ABSTRACT
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group of Chinese learners of English, an analysis of this type of
systematic variability is proposed in terms of typlogical
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English is chosen because cross-linguistic comparison reveals
interesting differences between Chinese and English. The results
suggest that there is internal consistency in the way learners apply
wh-movement to a range of permissible contexts. It is reflected by
stages of development in which the learner's initial knowledge is
observed to undergo a process of reorganization as new information
about the potential contexts that permit wh-movement is gradually
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occur. (Author/JL)

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Systematic Variability:
In Search of a Linguistic Explanation

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Abstract

This paper examines a specific aspect of systematic variability, which is taken to be a result of influence of linguistic context on interlanguage (IL) performance. While it is important to describe how or under what circumstances a linguistic context exerts an influence on IL development, one also needs to explain why it occurs. On the basis of an L2 study which examines the development of wh-movement in different extraction sites among a group of Chinese learners of English, we propose to analyze this type of systematic variability in terms of the typological characteristics inherent in these extraction sites. Wh-movement in English is chosen because cross-linguistic comparison reveals interesting differences between Chinese and English. The results suggest that there is internal consistency in the way learners apply wh-movement to a range of permissible contexts. It is reflected by stages of development in which the learner's initial knowledge is observed to undergo a process of reorganisation as new information about the potential contexts that permit wh-movement is gradually incorporated into his IL grammar. During this process of linguistic reorganisation, the subjects' performance is observed to vary depending on (a) which stage of IL development he is at, and (b) the internal properties of the linguistic context in which the movement rule may occur.

IL Variability

IL development is characterised by a high degree of variability, which may be described either from a horizontal or a vertical perspective, following the terminology adopted in Ellis (1989). The former refers to the variability that is evident in language use at a given point in time while the latter implies changes due to the development of IL grammar over time (i.e. order of development). Studies investigating either of these dimensions have documented that IL varies

systematically, hence development is predictable (see Tarone 1988 for a comprehensive review of the issue). There are different approaches to such an investigation. It may be studied in the context of individual variation, due to different learning styles, socio-cultural variables, psychological variable..etc. Alternatively, variability may be seen as a result of cognitive processing constraints such as attention to form, degree of automatic retrieval which are implicit in the discourse domains that a task may involve. Studies adopting the first two approaches have figured most strongly in the SLA literature (Schumann 1979; Meisel et. al. 1981; Beebe and Takahashi 1989; Bialystok 1982; Hulstijn and Hulstijn 1984; Ellis 1989, to name a few). The third approach is represented by the work of Huebner (1985) or Andersen (1984) in which they examine variation within the same sample of IL of an individual speaker as well as over time. It refers to the learner's continuous effort to explore different linguistic forms, both target and non-target, to convey the same intended meaning. Adopting this framework of analysis, Andersen claims that variability reflects a "restructuring" process over time, which provides valuable sights as to the way in which the learner's IL subsystems are organised or reorganised.

There is one aspect of systematic variability which has not been given sufficient attention so far. It deals with the effect of linguistic context on IL performance, which is regarded by Ellis as one of the potential sources of systematic variability, along with situational variables. Investigation of this type of variability may be subsumed broadly under the third approach just mentioned. What is common between this and Andersen's approach is the interest in studying variability of the developing IL grammar in its own right, with the assumption that it signals restructuring in progress. Although studies that examine this issue are not many, they provide preliminary evidence regarding how the phonological, morphological or syntactic properties of the linguistic context create an effect on IL development (see Dickerson and Dickerson 1977; Gatbonton 1978; Sato 1985 for evidence in phonological acquisition; Ellis 1988; Wolfram 1989 for morphological acquisition; Hyltenstam 1978; Ellis 1984 for syntactic acquisition).

A few conclusions can be drawn from these results. As a whole, that the influence of linguistic context on systematic variability is confirmed. The production of a target variant is affected by the properties of the preceding or following linguistic structure. For instance, the production of target-like /z/ by a group of Japanese learners of English in Dickerson and Dickerson's study is more frequently observed when it is before a vowel than before a consonant. In

Wolfram's study, the nature of the verb--regular or irregular--determines the successful application of tense marking. With syntax, Ellis (1984) observes that inversion is subject to which wh-pronoun is employed. Inversion in WHAT and WHO occurs more frequently than in WHERE and WHEN. Another much quoted study is Hyltenstam (1978) in which the Swedish learners' placement of the negator systematically varies depending on whether the clause it occurs in is a main or subordinate clause. In another study by Hyltenstam (1984), inversion occurs more frequently when the finite verb is an auxiliary verb than when it is a lexical verb. Based on the results of his studies, Hyltenstam goes further to suggest that cross-sectional data on horizontal variability mirrors the process of acquisition over time. Learners acquire the structure by systematically extending their knowledge to first one environment and then another. This stimulates an important theoretical question of why, at a particular stage of development, a certain linguistic context potentially 'favours' the application of a developing rule while others do not. Is it to do with the linguistic properties of the context of rule application? Or is the learner endowed with certain learning mechanisms which enable him to perceive certain properties at specific times of his IL development? The task in the study of IL variability is two-fold. It requires a description about the way IL varies as a result of certain linguistic or situational constraints; at the same time, it seeks an explanation of such a pattern of occurrence, to find out why and under what circumstances systematic variability results. As Andersen (1989) states, "In a dynamic framework of acquisition over time, systematic variation reflects a transition from an earlier invariant state S_1 to a second later invariant state S_2." (p.47). According to him, the ideal goal of the study of variation is "to reduce variation to invariance plus principles that account for the variation". These principles in his framework of analysis are similar to the set of cognitive operating principles of the type Slobin (1985) has worked on in first language acquisition. They are said to guide learners in their perception of structural relations and to incorporate it into their IL grammar. As far as the present study is concerned, we propose to investigate what the inherent properties of not only the developing rule but also the linguistic context for rule application may offer to our understanding of variability in IL development. It is argued that the employment of a developing rule in a range of contexts should in principle reflects the typological characteristics inherent in these contexts.

An Implicational Universals Approach to the Study of Systematic Variability

Within the typological perspective, universal generalizations are derived from observing the linguistic regularities of the world's languages. For instance, the word order universal put forward by Greenberg (1966) postulates that languages with dominant VSO order are always prepositional. A particular kind of typological universals, the implicational universal, has been adopted as a working hypothesis for second language acquisition research. The statement, 'If P then Q', assumes that if property P shows up in a language, one can also predict the existence of property Q, but one would not predict the existence of P without Q. Such statement also entails a degree of markedness with these two properties, in that P is regarded as typologically more marked than Q by virtue of its less frequent co-occurrence when compared with Q. A number of SLA studies have attempted to bring the influence of certain predefined implicational universals to bear on the order of development. These studies examine the acquisition of relativization (Gass and Ad 1984, Pavesi 1986, Eckman et.al. 1988; Doughty 1991) or wh-fronting in direct questions and inversion in both yes-no questions and wh-questions (Eckman 1987). The data so far have lent support to the hypothesis that IL grammar second language development is conditioned by typological markedness and universal constraints on the structure of natural languages.

A fundamental question with this approach is whether it has psychological validity since the universals are proposed on the basis of cross-linguistic data and not of acquisition data. With the corroborative results mentioned above, Gass (1989) claims that universal constraints on the formation of natural languages are also at work during the development of a learner language, given the assumption that learner languages are natural languages and are therefore subject to the same constraints inherent in the surface linguistic facts to which the learner is also exposed. Seen in this light, where systematic variability is taken to be an integral part of IL development, the development of a structure in a range of permissible linguistic contexts should in principle be attuned to the constraints inherent in these contexts. This is based on the assumption that at any point of IL development, systematic variability is conceived as an outcome of interaction between the inherent properties of linguistic context and the processes of acquisition. The studies on the acquisition of relativization may in fact be construed as evidence for this issue. In the following study, another implicational universal will be used to examine how typological markedness serves as the basis on

which systematic variability is interpreted. This universal deals with wh-movement in direct questions, with particular reference to the potential extraction sites to which it is applied. The discussion below will concentrate on how this rule operates in both English and Chinese. Where necessary, other cross-linguistic data will also be discussed.

Wh-movement in English and Chinese

In English, wh-movement plays a key role in constructions such as wh-questions, relative clauses and topicalisation where the wh-expression is moved to the clause initial position. Huang (1982) argues that wh-movement is a substantive universal which manifests itself either at the level of S-structure or logical form (LF)[1]. That is, all languages have the same semantics of questions but differ in the way it is realized syntactically. Comrie (1990) proposes three generalizations regarding the extraction phenomenon in wh-questions:(a) there is no extraction, as in Chinese (b) extraction is restricted within the clause, as in Russian, and (c) extraction occurs across clause boundaries, as in English. Since this study concerns mainly extraction within the clause, further discussion about this phenomenon is in order. A cogent description in relation to this issue is found in O'Grady (1987) in which he examines three extraction sites commonly found in languages. In general, all deals with extraction from a VP or constituents under VP. They are (a) extraction from a VP, as in (1a), (b) extraction from a PP dominated by a VP, as in 1b; and (c) extraction from a PP dominated by an NP.

1a. What did Mary [$_{VP}$ cook___]?
1b. What did the boy [$_{VP}$ hit [$_{PP}$ with___]]?
1c. Who did you [$_{VP}$ see [$_{NP}$ a picture [$_{PP}$ of___]]]?

O'Grady observes that typologically, Wh-questions in Chinese exhibit strict adherence because they do not involve wh-movement. For languages that require wh-movement, they differ in the range of extraction sites permitted. Korean allows extraction from no other phrasal categories except VPs. Dutch allows extraction from a VP or from a PP under a VP whereas French permits extraction from a VP or an NP under a VP but not from a PP. By contrast, English represents the most marked grammar since it allows extraction from all three

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[1] Note that Huang is adopting the GB approach to the analysis of wh-movement in Chinese questions, which is beyond the scope of the present discussion.

phrasal categories. To account for such cross-linguistic variation, he has formulated a Phrase Type Hierarchy which is based on the Continuity Requirement (O'Grady 1987, p.90).

The Phrase Type Hierarchy:

(a)   No discontinuous constituents.

(b)   Only VPs may be discontinuous.

(c)   Only VPs and PPs may be discontinuous, OR only VPs and NPs may be discontinuous.

(d)   VPs, PPs and NPs may be discontinuous.

He further suggests that these levels occur in an implicational relationship, that is, the existence of (d) implies the existence of (c),(b) and (a), but not vice versa. Moreover, this hierarchy also implies a degree of markedness in that (c) is more marked than (b), and (d) is the most marked. Although O'Grady defines markedness in terms of the types of discontinuity permitted within the clause, it is understood that this definition is also based on his observation on typological data.

Another phenomenon in relation to (c) and (d) is preposition stranding, in which the wh-expression is extracted from a PP, leaving the preposition behind. Preposition stranding has been argued to be structurally more marked than its nonstranded counterpart, i.e. pied-piping, in which the preposition occurs along with the wh-expression in the clause initial position (c.f. With what did the boy hit? (1b)). A number of suggestions have been made to account for the markedness contrast between the two constructions[2]. In the spirit of O'Grady's analysis, stranding is more marked because in the first possibility in (c) or in (d), it leads to an additional discontinuous PP. Note that the second

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[2] In the generative framework, Hornstein & Weinberg (1981) proposes a marked syntactic rule of reanalysis, in that in the domain of VP, a V and any set of contiguous elements to its right can form a complex V, in the form of the following: V --> V* (where V c-commands all elements in V*) Applying reanalysis to absorb the preposition in 1b into the verb, the trace will be immediately c-commanded by the verb, hence properly governed. Note that reanalysis is an optional rule which applies before case marking. This syntactic rule may serve to explain the markedness contrast between 1b and 1c; reanalysis in 1b involves a preposition only whereas in 1c, it affects both an NP and a preposition.

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possibility in (c) involves pied-piping although extraction from NP is permitted, this is different from (d) where stranding is permitted within the same extraction level. Even with languages that permit stranding, restrictions are found. Van Riemsdijk and Williams (1986) observe that stranding in Dutch is limited to the so-called R-pronouns. In English, there are a number of restrictions with respect to stranding, Hornstein and Weinberg (1981) claim that where the PP is not under the governing domain of VP, such as the temporal adjuncts, stranding is normally disallowed, as shown in the following example:

*1d. Which month did you [vp learn [np painting]] [pp during___]?

Also, stranding in 1c is said to be sensitive to lexical idiosyncrasy since a different choice of verb such as 'destroy' and 'find' causes a change of grammaticality.

1e. Who did you read/*destroy/*see a book about___?

In the context of acquiring wh-movement in English, Chinese questions will be considered as unmarked and English questions marked since Chinese questions do not require wh-movement but in English, wh-movement is obligatory[3]. During this process of acquisition, the Chinese learners' initial hypothesis may assume a no movement stage, probably as a result of L1 influence. Although they will be encountering ample positive evidence in the L2 data indicating to them that movement is obligatory in direct questions, the task of identifying those extraction sites that permit wh-movement is left entirely up to them Moreover, when approaching a stage in which extraction from a PP is involved, they will need to sort out the fact that in English both stranded and non-stranded questions are permitted only in certain contexts and in others only one of the two options is permitted. One can hypothesize that:

(a)   The learner will systematically apply the rule to the range of extraction sites in an order that reflects typological markedness, that is, extraction from a VP > extraction from a PP > extraction from a PP under an NP.

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[3] There is an exception to this rule, English allows the wh-expression to remain in situ with echo questions.

(b)   Before the learner successfully applies wh-movement to each of the extraction sites, at any point of his development, non-target variants will be adopted systematically in these contexts.

The Study

Linguistic contexts

This study serves a dual purpose. Apart from verifying systematic variability in the development of the three extraction sites identified above, a more detailed analysis on the learner's development of extraction from a PP is decided upon since there involves a number of restrictions in relation to extraction from a PP. Table 3 below displays a list of linguistic contexts from which a wh-expression is extracted. The first type involves extraction of a wh-expression that is immediately dominated by a transitive VP. Types 2 to 7 involve different types of PP extraction: Type 2 involves extraction from a PP which serves as a manner adjunct under VP. Types 3 and 4 involves dative questions (To- and For-datives) where the PP is separated from the verb by its sister NP. Type 5 involves what we commonly call 'phrasal verbs' where the verb and the preposition as a whole form a natural semantic unit. Note that this context allows stranding only. Type 6 involves extraction from a PP which serves as a temporal adjunct under S and in this case only pied-piping is permitted. Type 7 concerns extraction from a PP under an NP, which represents the most marked condition.

Table 3 Types of wh movement

Linguistic contexts	Examples	Stranding	Pied-Piping
1 Direct object of VP	Mary likes Peter very much	---	---
2 PP dominated by VP	Mary wrote with a pencil	yes	yes
3 PP after a sister NP (To dative)	Tom gave a book to Mary	yes	yes
4 PP after a sister NP (For dative)	Mary baked a cake for Jane	yes	yes
5 *Phrasal verbs	John looked after his sister	yes	no
6 PP dominated by S	Tom has many tests before May	no	yes
7 PP dominated by an NP	John took a picture of Mary	yes	yes

Subjects and Task

The subjects were formal classroom learners and received instruction on English since primary 1. At the time of the study, they had already been taught English question formation at primary 4, so one

could be quite safe to assume that they had developed some knowledge of wh-movement in English direct questions. Students from 5 levels of proficiency were chosen: primary 6, secondary 2,4,6 and first year undergraduates, renamed from group 1 to group 5 respectively. They were asked to do a question formation task which was written and untimed. In this task, a statement was given as stimulus. They were encouraged to produce as many questions as possible for the underlined expression in the stimulus sentence. The wh-expression was provided since this task was not concerned with its appropriate retrieval, but its syntactic movement during the formation of direct questions. A sub-class of wh-expressions were included, they were mainly WHO and WHAT, plus one or two WHICH MONTH and WHEN questions. There were 3 tokens for each context, making up a total of 21 responses. The items included in this task may be found in Appendix A. A group of native speakers was later recruited for comparison. To assess the learners' performance, one score was given to the successful application of each of the following process: wh-movement, stranding and pied-piping. Therefore, the total score of the contexts will range from one to three depending on whether one or more than one process are employed by the learner.

Results

Variability in the application of wh-movement in different linguistic contexts

The results in this section deals with whether the learners' application of wh-movement systematically varies according to the linguistic contexts identified; and whether such variability reflects typological markedness on the formation of IL. Table 4 summarizes the general performance of the learners according to their proficiency level.

Table 4: Development of wh-movement in different linguistic contexts

Level	N	TOTAL	TYPES OF LINGUISTIC CONTEXT						
			1	2	3	4	5	6	7
One	38	38.37	72.80	40.64	19.00	20.76	60 08	28.94	20.17
Two	40	42.98	76.6o	45.00	21.11	25.55	62.08	36.25	19.58
Three	39	56 70	89.74	53 84	40.45	44.72	85.47	39.74	33.33
Four	24	74.75	100.00	68.05	68.05	68.51	98.61	43.75	63.19
Five	34	80.59	100.00	74.18	78.75	80.39	96.56	58.82	62.74
Average:		56.78	86 47	54.85	42.60	45.33	78.57	40.85	37.14
Nat.speakers			100 00	98.74	100 00	100.00	100.00	97.50	94.44

In general, wh-movement in English direct questions is acquired first before other rules such as SV-inversion. Where extraction involves a PP, stranding predominates the data and appears a lot earlier than pied-piping, which is not observed until Level 4. From the results, the application of wh-movement is most successful the wh-expression is extracted directly from a transitive VP (Type 1). Another context favoured by the learners initially is the phrasal verbs (Type 5). Slightly poorer performance is found with Type 2 (i.e. extraction from a PP under a VP). With the other four types of wh-movement, performance is consistently far below average, except for the advanced learners (Level five). Among them, extraction from a PP dominated by an NP is consistently the most difficult. Another context which poses problems is extraction from a PP under S (Type 6). Between these two groups are the dative questions (i e. extraction from a PP which is separated from its head V by a sister NP). The mean scores thus provide some preliminary suggestions that the learners' performance on wh-movement systematically varies depending on the type of context to which the rule is applied. Such variability is generally observed either within each proficiency level or across all levels, reflecting both horizontal and vertical variability.

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Next, we test whether their application of wh-movement between these contexts is statistically significant. In the following analysis, subjects from all five levels are collapsed to form one population. The procedure Manova with repeated measure in SPSSx is used. The results as shown in Table 5 suggest that the subjects' performance is significant ($F = 222.02$, $p = .000$). Post hoc Scheffe tests are used to examine significant interactions between the extraction sites. The results are presented in Table 6.

Table 5. Manova analysis on Wh-movement (within subject effect)

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	317132 92	1218	303.77		
WH-MOVEMENT	404653 52	6	67442.25	222.02	.000

Table 6. Scheffe tests on significant interactions between extraction sites

	Type 7	Type 6	Type 3	Type 4	Type 2	Type 5	Type 1
Cell means	37 14	40.85	42.60	45.33	54.85	78.57	86.74
Cell totals	6499 50	7148 75	7455.00	7932.75	9598.75	13749.75	15179 50
Type 7	6499 50	0	649.25	955 50	1433 25*	3099.25*	7250.25*	8680.00*
Type 6	7148 75		0	306 25	784 00	2450 00*	6601.00*	8030.75*
Type 3	7455 00			0	477 75	2143.75*	6294.75*	7724.50*
Type 4	7932 75				0	1666.00*	5817.00*	7246 75*
Type 2	9598 75					0	4151 00*	5580.75*
Type 5	1374- 75						\	1420 75*
Type 1	151 75 5							0

df = 1044 N = 175 MSE = 303 77 k-1 = 7 F crit = 2 05 p = 0.05
F s = 14 35 t crit = 1235 19 *p = 0 05

In Table 6, the asterisks indicate significant interactions between the contexts being compared (t'crit = 1235.19, $p < 0.05$). One can divide these contexts into two groups for statistical comparison: Types 1, 5 and 2 vs Types 4, 3, 6, and 7. Performance between them is significantly different, suggesting that wh-movement develops first in contexts 1, 5 and 2 before the other four. It seems that reanalysing the preposition to the verb to form a 'non-decomposable' semantic unit like Type 5 has a significantly positive effect on the learner's development of wh-movement in this context. Another factor which may contribute to better performance is the fact that this context uniquely requires stranding, which seems to be readily perceived by these learners. On the contrary, there are few significant interactions between the extraction sites starting from Type 4 downwards. Unlike Type 5, Type 6 which uniquely

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requires pied-piping is not preferred by the learners. It is also interesting to note that even though the NP in Types 3 and 4 is not a discontinuous constituent, similar to Type 7, its presence does not encourage the application of Wh-movement initially. However, comparing the learners' development of Type 3/4 and Type 7 over time (see mean scores in Table 4), an apparent preference for Type 3/4 may be found as proficiency improves. It suggests that they are capable of distinguishing eventually the syntactic properties of the VPs between these contexts.

The last step of the analysis is to set up an implicational scale in terms of the application of wh-movement in the linguistic contexts under investigation. The rasch analysis is used for this purpose[4]. The scale is constructed with the difficulty estimate (in terms of logits) assigned to each of the raw scores in the analysis (see Table 1 in Appendix B). The reliability index for scaling the 175 subjects and the 21 items are 0.959 and 0.999 respectively, indicating that the implicational scale established below can be taken as a reliable measure of the subjects' application of wh-movement in the types of contexts identified.

Table 8. An implicational scale of the application of wh-movement in different linguistic contexts

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Type1        Type5                                      Typ:2        Type4    Type6
|------*----------|----*----------|----------------|----------------|*---------------|--*----*--*---*---|--------|
-4              -3             -2              -1               0              1  Type3   Type7    2.5
(high) < < = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = > >(low)
                                      Chance of success
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Type 1 which involves extraction from only one constituent such as the VP ranks the highest. This is followed by those contexts which involves two discontinuous constituents (i.e. VP and PP), among which

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[4] The rasch analysis provides a more objective analysis that predicts, probabilistically, what will happen when a person with a given level of ability meets a test item with given characteristics. Similar to Guttman's Implicational Scaling, the ability of people and difficulty of the item are plotted on the same scale. However, the rasch analysis allows us to get round the problem of selecting an artificial cut-off point to determine whether a structure is acquired or not. In sum, the rasch analysis provides a picture of the learner's development by maintaining an implicational relationship built upon his chance of success between the grammatical categories being scaled. A fuller explanation of this model is found in and Alaistair and Tang (1993).

Type 5 ranks a lot higher than the others. Type 7 which involves three discontinuous constituents ranks the lowest. Using the results here, one can predict, with a certain level of confidence that, the learner's success in applying wh-movement to the Type 6 context implies success in other contexts down the scale but not Type 7. In sum, this scale as presented confirms our hypothesis that the application of wh-movement to a range of permissible linguistic contexts can be predicted on the basis of typological markedness. Wh-movement is more frequently applied to extraction from an VP before extraction from a PP; and extraction from a PP dominated by an NP is the least favourable context of rule application. In other words, there are more successful instances of the less marked contexts than the more marked and success in extracting the wh-expression from an NP should in principle imply equal if not more successful application of this rule in the contexts down the hierarchy, as suggested by the "quantitative prediction" of Hawkins (1987). Hyltenstam (1984) suggests that implicational scaling based on cross-sectional data should reflect the process of acquisition over time; that is, horizontal variability should in principle reflect vertical variability (i.e. acquisition over time). The scale established here, which is based on the performance of individual subjects from 5 levels of proficiency, will represent stages or ways in which they reorganize their IL grammar in face of the potential contexts for rule development.

The co-occurrence of non-target variants

The results above generally reveal that a rule is not acquired in a wholesale fashion, but involves stages in which it is systematically applied across a range of permissible linguistic contexts. During this process of development, the data suggest the learners were conservative upon encountering new linguistic contexts. Without sufficient knowledge, they resorted to certain non-target constructions in their production. Table 7 below presents the percentage scores of three most prominent constructions. They may be regarded as non-target variants as opposed to the target preposed questions by virtue of the finding that they were consistently employed by the learners to overcome the difficulty in rule application at different stages of IL development. Where the wh-expression was an argument of the preposition under the governing domain of VP, the learners tended to retain the wh-expression in situ initially, leading to the co-occurrence of preposed and unpreposed questions in their production. That wh-movement became a variable rule was most prominent at Levels 1 and 2. Although wh-in-situ questions are permitted under special circumstances in English, what these learners

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have not yet developed is knowledge that, pragmatically, the meaning of the resultant echo questions differs from that of direct questions. In addition, we also observe that the more marked the context is, the more frequent it is for unpreposed questions to occur and this phenomenon is consistent across all levels of proficiency. For instance, Type 7 and to some extent Type 3 and 4 received the highest percentage scores regarding unpreposed questions at Level 1 and they also represented the last contexts for this non-target variant to get deleted. It is worth mentioning that wh-in-situ questions seldom occurred when the wh-expression was an adverbial (i.e.Type 6) and it was the first context for the learners to drop this incorrect hypothesis, almost as early as Level 2.

Table 7. Non-target constructions in IL performance

		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
Level 1	No movt.	3.51	4.39	14.04	14.04	12.28	1.32	14.84
	Sub. Q.	19.30	16.67	49.12	48.25	27.19	0.00	48.68
	No prep	----	12.28	11.40	6.14	2.63	21.05	7.89
Level 2	No movt.	1.66	3.51	6.14	.26	3.51	0.63	5.26
	Sub. Q.	23.68	24.56	81.58	75.44	50.00	0.00	76.32
	No prep.	----	8.77	7.89	3.51	4.39	55.26	9.21
Level 3	No movt.	0.00	0.00	1.75	0.00	0.00	0.00	3.95
	Sub. Q	11.40	15.79	34.21	29.82	17.54	0.00	31.58
	No prep	----	5.26	8.42	9.65	0.00	71.05	15.79
Level 4	No movt	0.00	0.88	0.00	0.00	0.00	0.00	0.00
	Sub. Q	0.00	1.32	4.39	3.51	0.88	0.00	7.89
	No prep	---	0.88	0.88	0.00	0.00	43.42	1.32
Level 5	No movt	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub. Q	0.00	0.00	0.00	0.88	0.00	0.00	0.88
	No prep	----	0.00	2.63	0.88	0.00	28.95	1.32

The second non-target variant is related to their avoidance of object extraction (Type 6 which involves extraction from a temporal adjuncts is irrelevant in this discussion). There seems to be a tendency for initial learners to produce subject questions although all items in the task required object extraction (e.g. Who gave a book to Mary?). In fact, from the data, most of these subjects were capable of extracting some object NPs on the same occasion (e.g. What the boy jumped over?, indicating that they understood the requirement of the task. Similar to the wh-in-situ variant, the typologically more marked context generally reveals a higher rate of occurrence of subject questions across all levels. Moreover, there appears to be a relationship between the

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occurrence of unpreposed questions and subject questions especially during the initial stage of IL development. As shown in Table 7 above, an upsurge of subject questions was observed at level 2 when the learners gradually dropped the no movement hypothesis. This learning phenomenon is seldom documented in the SLA literature and to what extent it is a result of L1 influence or of some other sources is subject to further investigation.

Where wh-movement is applied to the contexts in which a PP is involved, the learners were observed to delete the preposition systematically in these contexts, leading to the production of inappropriate questions on some occasions (e.g. What Mary drew? vs What did Mary draw with? or Which month they have many tests? vs After month months will they have many tests?) or ungrammatical questions on some others (e.g. Who John wrote a song? vs Who did John write a song for?). This phenomenon has also been noted in Bardovi-Harlig (1986) and in a recent study by Wolfe Quintero (1992). Both suggest that this "no-prep" stage may constitute the first stage of acquisition of prep-stranding in English direct questions. As shown in Table 7, deletion of the preposition was most prominent in the Type 6 context which requires pied-piping only. Also observed in this context were instances of stranded questions in the data (32.87% for Level 1, 15% for Level 2 and 2.5% for Level 3), or, with one item, some learners simply replaced the already provided WHICH MONTH by WHEN, hence simplifying the structure of the interrogative phrase. On the other hand, in the "phrasal verb" context, the rate of deletion was comparatively much lower than the other contexts and the first sign of overcoming this difficulty appeared as early as Level 2. It seems that, during subsequent development, the learners do not necessarily perceive the phrasal verb context to be different from the transitive VP context, regarding both the verb and the complex verb as a "natural predicate" for their NP argument.

Discussion and Conclusion

The study has presented data in support of the hypothesis that systematic variability can be explained by a theory of markedness defined in terms of typological characteristics of the world's languages. Linguistics contexts that are typologically less marked will encourage the successful application of a developing IL rule earlier than those that are more marked. If variability reflects the underlying restructuring process of IL grammar, as suggested by Andersen, the present study suggests

that it involves a series of testing of hypothesis on the linguistic contexts that potentially permit wh-movement. As new information is incorporated into the IL grammar, it triggers a series of structural changes of the internal rule subsystem. An outcome of this process of rule reorganisation is reflected by the learners' adopting both target and non-target variants in his IL performance. From the data, along with target preposed questions, other non-target constructions such as unpreposed questions, subject questions and the deletion of the preposition are consistently adopted by the learners especially during the initial stages of development. The results also suggest that the choice of one variant over the other is determined not only by the current state of IL grammar, but also by the inherent properties of the linguistic context.

However, there are a few caveats which deserve some discussion here. By positing an implicational order of rule application, we seem to suggest that, on the basis of this order, one can identify discrete stages of IL development progressing from the unmarked to the marked. To recall, the data collected are from a cross-section sample of Chinese learners of English, which is different from observing individual learner development longitudinally, with a view to eliciting when and how a form begins to emerge in his production. As Hawkins (1987) suggests, implicational universals stated in the form "if P then Q" is not as straightforward as it appears when it comes to predict language acquisition, both first and second. By acquisition, he refers to the first successful production and comprehension instances of the grammatical properties mentioned in an implicational universal. For instance, in terms of the "order of acquisition prediction" (Hawkins 1987, p. 457), implicational universals do not specifically predict that the acquisition of Q must necessarily precede P. All they say is that Q may either precede P or simultaneously with P but P will not be acquired before Q. Therefore what the present study may confirm is that the typologically more marked contexts for wh-movement are not acquired before the less marked contexts; but in no way can it suggest that the relevant rule will emerge in the less marked context before or at the same time as the more marked in their production. A longitudinal observation on individual learners' development may yield more fruitful analysis of vertical variability. Nevertheless, we do observe a counter example of this implicational universal as predictors of second language development, in that stranding, which is typologically more marked, was consistently produced before pied-piping. This finding corroborates previous studies on the acquisition of preposition stranding (Bardovi-Harlig 1986, White 1989). Bardovi-Harlig attributes this to the salience of stranding in the input data, hence readily perceived by the learners.

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Perceptual salience has also been adopted to account for the exceptional behaviour of the genitive relative clauses in a number of studies that examine IL development in terms of the NP Accessibility Hierarchy. As far as the present study is concerned, the salience of stranding may be further enhanced by a pedagogical effect. The teachers involved in the present study were interviewed after the experiment. All agreed that although pied-piping sounded formal, it was structurally "more complicated" than stranding Some even claimed that they would postpone introducing pied-piping to their students until very late or would leave the students to discover this process by themselves.

The second caveat is related to the universal in question. So far, few explanations have been advanced to explain why a universal becomes a universal or how the related universal constraints influence the formation of natural languages, or the interlanguage in this case. To explain the learnability of wh-extraction by Japanese learners of English, Wolfe Quintero (1992) argues that two types of principles are involved: language principles and learning principles. Language principles provide information about language structure while learning principles provide the strategies necessary to interpret and represent specific target langauge structure a learner is exposed to. Some of the learning principles suggested by O'Grady are conservatism, cumulative development and continuity. Taking these principles as a whole, learners are claimed to have an initial preference for structural continuity and their hypothesis will be the most conservative possible even if a more marked hypothesis is consistent with the input data. At the same time, development proceeds in stages and unfolds in increments, beginning from the least marked possible hypothesis. The results of the present study have provided some preliminary evidence that IL development may be seen as an outcome of the interaction between these learning principles and the typological characteristics of the world's languages. The principle of conservatism, for instance, may allow the learner to perceive the typologically least marked hypothesis before proceeding to the more marked contexts. In explaining language or typological universals. Hawkins (1988) claims they may involve mutual interaction between semantic. processing. cognitive and innateness principles. Taking processing as a plausible explanation, Hawkins claims that "processing difficulty is a gradient notion, with empirical consequences for language frequencies and implicationally defined co-occurrences of properties." In other words, the degree of processing difficulty will be reflected in the relative number of languages exemplifying the structure in question. He argues that it is possible that processing preferences join with other explanatory principles in shaping the structural options that

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a grammar can choose from. Seen in this light, one would wonder whether processing difficulty could explain the acquisition data as presented in the study. The results here seem to suggest that level of embedding may explain some but not all of the findings. One could argue that extraction from a transitive VP is less marked relative to extraction from a PP because the latter consists of two levels of embedding, hence creating more difficulty in processing such data in the input. Extraction from a PP dominated by an NP will be the most difficult to process since three levels of embedding are involved. However, it is also worth pointing out that level of embedding may not be the only factor constraining the systematic application of wh-movement to these contexts. The data suggest that even within the same level of embedding, there is a great deal of variation in the learners' performance. This can be exemplified by the learners' performance on the extraction of a wh-expression from a PP. To recall, there is a big gap between the development of wh-movement in the phrasal verb contexts and dative contexts, implying that level of embedding may not be the only constraint governing the reorganization of this IL rule, or the learners should attain equal success in applying the rule in these contexts. We are still a long way from having a clear explanation of the effect brought about by linguistic context. Further research are necessary to determine how universal constraints on the formation of natural languages will create similar effects on IL development; and more importantly, to what extent they interact with the learning principles to enable the learner to set up relevant hypotheses during the course of development.

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Appendix A

The list of items used in the written test.

1. Mary danced with <u>Peter</u>. (who)
4. Mary likes <u>Peter</u> very much. (who)
6. Tom gave a book to <u>Mary</u>. (who)
8. Peter found <u>a dog</u> in the box. (what)
9. Peter has been sleeping since <u>this morning</u>. (when)
10. Mary looked for <u>her mother</u>. (who)
12. Mary baked a cake for <u>Peter</u>. (who)
13. The boy jumped over <u>the gate</u>. (what)
14. Mary passed a key to <u>Jane</u>. (who)
16. John looked after <u>his sister</u> yesterday. (who)
17. They have many tests after <u>July</u>. (which month)
18. John took a picture of <u>Mary</u>. (who)
20. John wrote a song for <u>Mary</u>. (who)
22. Mary drew with <u>a pencil</u>. (what)
24. Peter turned on <u>the radio</u>. (what)
25. John found a photo of <u>Mary</u>. (who)
26. Mary made a doll for <u>Jane</u>. (who)
27. Peter kicked <u>the ball</u>. (what)
28. John lent a book to <u>Peter</u>. (who)

Distractors

5. The story is about <u>a cat</u>. (what)
2. Yes, he <u>killed a very long snake</u>.
3. John is going <u>to the zoo</u>. (where)
19. Mary is from <u>Hong Kong</u>. (where)
15. Yes, Mary <u>works every day</u>.
21. Yes, Peter <u>can drive very fast</u>.
11. Mary is good at <u>singing</u>. (what)

Appendix B

Table 1. Estimates of the test items based on the rasch analysis

	Type1	Type2	Type3	Type4	Type5	Type6	Type7
Wh-movt	-0.46	0.51	-0.01	-0.57	-1.52	-0.23	-0.18
	-6.05	-4.59	-0.46	-0.46	-0.69	-2.02	-0.76
	-4.42	-4.59	-0.29	-0.18	-4.59		
Mean:	-3.64	-2.89	-0.25	-0.40	-2.27	-1.12	-0.29
Stranding	----	0.95	1.23	0.20	-1.28	----	1.45
	----	-3.54	0.81	0.62	-0.57	----	1.67
	----	-2.48	0.95	1.05	-3.86	----	
Mean:		-2.32	0.99	0.62	-3.14		1.56
Pied-piping	----	4.13	3.92	3.55	5.02	3.99	----
	----	6.69	3.85	3.55	3.99	4.36	----
	----	4.91	3.55	3.49	----	----	----
Mean:		5.24	3.77	3.53	4.51	4.17	----
Grand mean:	-3.64	0.01	1.51	1.25	-2.703	1.69	1.81