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FOREWORD

The Department of Linguistics of the University of Victoria is pleased to present Volume 11 of the **Working Papers of the Linguistics Circle of the University of Victoria (WPLC)**. The articles appearing in this issue represent current research on language and linguistics at the University of Victoria. It is the editorial policy of the *Working Papers* to include an even representation of work by graduate students and established scholars.

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THE HISTORICAL DEVELOPMENT OF JAPANESE PSYCHOLINGUISTICS

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1. INTRODUCTION

The history of Japanese psycholinguistics, like that of Western psycholinguistics, is a relatively recent one and can be linked to psychological interests in language behavior over this century. Like Western psycholinguistics, the field has been confined largely to the discipline of psychology (See, for example, Haga: 1988), although more recently attempts have been made to incorporate current linguistic theory into the core of research directions (See, for example, Otsu: 1989). But Japanese scholarship has often followed an independent line of development in certain areas of scientific endeavor, and the analysis of language is an excellent example of unique perspectives on intellectual inquiry. For example, both traditional phonological analysis, as evidenced by the phonological elegance of the two *kana* syllabaries, and traditional grammatical analysis, as embodied in the discipline of *kokugogaku* 'the study of national language' are certainly derived from specifically Japanese perspectives. Some disciplines, like Japanese psycholinguistics, have also been influenced by European or Anglo-American theoretical concerns, with the resultant outcome that some focal areas in Japanese psycholinguistic research have been complemented or even enriched by these influences. Among these may certainly be counted the point-counterpoint status of the long-standing Japanese interest in *kana/kanji* processing, and the later Western parallels in lexical access, word recognition, and the structure of the mental lexicon. Similarly, recent neurolinguistic claims for hemispheric specialization in the comprehension and production of the syllabic *kana* versus the logographic Chinese-derived *kanji* characters are enhanced by the current medical technology found in PET scans, CT scans, and Magnetic Resonance Imaging techniques which pinpoint tissue damage for aphasic syndromes. Lastly, modern aspirations to harness even more clever generations of computational devices which can parse, make inferences as well as decisions, and even translate between languages, intersect with the boom in psycholinguistic work in sentence and text processing.

The history of Western psycholinguistics over the past century is well-known to interested linguists, but Japanese psycholinguistics is not. This paper attempts to fill this lacuna by illustrating the modern development of Japanese psycholinguistics by citing these four topics, namely, *kana/kanji* processing, hemispheric specialization and laterality differences, sentence processing, and text processing, and summarizing how these four areas have been approached and synthesized. One could, of course, take a strictly historical approach in listing dates and events,[1] but we believe that an issue-oriented approach will be far more enlightening. We do not, as a result, pursue the distant past too vigorously. For example, we are aware that the psychology of Leipzig's Wilhelm Wundt set the intellectual paradigm at the end of the 19th Century. We could have written on the likelihood that the general post-war decline of Wundtian psychology in favor of American behaviorism was slowed in Japan as a result of the influential purchase of Wundt's entire library by Sendai's Tohoku University after Wundt's death in 1920. But we instead choose to focus on the modern issues that psycholinguistics is currently pre-occupied with, and suggest that

this approach may be more informative of the recent historical development of Japanese psycholinguistics.[2]

2. KANA AND KANJI PROCESSING

Japanese employs a unique orthographic system which relies on two *kana* syllabaries and a large inventory of logographic *kanji* characters derived from several historical periods of Chinese influence. The *hiragana* syllabary is relatively cursive in character, and is used for writing non-kanji words and grammatical devices, such as function words and inflectional endings; as a result, it figures prominently in the normal presentation of written Japanese. The *katakana* syllabary, on the other hand, is relatively crisp and angular in nature, and is reserved for transliterating foreign words, proper names, borrowings into Japanese, and neologisms; it often serves as a form of marked writing system in the way that italics do in English, and it also appears frequently in some genres like advertising or signs presenting brand names and their qualities.

The received opinion is that the kana syllabaries evoke a phonological recoding in lexical access procedures, in that they are based on the relatively straightforward kana-to-syllable correspondences based on the V/CV canonical shapes found in Japanese phonology and morphophonemics. In contrast, the received opinion in respect to kanji processing is that their semantic values are directly accessed without special reference to their phonological readings, and is based on a word-specific strategy derived from visual shape.

However, recent psycholinguistic work has challenged whether such a simplistic view of kana-kanji processing can be upheld. For example, Osaka's work (See Osaka: in press, for a convenient summary) with eye-movements in reading Japanese texts calls for a reconsideration of the role of kanji vs. kana in processing text longer than a single word, and thus for understanding the cognitive processes in reading. The basic eye movements found in reading consist of a series of fixations and saccades, or movements until the next fixation point. The results from experiments using Japanese texts show that kanji-based texts are both easier and faster to read than kana-only texts. In kanji-based texts, the eye skips from kanji to kanji, using them like stepping stones to organize the text in a top-down processing strategy (Osaka: 1987). Moreover, the peripheral vision for kanji-based texts is wider (with a range of 6 words) than for kana-only texts (with a range of only 4 words). When Japanese subjects read English alphabetically-written texts, Osaka (1989) found that these subjects had the same eye movements as for kana texts, suggesting that phonologically-based writing systems (such as the kana syllabary and the English alphabet) and logographic writing systems (such as in kanji writing) elicit different processing strategies in reading. The implication is that kanji are accessed directly in the mental lexicon (See Osaka: 1990).

Contrary to popular beliefs about ease of reading horizontal and vertical texts, Osaka and Oda (1991) found no difference between these two modes of reading, as measured by both eye-fixation durations and saccade lengths. The effective visual field for both vertical and horizontal readings were found to be the same, namely, about 5 to 6 character spaces. Hirose and Hatta (1988) have also noted that reading disabilities are as common in Japan as they are in many Western countries, laying to rest the complementary belief that reading disabilities are extremely rare in Japan.

Work with lexical access and word recognition for isolated words also suggests that some kana shapes present immediate lexical access in the mental lexicon. For example, Besner and Hildebrandt (1987) found that visually and orthographically familiar words written in katakana were named faster than both non-words and visually unfamiliar words, suggesting that lexical access for such katakana words is achieved without reference to phonological recoding. Feldman and Turvey (1980) did, however, find that response latencies in naming color words that were written in kana were consistently faster than the words written in their familiar kanji counterparts. Their conclusion was that such phonologically-based kana forms support greater facility in naming, because the phonologically-based nature of kana supports greater facility in verbally naming the form. Lastly, some distinction between content words and function words should also be made, for it is unlikely that phonological recoding is needed in accessing all lexical items. Japanese, like English and alphabetically-based orthographies, probably elicits whole-word access for the configurational shape of function words, but word recognition studies have typically focussed on lexical access for content words.

Content words in Japanese are typically presented in text by the Chinese-derived *kanji* characters. Kanji have a special place in Japanese education, aesthetics, and consequently, in popular notions about the psychology of language; it is thus not surprising that this orthographic system has enjoyed an enormous interest in a large variety of psycholinguistic studies. A typical example of this focus can be seen in Kaiho and Inugai's (1982) attempt to rate the Gestalt characteristics of kanji, by using the *semantic differential* technique with 881 kanji. Indeed, there was overall high reliability among Japanese subjects for the 8 scales of complexity, compactness, elongation, openness, straightness, roundness, stability, and symmetry, and a subsequent factor analysis classified the kanji into 4 tighter groupings based on these Gestalt characteristics.

Current psycholinguistics is quite preoccupied with the structure of the mental lexicon, and the processes underlying lexical access and word recognition. And so also is the Japanese psychological literature, although through the medium of kanji processing. Kanji have been probed with semantic priming tasks, with the results often supportive of a spreading activation model of lexical access (See Kawaguchi: 1987; Naka: 1984). And Naka (1984) has paralleled Western findings with ambiguous lexical items, namely, that both meanings of an ambiguous homograph are activated (up to 0.6 sec) before one of the meanings is selected as the one linked to a context word (after 1.2 sec). Lastly, the logographic nature of the orthographic kanji unit has a shape which evokes both the phonological and semantic referent in an arbitrary way. Not surprisingly, Wang (1988) has found that the phonological and semantic processing of kanji are performed in a parallel mode rather than a sequential mode.

Priming experiments which examine lexical access procedures for words written in kanji offer some interesting perspectives on the full-listing vs. decompositional/affix-stripping positions on how word recognition is supposed to take place (See Kess: 1992, *Chapter 4*, for a fuller explanation of psycholinguistic experimentation in morphology and word recognition). Sakuma *et al.* (1989) examined whether kanji characters or word units are the recognition units in lexical access for vocabulary items written in kanji characters. A first experiment had two-kanji target words preceded by primes which consisted of a single identical kanji, two-kanji words which shared one identical kanji, or an identical two-kanji word. A priming effect was observed only when the primes were the identical two-kanji words. A second experiment examined whether priming effects appeared with single-kanji words. Once again, priming effects were observed only when the primes preceding the targets were the identical kanji characters. Simple kanji characters which corre-

sponded to the radicals of the target characters also failed to elicit any priming effect. Sakuma *et al.* concluded that lexical access for Japanese words written in kanji utilizes word units as the basic element in searching the mental lexicon, and not the kanji character units or analyzable parts thereof.

Psycholinguistic experiments which examine the difference in memory recall between kanji and kana words have not found dramatic differences for low-imagery and high-imagery words in recall tasks. When the task is an unexpected recall, high-imagery words do not exhibit a difference in the rate of recall between kanji and kana words; however, for low-imagery words, kanji words were better recalled than kana words. When the semantic task of free associations was required, however, there were no differences in the rate of recall between kana and kanji words (See Yokoyama and Imai: 1989). Delayed recall showed that both high-imagery and low-imagery kanji words were better recalled than kana words, and Yokoyama *et al.* (1991) suggest that there are differential recall processes for words presented in kanji and kana formats.

Lastly, to give some idea of the unique role accorded to kanji, we might note that some psycholinguists have even examined the knowledge that the congenitally blind have about kanji. Kaiho and Sasaki (1984) charted the possible correspondence between spoken words and written kanji, asking sighted and blind subjects which words that they expected to have corresponding kanji characters. Subjects produced as many kanji as possible, based either on the sound or on the radical (*bushu*) for the kanji.[3] The blind subjects did exhibit some sensitivity to the correspondence between words and kanji, though to a lesser degree than the sighted; in fairness, it should be noted that this is probably due to their naive, but accurate, grammatical assessment of words into part of speech classes which have a statistical probability of receiving kanji assignments. Although the blind do have some kanji knowledge, that knowlege of actual form is extremely poor; however, once form is acquired, it has a long residence in memory for the blind. The point to be made is that kanji are felt to be uniquely Japanese, and researchers apparently expect even the blind can have some psycholinguistic knowledge of their form and function.

3. HEMISPHERIC SPECIALIZATION AND LATERALITY DIFFERENCES

The received wisdom in the matter of kana vs. kanji processing is that kana recognition exhibits a right visual field (and thus left hemisphere) superiority, while kanji recognition for single kanji exhibits a left visual field (and thus right hemisphere) superiority. As a typical example, we may cite the findings by Hatta (1977b; 1978) that the logographically-based configurational shapes of kanji are mainly processed in the right hemisphere, while kana are processed in the left hemisphere, as well as Hatta's (1981a) finding that the Stroop test elicits greater interference in the left visual field while Japanese subjects are responding to kanji stimuli.[4]

But one must also discriminate between tasks which attempt to illustrate word recognition and lexical access procedures. For example, two favorite methodologies have been the *lexical decision* and the *naming* tasks, and they have often elicited different types of response. The *lexical decision* task requires subjects to decide whether a kanji is in fact a word, while the *naming* task requires subjects to articulate the word that a kanji stands for. Not surprisingly, the results may be different, and the typical finding is a reported left visual field (and thus right hemisphere) superiority for kanji naming, but either no visual field superiority or a left visual field superiority (and thus again right hemisphere) superiority for lexical decision tasks with kanji. This seems to

square with the general assumption that the left hemisphere analyzes linguistically-based patterned stimuli, while the right deals with visuo-spatial stimuli. This is what must explain the earliest findings by Endo *et al.* (1978) that responses to the left visual field were faster for random shapes, while responses to the right visual field were faster in nonsense word recognition.

But there are also reported differences in hemispheric involvement in specific tasks, and the matter may not be as simple as a binary left-right opposition in processing tasks. For example, Elman *et al.* (1981a) found a right hemisphere advantage in word recognition for high imageability kanji nouns, but a left hemisphere superiority for low imageability kanji See also Hayashi: 1985). Elman *et al.* (1981b) also report a right hemisphere advantage in identifying concrete kanji nouns, but a left hemisphere superiority in identifying abstract kanji. An earlier study by Hatta (1977a) did find that concrete kanji were more correctly identified than were abstract kanji, but he did not find a significant interaction between visual fields and concrete/abstract classes.

In investigating different aspects of kanji processing (for example, pattern matching vs. lexical decision vs. semantic comparison tasks), Hatta (1981b) found differential hemispheric involvement. For example,, in the first stage of kanji processing, i.e., pattern-matching, there is a predominant contribution by the right hemisphere. In the second stage of the processing, i.e., lexical decision, both left and right hemispheres contribute to the processing. At the last stage of the processing, i.e., semantic comprehension, the left hemisphere is predominant in the processing.

Similarly, Hatta (1981c) also found that kanji recognition is sensitive to differences in processing level as well as processing strategy. For example, different processing strategies are found in matching physical identity and matching phonological identity, while matching physical identity and matching semantic category differs in processing level. The first matching task showed no significant difference in laterality effect, but the second task did show a significant difference in laterality effect. Thus, the physical identity matching task did not show laterality differences, but category matching demonstrated a significant superiority for the right visual field (and left hemisphere). Sasanuma *et al.* (1980) also investigated whether it is the type of stimuli or the type of task involved that determines hemispheric asymmetry. In a phonological experiment, they found a shift of laterality for kanji, but in a visual experiment, they found a shift of laterality for kana, suggesting that both (namely, the type of stimuli as well as the task involved) contribute importantly to hemispheric asymmetry results reported. These findings challenge the received view that kanji recognition automatically invokes right hemisphere superiority, in that the factor of processing level is strong enough to supercede right hemisphere superiority. Hatta in fact concludes that processing level must be taken into account as a significant factor in any discussion of hemispheric specialization. In an experimental presentation of simple words in congruent and incongruent positions, Hatta (1985) also found that kanji, hiragana, and pictographs are processed faster when they appear in semantically congruent positions than in semantically incongruent positions. Such differences are not found, however, for English words and katakana, leading Hatta to suggest each of the five types of orthographic presentation invoke specific processing mechanisms.

Most recently, Hatta (In press) has demonstrated that the various kanji attributes will affect kanji processing differently, depending upon the level of processing. Rather than focus on a single attribute, Hatta wisely examined the mutual relationship of various attributes, as well as their relative contribution to a left or right visual field advantage. A multiple regression analysis, as applied to three distinct experimental tasks, revealed the relative relationships of kanji attributes

like familiarity, concreteness, hieroglyphicity, stroke number, and regularity. The prediction was that such attributes will differentially affect left and right visual field processing, as they interact with different tasks like lexical decision, naming, and semantic classification. Hatta, like many other researchers, assumed that such tasks map onto a continuum of kanji processing, so that different levels of processing invoke different degrees of cognitive analysis, and thus differ in depth of processing. For example, lexical decision requires a lower level of processing than naming, which in its turn invokes a lower level of processing than semantic classification of kanji into concrete or abstract semantic classes. And indeed, Hatta found that in the early stages of processing (e.g., lexical decision) certain perceptual attributes, such as the number of strokes for kanji characters, was a strong factor; but in later stages of processing (e.g., semantic classification), both perceptual and imagery-related attributes are contributing factors.[5] Nishikawa and Niina (1981) have also investigated the claim that the left, or linguistic, hemisphere employs a serial processing mechanism, in contrast to the right hemisphere which is said to display a simultaneous or parallel processing mechanism. Their subjects judged similarity for upper and lower case alphabetic letters, hirakana, katakana, and kanji, presented in either a normal upright mode or a physically inverted mode. Measurements of reaction time showed functional similarities for both hemispheres, depending on the stimulus type. Processing of the upright/inverted kanji and inverted kana and alphabetic symbols invoked linear processing; the rest of the stimuli types involved parallel processing, leading them to conclude that neither linear processing nor parallel processing is exclusively assigned to the left or right hemispheres. Each hemisphere may be specialized for stimulus type (linguistic vs. visuo-spatial), but each hemisphere also employs both types of processing.

Recent neurolinguistic work has also challenged whether such a simple view of kana-kanji processing and production can be supported in the face of recent aphasic diagnoses. In examining the relationship between localization and symptomatology for over two dozen cases of pure alexia, pure agraphia, and alexia with agraphia, Kawamura (1990) reports that the common sites for lesions causing these impairments are localized in the left parietal or temporal lobes, or the left angular gyrus. According to Kawamura, alexia is caused by the disconnection of visual information **to** the left angular gyrus, while agraphia is caused by the disconnection of visual information **from** the left angular gyrus; alexia with agraphia is caused by the disconnection of both incoming and outgoing information. Kawamura and Hirayama (1991) admit selective impairment in kanji and kana reading, and that the neurological routes involved in processing kanji and kana are partially different. But their physical examination of the functional role of the occipital, temporal, and parietal lobes in the visual recognition of kanji and kana, and their interaction with the left angular gyrus, suggests that the relationships between the two hemispheres, as well as within the left hemisphere, are somewhat more complex than has been suggested. A variety of other reports on pure agraphia (Kawamura *et al.*: 1984) and alexia (Kawamura *et al.*: 1981); Kawahata *et al.*: 1987) which employ CT or PET scans, also place both kana and kanji impairments in the left hemisphere, but not always in the classical lesional sites. An early paper by Sugishita *et al.* (1978) had already pointed in this direction in reporting on the reading capability of three patients who had undergone a partial commissurotomy. For a period of three years, these patients were examined for their abilities in the areas of oral reading, visual comprehension, and visual perception of nouns in kanji and hiragana. They exhibited no problem when individual nouns were exposed in the right half-field, whereas mistakes were made with exposure in the left-half field. Comprehension impairment was less severe than oral reading impairment, and word-matching tests were performed correctly irrespective of the type of script, indicating that the visual perception of words itself was intact. Sugishita *et al.* concluded that the the most noteworthy effect of commissurotomy in Japanese patients is unilateral dyslexia, which is more marked for kana than for kanji.

The clinical evaluation of symptomatology for aphasics, and more recently, the detailed results provided by enormous progress in advanced imaging devices, show the situation to be somewhat more compex than has been suggested by neuropsychological tests, and is far from being the simple left-right hemispheric split hypothesized by some neuropsychologists.

4. SENTENCE PROCESSING

The psycholinguistic study of sentence processing is a relatively new area of inquiry in Japanese psycholinguistics, and the number of studies on Japanese is limited. It has been the one area in which considerable influence from linguistics is evident, and this may be exemplified by the current preoccupation with issues like the role of empty categories in sentence processing and the cognitive consequences of parsing left-branching or right-branching sentence structures. Empty categories are of interest because they are postulated in at least one major grammatical theory; psycholinguistic experimentation is obviously able to provide evidence as to their psychological reality, and whether empty categories require any processing cost.

There have been to date a small number of studies concerning the psycholinguistic evidence for empty categories in Japanese. Nakayama (1990a; 1990b; 1991a) has tested whether empty categories have a processing effect by using a probe test (See Bever and McElree: 1988). The test measures whether a probe word is better recognized than other words in sentence comprehension; the reasoning is that a probe word is an antecedent of an anaphoric expression later in the sentence, and is better recognized because it is processed twice, once at the antecedent position and then in its anaphoric position. Nakayama has shown that when a probe word is an antecedent of *pro*, *PRO*, or the trace of an NP-movement in passive and unaccusative sentences, that probe word is better recalled than other words. The conclusion that Nakayama draws is that such empty categories are not simply theoretical constructs in a syntactic theory of *Government and Binding*, but also psycholinguistically real.

Nakayama (1991b) has, however, also examined the NP-movement caused by scrambling, but has been unable to demonstrate support for empty categories in this area of grammar. Nakayama admits that this lack of experimental support suggests a discrepancy between the syntactic theory of *Government and Binding* (See also Saito: 1985) and psycholinguistic reality. In contrast, Sakamoto (1989; 1991) has provided some theoretical support for the psycholinguistic validity of empty categories. Apparently, an empty category can function as an antecedent of another empty category, so that an empty category created by NP-movement can be a legitimate controller of another empty category.

In respect to the processing cost of empty categories, we can only report conflicting claims, rather than unanimity. Mazuka (1991) claims that the activities of processing empty categories and detecting their antecedents do not impose any processing difficulty. She examined the reading times for empty categories postulated as subjects of temporal adjectival clauses, but found no increase in reading times for any of her stimulus materials. In contrast, Yamashita *et al.* (1991) report the opposite finding when gapped and gapless relative clauses were used as stimuli. Reading times showed a localized time increase when subjects were processing empty categories in relative clauses which contained gaps.

The main theoretical issue underlying sentence processing differences for Japanese vs. English involves the psycholinguistic effects of processing right-branching languages (like English), as opposed to processing left-branching languages (like Japanese). Simply stated, is it the case that Japanese, as a left-branching language, is harder to process than English, a right-branching language? Since Yngve (1960), it has been generally assumed that left-branching sentences are harder to process than right-branching sentences, mainly because in the former the verb which provides subcategorizational information occupies a sentence-final position.

Besides being left-branching, Japanese has other grammatical characteristics which might suggest difficulty in sentence processing. Japanese has free word order, an abundance of empty categories, and there are typically no complementizers or relative pronouns which mark the beginning of a clause. All these features contribute to parsing indeterminacy, the on-line impossibility of knowing where a clause begins. Until a processor encounters a sentence-final matrix verb, there is no way of knowing how deep the embedding is; the result is that the processor constantly entertains the possibility of ambiguity and re-analysis. The above is also what simple computationally-based metaphors of language processing would predict. However, the possibility that Japanese, and languages like it, impose severe constraints in respect to processing, is obviously not a tenable position. Japanese subjects parse left-branching Japanese structures just as easily and efficiently as English subjects parse right-branching English structures.

Part of the answer to this conundrum may be found in the origins of theoretical models of sentence processing. One important bias found in modelling has been the tendency to apply English models to Japanese, possibly because the main preoccupation of psycholinguists in respect to sentence processing has been English. For example, Marcus *et al.* (1983) and Abney (1987) both present theoretically-based sentence-processing models which postulate right-branching advantages; given the Japanese findings, both must fail as a universal models of sentence processing (See Mazuka and Lust: 1990).

Another bias in Japanese work has been its almost exclusive reliance on the syntactic theory of Government and Binding, as a theoretical framework upon which to base both linguistic and and psycholinguistic formulations. As a result, GB-proponents typically ignore elucidating the boundaries between *competence* and *performance*, as well as the difference between branching *per se* and the structural complexities caused by branching. As Hasegawa (1990) points out, the processing difficulty often cited for English speakers in dealing with English sentential subjects in left-branching structures should be defined not only by the nature of left-branching *per se*, but also by the structural complexity caused by the fact of branching.

If we expect a model of sentence processing to be universally valid, serious theoretical consideration must be given to determining which types of models best characterize the processing of these two language types. We would reasonably expect a theoretical model of language processing to be as universally applicable as our model of language structure, and so far there is a gap between the two. Our main goal in a psycholinguistic sense is, therefore, to come up with a universal model which accounts for the ease in processing of both left-branching and right-branching languages. A plausible psycholinguistic model will have to consider the combination of top-down and bottom-up processing, coupled with serial (depth-first) and parallel (breadth-first) processing. Such combinations have in fact been tested as possible computational models (See Sato: 1988). A plausible psycholinguistic model will also have to resolve whether parsing models are commital or non-commital, and such have been debated in the study of *garden path* ambiguous sentences (See Gorrell: 1987; Frazier and Fodor: 1978).

Despite the variety of proposals, there is a general consensus that the configurational advantages of a top-down model make it more appropriate in explaining English sentence processing, while a bottom-up model might be more appropriate for explaining Japanese sentence processing. Because of its right-branching nature, the English sentence processor can construct a structural tree starting from a top-most S, attaching the sentence-initial NP to this S node. In contrast, because of the indeterminacy of embedding in Japanese sentences, the Japanese processor cannot perform this assignment until much more information has been added. Instead, the processor has to construct a tree from the bottom, attaching the sentence-initial NP to the most deeply embedded tree.

It is obvious from the foregoing discussion that the nature of Japanese, and the psycholinguistic results with sentence processing in Japanese, will continue to forcefully remind us of our theoretical responsibilities in constructing a truly universal theory of sentence processing.

5. TEXT PROCESSING

Much psycholinguistic research on text processing in Japan has investigated the role of story grammar and its analogues in the comprehension and recall of text. A text is not merely a collection of independent sentences. It is structured in such a way that several component sentences form a small information unit, and such small information units cohere as larger information units. The concepts of *story grammar* and *schema*, as proposed by Western scholars such as Rumelhart (1975), Mandler and Johnson (1977), Thorndyke (1977), Kintsch and van Dijk (1978), have been influential in the study of text processing in Japan. Though the details vary depending on the particular model, it is generally agreed that an text has an overall or *macro-structure*, which in turn consists of several components (*episodes* or *micro-structures*) which are related to each other in causal or temporal terms. Text comprehension thus involves discovering the macro-structure of a text, and interpreting each sentence in respect to this overall structure, as well as to other sentences in the text.

Much work in text comprehension has been devoted to formulating an adequate model of story grammar, and to chart the way in which story grammar affects text processing. A number of experiments, typically using memory tasks, have convincingly demonstrated that narratives are actually processed in units proposed by models of story grammar (See Masui and Kawasaki: 1980, 1981; Takahashi and Sugioka: 1988, 1991; Taniguchi and Kawamura: 1986).

Some researchers have criticized story grammar for its emphasis on the structure of the text, as opposed to the interaction between the processor and the text (See Norman and Bobrow: 1975). The claim is that attention should also be paid to the available processing resources, that is, the cognitive skills and space available for text processing. Kuwabara *et al.* (1983) did in fact find that the amount of available processing resource affects text memory independent of the structure of the text. Indeed, the process of constructing an apppropriate macro-structure out of the text requires inferential ability, and Ikeda (1981b) found that the inferential ability of individuals affects both text comprehension and recall.

Different presentation modalities involve different types of processing (e.g., visual vs auditory), suggesting that the process of text comprehension may also be different. The received opinion is, however, that differences in presentation modality do not lead to a significant differences in

comprehension (See Kintsch *et al.*: 1975; Kintsch and Kozminsky: 1977). This observation is confirmed by Yoshida *et al.* (1981) and Takai (1989) for story comprehension, as well as for the comprehension and recall of TV cartoons (See Takahashi and Sugioka: 1988, 1991).

Other data suggest that recall of expository texts is sensitive to the presentation modality, though the results are at times equivocal (See Sannomiya: 1982, 1984; Yoshida *et al.*: 1981). As a result, psycholinguistic work which finds its origins in educational psychology has been particularly active in elucidating facilitating factors. The experimental results have shown that activities which require the processor to respond to a specific goal, such as inserting questions, analogies, and examples, or imposing a summarizing task, definitely enhance the comprehension of expository texts (See Akita: 1988; Ikeda: 1981a; Mitsuda: 1986, 1990; Yonezawa: 1989; Otomo: 1991; Fushimi: 1991; Taniguchi: 1988; Kuwabara: 1985; Kirigi *et al.*: 1981). Facilitating text comprehension means facilitating the construction of an adequate macro-structure in a mental model of the text (See Taniguchi: 1988). Providing analogies, setting specific goals, asking questions, and eliciting summaries can all be interpreted as aids which reduce the cognitive expenditure necessary for text processing. The processor is supported in its quest for an adequate schema for the text, and the ensuing construction of an appropriate mental model for that text.

NOTES

1 One could cite, for example, the following as the first textbook with the term *psycholinguistics* in its title: Ichiro Sakamoto, Keiroku Okamoto, Shozo Muraishi, and Yasumasa Sato, *Gengoshinrigaku ['Psycholinguistics*], Tokyo: Gakugei-Tosho, 1956. Or the following as the first psychological text dealing with the matters *psycholinguistics* in its modern sense: Ichiro Sakamoto, *Kotoba no Shinri ['The Psychology of Language']*, Tokyo: Kaneko-Shobo, 1952. We are grateful to Professor Jun Haga of Tsukuba University for both of these references.

2 Our future plans, however, do include the presentation of historical descriptions of such unique and influential scientific episodes in the chronological development of Japanese psycholinguistics.

3 It should be noted that in Japan the blind do receive some training in kanji.

4 The above is true for single-kanji words; the reverse seems to be true for two-kanji words. That is, there is a reported tendency for the right visual field or left hemisphere to be superior in word recognition for two-kanji words.

5 For those who are interested, Hatta (1991) presents a useful historical overview of research on the relationship between laterality and kanji recognition by normal subjects, summarizing the pertinent literature on the subject, drawing from *Neuropsychologia, Cortex, Brain and Language, Brain and Cognition, Shinrigaku Kenkyu Japanese Psychological Research, Kyoiku Shinrigaku Kenkyu*, and *Psychologia.* The overview is laid out according to major topics, such as reseach methodology, the relationship of laterality to kanji recognition in normal subjects, processing strategies in kanji recognition, the processing level at which kanji recognition takes place, and a survey of explanatory models that attempt to account for the laterality effect. The overview concludes with an insightful summary of what has been achieved and suggestions for the direction of future research.

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INNATE LANGUAGE CAPACITY AND THE LANGUAGE ENVIRONMENT
–A Case Study of Adult-Child Conversation

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1. INTRODUCTION

Language acquisition of children is the product of two inseparable factors: the innate linguistic capacity of a child and the language environment in which the child is brought up. Overemphasis of one and neglect of the other will not fully account for the obvious facts of real life. No child fails to learn a native language (with an exception of some brain-damaged children), and language is largely learned before the age of 5. Children are not taught language in any formal way, and yet the fabric of language is already intact by the time school begins (Kess, 1992). Also, no other animals, even the cleverest chimpanzees which are closest to us human beings, can acquire human language even under special training. In examining the attempts to teach language to apes, we see that language is probably species-unique (Gleason, 1989), and language is an important part of the demarcation line that we use to keep human beings in and nonhumans out. Biologists suggest that language is species-specific to the human race. They consider the human infant to be genetically programmed in such a way that it can acquire language (Doughty, 1974). Children are designed to learn and use language as part of their normal development as human beings, just like they are designed to stand upright rather than to move on all fours.

Children are born with an innate language capacity, but they do not realise this species-specific capacity entirely on their own. Even if we consider a normal infant generally programmed to learn language, there is still another condition which must be fulfilled before the language learning can take place. That is, the infant must be born and brought up in a proper human language environment and be stimulated by linguistic input. This environment is critical to the child, because the innate feature of using language in the child is just a capacity and the child must be provided with the necessary condition in which to realise the innate capacity. If no such environment is provided, the child may not be able to develop his capacity for language no matter how very well-programmed he might be. Studies of feral children's language ability (e.g., the case of Victor, (see Tartter, 1986)) clearly show that children brought up in a non-human environment do not have normal human language, and this seems to suggest that the human environment is critical to the development of child language acquisition. Therefore, parents play an important role in providing the child with the proper linguistic environment, as they are the first source of linguistic stimuli the child normally has after arriving in this human world. Parents or care-takers provide children with a remarkable linguistic environment very soon after children are born (or even before they are born). Conversation is a most common means of communication and parents tend to start conversation with children even when they are still at pre-linguistic stage. It is a cross-cultural finding that mothers treat infants as their conversational partners even though they know what they say cannot possibly be understood by the infants. In the course of language acquisition, children are always provided with a proper speech model to imitate or to aim at. From the first cry at birth through cooing, babbling to the full acquisition of the first language, the child usually follows a sequence of closely-related and sometimes overlapping stages from where we can find

that certain linguistic aspects are mastered earlier than others due to linguistic and cognitive constraints. Imitation is certainly an important process of language acquisition, but children do not learn everything through imitation. Therefore, when providing best suited models to a child acquiring language, adults should not expect the child to produce the correct speech sounds or sentences before the child reaches the appropriate stage. Natural maturation of the child and proper language environment will eventually take care of the complete and normal language acquisition process. This is why no normal children in a normal language environment fail to acquire language. This paper focuses on how adults act in providing a linguistic environment for children by means of conversation. I will venture to show different aspects of language development in mother-baby conversations by discussing conversations in Chinese between native Mandarin-speaking parents and their children. Some of the data I present in the paper came from my wife, Hongyan, who patiently recorded the dialogues, carefully transcribed them, and sent them to me from China.

2. THE NATURE OF MOTHER-BABY CONVERSATION

Since all human infants are endowed by their biological heritage with innate propensities that underlie language development, linguistic stimulation in a proper language environment is all they need for the realisation of those innate propensities. But when does the stimulation start? What role do parents play in setting up the immediate language environment for their infants? Mothers start communication with their babies through conversations when the infants are still too young to understand anything linguistically. Some mothers, consciously or subconsciously, even communicate with their babies while the babies are still in the womb. I once observed a pregnant woman stroking her unborn baby and saying gently: "Hi, baby, don't kick mommy". It is of course questionable as to whether this can be counted as "conversation" since conversation is defined to have two main features -- informational and reciprocal. Adult conversation is generally carried in a two-part system for the organisation of turn-taking. For example, a question requires an answer, greeting requires similar greeting, an invitation requires a reply, a compliment requires a reply, and so on. Turn-taking keeps the conversation going and thus information is passed. Conversations between mothers and babies do, in a way, consist of these two features though they are quite different from normal conversations. In mother-baby conversations, Mothers tend to talk in special ways, and try to give the conversational turn to the baby. Though infants do not understand the words that are being spoken to them, they do react to the speech. This is the sign that an infant is realising its innate linguistic capacity in the linguistic environment the mother is providing early in its life. By 3 months of age (see Snow, 1977), infants are found to begin showing vocal responsiveness to vocal and visual stimulation by their mothers. Subsequently, the way that an infant reacts to speech affects the behaviour of the speaking adults. It is a cross- cultural finding that mothers tend to take prelinguistic infants as their conversational partners even though they know that infants could not understand what is being said. Snow (1977) studied some special "conversations" between some English mothers and their young infants. The results show that mothers tend to speak in short, simple utterances, and respond to whatever infants do. The mother's conversational attitude toward pre-linguistic children is perhaps cross-cultural. Let us now go through a little conversation between a Chinese mother and her 53-day old baby son, Bangbang (Note: unless otherwise noticed, all the Chinese examples provided in this paper were recorded or observed from native Mandarin speakers in Shenyang, Northeast China).

(1)

Mother	Bangbang
Bangbang, talk to mommy, OK?	nnnn
OK?	aaauuu
Ah, are you fine, Bangbang?	(burps)
Are you fine?	
Hmm?	
Fine?	aaaaa
Oh, fine. What a nice boy.	
What is your name?	aaa
Oh, your name is Bangbang, is that right?	
Yes, you are Bangbang.	aaa aa
Smile to mommy.	
Ah---,you are smiling, aren't you?	aaa
nnnn	aaaa
eeee	eeee
eeee, say it again.	(burps)
Ah, you can burp.	
Keep talking, will you?	(keeps burping)
What a loud sound.	
All right?	
Yes?	
Hmm?	
Now, talk to me.	(smiles)
Hmm, a nice smile.	nnn
A big open-mouth smile.	aaa uuu
Have a nice talk.	
You have grandpa and grandma,right?	aaa
Uncle and aunt, yes?	
Answer me, Ok?	(burps) nnn
Mmm, good answer.	nnn
Be a nice boy, ah-?	
Let mommy carry you.	(sneezes 4 times)
Oh, boy, good!	
Any more?	
You can burp,	
you can sneeze, you know everything, right?	aaaa aaaa
What are you thinking about?	nnn
Tell me, will you?	aaaa (smiles)
Good. That's good.	

The dialogue in (1) may suggest several points defining the nature of mother-baby conversation. Firstly, the utterances of the mother are short, simple and baby-centered. Most of the mother's sentences (over half) are questions. The rest are short answers, comments, simple instructions (like "talk to mommy") and imitation of the baby's vocalisations. The mother seems to understand that her conversational partner at this time is best communicated to in the basic question-answer pattern so that the child may be "introduced" to the first lesson of human conversation. Secondly, the mother responds to almost all the infant behaviours, such as burps, smiles, sneezes, vocalisations, and even the gentle kicks and other body movement of the baby. The mother even imitates the baby's vocalisation in order to induce more "talk" from the baby. This seems to suggest that the mother is not only taking the infant's responses as conversational contents on the baby's part, but also encouraging the infant to "take further steps" in the conversational activity. Obviously, the baby in the dialogue could not produce any real speech except for some natural behaviour like burps, sneezes, smiles and some sort of vocal articulation. (Note that the 'aaa' and 'uuu' sounds etc., in the dialogue may not be the same as adult speech sounds. They are transcribed that way to show that they are infant vocalisations of different kinds.) But the mother tries to respond to every "act" the baby makes with short answers or comments, and stimulates the baby with new utterances and repeated questions. Thirdly, unlike adult conversations in which one's major goal is to get his/her turn (see Snow, 1977), getting the baby to take his turn seems to be the major task of the mother in this conversation. Short questions like "Isn't it?" "Yes?" "OK?" or simply "Hmm?" occupy a large part of the mother's utterances, aiming to elicit specific responses, most often coos or smiles, from the baby. Each response of the baby is interpreted by the mother as a meaningful contribution from a conversational partner. Of course, the mother is not expecting the baby to say "My name is Bangbang" when asking "What is your name". Neither is she convinced that the burp and sneeze or any kind of the vocalisation from the baby mean anything linguistically. Still, the mother will treat the baby as her conversational partner and keep the conversation going. In doing so, the mother is providing the infant a nice immediate and direct linguistic environment in which the baby could take his first step into the realisation of his language capacity. In general, mother-baby conversation, in its special question-answer and turns-giving pattern, sets up a quite comfortable linguistic environment in which the baby could have plenty of one-to-one "primary lessons" of language acquisition. As Gleason (1989) puts it, the overall quantity of speech that the child overhears is not so important, but the quantity of direct adult-to-child input is. Conversations like this between parents and their very young babies do not just take place in just one particular culture, but probably in all human communities. In different cases, mothers may start conversations with their babies who are at the age of as young as 3 months, or even earlier in the infant-hood (if we suppose that the monologue to unborn babies is not considered as conversation). This seems to suggest that parents are the first language teacher to their babies in that they are the first (in most cases) to lead the baby to swim in the sea of language acquisition. Thus, mother-baby conversations play an important role in children's language development.

3. REDUPLICATION IN CONVERSATION

We have discussed the special characters of mother-baby conversation and have seen that mothers in general talk in special "turn-feeding" and "response-eliciting" patterns to children still so young that their ability to communicate is quite limited. There are some differences between the speech patterns which adults use among themselves and those they use in speaking to children. Adults "talk down" to children (Taylor, 1976). Normal adult conversation style will in no way resemble the speech pattern the mother uses in the above baby talk. In talking to young chil-

dren, adults may raise the voice, slow down the speed, shorten their sentences or repeat essential words. For example, reduplication is very common in Chinese baby talk, as in *Chi fan-fan* 'eat rice-rice' or *chuan xie-xie* 'put on shoe-shoe' (see Chao, 1967). To illustrate what is meant by the above statment, I present a little dialogue between a Chinese mother and her 2-year-old daughter, Jiajia. I will use the hyphen mark to indicate the reduplication in baby talk.

(2)
Mother:

Jiajia, lai chi fan-fan
name come eat rice-rice
'Jiajia, come and eat'

Jiajia:
mama fan-fan
mama rice-rice
'mother feed me'

Mother:
hao xiang-xiang
good delicious-delicious
'very delicious'

Jiajia:
mama wai-wai
mama out-out
'mother take me out to play'

Mother:
xian fan-fan, wanle wai-wai
first rice-rice finish out-out
'eat first, then I'll take you out'
chi wanle fan-fan, mama gei chuan wa-wa,
eat finish rice-rice mama give put on sock-sock
'after eating, mother will help you put on socks'

.....

The mother here obviously goes out of her way to use "baby talk" which is full of reduplication. Note that the dialogue is patterned in such a way that certain morphemes of syllables of each sentence are reduplicated. In Mandarin baby talk, reduplication can fall into two types. The first type, as shown in the above dialogue, exhibits reduplication of a certain syllable (a certain character in written Chinese) which can be either a noun (as in *chi fan-fan* 'eat rice-rice'), a verb (as in *mama wei-wei* 'mother feed-feed') or an adjective (as in *hao xiang-xiang* 'very delicious-delicious'). In some cases, even prepositions are reduplicated (as in *mama wai-wai* 'mother out-out'). This kind of baby talk is not a pure creation of the baby, but it is largely taught by the mother. The following is an example of how the Chinese word for "rooster" is taught in reduplication.

(3)

Mother (translated)	Bangbang	
(pointing at pictures) What is this?	utterance gugu	target ji 'rooster'
Are you telling me how the big rooster sings?	enn	'yes'
This is "ji"	ji	'rooster'
Now say "ji-ji"	ji-ji	'rooster'

This seems to imply that mothers believe that reduplication of a certain speech sound (or a *syllable* in a more linguistic term) can provide emphasis of that sound and experience in encoding the relevant object or the situation to which that sound refers. For example, *fan-fan* is certainly not the standard adult expression for rice in Chinese, but it helps a young child to relate this particular sound to rice and remember it better than the one syllable sound *fan*. Therefore, the mother uses the "sound reduplication" strategy to train the child in the acquisition of both vocabulary and pronunciation. In Chinese culture, and it seems reasonable to suggest that this is so in other cultures, parents seem to believe that to remember one's own name is very important for the child, and reduplication of the name can help the child acquire the sound of his name faster. Thus, one can find many of Chinese children have a reduplicated "pet name" like Bingbing, Dongdong, Nannan, Jingjing, Lili, Maomao, etc. Not only are children's own names reduplicated, but also most of the immediate relatives of a child are called by the child in a reduplicated way. The following is a short list of some common reduplicated names in the northern dialect of Chinese.

(4)

baba	'father'
mama	'mother'
yeye	'grandfather'
nainai	'grandmother on father's side'
laolao	'grandmother on mother's side'
gege	'elder brother'
jiejie	'elder sister'
didi	'younger brother'
meimei	'younger sister'
jiujiu	'mother's brother'
shushu	'father's brother'
shenshen	'shushu's wife'
gugu	'father's sister'

Reduplication in baby talk is also a cross-linguistic and cross-cultural phenomenon. For example, in English one commonly finds a simplified or diminutivized vocabulary for terms relating to

food, toys, animals and body functions, as well as phonological simplification expressed by reduplication of syllables (*wawa, choochoo, booboo, tumtum*) (see Kess, 1992). In English, children's "pet names" can also be reduplicated. For example, Michael, the baby son of a Canadian colleague of mine, is called "Mimi" (/maimai/) first by Michael's little native English-speaking friends, and later by the family.

There is another type of reduplication in Mandarin that can be found in baby talk, namely, a syllable (normally a verb or an adjective) is reduplicated with *bu* 'no' in between to form a question. For example, *hao-bu-hao* 'good or not good' means "Is it good?" or "Is it all right?" The answer can be either *hao* (which means "good" or "yes") or *bu-hao* (which means "not good" or "no"). In a mother-baby conversation, this type of "syllable-*bu*-syllable" reduplication is often found in mother's questions to children. The following dialogue may help illustrate the point.

(5)

Mother	Bangbang (17 months)
mama bao, hao-bu-hao?	hao
'Let mommy carry you, OK?'	'yes'
qu zhao baba, qu-bu-qu?	qu
'Go and find Daddy, OK?	'yes'
Bangbang ting hua, xing-bu-xing?	xing
'Bangbang be a nice boy, OK?'	'yes'
ni guai-bu-guai?	guai
'Are you nice or not nice?'	'nice'

In the above dialogue, the mother uses the "bu-" type reduplication and expects the baby to answer her questions by imitating the last syllable (the last word) of her question. In this way, the baby is not only provided with a certain repeated syllable as a model, but also learns a pattern to answer questions (which s/he will use even in adult conversation as a grown-up) by simply repeating the reduplicated syllable. It seems reasonable to suggest that baby talk or the way adults communicate with babies is not simply a culturally transmitted, functionless style, but rather a well-founded mode of speech that helps develop communication abilities in the child (Gleason, 1989).

4. IMITATION IN CONVERSATION

We have seen in the previous section that mothers "talk down" to their children in baby talk where reduplication is a common speech pattern. However, in the course of adult-children conversation, parents also expect children to "talk up", that is, they set up certain models for children to copy so that children can gradually get closer to more acceptable patterns of speech communication. Imitation is found to take place cross-linguistically in early parent-child conversation. We should note that maturation of children takes much longer than that of most animals, and children also have to follow a sequence of language development steps along with their physical development. Parents are only too aware of this fact. They hence tend to continually monitor the children's degree of attention and understanding, and try to adjust their speech patterns in order that the children can keep their responses at optimal levels (see Snow, 1977). To maintain the linguistic environment for children at optimal levels, mothers believe that more specific linguistic stimuli

are necessary for children when they grow old enough to produce words. Imitation seems to be a common way to satisfy the need. Parents start to provide models for babies to imitate as soon as babies start to vocalise sounds. In the recording of the conversation between the above-mentioned 53-day old baby and his mother, we find that the mother tries to use gimmicks (different sounds which are similar to the baby's vocalisation) to get the baby's attention, hoping that the baby will vocalise more by way of imitation. Of course, babies younger than 2 months are not likely to be ready to imitate, and most of them can barely vocalise at this stage. But the models are already there in the babies' language environment. As the child grows physically and cognitively, parents will provide new models for the child to imitate, and always take care to match their input to the child's developing cognitive levels. For example, Mandarin speaking children at one-word level can not only differentiate the different tones in the language, but they can produce mono-syllabic words with these tones. Parents at this stage tend to exaggerate the tones when talking to their children in order to help the children better distinguish the tone differences. If we assume that the behaviour of contour tones can best be characterised by representing them as a sequence of level tones (see Kenstowics & Kisseberth, 1979), baby talk in Mandarin can best illustrate this point. Allow me to refer to the Mother-Bangbang conversation again. At 15 months, Bangbang learns to pronounce the one-syllable word *hao* 'good' (Tone 3) by imitating his mother who deliberately exaggerates the tone and lengthens the syllable in the following level pattern:

(6)

Mother	Bangbang
	(imitates)
Say: "ha---a---a---o---o-- " 'good'	ha-a-o-o-
[mid-low-low-mid-high]	

The mother certainly will not use this pattern when talking to adults or older children in normal conversation. She does this to her 15-month-old son just to show him how this particular sound is made so that the baby can produce this sound, through imitation, more accurately in his speech. This little piece of evidence seems to show that the mother is always acting as the linguistic model for the child so that the child can never be without a proper language environment.

When we listen to children talk, we find that they cannot pronounce some of the sounds clearly or correctly while their pronunciation is perfect with other sounds. This shows that in a given language, certain features of sounds are more difficult to acquire than others. This may be cross-linguistically true. For example, glides may be acquired earlier than liquids in languages like English and Chinese. A child may say /kwai/ for "cry" (see Kess, 1992), but it is unlikely the case that /rai/ is used for /wai/. This sequence of sound acquisition cannot be changed through imitation and reinforcement. The following dialogue between Bangbang (16.5 months) and his mother may illustrate this point.

(7)

Mother (translated)	Bangbang	
(pointing at pictures)	utterance	target
What is this?	yi	li 'pear'
Oh, what is a "yi"? Say "li". "li-", yes.	yi	
And this?	yueyang	yueliang 'moon'
What? Hmm, yueliang.	yueyang	
Who is this?	yaoyao	laolao 'grandma'
No, say "laolao" (laughs) All right.	yaoyao (confused)	
Who is this?	ayjiu	erjiu '2nd uncle'
"er-jiu"	ay-jiu	
"er-jiu" Do you miss your uncle?	ay-jiu xiang	xiang 'miss'
Say "hui lai" (='come back')	lai	huilai 'come back'
What is this?	dadao	xiangjiao 'banana'
"xiangjiao", and this?	dao	tao 'peach'
This?	bi	pen 'basin'
This?	bi	bi 'pencil'
Good.		

In the above short dialogue, we can notice some special features of the speech of this one-word stage child. All the answers are one-word long. Glides tend to replace liquids (*yi* for *li*, *ay* for *er*). Voiced stops replace voiceless ones at initial positions (*dao* for *tao* and *bi* for *pen*). Note also that Bangbang did produce a correct /l/ sound in *lai* 'come', which shows the child can potentially produce liquids and they have trouble producing them only because they have not yet come to the right step of the development. Interestingly, in another recording two weeks later, the child was

found to produce remarkably more liquid sounds and could say *laolao* 'grandma' and *lai* 'come' with no problem. Another observation of mine also shows that at least some children acquire front consonants earlier than back ones. Consider the following short dialogue between a Chinese mother and her 2-year-old son, Gelin.

(8)

Mother	Gelin
Say "maoke" (='sunflower seeds')	maote
No, not "maote", say "mao-ke-"	mao-te-
Oh, let's come to this one.	
You say "xuegao" (='ice-cream')	xuedao
"xue-gao-"	xue-dao-

Three months later, Gelin was able to pronounce the same two words perfectly without much special training, although these words had been mentioned to him by the mother from time to time. The constant "model provision" seems to go along with the child's physical development, and this can probably be an example of the natural combination between the non-separable language capacity and language environment.

The acquisition of tone, an important phonological feature of Mandarin Chinese, is another aspect which shows how children develop their language ability. For example, on one occasion, Bangbang learned to pronounce a 2-syllable word *di-qiu* 'globe' (at the presence of a globe) with the correct tone (Tone 4 -Tone 2). When he went on to learn the next word *niu-nai* (Tone 2-Tone 3) 'milk', he was still holding to the tone pattern for *diqiu*. That is, the child was applying the tone sequence of one word to another. This observation seems to suggest that (1) tone in Chinese is acquired separately from other phonetic properties (at least by some children) which seems to support the autosegmental hypothesis (see Kenstowicz & Kisseberth, 1979), and (2) children tend to over-generalise linguistic phenomena, including tones. From the above examples, we can see that mothers, no matter how far their children have developed linguistically, never forget to provide proper models. They offer corrections, or simply repeat the correct pronunciation, in order to emphasise on the difference between the child's mispronunciation and the target sound. This is like holding a baby to walk when it can just stand but cannot make steps. Though the holding itself cannot make the baby walk, it can at least show the baby what walking is like and perhaps promote the physical development of the baby.

On the other hand, although imitation is important, children do not learn everything through imitation. They have to go through those necessary developmental steps before they can fully acquire language. That is, the innate capacity of acquiring a language has to develop to the right stage to enable the child to follow the model provided in the language environment. These developmental steps, though in a relatively fixed sequence, may not be taken exactly one after another by the child, and many of them may overlap. In whichever step, the child can (always?) find a proper speech model provided by the adult who, just through conversation, will train the child to become an acceptable language user in the community. As Palermo (1978) puts it, the people around a child who is acquiring language are sensitive to the child's level of development and try to provide a linguistic environment which is ideally suited to language acquisition. This seems to be an innate capacity of humans in response to children: older children and adults invariably talk to younger

children differently than they do to adults. This innateness itself helps provide a better environment to language acquiring children. We can again see the close relationship between the innate language capacity of the child and the language environment around him. In general, imitation has many functions in child language, and it does help children learn (see Snow, 1983). Adults are of great help in providing the imitation models.

5. INNATE LANGUAGE CAPACITY AND LANGUAGE ENVIRONMENT

As I mentioned earlier, the innate language capacity of a child has to be realised in a proper language environment. But a good language environment does not mean that a child can acquire language without any constraints. In the course of language acquisition in early childhood, children must go through a sequence of steps before they can comprehend and produce language in an acceptable style. Children need time to overcome both cognitive constraints and linguistic constraints. As we discussed above, certain sounds or sentence structures (usually those easy to produce or use) are acquired earlier than others which are comparatively harder to produce and complicated in form. Parents at this stage use baby talk to provide models, encourage and guide the children to go through these steps. However, models far beyond the child's developmental level can only result in confusing the child. That is to say, the realisation of linguistic capacity needs just natural language environment, and over-promotion or over-stimulation will not help. Instead, adults have to reconcile the child's development with attention and acceptance. For example, when the child says "mi" or "milk" to mean either "That's milk" or "I want milk", the child can be talking about only a few salient and essential things. The mother has to be well aware of these few and be highly attentive to the child's needs and his utterances, and accept the child's utterance as grammatically multi-functional. A child's utterance like *mama fan-fan*'mommy rice-rice' in Chinese is effective enough to mean either "Mother feed me" or "Mother is eating" or "It's mother's rice" to an understanding adult. The adult would "tolerate" such nonstandard style, and encourage the child with equally non-standard baby talk in order to keep the effective communication by which the child can exercise his linguistic ability. When the child is old enough to say "I want a glass of milk" or "Give me a bowel of rice", the conditions for the effective communication are no longer there and baby talk is no longer necessary. We can therefore say that baby talk is just a necessary step toward complete language acquisition. Baby talk appears naturally in adults conversation with children to help them develop their linguistic and cognitive abilities, and gradually disappears from the child's environment when he is comparatively mature both linguistically and cognitively. Over-expectation from a developing child will only disappoint the adult. I will use one more example to illustrate my point with a translated recording of a dialogue between a young Chinese mathematics lecturer and his 39-month-old baby son, Yanyan, who has barely learned to count from one to ten.

(9)

Father	Yanyan
Here are 2 trucks and there comes another one. How many are they?	3
Now here are 3 and there comes another. How many?	4

Plus another?	5
5 plus one more?	6
(excited) Good! My son can calculate now. How many are 5 plus 1 again?	7
Hnn? Here are 5 and there is 1, it should be 6, not 7, and you were right just now. Tell me again, how many are 5 and 1?	8
(laughs)	Yes, it is 8. (fluently) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Is that right?

In the above dialogue, one can notice that although the child can fluently speak out the numbers, he is not yet developed to the right cognitive level to match the numbers to the real objects. The father is disappointed only because he expects the child to do what he is cognitively unable to do. We can therefore infer from this example that language models set for a child must be at the child's optimal developing level, but not beyond it. Only in this way can the language environment be most effective for the child to realise his linguistic capacity. Chicken hatching requires two inseparable factors: the egg (not a stone) and proper temperature. Over-raising the temperature can in no way speed up the hatching process. The two inseparable factors of language acquisition are the innate language capacity of a child to acquire language and the proper and natural language environment around the child.

6. SUMMARY

In this paper, we have briefly discussed the two inseparable factors of language acquisition -- the innate language capacity of the child and the language environment. Parents tend to start providing children with the earliest and most suitable linguistic stimulation in order to help them realise their innate linguistic capacity. Baby talk is a cross-linguistic activity by which parents start and keep the adult-child conversation, through which children gradually learn the specifics of many aspects of the language they acquire. Reduplication is commonly found in the acquisition of both English and Mandarin Chinese, which may help children's language development. Imitation in general helps children learn, but it is certainly not the sole passage through which a child acquires language.

To conclude, adult-child conversation is important for language acquisition in that (1) it provides prelinguistic children with necessary linguistic stimulation which helps them to develop their innate language ability; (2) it provides young children with language models which they may use in future interaction with people in the community and (3) it guides children to go naturally through different steps of the development of language acquisition. If I may add the fourth point, it helps linguists to better study the issue of language acquisition.

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METALINGUISTIC DEVELOPMENT AND BILINGUAL ACQUISITION

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1. INTRODUCTION

This paper is a synthesis of two major strands of applied psycholinguistic research: one, the development of metalinguistic abilities in children, and the other the linguistic and cognitive effects of bilingualism. Our main concern is the effect that learning two languages at an early age has on the development of metalinguistic abilities in young children. Vygotsky (1934; 1986) was among the first to remark that the learning of a second language promotes the ability of the child to "see his language as one among many, to view its phenomena under more general categories, and this leads to awareness of his linguistic operations" (Vygotskii, 1986; p.196). It is this awareness of one's "linguistic operations", actually of one's linguistic system(s), which is referred to as "metalinguistic awareness".

A number of studies, such as those of Ianco-Worrall (1972), Ben Zeev (1977), Cummins (1978), Bialystok (1986a, 1986b, 1988), Galambos and Goldin- Meadow (1990) have indeed found bilingual children to exhibit superior performance on tasks requiring metalinguistic skills. A closer examination of these studies, however, reveals that, whereas bilinguals did perform better on certain tasks, on others they did not. Moreover, there are differences between different bilingual populations of the same age. So we are led to asking not only whether there is a difference between bilinguals and monolinguals in metalinguistic ability, but also to asking exactly what this difference is and how it develops. The purpose of this paper is to examine these questions in the light of special features of the bilingual acquisition experience and environment. Then, based on these findings, the research literature will be critically examined and a proposal made for further investigation.

2.0. LANGUAGE, CONTEXT AND BILINGUALISM

Language is always acquired in context. No language acquisition or for that matter metalinguistic acquisition theory today denies the role of environmental or input factors in acquisition and development. If we assume that bilingual acquisition does indeed stimulate metalinguistic development, we must address the question of just what factors are unique to the bilingual acquisition context which would promote such a development. Unlike the monolingual, the bilingual child is faced with a unique task: the separation of two languages, both when trying to make sense of his linguistic environment (i.e. the input) and when trying to express himself (i.e., his output). In cases of simultaneous acquisition (acquisition of two or more languages at the same time), the child is presented from the very beginning with at least two referents for every meaning. The argument made here is that this leads to an early realization of the arbitrary link between form and meaning and to the separation of formal linguistic system from context. This process of decontextualization is further reinforced by the resulting bilingual behaviours of translation, code-mixing (language mixing), and code-switching. The latter two in particular stimulate the development of a

special monitoring function, which, as we will see is present at an early age in all children. It is the development of this monitoring function, as well as the early understanding of the arbitrary nature of language, which underlie the differences in the research literature referred to above.

To demonstrate how the above process occurs, we will examine the types of of such phenomena that occur naturally in children's speech in such an environment. The majority of the data we will look at is taken from Leopold's extensive observations of the similtaneous acquisition of two languages, English and German by his daughter Hildegard (Leopold, 1970). It will be supplemented at times with notes made of metalinguistic utterances made by other children. It should be noted that Hildegard acquired her two languages in a fairly strict one language, one parent environment where her father spoke only German to her and her mother English. The other children were raised in a similar environment, although the languages spoken by the parents were reversed.

2.1. Theoretical Considerations

In examining metalinguistic development, a number of recurring questions or ambiguities arise. We will now examine them in turn.

(1) What is metalinguistic (awareness)?

One important question is what exactly is meant by 'metalinguistic awareness'. This paper will adopt the working definition proposed by Tunmer and Herriman (1984) who regard metalinguistic awareness as being:

> the ability to reflect upon and manipulate the structural features of language, treating language itself as the object of thought, as opposed to simply using the language system to comprehend and produce sentences. (Tunmer & Herriman 1984; p.16)

As Bialystok (1991) and Tunmer & Grieve (1984) note, it is important to isolate the notions of metalinguistic task, ability and awareness. In terms of task and ability, there is the need to link the performance of a certain task with the proper ability. Much of the confusion in the findings up to now arises from differences in experimental tasks and uncertainty as to exactly what is being measured. The real intractable difficulty arises, however, in differentiating the final two, ability and awareness. This is an epistomological problem that haunts the research: just when does a demonstrated ability to perform a certain task become a display of awareness. As this problem is really seated in the realm of a theory of consciousness, we will focus mainly on the notion of ability, keeping in mind that the distinction still expresses itself in terms of how 'conscious' or 'explicit' an ability is.

(2) Linguistic vs. metalinguistic

The second question arises out of the first; i.e., The difference between linguistic ability and behaviour and metalinguistic ability or behaviour. Put simply, at what stage is linguistic behaviour metalinguistic? This is a definitional problem for which the resolution must necessarily be an arbitrary one. Perhaps instead of insisting on a dichotomy of awareness, it would be more useful to view metalinguistic behaviour as a function of the degree of access the individual has to their linguistic systems, categories, and knowledge (Mattingly, 1984; Leong, 1987).

(3) Definition of bilingualism and role of linguistic proficiency

The question of linguistic ability leads us to the question of language proficiency and the definition of exactly what is meant by the term bilingual. Proficiency in both languages, or balance, is a key concept in bilingual research. Various researchers have noted that balanced or fully proficient bilinguals exhibit higher degrees of metalinguistic skill than monolinguals, whereas only partially proficient bilinguals do not (see Bialystok 1988; Galambos & Hakuta, 1988). Similarly, Bowey (1986) and Bowey & Patel (1988) have noted the high correlation between metalinguistic ability and general language ability in monolinguals.

(4) Acquisition context

The definition of 'bilingual' goes beyond the concept of proficiency in two languages. As Romaine (1989) notes, bilingualism is a social phenomenon, not just a linguistic one. The acquisition context defines the linguistic and (arguably) the cognitive outcome. The term acquisition context subsumes a number of parameters, but the context we are interested in here is what is referred to as simultaneous acquisition, where the child has been exposed to two languages regularly from a very early age, certainly before the acquisition of a first language.

(5) Cognitive vs. language oriented models of development

The fifth question that will arise is that of whether to adopt a cognitive or a language- oriented model of metalinguistic development. Extensive research on metalinguistic development in psycholinguistics and educational psychology has revealed that ,generally speaking, metalinguistic abilities blossom at the age of 6 or 7. This has led many researchers to hypothesise that metalinguistic development is related to a more general change of cognitive structure which takes place at this time (Hakes, Evans & Tunmer, 1980; Van Kleek, 1982; Bialystok & Ryan 1985). It is at this age, as the child moves into what Piaget has called the stage of concrete operations, that the metacognitive abilities develop which allow the child to view his own mental structures, including the linguistic system(s). The support from this position comes from experimental evidence which shows that before the age of 5, most children are unable to do a variety of metalinguistic tasks such as segmenting words into phonemes or sentences into phonemes, or grammatical judgement tasks (Hakes et al., 1980). The other view is that metalinguistic functioning is part and parcel of language acquisition (see Clark, 1978; discussion in Tunmer & Herriman, 1984). Taken in a strong form, it could mean that conscious manipulation of language is present from a very early age as the child actively hypothesises, generalizes, and induces rules from input and from the monitoring of the results of his output (feedback). A more mild version would assume that such active reflection on the linguistic system is indeed present in some form from an early age, but that its development is indeed linked to cognitive (and conceptual) development, although it is certainly not bound by it.

(6)Experimental vs. natural data

The choice of a development model one ascribes to is to some degree a function of the data one accepts. The cognitive development models are based upon experimental data, which are by their nature more conservative. The language oriented approach to development comes mainly from

observations of spontaneous metalinguistic remarks in case studies and field notes. Both have their strengths and both sources of evidence will be examined. First we will look at spontaneous speech data set within context, for in such a nebulous affair as deciding whether an utterance is metalinguistic or not, contextual and pragmatic variables are extremely important. Then we will examine the conclusions drawn from this analysis in the light of the emperical research literature.

(7) Age and onset of schooling

As can be seen above, age is a very important component in any developmental model. It is particularly important here since all Piagetan cognitive development models are predicated on maturational stages of development. Moreover, as is often noted in the literature, formal schooling and literacy have a very strong effect on metalinguistic development. In a bilingual context, Hakuta (1987) and Galambos & Goldin-Meadow (1990) have found that higher levels of performance exhibited by bilinguals disappear with age and after the onset of schooling. It is to minimize these confounding factors that this paper focuses on acquisition in young children.

3.0. THE DEVELOPMENT OF METALINGUISTIC ABILITIES

Clark (1987) has proposed that one of the basic mechanisms of language acquisition is a general principle which she refers to as the "Principle of Contrast." The Principle of Contrast basically states that the child assumes that every two forms contrast in meaning. This means that for every form the child encounters, he/she will posit a single meaning for this form. Clark sees this principle as being critical for allowing the conventional use of one form for one referent within a speech community. It also means that children give priority to known words and assign or create new words to fill gaps in their lexicon. This principle functions not only at the lexical level, but also at the other levels of language (morphological, syntactic, phonological, pragmatic). The application of such a principle in creating a linguistic system implies a constant interaction between the child and his environment, a monitoring of the input and the success or failure of his output in the social milieu. It is just this sort of monitoring which may be the basis of metalinguistic activity. We will now see what light bilingual acquisition can throw on this issue.

3.1. Bilingual/Monolingual Differences

When comparing monolingual and bilingual acquisition, the first question we must ask is: "Just how are they different?" The obvious answer is the learning of two languages vs. the learning of one. When we go deeper, however, this means that on all levels of language the bilingual child is faced with the task of sorting and systematizing two forms for every referent/meaning (or on the pragmatic level for every functions or speech acts) as compared to the monolingual's one. And he must learn to separate them in various contexts. This often involves two uniquely bi- or multilingual linguistic phenomena: translation and code-switching.

Like monolingual children, bilingual children also originally try to maintain a single meaning for each form. Where they differ from monolinguals, however, is that for every referent they have two forms in the input. This would necessarily present them with a violation of the principle of contrast. The acquisition literature does show some evidence that, at least in the early stages of acquisition, the bilingual child does indeed try to construct a single lexicon (see Taeschner, 1983;

Clark, 1987) and indeed a single syntactic system (Volterra and Taeschner, 1978). This single system is then split relatively quickly into two. (Miesel, 1989; Taeschner, 1983). This apparent violation of the principle of contrast and its resolution through separation into two languages is first evident at the lexical level, but it also occurs on the morphological and syntactic level. And it is this disengagement of word and referent, form and meaning, which leads the bilingual child to realize the arbitrary nature of language. And it is this, along with the constant monitoring required by switching between two systems, which spurs the development of a greater sensitivity to linguistic form and (non-language-specific) linguistic system, to view and reflect upon language as an object in itself, in other words to develop metalinguistic abilities.

We will now illustrate this process with examples of spontaneous metalinguistic utterances by young children.

3.2. Metalinguistic Expressions Common to All Children

We will first examine metalinguistic behaviour common to the speech of all children, whether monolingual or bilingual. Spontaneous metalinguistic expressions noted by Leopold (1970) and the author have been analyzed into a general functional classification scheme.[1] In general categories these include: 1) language play and creative use of language 2) self-corrections 3) corrections of others 4) comments on language 5) conscious learning.[2] These categories are not exclusive; they do, as we will see, overlap. We will examine each of these categories in turn.

3.2.1. Language play and creative use of Language

The first category we will examine is that of language play and creative use of language. Some examples of these phenomena are given in (1)-(4) below:

(1) B - di mɛkə di blɛtə di sɛkə di dɛkə [3;10]

(2) H - mɪl - wɔk - ʔi 'Milwaukee'
fɪʃ - past - ʔa 'Fischpasta' [3;0]

(3) H - There's an awful smell of rapples around here. Do you know what rapples are? Rapples are apples. [4;1]

(4) J - Kann ich bitte die *Ricardalada* haben.
'Can I please have the *Ricada-jam*?
(repeated several tmes, with laughter) [7;1]

In the first example the child, Ben, has tied together a string of bisyllabic real and nonsense words with certain common phonetic elements, in this case the vowels. Onset and rime are separated with the rimes of the syllables (the vowels) being held constant. This would seem to indicate an ability to break up syllables into their constituents and to engage in rhyme. In the second example, Hildegard playfully segments a word into syllables, an ability which appears quite early, while in the third she also shows the ability to see rhyme and to split off and add segments to accomplish this. The fourth is an interesting case, because the child, John, has taken the first two syllables of *marma/lada* 'jam', has linked it to the word *mama* 'mom' and then has substituted his

mothers name, *Ricarda.* This involves a sophisticated level of manipulation of the language and reveals an active and creative analytical skill in the child. While (1)-(3) demonstrate a certain knowledge of and ability to isolate phonological elements, (4) also involves play on the lexical level. The alliteration and rhyming play such as that noted in (1)-(4) can range from relatively random free association of like sounds/syllables/words to deliberate, explicit rhymes and limericks. As we can see from the data, the former occurs quite early and the latter quite late.

3.2.2. Self-corrections

Already at an early age children demonstrate the ability to correct their own mistakes as well as those of others. Correction implies monitoring of the utterance, recognition of the mistake, and access of the linguistic system to supply the correction. Thus, they can be viewed as metalinguistic acts. Some examples of self corrections (all from Hildegard) are given below:

(6) It don't ... It doesn't. [3;0]

(7) kennst du er ...den
'Do you know he...him' [5;2]

(8) Ich habe den Stein gewerft ... geworfen, nicht gewerft. [5;5]
'I threw the stone ... *geworfen*, not *gewerft.*'

(9) zweimal, dass ist das dreite ... das dritte.
'Twice, that's the third' [5;4]

These four examples are cases of morpho-syntactic corrections. At the age of three Hildegard is already able to correct the omission of the 3rd. person sg. marker in (3). In (7) she corrects her improper use of the nominative with the correct accusative form of the 3rd. per. personal pronoun, while in (8) she corrects the morphophonemics of the past participle. Example (8) is particularly valuable as it demonstrates an explicit attempt to repair. Hildegard has overgeneralized the German regular past participle suffix [*-t*] to the verb *werfen* 'throw', which actually takes the less regular inflection [*-en*]. She realizes her mistake, comments that it is really *geworfen* and not *gewerft.* Example (9) can also be interpreted as a morphophonemic correction. Hildegard realizes that she has incorrectly mixed the cardinal *drei* with the irregular ordinal *dritte.* What she has done is derive the ordinal according to the regular pattern, applying the regular derivational *-te* ending to the cardinal stem *drei.*

3.2.3. Corrections of others

Similar patterns are also found in children's corrections of others:

(10) F - Wir fahren auf's Boot.
B - Nein ... Wir fahren in's Boot. 'we're driving into the boat' [3;6]

(11) B - What did the big chim*ley* say to the little chim*ley*? [4;6]
S - Chimley...?! (laughs) [Adult]
V - No! It's Chim**ney**! [4.0]

(12) M - harter

H - härter, heisst es, mama — It's (should be) *härter*, mom. [5;3]

In (10) the child, Ben, corrects the adult's use of prepositions, stating quite reasonably that they are driving 'into' (*in*) and not 'onto' (*auf*) the ferry. One could see this as a semantic rather than a grammatical correction, but it, in any case, shows a conscious mental weighing of the use of prepositions. In example (10), we see a case of one child, Veronica, correcting a mistake in pronunciation made by another child, Ben. The adult (S) first identifies the form as being out of place, but Veronica is able to identify the mistake and, with contrastive stress, indicate the correct replacement for the violation. In (12) Hildegard corrects her English speaking mother's German, this time providing the umlaut which is part of the comparative morpheme. We can thus see this as a morpho-phonemic correction. And here the grammatical nature of the correction is not in doubt.

However, it could still be argued that the above examples are actually the product of linguistic processes and are not really metalinguistic in nature. Or, even if one accepts the lable "metalinguistic", that they require implicit knowledge rather than explicit knowledge. Clark (1978) notes that children can implicitly reflect upon the knowledge of linguistic units such as words, syllables, and phonemes much sooner than they can explicitly; i.e, that they can identify and manipulate such units before they can explain or label them. This is once again a question of just how one defines "metalinguistic". Perhaps, as Slobin (1978) suggests, the ability to explicitly (i.e., verbally) analyze language into units and reflect on structures emerges quite late simply because children lack the metalinguistic vocabulary to express themselves. In any case, what the data do show is that children have the capability of monitoring their own utterances and those of others. In addition, when they recognize a mistake they are capable of correcting it systematically.

3.2.4. Comments on Language

Compared to those in the preceding categories, these expressions are more overtly metalinguistic in nature. The child indicates by his/her comments on linguistic structure that they are indeed aware of, or at least searching for, system. For example in (13)

(13) Wenn Mutti Deutsch spricht, denn sagt sie: "Ich gehe drausen..."
Ich sage: "Ich gehe aus," draussen ist doch da (pointing to street)

'When mom speaks German, she says: "I'm going outside (*draussen*)"
'I say: "I'm going out (*aus*)". Outside is [out] there. [5;5]

Hildegard explicitly comments on her mother's German and indicates, according to her evaluation, why it is wrong. In (14)

(14) H - ...der Hamburg... (name of ship)
F - ...die Hamburg...
H - Ist der Schiff denn eine Frau. 'Is the ship a woman, then?' [5;6]

Hildegard reveals with her comment that she has equated grammatical gender with sex. She now seeks to discover the reason for the incongruence of this with adult usage. In (15), however, she notes inconsistancy in usage between adults, and asks for clarification.

(15) H - You know, grandpa says "yourn", "this is yourn", why does

he do that? [3;9]

The next two examples of comments (16-17) show development of the first clear, explicit explanations of linguistic rules that Leopold notes.

(16) H - It's all ours ...it's yours and mine and mama's [3;7]
(17) H - If there is one , you have to say *schuh*
If there are two, you have to say *schuhe.* [4;2]

In (16) the child is expanding on the word 'ours', showing a clear understanding of what this possessive pronominal form encompasses. Example (17) is a clear explicit explication of the plural rule for this form in German. This is all the more interesting in light of the findings of Hakes *et al.* (1980) and others (see Nesdale and Tunmer, 1984) that generally before the age of 5 children tend to focus on the meaning of a subject rather than on the form.

3.2.5. Conscious Learning

One further dimension of metalinguistic utterances in children is that of conscious learning. The child makes direct requests for linguistic entities and structures, asks for definition and structure, and consciously practices new forms. Indeed, (14) and (15) above are good examples of this. Another can be seen in (18):

(18) H - lauf laufen (experimenting)
(Father indicates *lauf* is the correct form (of imperative)
(H. requests word for *go* in German)
F - gehen
H - geh [4;7]

Here, Hildegard is consciously practicing the German imperative. She asks her father for a vocabulary item and then tries out her rule with that item.

It is evident from the above data that the child is actively involved in monitoring and improving his/her language output from an early age. Moreover, he or she monitors the speech of others and reacts to feedback from others to his/her own speech. And some of the child's linguistic output in this context could definitely be labeled as metalinguistic, even granted the scepticism with which such "uncontrolled" (i.e., non-experimental) phenomena must be approached.

3.3. Uniquely Bilingual Phenomena

In examining the particularly bilingual phenomena found in Leopold's corpus, I will focus not on the previously mentioned categories, but on certain processes and contextual features which separate the bilingual from the monolingual. As we have noted, the bilingual child at first seems to try to develop a one to one form-meaning mapping. This can be seen in (19) below.

(19) F - Käse 'cheese'
H - d*e*:ʃ

- diʃ (her English word for 'cheese') [2;2]

For Hildegard this is actually a self-correction. In repeating her father she has blended two words, her English word diG with her father's German word. Realizing the incongruence of the expression, she corrects herself with her original English word, which she maintains for some time even when speaking to her German-speaking father. Leopold notes that Hildegard would often persist with a currently dominant form from one language in both languages.

Yet there is evidence that even at an early age Hildegard was starting to differentiate her languages. Note the example of translation found in (20):

(20) M - What did mama tell you!
H- No, no
M- Don't you know what "no no" means!
H- Nein, nein [1;6]

This not only shows a translation capacity at an early age [1;6], it also demonstrates a particularly bilingual rendering of the metalinguistic verb *mean*. *Mean* in a bilingual environment is not only a request for definition or explanation, but also for translation. Indeed, Leopold notes that at age [2;0] Hildegard seemed to consciously ask for words in both languages for the same meaning , going first to one parent to get the English or German word, then to the other parent to get the word in the other language. As she got older she began to make specific requests for translations, as in (21) and (22):

(22) I say 'napkin' [napənt], you say it in German [dɔmən], mama [2;6]

(23) Papa, what is *deutsch specken* "practice"?
'Papa, how do you say "practice" when speaking German?' [3;6]

During this period there was an increase in translations, both requested and unrequested, as in (23) and (24), respectively.

(23) H- ...nose
F- Wie heisst das auf Deutch 'What does that mean in German.'
H- Nase. [3;0]

(24) *unterwäsche* means 'underwear'
(after hearing father mention underwear) [2;6]

The second example could also be seen as an example of conscious learning. Such conscious translation also takes place in the example of language play we can see in (25).

(25) schreibaby - schreibaby - squealbaby. 'crybaby' [3;2]

Hildegard also demonstrated the awareness of her two languages being two different systems in her self-corrections, both spontaneous and in reaction to feedback from others, as can be seen in (26) and (27), respectively.

(26) This is a *wasser* - water [3;3]

(to non-German-speaking cousin)

(27) F- Ich glaube 'I believe so.'
H- He glaubs (translating to mother) [3;9]

(Mother and father laugh. H pauses, reflects and asks if *He thinks* is correct.)

The correction of language mixing in (27) demonstrates quite clearly the effects of feedback in the bilingual environment. It is such feedback that draws attention to mistakes in output. This is not to say that negative feedback is the primary mechanism in linguistic or metalinguistic development. As we have seen, the child is also monitoring his/her own speech and is consciously interacting with and learning from others.

One last point should be discussed here. Tunmer & Bowey (1984) have noted that at the age of 5 phonemic awareness has not developed in most children. Hildegard, however, was faced with contrasting pronunciations of the same form due to differing pronunciations in the two languages. This is nowhere more evident than the metalinguistic comment on the pronunciation of her own name in (28):

(28) *Opa* ('grandpa') might call me Hildegard [d], in German though: Hildegard [t] [4;9]

where she has marked the voicing contrast on the final phone (German having a final devoicing rule).

3.4. Summary and Discussion

The data show very clearly that even very young children can display a variety of metalinguistic behaviours in their spontaneous speech. Such metalinguistic behaviour is already evident before the age of 5 on the syntactic, morphological, lexical and phonological levels. As to differences between bilingual and monolingual development, the necessity of separating the two languages within the bilingual acquisition context very soon breaks down the tight union of form and referent assumed in Clark's Principle of Contrast. This results in a unique bilingual activity: translation. Indeed, as Malakoff & Hakuta (1991) have noted, translation is in itself a metalinguistic act. The mixing of languages and code-switching acts as a further stimulus to metalinguistic development in that communicative feedback from his environment constantly alerts the child to transgressions or success in this regard. This would arguably lead to a high degree of monitoring and a greater ability to separate the two systems. This would in turn result in an increased knowledge of languages as formal systems. Although this would be most evident at the level of the lexicon, one would expect to extend beyond it to the domains of morphology and syntax, and perhaps even to phonology. Thus, we would expect bilinguals to show higher metalinguistic degrees of skill in manipulating or reflecting on the nature of linguistic structure. Indeed this is the beginning of viewing language as an object in itself. It is important to note, however, that there is nothing in the acquisition context that suggests that bilinguals should know more about the structures of a particular language than a monolingual. This moves into the domain of proficiency. It should also be pointed out that the features of the bilingual context do not justify making any assumptions about increased abilities to define or explain metalinguistic terms such as 'word,' or to logical analytical functions such as those underlying metaphor. And this is indeed what is found in the experimental literature, which we will now examine.

4.0. EXAMINATION OF THE RESEARCH LITERATURE

As we noted earlier, the research literature shows bilinguals to be superior to monolinguals in the performance of some metalinguistic tasks, but similar or inferior to monolinguals on others. As Bialystok (1991) has pointed out, this seems to be largely a function of which task is used and which ability it taps. In the literature we find that bilinguals consistently outperform monolinguals on metalinguistic tasks which require separating form from meaning, such as demonstrating the arbitrary nature of words, as seen in studies by Ianco Worrall (1972), Ben Zeev (1977), Cummins (1978), Bialystok (1986a, 1988). Similarly they have been found to be superior to monolinguals on tasks requiring them to focus on form despite a distracting semantic context (Bialystok, 1986b, 1988). They have not, however, outperformed monolinguals on tasks such as articulating the concept of word (Bialystok, 1988), certain grammatical correction tasks (Bialystok, 1986b), overt explication of errors and corrections (Galambos & Goldin-Meadow, 1990), or metaphor interpretation (Johnson, 1991). Although there are some contradictions, as in the case of differential findings on grammaticality judgements (compare Bialystok, 1986b and Hakuta, 1987 with Bialystok, 1988), the tendency is clear: Bilinguals outperform monolinguals on tasks requiring sensitivity to form to the exclusion of meaning. This is particularly evident in Galambos & Goldin-Meadow's (1990) finding that, when they correct sentences, bilinguals show a completely form-based strategy while monolinguals tend to focus on content. Moreover, they display a similar tendency in their explications of grammatical errors.

One possible explanation of these results is to say that through their unique acquisition context, bilinguals have a greater awareness of linguistic form, but not supralinguistic functioning. Another is to view them in terms of a cognitive development model, as does Bialystok (1991). Bialystok regards metalinguistic development as being the product of two general metacognitive skills: control of processing and analysis of knowledge. She argues that bilinguals have a greater degree of control of processing, the cognitive executive function which directs attention and cognitive resources to tasks. This would explain bilinguals' better performance on tasks which require paying attention to form and ignoring distracting semantic contexts. They do not, however, have higher levels of the higher analytical function, analysis of knowledge,which is required for such tasks as explaining metalinguistic concepts or correcting grammatical sentences. The justifications for this differential development of abilities are logical in light of our discussion of the special features of the bilingual environment in metalinguistic development. The monitoring we have spoken of would be a function of the control executive in Bialystok's model. And it is the constant monitoring required to separate the two languages in his environment and own speech which stimulates the development of this cognitive function.

In a sense the two approaches we have discussed are congruent. They are really different perspectives of a similar process. The first is based on the function of acquisition principles in a special acquisition context; whereas the other is a cognitive model based on information processing theory. Both lead us, however, to similar predictions concerning metalinguistic development in bilinguals. There are some cases, however, where the study of the acquisition context may give us certain insights which might not be clearly indicated by the cognitve development model. One such area is segmentation tasks, which have been studied in monolingual children by a number of researchers (for reviews see Bowey & Tunmer, 1984; Leong, 1987, 1991). According to Bialystok (1991), segmentation and word counting require high degrees of both control of processing and analysis of knowledge. Although she herself hypothesizes that bilinguals should have an advantage on such a task (Bialystok, 1986a), given that high degrees of analysis are also involved, such

a hypothesis does not flow naturally out of the model. However, it does from an analysis of the acquisition context. The bilingual is constantly exposed to and uses two words for the same referent, and is constantly made aware of this, particularly in situations of code-switching and language mixing. This can be seen in cases like (27) above, *He* **glaub***s*, where Hidegard has mixed English and German, using the German unbound morpheme *glaub-* 'think' with the English verb inflection *-s* while translating a sentence from German to English.[3] Negative feedback to such utterences, as well as the need to shift from language to language to understand them in the speech of others, would suggest that the concepts of words as categories of form and referent matches would develop earlier in bilinguals, leading to better performance on word counting/ segmentation tasks.[4]

5.0. CONCLUSION

Bilingual acquisition does seem to stimulate the development of certain metalinguistic abilities, and the seeds of this difference can be found in the bilingual acquisition context. Language acquisition is not only a function of certain universal developmental and language acquisition principles, it is also a function of context. In other words, the language a child uses is dependent on the input it receives. This extends to some degree to higher linguistic functions such as metalinguistic knowledge or ability. The bilingual acquisition context presents the child with an extra set of contrasts which accelerate the ability to separate form from meaning and the realization of the arbirariness of language. This is strengthened through the activities of translation and code-switching (including language mixing). The former further weakens the notion of the indivisibility of form and referent and highlights differences in structure, while the latter promotes the development of the monitoring function which allows the child to monitor not only the external effects of his speech, but also his own utterances. This monitoring function can be seen in cognitive terms as a control processing function which directs thought. It is this control processor which many cognitively oriented researchers see as the basis of metalinguistic ability. This ability seems to extend mainly to the child's seeing language as a formal system and his being able to apply this perspective in approaching linguistic activities or tasks, such as symbol substitution, sentence correction, separating form from meaning. However, it does not extend to so called higher metalinguistic functions such as the explicit definition of metalinguistic vocabulary and linguistic concepts, or making logical connections as in the case of metaphor. In the case of the former this seems to be much more the product of learned knowledge (schooling), whereas the latter would seem to be a product of a more logical function requiring the juxtaposition and analysis of concepts. There is indeed nothing particular to the bilingual acquisition environment which would especially stimulate the development of such a faculty and this is exactly what the research literature bears out.

Finally, the examination of the bilingual acquisition context not only allows us to explain different findings in the research, it also permits us to make certain predictions which cannot be made with simple reference to a theoretical cognitive model alone. This highlights the value and necessity of viewing language acquisition as a social, interactive phenomena and not simply a formal or psychological puzzle.

NOTES

1 See Clark (1978) and Slobin (1978) for somewhat similar classifications.

2 Clark (1978) and other researchers have included metalinguistic acts which we will not address, such as ambiguity interpretation, riddling, and metaphor, but these are extremely complex phenomena and are generally truly acquired at a later stage than we will focus on here.

3 This kind of mixing is common in cases of bilingual acquisition in the following example from Ben [3:10]: *er hat mich ge***kick***t* Such cases would make one suspect that the basic unit which would be salient and easiest to access (other than the syllable, which has a physical, accoustic reality (Leong, 1987)) would be the unbound morpheme.

4 This hypothesis is currently being tested by the author in a study of kindergarten children.

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NIGERIA AND LANGUAGE CHANGE: A STUDY IN HISTORICAL PATTERNS

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It is not easy for an outsider to get a sense of proportion on social and political issues in Nigeria. The African inherits a temperament, environment and history that is not immediately comprehensible to a nordic visitor. Experience teaches both caution and enthusiasm. To live in Nigeria without forming opinions about language issues would be unthinkable; problems of communication and inter-ethnic tension are a part of daily business for native and foreigner alike.

The questions an outsider might ask are many and broad. How do language groups come into conflict? What steps are taken to try to deal with these conflicts? How often are policies to deal with linguistic diversity effective and how often destructive? Can we predict some of the conflicts that occur? Can enlightened language policies ease the ethnic tensions that apparently all multilingual societies face? These are universal questions. Are there universal answers?

I have lived in Nigeria on two separate occasions, from 1983-85 and in 1989. On the first occasion I taught English in a secondary school and on the second I taught a variety of subjects to apprentice cabinet-makers in a furniture-making shop. My views are informed, then, by my own experience as an observer of Nigerian life, a teacher of young Nigerians, and as, at times, a member of a linguistic minority in conflict with the community around me. The spacing of my two periods of residence has allowed me to get a feeling for rate of change. Nigerian society is quite unstable and is currently going through a period of economic hardship. There are social forces at play that may have dated the earlier work of Nigerian linguists and language planners. Not the least of the new factors is a decline in the standard of and access to education. English, the official language, is, however, virtually no one's first language and depends for its vitality on a vigorous and widely accessible education system. As in other African countries, the once seemingly unassailable colonial languages may not in time be so difficult to dislodge, if and when African societies stabilize into a way of life based on their own priorities and realities.

My interest, then, is in language attitudes, language change and implications for language policy in the West African country of Nigeria. Although Nigeria has been identified as the most ethnically and linguistically (equivalent terms in Nigeria) diverse in Africa, and its problems of administration and nation-building the most difficult, its predicament is by no means uncharacteristic of many countries, both in Africa and elsewhere, and both today and in past.

I will first summarize the typology of language decline presented in Kahane and Kahane (1979), then examine some evidence for language change in other African countries (Ivory Coast, Zaire, Ghana and Tanzania). Following that I will speculate on possible futures of the official and national languages of Nigeria. I will argue that language change observable in African states conforms to historic patterns and natural laws which operate with little regard for the best intending language plans.

To champion the observed lessons of history is to challenge what appears to be a widespread assumption about the uniqueness of the age in which we are living. Communication technologies seem to make it improbable that significant cultures can survive in isolation, and seem to have made the spread of world languages both desirable and inevitable. The present status of English as an international language may be without precedent, but clearly it represents a phenomenon often repeated throughout history, and its uniqueness at present is purely a matter of degree. Medieval Latin served an analogous useful function, as did Classical Latin, Classical Greek and French at their respective periods of ascendancy. Civilizations go through cycles of rise and decline; the ebb and flow of history embraces periods of internationalism and universal states, and of nationalism and the drive for individual identity. There is no evidence that these poles of civilization have ceased to effect a dynamism of change.

Kahane and Kahane conclude their examination of the decline of Western prestige languages as seen through six selected case histories with the following summary:

> A frequent pattern of sequences, then, seems to unfold: a diglossic system, H vs L, reflecting a class society, is strangled by L, which expands under popular pressures. Elitist H declines, but it does not disappear completely; rather it compromises with L through a largely lexical fusion, thereby creating a more flexible instrument for a more open society. The standard which is born is the language of the educated middle strata. (196)

In the light of this, then, the questions to examine are:

1. Are the old colonial languages, in widespread use now as official languages and languages of education in African countries, likely to survive?

2. What is happening to the "national" languages (Hausa, Ibo and Yoruba in Nigeria)?

3. Are there other languages emerging that are establishing themselves, policies notwithstanding, as primary communication vehicles (lingua francas)?

Another way to ask these questions is to ask if the historical typology outlined above holds, or if, in this unique period in history, the forces at play will produce new patterns of language change?

In Ghana (Saah, 1986) language diversity is of a nature such that no indigenous languages have been elevated to official or national language status. A former British colony, Ghana retains English as its official and educational language. Its position seems undisputed in these domains, and it might be noted that amongst English speaking West African, Ghanaians have a reputation for having a high level of English competence.

Standard Ghanaian English has become Africanized not so much lexically or structurally, as through its assimilation of cultural norms for local language groups. Thus, the use of euphemism in English by native speakers of Akan reflects the practice of the speakers' first language. A diglossic situation exists between local languages and English.

> It is a sad state of affairs that due to the high premium placed on English in Ghanaian schools, most literates feel much more comfortable writing in English to their

> friends and relations though they usually communicate verbally in their own language. (Saah:371)

There also exists a diglossic relationship between varieties of English, with standard and pidgin varieties opposed. Though the language of "totally illiterate speakers", pidgin "has become so fashionable to use... that even some high school and university students use it a lot in casual conversation" (372). Pidgin has acquired a kind of prestige as a language of solidarity and identity. Saah (p.375) writes of working as an enumerator in the 1970 population census, when he was unable to gain the confidence of one old man (albeit, a Liberian living in Ghana) until he switched from standard "book" English to pidgin.

Ivory Coast (Côte d'Ivoire) is a former French colony that, at least at a glance, seems to have retained close ties to its old colonial masters (this is an impression gathered during a visit in January, 1990). It exhibits the characteristic language diversity of its neighbours, with four major language groups subdued under French as the official language and language of education. The position of standard French, however, is not secure:

> In the face of all kinds of economic difficulties, of record numbers of school dropouts and (intellectual) unemployment, mastery of the official language is no longer a guarantee of socioeconomic integration. In fact, the use of Standard French when addressing an uneducated or less educated person may sometimes be perceived as an offense. (Djite, 1987:220)

Competing with Standard French as lingua francas are Dyula (a dialect of Mandingo) and Popular French (a pidgin). While Popular French, though relatively widespread, remains stigmatized as a language of illiterates, Dyula is more widely accepted.

> The frequent use of Dyula by the elite and the international community for functions other than those of government and administration has increased the pervasiveness of the language and contributed to making it more attractive to all... the language is no longer regarded as the exclusive medium of communication of the uneducated... [it has] become a marker of the desire to identify with the natives... this variety is simplified and its lexicon is full of borrowings from other local languages and from French. (219)

Though these languages appear to be on the ascent,

> Populations are suspicious... a new language policy... might rob them of the only chance...to achieve a higher socioeconomic status, which they still associate with the mastery of Standard French. (222)

Zaire rivals the linguistic complexity of Nigeria, with 300 local languages, four national languages (Ciluba, Kikongo, Kiswahili and Lingala) and French as "the language of public administration and international relations and the medium of instruction" (Rubango, 1988:267).

With only four per cent of the population speaking this language of power, and with changing times, French here is also in trouble:

> Toutefois, depuis l'indépendence, le chômage et le paupérisation des jeunes élites s'accentuent... se forme graduellement une nouvelle aristocratie financiere généralement non ou insuffisamment instuite. D'ou le slogan populaire qu'on rencontre dans plusieurs langues nationales: "le français, est-ce l'argent?" D'ou également la croyance corollaire que... le français constitue une des voies les plus sures de la clochardisation, de la prolétarisation. (256)

French taught in the school systems is accused of undergoing all the deviations from the standard characteristic of the pidginization process. Hostility or indifference to French, poor habits of French use at home and school, incompetent teachers, insufficient instruction manuals are all cited as reasons for the failure of the official language.

The government maintains French as the official language, however, because it fears "une nouvelle tempête de passions et de violences dans un pays ou la plaie des troubles politiques et sociaux n'est pas completement encore fermée" (261). It is recognized that another danger exists "a épouser une maniere de national-chauvinisme stérile et d'ethno-centrisme asphyxiant" which would result in the loss of

> Certaines valeurs étrangeres positives, qu'elles émanent d'Occident ou d'ailleurs, qu'elles soient d'ordre matériel, technologique ou spirituel, culturel. (264)

Increasingly, however, English is being seen as this vehicle to gain access to the positive influence of the outside world, and the educated elite seem to be turning more and more to it. English cannot take the place of an internal lingua franca, however. It is in the national languages that French here faces its competition, "particulierement celles qui, parmi les linguae francae, présentent une vocation continentale et mondiale" (263).

Tanzania differs from other countries discussed and shares in common with northern Nigeria a history in which colonial administrations (German and British) used an already established trade language, Swahili in this case, as the language of administration. The happy consequence of this was a post-independence language policy that is "one of the most successful instances of language institution in the world" (Fasold, 1984:266). English survives for a number of "high" functions, but Swahili, a language both indigenous and neutral (not favouring any particular ethnic group), remains the national and official language.

Tanzania's situation is fortunate and, apparently, unique, for even at the time of independence, use of Swahili was widespread. Kenya, by contrast, has also attempted to establish Swahili, but against a background of very limited use, and it has found itself much more dependent on English for its official and inter-ethnic communication needs.

Tanzania, then, is an anomaly in the linguistic fabric of modern Africa, having, in some sense at least, attained the more open society the Kahanes saw as the driving force behind language change in diglossic language communities.

Wardaugh (1986) identifies the problem:

> When European imperialism was finally effectively removed from Asia and Africa... there was no... redrawing of political boundaries. The previous colonies, often

> peculiar amalgams of language and ethnic groups, since conquest rather than language or ethnicity had accounted for their origins, became independent whole nations except in a few cases, such as Pakistan, Burma and Sri Lanka, when there was successful separation in contrast to Biafra's unsuccessful attempt to secede from Nigeria and Katanga's from Zaire. Many of the resultant nations have no common ethnicity, and strong internal linguistic and ethnic rivalries, making national planning and consensus difficult to achieve at best...
> One important consequence is that the new states... are often multilingual but, as a result of their histories, have elites who speak a European language such as English or French. This language not only serves many as an internal working language but is also regarded as the language of mobility. It is both the language that transcends local loyalties and the one that opens up access to the world outside the nation.

He goes on to observe:

> It is unlikely that in these circumstances such "outside" languages will disappear; rather it is likely that they will continue to be used and that positions of leadership will continue to go only to those who have access to them, *unless present conditions change* [my emphasis] (345).

In the African countries examined there is widespread evidence of the emergence of popular lingua francas, unofficial challengers in many cases to the official languages as established by stated government policy. In Ghana the popular lingua franca is pidgin English which is gaining acceptance amongst well-educated members of the society, though it does not at this time threaten to supplant English. In Ivory Coast, however, standard French seems confined to a particular social stratum, its former prestige undermined by changing economic realities. Rising is the popular language Dyula, enriched with French lexical items, acceptable across social class and ethnic boundaries, though not yet developed enough to take over the official duties of standard French. In Zaire standard French is being challenged as an international language by English, and as a lingua franca by the national languages, though official functions cannot be surrendered at this time. Similarly, in Central African Republic the official language is French, but a national language in widespread use, Sango, is a combination of a simplified local language and French lexical material (Samarin, 1986). Tanzania is an exception to the pattern apparent here due to more favourable historical circumstances.

Nigerian linguists devote much thought to national language issues. Most are frankly uncomfortable with the role English has assumed in Nigerian life; it is a sort of inescapable reminder of a colonial past few feel proud of, or completely reconciled to. It is felt that, at least so far, English has not "forged the national unity or integration envisaged by the early planners" (Awonusi,1985:25). Discussion of language issues follows a well-worn course: first, possible indigenous alternatives to English are examined, then rejected because of probable interethnic conflict; exogenous African languages are considered, such as Swahili, and are then rejected because of difficulties encountered where this strategy has been tried (Kenya and Uganda). A less common alternative has emerged in Nigeria where a planned language (Guosa; see Igbinewka, 1987) has been developed. There is little historical precedent for the success of planned (artificial) languages due to a lack of "historicity" and "vitality" (see discussion of Stewart's formula in Fasold, 1984:64-67). Most discussions conclude as in Awonusi (29): "therefore, loved or hated, the English language is bound to remain Nigeria's lingua franca for the foreseeable future."

The national language most frequently singled out as a possible candidate to replace English is Hausa. It has a history as a trade language across the northern regions of several modern West African states, it numbers more speakers than even Swahili in East Africa and it has been developed as a language of administration. Awonusi conducted a study early in the period of the second civilian regime (1980) which indicated that there was considerable openness amongst the elected members of the government to the Hausa language as a replacement for English. This support seemed to cross the old ethnic divisions. Fakuade (1989) traces the spread of Hausa through a number of non-Hausa speaking areas in some of the northern states of Nigeria.

Awonusi's study, however, was made during a period of great optimism that the subsequent performance of the civilian regime could not sustain. Hausa has never, professed openness of legislators notwithstanding, made significant inroads in the Yoruba and Ibo speaking parts of Nigeria, though each of those languages seems to be growing in importance relative to its minor language neighbours. Significantly, neither Awonusi nor Fakuade saw Hausa establishing itself nationwide. It would seem that if Nigeria had in fact split into the thre countries it nearly did in the 1960's (it was the north that first attempted secession; the east, Biafra, followed), language problems would be of considerably more manageable proportions. This reasoning still has considerable currency, though perhaps is losing its force in the younger generation.

Recognizing the magnitude of the problem, the government of Nigeria, in 1977, presented a three language policy:

> The Government considers it to be in the interest of national unity that each child should be encouraged to learn one of the three major languages other than his mother-tongue. In this connection, the Government considers the three main languages to be Hausa, Igbo, and Yoruba. (Olagoke, 1982:200)

This policy was developed in a time of great expansion of the education system. It was not implemented then. Today that system is very much in decay; school enrollment has dropped with the re-introduction of school fees, funding is not available to staff schools adequately, texts and supplies are few. The three-language policy (that is, native, English and one other major language) seems a remote dream. It is simply too much trouble in a climate where basic survival cannot be assured.

With 40% of Nigerians bilingual in English, and its exclusive use for the functions of the present federal military government; with the major languages not able to gain acceptability beyond traditional or present geographic domains, it might seem that English is too firmly established and too important to lose. Perceiving this to be the case, some writers have sought to dignify it through a concept of Nigerian Standard English. Akere (1978) examines some "wider semantic features" associated with kinship terms. His attempt to identify with a rigorously "correct" English that acquires its African identity in this manner, while dismissing the syntactic and phonological changes of popular usage as "mistakes and solecisms", suggests an understandable but unnecessary insecurity. The educated elite may often have felt a need to measure themselves by international standards. This need, however, undoubtedly serves as a counter-force to the realization and articulation of a coherent African identity. The rise of a truly representative popular standard will reflect growing confidence in the identity it expresses. The emergence of that confidence should reflect an evolving maturity of the new national societies.

The language that seems most likely to become that popular standard is pidgin.

> Pidgin English has almost taken over the role of lingua franca in nonformal domains. Thus, it has become the most popular medium of intergroup communication in various heterogeneous communities throughout the country... it is now developing into a mother tongue and is spreading both horizontally across the entire country and vertically across various categories of speakers, literate and illiterate, male and female, old and young. (Akinnaso, 1989:136)

Nigerian Pidgin is a combination of southern Nigerian languages and English (see also Faraclas, 1989). It is used by some newspapers, by broadcast media, as a literary vehicle and as the language of the marketplace whereever different ethnic groups meet. It is the language of communication used by the police and the army. It is growing in acceptance amongst educated speakers (as in Ghana).

With economic hard times, the decline of the education system and the shrinking of the professional civil service, a new class of elites can be expected to emerge, as in Zaire, who show financial and business acuity, but, being generally less educated, will speak the language of the marketplace. Many of the best educated in the Nigeria of the 1990's are finding that the ivory tower can no longer provide the middle class lifestyles that they had grown accustomed to. They too are finding new peers in the world of entrepreneurs and the exchange of goods and services.

Perhaps also, as literacy fails to bring the rewards it once seemed to promise, those more fit to survive may prove to be those illiterate farmers and market women once ridiculed by their better educated children. As the young people come to recognize a greater value in the skills of these people, the prestige they acquire is likely to attract identification through the use of their language variety. Although it is speculative to generalize from a few personal experiences, I have noticed young people using pidgin, taking the trouble to learn it when a few years ago they might have shown contempt.

Language change is inevitable. History provides many examples of this. Today, in Nigeria, as in many other African countries, language change shows a close adherence to historical patterns. The typology presented earlier seems to be strongly representative of the process in evidence. Nigeria, like other African countries discussed, has a functioning diglossic system. Standard English, the language of an educated elite, serves as the high language, H. Pidgin English, the most widespread popular lingua franca, has traditionally been used by the uneducated. Popular pressures, the product of changing economic fortunes and a maturing identity, are in fact spreading this language and reducing the domain of standard English. Pidgin is already a compromise language between certain local languages and English. Because of its predominantly English lexical content, it should readily be able to assimilate new lexical material for ever-expanding functions. Though pidgin is not yet the language of the educated middle strata, it is rapidly becoming acceptable to them.

It would be incautious to claim that Nigerian Pidgin will in fact one day become the official language of the country. The status of English as an international language is currently undisputed and it is unlikely that it will be replaced in certain critical domains in the near future. But this does not mean that the status quo will survive. The processes that brought about the decline of other prestige languages are active in many African countries. We can expect significant language changes.

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THE GODDESS AND THE SEA PEOPLE
The origins of the languages of the Minoan scripts

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1.0 INTRODUCTION

It is ironic that although the world has known for millenia about the accomplishments of the "Ancient Greeks" through the writings of Homer and his contemporaries, it was only relatively recently that the evidence of the advanced civilization pre-dating Homer by almost a thousand years, that of the Minoans, has come to light. It was excavations by Sir Arthur Evans - most notably at the site of Knossos, on the island of Crete (Greece) in 1901 - which first gave notice of the existence of scripts used by the Bronze Age Aegean civilization discovered in the late nineteenth century by Heinrich Schliemann.

Focussing on the similarities between Minoan Linear A, its precursor, Cretan-Pictographic Script, and the symbolic language of the Goddess religions described in *Language of the Goddess* (Marija Gimbutas, 1989), this paper will attempt to demonstrate a relationship between the writing and linguistic system of the Minoan civilization, and those systems of other earlier and contemporary Goddess-centered civilizations (e.g., those of Sumer, Egypt, Phoenicia). The "Language of the Goddess", which will be discussed in detail later, has been shown to include elements that have been consistently evident in the religious/historical artifacts of widespread cultures, spanning from the Paleolithic (ca. 60,000 B.C.) through to the last days of the Roman Empire (ca. 500 A.D.). By connecting the Minoan scripts to this historical religious tradition, I propose a connection between the Minoans as a people and a larger religious-cultural tradition, to begin to identify not only their ancestry and linguistic roots, but also to settle the issue of the origins of their writing systems.

The scripts discovered by Evans can be roughly divided into three groups: (1) those apparently encoding the languages of non-Indo-European Minoans (dating between 2500 B.C - 1600 B.C. - e.g., Pictographic, Linear A and arguably Linear C), (2) those encoding the language of the Indo-European Proto-Greek Myceneans (1600-1250 B.C. - Linear B), and (3) Linear D (derived primarily from one text - the Phaistos Disk). It will be the first group - the non-Indo-European Linear A and Cretan Pictographic - which will be the focus of this discussion since the latter two scripts date after the arrival of the patriarchal Indo-Europeans (Mycenaeans) (Cotterell, 1979; Packard, 1974).

The decipherment of Linear B script - which has fundamentally influenced the subsequent interpretations of the other Pre-Homeric scripts (i.e. Cretan Pictographic, Linear A, Linear C and Linear D scripts) - was based on the imposition of phonetic values on the somewhat stylized ideograms of Linear B. Thus, for example, the ideogram of a three-legged cauldron was seen to be accompanied by syllabic signs which could be read as *ti-ri-po-de*: "almost exactly the Greek word *tripodes*, which of course means *tripods* and is used of cauldrons of this type" (Chadwick, 1987: 20). With the decipherment of Linear B as Greek (albeit a very early form of it), came the decoding of

Cypro-Minoan Linear C script, facilitated by the discovery of a bilingual (Greek/Linear C) text. In fact, a number of bilingues of various combinations of languages have been found (see Gordon (1966) for discussion). It was assumed that this script, in use on the island until ca. 800 B.C., also encoded a Greek phonology for a different dialect. Although questions remain concerning the origins of the script itself, as its use predates that of Linear B, it appears to be derived from Linear A and/or Cretan Pictographic scripts [see Best & Woudhuizen (1989) for discussion].

The hidden influences and biases on the study of ancient languages and cultures which appear to have conspired to obscure the relationship between the Minoan scripts, the Minoan language, and the language of the religion of the Goddess will also be discussed. These influences include the imposition of researchers' own socio-cultural expectations and belief systems on to the civilization under investigation. The decipherments currently proposed for Linear A, Linear D and Cretan-Pictographic are also based primarily on original decipherment of Linear B [for further discussion, see Best & Woudhuizen, 1988, 1989]. As will be seen in the later discussion, this unquestioning acceptance of the earlier work may have compounded an original error. Examples of such unsubstantiated assumptions concerning societal structures leading to linguistic assertions will be discussed, with reinterpretations of some of the linguistic data being offered. One such assertion that will be re-examined is the traditional interpretation of the Cretan pictographic ideograms for man and woman. It will be proposed that the (unchallenged) original decipherment derived primarily from twentieth century socio-cultural expectations, and as such lacks an internal linguistic foundation. Thus, in this paper, such questions of gender identification will be examined in detail - as will other presuppositions concerning identification of ideograms which may have influenced subsequent linguistic analysis.

One of the first researchers to connect the widespread (temporally and geographically speaking) similarity of the symbols associated with writing to the worship of the Goddess was Marija Gimbutas (1989), who in exhaustively cataloguing what had previously been marginalized as "geometric designs" on artifacts dating from the Paleolithic era onwards, became aware of a systematic and consistent use of specific patterns by followers of the Earth Goddess religions - in Greece, as well as throughout the continent. The Minoan civilization appears to have been one of the last surviving Goddess-worshipping societies. She argues persuasively that the "geometric designs" represent an ideographic script encoding religious symbols in a consistent cross-cultural, albeit not language-specific, manner.

Many of the characters or ideograms of the earliest discovered Minoan scripts found by Sir Arthur Evans (1909) show amazing similarity to the symbolic "Language of the Goddess" documented from sources across the Ancient world by Gimbutas (1989). Since the worship of the Goddess (or a Mother-Goddess) can be seen to have existed at different times (Paleolithic to approx. 3000-2000 B.C.), connections between the temporally and geographically disparate groups are significant for the identification of the Minoans throughout Old Europe and the Middle East as much of the literary evidence from these civilizations has taken the form of inscriptions - frequently invocations of the resident deity.

Surprisingly, although it may appear that the original error would lie with Sir Arthur Evans who found the first tablets at Knossos and proposed the original decipherment, many of Sir Arthur's theories and observations from 1909 have considerable relevance to the current research. Chadwick notes that Evans "had been in no doubt that his 'Minoan' Cretans were not Greek speakers." (1987: 17)

It is therefore unfortunate that many Minoan scholars appear to have omitted a close perusal of his original work, relying instead on secondary sources. Given the minimal acknowledgement of the Minoan Goddess religion in many recent works (e.g. Castleden, 1990; Cotterell, 1979, 1985), it is surprising to find many attributions to the "Goddess of the Minoans" in Evans' research, albeit without examination of the possible socio-political and/or linguistic ramifications of a female centered culture (especially with respect to the Cretan Pictographic script). Furthermore, he assumes that the palaces were controlled by Priest-kings rather than the equally plausible Priestess-queens, as do many of those who followed (e.g. Baikie, 1926; Baker, 1979; Burn, 1930; Castleden, 1990; Chadwick, 1987; Cotterell, 1979; Packard, 1974; Yamauchi, 1967). In fact, considerable literary and archeological evidence exists supporting the latter position. Although most of this evidence has come to light via the work of female linguists and archeo-historians (e.g. D'Eaubonne, 1976; Eisler, 1988; Gadon, 1990; Gimbutas, 1989; Goodison, 1989; Goodrich, 1989; Stone, 1976).

Sir Arthur Evans suggested a number of similarities between the Minoan "hierogyphs" (Cretan Pictographic script) and scripts of what are now known as the Goddess-influenced civilizations (e.g. Egypt, Cyprus, and Lycia - see discussion in Stone, 1976). Of the "hieroglyphs" summarized in Evans' (1909) book, he directly identifies a number of them as "symbols of the Goddess". One such example is the double axe (the *labrys*) from which the name *Labyrinth*, the Place of the Double Axe, is assumed to have been derived (e.g., Evans, 1909: 232, 233).

Evans states:

> the double axe is associated with the Palace sign...as an ideograph, the sign may at times cover a religious title in connexion with the Minoan priest-kings (*sic*). In a recurring formula it is grouped with the serpent or zigzag (#83) and grain jar (#50). In one case it is coupled with the "serpent" alone, a point of some significance when it is remembered that the snake, like the double axe itself, was a special attribute of the *Minoan Mother Goddess* [my emphasis] (1909: 195).

Some of the other ideographs that Evans (1909) attributes to the Goddess, or "early Cretan" religion, include the following: the bull's head (#62), the ox's head (#38), the ankh (#39), the owl (#78), the dove (#79), the snake and "zigzag" (# 84 - frequently grouped with the double axe, arrow), the "sieve" (#54), the sun (#108), the moon (#111), the axe (#12), the double axe (#36), and the "cross" (#112). Additionally, we may see similarities between Evan's "sieve" (#54), a circular net-like ideograph, and the images on the pottery in Gimbutas (1989: 82). The similarities between the "three flowers" ideographs in 25c, 25d, 25h, 25l and 25m (Evans, 1909: 215) and the poppy crown on the head of the statue of the Goddess in Cotterell (1979: 160) is also thought-provoking. Finally, the symbolism of three reflected in some of the Minoan characters can quite transparently be seen in the earlier votive offerings and pottery [e.g., compare Evans (1909: 215) with Gimbutas (1989: 91)].

2.0. QUESTIONS OF OBJECTIVITY: SEXISM & ETHNOCENTRICISM

The influence of researcher bias on the decipherment of ancient scripts has resulted in the imposition of non-linguistic values in the analysis. Sir Arthur Evans' lack of interest in the world-view implications of the symbols of the Goddess in the Minoan scripts, and subsequent work shows an extreme avoidance of the topic. Unfortunately, it seems to be the norm to limit discussions of

the implications of the Goddess religion on the Minoan society to approximately one or two paragraphs - even in discussions of the Minoan religions (e.g. Castleden, 1990; Cotterell, 1979, 1980).

The implications are examined by Stone, who asks:

> Why do so many people educated this century think of Greece as the first major culture when written language was in use and great cities built at least twenty-five centuries before that time? And perhaps most important, why is it continually inferred that the age of the "pagan" religions, the time of the worship of female deities (if mentioned at all), was dark and chaotic, mysterious and evil, without the light of order and reason that supposedly accompanied the later male religions, when it has been archaeologically confirmed that the earliest law, government, medicine, agriculture, architecture, metallurgy, wheeled vehicles, ceramics, textiles and *written* languages were initially developed in societies that worshipped the Goddess? (1976: xxiv)

The assumption of a male-dominated Minoan society has resulted in some questionable decipherments. One blatant example of socio-cultural and linguistic preconceptions leading to unwarranted linguistic extrapolation may be found in the discussion in Best and Woudhuizen (1989: 12) concerning the origins and meaning of the term *sa-ri* (*sa-ru-* nominative). The authors claim that because this term appears before the name of the person most often mentioned (i.e. the most powerful), and the one receiving the largest amounts of goods on the tablets, it must *a priori* transliterates a "king". This assertion, as will be illustrated below, ignores their *source's* transliteration of the word in definitively non-gender-specific terms. Best and Woudhuizen cite as their source the linguist ten Haf who:

> compared *sa-ra* with Hebrew *sar*, "chief, ruler, captain", *ru-zu-na* with Hebrew *rôzên*, *râzôn*, "prince, knight, ruler", and *sa-qe-we* with Hebrew *zâqîf*, "military guard" and deduced from the numbers behind them that the three functionaries, like the *wa-na-ka*, *ra-wa-ke-ta* and *te-re-ta* in a more or less similar context on the Linear B tablets, are noted in order of decreasing importance. His (ten Haf's) conclusion on *sa-ra* was: "It would not be surprising if it turned out to be the official title of the local ruler" [i.e. not necessarily a male ruler, or a "king"] (1989: 13)

However, ignoring ten Haf's frequent use of the gender-neutral term ruler", Best and Woudhuizen (1989) present the following sexist and somewhat ethnocentric baronial hierarchy:

> we have on HT 116 in order of descending importance *sa-ri* "my king", *ru-zū-na*, "prince", *sa-qe-we*, "baron" on one line with *wa-na-ka*, *ra-wa-ke-ta* and *te-re-ta* in Linear B (p. 14)

The influence of preconceptions based on personal socio-cultural environment is obvious in this "linguistic" reasoning. Unfortunately, as will be illustrated below, these kinds of assumptions are evident throughout the literature.

One final note with respect to the title *sa-ri*. It appears that this term may derive from the name of the Phonaecian "Pillar Goddess", Asherah - in which case it would not seem unusual for it to inflect for the feminine [a sticking point for Best & Woudhuizen, 1989]. The fact that the

name of the Goddess in Hebrew inflects for the masculine plural ("asherim") also serves to illustrate one of the dangers of making linguistic comparisons without reference to the temporal, cultural and religious differences between the language **groups** in question. The Pillar Goddess (of Canaan) was the "main competition of Jahweh" (Stone, 1976), and the Hebrews (then and now) refuse to even *acknowledge* a female deity, using only the masculine word *Elohim* (gods).

Stone states:

> The writers of the Judeo-Christian Bible, as we know it, seem to have purposely glossed over the sexual identity of the female deity who was held sacred by the neighbours of the Hebrews in Canaan, Babylon and Egypt. The Old Testament does not even have a word for "Goddess". In the Bible, the Goddess is referred to as *Elohim*, in the masculine gender, to be translated as *god*. But the Koran of the Mohammedans was quite clear. In it we read, "Allah will not tolerate idolatry...the pagans pray to females" (Stone, 1976: xviii).

Thus, to understate the case, "a Hebrew translation of a religious Linear A formula is incompatible with a Phoenecian pillar cult" (Best & Woudhuizen, 1989: 19). Ironically - considering the confusion perpetuated by their discussion of the meaning of *sa-ri/sa-ru*, Best and Woudhuizen suggest that the most temporally appropriate comparisons for the Minoan Linear A texts would be those made to texts of the Ugaritic language (ca. 1400-1200 B.C.), who were also followers of the Goddess (see Stone, 1976).

More examples of this sexist bias can be seen in Chadwick's (1987) assumption that female workers in the Cretan records would *necessarily* be slaves He states:

> In Crete at least the production of wool was highly organized; and there too the palace controlled groups of female workers, who spun the yarn, wove and decorated the cloth... **These women are not specifically called 'slaves' but their status can hardly have been much higher [my emphasis]** Other workers are *specifically* [my emphasis], called by this title, but perhaps the distinction between slave and free was not so rigidly drawn as in later Greece. There are also slaves (or servants) of various deities, but some of these seem to have been of higher status (Chadwick, 1987:37).

Note that in addition to the blatant imposition of a twentieth century perspective on the Minoan civilization, the author has also apparently overlooked the fact that supplicants of most religions declare themselves to be subservient (i.e., slaves or servants) to their gods and goddesses. Other evidence of bias is addressed in the following quote:

> The women who followed the ancient sexual customs of the Goddess faith, known in their own language as sacred or holy women, were repeatedly referred to (by academics) as "ritual prostitutes". This choice of words once again reveals a rather ethnocentric ethic, probably based on biblical attitudes. Yet, using the term "prostitute" as a translation for the title of women who were actually known as *qadesh*, meaning *holy* [my emphasis], suggests a lack of comprehension of the very theological and social structure the writers were attempting to describe and explain (Stone, 1976: xx).

A final case of a researcher unwilling to accept the implications of his data can be found in a paper entitled "Homeric ανθος" [anthos] in Chadwick and Baumbach's (1963) discussion of Mycenaean Greek and Linear B (Woodman, 1991). In his paper, J. M. Aitchison provides, albeit unintentionally, additional evidence of the influence of a Minoan religion on the development of the Greek language. He questions the traditional interpretation of ανθος as "flower", and from the point of view of this paper, it is provocative to note the similarities between ανθος and the Minoan word "Athĕnai", the goddess after whom the city of Athens was named, and who has been identified as the Minoan Goddess (see Eisler, 1987). Aitchison's disagreement with the traditional definition lies in the "word (and its derivatives)...(having)...to be regarded as metaphorical in at least six of the contexts in which it occurs" (p. 271). He proposes that a more "natural meaning" for ανθος based on analysis of the contexts in which it is found is "upward, visible growth" (p. 272). The relationship between the Minoan Goddess religion and nature, and life and fertility, is well documented in the murals and artifacts discovered at these sites (Betancourt, 1985; Castleden, 1990; Cotterell, 1979, 1985; Doumas, 1978; Hagg & Marinatos, 1984, 1987; Packard, 1974; Stone, 1976). Despite the additional evidence the author himself presents, he seems unable to acknowledge the obvious relationship between the origins of term ανθος and the "fertility cults". Thus, while noting (p. 276) the use of ανθεα [anthea] in reference to the goddesses Hera (Ανθεα &et. Ηερα [Anthea i Hera]) and Aphrodite (Ανθεα &et. Αφροδ&et.τε [Anthea Aphrodite]), and even going so far as to cite Welcker's theory that Hera was "originally an earth goddess" and that "she was... undoubtably connected with growth and fertility...(since)...ears of corn were called ανθεα &et. Ηερ&et.s [anthea Heris], Aitchison balks - stating that such theories have "met with strong opposition" (p. 276). Aitchison concludes, upon reviewing the etymological theories on the origins of ανθος, that there remains an "absence of convincing cognates in other Indo-European languages" for ανθος (p. 277)!

3.0. MALE OR FEMALE?: A RE-ANALYSIS OF SOME CRETAN IDEOGRAMS

As has been suggested, it is critical to consider the implications of the decisions implicit in every aspect of the decipherment of ancient (and unquestionably dead) languages. For example, consider the implications on the subsequent characterization of an entire socio-cultural and linguistic era of an incorrect assumption of the value of the ideographs and/or characters assumed to represent the male and female. It is my contention that questions of such magnitude can be raised concerning the decipherment of the Minoan scripts, specifically with respect to basic assumptions of gender-specific ideograms.

From the initial analysis by Sir Arthur Evans in 1909 through to current times (e.g. Chadwick, 1987), a triangular-topped stick figure has been assumed to represent the Minoan ideogram for male, and a rather shapeless stick figure is assumed to be the ideogram for female [see examples in Chadwick (1987: 13) and Packard (1974: 33)]. Attempting to discover the basis for the original gender allocation in the decipherment of the Minoan scripts is difficult as discussion of the "female" sign is virtually non-existant in the literature. Evans (1909) does not even include a discussion of the "female" ideogram, although he dedicates a page to the "male" one (p. 181). In addition, one finds very little of what could be considered independent evidence for the original gender-designation. However, as will become clear below, evidence certainly appears to exist to question it.

Some comments by Packard (1974) as to the rationale behind his support for the designation are illuminating. Discussing the basis for the two ideograms he refers to as MAN, he states (p. 51):

> The criterion for assigning a list to the B series is the presence of the sign L99 or one of its variants L125, L126, Lc55. *These signs seem to depict men,* **though they do not closely resemble the Linear B [Greek] ideograms VIR and MULIER.** *We shall refer to them as "MAN" ideograms, but for purposes of classification* **it will not be necessary** *to establish what the signs represent.* For the most part these signs stand in isolation in apparent ideographic usage, but in a few cases phonetic function is conceivable.

Since the two MALE ideograms do not even particularly resemble each other - one appears to be wearing a skirt, which according to evidence from wall paintings Minoan *men* did not wear [they wore loincloths - see Cotterell, 1979] - Packard attempts to clarify his reasoning:

> The analysis of the B series lists shows that the entries appear to form a coherent group and does not contradict the view that they designate entities counted (in whole numbers) rather than measured (with fractions). The identification of of these ideograms as MEN on the basis of their shape is consistent with the context in which they occur...It is further supported by the nature of the lists which appear on the same tablets with B lists...These groupings would accord well with an interpretation of the B series ideograms as *classes of men.* (Packard, 1974: 52).

However, the underlying assumptions upon which Packard's decisions were made are clarified later - they are based on his assumptions concerning what constitutes "mens' jobs", along with the assumption that women did not work. He does not even consider women worthy of discussion with respect to these hypothesized professions. He states:

> The most obvious need for distinguishing *groups of men* is by their profession. In this connection it may be relevant to consider three signs which occur in B series along with various MAN ideograms: L8, L35, and L10. The first of these resembles the Linear B ideogram for bronze; the second looks like the prow of a ship, and the third may be based on the ideogram L67, perhaps BARLEY. It is tempting, though highly speculative, to interpret these as "*men* who work with bronze", that is, bronzesmiths (cf. *ka-ke-u* in Linear B); "*men* who work with boats", perhaps shipwrights (cf. *na-u-do-mo*in Linear B); "*men* who work with barley", or bakers of some sort (cf. *a-to-po-qo* in Linear B). (Packard, 1974: 53).

Ironically, the bias noted above also has certain costs attached to it. A number of problems arise in the analysis as a result of the author's adherence to the original designation. Packard complains:

> It is not easy to determine what distinctions are made by the various modifications of the MAN ideograms and by the various sign-groups and ligatures which occur in lists with them.... *Some of the MAN ideograms seem to be wearing ceremonial robes* [skirts? - my emphasis] this may be illusory in view of the schematic nature of the signs. The detailed ritual preparations listed on the Linear B tablets might lead one to look for *religious personnel* in Linear A. (Packard, 1974: 53).

It is interesting that for Packard (and others) even figures in dresses must = MEN, presumably based on "context". Researchers have seem extremely hesitant to consider the ideograms as FEMALE, despite evidence from the wall-paintings and sealstones. Glotz (1925 - cited in Stone, 1976: 58) notes 76: 58) notes the following:

> The priestesses long presided over religious practices...Hosts of objects represent the priestesses at their duties... *the participation of men in the cult was, like the association of a god with a goddess, a late development* [my emphasis]. Their part in the religious ceremonies was always a subordinate one, even when the king became the high priest of the bull...while private worship was performed in front of small idols, *in public worship the part of the goddess was played by a woman* [my emphasis]. It is the high priestess who takes her place on the seat of the goddess, sits at the foot of the sacred tree or stands on the mountain peak to receive worship and offerings from her acolytes and from the faithful.

Another aspect of the traditional MALE ideogram which is problematic in the face of historical evidence is the triangular upper body. As noted by Gimbutas (1989), the triangle has been a symbol historically associated to the FEMALE (e.g., the breasts and vulva - Gimbutas, 1989). According to Gimbutas, this association of triangles and the female body can be traced from the Upper *Paleolithic*. Interestingly, in a number of the pictures designating a female with a triangular upper body, the anatomically obviously male image is a very linear figure, much like the currently designated FEMALE ideograph [see sealstones, Gimbutas, 1989]. The triangle itself is also a symbol in the Minoan script, and arguably has come down to us as the Greek letter delta (Δ).

A third questionable attribute of the traditionally MALE signs (albeit for animals) is the double, or bi-line. In Chadwick's illustrations of the ideograms for domestic animals (e.g., Chadwick, 1987: 29), the animals distinguished by a double line crossing mid-body are designated as male (as well as *castrated* male). No rationale is given for this decision. As the cross-cultural and historic information in Gimbutas (1989: 170), demonstrates also shows a strong affliation with the female [e.g., see "mother-and-child" statue in Gimbutas (1989: 170)]. Interestingly, a tri- and bi-line symbol/ideogram also exists in the Minoan script (e.g. Evans, 1909).

4.0. THE GODDESS IN THE LINEAR SCRIPTS?: INVOCATIONS AND LINGUISTIC EVIDENCE

The influence of the Goddess civilizations on the development of the Minoan scripts remains the subject of considerable debate. For example, Best argues against a blanket assumption of Semitic origins (Best & Woudhuizen, 1989) on the basis of his questioning of Gordon's (1961) interpretation of the name of the goddess, *Aš šara*, as Semitic. He suggests instead that the term *a-ša-ša-ra.me/ma*, the ending *ma/me* should be considered as a separate inflectional. He comments (p. 21):

> A sophisticated interpretation based on the Semitic stem *s/m*, in which *(y)a-sa-/sa-la-mV* must be read instead of just *(y)a-sa-sa-ra-.me/ma* contradicts the facts, because the epigraphical evidence proves that the pair *ma/me* forms, from the very origin of Cretan writing, no part of the stem *a-ša-ša-ra*, not to speak of the fantastic appropriation of *y-*, which in the pictographic inscription never occurs to the stem *a-ša-ša-ra*.

By doing so, however, it should be noted he is in fact arguing agains his own initial hypothesis concerning the Semitic origins of Minoan (i.e., Best, 1972). Emphasizing the extreme complexity of the linguistic situation under investigation, the author notes the example of a text in which can be found: "Akkadian technical terms, graphic variants typical for Akkadian texts form the Northwest Semitic area, Northwest Semitisms like fluctuating endings and a purely indigenous title" (Best & Woudhuizen, 1989: 14).

The phrase mentioned above is found on many of the Linear A inscribed materials. Significantly, Best's asserts:

> One of the important linguistic consequences of the decipherment of Pictographic and Linear A is that *a-ša-ša-ra-ma/me* ca. 2000 B.C. formed nothing more or less than proof of a primary vocative particle *ma/me* in, in diachronic order, Pictographic, Linear A and, as *-m*, in Ugaritic and *ya-sa-sa-ra-me/ma* c. 1600 B.C. of a secondary vocative particle *ya-*, and *y-* in Linear A and Ugaritic respectively: e.g., *ya-ša-ša-ra-ma-na*, "Oh, our Pillar", if *y*-vocative particle, *(ma)* would stand in its right place in the clause, and function in combination with the name of the deity invoked, followed by the first plural possessive pronoun suffixed behind the whole (Best & Woudhuizen, 1989: 22).

The comparison with Ugartic is pertinent given the cultural/religious ties the two nations apparently shared. Of course, the fact that the nature and content of this "most frequently attested standard libation formula in Linear A is the invocation of the Goddess is also significant. It reads as follows:

> *(y)a-ta-nūtī wa/u-ya (y)a-di hi-te-te ... (y)a-ša-ša-ra-me ... (i-)pi-na-ma (= (ib)bi-nam-ma)* "I have given and my hand has made an expiatory offering...oh Pillar (Aššara)...please give me..." [From Best & Woudhuizen, 1989: 32]

Finally, other evidence of the Goddess can arguably be found in the analysis of Gordon (1966: 8):

> The Eteocretan [Creto-Minoan] is better engraved than the Greek and its readings are clear. The final word in the Eteocretan is *__MO* corresponding to *]MATPI TAI A[* Since *MATPI* can only be the dative for "mother", the Eteocretan *λMO* is the equivalent of Hebrew *l'immō* "for his mother"...(cf. the Ugaritic name *ištrmy "Ishtar is-my mother"* = syllabic *ištar-im-mi-ya* (Gordon, 1966: 8).

5.0. CONCLUSIONS

In this paper, a linguistic comparison of the Pre-Homeric scripts with the language of the Goddess was done to examine the influence of the Goddess religion on linguistic and script development in Minoan Crete, on the basis of symbol similarities and of textual evidence of a religious nature. The hypothesis that the linguistic evidence would support the influence of the Goddess religion as a unifying principle in the origins of both the Minoan scripts and of the Minoan language(s) appears to have received substantial support. Similarly presented was evidence of the influence of bias on the study of ancient languages and cultures which has to a considerable extent conspired to obscure the relationship between the Minoan scripts, the Minoan language, and the

language of the religion of the Goddess - most notably in the area of gender-specific ideograms. The lack of an internal linguistic foundation for the decipherment of the ideogram MALE in the Minoan scripts raises serious questions as to the validity of the traditional decipherments of many ancient languages. Further research and re-evaluation is needed.

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THE REGISTER TONAL FEATURE AND THE NEUTRAL TONE IN MANDARIN

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In this paper I will discuss Yip's (1980) system of tonal features as it applies to the neutral tone of Mandarin. In particular I will demonstrate a number of problems posed for Yip's tonal features when it applies to the Mandarin neutral tone.

Yip's system of tonal feature has exerted a major influence on subsequent studies of Chinese tones. Being virtually the only non-linear analysis of Chinese tones for more than a decade, Yip's system has been adopted in a number of studies of Chinese tones (e.g. Bao 1990, Shih 1986, Packard 1989, Pulleyblank 1986, Yip 1989a,b, among others). However, in recent years, Yip's system has been challenged in a number of studies (Packard 1989, Zee 1991). Zee (1991), for instance, produced evidence from Shanghai to show that Shanghai is fundamentally a three, rather than four level tonal system, and therefore, Yip's tonal feature system which defines four levels does not work for the analysis of Shanghai tones. A similar finding is made in Lin (1992) with regards to Madarin tones. In this paper, however, I will only focus on Yip's analysis of the Mandarin neutral tone and discuss a number of problems with it. I will begin the discussion of these problems with a brief introduction to Yip's tonal feature system.

1. YIP'S REGISTER FEATURE SYSTEM

The most unusual aspect of Yip's tonal feature system is probably its use of an unconventional Register Feature *[upper]*. This feature and the feature *[high]* are the two component features in Yip's featural analysis of Chinese tones. Called Register Feature and Tonal Feature respectively, these two features interact to define four tonal levels:

(1)

Register Feature	Tonal Feature	Chao's Scale	Four Tonal Level Defined
[+upper]	[+high] (H)	5	[+upper, H]
	[-high] (L)	4	[+upper, L]
		3	
[-upper]	[+high] (H)	2	[-upper, H]
	[-high] (L)	1	[-upper, L]

Claiming a separate autosegmental tier, the Register Feature partitions the whole range of the voice pitch into two equal portions, a [+upper] portion and a [-upper] one. On Chao's five-level scale, [+upper] covers a pitch range from 5 to 3, and [-upper] from 3 to 1. Each of the two portions, in turn, is divided into two sub-portions by the Tonal Feature [high]. Thus, in terms of coverage of the pitch range, these two features overlap each other. Yip cited a number of cases from

Mandarin to motivate her Register Feature analysis. In this paper, I will focus on her analysis of the Mandarin neutral tone.

2. MANDARIN NEUTRAL TONE: AN INTRODUCTION

First, let me give a brief introduction to the general characteristics of the neutral tone in Mandarin. In the literature, a syllable with the Mandarin neutral tone has been described as toneless or atonic (Dow 1972), or pitchless (Li and Thompson 1981). It is said to be short and light (Xu 1983), and short and lax (Cheng 1973). Based on earlier acoustic studies by Zadoenko (1958) and Dreher and Lee (1966), Cheng concludes that "the length of a neutral tone syllable is about one half that of a full tone syllable (p. 55)."

The neutral tone has been observed to be related to no stress or lack of stress. Being the first person using the term "neutral tone" for the tone in question, Chao (1968), for instance, indicates his belief in a connection between the two by placing the discussion of the neutral tone in the section entitled "Weak Stress" in his book. In this study, Chao also remarks that "in weak stress, the tone range is flattened to practically zero and the duration is relatively short (p. 35)."

The connection between the neutral tone and lack of stress is also expressed in Li and Thompson (1981). According to these authors, "if a syllable has a weak stress or is unstressed, it loses its contrastive, relative pitch and therefore does not have one of the four tones. In such a case, the syllable is said to have a neutral tone (p. 9)." In still another study, the neutral tone and weak stress are not even distinguished. Xu writes in his 1983 paper that "the neutral tone is also called weak stress. It is pronounced with the characteristics of being light and short (p. 220)." To establish a cause-effect relationship between the neutral tone and stress, Cheng (1973) maintains that the neutral tone is derived from lack of stress. According to him, "when a syllable is stressed, it has a tone, but when it is unstressed, its tone becomes neutral (p.57)." Therefore, he continues, "the neutral tone items must be specified with full tones in the lexicon (p. 66).[1]"

Still another fact concerning the neutral tone is that almost all morphemes that appear in the neutral-tone shape have also a corresponding full-toned form found in a stressed position. This fact indicates that the neutral tones in these morphemes are each derived from their respective full tones in a non-stressed or weak-stressed position. There are, however, a handful of exceptions (less than ten), and these include the frequent grammatical particles such as the perfective particle *le*, the possessive particle *de*, and the continuous-aspect particle *zhe*.[2] These particles are always in the neutral tone form, and their exact full-tone correspondences are hard to trace from a synchronic point of view.[3]

What then is the shape of the neutral tone in phonetic or phonological terms? According to Chao (1968), the neutral tone does not have a phonemic tone shape (or pitch value) of its own; rather, it derives its pitch value from the tone that precedes it. When following other tones, for instance, its pitch value varies with the pitch values of the end points of the preceding tones.

Having given a general introduction to the neutral tone, let us examine Yip's analysis of it.

3. YIP'S ANALYSIS OF THE NEUTRAL TONE

Yip indicated that the neutral tone (Tone 0) provides evidence for the autonomous status of the [upper] feature, and therefore justification for its postulation. Specifically, she argues that this Mandarin tone, when appearing on the handful of grammatical particles just mentioned, is prespecified for its Register Feature [upper], but not for its Tonal Feature [high]. Namely, it consists of the following underlying representation:

(2) [-upper]

Yip's analysis for the neutral tone is based on the following data (Yip, p.47 and p. 163).[4]

(3)

	Tone 0
Tone 1 (55)	3
Tone 2 (35)	3
Tone 3 (21)	4
Tone 4 (53)	1

These data indicate specifically that the neutral tone has a middle-level pitch after Tone 1 and Tone 2, and a low pitch after Tone 4, but a relatively high pitch after Tone 3. If Chao is right in considering that the value of the neutral tone is derived from its preceding tone, what then are the derivational processes involved? According to Yip, the derivations are done in the following manner:

(4)

	(A)		(B)	
	Tone 0		Tone 0	
a. Tone 1	[+upper]	[-upper]	[+upper]	[-upper]
	H H	-->	H H	
b. Tone 2	[+upper]	[-upper]	[+upper]	[-upper]
	L H	-->	L H	
c. Tone 3	[-upper]	[-upper]	[-upper]	[-upper]
	L L	-->	L L	H
	H			
d. Tone 4	[+upper]	[-upper]	[+upper]	[-upper]
	H L	-->	H L	

First, in each case, the neutral-toned morpheme shows up with its prespecified feature [-upper] after the concatenation of the two relevant morphemes. Then, spreading occurs through which the neutral tone acquires the value of its Tonal Feature from its preceding tone. Such an analysis works well in the cases of Tones 1, 2 and 4, but fails to work for the neutral tone following Tone 3. Yip's solution for this problem is "a special rule that inserts a H tone after the third tone when no other tone follows (Yip, p. 162)." Yip explains that by "no other tone follows", she means "pre-pausally or before a neutral tone (p.162)". Namely, a rule in the following shape:

(5) LL --> LLH / ___ pause or a neutral tone

4. THE PROBLEMS

4.1. Prepausal Position and the Neutral Tone

First, there seems to be a minor problem with Yip's treating the neutral on an equal footing with the pre-pausal position. While it seems quite natural to consider a pause as a case of "no other tone follows", it is not exactly clear whether the neutral tone can be similarly considered. In other words, it is not clear how a syllable, though in the neutral tone, can function just like a pause. Arguably, the appearance of an extra toneme in the third tone before a pause may be due to that there being "room" for its appearance. The pre-pausal position is after all a common place where extrametrical and idiosyncratic materials do occur to "take shelter" from rigid phonological rules. No such "room" or shelter-type function, however, can be found before another syllable, neutral-toned or otherwise.

From another viewpoint, if the occurrence of an extra toneme is to achieve a growth in length in the third tone so that it may realize its potential full length, it is odd that no such tendency toward an increase in length is seen in the pre-neutral-tone position. A research finding made in Dreher and Lee (1966) shows that the tone before the neutral one is shorter than it is before other tones. According to these authors, tones immediately preceding the neutral tone are about 20 percent shorter than usual.

The conclusion to be drawn from the above discussion is that there is no bona fide reason for the insertion of a H toneme in that specific position (see (4c)). It should be noted, however, that this problem in Yip's analysis does not constitute a sufficient argument to reject her analysis. That argument comes from the fact that Yip's analysis of the neutral tone fails to capture an important generalization about the neutral tone.

4.2. The Neutral Tone after the Third Tone

As mentioned earlier, Chao (1930, 1968) believed that the neutral tone does not have its own inherent pitch value, but acquires its surface value from its preceding tone. Chao's observation is true to a certain extent. The proposed assimilation (or spreading, shown in column B of (4)) does indeed occur to produce the precise surface pitch forms. The question is: how can one account for these precise pitch values? Or, is there any generalization hidden among these phonetic surface values?

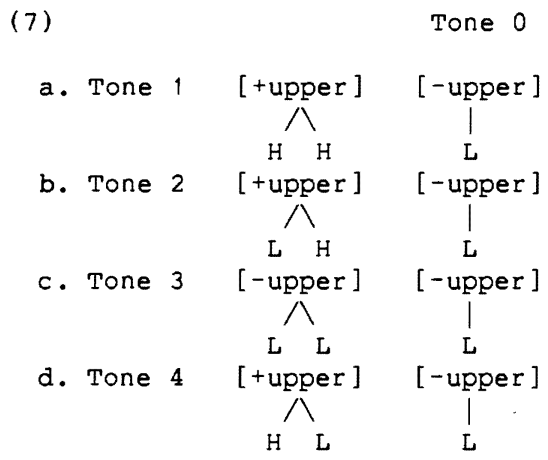
The answer to the latter question is yes.[5] Now, let us have another look at Yip's data provided earlier in (3).

(6)

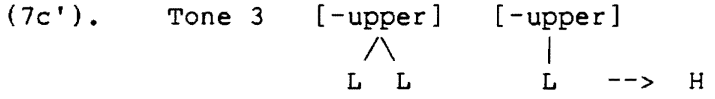
		Tone 0
Tone 1	(55)	3
Tone 2	(35)	3
Tone 3	(21)	4
Tone 4	(53)	1

One observation that can be made about these data is that the differences in pitch value between the endpoints of Tones 1, 2 and 4 and that of the following neutral tone all equal 2: in all three cases, the pitch of the neutral tone is 2 points lower than the endpoint of its preceding tone, measured on Chao's scale. However, the difference in value between the neutral tone and its preceding Tone 3 is a positive 3, (if the number 2 just mentioned is regarded as being negative). The question is: why does the neutral tone behave differently when following the third tone?

The answer clearly lies in the distinct form of the third tone as opposed to the forms of the other three phonemic tones: it is the only low tone and the only tone that reaches the lowest pitch before the neutral tone. This fact does not seem to matter much when one tries to relate it to the precise phonetic values of the neutral tone. But suppose the neutral tone is represented as a fully specified low tone in the underlying representation, the situation would look more obvious. This can actually be illustrated in Yip's analysis.



One thing that becomes readily observable from such a configuration is the total identity between the shape of the neutral tone and the endpoint of its preceding Tone 3 (c). notice that the same identity is not found in the other cases. Under such an analysis, the mystery about the odd behavior of the third tone is resolved: the identity triggers a dissimilation process which raises the neutral tone after Tone 3 in pitch. Namely,



With the above generalization captured, it becomes now easy to account for the other values of the neutral tone. Clearly, the higher surface values of the neutral tone after Tone 1 and Tone 2 are due to a lower level phonetic co-articulation, as described in Shen (1990). Specifically, the value of the neutral tone is raised to 3 simply because Tones 1 and 2 that precede it are both tones ending in high tonemes. It is not after Tone 4, because Tone 4 ends in a relatively lower toneme.

It should be noted that it takes the identity in both tiers to trigger the dissimilation process described in (7c'), as a similar process is not found in the case of Tone 4 where there is no match between the two Register-Feature specifications in spite of the fact that there is identity at the

Tonal tier. If this observation is correct, it should serve to indicate that the neutral tone cannot be an underspecified tone, but just a plain low tone (probably 1 in pitch value), and that the neutral tone case does not constitute an argument for the autonomous behavior of the proposed Register Feature.

4.3. The Neutral Tone on Post-Verb Syllables

Another related piece of Mandarin evidence Yip cited to motivate the Register Feature [upper] and its autosegmental behavior comes from the following data (Yip, p. 63 & p. 175):

(8)

mai(4)	"sell"		song(4)	"deliver"
shang(4)	"up"		qu(4)	"go, to"
le	"perfective particle"			

a. mai(4) le. "sold; have been sold"

b. song(4) shang(4) qu(4). "deliver up (to)"

c. song(4) shang(4) qu(4) le. "delivered up (to)"

where (4) = Tone 4

One characteristic concerning the above three sentences is that all of the syllables after the main verbs *mai(4)* and *song(4)* receive weak stress, and the stress pattern can be roughly shown as follows:

(9)

a.
s	w
mai(4)	le.

"sold; have been sold"

b.
s	w	w
song(4)	shang(4)	qu(4).

"deliver up(to)"

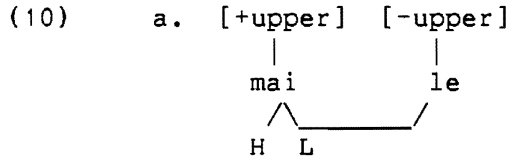
c.
s	w	w	w
song(4)	shang(4)	qu(4)	le.

"delivered up(to)"

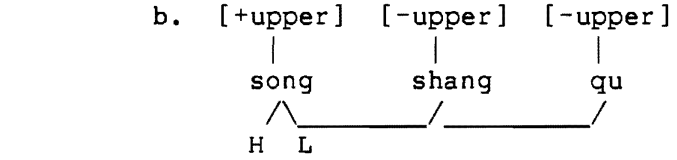
where s=strong and w=weak

Namely, the main verb in each case is stressed while the rest of the syllables are not (or have weak stress). In addition, these post-verb syllables may be regarded as carrying the neutral tone,[6] although the source of the neutral tone on *le* is different from that of the neutral tones on the rest of the post-verb syllables. The former is underlyingly a neutral tone (signalled by the absence of any tonal diacritic); it is a neutral tone before syntactic concatenation. The latter, however, are underlyingly full-toned, derived through a lack of syntactic stress. In general, all the syllables after the verb are perceived as rather low in tonal value. Now let us see how Yip interprets the data as a support for the postulation of the Register Feature:

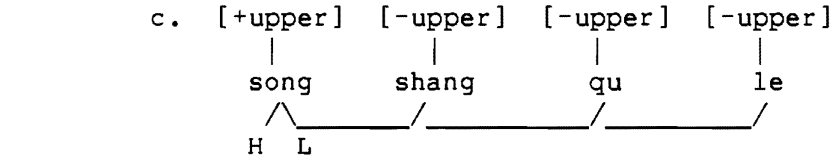
(10) a.



b.



c.



Assuming that all the neutral toned syllables are prespecified as [-upper] for the Register Feature, Yip adopts a spreading analysis whereby all the post-verb syllables acquire their low tonal value through the spreading to them of the Tonal Feature L ([-high]) from the preceding verb.

First, there is a minor problem regarding this analysis: while Yip is explicit about the source of the feature [-upper] on the syllable *le* (one of those few syllables in Mandarin which are always neutral-toned; see also the last section for relevant details), she does not explain how [-upper] gets there for the rest of the post-verb syllables. However, this problem is probably not difficult to work out; it appears to be just a technical problem which needs to be worked out in detail. Therefore, I will dwell no further on it.

The major problem with this analysis lies in its violation of the locality requirement implicit in the observation that the neutral tone derives its tonal value from its preceding tone. Although the neutral tone has been reported to derive its phonetic surface value through spreading from its immediately preceding tone, no studies have found this spreading to go beyond its immediately following tone. This problem does not show much in Yip's analysis (10) of the sentences in (8), since this analysis does yield the grammatical result of a low tone on these post-verb syllables. The problem is better shown if Yip's data are expanded to include the following sentences:

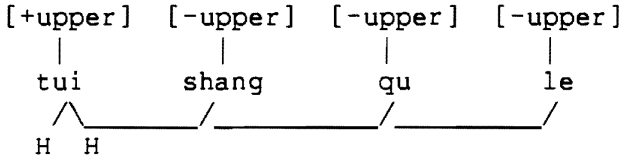
(11)

```
tai(2)    "carry"
tui(1)    "push"

a. tai(2) shang qu le     "carried up"
b. tui(1) shang qu le     "pushed up"

   where (2) = Tone 2
         (1) = Tone 1
```

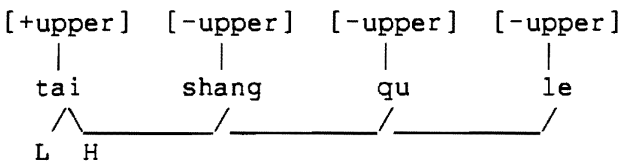
Notice that in Yip's earlier data, all the main verbs are by chance in the fourth tone (i.e. (53) according to Yip). These two sentences here are identical to her sentence in (8c) in every other

aspects except for the tonal values of the main verbs at the beginning of the sentences. Here in (b), the verb *tui* carries the first tone (55), while in (a), the verb *tai* is in the second tone (35), both being tones ending in high tonemes. Based on Yip's earlier treatment, the neutral-toned, post-verb syllables in these two sentences should acquire their tonal value through prespecification and then spreading as shown below:

(12) * a.

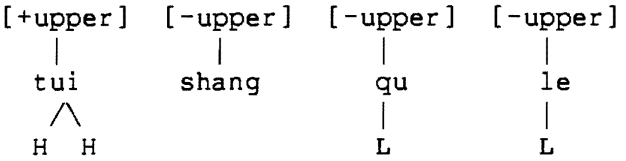


* b.

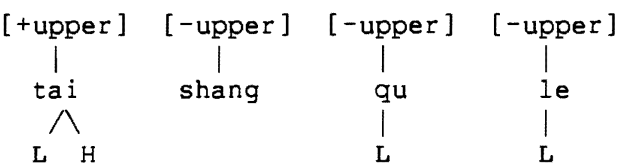


While the results in (10) may by chance be grammatical, the results here with all the neutral-toned syllables having a value at the middle range (i.e [-upper, H]) are clearly unacceptable. Although this value (i.e [-upper, H]) may be accepted for the syllable IMMEDIATELY following the verb as a low-level phonetic surface representation, it can by no means be accepted for the two tones that follow. The right output for these two tones should be just as the post-verb tones in the earlier cases in (10):

(13) a.



b.



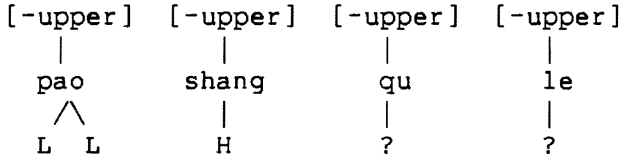
The problem involved is this: the spreading will not go beyond its adjacent tone, if there is indeed a spreading of the Tonal Feature from the preceding tone. From this follows another problem: if the two final syllables do not receive their Tonal Feature specification from the main verb, where can they acquire that feature specification? Or, how exactly can they surface fully specified? It is not clear how these questions can be answered in Yip's analysis. The problem of the source of the Tonal Feature specification shows up even more obviously in another sentence of the same type:

(14) pao(3) "run"
pao(3) shang qu le "ran up"

where (3) = Tone 3

This sentence is once again identical to Yip's sentence in (8c) in every respect except for the tonal value of the main verb. The difference is that there, the verb is fourth-toned (53), but here the verb is third-toned (213). Now a serious problem arises in the acquisition of the Tonal Feature specification on the part of the post-verb syllables. Let us observe the following:

(15)



Recall that in Yip, the neutral tone immediately after the third tone acquires its Tonal Feature specification by way of the following rule (cf. (5)).

(16) LL --> LLH / ___ pause or a neutral tone

What this rule says is that a Tone 3 (213), represented as [-upper] LL, acquires a H tone when preceding a neutral tone or a pause. If the locality requirement on the spreading of the tonal value from a preceding tone to its adjacent following neutral tone is not obvious in the previous cases in (8) and (11), it should be quite explicit by virtue of this rule that the only neutral tone that is affected is the one IMMEDIATELY after the verb. However, although this rule is right in correctly encoding the adjacency requirement, it also reveals a problem in Yip's treatment of the type of sentences in question. The problem is: how can one account for the tonal values of the two syllables that are not adjacent to the verb? It is not clear how this difficulty can be easily surmounted. It would seem rather unnatural if more rules should be devised to insert more H tones for the two words *qu* and *le* at the end of the sentence. Even if these H tones can, by some perhaps unnatural means, be created for the two syllables, the resultant sentence is ungrammatical anyway. This is because the last two syllables again do not occur as a middle tone [-upper, H], but rather as a low tone, specifiable in terms of [-upper, L].

By now, it should be clear that Yip's analysis for the post-verb tones under discussion is not adequate, and that it has not succeeded in demonstrating that the autonomous Register Feature is supported through this analysis. This case of the tones on the post-verb syllables provides further evidence to show the implausibility of Yip's analysis for the neutral tone discussed in the last section. Among other problems, it cannot account for the surface tonal shape of a neutral-toned syllable found after another neutral tone. And, this case provides further evidence that the neutral tone should be fully specified before the low-level assimilation takes place.

NOTES

1 See Chen (1984) for a different view.

2 The names or the exact syntactic functions of these particles may be controversial. However, the controversy should not affect the present discussion.

3 Diachronically, though, they have been found to be derived from full-toned morphemes (Cheng, p.65).

4 She does not mention the source of her data here. Presumably they are from Qi (1956), since they are identical with those of Qi's. The data are almost identical to Chao's as well, which are given below (Chao 1968, p.36):

	Tone 0	
Tone 1	(55)	2
Tone 2	(35)	3
Tone 3	(213)	4
Tone 4	(51)	1

The only difference between Chao and Yip's data shows up on the neutral tone after Tone 1. In Chao it is measured at 2 while in Yip's citation, it appears as 3. I believe the difference is trivial and therefore negligible.

Notice also that in (3), Tone 3 is represented with a value of (21) rather than (213). The examples shown there are mine.

5 For a more detailed discussion and justification of the existence of this generalization and an alternative analysis of the Mandarin neutral tone, the reader is referred to Lin (1992, Chapter 6).

6 I would not be surprised if there are researchers who do not agree with treating them all as identical neutral toned syllables. In fact, my intuitive feeling is that these post-verb syllables (except *le*) still carry distinct though reduced tones, the reduction being due to lack of stress, and no matter how much tone modification occurs in each case, these syllables are not produced with an exactly identical contour or pitch. However, this perception may be purely phonetic in nature. Namely, phonologically, these tones may very well be considered to be the same neutral tone.

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VERB SERIALIZATION IN EWE

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1.0 INTRODUCTION

Serial verbal constructions (henceforth SVC) is a phenomenon commonly found with the Kwa languages of West Africa and Carribean Creoles. They are also reported in Chinese (Li & Thompson, 1973) and in Burmese (Matisoff, 1973)[1]

In this paper, I will examine SVCs in Ewe (a Kwa language of Ghana) in the light of the principles of of Government and Binding Theory. The paper will specifically examine the syntactic framework proposed by Baker (1989) and the problems with that framework will be outlined. I will argue, for instance, that the object-sharing phenomenon, which Baker (1989) suggests is obligatory, is not found in all cases (at least for Ewe). I will also argue that certain SVC structures in Ewe pose a problem for Baker's model, with respect to the Projection Principle, and I will suggest an alternative framework for SVCs. The paper is organized as follows: in the next section, I shall discuss the major characteristics of SVCs that distinguish them from other structures in Ewe. In section three, I shall discuss Baker's proposal in some detail, noting the problems with his framework in section four. I shall show that Baker's proposal does not account for all the SVC types in Ewe, and in section five , I shall make an alternative proposal.

2.0 CHARACTERISTICS OF SVCs

One of the early linguists who hinted about the notion of SVCs was Westermann, who wrote a grammar of the Ewe language in 1930. He wrote:

> A peculiarity of Ewe is that we often find a row of verbs one after the other. The chief features of this are that all the verbs stand next to each other without being connected, that all have the same tense or mood, and that in the event of their having a common subject and object, these stand with the first, the others remaining bare (Westermann, 1930:126).

Baker (1989) describes SVC as a construction in which a sequence of verbs appears in what seems to be a single clause (p.513). According to him, there is usually one tense/aspect specification for the whole chain of verbs. The verbs in a SVC are also believed to have a single structural subject and they share logical arguments. The following are some examples of SVCs.

1. *Yoruba*: Aje sunkun lo ile
   Aje weep go home
   'Aje wept on his way home' (Awoyale, 1988)

2. *Haitian*: Emil pran liv la bay Mari

E. take book DET give M.
'Emil gave the book to Mary' (Dechaine, 1988)

3. *Sranan*: Kofi naki Amba kill
Kofi hit Amba kill
'Kofi struck Amba dead' (Baker, 1989)

4. *Akan*: Kofi tɔɔ bayire dii
Kofi bought yam ate
'Kofi bought yam and ate' (Campbell, 1991)

5. *Ewe*: Kofi da nu du
K. cook thing eat
'Kofi cooked and ate'

One powerful test that has been developed over the years to distinguish SVCs from coordinate and purposive constructions is WH-extraction. If the NP argument of a verb in a SVC can be extracted by WH-movement, it follows that the structure cannot be a coordination or an embedded purpose or result clause (see Ross, 1967). Consider the following examples in Ewe.

6. a. Kofi da nu du
K. cooked thing ate
'Kofi cooked and ate'

b. Nuka Kofi da du?
Thing-which K. cook eat
'What did Kofi cook and eat?'

7. a. Kofi fle agbale na Ama
K. buy book give A.
'Kofi bought a book for Ama'

b Nuka Kofi fle na Ama?
Thing-what K. buy give A.
'What did Kofi buy for Ama?

In (6) and (7), the (b) and (c) examples are Wh-extractions of the NP arguments. In (7), there is an extra argument because of the presence of the 3-place predicate verb "na" (give). All the three NP arguments can undergo WH-extraction.

The verbs in a SVC form a complex predicate. One test that proves this for Ewe is negation. In Ewe, the negative marker is a discontinuous element (me ... o) and the negated constituent lies between the two elements. This is shown by the ungrammaticality of the (c) and (d) examples in (8) and (9) below.

8. a. Me fle agbale na Ama
1sg buy book give A.
'I bought a book for Ama'

b. Nye me fle agbale na Ama o
1sg NEG buy book give A. NEG
'I did not buy a book for Ama'

c. * Nye me fle agbale me na Ama o
1sg NEG buy book NEG give A. NEG

d. * Me fle agbale me na Ama o

1sg buy book NEG give A. NEG

3.0 SYNTACTIC REPRESENTATION OF SVC

The problem this paper wishes to address is to demonstrate that SVCs are subject to the conditions - universal principles and parameters (e.g Theta-theory, Case theory etc.) that license other syntactic configurations. One of the most challenging phenomena in SVC analysis, according to Baker (1989), is the notion of object sharing. Stewart (1963) in analyzing Twi SVCs suggested that SVCs formed out of a sequence of two transitive verbs show an object deletion under identity (i.e one of the objects is deleted (normally that of V2) because it is identical to the object of V1)). So for example, the Ewe example in (9) below will be derived from (10).

9. Kofi fo Ama wu
K. beat A. kill
'Kofi beat Ama to death'

10. Kofi fo Ama wu Ama
K. beat NP kill NP

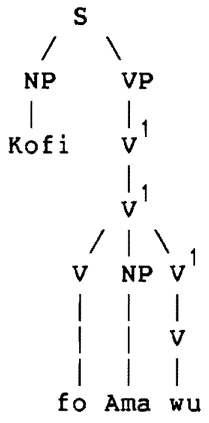
and the subsequent deletion of the second NP under identity with NP1. With the demise of transformations as prevailed in early generative transformational grammar, one option that readily comes to mind is to posit a D-structure in which the two verbs in the SVC take an object NP either to their right or left, depending on the type of language.

11. [VP [V beat [V kill [NP [Ama]]]]].

In the above structure, only the V2 directly theta-marks the NP. The V1 does not case-mark the NP because the adjacency condition is violated. One alternative is to move the NP to a position between the two verbs. In this case the V1 directly theta-marks the NP. But how can we account for the theta-marking and case-marking properties of the V2, which is a transitive verb, and, therefore, has to assign case?

Baker (1989) suggests a framework for SVCs in Yoruba. He proposes that the NP that comes between the two verbs in the SVC is literally a shared object, in that it occupies a position which is theta-marked by both verbs (or their projections). Thus under Baker's analysis, (11) above will be assigned the structure in (12).

12.



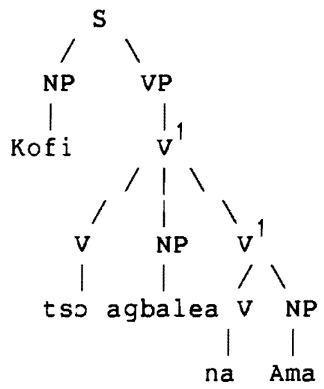
Baker assumes that SVCs are dual-headed - that the serial verbs jointly constitute a complex predicate. In the above structure, therefore, the VP is double-headed and the NP it contains is governed by both verbs. From the structure in (12) above, the theta-marking of the NP within the VP by the V1 is straight-forward, but the notion of V2 also theta-marking the same NP might seem doubtful. To account for this Baker invokes the standard conditions on theta role assignment from Chomsky (1986a), which are stated as follows.

13. α may theta-mark β iff
    (a) α and β are structural sisters.
    (b) a projection of α is a structural sister of β

Clause (a) in the above conditions allows for theta-marking of the NP by V1 while condition (b) allows for the theta-marking of the NP by V2, whose projection is a structural sister to the NP. Under Baker's analysis, theta-marking of the external argument is achieved by invoking Williams' (1984) notion that the external (argument) role of the verb percolates to its maximal projection. Since VP in the structure in (12) is the maximal projection of both V1 and V2, the external theta role of both verbs percolate up to it, where they are assigned to the subject by clause (13b) (Baker, 1989:520). So the lexical theta role assignment properties of both verbs are satisfied and the Projection Principle is obeyed. I shall examine, in the rest of this section, how the frame work of Baker can handle the various types of SVCs in Ewe.

The example in (12) above involves two transitive verbs with a shared NP. Each of the verbs is a 2-place predicate. There are examples in which one of the verbs is triadic (i.e a 3-place predicate). This type can fit into Baker's framework. We only have to expand the last V^1 into a V and NP as in (18).

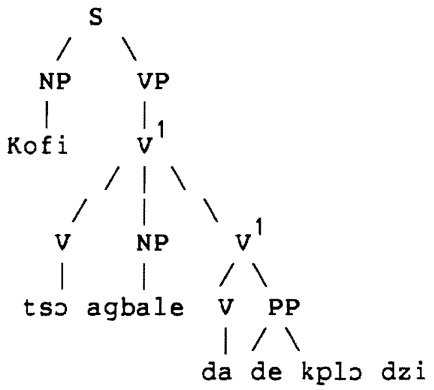
14.



In (14), the shared NP is "agbale" (book) and the V2, a triadic "na" (give), takes an additional argument "Ama". V1 theta-marks the NP "agbale" by (13a) and V2 theta-marks the same NP by (13b). The V2 theta-marks its additional argument by (13a).

There is a type of SVC which differs from the one in (14) in that V2 takes a PP complement instead of NP in (14). This sentence is also successfully represented in the framework under discussion as shown in (15).

15.



Now consider the sentence in (16) below.

16. Adela da tu wu xevi
Hunter shoot gun kill bird
'The hunter shot and killed a bird'

In the SVCs represented so far, the two verbs have a common NP object which is theta-marked by both verbs. The verbs assign the same theta role to the NP. But in (16), the NP between the two verbs receives two different theta roles from the two verbs: *Theme* from V1 and *Instrument* from V2. Despite this assignment of different theta roles to the NP object, the sentence fits well into the syntactic frame we are considering. It is possible for the NP to receive two different theta roles, provided it is the same structural position that is involved (cf. Baker, 1989:521). One characteristic of SVCs that comes out clearly at this stage is that they share at least one argument, and that this argument is not always the grammatical object of both verbs.

A class of verbs in Ewe and Yoruba (Baker, 1989) which raises some questions about their role in SVCs, is the so-called "bimorphemic" verbs which are made up of a bound verb and a noun complement referred to as "bound verb complement (BVC)". for example,

17. da nu.
cook thing "cook"

18. no tsi.
drink water

19. dzi ha
sing song "sing"

20. kpa ha
compose song "compose"

The controversy is whether the BVCs are syntactic objects of the verbs or whether they compound lexically with the verb root to form true intransitives. I suggest that the BVCs are syntactic objects to the verbs concerned in 17-20 above. Consider the following sentences.

21. E - da nu du
3sg cook thing eat
'He cooked and ate'

22. E - ku tsi no
3sg. fetch water drink
'He fetched water and drank it'

23. E - kpa ha dzi
3sg compose song sing
'He composed a song and sang'

In the above examples (all grammatical and acceptable), the V2s have no object after them. Like most of the SVCs we have examined already, these examples have NPs which are theta-marked by both verbs. If the verbs in 18-21 are true intransitives (as Baker assumes for Yoruba), then they should not share an argument, and we expect forms like (24) and (25).

24. * E - *da nu* du nu
He cook thing eat thing

25. * E - ku tsi *no tsi*
He fetched water drink water

But these forms are not grammatical in Ewe. Moreover, other nouns can be substituted for the BVCs. consider (26) and (27).

26. E - da te du
3sg cook yam eat
'He cooked yam and ate'

27. E - no aha mu
3sg. drink alcohol be drunk
'He got drunk by drinking alcohol'

In the above examples, the nouns act as complements to the so-called bound verbs in grammatical SVCs. They amply suggest that the NPs are the syntactic complements of the verbs concerned. I, therefore, suggest that the verb roots in 17-20 are real transitive verbs that subcategorize for NP objects, just like any other transitive verb in the language. It seems the syntactic properties of the types of verbs found in 17-20 in Ewe are similar to the corresponding examples in Yoruba, in which "momi" and "jeun" are both bimorphemic verbs made up of

28. (a) mu + omi ---> momi
drink water "drink"

(b) je + oun ---> jeun
eat something "eat"

The Yoruba structure in (29):

29. * Mo bu omi mumi
I pour water drink
'I poured water and drank'

is ungrammatical in Yoruba, just like the Ewe (25).

There are, however, some verb-noun pairs which can be said to form true intransitives in Ewe. These are shown in 30-33.

30. ku dzi.
kill heart "annoy"

31. fu du.
run race "run"

32. ve dɔme
hurt stomach "annoy"

33. tsi megbe
remain behind "be late"

This class of verb-complement pairs are more or less idiomatic expressions that behave like single verbs and true intransitives in that no NP can occur in place of the BVCs in these examples. As intransitives they cannot take direct objects. They can, however, take other verbs in SVCs.

34. Devi-a fu du dzo
child-the run race go
'The child ran away'

35. Nufiala tsi megbe va suku
Teacher remain behind come school
'The teacher was late to school'

In these examples, the complements (BVCs) of the first verbs (V1) are not shared by the second verbs (V2), because the V1 in each case is made up of the "bound" verb root and the complement (BVC) to become an intransitve verb.

Another class of verbs in some African languages (including Ewe and Yoruba(cf. Awoyale, 1987)) is the class of morphologically complex transitive verbs which have been treated as some kind of serial verbs (Bamgbose, 1982) or as a distinct class of their own and referred to as "splitting verbs" (Awolobuyi, 1969; quoted in Awoyale, 1988:21). Ewe has such examples as:

36. xɔ se
receive hear -"believe"

37. de fia
remove show "introduce"

38 bia se
ask hear "inquire"

39 dɔ kpɔ
taste see "taste"

The term "splitting" is applied here to refer to the fact that the two verbs forming the complex can be "split" by an intervening NP object. Those who hold this view regard the verb pairs as single lexical items. Others like Bamgbose (1982)[2] regard them as relatively "frozen serial collocations". I hold the latter view that these verb pairs form serial verb strings. They behave just like other serial verbs. If they are, then it follows that the two verbal elements forming the pair are syntactic lexical heads forming a complex VP. To show that they are lexical heads in a complex VP, we subject these pairs in SVCs to the tense/aspect test.

40. (a) Kofi da nu du
K. cook thing eat
'Kofi cooked and ate'

(b). Kofi a-da nu a-du
K. FUT.-cook thing FUT.-eat
'Kofi will cook and eat'

41. (a) Kofi xɔ nya la se
K. receive word the hear
'Kofi believed the message'

(b). Kofi a-xɔ nya la a-se
K. FUT.-receive word the FUT.-hear
'Kofi will believe the message'

As the (b) examples in 40-41 show, each of the verbs receives a FUTURE marker, proving that they form a double-headed predicate. Example (40) involves the normal transitive verb while (41) involves the "splitting" verbs under discussion. These "splitting" verbs, though they are not single syntactic units, form single semantic units. They are a kind of fixed collocations, because the two verbs forming the pair in each case have a fixed semantic interpretation.

4.0 THE PROBLEM

The examples of Ewe SVCs examined so far seem to be adequately accounted for by Baker's model. These are examples involving transitive verbs. In those examples, it must be noted that the V1 takes only one argument. Now let us consider cases in which the V1 takes an extra argument.

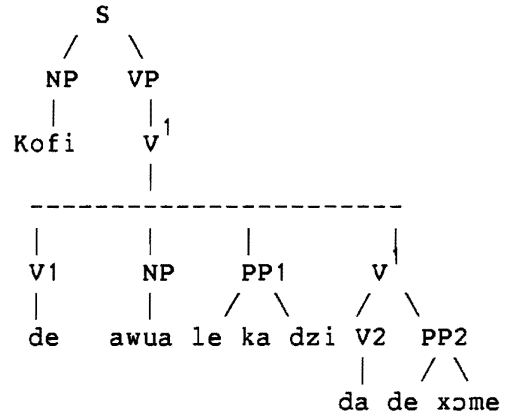
42. Kofi de awua le ka dzi da de xɔ me

K. remove shirt on rope top put LOC. room in
'Kofi removed the shirt from the line and put it in the room'

43. Kofi fɔ agbaleawo le xɔa me da de gota
K. collect book-the-PL. in room put LOC. outside
'Kofi collected the books from the room and put them outside'

In the two examples in (47) and (48), the V1 in each case assigns an additional theta role to the PP. Applying Baker's model to these examples, we would expect that the V2 would theta-mark the PP argument of V1.

44.



In the representation in (44), a projection of V2 is a sister to both the NP and the PP. Note that Baker (1989) claims that the sharing of the NP by the two verbs is obligatory (p. 527). That is, the two verbs should theta-mark the NP between them. Since the PP1 in (44) above is an argument of V1 and a structural sister to the projection of V2, we would expect that V2 should theta-mark the PP too; but it does not. This constitutes a violation of the Projection Principle and the standard conditions on theta-role assignment adopted by Baker.

Now let us consider examples of SVCs involving a transitive verb and an intransitive or two intransitives.

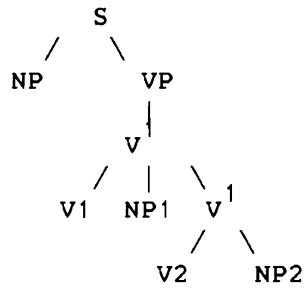
45. Kofi no tsi ku
K. drink water die
'Kofi died by drinking water'

46. Kofi tutu devia dze anyi
K. push child-the fall down
'Kofi pushed the child and fell down'

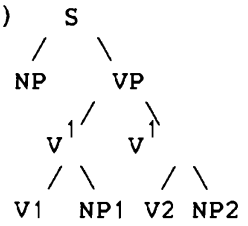
47. Xevia dzo dzo
Bird fly go
'The bird flew away'

In all the examples in 45-47, the V2 is intransitive and the object-sharing does not apply. To account for these examples, Baker suggests that where the two verbs theta-mark the NP between them, the structure in (48a) is projected. The structure in (48b) which Baker terms "covert co-ordination" is projected where only the first verb theta-marks the NP.

48. (a)



(b)



According to Baker, the Projection Principle forces the V2 to theta-mark the NP1 in 48a above, but this requirement would not hold for 48b. He suggests that the V2 would not be able to theta-mark the NP1 in the configuration in 48b because the NP is not sister to V2 or any of its projections. He views the so-called "overt co-ordinations" as a sequence of distinct events, whereas the true SVC is perceived as a single event. This is suggesting that "covert co-ordination" types are not true SVCs. This position is not acceptable (at least for Ewe). The Ewe examples in 45-47 above all pass the WH-extraction and negation tests for SVCs.

49. (a) Kofi no tsi ku
K. drink water die
'Kofi died by drinking water'

(b) Nuka Kofi no ku
What K. drink die?
'What did Kofi drink and died?'

(c) Kofi me no tsi ku o
K. NEG. drink water die NEG.
'Kofi did not die by drinking water'

50 (a) Kofi fo devia si
K. beat child-the flee
'Kofi beat the child and fled'

(b) Ameka Kofi fo si?
Person-which K. beat flee
'Who did Kofi beat and fled?'

(c) Kofi me fo devia si o
K. NEG. beat child-the flee NEG
'Kofi did not beat the child and fled'

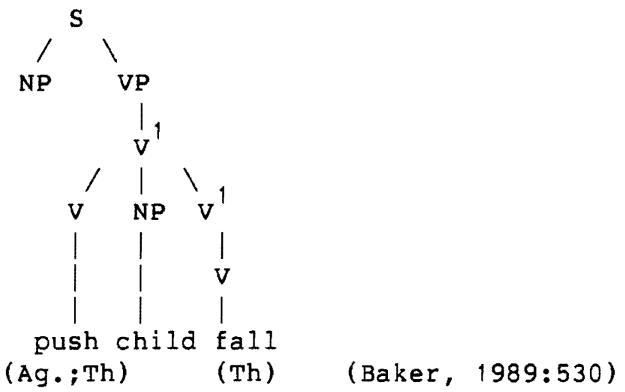
I, therefore, conclude that all the examples in 45-47 above are also true SVCs in Ewe.

One other problem has to do with subject-sharing by the verbs in the SVC. As noted earlier, SVCs have the characteristic of having the same subject. While this is true for Ewe, Baker (1989) reports something different for Yoruba. In the following example (taken from Baker, 1989:529),

51. Olu ti omo na a subu
Olu push child the fall
'Olu pushed the child down'

This example is accounted for by Baker's model as far as object-sharing is concerned (i.e the V2 theta-marks the NP between it and the V1). But instead of the two verbs sharing the subject "Olu", the object of the first verb becomes the subject of V2. "Fall" takes "child" as NP within its second V-bar projection as its only argument (it is unaccusative).

52.



(Baker, 1989:530)

Baker suggests that this structure has two consequences for the intransitive V2:
(a) V2 must be lexically capable of assigning an internal theta role;
(b) its theta role must be assigned to the object of V1 rather than to the subject of V1.
From this example, Baker predicts that only an unaccusative type of intransitive verb can follow a transitive or unaccusative in a true SVC (i.e V2 must always be unaccusative if it is intransitive). This prediction is proved wrong by example (60a) above, where the V2 "flee" is unergative and has only an external argument.

In the Ewe example in (46) which is similar to the Yoruba example in (51), the V2 does not theta-mark the NP object of V1, and the sentence has only one interpretation (i.e Kofi pushed the child and Kofi fell down, not the boy, as in the Yoruba example). In the Ewe example, therefore, the subject-sharing phenomenon is preserved. For an Ewe equivalent to the Yoruba example in (51) (with the interpretation given by Baker), a pronominal third person singular coindexed with the object NP will have to precede the V2, as in the example below.

53. Kofi tutu devia wo dze anyi
K. push child the 3sg. fall down
'Kofi pushed the child down'[3]

So we see examples in which no object-sharing takes place but the sentences are true SVCs. I, therefore, propose theta all SVCs, whether object-sharing or non-object-sharing, and whether they denote single events or multiple events should be regarded as true SVCs. This claim rejects the distinction drawn between true SVCs and "covert co-ordination".

One other problematic type of SVC for Baker is the one involving an unergative and an unaccusative. An example is (47) repeated below.

54. Xevia dzo dzo
bird the fly go
'The bird flew away'

As Baker noted in a footnote, this particular type of SVC raises a problem for the theta-criterion. "Bird" receives theta-roles in two different positions: one as a subject of "fly" and one as the object of "go". It has been observed that the same structural position can receive more than one theta-role. But the case under examination involves two different structural positions, external argu-

ment position of "fly" and internal argument position of "go". In a structure involving only an unaccusative, the base-generated object which is in a non-case assigning position has to move to subject position to receive NOMINATIVE case in order to satisfy the case-filter.

55. [bird [V go t]]

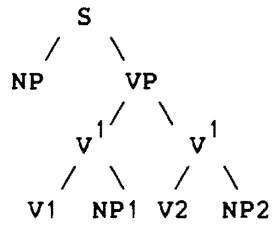
But when this verb "go" is combined with the unergative "fly", a problem arises. The subject position is filled by the external argument of the unergative. How do we account for the theta-role assignment by the unaccusative verb?

5.0 AN ALTERNATIVE ANALYSIS

In the preceding section, I have tried to unearth the various problems some Ewe SVCs pose for the framework of Baker (1989). In this section, I will make an alternative proposal in an attempt to address those problems raised in the preceding section.

I propose for SVCs a structure in which the double-headed VP splits into two non-maximal V^1s.[4] I follow Baker (1989) and Lefebvre (1991) in having a double-headed VP. But I differ in the way the VP is projected in the tree.

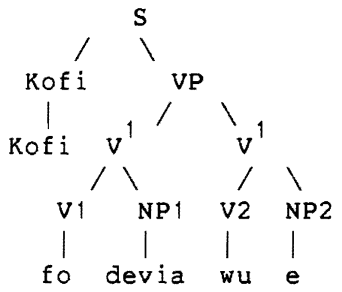
56.



I also propose that in SVCs involving object-sharing, there should be a null object for V2 coindexed with the NP object of V1. We noted earlier that in SVCs where the V1 takes an additional (PP) argument, the V2 is not able to theta-mark this argument thus violating the Projection Principle under Baker's proposal. This suggests that the object (argument) sharing phenomenon should be projected in a different way than Baker suggested. Applying a typical example like (57a), we shall have the structure in (57b).

57. (a) Kofi fo devia wu
K. beat child the kill
'Kofi beat the child to death'

(b)



My proposal, I believe, would avoid the three major problems of Baker's proposal, namely:

(i) the inability of V2 to theta-mark a PP argument of V1 even though the argument position satisfies the condition for theta-marking proposed by Baker;
(ii) non-sharing of NP between V1 and V2 in some SVCs;
(iii) the problem of the "fly go" type.

In my proposal, the V2 would not have to theta-mark the object of V1, since V2 would have its own object position projected. This solves the second problem automatically; that is the verbs do not have to share NP objects. Concerning the "fly go" type, my proposal does not involve movement of the internal argument of V2 to subject position as is normally proposed for unaccusatives, since that position would already be filled by the external argument of V1. So the internal argument position of V2 is projected as an empty category co-referential with the subject of the sentence. In (57a), the object of V2 is understood. It is, therefore natural to assume that there is an empty category in the object position of V2. The question then arises as to what type of empty category the null object is. It is assumed that there are four types of empty categories, on the basis of the two binary features [+ - anaphor] and [+ - pronominal] (cf. Chomsky, 1982).

58. (a) PRO: [+ anaphor, + pronominal]
    (b) pro: [- anaphor, + pronominal]
    (c) WH-trace: [- anaphor, - pronominal]
    (d) NP-trace: [+ anaphor, - pronominal]

PRO is ruled out as a probable candidate. PRO is said to be ungoverned at S-structure. The object position in (57b) is governed by the verb, since that position must be case-marked. NP-trace is also not a possible candidate because NP-movement involves movement from a theta-position to a theta-bar position. The null object in (57b) is in a theta position, and its antecedent is also in a theta position. Therefore, it cannot be NP-trace. However, the null object under discussion seems to share a property with NP-traces. An NP-trace is subject to Principle A of the Binding Theory which says that an anaphor must be bound in its governing category. The governing category for the null object in (62b) is the entire clause, and the null object is coindexed with an NP within its governing category. So in a way, the null object has something in common with an NP-trace, i.e they both occur in A-positions. But they differ in their case-marking properties.[5] WH-trace is also ruled out because it must be bound by an antecedent in an A-bar position. In the examples under discussion, there is no A-bar binder for the trace. This leaves us with *pro*.

Supposing we assume at this stage that the null object is *pro*. This raises two questions:
(a) What are the conditions that formally license the *pro* (i.e how is *pro* licensed)?
(b) How is the content of *pro* determined or recovered?

To answer these questions, let us look at the proposal by Rizzi (1986a) in which he proposes that *pro* is subject to two requirements, formulated in what is termed the "pro-drop parameter".

59. *The pro-drop parameter*
    (a) *pro* is governed by X^0
    (b) Let X be the licensing head of an occurrence of *pro*; then *pro* has the grammatical specification of the features on X coindexed with it.

Condition (a) can be satisfied in (57b); the object position is licensed by the verb "wu" (kill). The problem is with condition (b). In Italian, a typical pro-drop language, the content of *pro* in subject position is recoverable from the rich morphology of the verb (i.e from strong agreement features). But for *pro* in object position, he suggests something different. Rizzi (1986a) draws a distinction between English and Italian in the way null objects are licensed. He claims that an occurrence of *pro* in a verb-governed position is allowed in Italian but not in English. He argues that in Italian, the understood object is syntactically "active" in that it can act as a controller, as a binder, and as a subject of predication for adjunct and small clauses, whereas the null object in English appears to be syntactically "inert" in the same environment (p.502). Compare the following sentences from English and Italian.

60. (a) This leads people [PRO to conclude what follows].
    (b) *This leads [PRO to conclude what follows]

61. (a) Questo conduce la gente alla seguente conclusione
    (b) Questo conduce -- alla seguente conclusione.
    (Rizzi, 1986a: 503)

In (60b), we find that we cannot delete the object controller, whereas in (61b) we can. This suggests that in object-control structures in English, the object NP controller must be overtly represented. Ewe follows English in this respect. Consider the following.

62. (a) Esia nana amewo susuna be nuwuwua do
    This make-HAB. people think-HAB. thet end-the arrive
    'This makes people think that the end is near'

    (b) * Esia nana ---- susuna be nuwuwua do

In (62b) the object cannot be deleted. Rizzi (1986a) also points out that in Italian, argument small clauses selected by causative verbs can take null subjects having the same interpretive and formal properties as the null objects.

63. (a) Questa musica rende [-- allegri]
    This music renders --- happy [+pl]

    (b) Certe medicine rendono [-- piu intelligenti/calmi]
    Certain drugs render --- more intelligent/calm [+pl]

The English glosses in (63) are ungrammatical. The missing null object in the Italian examples must be present in the English glosses to be grammatical in English. Ewe behaves just like English in this respect too.

64. (a) Atike ade-wo wɔa [ame drɔzii]
medicine INDEF.-pl make person weak
'Some drugs make people weak'

(b) * Atike adewo wɔa --- drɔzii
'Some drugs make weak'

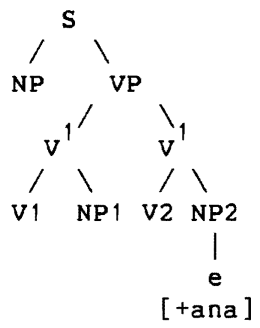
(64b) is ungrammatical because of the missing small clause subject.

Evidence adduced so far points to the fact that the null object being proposed for Ewe SVC may not be *pro*. In fact the discussion so far suggests that there is no structural NP position. But as has been pointed out, the failure of Baker's model to satisfy the Projection Principle suggest that the object sharing phenomenon should be projected in a different way. One plausible way is to project an empty NP object for V2 and this NP will be co-indexed with the NP object of V1. Moreover, *pro* as a pronominal must be free in its governing category (i.e it is subject to Principle B of the Binding Theory). The null object being proposed here is quite different, in that it is co-indexed with an NP within its governing category. It will also be shown that this null object is bound by the NP object of V1.

Raposo (1986) proposed for European Portuguese that the empty category in object position is a variable.[6] According to Principle C of the binding theory (Chomsky, 1981), a variable, like other referring expressions, cannot be coreferential with a c-commanding nominal occurring in an argument position. This is because variables, like other referring expressions cannot be A-bound. Pronominals, on the other hand, are not subject to Principle C and can, therefore, be coreferential with a c-commanding argument (as long as these arguments do not occur in the governing category (GC) of the pronominal. This rules out the null object being a variable and brings us back to a point mentioned earlier.[7]

We noted earlier that the null object being proposed shares a characteristic with NP-traces but it cannot be NP-trace because it is in a case-marked position. The shared characteristic is that the null object is bound in its governing category (i.e it has as its antecedent, an argument in its GC). This position satisfies the condition for an anaphor. I, therefore, propose that the null object in the Ewe SVC structure in (57b) is an "empty anaphor" (cf. Saxon (1989, 1990); Chung, 1989). We will have a base-generated NP "empty anaphor" coreferential with the NP object of V1. This gives us the structure in (65).

65.



Since this empty category is an anaphor, it must obey Principle A of the binding theory. We shall now explore the conditions on this binding principle and see how far the structure in (65) fits into it.

66. **Binding Theory**
Principle A
An anaphor must be bound in its governing category.

67. *A-binding*
α binds β iff
(i) α is in an A-position;
(ii) α c-commands β;
(iii) α and β are co-indexed.

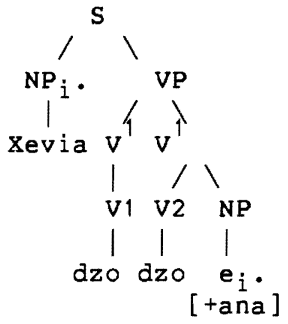
(66) involves two notions, "binding" and "governing category". (67) outlines the conditions for binding. The first is that α must be in an A-position. In (65), the NP binder is in an A-position. The second condition is that α must c-command β Here, I will adopt the revised version of c-command which is also known as m-command, and which is stated in Sells (1985:39) as follows:

68. *C-command (revised definition)*
α c-commands β iff every maximal projection dominating α also dominates β

Under this interpretation of c-command, the governing category of the empty anaphor being proposed will be the entire clause. This empty anaphor will be bound by the NP which is within the GC, thus satisfying Principle A in (66).

Now let us consider the other problematic type of SVC (i.e the one involving unergative and unaccusative verbs). Just as has been proposed above, I shall propose the same base-generated "empty anaphor" for the argument of V2.

69.



As noted earlier, the only argument of the V2 is internal, and if this verb occurs alone in a structure, then the D-structure argument moves to subject position to receive NOMINATIVE case. But here it is combined with an unergative, whose only argument is external. Therefore, when these two verbs combine, the subject position is already filled by the external argument of the V1 and, therefore, the object of V2 cannot move there to receive case. So it must be empty and, since it is coreferential with the subject, it must be an anaphor. Its GC is the entire clause. The subject "bird" m-commands the empty anaphor and they are co-indexed.

One question that needs to be addressed is whether the empty anaphor, *ana*, needs case. To answer this question, I will say that *ana*, being the object of a transitive verb, must be case-marked. The position is governed and theta-marked and, therefore, nothing prevents the empty anaphor from receiving case. Moreover, WH-traces and *pro* are case-marked. So we can say that the empty anaphor is case-marked. The case on the empty anaphor will make the theta position visible and allow the predicate to assign its theta role.[8]

6.0 CONCLUSION

I have been discussing Ewe serial verbal constructions within a framework suggested by Baker (1989). It has been noted that the Ewe data pose certain problems for Baker's framework, especially with respect to the Projection Principle and the notion of object-sharing. The idea of a true and non-true SVCs has been rejected (at least for Ewe). An alternative proposal has been made for handling SVCs in Ewe. This is a proposal in which the notion of "empty anaphor" is being introduced, after the attempt to explore the possibility of the null object being projected as any of the four types of empty category has failed. This proposal has to be tested with other SVC languages to prove its universality. Moreover, the notion of empty anaphor or little *ana*(cf. Saxon, 1989, 1990), is quite new and needs to be further researched into.

Despite the extensive work done on SVCs in the past twenty years, there are still more questions than answers. The issue of what constitutes a true SVC is not clear. Also pertinent is the question of what constitutes a main verb in SVCs. Should there even be a main verb and a subordinate one? What principles determine the order of verbs in SVCs? These and other questions need to be addressed in future researches.

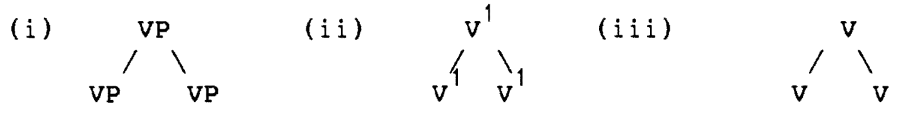
NOTES

1 Reported in Awoyale, 1988.

2 Cited in Awoyale (1988).

3 There seems to be a pragmatic issue here. The pronominal third person that distinguishes the two sentences in (51) and (53) is always coreferential with the immediately preceding NP. It is the subject of the embedded clause and, being a pronominal, it should be free in its governing category. The antecedent of this pronominal is the object of the matrix verb, which is outside the GC of the pronominal.

4 This structure may look like a co-ordinate one. But it may be argued that a true co-ordinate structure should be one in which the mother category and the daughters bear the same bar level as in



In the structure being proposed, the two verbs are immediately dominated by a non-maximal V^1 and the two are dominated by a maximal VP. This position is, however, open to further dis-

cussion.

5 This issue will be taken up again somewhere in this section.

6 Reported in Cole, 1987:597.

7 It may be possible to say that the null object is a variable left by an empty operator. But assuming that an operator moves only into [Spec, CP], the issue will be where to locate the operator in the tree in (57b) for example. Carstens (1988) is reported to have taken on that issue (cited in Baker, 1989).

8 Case-assignment for the empty anaphor in (69) is, however, problematic. It may be possible to propose that the empty anaphor in (69) is case-marked, with the case realized on its antecedent. This is yet to be further explored.

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ON PROCESSING EMPTY CATEGORIES IN ENGLISH AND JAPANESE

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1. INTRODUCTION

One of the more interesting questions of late has been the treatment of **empty categories** (EC) in natural language. **Empty categories** have been postulated in several mainstream grammatical theories, most notably the theory of Government and Binding, and have also been investigated in studies of sentence processing. The question which invariably interests linguists is the degree of relationship between formulations in grammatical theory and processing results in psycholinguistic experiments which employ those formulations as basic constructs. The interest has been one of long standing in matters of sentence comprehension, and more recently, this interest has been expanded to incorporate parsing strategies. There has, however, been a varied history of how theoretical linguistics has chosen to receive such information about processing constraints. By virtue of its self-claimed membership in the cognitive science fold, this interest has been now directed into determining what processing models of natural language should look like. In general, the linguist's expectation has been that the architecture of the processing mechanism, however specified, will not only be attuned to the grammar as such, but also reflect the structures posited therein. Fodor (1989:205) has most recently labelled this approach the Transparency Hypothesis, giving terminological substance to this Jungian set of disciplinary expectations.

A number of studies on the processing of empty categories in English have been conducted over the last several years which have largely suggested that the Transparency Hypothesis is correct insofar as English parsers are concerned. Since the representation of EC's is posited at an abstract level, such research claims to provide us with insights into the cognitive nature of the human processor itself, as well as the correlation between the grammar and the processor. We, of course, expect that the basic theoretical nature of EC's as a grammatical phenomenon would be generally the same across languages like English and Japanese. And indeed, this is an expectation which we have seen more easily fulfilled in deliberations on syntactic theory than the complementary demand from the processing side of modelling. That is, the quest for universality has also led us to expect that processing constraints on grammatical variables like EC's should turn out to be roughly the same across languages like English and Japanese. This paper, therefore, surveys this question of universality in respect to EC's and their psycholinguistic nature as measured by their degree of accessibility to syntactic antecedents. We should note that we have broadened the coverage to have our discussion of EC's include other elements which enter into relations of binding, such as pronouns and reflexives. We do so because these other elements also may call into play the psycholinguistic task of antecedent accessibility in sentence processing. There are linguistic reasons too, since some EC's, such as NP trace, *pro*, and PRO, are considered to share feature values with pronouns and reflexives.

2. COMPARISON OF ENGLISH EC'S WITH JAPANESE EC'S

If we assume that the mechanisms of syntactic processing are universal, in the same sense that we expect the mechanisms of syntactic theory to be universal, we expect that the processing of EC's in English and Japanese should be fundamentally the same. For example, we should predict that EC's which belong to the same syntactic categories should not differ widely in their antecedent accessibility in these two languages. English and Japanese are interesting prototypes for such a comparison, because they differ so radically in primary syntactic dimensions such as left-branching vs. right-branching sentence development, head-initial vs. head-final presentation of argument structure, and *pro*-drop. To test the scope of universalistic assumptions about processing of empty categories, this paper attempts to synthesize previous psycholinguistic work on this topic in the two languages. The focus of our inquiry is, therefore, threefold:

1. to ascertain whether EC's exhibit accessibility to their antecedents in both languages;

2. to ascertain the degree to which this processing strategy is the same or different in the two languages;

3. and lastly, if there are differences, to ascertain what might cause such differences in the two languages, English and Japanese.

2.1 Empty Categories in English

Introduction: There have been a number of psycholinguistic studies on the processing of syntactic elements with long distance dependency in English, the majority of which are based on the theoretical framework of Government and Binding Theory (Chomsky, 1981). The main issues in much of this work reflect the attempt to determine whether EC's can be said to exist in some psychologically real sense, because EC's, like other anaphoric elements, access their antecedents in on-line sentence processing. A related issue has been to assess whether such EC's are the same or different in their degree of antecedent accessibility.

One common finding in recent work on the processing of EC's in English has been that these elements do indeed reactivate their antecedents. For example, in simple experimental tasks like end-of-sentence word verification, a probe word is processed faster when it is the antecedent of an EC than when it is not. This fact is explained by postulating that a probe word which is in such an antecedent position is processed twice; it is processed once at the antecedent location and then once again at its EC position. However, it has also been reported that EC's, as well as other anaphoric elements, exhibit different degrees of accessibility to their antecedents. The discussion which follows examines this differential in accessibility for such elements; the subsections in the discussion follow the same order as the formulaic summary of differences presented immediately below in our proposed hierarchy of accessibility (adapted from Nicol and Swinney, 1989).

Wh-traces > Pronouns/Reflexives > NP-traces > PRO

Wh-traces: Previous studies unanimously demonstrate that the EC type which shows the strongest accessibility to its antecedent is the *wh-trace*, and right across a variety of experimental techniques ranging from cross-modal priming, naming (Swinney et al., 1988), and even rhyme priming (Tanenhaus, Carlson and Seidenberg, 1985). Nicol (1988) argues that the reason why *wh*-traces

are so strong is because of their *expectability* quotient. This expectability arises because a *wh*-phrase stands out by being in a pre-clause, non-argument position; because the *wh*-phrase is well ahead of its trace, the processor has time to prepare for the encountering of this trace. Unlike other types of traces which lack such expectability, *wh*-traces are extremely robust in accessing their antecedents. Not surprisingly, theoreticians like Fodor (1990:196-197) rightly note that this "expectability" is a serious problem for extracting pure linguistic effects from experiments. The scope of *wh*-traces has been suggested by Nicol and Swinney (1989) as encompassing the immediate reactivation of all those antecedents which are structurally plausible antecedents, and in a way that is immune to semantic interference. That is, it has been demonstrated that even semantically incongruent elements are reactivated if they have appeared at structurally appropriate syntactic positions (Nicol and Osterhout, 1988).

Pronouns and Reflexives: Details aside, both pronouns and reflexives in English access their antecedents. In the case of reflexives, accessibility is observed only in regard to structurally plausible antecedents (Nicol, 1988). As for pronouns, however, it is not clear whether reactivation involves all preceding NP's (except for local NP's) which are structurally relevant (see Nicol and Swinney, 1989:14).

NP-traces: Our hierarchy places the NP-trace after pronouns and reflexives because the experimental conclusions are equivocal in respect to the processing of NP-traces. Two conflicting views have been presented in respect to accessibility for NP-traces (see Nicol and Swinney, 1989). For example, Bever and McElree (1988) examined NP-traces in passives by using an end-of-sentence word-verification task. Passives were paired with non-passives, as follows:

1. *The astute lawyer who faced the female judge was suspected [EC] constantly*

2. *The astute lawyer who faced the female judge was suspicious constantly*

Their experimental results indicated that probe words, like *astute* in the above sentences, were processed faster in passives than in non-passives. This processing difference was explained by claiming that probe words in passives were recalled faster because they were processed twice, once at the subject position and then once more at the [EC] trace position. Using the same experimental task, but examining both verbal and adjectival passives, MacDonald (1989) has reduplicated these findings. Priming effects were found for verbal passives, ostensibly because they contain an NP-trace; but they were not found for adjectival passives, ostensibly because they do not contain an NP-trace. In contrast, however, Osterhout and Nicol (1988) employed an on-line cross-modal task which measured reactivation effects during the processing of a sentence rather than after the sentence was completed (see Nicol and Swinney, 1989:11). Osterhout and Nicol found no significant priming effect in the actual trace position in passives, though there was an insignificant priming trend 1000 msec. downstream from the trace position. Our hierarchical summary attempts to balance these conflicting results, noting that the accessibility quotient for NP-traces is not as clear as that for pronouns, reflexives, and *wh*-traces.

PRO: Previous work uniformly reports that PRO is the weakest type of EC in antecedent-reactivation. It is generally held that EC's created by movement (e.g., *wh*-movement, passives, or NP-raising) are stronger in reactivation than those involving no movement (e.g., PRO). Bever and McElree (1988) attribute this weakness to the semantic nature of PRO, noting that the properties of PRO are largely determined by semantic factors derived from the main clause verb. Other EC

types are characterized by strictly syntactically-motivated binding. Such syntactico-semantic differences are thus suggested as the reason for accessibility differences between PRO and the other anaphoric elements.

Summary of English Results: In sum, even though English EC's exhibit accessibility to their antecedents, they do differ in their degree of accessibility. *Wh-traces* are reported as showing the strongest features of accessibility, perhaps largely due to the factor of expectability; at the opposite end of the accessibility continuum, PRO is the weakest, possibly due to its semantic nature.

2.2 Empty Categories in Japanese

Introduction: The record of psycholinguistic studies of EC's in Japanese is somewhat sparser, and there are typological differences which do not allow us to compare English EC's and Japanese EC's in a straightforward manner. For instance, *wh*-traces do not apppear in Japanese because the language lacks *wh*-movement (although Watanabe (1991) claims otherwise). But Japanese exhibits EC's which are derived from scrambling, a type of movement which is lacking in English. If we extrapolate from what literature there is (admittedly relying largely on Nakayama's work (1990a, b, 1991a, b)), the accessibility hierarchy for Japanese EC's looks something like the one below.

Empty pronouns > NP-traces > Overt pronouns > PRO > Reflexive jibun

Although Nakayama (1990a) claims that English EC's and Japanese EC's are basically the same in respect to antecedent accessibility, this does not square with the way in which the above hierarchy compares to the English hierarchy cited above. Our reading of the evidence suggests that EC's in these two languages differ in respect to antecedent accessibility.

Empty Pronouns: An experiment reported by Nakayama (1990a) found that empty pronouns exhibited short reaction times in a word-verification task performed at the end of test sentences. Empty Pronouns (*pro*) exhibited faster reaction times than even overt pronouns (*kare* 'he' and *kanojo* 'she'), *PRO*, and the Japanese overt reflexive (*jibun* 'oneself'). For examples of such sentences, consider sentences (1) through (4) below.

1. Empty Pronoun (*pro*):
   Toshokan de benkyooshiteita gakusei-ga tomodachi-ni [pro] shukudai-o shiteoita to tsugeta.
   'The student who was studying at the library informed (his) friend that *pro* did homework (for him).'

2. Overt Pronoun (*kanojo*):
   Machi-o aruiteita obasan-ga keisatsu-ni [kanojo]-ga doroboo-o mita to denwashita. 'The woman who was walking on the street telephoned the police that *she* saw the thief.'

3. *PRO*:
   Paatei-no yooi-o shiteiru dansei-ga John-ni [PRO] Mary-o shootaisuru to yakusokushita.
   'The man who was preparing for the party promised John *PRO* to invite Mary.'

4. Overt reflexive (*jibun* 'oneself'):

Yakusoku-o yabutta otto-ga okusan-ni jibun-ga tashikani warukatta to ayamatta. 'The husband who broke the promise apologized (to his wife) that *self* was certainly wrong.'

Nakayama (1990a) accounts for this finding by arguing that Japanese *pro* and the English pronouns ultimately belong to the same category. But this suggestion does not account for the finding that explicit pronouns in Japanese are about as weak in their activation strength as referential R-expressions. It is obvious that English does not have *pro*, and that a one-to-one comparison is impossible, but the suggestion that Japanese *pro* is equivalent to the English pronominal category is simply a categorizational sleight-of-hand to attempt to account for the data. The psycholinguistic fact is simply that Japanese *pro* shows strong, possibly the strongest, antecedent accessibility; this activational strength cannot be accounted for just by equating *pro* to English pronouns.

NP-traces: Psycholinguistic work with NP-traces in Japanese has examined NP-traces in both unaccusatives and direct passives. Nakayama (1990a; 1991a) has demonstrated that NP-traces in unaccusatives are very strong reactivators, but his work has not provided any reason why NP-traces in unaccusatives are so strong. For an example of the Japanese unaccusative, compare (1) and (2) below.

1. Unergative:
   John-ga (inukaki-de) oyoida. 'John swam (by dog paddling).'

2. Unaccusative:
   John-ga (rokuji-ni) [trace] tsuita. 'John arrived (at six o'clock).'

Unfortunately, there is no data concerning English unaccusatives, making it impossible at this point to compare unaccusative NP-traces in English and Japanese.

NP-traces which are created by passivization in Japanese are somewhat mixed in their reactivation effects. For example, in replicating Bever and McElree's (1988) work, Nakayama (1990a) found that in Japanese passives traces show strong reactivation of antecedents in direct passives only when they contain a by-phrase which expresses the agent. Such strong reaccessibility is not manifested, however, when the passive does not contain such a by-phrase which makes the agent explicit. For examples, of these two direct passives in Japanese, compare sentences (1) and (2) below.

1. Direct Passive with Overt Agent:
   Jikken-ni seikooshita kenkyuusei-ga kyooju-ni [trace] homerareta. 'The student who succeeded in the experiment was praised by his professor.'

2. Direct Passive without Overt Agent:
   Kane-o tsukaikonda kachoo-ga tetteitekini [trace] hinansareta. 'The section head who used the company money was criticized thoroughly.'

This unexpected result is explained by claiming that the processing delay is caused by the processor's pragmatic expectation of encountering an agent for the passivized action; because the processor cannot find such an agent, a certain amount of processual wandering is supposedly manifested as a time delay in processing. Whatever the real explanation, NP-traces in Japanese pas-

sives cannot be uniquely classified as strong reactivators. Thus, in both English and Japanese, NP-traces in passives are not always strong reactivators; in Japanese direct passives, the accessibility of antecedents is further attenuated by pragmatic factors like the processor's search for adjunct information on who the agent is. Since there is no experimental comparison of *pro* with NP-traces in respect to antecedent accessibility, there is no clear evidence from which to conclude which is stronger (see Nakayama (1990a)). However, noting the non-homogeneity of NP-traces in respect to reactivation, we have ranked *pro* above NP-traces in the accessibility hierarchy.

Overt pronouns: There are clear differences between the two languages when it comes to overt pronouns. Although they are not as robust as *wh*-traces, English pronouns show relatively strong reactivation capabilities for structurally plausible antecedents, as measured by word-verification times. Overt pronouns in Japanese, however, are extremely weak in accessing their antecedents. In fact, they are so weak that Nakayama (1990a) was prompted to re-classify them as R-expressions. Nakayama (1990b) has further demonstrated that overt pronouns differ from NP-traces in Japanese. NP-traces, unlike pronouns, can access their entire phrasal antecedent; but this is not true for pronouns in Japanese, suggesting that the scope of their antecedent accessiblity is fairly limited.

1. NP-trace Accessing Entire Antecedent Phrase:
   [Supiichi-o yomu tomodachi-ga] yatto [trace] kita 'The friend who is going to read the speech finally came.' (unaccusative)

2. Overt Pronoun Partially Accessing Antecedent Phrase:
   [Machi-o aruiteita obasan-ga] keisatsu-ni [kanojo]-ga doroboo-o mita to denwashita. 'The woman who was walking on the street telephoned the police that *she* saw the thief.'

We will refrain from speculating on why Japanese pronouns are so weak, but it is obvious that overt pronouns in these two languages are very different in respect to antecedent accessiblity.

Reflexive jibun: This same observation applies to the Japanese reflexive (*jibun* 'oneself'). *Jibun* was weakest in its reactivation capacity in comparsion to the other EC's and anaphoric elements. So much so that Nakayama (1990a) found no difference between *jibun* and the non-anaphoric expressions he used as controls.

1. Overt reflexive (*jibun* 'oneself'):
   Yakusoku-o yabutta otto-ga okusan-ni [jibun]-ga tashikani warukatta to ayamatta. 'The husband who broke the promise apologized to his wife that [self] was certainly wrong.'

2. Control (non-anaphoric):
   Terebi-bakari miteiru kodomo-ga okaasan-ni [kono bangumi]-wa benkyoo-ni narune to tsubuyaita. 'The child who watches TV murmured to his mother that [this TV programme] was educational.'

This weak capacity does not correspond to the English reflexive, suggesting that Japanese and English also differ considerably in this aspect of the accessibility hierarchy.

PRO: Japanese PRO is a weak reactivator, as it is in English, and our hierarchy places it between overt pronouns and *jibun*. This relative weakness has been attributed to its semantic nature (see

Bever and McElree, 1988, as well as Nakayama, 1990a), in that it lacks purely syntactic binding constraints. That is, the choice of antecedent for PRO is determined by semantic rather than syntactic factors. Although English and Japanese PRO may be roughly the same in antecedent accessibility, their position of relative weakness on the hierarchy, when compared to other anaphoric elements, lacks a satisfactory explanation.

1. English PRO:
   The astute lawyer who faced the female judge strongly hoped [PRO] to argue during the trail.

2. Non-anaphoric Construction:
   The astute lawyer who faced the female judge hated the long speech during the trial.

3. Japanese PRO:
   Paatei-no yooi-o shiteiru dansei-ga John-ni [PRO] Mary-o shootaisuru to yakusokushita.
   'The man who was preparing for the party promised John [PRO] to invite Mary.'

4. Non-anaphoric Construction:
   Paatei-no yooi-o shiteiru dansei-ga John-ni Mary-wa sutekida-to itta 'The man who was preparing for the party said to John that Mary was beautiful.'

3. CONCLUSIONS

In summary, we can offer the following conclusions. Recall that our accessibility hierarchies for English and Japanese were postulated as follows:

ENGLISH: **Wh-traces > Pronouns/Reflexives > NP-traces > PRO**

JAPANESE: **Empty pronouns > NP-traces > Overt pronouns > PRO > Reflexive jibun**

First, while English *wh*-traces offer the strongest evidence in respect to antecedent accessibility, no comparisons are possible because Japanese lacks *wh*-movement. Secondly, although Japanese *pro* and unaccusative NP-traces exhibit strong antecedent accessibility, their exact standing relative to one another in the hierarchy is as yet unclear. Comparisons with English are impossible because English lacks *pro*, and English data is unavailable for unaccusative NP-traces. Third, NP-traces in English and Japanese passives share a somewhat similar position in respect to their equivocal position on the hierarchy; NP-traces are neither as strong as *wh*-traces and pronouns in English nor are NP-traces as strong as *pro* in Japanese. Moreover, in Japanese their accessibility quotient may be attenuated by other than purely syntactic factors. Fourth, in both English and Japanese, PRO is a weak reactivator. Semantic explanations have been offered (Bever and McElree, 1988, and Nakayama, 1990a) to account for PRO's weak showing, but these semantic explanations cannot be regarded as universally satisfying. For one thing, Japanese *jibun*, a syntactic bindee, shows weaker reaccessibility than PRO. Fifth, there are clear differences between these two languages in the area of overt pronouns and reflexives. In English, both are relatively strong reactivators, but in Japanese they are weak enough to prompt some to re-classify them as R-expressions.

These observations lead to the conclusion that processing models will have to account for differential psycholinguistic behavior with empty categories and anaphoric elements. Very simply, the nature of the processing task may differ across languages like Japanese and English. Whatever the abstract treatment of empty categories and anaphoric elements in the grammatical scheme of things, their language-specific processing status appears to be a somewhat internal matter, and theoretical claims about uniformity in strategies to deal with these common elements at the syntax-discourse boundary seem to have been overstated, given our present state of knowledge. We have no doubt that there are universal processing strategies, but have our doubts that they will exactly mirror the constructs of any one current syntactic theory. The final explanations will ultimately be based upon processing strategies which are more psychological in nature, and may not use the structural elements posited by grammatical models. In short, if empty categories and anaphoric elements in language are any indication, the fit between grammatical models of language and processing models of language is as yet a very loose one. And if the fit between processing results in two languages like Japanese and English is not atypical, we have much to do in order to construct universally valid explanations of what does go on in processing.

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THE DISTRIBUTION OF CHINESE REFLEXIVES

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0. INTRODUCTION:

The distribution of reflexive pronouns has been a major concern in generative grammar. The research has long focussed on the properties of local reflexives. While much about local reflexives remains to be analyzed, the observation of long-distance (LD) reflexives in a number of languages such as Chinese has evoked new controversies in the theory of grammar.

In this paper, I discuss major properties of both local and LD reflexives in Chinese. There are two basic properties of Chinese reflexives: the simplex reflexive allows LD binding constrained by a local feature-agreement restriction, and both simplex and complex reflexives are subject oriented. Assuming that the basic constraints governing the distribution of reflexive pronouns in Chinese are not different in substance from that of English reflexives, I sketch an analysis of these properties in terms of an interaction between syntax and semantics, along the tradition of Generalized Phrase Structure Grammar (GPSG). This analysis owes much to Hukari (1989), while differing in several respects. In the context of the feature instantiation system developed in Gazdar et al. (1985), I will show that syntactic domains of reflexive pronouns including LD reflexives can be defined in terms of the interaction of feature co-occurrence restrictions (FCRs) and the reflexivization metarule. I suggest that subject-orientation is independent of the lexical property of a reflexive. The difference between Chinese and English with respect to subject-orientation vs. non-orientaion may be expressed in slightly different forms of semantic interpretation. As a result, not only can various complications and assumptions be avoided, but also the difference between local and LD reflexives can be reduced to a variation of feature co-occurence restrictions.

1. THE MAJOR PROPERTIES:[1]

Chinese has two reflexive forms: morphologically simple reflexives and morphologically complex reflexives. The former occurs with the invariant form **ziji** and the latter occurs with the form of a pronoun+**ziji**, such as **ta-ziji** 'himself/herself'. While they share certain features in common, these two forms of reflexives seem to differ in two notable aspects. First, they exhibit distinct referential properties. Complex reflexives in general require strictly local binding; simplex reflexives allow LD binding. Thus in (1a) either the embedded subject **Lisi** or the matrix subject **Zhangsan** may be the antecedent of the reflexive **ziji**, but in (1b) the complex reflexive **ta-ziji** can only be understood as referring to the embedded subject **Lisi**:

(1) a. Zhangsan$_i$ renwei [Lisi$_j$ xihuan ziji$_{i/j}$]
Zhangsan think Lisi like self
'Zhangsan$_i$ thinks that Lisi likes himself/him$_i$'

b. Zhangsan$_i$ renwei [Lisi$_j$ xihuan ta-ziji$_{*i/j}$]
Zhangsan think Lisi like himself
'Zhangsan$_i$ thinks that Lisi likes himself/*him$_i$'

The other difference between simplex reflexives and complex reflexives is that while the complex reflexives have inherent person and number features, these features of a simplex reflexive seem to depend on the context in which it occurs.

(2) Zhangsan$_i$ xihuan ziji$_i$.
Zhangsan like self
'Zhangsan likes himself'.

(3) Wo$_i$ xihuan ziji$_i$.
I like self
'I like myself.'

In the following sections, I review and summarize the major properties of Chinese reflexives with respect to both simplex and complex forms.[2]

1.1. Potential Antecedents

The antecedent of a reflexive is mainly a subject. This phenomenon is referred to as subject-orientation (see Huang 1982, Huang and Tang 1991):

(4) Zhangsan$_i$ song Lisi$_j$ yizhang ziji$_{i/*j}$ de xianpian.
Zhangsan give Lisi one-CLA self DE picture
'Zhangsan$_i$ gave Lisi$_j$ a picture of himself$_{i/*j}$.'

In (4), the reflexive pronoun **ziji** only refers to the subject. The same is true of complex reflexives, as shown by the sentence in (5), where the local subject must be understood as the antecedent of the reflexve **ta-ziji**.[3]

(5) Zhangsan$_i$ shuo [Lisi$_j$ song gei Wangwu$_k$ yizhang
Zhangsan say Lisi give to Wanwu one-CLA
ta-ziji$_{*i/j/*k}$ de zhaopian].
him-self DE picture
'Zhangsan$_i$ said Lisi$_j$ gave Wangwu$_k$ a picture of him$_{*i}$/himself$_{j/*k}$.'

In addition, the potential antecedent of a reflexive must be animate in nature (see Tang 1989). Thus, the antecedent of a Chinese reflexive is an animate subject NP.[4]

1.2. LD Binding and Feature Agreement

While the simplex reflexive **ziji** allows LD binding, LD binding with **ziji** is constrained by a feature agreement restriction. An NP in a higher clause can be the antecedent of a reflexive **ziji** only if the NP agrees in person and number with the local subject of the predicate containing the reflexive. In fact, the local subject may always serve as the antecedent of the **ziji** and the person and number (and gender) features of a simplex reflexive must correlates with the local subject. Furthermore, a non-local NP can be the antecedent of the reflexive only if it agrees in person and number with all the NPs that are potential antecedents intervening between the reflexive and the non-local NP. Thus, while the matrix subject **Zhangsan** can be the antecedent of the reflexive in (6), in (7) the matrix subject cannot be the antecedent of the reflexive even though it agrees in person and number with the lowest embedded subject **Wangwu**, since the subject NP in the intermediate clause disagrees (in person) with the local subject of the clause containing the reflexive and thus LD binding with this intermediate subject NP or any NP in a higher clause is blocked. This is the well-known fact of blocking effect of Chinese reflexivization (see Huang Y.-H. 1984, and Tang 1989).

(6) Zhangsan$_i$ zhidao [Lisi$_j$ renwei [Wangwu$_k$ zui xihuan
Zahngsan know Lisi think Wangwu most like
ziji$_{i/j/k}$]]
self
'Zhangsan$_i$ knows that Lisi$_j$ thinks that Wangwu likes
himself/him$_{i/j}$ most.'

(7) Zhangsan$_i$ zhidao [ni$_j$ renwei [Lisi$_k$ zui xihuan
Zhangsan know you think Lisi most like
ziji$_{*i/*j/k}$]]
self
'Zhangsan knows that you think that Lisi likes
himself most.'

In short, a non-local NP in general cannot be a LD antecedent of the reflexive **ziji** if the non-local NP differs in person or/and number (person-number) with the local NP or any NP which is a potential antecedent of **ziji** and intervenes between the reflexive and the non-local NP. Thus, LD antecedent is possible only if the antecedent agrees with the local subject in person-number features and there is no intervening subject that bears distinct person-number features.

Given the discussion above, the major distributional and referential properties can be summarized as follows:

(8) **a.** While complex reflexives have inherent person-number features, these features of a simplex reflexive correlate with the local subject of the predicate containing the reflexive, and the local subject is always the potential antecedent of the reflexive.

b. The antecedent of a reflexive must be an animate NP, and is in general a subject in both simplex and complex reflexive cases.

c. While complex reflexives require local binding, the simplex reflexive exhibits the possibility of LD binding, subject to a restriction that requires the LD antecedent to agree in person and number features with all potential antecedents interveving between the LD antecedent and the reflexive.

Though there remains some degree of disagreement in terms of the relevant facts in certain instances, it seems that the distributional and referential facts of reflexives discussed above are well-recognized (see Tang 1989, Battistella 1989, Cole, et al. 1990, Huang and Tang 1991). In the following section, I present a phrase structure analysis.

2. CHINESE REFLEXIVES IN PHRASE STRUCTURE GRAMMAR

Following the tradition of GPSG (see Pollard and Sag 1983, and Hukari 1989), in this analysis, reflexives are treated in a syntax-semantics cooperation. More specifically, reflexive specifications are introduced by a metarule, which interacts with the foot feature principle (FFP) and the mechanism of feature co-occurrence restrictions, and binding is accomplished through a semantic interpretation procedure.[5] In the theory of GPSG (Gazdar et al. 1985), metarules applying to a set of basic (lexically-headed) ID rules define a new set of ID rules, thus capturing systematic relations among ID rules. The FFP says informally that 'the foot features instantiated on the mother in a tree fragment are identical to the unification of the foot features instantiated on the daughters' (cf. Sag et al. 1985, p. 46). FCRs are understood as absolute restrictions on the possible feature composition of a category. No categories may be specified in a way contradictory to what a FCR says.

It seems uncontroversial that simplex and complex reflexive pronouns differ from each other in feature structures. In other words, simplex and complex reflexives belong to different feature specifications, referring to different entries in the lexicon. Under this assumption, I treat simplex reflexives and complex reflexives as distinct feature specifications. I propose that the foot features SIMRE and COMRE are responsible for simplex and complex reflexive pronouns respectively. Now consider the following reflexivization metarules, which are relevant to simplex and complex reflexives respectively:

(9) a. VP --> W, X^2 ==> VP --> W, X^2[SIMRE: NP]

b. VP --> W, X^2 ==> VP --> W, X^2[COMRE: NP]

Clearly, these two metarules are not unrelated; they represent two subcases of one general phenomenon:

> Any category of VP that immediately dominates a BAR-2 category may associate with a reflexive feature specification, which may be either morphologically simplex or morphologically complex.

Thus, the two metaruls can be collectively stated in the following form, where RE stands for the set of possible reflexive features, SIMRE and COMRE[6]

(10) VP --> W, X^2 ==> VP --> W, X^2[RE: NP]
where RE is in {SIMRE, COMRE}

Note that this metarule ensures that the upperbound on percolation of the feature RE will be the category VP. Since the feature RE on a daughter node in the relevant local tree is introduced by the metarule and therefore inherited, the FFP will not require it to occur on the mother VP node. In addition to the metarule in (10), the following FCRs is crucial to Chinese reflexive binding. Remember that SIMRE pertains only to the simplex reflexives.

(11) FCR 1: $\neg$[SUBJ: NP[pn_α] & SIMRE: NP[pn_β]] ($\alpha \neq \beta$)

For discussion purpose, here I tentatively assume a monadic feature "pn" for feature specifications in person and/or number (person-number). In (11), NP[pn_α] and NP[pn_β] stand for NPs which are distinct to each other in person-number. FCR 1 says that no category may be specified both for SUBJ and SIMRE if they have distinct values for person-number features.

As mentioned above, unlike the simplex reflexive, complex reflexives require strictly local binding. Thus, complex reflexives fall into the general binding pattern of morphologically complex reflexives observed in other languages such as English reflexives, the relevant FCR for Chinese complex reflexives is the same as the one for English (see Hukari 1989, p. 208):

(12) FCR 2: $\neg$[SUBJ & COMRE]

The interaction of the metarule and the FCRs defines the syntactic domain within which a specification of RE may percolate due to the effects of the FFP. It is within that domain that a reflexive must be bound and therefore be translated into intensional-logic under semantic interpretation. The semantic interpretation procedure is rougly as the following:

(13) The Semantic Interpretation for Chinese R-binding

If the mother contains a SUBJ specification but not a RE specification, while a daughter contains a RE specification, and if the value of SUBJ agrees with the value of RE, then

(a) combine the daughters by normal functional application.
(b) a subject-control binding predicate applies to the semantic combination of the daughters.

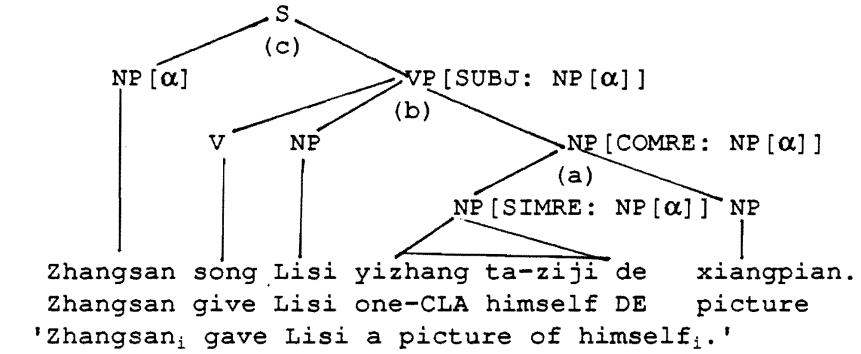
This is a simplified version of clauses (i) and (ii) of the reflexive binding schema found in Hukari (1989). When both the mother and the daughter(s) contain RE specifications, the interpretation follows the general interpretation procedure for foot features (see Gazdar et al.). Here the fearture agreement between the reflexive and its antecedent is treated as a condition on binding in seman-

tics, and the binidng translation crucially depands on the syntactic information available in a local tree. For instance, no interpretation of binidng will obtain if the category value of RE is different from that of SUBJ, which agrees with the syntactic subject via the feature instantiation system.

Before demonstrating how the system operates, let us assume, following Cole and Sung (1991), that lexical items of simple reflexives as well as complex reflexives are sepcified with person and number features in the lexicon.[7] Thus, the phenomenon that the simplex refelxive depends on the subject for person-number features becomes merely apparent. Simplex reflexives pattern with complex reflexives in the sense that a reflexive must agree in person-number features with its potential antecedent. I will discuss how the blocking effect follows under this assumption later in this section.

Now RE and SUBJ feature instantiation and reflexive binding can be illustrated by the following tree digrams. As mentioned above, subject-orientation and LD biniding constrained by a local feature-agreement restriction are two central properties of Chinese reflexives. First, consider a structure like (14):[8]

(14)



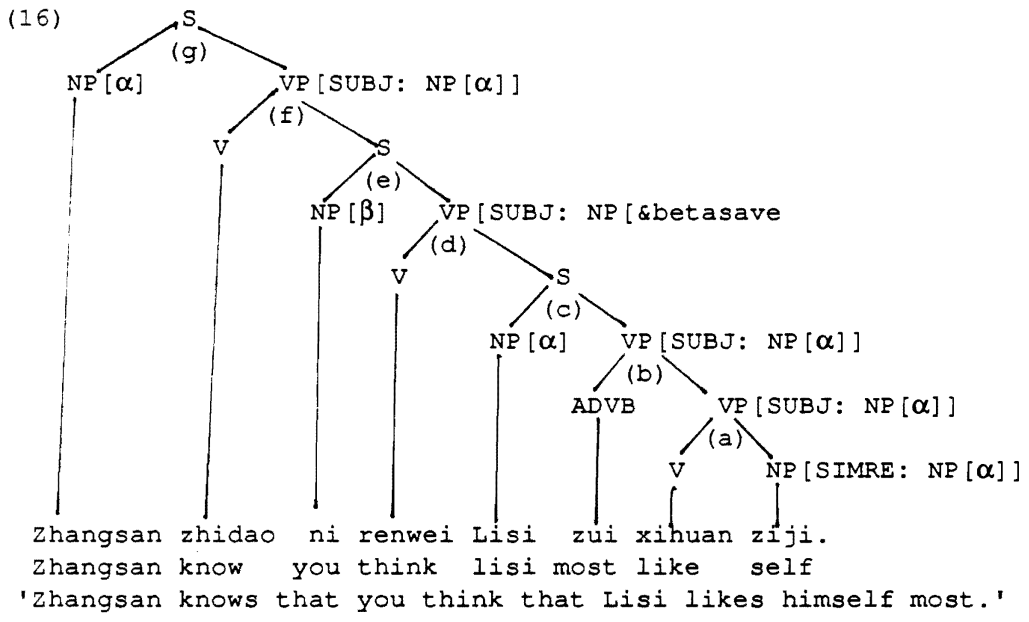
In (14), the metarule may apply only to an ID rule corresponding to the local tree (b), namely the one dominated by the VP. Thus, the relevant domain for binding will be this VP in this case. As the VP contains a SUBJ and the daughter contains a RE (i.e. COMRE), the RE specification must be interpreted and therefore be bound in the translation of the VP in accordance with (13). The reflexive pronoun translates as $\lambda\wp\,\wp$ denoting the identity function on NP types (see Pollard and Sag 1983, and Hukari 1989)). The subject-control binding predicate is defined as (see Hukari 1989) $\lambda\upsilon\lambda\wp\,\wp\{\lambda x[\upsilon(x^*)(x^*)]\}$. The translantions for (14) are roughly like the following:

(15) (a) $\lambda\wp_1$(yizhang'($\wp_1$)(xiangpian'))
(b) $\lambda\wp_2\wp_2\{\lambda x$[song'(yizhang'(x*)(xiangpian'))(λPP(l))(x*)]}
(c) song'(yizhang'(z*)(xiangpian'))(l*)(z*)

As the translation of the VP combines with the translation of the subject, the desired result of a subject antecedent is achieved.

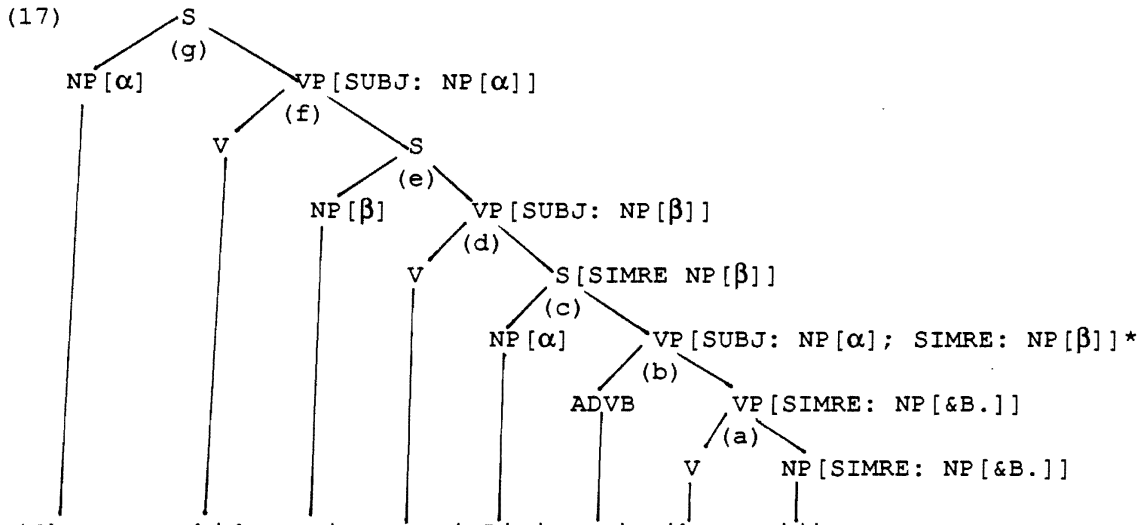
Now consider a typical case of potential LD binding involving blocking effect, as shown in (16). In this structure, the subject of the intermediate clause differs in person-number from the the lowest subject and the matrix subject. Thus, the SUBJ specification on the intermediate VP dif-

fers in person-number from that on the lowest VP (or that on the matrix VP), i.e. [SUBJ: NP[β]] vs. [SUBJ: NP[α]]. In this case, the reflexivization metarule may apply in local trees (a), (d), or (f).



When the metarule applies in local tree (a), the lowest subject should bind the reflexive. Suppose the metarule applies in local tree (d), as shown in (17), the feature SIMRE will percolate down in accordance with the FFP. In order to be bound by the intermediate subject, the reflexive must agree with it in person-number. But if the reflexive agrees with the intermediate subject in person-number, the percolation of SIMRE is blocked by the FCR 1, when SIMRE is instantiated on the mother VP of local tree (b), since SUBJ and SIMRE in this VP disagree with each other in person-number and FCR 1 insists that no category can be specified both for SUBJ and SIMRE if they have distinct values with respect to person-number features.

(17)



*Zhangsan zhidao ni_i renwei Lisi zui xihuan $ziji_i$.
Zhangsan know you think lisi most like self
*'Zhangsan knows that you think that Lisi likes youself most.'

Thus, this structure is correctly ruled out because of violation of FCR 1.

Now imagine that the metarule applies at the matrix VP (i.e. local tree (f) in a structure like (17)). It is not difficult to see that the percolation will not succeed and the structure will be ruled out in a similar way as the structure in (17), as the matrix subject and the intermidiete subject differ in person-number features. Thus, only structure (16) is well-formed, since SIMRE specification cannot be successfully introduced at either the intermediate VP or the matrix VP. In other words, there is no well-formed antecedent-reflexive path from a non-local subject NP (or any NP in a higher position) down to the reflexive in a interpretable structure if this non-local NP or an intervening subject NP differs in person-number features from the local subject of the predicate containing the reflexive. Thus, the present system correctly predicts the blocking effect.[9]

As for cases involving embedded clauses containing a complex reflexive somewhere, the present system predicts that the local subject of the predicate containing the reflexive must be its antecedent. Further the reflexive pronoun does not have to occur in the lowest embedded clause. The metarule may apply to any VP as shown in previous cases and the FCR 2: ¬[SUBJ & COMRE] will block perculation of the feature COMRE. Thus, in a sentence like the following the subject of the intermediate clause must be the antecedent of the reflexive but not any of the others.

(18) $Zhangsan_i$ renwei $Wangwu_j$ gaosu-le $ta\text{-}ziji_{*i/j/*k}$ de laoshi
Zhangsan think Wangwu tell-asp 3s-self DE teacher
$Lisi_k$ bu yuanyi lai.
Lisi not willing come
'Zhangsan thinks that Wangwu told the teacher of himself that Lisi will not come'.

However, case like the following are also allowed in Chinese, where a complex reflexive is contained in an embedded subject position.[10] In such a case, the subject of the immediately higher predicate must be taken as the antecedent of the reflexive.

(19) Zhangsan$_i$ zhidao ta-ziji$_i$ de pengyou gaosu-le laoshi Lisi$_k$
Zhangsan know 3s-self DE friend tell-asp teacher Lisi
bu yuanyi lai.
not willing come
'Zhangsan knows that his own friend told teacher that Lisi would not come'.

In this case, the relevant reflexive may only be licensed by applying the metarule at the matrix VP and the COMRE feature will percolate to the subject position of the intermediate clause without violating any principle in the grammar. The feature COMRE cannot percolate elsewhere, however, since the percolation would voilate the FCR 2: ¬[SUBJ & COMRE], and thus no other binding is possible.

3. SUB-COMMANDING CASES

Tang (1989) reports that a sub-commanding (non-c-commanding) subject NP contained in an inanimate subject may also serve as the antecedent of a simplex reflexive:

(20) [[Zhangsan$_i$ de] jiaoao$_j$] hai le ziji$_{i/*j}$.
Zhangsan DE pride hurt ASP self
'Zhangsan's$_i$ pride hurt him$_i$.'

This phenomenon seems to suggest that the c-command condition as given in the standard binding theory (Chomsky 1981) is inadequate and should be relaxed for Chinese **ziji** if the antecedent is contained in an NP that is itself not a potential antecedent.

While the cases above appear possible for some speakers, it seems that it is overly simplified to claim that in principle a sub-commanding NP may be the antecedent of **ziji** if it is contained in an inanimate subject NP that c-commands the reflexive. The real situation is far more complex. The following facts seem to be relevant.

First, not every inanimate NP always allows a natural interpretation of a sub-commanding subject NP as the antecedent of **ziji**. Consider the following examples:

(21)a.??[[Zhangsan$_i$ de] xiaoxi] hai le ziji$_i$.
Zhangsan DE news hurt ASP self
'The news about Zhangsan$_i$ hurt him$_i$.'

b.??[[Li xiaojie$_i$ de] xiaoxi] dui ziji$_i$ meiyou haochu.
Li miss DE news to self not-have good
'The news about miss Li$_i$ will do her$_i$ no good.'

In fact, either of the sentences above is ambiguous. In addition to the reading as indicated above, (21a), for instance, may also be interpreted as "the news Zhangsan$_i$ spread hurt him$_i$". When the sentence has the reading "the news about Zhangsan$_i$ hurt him$_i$" as above, the coindexing between the reflxive and the sub-commanding NP is impossible or at best marginal. The difference between the two readings is that when the sub-commanding NP is understood as the source of the proposition, a coindexing between a reflexive and a sub-commanding NP may be acceptable; otherwise such a coindexing is usually impossible. Note that it is not clear how the two possible interpretations in sentences like above can be distinguished in syntactic terms.

Another case in which a reflexive with a sub-commanding antecedent is usually acceptable is one when a sub-commanding NP is contained in an inanimate NP that denotes some inherent property of the sub-commanding animate NP, as shown by (22a-b) (and (20) above):

(22)a. [[Zhangsan$_i$ de] taidu] hai le ziji$_i$.
Zhangsan DE attitude hurt ASP self
'Zhangsan's$_i$ attitude hurt him$_i$.'

b. [[Li xiaojie$_i$ de] taidu] dui ziji$_i$ meiyou haochu.
Li miss DE attitude to self not-have good
'Miss Li's$_i$ attitude will do her$_i$ no good.'

A similar contrast can also be observed between the following two sentences. It seems generally agreed that (23a) is much better than (23b) though judgements vary to some extent. ,

(23)a. [[Zhangsan$_i$ de] toufa] dangzhu le ziji$_i$ de shixian.
Zhangsan DE hair block ASP self DE vision
'Zhangsan'$_i$s hair blocks his$_i$ own vision.'

b.??[[Zhangsan$_i$ de] fangzi] dangzhu le ziji$_i$ de shixian.
Zhangsan DE house block ASP self DE vision
'Zhangsan'$_i$s house blocks his$_i$ own vision.'

In (23a), **ziji** can clearly refer to **Zhangsan**. But in (23b), **ziji** is most naturally understood as referring to someone other than **Zhangsan** (possibly the external speaker). Semantically, a part-whole relation holds between the two relevant NPs in (23a) but there is no such relation in the case of (23b), though the NP **Zhangsan** acts as the possessor in the larger NP in both (23a) and (23b). These examples indicate that when a sub-commanding subject NP may serve as the

antecedent of **ziji**, it is usually contained in one of those NPs which closely associate with the sub-commanding animate NP semantically or pragmatically. This clearly suggests that whether a sub-commanding subject NP may serve as the antecedent of a reflexive or not has a semantic (or pragmatic) basis and cannot be generally determined on the basis of structural properties.

Second, as Huang and Tang (1991) note, a sub-commanding subject in general cannot be a LD antecedent of the reflexive **ziji** regardless of whether the person-number feature agreement is satisfied:

(24) Zhangsan_i de xin biaoshi [Lisi_j hai le $\text{ziji}_{*i/j}$.]
Zhangsan 's letter indicate Lisi hurt ASP self
'Zhangsan's letter indicates that Lisi hurt himself.
(Huang & Tang 1991)

In other words, sub-commanding NPs differ from c-commanding NPs in terms of their potentiality of being antecedents. Given that long-distance binding with the feature agreement restriction is a central feature of Chinese reflexive binding, the fact that this feature does not pertain to reflexives with sub-commanding antecedents strongly suggests that sub-commanding cases fall outside the domain of the core cases of reflexive binding.[11]

Finally, it is not really true that a sub-commanding NP can be the the antecedent of a reflexive only when it is contained in an inanimate NP. Consider now (25) and (26). In each of the examples, the subject contains two NPs in a coordination structure. In (25) the reflexive refers to both the NP **Zhangsan** and the NP **Lisi**, and in (26) it refers to both the two sub-commanding NPs **Zhangsan** and **Lisi**, which are contained in two inanimate NPs respectively.

(25) Zhangsan he Lisi dou zhu-zai ziji de jiali.
Zhangsan and Lisi both live-in self DE house
'Zhangsan and Lisi both live in their own houses'.

(26) [Zhangsan de qian] he [Lisi de shu] dou bei ziji de pengyu
Zhangsan DE money and Lisi DE book both BEI self DE friend
touzou le
steal ASP
'Zhangsan's money and Lisi's books were both stolen by their
own friend(s)'.

Note that the NPs in a coordination structure may collectively serve as the antecedents of a reflexive. But interestingly, in (27) the reflexive can be understood as referring to **Zhangsan**, and in (28) the reflexive **ziji** will be understood most naturally as referring to **Zhangsan**.

(27) [[Zhangsan$_i$ de] baba he mama de shu] dou bei ziji$_i$ de pengyu
Zhangsan DE father and mother DE book all BEI self DE friend
touzou le
steal ASP
'Zhangsan$_i$s father and mother's books were all stolen
by his$_i$ friend(s)'.

(28) [[Zhangsan$_i$ de] baba de qian he mama de shu] dou bei ziji$_i$
Zhangsan DE father DE money and mother DE book both BEI self
de pengyu touzou le
DE friend steal ASP
'Zhangsan$_i$s father's money and mother's books were both stolen
by his$_i$ friend(s)'. (Pollard & Sag 1992)

As noted by Pollard and Sag (1992, originally due to Wang 1990), Tang's judgements about the sub-commanding cases seem to reflect merely preference for a topic (or the most prominent NP in the discourse).

It should not be surprising that Chinese may allow reflexives with sub-commanding antecedents, since similar cases can also be found in English, which in general requires strictly local binding. The relevant English examples have been discussed in the literature, e.g. by Reinhart and Reuland (1991), and Pollard and Sag (1992):

(29)a. A fear of himself$_i$ is John$_i$'s greatest problem. (from Higgins 1973)

b. John's$_i$ campaign requires that pictures of himself$_i$ be placed all over the town. (from Lebeaux 1984)

c. John's$_i$ intentionally misleading testimony was sufficent to ensure that there would be pictures of himself$_i$ all over the morning papers. (Sag & Pollard)

d. Bismark$_i$'s impulsiveness has, as so often, rebounded against himself$_i$. (from Zribi-Hertz 1989)

Pollard and Sag point out that these cases belong to a logophoric use of reflexives (more specifically a focus use of reflexive in Reinhart and Reuland's term).

Given the discussion above, there are good reasons to believe that Chinese reflexives with sub-commanding antecedents are variatants of their English counterparts, which go beyond the domain of a syntactic analysis.

4. FUTHER DISCUSSION AND CONCLUSION

I have discussied major properties of reflexivization in Chinese. I have shown that the distribution of Chinese reflexives in a vast majority of cases can be represented in the feature instantiation system found in Gazdar et al. (1985), parallel to that of English reflexives as discussed in Hukari (1989). In this analysis, reflexive pronouns are represented by category-valued foot features SIMRE and COMRE, whose occurrences are introduced by a reflexivization metarule.

(30) X[SUBJ] --> W, X^2 ==> X[SUBJ] --> W, X^2[RE: NP]
where RE is in {SIMRE, COMRE}

This rule entails that though simplex reflexive and complex reflexive pronouns are separate lexical items in the lexicon, they are related in syntax. More precisely, occurrences of both simplex or complex reflexives in general are associated with VP (or predicative categories) and must be related to the subject of the VP category in question. Note that what is expressed in this metarule is quite general (see Pollard and Sag 1983, and Kang 1988 for discussion). It is uncontroversial that reflexive pronouns are universally related to predicative categories and the notion of accessible SUBJECT (or AGR) plays a crucial role in reflexive binding, even for languages that allow object antecedents (see Chomsky 1981). Thus, the metarule is also relevant to languages like English. RE stands for the set of possible reflexive features, SIMRE and COMRE. It may be assumed that the reflexivization metarule universally contain both SIMRE and COMRE, and that languages like English simply does not have lexical items of simplex reflexives in the lexicon. Thus, no sentences containing simplex reflexives will be generated in English.

As much discussed in the literature (see e.g., Reinhart and Reuland 1991), it seems to be generally true cross-linguistically that morphologically simplex reflexives (like **ziji**) usually allow LD binding, while morphologically complex reflexives (like **ta-ziji** and English **himself**) require local binding. Thus, while some languages may only have complex reflexives and thus exhibit only local binding, other languages may have both complex and simplex reflexives and thus allow both local and LD binding. Though the reflexivization metarule sets the upbound of the RE percolation path, it does not seem sufficient by itself to define the domain of binding in terms of simplex and complex reflexives respectively. The metarule, in fact, predicts LD binding, since a specification of RE in principle can percolate down and pass between clauses. Feature co-occurrence restrictions are employed to restrict possible percolation of RE.[12] Thus, the metarule and FCRs interact to define the domain of binding. As a result, various complications are avoided and quite a few parallels among languages, which have been seemingly unrelated, fall out directly from the general mechanisms of the grammar. Here the difference between complex reflexives (for English, Chinese, and other languages) and simplex reflexives in Chinese is simply a variation of FCRs:

(31) a. FCR 1: ¬[SUBJ & COMRE]
b. FCR 2: ¬[SUBJ: NP[pn_α] & SIMRE: NP[pn_β]] (for **ziji**)

Complex reflexives are relatively more straightforward in the sense that they generally require local binding. While simplex reflexives universally allow LD binding, they differ from

one language to another in terms of conditions governing the LD binding in question, varying from a wide range of phenomena, though these phemonena are not totally unrelated. For instance, they all seem to be associated in some way with conditions on VP. But it does not seem possible to unify all these phenomena under one general priciple. Thus, it may be appropriate to consider them as parallel but individual phenomena rather than subcases of one single phenomenon. Though the present analysis concentrate on Chinese reflexives, I would hope that it is extendible to long-distance reflexives in other languages.[13]

Although reflexive pronouns must be related to predicative categories with accessible SUBJECT cross-linguistically, languages differ in the choice of the set of possible antecedents. Some languages allow only subject antecedents, and other languages also allow object antecedents. In view of the fact that simplex reflexives are universally subject oriented, it is quite tempting to attribute subject-orientation to the lexical property of simplex reflexives. Various analysis concerning subject-orientation have been discussed in the literature. A basic idea has been that simplex reflexives are subject oriented because they lack inherent *phi*-features and in order to be interpreted, they will have to acquire *phi*-features from AGR so that they are closely associated with SUBJECT via AGR. Let me note here very briefly that complex reflexives in a language may also be subject oriented although they clearly have inherent *phi*-features, as shown by Chinese complex reflexives. Further, some languages may have both AGRs and AGRo. If acquisition of *phi*-features require association with an element carrying them, there should be some observable correlation between the existence of AGRo in a language and object-orientation (or no orientation) in the choice of antecedents for simplex reflexives in that language. But as far as I know, no such correlaton has been reported.

In the theory of GPSG, the apparent dependence of simplex reflexives on the subject for person-number features seems to suggest that subject-orientation can be achieved by stating feature agreement between the value of RE and that of SUBJ in the metarule. However, there are at least two points which indicate that this approach is undesirable. First, agreement between a reflexive pronoun and the subject (or a NP) in person-number features by itself does not guarantee binding. For instance, the reflexive in the following sentence agrees in person-number features with the object as well as the subject, but it can be bound only by the subject:

(32) Zhangsan$_i$ song Lisi$_j$ yizhang ziji$_{i/*j}$ de xianpian.
Zhangsan give Lisi one-CLA self DE picture
'Zhangsan$_i$ gave Lisi$_j$ a picture of himself$_{i/*j}$.'

Something independent of agreement is still needed to ensure binding. Thus, agreement and binding are distinct notions, though feature agreement is a necessary condition on binding, as the binding in the following example is not possible:[14]

(33) *The man$_i$ standing by Harry is scratching them$_i$

Second, reflexive binding has been considerd a semantic matter in the theory of GPSG (see Pollard and Sag 1983, and Hukari 1989).[15] For languages like English, subject binding and nonsubject binding are achieved via semantic interpretation rules. If this is correct, it is certainly undesirable to state subject-orientation in syntax specifically for Chinese, since (subject) binding

will be stated in semantics for this language. Thus, it seems more plausible to distinguish between languages with subject-orientation and languages with no orientation in semantics. The difference of these two types of languages in terms of subject-orientation can be represented in a variation of semantic interpretation rules. The theory becomes simplified if it is assumed that a language does not have to instantiate all the interpretation rules and subject-oriented languages simply lack the interpretation rule for object binding. Thus, interpretation rules for reflexive binding for Chinese constitute a subcase of the general reflexive binding schema. In conclusion, subject-orientation is a property independent from the typology of either simplex reflexives or complex reflexives. Given the fact that complex reflexives may be subject-oriented, I consider any analysis that treat subject-orientation as a derived property of simplex reflexives inadequate.

In this analysis, the percolation of RE is regulated by the FFP (and the relevant FCRs). This predicts correctly that in principle reflexive pronouns may occur in adjuncts and island constructions.[16] Thus, LD antecedent-reflexive dependencies differ substantially from antecedent-gap dependencies. LD reflexives allow quite a general path and they can occur in all possible NP positions, in constrast to empty categories, which can occur only in certain positions. Though it may be useful to explore how the relation between reflexive binding and antecedent-gap relation can be best represented, it is certainly incorrect to consider LD reflexive binding essentially the same as the phenomena of extraction.

NOTES

* I wish to thank Tom Hukari and WPLC editors for their commments and suggestions.

[1] Like reflexives in other languages, Chinese reflexive pronouns can be used as anaphors and intensifiers, which can be largely distinguished by the relative distributions as discussed in the literature (see e.g., Tang 1989). This paper focuses on the discussion of the anaphoric reflexives.

[2] The simplex reflexive **ziji** may also be used with other functions. For instance, it may occur to mean "1st person singular pronoun". See Battistella and Xu (1990) for discussion and references of other occurences of **ziji**. As mentioned earlier, this paper will restrict its attention to occurrences of **ziji** as a bound anaphor.

[3] Cole and Sung 1991 claim that in sentences like (5), the indirect object **Wangwu**, may also be a potential antecedent of the reflexive **ta-ziji** even though the subject is preferred to the object. However, I do not share this judgement, and none of the native Chinese speakers that I have talked to have obtained the object antecedent in sentences like (5) in normal circumstance. As discussed in the literature (e.g., Sells 1987), logophoric and contextual factors may play an important role in the determination of possible antecedents for reflexives. If one takes the viewpoint of the individual in object position, an object antecedent maybe possible for some speakers. But it should be clear that this is logophoric binding rather than a syntactic one. Thus, following the judgement generally adopted in the literature (see e.g., Tang 1989, Huang and Tang 1991), I assume that both simplex and complex reflexives in Chinese are subject oriented.

[4] In Chinese, as in English, a logophoric verb may allow the antecedent of a reflexive to be in a position other than a subject or controlling object position. The following is an example:

(i) Ziji de shibai shi Zhangsan shifen shangxin.
self DE failure make Zhangsan very sad
'The failure of himself made Zhangsan very sad.'

In this paper, I will not discuss logophoric binding.

[5] In Xue (1990), reflexives are analyzed in terms of the following FCRs and FSD without invoking metarules.

(a) FCR 1: ¬[SUBJ: NP[pn$_\alpha$] & RE: NP[pn$_\beta$]] ($\alpha \neq \beta$)
(b) FCR 2: [SUBJ & RE] ⊃ [RE: NP[pn]]
(c) FCR 3: [+V] ⊃ [SUBJ]
(d) FSD 1: ¬[RE: NP[pn]]

This analysis entails free instantiation of the foot feature RE and thus requires a relativized formulation of the FFP (see Hukari 1989). As pointed out to me by Tom Hukari (personal communication), if FCR 1 above is correct, the grammar becomes overly restrictive due to the interaction of FCR 1 and the relativized FFP.

[6] This is a simplified version of the reflexivization metarule, since reflexive pronouns may associate with various types of predicative categories including VP, predicate AP, possessed NP, and certain cases of predicate PP. This can be accomplished by assuming that the application of the metarule is restricted to PRED(icative) categories, which contain SUBJ specifications in virture of the FCR: [+V or [+PRED]] ⊃ [SUBJ]. See Hukari (1989) for discussion.

[7] As Cole and Sung note, technically a simplex reflexive **ziji** may either be specified with person and number features in the lexicon or be assigned person and number features in some way by the subject of the predicate containing the reflexive. There does not seem be empirical differences favoring one approach over the other.

[8] The left-branching node of the lowest local tree in (14) is here tentatively assumed as NP[[+DE]; RE: NP[α]]. Due to the printing difficulty, I omit [+DE] in the tree.

[9] One way to accomplish the animate condition is to assume that the lexical entry for **ziji** carries the feature [+ANIMATE] in the lexicon. Thus, the application of the reflexivization metarule will not generate a well-formed sentence if the subject is [-ANIMATE].

[10] Chinese even allows reflexives to be nominative.

[11] Haung and Tang note that since both long-distance binding and binding by a subcommanding NP each represents a marked case, long-distance binding by a subcommander would be doubly marked and thus not allowed.

[12] The metarule and a FCR (particularly that for complex reflexives) seem to be somewhat overlapping, since both of them state that a RE specification cannot percolate beyond the predicative category containing the reflexive. But they become overlapping only when the binding domain involves monoclausal structures.

[13] See Kang (1988) for an GPSG analysis of LD reflexives in Japanese, Korean and Icelandic.

[14] I am indebted to Tom Hukari (personal communication) for this point.

[15] Also see Bach and Partee 1980 for discussion arguing for a semantic approach to binding.

[16] See Huang and Tang (1991), and Sung and Cole (1991) for discussion and examples of LD binding of **ziji** across relative clauses and adjunct adverbial clauses. LD reflexives extending into relative clauses and adverbial clauses are also found in other languages such as Icelandic (see e.g., Maling 1984, Sells 1987).

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A negative particle ANI in Korean*

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1. Introduction

According to Song (1988), there are many aspects described inadequately in Korean grammar, but few descriptions are as inconsistent and inelegant as those of negation. I shall introduce the controversy over negation in the literature, and try to capture a characteristic of negation in Korean by using the notion of metarule in generalized phrase structure grammar. (Gazdar *et al.*, 1985)

2. Negative types

There are two negative-sentence types in Korean. The types are called short and long forms of negation. Moreover, there are two negative particles, *ani* and *mos*. The contrast between the two negative types shows up in the use of action verbs, but does not show up in the use of description verbs, because the negative particle *mos* only appears as a long form when it is used with description verbs. Furthermore, the particle *mos* contains the meaning of "possibility," like the English auxiliary verb *can*. Interestingly, Song notes that there is some consensus among Korean linguists that one of the negative particles is regarded as an adverb. In this paper, sentences with *ani* will be reviewed briefly.

In Martin and Lee (1969:45), negation is introduced as in the following:

> To put a verb into the short negative form, you place before it one of two negative words an and mōs. But a DESCRIPTIVE verb (translated 'is...') can not take the short negative with mōs in this way; instead you must use the long form that is optional for the other verbs...

When the negative particle is *ani*, monosyllabic verbs can be negated directly, although most description verbs form the long form mentioned above. Verbs of existence and the copula present their own particular patterns according to Song (*idem*). Contrary to the general principle above, the frequency of direct negation among action verbs in monosyllable also prompts the regular negative formation of description verbs in monosyllabe to be the short form. It seems that the negation of propositive and imperative sentences involves questions of a different nature while employing a negative particle. Consequently, the description of negation in Korean has been even more confusing due to lack of a systematic account for irregularities in constructing negative sentences. Let us first observe the negative sentences with *ani*.

2.1. Type I: ANI (short form)

The negative particle *ani* directly precedes a verb.

acc:	accusative
comp:	complementizer
dcl:	declarative
ind:	indicative
nom:	nominative
top:	topic marker

(1) a. Pi-ka o-n-ta
Rain-nom come-ind-dcl
"It is raining."

b. Pi-ka ani o-n-ta
Rain-nom NEG come-ind-dcl
"It is not raining."

(2) a. Yengswu-ka ka-ss-ta
Y. -nom go-past-dcl
"Youngsoo went."

b. Yengswu-ka ani ka-ss-ta.
Y. -NOM not go-past-dcl
"Youngsoo did not go."

2.2. Type II: 'Verb stem + ci' ANI (long form)

(3) a.(=1a) Pi-ka o-n-ta.

b. Pi-ka o-ci(-lul) ani ha-n-ta
Rain-NOM come-comp(-acc) NEG do-ind-dcl
"It is not raining."

(4) a.(=2a) Yengswu-ka ka-ss-ta.

b. Yengswu-ka ka-ci(-lul) ani hay-ss-ta
Y. -nom go-comp(-acc) NEG do-past-dcl
"Youngsoo did not go."

While many native Korean grammarians regard the b-sentences in (1) and (3), and those in (2) and (4), as synonymous, Song does not treat them as the surface forms of the same underlying representation. Rather, he shows us that the type II negation has the occurrence of the elements *ci*, *ha*, and optional *lul* which need adequate explanation.

Despite the disagreement on many points in the grammatical descriptions, Song (*idem*) found it interesting that *-ci* is generally accepted as an adverbial ending added to verb stems. I also learned *-ci* as an adverbial ending in my secondary schooling. Song, however, does not agree with the generally accepted assumption, and notes that Fred Lukoff calls it a gerund. Furthermore, Samuel Martin treats it rather as a 'suspective' morpheme in negative constructions. Song adopts Lukoff's (1982: 177) treatment, since *-ki* is another generally accepted nominalizer which also functions as a complementizer. In short, he treats *-ci* as a derived form of *-ki* when it is used in the negative environment like (V.... NEG + ha). It is also noted that the complementizer *-ki* and the controversial *-ci* are in complementary distribution.

3. Discussion

In most languages we add a negative particle or other appropriate device to negate an affirmative sentence in order to get a corresponding negative form. The cleavage between the two arguments

of synonymy and non-synonymy above can be well illustrated when the verb is transitive as in the following:

(5) John-un manwula-lul twutulki-n-ta
J.-top wife-acc beat-ind-dcl
'John beats his wife.'

(6) a. John-un manwula-lul ani twutulki-n-ta
NEG
'John does not beat his wife.' (Song's gloss)
'Now John does not beat his wife.' (my intuition)

b. John-un manwula-lul twutulki-ci-lul ani ha-n-ta
J.-top wife-acc beat-comp NEG do
'It is not the case that John beats his wife.' (Song's gloss)
'It is not the case that John ever beats his wife.' (my intuition)

Song regards sentences in (6) as non-synonymous, while other native linguists like Lee (1970) treat them as synonymous.[1] Moreover, Song uses double negation to support his non-synonymy hypothesis.

Here, the negative particle *ani* in Korean can be inserted by the notion of metarule in Gazdar *et al.* (1985). The relevant I(mmediate)D(ominance) rule for negation is applied at the lexical level of verbal phrase. VP becomes a head and a phrasal category:

(7) VP $\longrightarrow$ H, XP

(8) Metarule (Negative)

$$\begin{array}{lcl} \text{VP} & \longrightarrow & W \\ & \Downarrow & \\ \text{VP[+NEG]} & \longrightarrow & W, \{\text{[SC:ani]}\} \end{array}$$

Metarules map from lexical ID rules to lexical ID rules (Gazdar *et al.*: 59). In detail, if we have a rule VP dominating some other categories (W), we can derive another ID rule VP[+NEG] dominating the same multiset variable plus a lexical category ANI. Without mentioning the semantic issue here, the negative sentences in (6) are well described by the new ID rule sanctioned by the metarule (8). Since Korean is one of the left branching languages, the relevant linear precedence rules will be as in (9):

(9) $\sim$[subcat] $\prec$ [subcat]
[ani] $\prec$ V

What ID rules (7) and (8) yield covers every possible negative sentence[2] including (6). That is because the negative sentences are treated uniformly by placing the negative particle before the verb in matrix clause. Clearly, then, Song's position on non-synonymy is captured by the expressive power of metarule and the relevant linear precedence rules. If we follow the synonymy position of Lee's, then we should add some specific device to the ID rules which provides the grammar with an auxiliary verb *-ha* (English *do*).

(10) VP[AUX] $\longrightarrow$ H, VP(*-ci*) (ha)

The linear precedence rule will be as follows: *ani* follows the main verb, but precedes the auxiliary *ha*. Therefore, we need another linear precedence rule stating that the main verb precedes the negative particle which is followed by the auxiliary *ha*.

(11) $V^2 \prec \{[\text{ANI}]\} \prec V\ [+\text{AUX}]$

In any event, we need another ID rule to introduce the auxiliary to the grammar, although the ending *-ci* can be treated as a morphophonemic process in Korean.

4. Concluding remarks

Despite controversy, in terms of the number of ID-rules and specific LP-rules in generalized phrase structure grammar, the non-synonymy explication using *ani* needs fewer rules than the argumentation in synonymy. Although it is too early to judge which one is legitimate for the generalization of Korean negative constructions, it becomes clear that the synonymy and non-synonymy approaches mentioned in the previous sections have captured the charateristics of negative sentences with the particle *ani*. Finally, it is hoped that further research on imperatives along the line of non-synonymy will enhance our understanding of Korean negatives.

NOTES

* "A Note on Negation" by Song was originally from *Linguistics* 76 (1971): 59-76, Mouton de Gruyter. Yale Romanization is adopted in Korean examples.

1. Oh (1971) explores negation based on the generative semantics model.

2. Double negative sentences should be covered by this metarule.

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'FIR' DIGITAL FILTER MODELLING OF LINGUISTIC PHARYNGEALS TRANSMISSION: SHORT-TIME AMPLITUDE IN LOW-FREQUENCY RAPID SPECTRUM CHANGE

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1. INTRODUCTION*

This paper is a report on research into the preliminary design and application of FIR (finite impulse response) filters using CSL © (Dickson and Clayards 1990). These are used to quantize the sound pressure level (SPL) amplitude power component of linguistic resonant pharyngeal consonants / R /, in root-initial CV environments, Fig. 1, / R aymt/ 'angry'. The data are from the phonological inventory of Spokane, Interior Salish, recorded by Carlson (1992, 1969). Voiced pharyngeal resonants are limited in their distribution cross-linguistically (Maddieson 1984). Spokane was selected due to the morphophonemic occurrence of pharyngeals in that language, and because within Spokane there is a measureable phonetic, surface difference between early and recent data collected on root-initial pharyngeal segments, Figs. 1 and 2. In both samples there is ambiguity between the pharyngeal resonant, laryngealized (creaky) voice, and the glottal stop, / G /. In earlier recordings the pharyngeal is clearly the primary segment, and laryngealization is negligible. This differs in recent data: the glottal stop is the primary segment, often accompanied by creaky voice, and with no pharyngeal resonant. At issue then is the integrity of the pharyngeal, its status as a segment and its acoustic characteristics whereby it may be identified as a pharyngeal.

The objective in this paper is primarily descriptive: to provide acoustic specifications of the pharyngeal resonants. This is obtained in noting the amplitude response to filters applied to the pharyngeal segment, wherein the low-frequency spectrum is included in the filter, and transients are captured within this range. Second, in observing the acoustic behaviour of the filtered segments, a relationship is analysed between the fundamental, the lower harmonics, and the first formant. This in turn contributes to the definition of the pharyngeal resonant. Further, its contrastiveness with phonetic glottal onsets is hypothesized on a comparative basis. Lastly, the acoustic specifications of the pharyngeal resonant are drawn, interpretively, stating their function informally in terms of their transmission. This interpretation is tentative; but I believe it is well-founded, in the analysis of pharyngeals within a framework of sound transmission.

In the research here, digital filters are used to develop a reliable psychoacoustic model comparable to linguistic distinctive features specific to pharyngeals in root-initial syllable onset position. While this requires an evaluation of psychoacoustic scales presently in use, the evaluation of such is outside the immediate scope of this paper. For present purposes the accepted measurement unit pertaining to amplitude dynamics is the 'Bark', a frequency-based scalar unit from which the 'Bark Scale' is derived. The scale's unit, the Bark, has an acoustic equivalent: 1 Bark = 100Hz. The frequency range of concern in this research is from 200Hz to 950Hz, to include the fundamental frequency, i.e. [voice], and the first and second formants which in addition to LPC frequency spectrum (formant structure) features, can be interpreted in terms of articulatory features.

* The letter R is used to denote the pharyngeal resonant; G denotes the glottal stop.

In applying filters to digitized language segments, the amplitude response of the Fig. 1 onset consonant only is modelled, with FIR transfer functions corresponding to specific SPL acoustic responses: glottal excitation (forced response) specific to phonation (voicing), Fig. 3, which is separate from the pharyngeal transmission (natural response), specific to articulation, Fig. 4. These responses are assumed generally to be present as input, at the microphone.

The FIR transfer function (impulse response) system design has the following properties: pharyngeal transmission interpreted as odd amplitude/even phase, differentiated from glottal source characteristics: even amplitude/odd phase. This motivates the application of a specific digital structure referred to as a DTLTI: discrete time, linear time-invariant system. Its important design characteristic in modelling pharyngeal transmission is that the amplitude is odd (nonlinear) and the phase is even (linear). This design specification is a departure from the literature on psychoacoustic and digital signal processing of speech.

The objective of the FIR design as applied to speech transmission, pharyngeals in particular, is to derive linguistic structure, along general lines, such that transmission functions analysed in the signal correspond to segmentation in the auditory system and to active articulatory mechanisms in speech production. In the case of pharyngeals one general issue is the separation of the system from the source: here, a transmission function for decoupling vocal cavity resonances from vibrations of the vocal cords (Fant 1970, 1980; Fant and Pauli 1974). The basic design problem is the filter order: the determinants of the SPL amplitude constant derived from an impulse which, integral to the pharyngeal transfer function, will satisfy a linguistic system's transmission requirements taken from psychoacoustic literature as a necessary condition in the auditory analysis of pharyngeal resonants. As acoustic transients, resonants exhibit an increased and rapid spectrum change of amplitude in the low-mid frequency region, Fig. 4. Also, decreasing energy in the glottal excitation contrasts acoustically with the increasing energy exhibited in the transient, (Stevens and Keyser 1989; Stevens and Perkell 1977), (Figures not included).

2. FILTERS

Neither the (temporal) rapidity of the spectral change nor the bandwidth are modelled, since the problem is the nonlinearity of SPL amplitude and not frequency characteristics. Instead, the real-time dimension and the bandwidth are derived as constants, which are linear generally. An FIR filter structure is implemented to obtain the linear phase and thus a constant phase shift, thereby allowing the amplitude response to be modelled. In an FIR filter the impulse response $h(n)$ is therefore limited to a finite number of points in real-time (Stanley, Dougherty and Dougherty 1984; including following equations). The impulse response is expressed as

$$h(n) = \begin{cases} \alpha_n, & \text{for } 0 \leq n \leq k; \\ 0, & \text{elsewhere.} \end{cases} \tag{1}$$

or

$$h(n) = \sum_{i=0}^{k} \alpha_i \delta(n-i). \tag{2}$$

The transfer function for (1) or (2) is expressed as

$$H(z) = \sum_{m=0}^{k} \alpha_i m_{m-z} = \alpha_0 + \alpha_1 z^{-1} + \cdots + \alpha_k z^{-k}, \tag{3}$$

where k = the number of terms, and function order. The difference equation for (3) relating the output to the input is

$$y(n) = \sum_{i=0}^{k} \alpha_i x(n-i) = \sum_{i=0}^{k} h(i)x(n-i). \tag{4}$$

This describes a nonrecursive realization for the FIR transfer function.

One significant advantage of the FIR filter function is its capability in obtaining linear phase (i.e., constant time delay), derived via expanding the amplitude response in a sine series. The transfer function also is expanded in sine terms; the amplitude response can then assume negative values. This method is possible because at low frequencies the amplitude response is asymptotic to w^k, with k odd (Stanley, et. al. ibid: 223; Lagerstrom 1988). This is a systemic transmission property.

The FIR filter amplitude response approximating that of an ideal differentiator is

$$A(f) = w, \tag{5}$$

$$\beta(f) = \pi/2 - MTw = \pi/2 - 2\pi MTf. \tag{6}$$

where w = radian frequency (π/s); $A(f)$ = amplitude response; and $\beta(f)$ = phase response, in radians: the phase associated with the noncausal function combined with the additional phase due to the added delay (Stanley, et. al. ibid: 218–226). This method differs from stating the filter function in cosine terms, the amplitude response of which has a constant amplitude slope, and thus is predictable for any odd phase passband. Segments bearing this type of acoustic feature, and without phonatory input, are non-contrastive linguistically, and are attributed to vowel colouring, or, secondary features. The segments are contrastive in some languages only if phonatory features are added (Esling, et. al. 1991; Laver 1988).

Acoustic analysis using cosine terms thus does not capture the transient's amplitude change. Also, whereas the phase shift in cosine terms is ideal, the sine-type expansion allows for a real linear phase: its phase shift is constant and at 90°; also as per (6) it is given in radians, etc., and has all its poles at the origin, and therefore is stable.

The FIR filter order determines the transfer function as a real function of frequency, thus proferring stability on the linear phase characteristics. In a DTLTI system the FIR amplitude response, $A(f)$, is related as a transfer function not only to the phase response, $\beta(f)$, also to the impulse response. The latter, approximating a real function of frequency (i.e., critical band), should satisfy the joint requirement for transmission: linear phase and constant time delay. The

impulse response is multiplied in a Hamming window function, with a 12th order bandpass filter. A low-high cutoff is used, where 1 = 5000Hz, the Nyquist frequency. The filters are applied to the surface phonetic form: the onset consonant segment, [R]. In one filter the bandpass cutoff is .04–.19 (200–950Hz: 7.5 Bark), (Fig. 5); in a second filter (Fig. 6) the cutoff is .10–.19 (650–950Hz: 3 Bark). Thus in the first filter both the fundamental and the bandwidth approximating the second formant are included; in the latter filter only the second formant bandwith is included. The research question then is, how narrow must the main lobe of the window be so as to satisfy sharp tuning, active cochlear mechanics in the auditory system, whereby short-time amplitude in low-frequency spectrum change is detected and identified? (cf., Pickles 1991, for discussions on sharp tuning).

3. RESULTS and SUMMARY

Both filters when applied to the entire input waveform of the pharyngeal consonant onset segment, including the phonetic glottal onset, as in Fig. 1 result in a null amplitude response and formant/resonance response to the frequency range, Figs. 7 and 8, respectively. Also, the pitch characteristics are the same for both filters, i.e., pitch is the same with and without the fundamental. Their pitch patterns differ, however, from the pre-filtered pitch characteristics in Fig's. 3 and 4, the phonetic glottal onset and the pharyngeal resonant, respectively, in which pitch patterns were identical. Additionally, the subjective perceptual sound of the segment in each instance of filtering is a woody pulse — flatly-tuned and lacking perceptual resonance. In sum, without the fundamental the filtered output of the pharyngeal segment as a whole, including the phonetic glottal onset, is similar acoustically and perceptually to a glottal stop, [G] in which there is minimal laryngeal activity, ideally none — i.e., [-voice], and a constricted glottis [+cg], Fig. 2.

Fig's. 9 and 10 illustrate a similar filter-response, but with each filter applied to the phonetic glottal onset as segmented in Fig. 3. In both applications, with and without the fundamental frequency, there is an insignificant, if any, amplitude response. Fig. 9, illustrating the fundamental included in the filter, shows energy (in D Window), though this is low and a constant function of the entire frequency range, 200–950Hz. The energy response is not necessarily a response to the fundamental; in Fig. 9 to the fundamental's presence, in fig. 10 to its absence. The nil response is conceivably dependent on the presence of the first formant in the low frequency region, i.e., 300-650Hz. In contrast in Fig. 10 the bandpass without the fundamental and the first formant, there is no energy response nor is there an amplitude response. This then suggests that energy in the phonetic glottal onset is related to the presence of both the fundamental and the first formant. Similarly, the nil FFT/SPL amplitude response varies relative to the presence/absence of the fundamental and the first formant.

In comparison, Fig's. 11 and 12 illustrate the response to both filters to the onset and transient pharyngeal component of the segment analysed from Fig. 4. In both applications there is an amplitude response. Though this is comparatively lower when the fundamental and first formant are not included, Fig. 12, there is an amplitude response in both applications. Further, the damping configuration is similar to the overall shape of the pre-filtered pharyngeal, Fig. 4. Lastly, in comparison with the low and constant energy in the phonetic glottal onset filter including the fundamental and first formant, Fig. 7, the pharyngeal's energy function is low but increasing and stepped. However, similar to Fig. 8, the filter not including the fundamental and first formant, has no energy response.

In sum then, the energy response to filters on the phonetic glottal onset and the transient pharyngeal is dependent hypothetically on the fundamental and the first formant. The dependency

of the glottal onset's SPL amplitude response on either the fundamental or the formant structure is indeterminate, as is its dependency on the presence or absence of the fundamental alone.

Comparatively, pharyngeal resonants do show an SPL amplitude response, when filtered with and without the fundamental and the first formant. While this does not provide full support for mutual and hierarchical dependency relations, the acoustic observations do narrow the relationship to articulatory terms equivalent to those involved in the function of a relation between the fundamental, first formant, and SPL amplitude response. This suggests an invariant relationship between the transient pharyngeal resonant, the first formant and the lower harmonics. This, according to the filters' design, is an impulse response in the amplitude domain. In contrast, glottal stops do not have an impulse response; no SPL amplitude response is indicated.

Notably, Fig's 7 and 8, similar to 9 and 10, differ from Fig's 11 and 12: in the former the presence of a phonetic glottal onset does not have amplitude response and formant resonance response. This holds in Fig's 7 and 8, though the transient pharyngeal resonant is present. In comparison, in Fig's 11 and 12, where there is no phonetic glottal present, there is an amplitude response, with and without the fundamental being present. (The filters' resonance response, FFT, was not measured here). This in-part suggests SPL amplitude blocking by the glottal: there is no natural or impulse response, acoustically. Further, the nil SPL spectrum of the filtered phonetic glottal onset, Fig's. 9 and 10, precludes mapping to complex auditory responses found to occur, particularly, in the dorsal cochlear nucleus (DCN) responses to linear phase signals in which the amplitude is odd (nonlinear). For example, in damping (Fig. 4, 650–950Hz: 3 Bark); and in sharp tuning resolution found in transient patterns involving significant SPL peaks and troughs. Moreover, the FIR filtered glottal segment's amplitude response prevents lateral inhibition.

Summarily, in contrast to the phonetic glottal onset the transient pharyngeal resonant has a unique acoustic property: relative to the frequency spectrum, the SPL amplitude response is greater in the presence of the fundamental, the lower harmonics, and the first formant - i.e., to damping in the 200-650Hz range. This can be interpreted as a transmission property, retained in the digital filtering processing. By hypothesis this property is significant in mapping to complex auditory responses, for example, sharp tuning in higher order auditory-neural functions.

Nonetheless, the findings here do not rule out the theory that sharp tuning is due to lateral inhibition (Pickles, ibid.). Also, there is no substantiation to the claim that the missing fundamental (approx. 200 Hz) alone contributes to the lack of amplitude response. As illustrated in Fig's. 7 and 9, for example, though the fundamental is present; there is no amplitude response. In contrast, Fig. 12, there is no fundamental; there is an amplitude response.

The observations rule out claims that formant resonance is filtered independently of the fundamental and lower harmonics — i.e., that in both filters high frequency energy is filtered, and thus the damping function in the 200–950Hz range, if missing, is is inconsequential as an actual resonance factor. Here, its function is invariant, albeit in binary terms, as shown by the technical filtering.

As demonstrated, when the spectrum is bandpass filtered to allow energy but no phonation or formant resonance in the low-frequency range there is nothing to which the SPL amplitude may respond or on which it may be modulated. Thus damping is prevented from occurring. This being the case is inconsequential for glottal stops; whereas resonance conditions which, present in pharyngeals, are necessary acoustically for damping. If these are absent due to filtering, digital or peripheral, one might ask how these are present - i.e., in Fig's 11 and 12 what is the amplitude

response a function of.

The hypothesis here is that the amplitude response is a function of a relation between the fundamental, the lower two harmonics and the first formant. These form a resonance condition, i.e., resonance in the 200–950Hz range. The resonance condition therefore is considered here as a potential, determined by the natural impulse response, not the phonatory forced response.

4. CONCLUSION

In the preliminary design and application of the filters to the Spokane data indications in the filter responses are that the auditory system uses SPL amplitude changes of less than 3 Bark, the critical distance across formant bandwidths. While this conclusion appears profound and may be controversial, the findings are preliminary and depend on the methodological design of a systemic relationship, rather than a logical separation of transient pharyngeal transmission frequency bands from excitation period frequency bands. Using a bandpass Hamming filter it is possible to maintain this, while also obtaining the separation, resulting in a characteristic glottalic segment.

The observations here do not correspond directly to the phonemic and dependency representation of the transient pharyngeal resonant. As outlined, by tentative hypothesis the phonetic glottalic onset inhibits the transient pharyngeal - i.e., there is an acoustic-linguistic feature retained by which the two are associated, but contrastive. Further, since this relation appears ambiguous in present-day Spokane, research which might contribute to linguistic and clarification is psychoacoustic: the application of the filtered segments to obtain native speakers' judgements (p.c., B.C.Dickson). If for the native speaker the filtered segment in fact retains its contrastiveness with pharyngeals, then by hypothesis the apparent pharyngeal resonants/glottal stops alternation is phonetic, only. This could be supplemented with linguistic research into the morphology and prosodics of Spokane, with testing independent of the acoustics.

In regard to the acoustics of root-initial pharyngeal resonants in CV environments, while the amplitude generated alone by the fundamental is used in phonatory production, alone, this neither accounts for nor preserves the apparent transient damping in the low-frequency first formant region of the spectrum. Whereas FIR filter designs based on source-filter theory require a transfer function that will satisfy formant transitions expanded in terms of bandwidths and the fundamental, the same derivational basis is not present from input (microphonic) data. Expansions in the same terms therefore are not possible, in a DTLTI transmission system specific to pharyngeal resonants. At the microphonic input level the transfer function is a higher order, a form of transmission, which as a filter can be considered distinct from but not independent of the excitation (source). It should in this way be differenced, formally, and as such be expanded functionally, as an operation on damping - this in attempts to identify any correspond it has to segmentation in the auditory system. FIR filtering, with constant phase shifts, allows for this as an operation.

Further acoustic research is required to address one of the FIR's conventional disadvantages: stability of the higher-order filter number and its concomittant increasing time delays in accounting for the observed amplitude response. This could be examined, perhaps by differencing filtering and damping in the transmission transfer functions corresponding to delays in the dorsal cochlear nucleus' complex signal processing.

NOTES

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Fig. 1

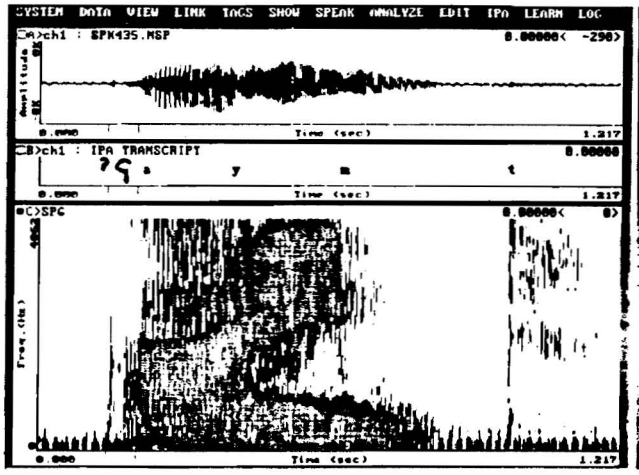


Fig. 2

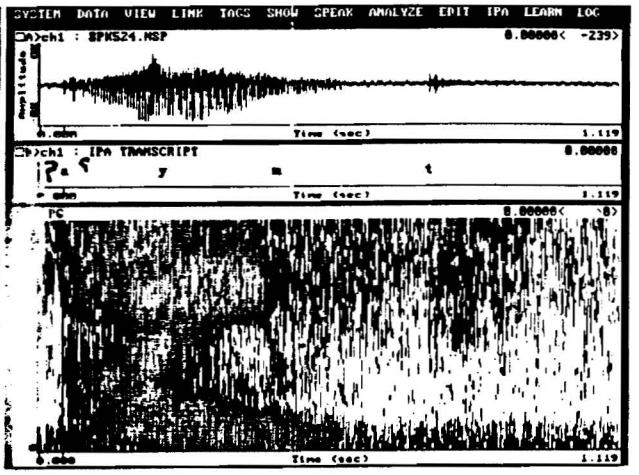


Fig. 3

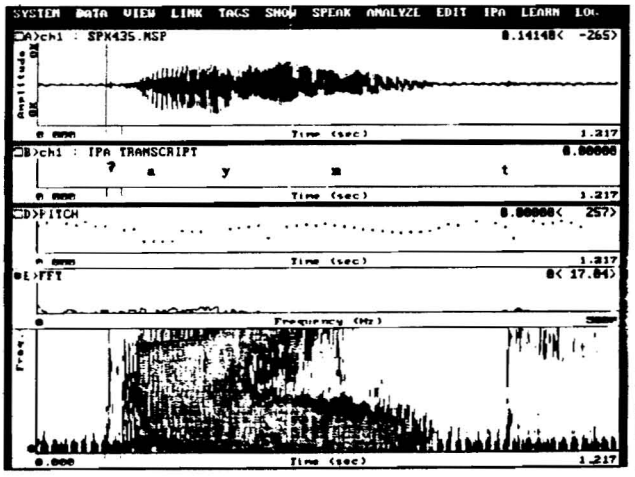


Fig. 4

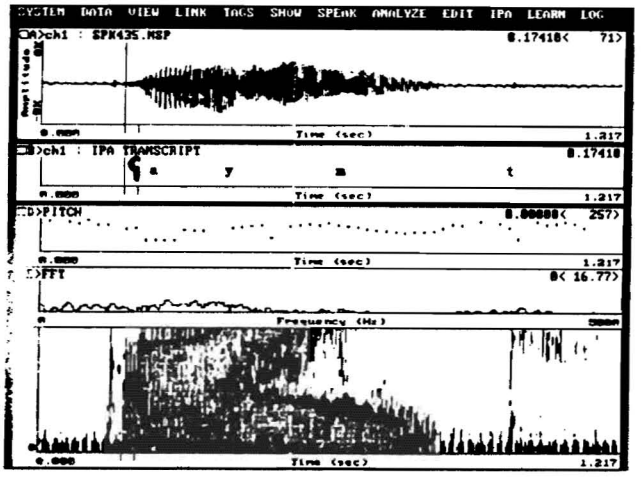


Fig. 5

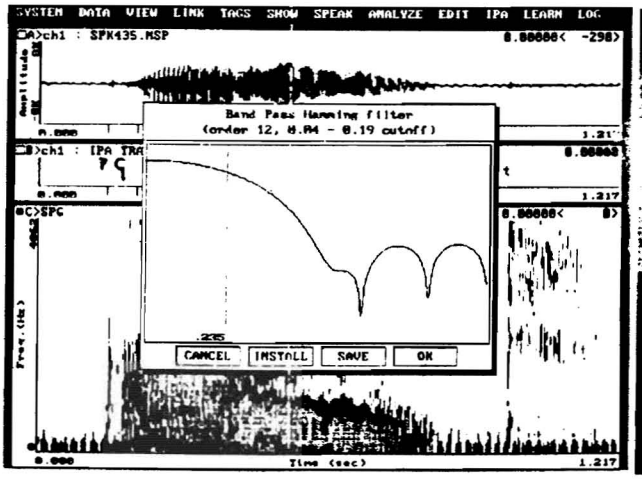


Fig. 6

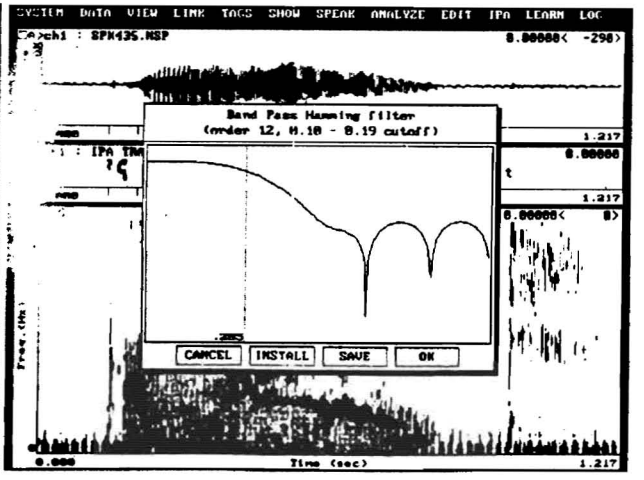


Fig. 7

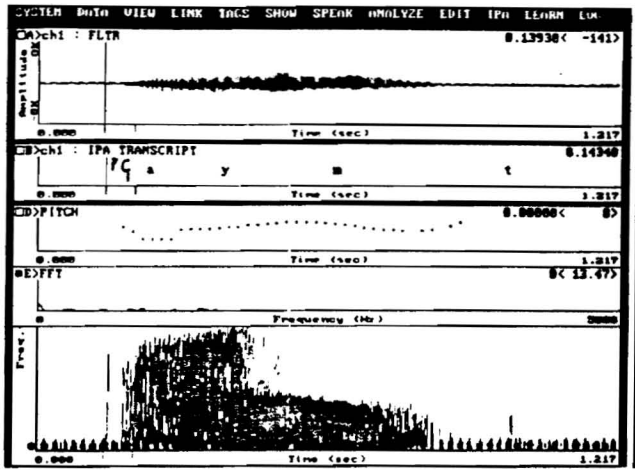


Fig. 8

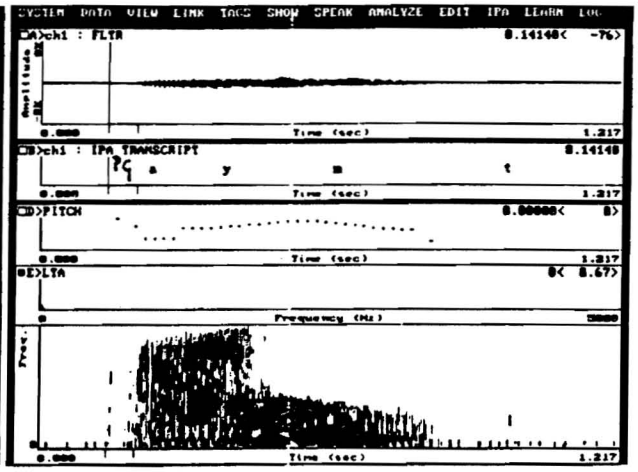


Fig. 9

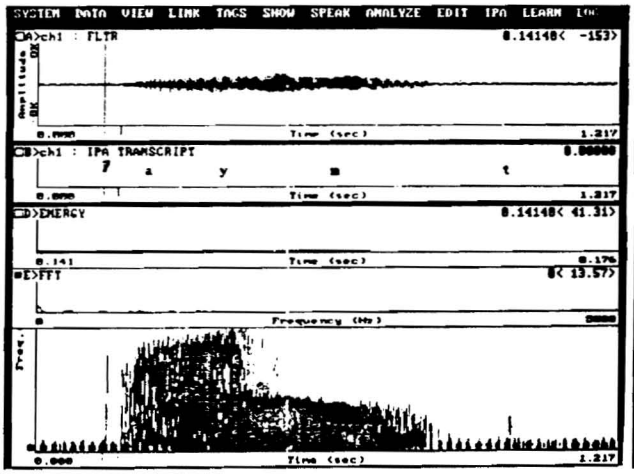


Fig. 10

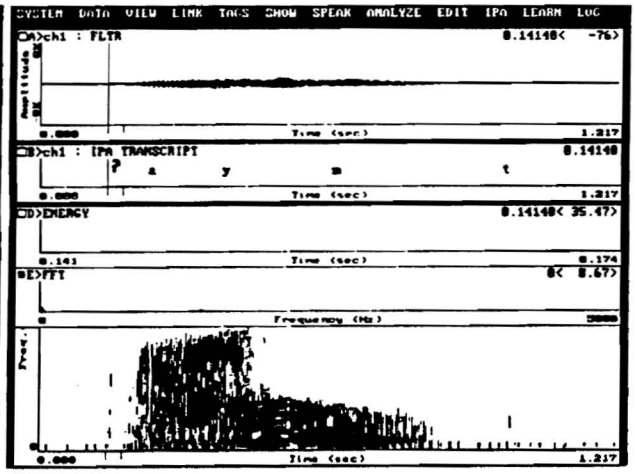


Fig. 11

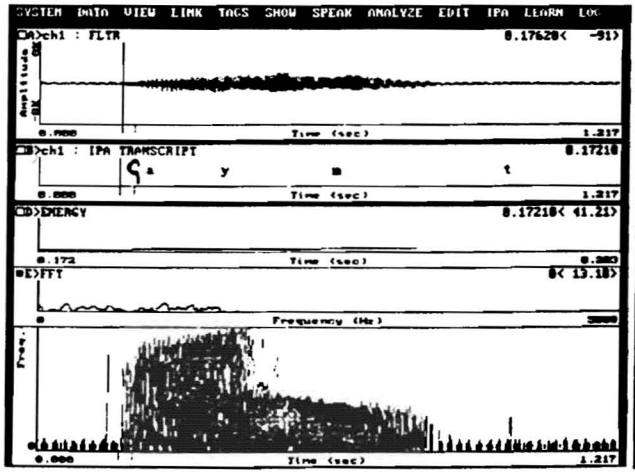
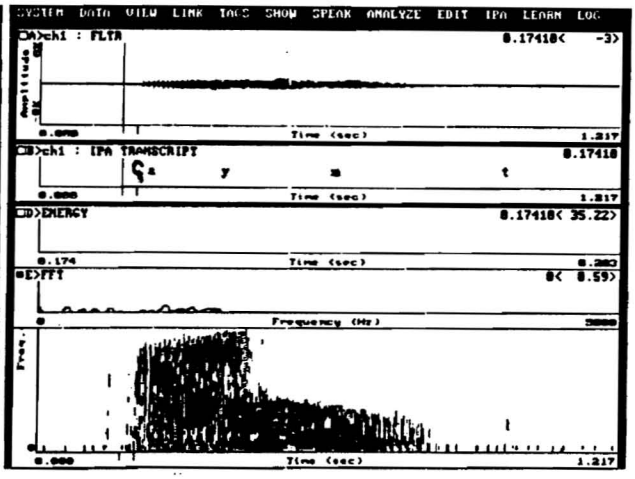


Fig. 12



SOME ASPECTS OF AUSTRALIAN COMPARATIVE LINGUISTICS

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I. INTRODUCTION

In this work, some major comparative work done on Australian languages will be reviewed. The central issue is whether O'Grady et al.'s (O'Grady, Voegelin and Voegelin 1966) genetic classification, representing the work of Hale, O'Grady and Wurm, should be followed (however, note that the first person to propose a Pama-Nyungan hypothesis was Hale (O'Grady 1990a:xiii)), or Dixon's analysis (1980) in which Australian languages constitute one single language family. The latter scholar considers the placing of the Pama-Nyungan family and the other twenty six families under the proto-Australian node to be incorrect. The other major issue is linguistic diffusion, which is prevalent in Australia and creates problems for the comparison of Australian languages. These topics will be the focus of the discussion that follows.

II. THE CLASSIFICATION OF AUSTRALIAN LANGUAGES

The two most well-known classifications of Australian languages are a typological classification done by Capell (1956) and a genetic classification by Hale, O'Grady and Wurm (O'Grady, Voegelin and Voegelin 1966). In Capell's typological classification, he has distinguished suffixing and prefixing languages, where the former group uses suffixes exclusively and the latter has prefixes as well as suffixes. The prefixing languages form a geographical bloc which is the area north of a line running from Dampier Land in Western Australia to the western coast of the Gulf of Carpentaria. The suffixing languages cover the remaining four-fifths of the continent, including the northeast corner of Arnhem Land (Blake 1990:435-436). In Hale, O'Grady and Wurm's genetic classification, a large subgrouping, the Pama-Nyungan language family, is recognized. Other languages outside this family are seen as forming another 26 phylic families (in Wurm's 1972 revision).

Interestingly enough, Capell's suffixing languages are essentially the Pama-Nyungan languages in Hale, O'Grady and Wurm's classification; the prefixing languages are languages which constitute the other 26 families.

A strong objection to Hale, O'Grady and Wurm's genetic classification comes from Dixon (1980:226) who considers the Pama-Nyungan and non-Pama-Nyungan classification to be typolog-

ical (or areal), like Capell's. His argument is that the subgrouping is not based on shared innovations and subsequent divergence and that only vocabulary comparisons are considered. However, works done on Australian comparative linguistics after this preliminary classification does support the hypothesis of a Pama-Nyungan subgrouping. Since then, O'Grady has reconstructed many more proto-forms for the Pama-Nyungan group. Alpher (1990) provides reconstruction of Pama-Nyungan verbal morphology. The work of Blake (1977, 1988, 1990) in reconstructing case systems and pronouns of Pama-Nyungan and non-Pama-Nyungan languages provides very strong supporting evidence. Even Dixon himself has provided evidence. He has reconstructed some grammatical features that he claims to be proto-Australian, but most of them are reflected only among the Pama-Nyungan languages. More detailed discussions of these works appear in the next section.

II.1. Comparative Work Supporting a Pama-Nyungan Subgrouping

The debate rests on whether there should be a subgrouping of Pama-Nyungan family. I will start my arguments for this classification with a consideration of Dixon's distinction between a typological and a genetic classification. To Dixon, a genetic classification must involve "the uncovering of systematic phonological and morphological correspondences, putting forward a hypothesis concerning structural features of the proto-language, and showing the regular ways in which each modern language has developed from the proto-system (1980:251)". The uncovering of systematic phonological correspondences has been achieved in O'Grady's work over the years which has led to the reconstruction of many proto-Pama-Nyungan roots. In fact, there is a phonological conservatism in the descent of many modern Pama-Nyungan languages which makes phonological correspondences among these languages straightforward (O'Grady 1990e:455). Systematic morphological correspondences are provided by Blake (1977) in the reconstruction of Pama-Nyungan case systems. Hale's (1964) reconstruction of the initial dropping languages from Cape York peninsula provides another systematic change that has taken place. At the same time, these supposed "unAustralian" languages are identified as not only Australian but also Pama-Nyungan. Dixon (1980:193) praises Hale's work on these initial dropping languages as "one of the most spectacular achievements of Australian historical linguistics". Alpher's (1990) comparison of inflected verb forms gives insights into Pama-Nyungan morphological reconstruction as well. On the other hand, Dixon's own reconstruction of supposed proto-Australian verbal conjugations, is assigned to "an origin (proto-Australian) much earlier than the evidence warrants" (Evans 1988:94). His reconstruction of proto-Australian nominal case markers and pronouns suffers from the same problem, that is, only the non-prefixing languages i.e., Pama-Nyungan languages, were consulted. However, these reconstructions of Dixon's are an important contribution to Australian comparative linguistics.

O'Grady (1990d:209) describes the search for proto-Pama-Nyungan roots so far as revealing only "the tip of the lexical iceberg". His estimate is that the roster of proto-Pama-Nyungan and sub-proto-Pama-Nyungan (meaning reconstructions at the levels below proto-Pama-Nyungan) reconstructions will run to a four-digit figure, probably over two thousand. This figure would make

Pama-Nyungan comparable to families such as Austronesian, Indo-European, and Algonkian in so far as "the breadth and depth of coverage of the ancestral lexicon" are concerned.

Drawing from varying numbers of languages within Pama-Nyungan, from as few as two to as many as thirty, O'Grady (1990c, d) provides reconstructions of forms with initial ***m, *j, *k**, and ***pa** in Pama-Nyungan. He has also been systematically doing further lexical comparison among Pama-Nyungan languages. Many cognate sets compiled from languages that are geographically far apart constitute very strong evidence for a genetic relationship.

O'Grady's (1966) reconstruction of proto-Ngayarda phonology uncovers a number of sound changes that took place in this subgroup and particularly in Yindjibarndi.

Hendrie (1990) has reconstructed 96 proto-Pama-Nyungan roots with initial apical consonants from nine geographically spread-out languages. Based on twenty geographically widespread Pama-Nyungan languages, Fitzgerald (1991) has reconstructed 168 initial ***ng** forms in proto-Pama-Nyungan and sub-proto-Pama-Nyungan. Most of them are reconstructed at the Pama-Nyungan level. Based on the same 20 languages, and focusing only on initial ***w** forms, I have reconstructed 101 proto-Pama-Nyungan roots and 91 sub-proto-Pama-Nyungan roots (Chen 1992 M.A. thesis). The comparison of these proto-Pama-Nyungan roots with forms in the lexicons of non-Pama-Nyungan languages will be the next stage of work to determine the role these reconstructions play within the Australian language phylum as a whole. If there are very few or no true cognates found in languages of the non-Pama-Nyungan families, these reconstructions will be uniquely Pama-Nyungan and can serve as proof of the existence of a Pama-Nyungan language family.

Alpher (1990) gives reconstructions of certain inflected verb forms in proto-Pama-Nyungan. He follows the heuristic assumption that sound change is regular and phonologically conditioned in his application of the comparative method. The most significant aspect of his work is his comparison of the inflectional endings together with verb stems in modern Pama-Nyungan languages. His concern is that "reconstructing endings alone, disembodied from stems, gives no confidence that the result is in fact a proto-paradigm" (Alpher 1990:167). This is especially important because verb roots fall into different conjugation classes. For example, a root can take a certain past tense form and a certain imperative form. A root that takes a different form in the past tense will also take a different form in the imperative (Dixon 1980:279). Examples (O'Grady, p.c.) follow:

Western Desert	**patja+rnu**	*bite+PAST*
	patja+la	*bite+IMPERATIVE*
	nya+ngu	*see+PAST*
	nya+wa	*see+IMPERATIVE*

Alpher's comparisons are mostly limited to Pama-Nyungan. He does find a few reconstructions that are attested in non-Pama-Nyungan languages. The aim and end results, according to Alpher,

do "support the findings of Evans (1986) and Blake (1988) that Pama-Nyungan languages comprise a genetic subgroup within the larger Australian phylum" (1990:166).

In the same work, Alpher points out two questionable theoretical assumptions held by Dixon (1980). One is "an extreme position on the nonregularity of phonological change, which is held to be conditioned by the semantic nature of inflections and by the presence of inflectional morpheme boundaries" (Dixon 1980:412). Alpher takes this position to be incompatible with the neogrammarian theory of the regularity of sound change and at the same time going against "certain important and very commonsense varieties of generativist theory". As a result, this position "licenses all kinds of mischief". The other concerns the degree to which borrowing can be held responsible for lexical replacement in Australia. This point is discussed further in the next section concerning Dixon's 50% equilibrium hypothesis.

Evans (1988:91) sees Blake's work, "Redefining Pama-Nyungan" (1988), as a landmark in Australian historical linguistics. The redefined Pama-Nyungan appears as a "much more promising candidate for a genuine mid-level genetic subgroup, clearly distinct from typological and areal groupings" (Evans, 1988:91). Blake (1988:3) points out that lexical comparison can establish genetic distance and in particular, Pama-Nyungan is shown to form a homogeneous group in comparison with the other mainland languages. The pieces of evidence that Blake provides are the following:

1. The comparison of function words: the basis of this practice is that "functions are peculiar to particular languages" and "function roots are relatively unborrowable".

   Cognate reflexes for case markers constitute part of his evidence for the genetic relatedness of the Pama-Nyungan languages. He finds that a number of the non-Pama-Nyungan languages lack these cases (Blake 1977). If the Pama-Nyungan and non-Pama-Nyungan languages are ultimately related, then a change such as the loss of case markers in the non-Pama-Nyungan languages would seem to increase the genetic distance between the two groups.

2. A comparison of pronoun roots : in view of the intensive lexical and grammatical diffusion in Australia, the comparison of pronouns is considered to be more accurate than the lexicon in establishing linguistic genealogy (Blake 1988). Blake points out that even in Heath's (1981) study of an extreme case of lexical diffusion in northeast Arnhem Land, there is no significant borrowing of pronouns. The languages Blake considers are from the northeastern corner of the Northern Territory and the northwestern corner of Queensland.

The results of Blake's comparison make necessary some amendments to Hale, O'Grady and Wurm's classification. They are:

1. Yanyuwa, which was earlier classified as non-Pama-Nyungan, is now seen genetically as a Pama-Nyungan language.

2. The Tangkic languages, which were counted by Hale, O'Grady and Wurm as Pama-Nyungan, should be reclassified as non-Pama-Nyungan.

3. Garawa and Wanyi should be counted as Pama-Nyungan languages.

On the whole, the genetic unity of Pama-Nyungan languages is recognized by Blake. It is only at the level of Pama-Nyungan and non-Pama-Nyungan that he has made amendments. Evans (1988) also provides evidence for the genetic significance of Pama-Nyungan. He provides evidence for a distinctive phonological change shared by all and only the Pama-Nyungan languages. The change he proposes is the laminalization of initial **d-** and **n-** to **DH-** and **NH-**. This laminalization isogloss almost corresponds to isoglosses for other innovations unique to Pama-Nyungan languages. Hence, this constitutes further support for a Pama-Nyungan family. The non-Pama-Nyungan languages i.e. the northern languages, form a "residue group". The pronoun systems and the presence of initial apicals are archaic retentions of the northern languages as opposed to the Pama-Nyungan ones.

Evans and Jones, after reviewing various comparative work on Australian languages, discuss the innovations that Pama-Nyungan has made (1991:9). They are: "to have shed prefixing verbal morphology, abandoned noun class prefixes, developed a substantially new set of pronouns and case forms, forged a distinctive set of verb 'conjugation markers' by analogically reshaping its inherited verbal paradigm, and laminalized initial [apical] consonants". Evan and Jones also see something in common with the proposals concerning non-Pama-Nyungan languages; that is, they all point to a considerable time-depth for the complicated verbal and nominal prefixing morphology in each reconstructed group. This renders Dixon's view that the prefixing typology is a recent areal development untenable.

II.2. Linguistic Diffusion in Australia

The phenomenon of intensive areal linguistic diffusion in Australia is noted by many researchers. For reasons of social or cultural factors such as death tabooing, bilingualism, multi–lingualism and intertribal marriages, linguistic diffusion is pervasive. Death tabooing is said to apply in every part of Australia. After a person's death, his or her name is not to be spoken for some time (Dixon, 1980:28). Any vocabulary item that is similar in form to the banned name will be tabooed as well. This causes some vocabulary changes in Australian languages, for a synonym might be used to replace the tabooed word, or a newly coined compound might become the substitute instead. More often, it might be replaced by a word borrowed from neighbouring tribes. Dixon sees death tabooing as a significant force in lexical replacement, and thus a cause of vocabulary change in Australian languages. Alpher and Nash (1982:4-5), however, checked through material available and found that tabooing has only a minimal effect on vocabulary change and that the nature of replacement is temporary.

Heath points out that particular demographic factors characteristic of Australian aboriginal societies make diffusion greater in Australia than in almost any part of the world (1979:396). By demographic factors he means, in this particular context, the frequency of direct contact between

people from different language groups due to the influence of the complex of environmental and social-structural phenomena (1979:401). Contact between neighboring language groups can be intimate or minimal. Environmental features that can restrain contact include mountain ranges, bodies of water, and areas where there are not enough food supplies, for example, in the central desert.

There are also nondemographic cultural factors. Heath describes a crude dichotomy of assimilatory versus dissimilatory forces. With the former, we find certain instances of language/dialect convergence taking place at an accelerated rate when two groups have socio-cultural motives for manifesting their solidarity or structural equivalence. With the latter, languages and dialects can undergo divergence when convergence is blocked, for example, by tribal division.

O'Grady (1990e:469) has encountered a type of dissimilatory force which causes divergence. He points out that there could be conscious manipulation of word shapes involved. For example, PPN ***rawa** descends in Garadjarri as **rawarri** *dead*. The feeling grows that the accretion of **-rri** is part of a conscious drive on the part of Garadjarri speakers toward creating greater differentiation between Garadjarri and neighbouring languages. Such innovations may have first arisen in the context of language use by the initiated, who would have been concerned to keep certain knowledge secret (Alkire, p.c.).

Similarly, the semantic flip-flop whereby PPN ***yu+ng** *give* > GYA **yu.nga+l** *send* and PPN ***jAya+** *send* > GYA **taya** (IMPERATIVE) *give!* may also be a result of conscious manipulation (O'Grady, p.c.).

Heath discusses further a whole series of effects which nondemographic diffusional pressures have on aspects of linguistic structure. The main point is that diffusion is greater between Australian languages than between Indo-European languages or between languages in other well-known language families (1979:405).

Heath has produced a study of linguistic diffusion in eastern Arnhem Land. There, the Yuulngu group, which is a member of the vast Pama-Nyungan family, is isolated in the northeastern corner of the area and in contact over a broad area with non-Pama-Nyungan languages. Thus, an interesting situation has arisen.

Looking at a map of this area suggests close contact between two genetically related non-Pama-Nyungan languages: Ngandi and Nunggubuyu. However, in recent times the Ngandi-speaking people have been interacting socially with people speaking Ritharngu, which is a Pama-Nyungan language. As a result, Ngandi shares nearly 50 percent of nominal and verbal stems with Ritharngu. Only a few shared items between the two can be attributed to independent retention of Proto-Australian items. As a sister language of Ngandi, Nunggubuyu, however, does not share as much vocabulary with Ngandi. What Heath wants to show is that Australia is not "a glotto-chronologist's paradise, and that genetic classification based primarily on quantification of lexical (or other) synchronic sharings are unlikely to bear fruit (1979:406)". At first glance, this comment seems so strong as to preclude efforts at the lexical comparison of Australian languages. However, we should

note that what has taken place for Ngandi may not apply to every corner of Australia. As to the dichotomy of assimilatory versus dissimilatory forces, Heath says that more often the latter prevail. So far, there is not a diffusional pattern that is attested as being general to all the Australian languages. A look at another pair of neighbouring languages in this same area, Nunggubuyu and Warndarang (the latter belongs to a different non-Pama-Nyungan family than Nunggubuyu does), will illustrate another aspect of diffusional phenomena in Australia. Lexical diffusion between the two languages is said to have been insubstantial and has been almost nonexistent for verbs. Even among just four neighbouring languages– Ngandi, Nunggubuyu, Ritharngu and Warndarang, there is no set pattern between each pair: namely, between Ngandi and Ritharngu, and between Nunggubuyu and Warndarang. The point to make here is that no generalization about diffusion covers the whole continent. The facts are different in each of the cases studied. Heath (1979:400) proposes that difussional studies can be conducted in several different areas on the continent and different results should turn up. The areas he suggests are: (a), the Arandic speech area together with the area where Warlbiri, Warramunga and Djingili are spoken, (b), the area of the Western Desert group, (c), Cape York Peninsula.

However, Dixon (1980:254-255) imagines more regularity. He says that "if, in Australia, two rather different languages come into contiguity, they will borrow back and forth until the proportion of common lexemes gradually rises, and eventually makes up about 50 per cent (in practice 40-60 per cent) of each language's total vocabulary". In Hale, O'Grady and Wurm's classification, the phenomenon of diffusion has been considered. The two conditions noted as exceptions to the criteria for classification with cognate density are: one, when the existence of a dialect chain is strongly indicated; and two, when borrowing between two languages is demonstrated (1966:25). With the expressed goal of doing one thing at a time and doing it well, this team had to complete the task of arriving at a preliminary genetic grouping of Australian languages with full concentration on lexical evidence. They later encouraged more detailed work leading to possible revision and refinement of the classification (O'Grady and Klokeid, 1969:311).

Dixon's hypothesis has another focus. He says, "if one tribe splits into two new tribes, each will taboo and replace words independently, and the percentage of common vocabulary will steadily drop until it reaches the 50 per cent 'equilibrium level' " (1980:255). He further concludes that if any two Australian languages have been in contact for a sufficiently long period, their vocabularies will be expected to have 40-60 per cent identical or similar forms. His example involves a comparison of the two neighbouring languages Warrgamay and Nyawaygi, from north-east Queensland. The two languages have 44 per cent common or closely similar vocabulary on a standard 100-word list and 48 per cent on a fuller 500-item count. In examining Dixon's equilibrium hypothesis, Alpher and Nash (1982:4) have found three aspects needing closer examination: 1. Observation of particular instances of replacement. 2. Observation of replacement rates in Australia. 3. Observation of the proportion of shared vocabulary between neighbouring languages in "equilibrium".

Here, "Instances of replacement" refers to death tabooing, as mentioned above. This phenomenon has caused some linguists to think that the lexical retention rate is very low in Australia, and therefore, it is another reason to question Hale, O'Grady and Wurm's classification. However,

an example is provided by Hale and O'Grady to show that this is not the case. They used a test list for Parnkalla from 1960 and checked it against a vocabulary published by Schürmann in 1844. The two lists turned out to show almost total agreement of lexical items. The few disagreements may well have been because they were looking at two different dialects of the same language (O'Grady, Voegelin, and Voegelin 1966:26). Alpher and Nash give a further example provided by Haviland, who has been able to make a comparison across 200 years - the longest period possible for Australia and the only case available. A detailed comparison of Cook and Bank's 1770 list of Guugu-Yimidhir is made with the modern recorded data by Haviland. He finds that the retention rate for Guugu-Yimidhirr over this period is 98 per cent, which would extrapolate to 90 per cent per millennium, whereas glottochronologists hypothesize an 86 per cent per millennium retention rate (the figure 86% is from Bynon (1977:269)).

A simple comparison between Gawurna's and Yaralde's 100-item basic wordlists (based on the Swadesh 100-item wordlist as revised by O'Grady) is conducted to see whether the percentage of vocabularies shared reach the 40-60 percent "equilibrium" level. Both languages are in South Australia and are geographically in contiguity. The cognates found are listed below (all letters are capitalized to remind the reader that both languages were recorded before the advent of phonemic theory):

	Yaralde	Gawurna	English Gloss
1.	KELE	KADLI	*dog*
2.	KUNAR	KUDNA	*faeces*
3.	PERAR	BIRRI	*fingernail*
4.	MARI, MAROWI	MARRA	*hand*
5.	NGAPE	NGAI, NGATTO	*I*
6.	KANGKIN	KARNKE+	*laugh*
7.	TORE, TORENGK	TĀ	*mouth*
8.	NAKKIN	NAKKO, NANGA	*see*
9.	TALLANGGE	TADLANYA	*tongue*
10.	PULLATYE	PURLAITYE	*two*
11.	NGANGGE	NGANNA	*who*
12.	NGUNE	NINNA, NINDO	*you,(sg.)*

The above twelve pairs are surely cognates. There are another five pairs that are possible cognates. For example, words such as **NGUMPURA** in Yaralde and **NGAMMI** in Gawurna both mean *breast of female*. However, it is a question of whether Yaralde **-MP-** corresponds to Gawurna **-MM-** (presumably **-m-**).

In the above comparison, the two neighbouring languages share only 12 per cent of the 100 basic words. The figure of 12 per cent is certainly a lot lower than the 40-60 per cent Dixon's

hypothesis would predict for languages which are geographical neighbours. However, it is not clear how long Yaralde and Gawurna were in contact. Dixon has an account of a Yaralde legend which describes how the tribe used to live further up the Murray River (its mouth is at Lake Alexandrina in South Australia and it extends up to Mildura in Victoria and beyond) and eventually moved down the river until they reached the coast and settled there. Therefore it is not a good test for Dixon's hypothesis. On the other hand, it also shows one aspect of the difficulties involved when doing a diffusion study. As Johnson (1990:420) points out, it is now almost impossible to determine former sociolinguistic patterns because of the massive changes in Aboriginal life that have taken place since the European invasion.

O'Grady's (1959) study of the effects of the spread of circumcision and subincision on languages in Western Australia offers yet another perspective concerning Gawurna and Yaralde. The people of Yaralde did not acquire this ritual as the people of Gawurna did. On top of this, the fact that Yaralde had moved from the north, which is detected from their legendary account by Dixon, indicates that there is a more distant linguistic relationship than what the geographical proximity between the two languages shows.

As Alpher and Nash (1982) have suggested, two languages that share a very low percentage of cognates may have been neighbours for a long time. They also point out that if O'Grady et al.'s lexicostatistical classification shows nothing else, it at least gives numerous instances of adjacent languages that shared less than 40 per cent or more than 60 per cent common vocabulary. For example, between Mara and Yanyuwa, the two adjacent Western Gulf languages, only 2 per cent of sharing is calculated. In addition, O'Grady and Klokeid (1969) have shown 90 per cent for the Western Desert dialects Pintjantjatjara and Yankuntjarra. The above cases are enough to disprove the "equilibrium" hypothesis from either direction, whether there was convergence or divergence.

I will state again at this point that the phenomenon of linguistic diffusion has not been fully studied and the situations outlined above cannot be considered general in every part of the Australian continent. This is true up to the most recent research done by Johnson (1990:419-420). He feels that although the kind of linguistic diffusion found in western Cape York "has been more prevalent elsewhere than is generally recognized", a claim that this situation is general to Aboriginal Australia still cannot be made. After all, as Johnson concludes, if only some of the language groups under study changed their geographical relationship every five hundred years or so, repeated diffusion caused by small scale migration would "scramble the fine genetic details beyond recovery" (1990:431-432). It is relationships of the intermediate levels among the languages in question that are hard to establish, whereas a broad genetic relationship is fortunately obvious. In other words, a subgrouping into Pama-Nyungan and non-Pama-Nyungan languages is not likely to be threatened by the factors enumerated by Johnson. Eventually, in cases where diffusion has taken place and blurred the evidence for genetic relationships, we would just have to "work directly from present-day languages to proto-languages without the comfort of any intermediate levels" (Johnson, 1990:432). Linguistic diffusion in Australia affects low level subgrouping to a large extent, but it should not impose problems on a high level subgrouping in a family tree where the splits between Pama-Nyungan and the other 26 language families has taken place.

On the other hand, Harvey (1991:15) seems to think that diffusion did not operate to the extent of obscuring genetic affiliations.

Heath (1981:356) does further analysis in his more recent work on linguistic diffusion in eastern Arnhem Land. He suggests that a more flexible approach than the traditional lexicostatistics should be adopted when dealing with languages from areas where intensive lexical diffusion has taken place. Interestingly, Hale, O'Grady and Wurm had already identified a language group in this area, Yuulngu, as belonging to Pama-Nyungan before Heath's study. The intense diffusion between the Pama-Nyungan languages and the non-Pama-Nyungan languages of this enclave have not prevented Hale, O'Grady and Wurm from identifying their genetic relationship. According to Alpher and Nash, the three-man team's "estimates of the fraction of lexical replacement that is attributable to borrowing, and estimated equilibrium rate that follows from this, are low enough to suggest that lexicostatistics, as a rough-and-ready method of language subgrouping, can proceed without undue concern for the effects of borrowing". Also, there is always the possibility that one or more languages may be misclassified by this rough-and-ready method. However, the subgrouping of Pama-Nyungan languages as a family is supported by the specific research conducted in their study.

O'Grady (1990b:1-10) has conducted an experiment which is inspired by Anttila's direct comparison of German and Russian. What Anttila (1972, 1989) has worked out is that "German and Russian are plausibly relatable on the basis of contemporary evidence only"(O'Grady cites Anttila). Using the same approach, O'Grady claims to find a similarly plausible relationship between Wadjuk, which is located in the southwest of Australia, and Umpila, which is on Cape York Peninsula in the extreme northeast. He does this even when burdened with four disadvantages (which turned out not to be crippling) (O'Grady, 1990a:xiii):

1. "wide geographical separation;"

2. Wadjuk was transcribed in the "pre-phonemic" notation of the 19th century;

3. "the sparseness of the available Umpila lexicon, which consists of no more than one thousand entries;" and

4. "we scrupulously avoid consulting data from close relatives of either Umpila or Wadjuk."

O'Grady is able to find over fifty highly plausible cognate pairs of elements. Among them, nominal case-marking suffixes, pronouns, names of body parts and terms for basic life functions are included. This result reassures us of the genetic relationship between the two languages. O'Grady points out that if more complete dictionaries of both languages were to be available, many more cognates would turn up. The same type of comparison could have been conducted with other languages to show a comparable amount of evidence for genetic relationship. By the comparison of languages that are far apart, the problem of diffusion is greatly lessened.

Once a relationship between a pair like the above is established in Australia, more languages from the intervening linguistic and geographical space can be selected to provide further evidence for Pama-Nyungan as the "largest coherent linguistic genetic construct in Australia".

III. CONCLUSION

In this work, two main issues that have developed in Australian comparative linguistics are discussed: the validity of a Pama-Nyungan subgroup within the Australian language phylum and the effects of diffusion on comparative work in Australia. The evidence supporting Pama-Nyungan –real language data–counts for more than this or that linguist's opinion. Hock (1986:42) makes the following comment:

> ...linguists...are not simply playing around with changes and imposing their own view on history. Rather, it is the history of the language and its development which imposes the solution on the linguist.

Though further research centering on the relationship between the Pama-Nyungan and non-Pama-Nyungan languages needs to be pursued, a genetic unity such as Pama-Nyungan is well supported with data and analysis provided by Alpher, Blake, Dixon, Evans, Fitzgerald, Hale, Hendrie and O'Grady.

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