the relatively higher proportion of lexical mentions for *A*.

To follow Du Bois, let us also compare the number of lexical mentions in each argument role with the total number of mentions in that role.

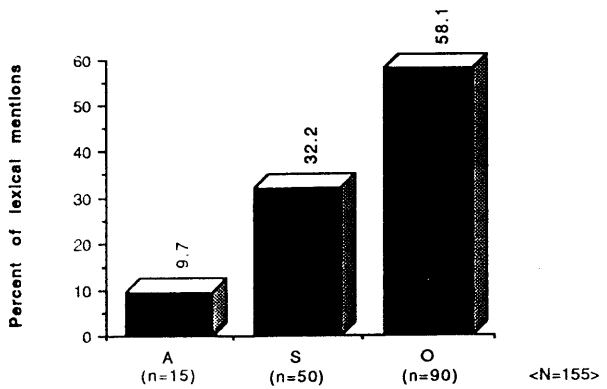

Figure 5. The proportion of argument positions that are lexical.

The above graph shows what proportion of each argument position is lexical in the observed data. Du Bois (1987) demonstrates that *S* and *O* both contain a substantial portion of lexical mentions (almost half) and that *A* contains a much smaller proportion of lexical mentions. Our observation show that, even though *A* contains a smaller proportion of lexical mentions, *S* does not contain a much larger proportion either, whereas *O* contains a great proportion of lexical mentions. Let us compare them with the following table.

	A	S	O
Sacapultec	6.1	48.1	45.8
Mandarin	9.7	32.3	58.1

Table (6) Proportion of lexical mentions: Sacapultec and Mandarin Chinese compared.

To see if the lexical NP's are randomly distributed across grammatical positions, let us test it by applying an X^2 test. If the distribution is random, we should expect a higher incidence of them in the *A* position.

	Lexical	Non-Lexical
A	15	93
Non-A	170	169

($X^2 = 4.44$, df = 1. $p < 0.05$)

Let us take a look at the results of the X^2 test with regard to only arguments:

	Lexical	Non-Lexical
A	15	93
S + O	140	142

($X^2 = 4.17$, df = 1, $p < 0.05$)

According to both X^2 tests, the null hypothesis that lexical NP's are randomly distributed can be rejected. In other words, the distributions are not random but follow certain patterns. That is, lexical mentions of the *A* role are significantly lower than expected. All this, even with the relatively lower frequency of lexical mentions in the *S* role and the higher frequency of lexical mentions in the *A* role as compared with the results of Du Bois's, supports Du Bois's claim that there is a tendency in connected discourse to limit the quantity of lexical arguments in a clause to a maximum of one and that this single argument is not distributed randomly across grammatically possible positions, but systematically disfavors the *A* role.

Now we see that, on the grammatical level, both the *One Lexical Argument Constraint* and the *Non-Lexical A Constraint,* which together constitute the grammatical dimension of the PAS, are applicable to Mandarin Chinese. Interestingly enough, we observe that for Mandarin Chinese, a language known to be by no means ergative[8], the discourse also has an ergative surface syntax. The discourse distribution of grammatical roles falls into a pattern which reflects the defining property of ergative languages: *S* and *O* constitute a class which is set off as distinct from *A*.

The *One New Argument Constraint*. Another constraint Du Bois proposed is the *One New Argument Constraint,* which, stated otherwise, would mean that in the domain of discourse pragmatics, speakers always avoid introducing more than one new argument per clause. This should not be too hard to accept once one takes into consideration such factors as information pressure in the discourse and the amount of information the hearer can possibly process. From an information processing point of view, a text, written or oral, is chunked into propositions (van Dijk & Kintsch, 1983). These propositions are similar to what we regard as *clauses.* The propositions/clauses should therefore be taken as information storage units. Chunks of stored information in coherent discourse are propositional. All these propositions are combined by an argument overlapping process (Anderson 1985). In this process, the propositions are overlapped by at least one (possibly two or three) chunk(s) of old information. These chunks of old information are mostly referential. They serve the function as the addressing, reference, or filename in the memory-storage of discourse (Givón 1988: 2). Information processing is made possible by such a process. By alleviating information pressure and thus preventing the overflow of information, the argument overlapping process assures that the hearer processes only a certain amount of information at a time, and, therefore, keeps the discourse coherent. With the overlapping process, a discourse is therefore by definition multi-propositional. We normally find equi-topic/theme chains in connected discourses, which is what makes a discourse coherent.

This argument overlapping process can well explain the *One New Argument Constraint* since both have the same psychological roots. While the argument overlapping

process is the cause at the level of cognition, the constraint is the effect that is realized at the level of production. It is our cognitive capacity that limits us in general to having not more than one new argument per proposition/clause. Only with such limitations on the amount of new information entering each proposition/clause is it possible for us to activate and process that chunk of information. Overflow of new information would overburden our processing capacity, hence, the maximum of one chunk of new information per proposition/clause.

With all this, we would expect the data in Mandarin Chinese to support the proposed constraint. In the data, 44 mentions carry either *Brand New* or *Brand New Anchored* information status, which means only 9.8% of the clauses are new. Figure 6 demonstrates the frequency of clauses with zero, one, and two new arguments.

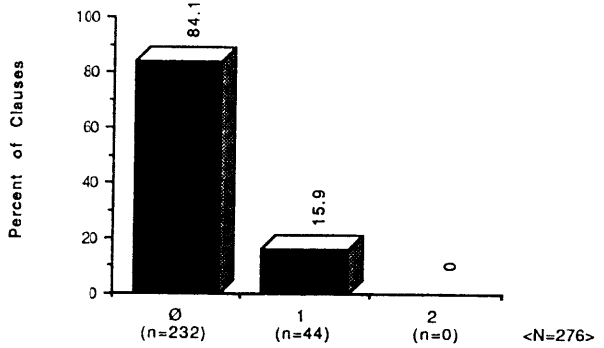

Figure 6. Frequency of clauses with zero, one and two new arguments.

There is an interesting difference between our results and Du Bois's: ours show an even higher frequency of non-new argument clauses (84% vs 73%). We consider this very indicative. It gives greater support to the observation that a clause can contain a maximum of one new argument; this is to facilitate the flow of conversation and help implement information processing.

The *Given A Constraint.* Now that we know only a maximum of one new argument is introduced per clause in connected discourse, let us find out where the new mentions go -- what is the distribution of new mentions in terms of their syntactic roles? Figure 7 shows the distribution in Mandarin Chinese.

In our data, all the new mentions are lexical. This confirms a fact that lexical NP's carry more information load, for more often than not they are employed to introduce new information. A full NP is typically selected whenever the referent represents new information (Chafe 1976: 31). As is clearly demonstrated in Figure 7, a relatively small proportion of all new mentions appears in the *A* role.

Now let us see what the proportions of new mentions are like in each argument position, as shown in Figure 8.

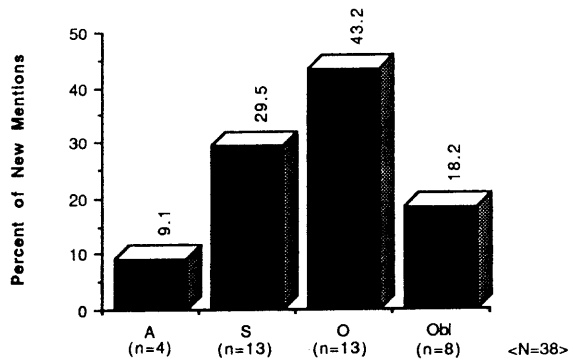

Figure 7. Distribution of new mentions among Dixonian roles.

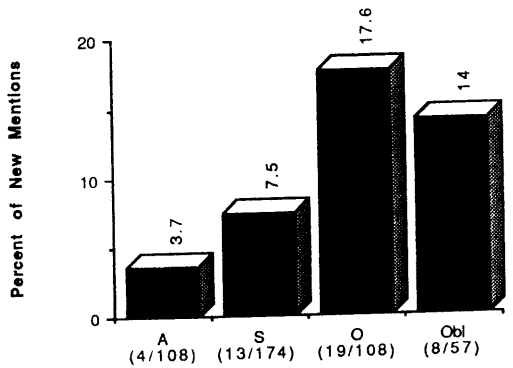

Figure 8. Proportions of new mentions in each argument position.

Admittedly, the results of my observation show a much less striking difference between the frequency of new *A* and that of new *S*, as compared to Du Bois's:

	% of new mentions in A	% of new mentions in S
Sacapultec	3.2	22.5
Mandarin	3.7	7.5

Table (7) Proportions of new mentions in *A* and *S* positions: Sacapultec and Mandarin Chinese Compared.

The results can still show, however, that the single new-argument mention that a clause may maximally introduce typically occurs in *S*, *O* and Oblique roles.

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Discussion. Now that we find that the PAS is exhibited in natural discourse of Mandarin Chinese, we can conclude that 1) the PAS is not restricted to a specific language or to a typological class of languages, since typologically Mandarin Chinese belongs to a completely different class from Sacapultec; that 2) ergative surface syntax is not limited to ergative languages, since Mandarin Chinese, being a nominative-accusative language, also demonstrates the ergative discourse pattern; and, finally, that 3) the PAS is independent of the grammatical type, i.e. ergative-absolutive, nominative-accusative, etc., realized in a particular language. The present study apparently supports Du Bois's claim that the PAS is a discourse-level, structure-independent motivation for a particular grammatical structure.

The universality of the PAS would greatly strengthen our speculation that the PAS is closely related to human cognition. Many of the constraints can well be understood as constraints to human cognitive capacity.

From a cognitive point of view, the basic unit of information processing is the mental proposition. On the surface, these mental propositions appear as recognizable clauses or sentences, but also as a single-chunk fragment that is much less recognizable as such, with some vital parts that must be assumed to be there at the level of interpretation, even though they are not showing up at all on the realized surface form. A coherent discourse is largely multi-propositional. These many propositions that make up a discourse are chained together by an argument overlapping process. Thus we normally can expect an equi-topic/theme chain in a coherent discourse.

From the hearer's perspective, the information that the propositions carry should be neither completely novel nor completely predictable. Either extreme would be untenable for information processing. Completely predictable propositions are useless to the hearer as s/he has no motivation to process them. Completely novel propositions are equally useless, since the hearer has no coherent framework to fit them into. Propositions/clauses in human discourse must thus be informational hybrids (Givón 1988: 3). While propositions/clauses contain new information to make the discourse meaningful, the existence of old information also functions significantly in the course of communication. Old information, more often than not functioning as topic/participant, serves as the addressing, reference or filename in memory-storage of discourse. From a cognitive perspective, it is the reasonable distribution of old information and new information in a proposition/clause and the sequencing of the propositions/clauses that make a discourse accessible and processable with adequate mental effort. The PAS is, therefore, an outcome of human cognitive capacity in processing a discourse.

The *One Lexical Argument Constraint,* for example, is clearly the effect of the limitation of human cognitive capacity on the amount of new information to be processed. Full NPs have a much greater information load because they are typically selected whenever the referent presents new information. To have two or more lexical NP's, therefore, would be equivalent to having two (or more) new arguments introduced into a proposition. As observed earlier, propositions are combined by an argument overlapping process. The fact that two new arguments are introduced into one proposition would certainly destroy this overlapping mechanism and, as a result, would make it hard for the hearer to store the proposition in his propositional network. According to Myhill (1988), this is a type of *repulsion.* He observed that highly categorial nouns and verbs tend not to occur in the same clause and that it is relatively unlikely for two highly categorial nominals to be used in the same clause. Full NP's are the most categorial and are most likely to represent new information. And as a corollary of the principle of *clustering,* pieces of new information are released in separate clauses. It is much less so the case with written communication. Written work would enable the reader to think longer and transform that one heavily loaded proposition to a few more propositions with arguments overlapping each other. It

is not impossible in natural oral discourse, it should be noted, for this to happen, but people tend to be more facilitative in oral discourses. Needless to say, the above argument also explains the *One New Argument Constraint,* as was elaborated earlier.

A unit of information transacted in discourse has a certain level of predictability, given its communicative context. The overall level of referential predictability of a nominal topic, embedded in a particular clause in discourse, is a complex function of many factors. These factors may be divided according to the three main contextual domains used systematically in human communication (Givón 1988: 9):

1) The deictically-shared context, or speech situation;

2) The generically-shared context, or culture knowledge; and

3) The textually-shared context, or preceding discourse.

These factors would explain the frequent use of zero-form arguments (95/447), and also why, in the observed data, we find so many pronominals (167/447). The interpretation of personal pronouns, place-referents, time-referents and deictic demonstratives can be made easy given the speech situation. In the two conversations that we observed, deictic context played a significant role in referential interpretation: many things can be pointed at and thus trigger topic changes at the dinner table.

Also important is the generic context. The shared generic-cultural knowledge of the participants in the conversations makes some of the referents accessible. Referents such as *zǒnǐǒng (the President), guóhuì (the Congress),* etc. are part of the knowledge base of the participants in the conversation and are, therefore, accessible to the receiver. This makes the speaker use more coding idn the form of full NP's.

The shared prior text is the major source of predictability in human discourse. The anaphoric discourse context referred to by linguists presupposes some structured text stored in some memory representation. The text is stored in part sequentially, in some linear (often temporal) order but at the same time the stored text is organized hierarchically, according to thematic units and sub-units -- story, chapter, episode, paragraph, clause (Givón 1988: 10). Pronominal and, most significantly, zero referent can adequately occur only when the referential distance, i.e. the gap between the last previous occurrence of the referent as a clausal argument in the preceding discourse and the current occurrence in the clause, is not too large. The effect of the referential distance on referential identification is presumably due to memory decay. Too big a gap in referential distance would then mean too much memory decay in recovering the identification of referents. Within the referential distance, however, there is potential interference competing for referential identification. While referential distance stems from the limiting capacity of memory recovery, referential competition comes from the limiting capacity of attention. Apparently, in speech processing only one referent at a time can occupy the focus of attention. When a single referent/topic has been established in the preceding discourse, and has persisted alone for a while, the normative assumption of human communication is that of default referential continuity (Givón 1988: 11):

1) All other things being equal, the current clausal topic also tends to be the topic in the next clause.

2) Coherent discourse will is biased towards default referential continuity.

Specifically, default topic continuity means that the current referent continues to occupy the focus of attention. Under such conditions, the least amount of mental effort is expended in filing the information in the next clause, because the filing address remains the same. In this case, we have the locally-important topic persisting and default grammatical procedures are used. Once can not help noting, in the observed data, that the amount of grammatical code that is spent in such situations is normally minimal. This is where we find pronominal and zero referents.

The fact that people avoid using more than one lexical argument and frequently employ pronominal/zero forms can, therefore, also be seen as a two-fold phenomenon. On the one hand, anaphoric reference takes many pronominal/zero forms to assure the hearer that the referent has been previously mentioned and that referent/topic stays in the default situation. Thus anaphorically the pronominal or zero forms also signal continuity of the discourse, keeping participants within the flow of the conversation. On the other hand, it is the outcome of coding economy. Since the filing address remains the same, not much mental effort is required in processing the proposition/clause. So, there is no point in employing a greater amount of grammatical code: greater lexicality, which will only overload the hearer with unnecessary interference than s/he can possibly handle. This is also indicative of the cooperative nature of human communication.

The topic of each successive clause retains its local importance by virtue of continuous occupation, i.e. for having been the locally important topic in the preceding clause. When topics change, however, the new or re-introduced topic must actively gain attention. When the default referential continuity is broken, i.e. a) when attention is disengaged; b) when a new topic is searched for and identified; and c) when attention moves to the new topic, more mental operation must take place. Such operation is more effort-demanding cognitively and more marked grammatically, in the sense that perceptually more salient topic-coding devices must be used. Such grammatical devices make use of the code quantity principle, which is stated as follows:

> The less predictable the information is (or the more important), the more prominent, more distinct or larger will be the code element(s) that convey it. (Givón 1988: 16)

The reason for employing the more distinct and prominent coding devices is that they attract more attention. And information that attracts more attention is memorized, stored and retrieved more efficiently, and can therefore function better as a topic.

The different constraints in the PAS, as we have observed, are simply the reflection of the ways in which speakers package information in a discourse. Specifically, the *One Lexical Argument Constraint* and the *Non-Lexical A Constraint* are reflections of how information is initially introduced/reintroduced and subsequently managed throughout the discourse. The *One New Argument Constraint* is the direct result of information pressure and the limited capacity of cognition as shown by the argument overlapping process. The *Given A Constraint,* that is, the appearance of lexical and new mentions in the *S* and *O* roles, but not the *A* role, is ultimately related to the role of topic continuity in the construction of discourse.

This may bring us to the observed fact that, in the data, the proportion of new mentions in the subject position looks more like the proportion of new mentions in the *A* position than in Du Bois's. (cf. Table (7)). This may be accounted for by the fact that the two studies use two different types of data, although both are natural connected discourse, one being narrative, the other being conversation.

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In conversation, however, there is a much lower, if any, density of participant introduction. And, unlike the narrative, there is a much smaller role for the human protagonists to play, in which case, subjects would be more aligned with agents in being indefinite and identifiable and in taking the less marked coding; i.e., pronouns and zero forms.

The fact that new mentions are typically coded in the roles of either *S* or *O*, but rarely in *A* accounts for the high preference of lexical mentions in *S* or *O*, but rarely in *A*. Thus *S* and *O* are paired together in that they both introduce new information to the discourse. While there is a strong discourse pressure uniting *S* and *O*, there is an equally strong, possibly stronger, discourse pressure which motivates a nominative category (Du Bois 1985: 355), namely the pressure to mark topical information. That is to say, there is an equally strong pressure to mark noun phrases which recur in successive clauses in a discourse. Under this discourse pressure, *S* and *A* are paired together in their tendency to code empty noun phrases, i.e. noun phrases which are human, agentive and topical. These two strong pressures amount to the discourse motivation for an ergative pattern.

Conclusion. The results of this study suggest the universality of the PAS, which greatly encourages our speculation that the PAS is closely related to human cognition. The constraints that we have examined can all be understood as constraints to human cognitive capacity. Specifically, they are largely related to the processability and accessibility of information and the mental effort that is spent in the course of information processing.

The observed facts convincingly indicate that word order in a language functions to a great extent on the basis of pragmatic factors. This lead us to assume that languages, in establishing the order and the particular grammatical form of noun phrase arguments in a clause, will systematically distinguish between information that is identifiable and information that is not identifiable. The packaging of information, therefore, must take account of old information, including both that communicated in the prior discourse and the unverbalized information that the speaker and the hearer share as implicit knowledge of the world, represented in frames, schemas, scripts, etc. New information must virtually always be integrated within a framework of shared (old) information, in order to be usefully interpretable. Therefore, in natural discourse, almost all messages contain both types of information. Typically, the larger part of a message will consist of given or presupposed material, while only a small chunk consists of the actual message, new information.

As we have observed, the old information greatly correlates with topic/thematic mentions and new information with comment/rhematic mentions. Similar observation was also made of Brazilian Portuguese in Dutra (1987:175-6): "new information about NP arguments is introduced in the discourse in post-verbal position -- for example, in O. As such, postverbal noun phrases will be, typically, lexical and indefinite". All this makes it hard for us to discard the speculation that topic-prominence in Mandarin Chinese *may* be motivated by the PAS and that the surface syntax of Mandarin chinese is more of the result of discourse pressure. It will, therefore, definitely be worth the effort to find out the relationships if any, between the distribution of topics and the PAS in Mandarin Chinese and see if Mandarin Chinese is more indicative of discourse property of language in actual use.

The observed data, confined to the production end as they are, should be indicative of the comprehension end as well. The packaging of information should in the meantime have said something about the unpackaging of information. At any rate, further study would be of great value to find out whether it is the same case on the comprehension end and what that would reveal about human cognition.

Notes

[1]LaPolla (1990) gives an insightful typological analysis of this fact. He argues that "in a pragmatically controlled language, the order of elements is not as crucial to interpreting the semantics of what the speaker is trying to convey. Word order reflects more the flow of information, and syntactic constructions grammaticalize this rather than syntactic functions." (LaPolla, 1990:2).

[2]The data of my study are glossed using the same notation as in Li and Thompson (1981). Explanatory remarks about the notations are made in the footnotes when necessary. Otherwise, I assume the reader is familiar with the notation in question.

[3]Following Li and Thompson (1981), the sentence-final particle *ne*, which has the semantic function of pointing out to the hearer that the information conveyed by the sentence is the speaker's response to some claim, expectation, or belief on the part of the hearer, is glossed as REx (Response to Expectation).

[4]RVC stands for Resultative Verb Compound. The negation particle *bù* (not) comes in between the compounding elements, as in the case here.

[5]Du Bois (1985) argues that *A*, *S* and *O* are not universal primitives. However, they are useful heuristic notions. We will use them nonetheless, just as Du Bois does.

[6]CRS stands for 'Currently Relevant State' which is the basic communicative funciton of *le*. Firstly, this means that *le* claims that a state of affairs has special current relevance with respect to some particular situation. When no other situtation is mentioned, it is always assumed that the statement signaled by the sentence with the *le* is relevant to *now*, that is, to the situation of the speech context in which the speaker and hearer are engaged. If another situation is explicitly mentioned, then the statement signaled by the sentence with the *le* is claimed to be relevant to that particular situation. Secondly, *le* claims that some state of affairs signaled by the sentence is relevant for the speaker and the hearer.

[7]The term *coverb* refers to a class of morphemes in Mandarin Chinese which includes such morphemes as *gēn* 'with;, *cóng* 'facing', *yàn* 'along' and the like, as well as forms that figure prominently in certain grammatical constructions such as *zài* 'at' used in locative constructions. An example of a coverb phrase in Mandarin Chinese would be:

e.g. ta cóng nǎr lái?
3sg from where come
'Where did s/he come from?'

[8]LaPolla (1990) argues that there is no evidence that Chinese has nominative-accusative syntax. In fact, he claims that Chinese morphosyntax exclusively codes pragmatci categories, not syntactic functions and that in Chinese pragmatics is more basic than syntax.

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