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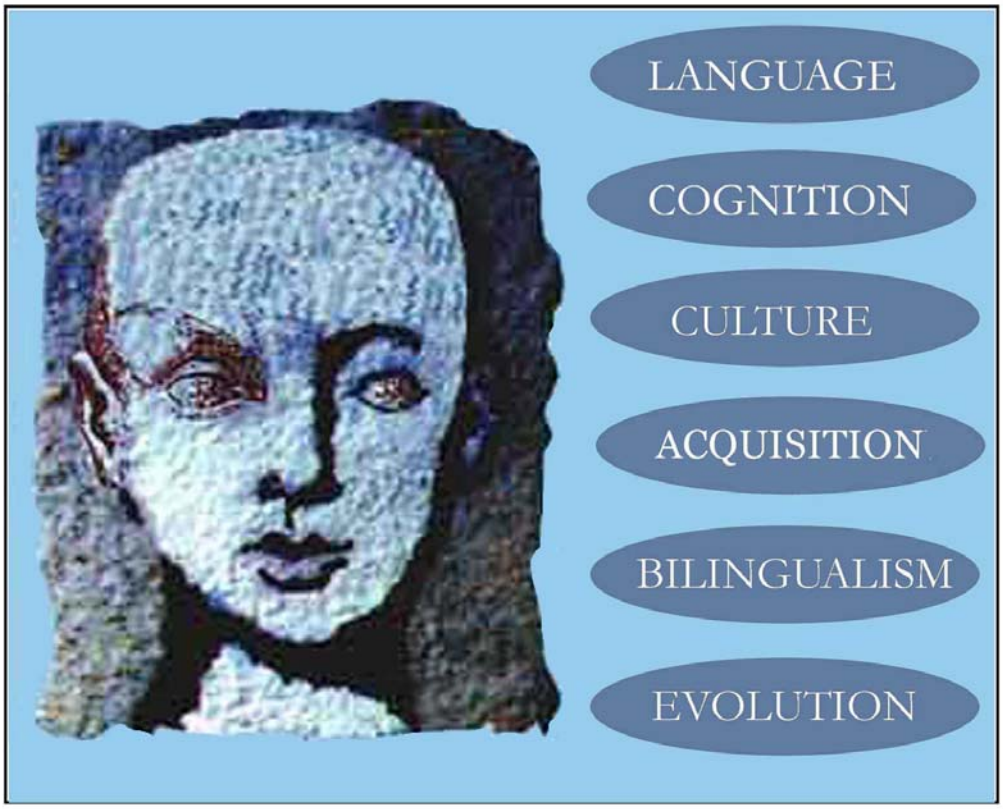
Susan Buescher and Keri Holley, Executive Editors
Evan Ashworth, Clay Beckner, and Christopher Shank



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High Desert Linguistics Society
Linguistics Department
MSC03 2130
1 University of New Mexico
Albuquerque, New Mexico 87131-0001
+1-505-277-6353
http://linggraduate.unm.edu/
hdls@unm.edu

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The High Desert Linguistics Society (HDLS) was proud to continue the tradition of the HDLS Conference series with its sixth meeting, held from November 4 through November 6, 2004 on the University of New Mexico campus. The HDLS Conference began as a coordinated effort of the graduate student body in the Linguistics department at the University of New Mexico. The conference was designed "to provide a forum in which students and other presenters meet to exchange ideas, research and criticism in the spirit of collegiality and support."

An academic conference comes together only through the effort of many individuals. HDLS would like to thank Joan Bybee, Suzanne Kemmer and David McNeill for their informative and thought-provoking keynote presentations during the conference. We also extend our gratitude to the Chair of Linguistics Department at the University of New Mexico, Sherman Wilcox, for his continuous support of HDLS and for his efforts in arranging for our keynote speakers; as well to Nancy Montoya, the Department Administrator, for her assistance in working with the University administration to obtain rooms, equipment and other logistical concerns. Additionally, we would like to thank the faculty advisor to HDLS, Phyllis Wilcox, for her help and support in our efforts to both organize and carry out the conference. We would also like to recognize the generous financial assistance provided by Amanda Cobb for the Institute for American Indian Research (I*f*AIR) and the Graduate Professional Student Association (GPSA) to help pay for the interpreting services. In addition HDLS would also like to thank Barbara Shaffer and Brenda Nicodemus for organizing the signed-language interpreting during the conference.

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In addition to the officers, HDLS would also like to thank the numerous individual volunteers who made both this conference and these proceedings possible, with their hard work and enthusiasm:

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*Volunteer signed-language interpreters

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THE ROLE OF PHONOLOGICAL WORKING MEMORY IN CHILDREN'S SENTENCE COMPREHENSION*

TUYUAN CHENG
University of Taiwan / Tainan Institute of Nursing
HINTAT CHEUNG
University of Taiwan

The present study examines the role phonological working memory (PWM) plays in sentence comprehension in children. A nonword repetition task (NRT) is used as the PWM indicator task, as NRT is a processing-dependent measure which minimizes the potential lexical effect and invokes the manipulation of PWM. Results are reported from NRT and sentence comprehension tasks (SCT) based on 32 normally developing Mandarin-speaking children aged around 6. These results demonstrate a link between PWM and children's sentence comprehension in three ways. First, a Pearson product-moment correlation computation shows that children's NRT scores are highly correlated with their SCT scores ($r=.53$, $p<.05$). Second, the factor of sentence length, increasing with word tokens, shows significant effect and interaction particularly in children of lower NRT. Third, the factor of sentence type, being analyzed in predicate-argument structure, shows that the number of predicates and arguments are competing roles in children's sentence comprehension. Critically, these results demonstrate that children's sentence comprehension is affected more by PWM-related factors, i.e. length effect.

1. INTRODUCTION.

Phonological working memory (PWM) has been proposed to be closely linked with language acquisition in children with normal development as well as those with specific language impairment (SLI). Aspects of language development demonstrated to have an association with PWM include speech production (Adams & Gathercole 1995), vocabulary acquisition (Gathercole & Baddeley 1989; 1990a), reading skills (e.g., Liberman, Mann, Shankweiler & Werfelman 1982; Mann & Liberman 1984), and sentence processing (Willis & Gathercole 2001). Concomitant with these findings, researchers further advanced the proposal that SLI might be in part related to phonological memory deficiency (e.g., Gathercole & Baddeley 1990b; Montgomery 1995, 2004). According to the phonological memory deficit account for SLI, the deficits exhibited by children with SLI are the reflection of their specific phonological capacity deficiency, rather than linguistic impairment. The role of PWM, in this case, is a core issue in terms of language processing and acquisition.

* The study was financially supported primarily by the grant issued to University of Taiwan from Ministry of Education in Taiwan, and partially by Tainan Institute of Nursing. The author would like to acknowledge Prof. Hintat Cheung for his valuable comments. Special thanks for artwork by SCT made by Huan-Jia Lin, Jia-Yu Liu, Yi-Zeng Chang, Zi-Xuan Zeng, and Shi-Ni Lin. Thanks also to the staff and children in 5th Kindergarten, Guang-Hua Kindergarten, and Nan-Ci Day-Care School in Tainan, Taiwan. Sincere gratitude is also owed to the anonymous reviewers.

PWM, within the theory of working memory model (Baddeley 1986; Gathercole & Baddeley 1993), refers to the component of cognitive capacities that retain sequences of verbal information over short periods of time. This component, alternatively termed as "phonological loop," works together with the other slave system, visuo-spatial sketchpad, to control, manipulate, and temporarily maintain various information within a particular domain. The phonological loop model proposed that the verbal speech input is coded and temporarily (for about 2 seconds) retained in the capacity-limited phonological short-term store, and then the sub-vocal rehearsal acts to refresh and maintain the speech material in a period of time for it to be adequately processed. The sub-vocal rehearsal is the articulatory loop, which is a covert articulatory control process and has been evidenced by a series of articlatory suppression experiments (e.g., Murray 1965, 1967; 1968; Levy 1971; Estes 1973).

If prevented from subvocally rehearsing the target items by uttering an irrelevant sound during the task, subjects' recalling performance will be disrupted. This indicates that language processing demands overt/covert inner speech. Therefore, disruption in the phonological loop function caused by either the reduced phonological short-term memory capacity or inefficient rehearsal abilities is predicted to result in decaying of the speech material, which will fail to enter long-term memory eventually. Children, in cases with a deficit in the phonological working memory capacity, might show imprecise and fragile phonological representation, which in turn exerts a global adverse effect on their language learning.

In spite of the general consensus on the importance of PWM, to what extent PWM might affect the multi-aspects of language acquisition has, nevertheless, long been in debate, especially in the domain of sentence comprehension. Two main positions have been proposed regarding the role of PWM in sentence comprehension. In a pivotal view, Clark & Clark (1977) suggested that PWM is critical, for listeners presumably store entire sentences in a phonological input store until all syntactic and semantic analyses have been completed. This position predicts that deficits in PWM will cause difficulty in processing sentences of any length. A weaker version of this pivotal perspective is proposed by Baddeley, Vallar, & Wilson (1987) and Waters, Caplan, & Hildebrandt (1987). They posited that the PWM is involved in the pre-parsing stages of comprehension (see the discussion in Montegomery 1995): the serial order of the lexical items are held, while simultaneously these items, along with their syntactic categories, are retained and processed in the phonological loop and look ahead for the forthcoming construction of the syntactic structures.

This view leads to the prediction that reduced or impaired PWM might cause greater difficulties in processing longer sentences, which either contain longer words or more words, given that the sequence and information of the lexical items have to be stored and processed in the phonological loop. Gathercole & Baddeley (1993) added that spoken language comprehension involves on-line processing and off-line analysis, and that both require representation of phonological memory as a backup system. Limited phonological capacity will probably cause the sentence processing and analysis to be incomplete. Willis & Gathercole (2001) also confirmed that memory-related factors, including the length and number of words in sentences, affect sentence comprehension in children.

In contrast, the marginal view does not consider PWM to be as important as the pivotal view mentioned above. Two positions can be further delimited. Researchers with a strong marginal view argue for a semantic storage buffer besides the phonological loop, and suggest that sentence repetition has recourse to both PWM and the semantic buffer, while sentence comprehension relies primarily on the latter (Hanten & Martin 2000). PWM, in this view, is modeled in a multiple systems approach wherein phonological, lexical, and semantic knowledge representations are activated during language processing. These activations then pass on to the

temporary phonological and semantic storage buffers (Martin, Shelton, & Yaffee, 1994).

However, a weaker marginal view does not completely rule out the contribution of PWM in sentence processing. This position advocates that young children may depend on PWM to support their language processing to a greater extent than adults, for young children are evidenced as slow processors (e.g., Plaut & Booth 2000). McCarthy & Warrington (1987) have previously suggested that PWM support is necessary under conditions of slow lantencies of language-analytic processes. Since young children's analytic process operates more slowly, off-line analysis requiring PWM support is demanded. While encountering sentences of more syntactic complexity, off-line analysis and PWM are demanding for children.

To summarize, the weaker marginal view suggests that PWM, if necessary, relates more to syntactic complexity: Sentences containing syntactically complex constructions constitutes the major processing constraints for children. On the other hand, the weaker pivotal view emphasizes the effect of PWM regarding sentence length.

Here we reach a convergence from the two opposing positions: PWM can be involved in children's sentence comprehension either in sentence length (in the weaker Pivotal view) or syntactic complexity (in the weaker Marginal view). It is intriguing to tease out whether the manipulation of increasing sentence length and syntactic complexity will favor the weaker Pivotal view or the weaker Marginal. This motivates the present study. The following questions are addressed. Assuming PWM is involved in children's sentence comprehension, will effects be found for longer sentences or more syntactically complex ones? How does PWM work in different syntactic structures and sentences of differing length? We will examine whether potential differences in PWM capacity of normally developing children are correlated with their differences in sentence comprehension performance. As a notice in advance, this study argues for the weaker Pivotal status of PWM. Before discussing the method of this study, it is necessary to make a brief description of the background on which our correlation study is based.

2. NONWORD REPETITION TASK.

To evaluate the role of phonological working memory (PWM) capacity, some indicative measurements are needed. The frequently used norm-referenced tests evaluating children's PWM capacity include nonword repetition, digit span, and serial recalls. Among them, the nonword repetition task (NRT) is considered a more favorable measure of phonological memory ability over other measures (Gathercole & Baddeley 1990a). The considerations can be summarized in three main ways.

First, the most pertinent feature of the PWM is its capacity in retaining phonological information. Unlike digit span, which is conducted to determine the amount of digits a person is able to recall immediately after they hear the target digits, NRT requires subjects to hear a series of unfamiliar but wordlike phonological forms varying in length and to repeat each immediately after hearing each nonword form. In this way, NRT is more related to the processing of phonological information.

Next, NRT is considered to be a processing-dependent measure (Dollaghan & Campbell 1998; Gathercole & Baddeley 1990a, 1990b). Proponents of NRT have argued for the purity of nonword repetition since the nonword design will minimize the potential influence of prior lexical knowledge and invoke the subjects to multiple phonological processes, which depend on the phonological short-term memory store in the phonological loop model. Accordingly, the NRT procedure apparently helps highlight the capacity-limited nature of the phonological memory system.

Last but not least, NRT is empirically supported as an index of phonological working memory. More recently, empirical research has identified NRT as a behavioral marker to differentiate impaired and intact language groups. For example, Bishop, North & Donlan (1996) made a twin study to compare children with persistent language impairment vs. children with resolved language impairment. They found that both groups show consistently poorer performance on nonword repetition tasks, which suggests that there is an underlying deficit in PWM pertaining to the nonword repetition task, leading to the common behaviors across groups. Moreover, Dollaghan & Campbell (1998) administered a set of NRT to a group of 20 school-age children enrolled in language intervention (LI) and a group of 20 age-matched peers with normal language development (LN). No overlap was found across both groups regarding their NRT performance. This indicates NRT as a clinical screening measurement to distinguish LN from children with impairment (i.e. LI).

Based on these considerations, the present study will use NRT as a basis to index children's PWM capacity and use it for grouping children into low NRT (LP) and high NRT (HP) groups for further examination.

3. THE PRESENT STUDY.

The study reported here aims to address the following questions:

(1) Can we find link between phonological working memory capacity and sentence comprehension in normally developing children?
(2) What role does phonological working memory capacity play in sentence comprehension? Is it memory-capacity induced (i.e., showing more length effect) or linguistic structure induced (i.e., showing more syntactic effect)?

Note that in conducting the present study, we have assumed that nonword repetition acts as an index to the phonological working memory capacity and that normally developing children exhibit individual differences in PWM capacity. Based on these assumptions, our prediction is as follows: If sentence comprehension is affected by sentence length in PWM, it is predicted that the nonword repetition performance, presumably controlled by memory relevant capacity, is expected to correlate with the sentence comprehension task. Namely, the nonword repetition performance for multi-syllabic words will be associated with the comprehension performance in sentences containing more word tokens. If sentence comprehension is affected more by syntactic complexity in PWM, no such positive correlation would be observed.

The presence of a length effect also predicts that increasing length, irrespective of syntactic complexity, will result in children's poorer performance in sentence comprehension task (SCT). The presence of a syntactic complexity effect, nevertheless, predicts that sentences of similar syntactic complexity but different length would not show significant difference in SCT. Moreover, the presence of a length effect will highlight the connection between PWM and sentence comprehension by delimiting the subject group in a corresponding manner, i.e., the high group in the NRT will correspond to the high group in SCT, and the low group in the NRT to the low group in SCT. However, the presence of a syntactic effect would make a different prediction. If PWM is not purely memory driven but more induced from linguistic complexity, and sentence comprehension is not only confined to memory-relevant capacity, then the subgroups characterized in NRT will not necessarily match with the subgroups in SCT.

3.1 METHOD.

3.1.1 DESIGN.

To examine whether children's phonological working memory capacity is associated with sentence comprehension, a direct correlation study was conducted as the first step. Subjects of normally developing children were given a nonword repetition task (NRT) to measure their individual phonological memory ability. Then they were given a sentence comprehension task (SCT). The specific scores for both tasks within the subjects were measured with the Pearson Correlation. In the subsequent step, variables manipulated in the task, including the number of syllables in the NRT and the number of words and syntactic complexity in the SCT, were further analyzed. The main effect and interaction were also discussed.

Predictions based on the weaker Pivotal and Marginal views were examined respectively. First, if the PWM plays a certain role in the comprehension of sentences as suggested by the weaker Pivotal view, a correlation is expected between the nonword repetition performance and the sentence comprehension performance within subjects. Namely, children with high performance in the NRT are expected to perform better in SCT using longer sentences. Second, since researchers of the weaker Marginal view documented that sentences of higher syntactic complexity demand more off-line analysis and thus require phonological memory as a backup system, the variables of syntactic complexity are expected to interact with children's NRT performance.

3.1.2 SUBJECTS.

A total of 32 Mandarin-speaking children, including 17 6-year-old boys and 15 6-year-old girls, participated in the present study. All the subjects are restricted within the age range between 6;0 and 6;7, to avoid the maturational lag factor. The children all attend the kindergartens located in Tainan city, Taiwan. None of them are reported to have language disorders or hearing impairment.

3.1.3 EXPERIMENT 1: NONWORD REPETITION TASK.

3.1.3.1 STIMULI.

Twenty four nonwords were constructed. The nonwords ranged from one to four syllables long. Table 1 lists the experimental nonwords.

One syllable	Two syllables	Three syllables	Four syllables
xia3	kao1-pie2	nue3-gei4-miu1	cao4-nao1-san2-kuo3
min1	tie2-suo4	nai2-pou4-sai3	nuo1-mai1-diu4-gei1
dai2	kan2-cuo3	mou4-xiu2-pen4	mie2-sai3- nue1-ken4
pai3	pie4-kuo1	sao2-gua2-zan3	tie4- mei1-kai2-nei1
gun2	nuo3-kou1	nai1-gai2-pou2	*tun3- miu4-zai2-sou2
cen4	cuo2-gun1	dao2-mou1-kua2	*ban2-miu3-tun4-cui2

TABLE 1. STIMULI IN NONWORD REPETITION TASK (NRT).

All these non-words meet the following criteria.

(1) They conform to the phonotactics of Mandarin
(2) Each syllable shares the same structure-CV(C/N)
(3) Phonemes of earlier stabilization based on Mandarin children development were included. They are12 initial consonants: b, p, d, t, g, k, m, n, z, c, s, x, 5 vowels: a, i, e, o, u and 1 final nasal: n
(4) To avoid the interference of subjects' vocabulary knowledge, none of the syllables correspond to a real Mandarin word. Nevertheless, all the nonwords are generated from the lexical accidental gap. Namely, all the nonwords are made of legal syllables without corresponding lexical tone in Mandarin.

3.1.3.2 PROCEDURE AND SCORING.

The repetition task was administered to the subjects individually. All the stimuli were randomly arranged and recorded with a high quality cassette tape recorder. Each target item was presented only once, with a 5-second interval preceding the following item. Children were told to repeat some new words immediately after hearing the tape. Three test items were presented to familiarize children with the task. Children's performances were recorded by the experimenter and were coded within 24 hours.

All the target and repeated stimuli were encoded in Hanyu-Pinyin. A phoneme-by-phoneme scoring was administered. Phoneme substitution/omission and tone error were scored as incorrect. The number of phonemes together with tones repeated correctly was divided by the total number of phoneme targets with tone, which was then transformed as the Accuracy Percentage of Nonword Repetition (APNR). See example (1). The APNR scores were peer checked by two non-linguists.

(1) APNR=uttered/target
=nie2-sai2-nie1-ken4/mie2-sai2-nue1-ken4
=14/16=87.5%

* The underlined nonwords are infrequently used real words in Mandarin. Since most of the lexical gaps in Mandarin pertain to 2nd tone, they are used here to make the four-syllabic nonwords conform to the tonotactics

3.1.3.3 RESULTS.

The results of the NRT are shown in Figure 1.

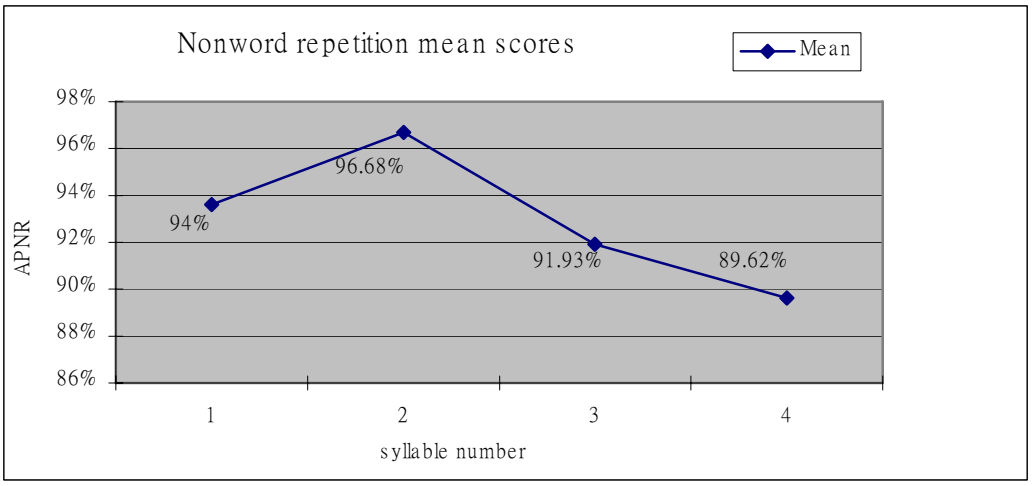

FIGURE 1. NONWORD REPETITION MEAN SCORES.

As can be seen, the overall NRT result tends to be influenced by stimuli length: children performed poorer on the 3-syllable and 4-syllable items but better on the 1-and 2-syllable items. This is consistent with results on nonword repetition in previous studies (e.g., Montgomery 1995).

3.1.4 EXPERIMENT 2: SENTENCE COMPREHENSION TASK.

Task 2 is an experiment on comprehension of shorter and longer sentences in terms of 4 sentence structures. Children were required to fulfill a forced-choice picture verification task after hearing a tape-recorded target sentence. For each target sentence, 1 sentence-matching and 3 foil pictures were compiled on each page of a stimuli-picture book. There were 32 target sentences and 3 practice trials. Two picture books were constructed. One book was used for one session.

3.1.4.1 STIMULI.

Two variables were involved in the stimuli: syntactic complexity and incremental number of word tokens in the stimuli sentences. 32 sentences were constructed. They are of four sentence types adapted from the Test for Reception of Grammar (Bishop, 1982). The types are (1) passive sentence (PS), (2) sentence with relative clause (RS), (3) sentence containing locative preposition (LS), and (4) sentence of negative construction X-not-Y (NS). The former two types, PS and RS, being non-canonical, were further characterized as syntactically complex, while the others as syntactically simpler. The sentence length varied with the incremental number of content words ranging from 1 to 4 tokens added to the sentence. All the content words are selected from familiar objects, animals and attributes of higher frequency. With 4 sentence types × 4 token variations, each set contained only 2 sentences (e.g., 2 sentences for PS in each word token condition). Part of the stimuli is listed in Table 2, and one set of X-not-Y sentence construction

pictures used in the SCT is illustrated in Figure 2, which denotes “It’s not the big frog, but the spotty goldfish, sleeping.”

Sentence	Token	Stimuli	Syntactic structure
Passive sentence (PS)	1	**shan1-yang2* bei4 zhui1 *山羊 被 追 goat by chased The goat is chased.	NP+ BEI+V
	2	*hou2-zi* bei4 *xiao3-gou3* zhui1 猴子 被 小狗 追 monkey by dog chased The monkey is chased by the dog.	NP+BEI+NP+V
	3	*fei2-pan4* de *tu4-zi* bei4 *wu1-gui1* zhui1 肥胖 的 兔子 被 烏龜 追 fat GEN rabbit by turtle chased The fat rabbit is chased by the turtle.	AP+NP+BEI+NP+V (AP=Adjective phrase)
	4	*bai2-se4* de *lao3-shu3* bei4 *hua1-wen2* de *mao1-mi1* zhui1 白色 的 老鼠 被 花紋 的 貓咪 追 white GEN mouse by spotty GEN cat chased The white mouse is chased by the spotty cat.	AP+NP+BEI+AP+NP+V

*The italic Roman letter of Hanyu-Pinyin and the underlined Mandarin character indicate the content word incrementally added to this construction.

TABLE 2. STIMULI IN SENTENCE COMPREHENSION TASK (SCT).
(IN SESSION 1: PASSIVE SENTENCE CONSTRUCTION)

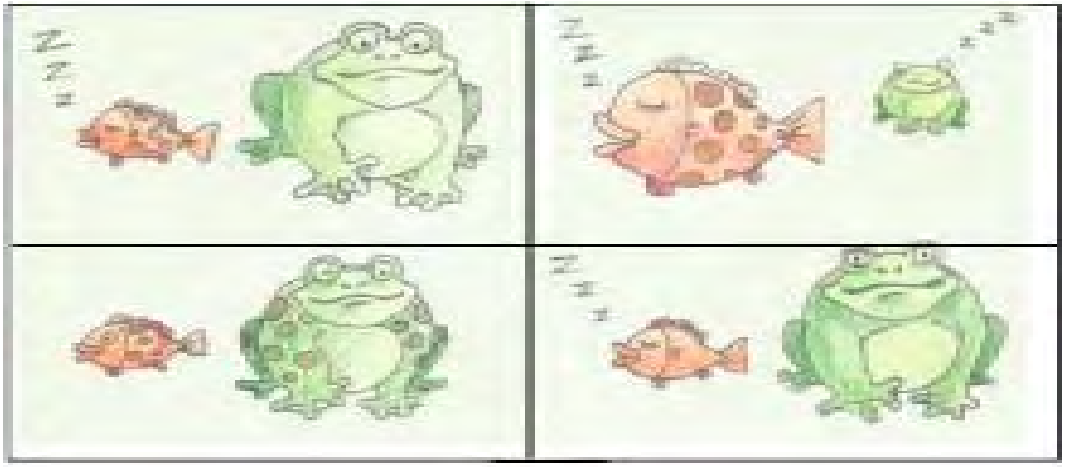

FIGURE 2. ILLUSTRATION FOR SCT IN NEGATIVE SENTENCE.

3.1.4.2 PROCEDURE AND SCORING.

The sentence comprehension task was administered to the subjects individually and was conducted separately from the NRT, with at least 2 days interval. All the target sentences were recorded on a high quality cassette tape recorder. Each target item was presented only once, with a 6-second interval preceding the following item. Not until the subject heard the target sentence presented on the tape recorder did the experimenter open the picture book for children to make their choice. 32 target sentences were divided into two sessions. Subjects would take a break between the two sessions. The experimenter immediately checked the children's comprehension of the sentence while they were tested. The number of times each child pointed at the correct picture was divided by the number of total target sentences, which results in the Accuracy Percentage on Sentence Comprehension (APSC).

3.1.4.3 RESULTS.

Figure 3 displays the overall APSC plot.

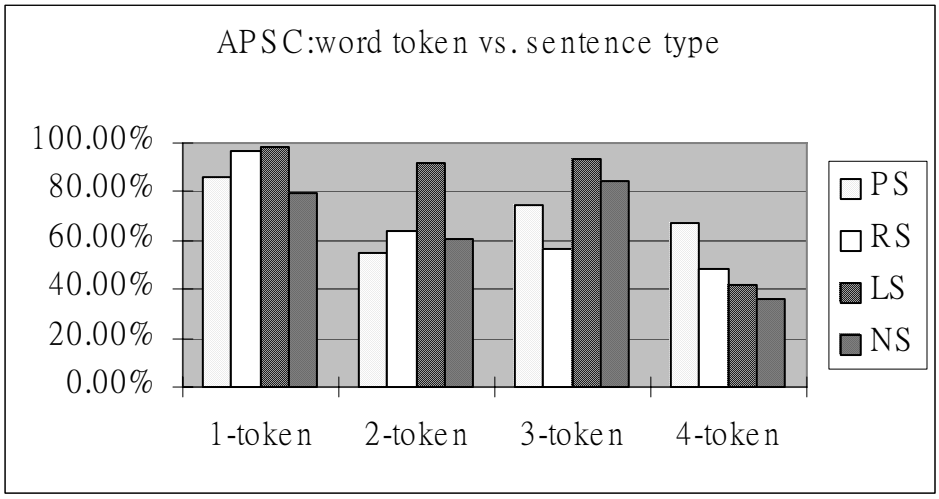

FIGURE 3. APSC: WORD TOKEN VS. SENTENCE TYPE.

As can be seen in the plot, APSC appears to be affected by the factor of incremental token number. In general, children performed most poorly in the longest sentence containing 4 additional word tokens.

3.2 CORRELATION STUDY.

To examine whether there is relation between PWM capacity and sentence comprehension, a Pearson product-moment correlation was calculated in terms of the APNR and APSC. A positive correlation was found ($r = .53$, $p < .05$). Figure 4 demonstrates the scatter plot represented by each subject on their individual pair performance between APNR and APSC.

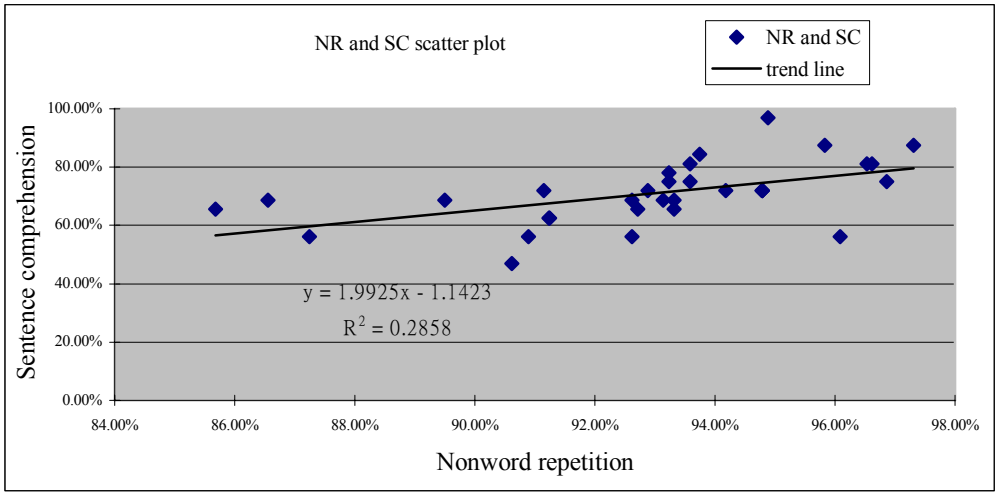

FIGURE 4. SCATTER PLOT OF APNR VS. APSC.

Generally, normally developing children participating in the NRT and SCT show a within group correlation on the performance of both tasks: subjects attaining higher APNR revealed better APSC; lower APNR, poorer APSC. At first sight, the results support the weaker pivotal view on the potential role of PWM related to sentence comprehension. However, a further analysis is required to tease out the plausible influence from syntactic complexity. To decide whether the correlation is pure PWM-driven, we group the subjects based on their phonological capacity, and examine whether the subgroup performance regarding both tasks conforms to the prediction made by the weaker pivotal position that the subgroups in NRT will correspond to the subgroups in SCT.

3.3 GROUPING ANALYSIS.

3.3.1 GROUPING AS A FUNCTION OF APNR

In the grouping analysis, the subject children were grouped into 2 groups based on their NRT performance. As previous studies and the present NRT performance demonstrated (see Figure 1), children show sensitivity toward 3-syllable and 4-syllable nonword items: their performance will drop on these two items. Therefore, the cut-off point for grouping depends on subjects' accuracy percentage on the 3- and 4-syllable items. Children performing with higher accuracy on the longer nonwords were characterized as having higher phonological capacity. The remaining children were classified as having lower phonological capacity. 17 children were typified as belonging to the higher group, and 15 were in the lower group. Figure 5 shows the APNR plot pertaining to the higher and lower groups.

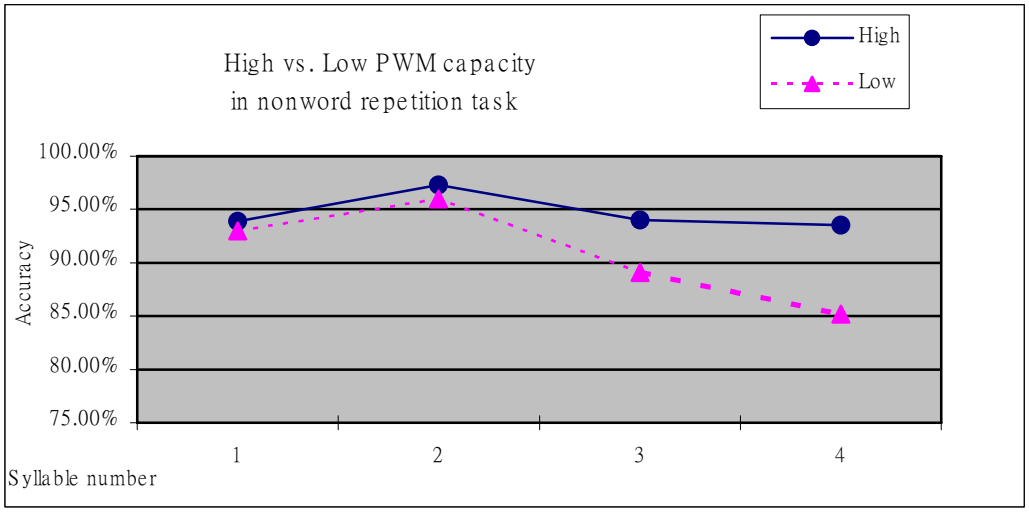

FIGURE 5. APNR IN HIGH VS. LOW GROUP.

It can be seen that low PWM group is affected by nonword length, but high PWM group isn't. A one-way between-group ANOVA reveals that the lower group performed significantly poorer on the 3-syllable nonwords [$F(1,30)=10.35$, $p<.05$] and 4-syllable nonwords [$F(1,30)=30.37$, $p<.05$]. However, on the 1- and 2-syllable nonwords, no group differences were found. The group with a lower PWM was influenced to a larger degree by the nonword length.

3.3.2 REANALYSIS ON APSC BY HIGHER/LOWER GROUPS.

A reanalysis on APSC was conducted to determine whether PWM capacity plays a certain role in sentence comprehension. The questions at issue are: does APNR show a connection with APSC? Can the marker to PWM, i.e., APNR, be the index to the sentence comprehension?

Figure 6 shows the curve plot of APSC performed by higher phonological group (HP) and lower group (LP), along with two variables: incremental word tokens and sentence types.

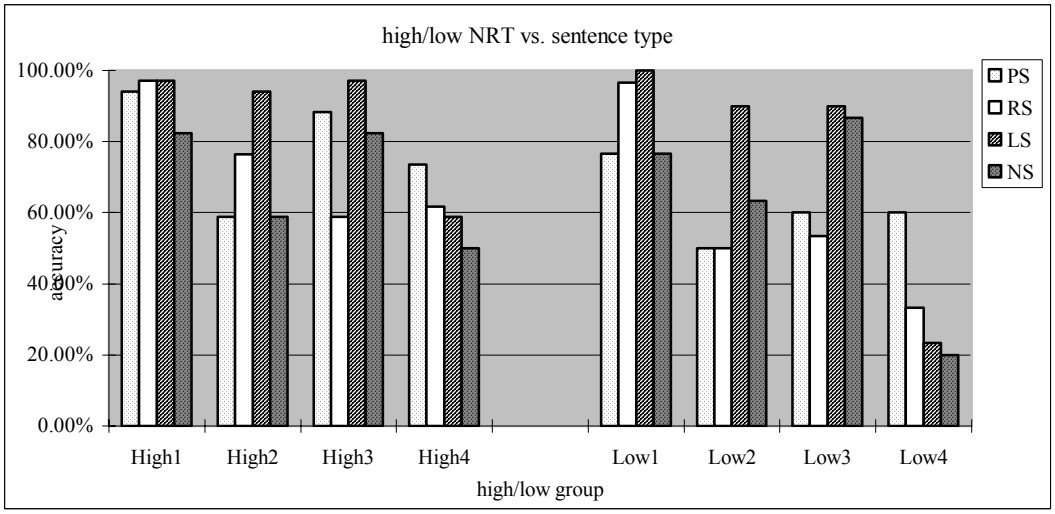

FIGURE 6. HP/LP IN SENTENCE TYPE AND TOKEN VARIABLES.

HP and LP are similar in that they perform poorly in the longest sentences irrespective of sentence types (see High 4 vs. Low 4). A general pattern can be found in that both groups tend to perform best in the sentence with 1 incremental token (see High 1 vs. Low 1), then the APSC drops or rises in the 2-and 3-token condition, and APSC in both groups finally drops in the 4-token condition. Nevertheless, compared to HP, LP demonstrates a different pattern and appears to be affected more by the sentence length across sentence types. The LP group shows strikingly abrupt slope in the LS and NS types in 4-token condition, replicated in Figure 7. This result contradicts the weaker marginal view that simpler sentences (i.e., NS and LS) should be easier for processing even in longer sentence. Thus, a further statistical analysis was made to see if this is due to the syntactic factor involved.

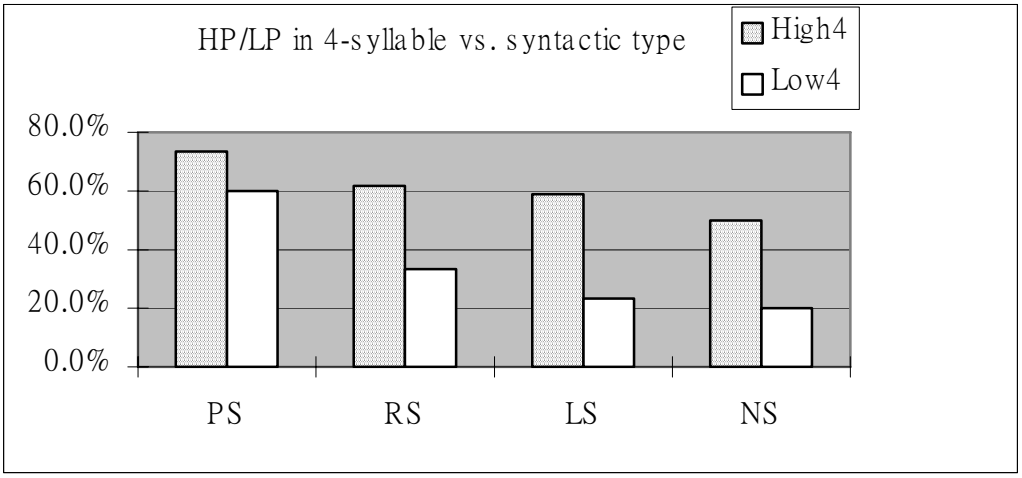

FIGURE 7. HP/LP IN 4-SYLLABLE VS. SYNTACTIC TYPE.

A 2-way repeated measures ANOVA, Group (2) × sentence type (4) yielded a highly significant main effect of group, $F(1, 112)=22.16$, $p<.05$, as well as a main effect of sentence type, $F(3, 112)=7.16$, $p<.05$. However, no interaction was found in the group and type variables. This indicates that HP and LP differed significantly with sentence types, but the effect of sentence types did not differ in terms of groups (i.e., no interaction).

However, the results of a 2-way repeated measures ANOVA, Group (2) × incremental token (4) revealed a highly significant main effect of group, $F(1, 112)=22.12$, $p<.05$, highly significant main effect of token, $F(3, 112)=41.09$, $p<.05$, and interaction between group and token, $F(1,112)=3.21$, $p<.05$. This indicates that the incremental token number in sentences significantly influenced HP and LP's performance, and that the token effect differed with different groups: LP was affected in an interactive manner, as Figure 8 displayed.

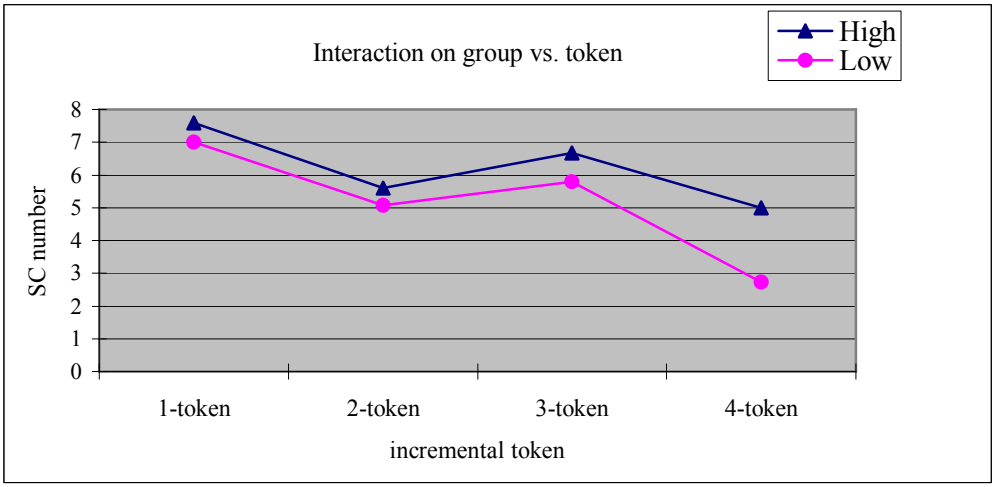

FIGURE 8. INTERACTION ON GROUP (2) × TOKEN (4) VARIABLES

As for the 2-way ANOVA on type (4) × token (4) variables, no main effect and interaction were found.

3.3.3 DISCUSSION.

The results gathered up to now demonstrate that both HP and LP perform best in the sentences containing the fewest word tokens, but LP performs poorly in the sentences containing the most word tokens. LP is affected to a greater extent by sentence length across sentence types. Sentence length (increasing with word tokens) not only shows significant effect in the LP group, but also demonstrates interaction between HP and LP groups. This indicates that sentence length interferes with the PWM capacity, and can help distinguish groups.

As for the factor of syntactic types, although significant effect has been found in HP and LP, no interaction was attested between HP and LP. This indicates that syntactic structure might not interfere with the PWM capacity and did not match its group difference concerning PWM performance. These results confirm the weaker pivotal view regarding the role of PWM in that more word tokens require more proficient PWM, but disconfirm the weaker marginal view in that more complex syntactic structures lead to demands on more proficient PWM than simpler structures do (see Fig 7, in the cases of LS and NS).

Based on this, we might reach the conclusion that word token factor plays an important role in matching children's sentence comprehension with their PWM capacity, but syntactic structure doesn't. Nevertheless, to further validate the weaker pivotal position, we reconstruct the metric measuring syntactic complexity by conflating it with the sentence length factor and examine whether a match between PWM and SCT regarding sentential types can be found. If this approach is done, the role of PWM can be clearly confirmed.

3.4 RESTRUCTURING SYNTACTIC COMPLEXITY.

Seeing that our grouping analysis did not favor the weaker marginal view and that the simpler structures (i.e., LS and NS) do not take more advantage than complex structures (i.e., PS and RS) regarding PWM factor, we wonder whether this is due to the classification of syntactic types. Given the high correlation between PWM and sentence comprehension, it is plausible that the

metric of sentential complexity could be alternatively developed based on PWM-related elements. Therefore, we take the predicate-argument structure approach, which uses the number of arguments and predicates as the complexity metric. Sentences with more predicates and arguments are assumed to be more complex and require more processing loading from the PWM. For all the 32 test sentences in the SCT, we categorize them into 8 types, which are signaled by the number of adjectives (Adj), predicates (Pre), and arguments (Arg) in the sentence. Table 3 shows the reanalysis.

Type	Adj	Pre	Arg	N=32	Total(N×subject)
I	0	1	1	8	120
II	0	1	2	7	105
III	0	2	1	2	30
IV	0	2	2	1	15
V	0	2	3	2	30
VI	0	3	4	2	30
VII	1	1	2	4	60
VIII	2	1	2	6	90

TABLE 3. RESTRUCTURING THE SYNTACTIC COMPLEXITY.

Based on the restructuring, we then examine whether the HP/LP performance correspond to children's performance by the metric of predicate-argument (number) structure. The results are demonstrated in Figure 9, which provides evidence that HP and LP behave typologically different as the function of predicate-argument structure.

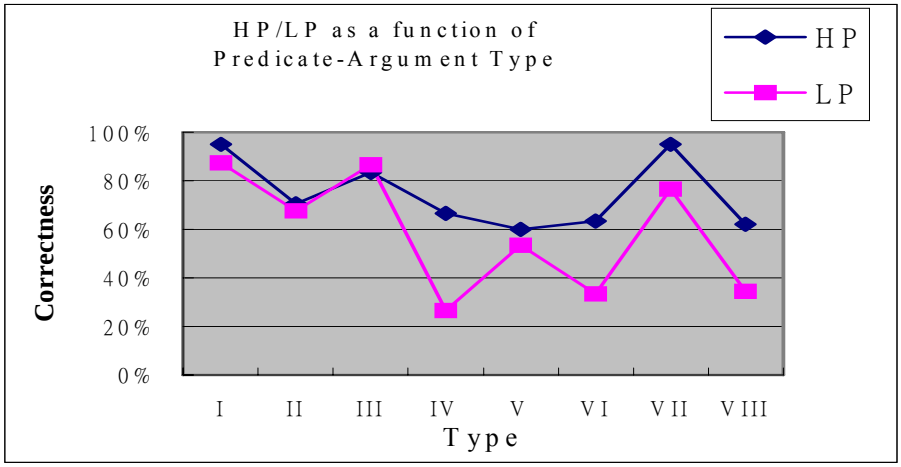

FIGURE 9. HP/LP AS A FUNCTION OF PRE-ARG STRUCTURE.

In general, HP performs better than LP across these 8 types, except in Type III. In addition, HP shows overall correctness percentage above 60%. We further made an analysis to examine, among the three elements (Adj, Pre, and Arg), which one is decisive in determining the corresponding performance. The results were shown in Figure 10.

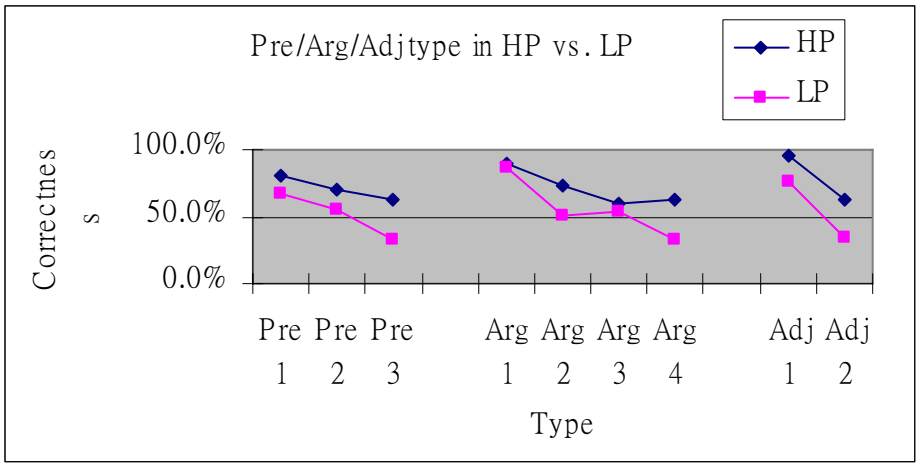

FIGURE 10. PRE/ARG/ADJ-TYPE IN HP/LP.

It appears that the number of predicates and arguments form competing factors in deciding the performance of HP and LP in terms of the sentence structures, while the factor of number of Adj only undertakes a linear pattern. Overall, the predicate-argument structure analysis can map the performance of PWM (HP vs. LP) with children's corresponding performance in SCT.

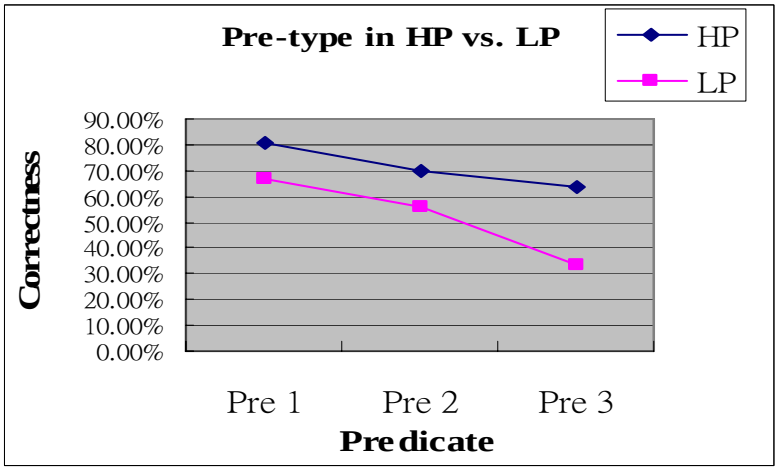

FIGURE 11. PERFORMANCE OF PWM (HP VS. LP).

4. GENERAL DISCUSSION.

This study was conducted to examine the role of PWM and its potential relationship with sentence comprehension. The results argued for the essential contribution of PWM to the sentence comprehension suggested by the weaker pivotal view, which differs from the weaker marginal position that sentence comprehension is primarily underpinned by other syntactic processing sources. Our evidence comes from three aspects. The correlation study confirms that children's PWM capacity is highly correlated with their sentence comprehension performance. Then our grouping analysis further attests that word token factor plays a significant role in matching children's SCT performance with their PWM capacity. Our labeling children as phonological higher and lower groups based on their individual PWM capacity found that the LP

group, poorer in the NRT, was correspondingly inferior in the SCT. The inferiority evident in LP was even more obvious as the token in the sentences increased, which was reported by the interaction between group and token. On this part, this result conforms to our prediction based on the weaker pivotal view of PWM. However, that the weaker marginal position owes the processing difficulty to the imposing of syntactic complexity on phonological information storage is not confirmed in our grouping analysis, for the results show that LP does better in complex constructions in longer sentences, but worse in simpler ones.

Finally, we demonstrate that the syntactic complexity, if measured by the predicate-argument (number) structure, will show its correspondence to the index of PWM. The HP vs. LP group approximately matches their performance concerning Pre-Arg structure. PWM can adequately link with sentence comprehension performance. This indicates that the syntax-driven view on PWM made by the weaker marginal view can be in fact attributed to increasing numbers of predicates and arguments in sentence. Namely, the increasing word tokens of predicates or arguments in a sentence would exert processing loading from the PWM. Therefore, children with lower PWM capacity demonstrate greater difficulty in comprehending sentences with more tokens and higher Pre-Arg structure complexity.

In conclusion, children's sentence comprehension is affected by PWM-related factors, such as number of word tokens and number of predicates/arguments. This is evidenced by the correlation study, and further by the grouping analysis, which shows that the group distinction made by PWM can approximate the distinction made by children's sentence comprehension regarding sentence length and predicate/argument structure. Nevertheless, the predicate/argument structure analysis in this study is only a preliminary attempt and has not been well-established. A further study on the metrics of sentential complexity is required to further verify the relation of sentential complexity with PWM.

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DISCOURSE FUNCTIONS OF METAPHOR: A FREQUENCY-BASED CORPUS STUDY

DAN SANFORD
University of New Mexico

Metaphor research, while usually carried out in a functionalist/cognitive framework, often relies heavily on the methods of formalism, namely, contrived sentences and introspection as a source of data. Work on the role of metaphor in discourse must, of necessity, take actual discourse as its source of data. A study is presented herein in which the overall frequency, as well as relative frequencies of types according to target, are analyzed within ten conversation from the Santa Barbara Corpus of Spoken American English. Based on systematicities in the data set, three levels at which metaphor structures language are hypothesized: conceptual, syntactic, and discourse.

1. INTRODUCTION.

Any work purporting to delimit the role of metaphor in actual discourse must, of necessity, take actual discourse (as opposed to elicited data, the metalanguage of contrived sentences, or the intuition of linguists as native speakers) as its source of information. As Chafe (1998: 96) points out, "ordinary conversational talk… occupies a special place as the kind of language that is most natural in both form and function, the kind of language humans must be designed by evolution to produce and comprehend. It requires no special training or skill to be able to talk casually with others, and every normal person acquires this ability as a natural part of maturation. Because conversation is the form of language least influenced by acquired skills, it provides us with the most direct and uncontaminated access to natural mental processes." Metaphor, like all aspects of language, occurs in its most natural form in spontaneous, conversational speech. Corpora of spoken discourse provide ready access to spontaneous speech, and thus to the natural environment of spontaneous metaphor.

The small amount of corpus-based research in the area of metaphor that has been done has tended to focus on specific, searchable (using concordancing software) lexical items (Deignan 1999). A study such as this one, which seeks to look more broadly at the use metaphor in discourse, is limited in size by the fact that tokens must be identified manually. This study, then, focuses on ten conversations from The Santa Barbara corpus of spoken American English (Du Bois et. al. 2000, 2003), a collection of recordings of people from a variety of locations within the United States engaged in natural discourse, the corpus as a whole aimed at providing a broad sample of ways in which people use language in daily life. The SBCSAE project aims at a 200,000 word collection; parts one and two, from which the data used in this study are taken, represent a collection of around 90,000 words. This study seeks to identify all uses of, and regularities associated with the use of, metaphor within the selections.

This approach necessarily introduces the element of human error. Metaphor is so deeply embedded in the way that we speak that many instantiations of it are unconscious to both the speaker and the listener. While few readers of Romeo and Juliet may miss the metaphor explicit in "But soft! What light through yonder breaks? It is the East, and Juliet is the sun," considerably fewer readers would identify, a few lines later, the metaphor implicit in "Two of the fairest stars in all the heaven": heaven has no innately container-like qualities, yet stars can

be "in" it through the metaphorical conceptualization of the heavens as a container. Most instances of metaphor are simply so deeply rooted in our conceptual systems that they seem literal to us, making the task of identifying all instances of metaphor within a stretch of discourse a formidable one. It is hoped that through a slow, cautious, and repeated review of the data, the element of human error has been, to as great an extent as possible, eliminated here.

The other major issue raised by such an approach is that of the dividing line between metaphors and non-metaphors: What criteria constitute a necessary and sufficient definition of metaphor to which individual utterances may be held? Deignan (1999:182) identifies the three major factors which contribute to a blurring of the boundary:

> firstly, establishing a point at which dead metaphor is so well established in the language as to be regarded as a literal sense, related to other senses of the same lexeme by a relation of polysemy rather than metaphor; secondly, dealing with the metaphors which occur in regularly occurring, relatively fixed phrases which might better be described as idioms; and thirdly, handling the boundary between metaphor and metonymy.

On the first count, Fauconnier's admonition (1997)that the point at which a metaphor is often viewed as dead is more frequently evidence of the point at which a metaphor becomes so deeply entrenched that we as language users are no longer conscious of it is a point well taken. Lakoff (1987b) suggests identifying as metaphorical only those uses of a word of which a literal sense remains in the language, and the figurative use of which triggers a mapping between domains. With respect to metaphors which occur in fixed idiomatic strings, Gibbs' & O'Brien's (1990) work negatively addresses the assumption that such metaphors do not reflect genuine metaphorical mappings.

As Cameron (1999b:123) points out, explicitness of criteria must often serve, in research, the role that an objective, universally (or even widely) agreed upon definition of metaphor cannot. For the purposes of this study, an utterance is taken as metaphorical whenever (1) the systematicity of one domain is applied to another domain, (2) an incongruity exists between domains, and (3) a literal interpretation of the utterance (in a sense compatible with context) is not possible. These criteria allow for the metaphoricity of implicit metaphor (in which the topic and/or vehicle of the metaphor are not made explicit) while also providing a basis for distinguishing between metaphorical and non-metaphorical utterances in each of the three cases outlined above.

One the basis of these three criteria, ambiguities with respect to each of the three issues raised by Deignan are largely resolved. Metonyms occur frequently in the data set, but are not included in the set of metaphorical utterances on the basis that no incongruity or transfer of meaning between domains takes place (these examples, as well as all those that follow in this section, are taken from the data set): in utterances such as 'passages of scripture seem to indicate that...,' 'wouldn't the whole place just laugh,' or 'you gotta go through Iceland' (uttered during a game of Risk), no metaphorical A is B relationships are established. Rather, one part of a whole is being used to refer to another part of that whole (writing for author, place for the people in it, and game piece for the person moving it, respectively). No relation between domains is established because the A and B of a 'B refers to A' metonymic relationship are both within the same domain, often parts of an ICM. Metonyms frequently appear metaphorical at first glance: in a case such as 'granola woman' the utterance is deemed metonymical (with the person referred to by something that they are associated with) rather than as metaphorical on the basis

that while there is an apparent incongruity between domains (food, people), there is no systematicity applied from one to the other– i.e., no attribute of granola is applied to the woman.

While metonyms and metaphors are discrete sets, idiom overlaps with metaphor in a way which makes it the researcher's place to determine whether specific idioms draw, for their meaning, on an underlying metaphor, or whether the meaning of the string is determined on a purely lexical level. While, for example, idioms such as 'pain in the ass' and 'pain in the neck' seem to be motivated by an underlying metaphor which equates problems to minor physical pains, highlighting their annoyingness, it's unclear what the metaphors underlying 'scared to death' or 'hang out' would be. In the case of 'scared to death' it is, quite literally, possible to be so scared that one loses consciousness, and in extreme cases dies, so the figurative meaning of the idiom does not depend on cross-domain mappings and seems to have more to do with exaggeration than metaphor. 'hang out' is exemplary of the type of idiom not counted as metaphorical: a string with a fixed meaning independent of the combined meaning of the individual lexemes of which it is composed, no aspect of the only candidate for a possible source domain (hanging) carries over to the meaning of the string.

The issue of polysemy relates to distinguishing metaphorical uses of individual words, in which the word takes on a new meaning in its new context, from polysemy, in which two or more distinct, if, in some cases, semantically related words are involved. Thus 'deeply appreciative' involves a metaphorical extension of the literal meaning of depth (extension downwards) to a new domain (emotions) (see Deignan 1999 for a full discussion of the metaphorical issues associated with 'deep'). Similarly, in 'muster up the courage' a transfer takes place from a military to domain to that of emotions. In a case such as 'she was a real pill,' on the other hand, 'pill' is regarded as a polyseme of rather than as a metaphorical extension from the more common meaning of 'pill' (a medicinal tablet) on the basis that no transfer of systematicity from source to target domain takes place: no actual pill-like qualities, or aspects of the ICM associated with taking pills, are ascribed to 'her.' On the basis of the three criteria stated above, then, metonyms, polysemes, non-metaphorical utterances, and non-metaphors in general were excluded.

Included, notably, in the tally of metaphorical utterances (hereafter, MU's) were not only metaphors, utterances which make an explicit A is B assertion (e.g.,'human nature is like a horse', or 'kids are seedpods'), but also utterances in which a metaphor is implicit. The former category, in fact, accounts for a small fraction of tokens in the data set. By far most common are utterances which are predicated on, or refer to, an underlying metaphor without actually stating the metaphor. Utterances based on conceptual metaphors compose the majority of the category, as for example in 'the assault on scholastic theology', predicated on the conceptual metaphor ARGUMENT IS WAR (and, more specifically, on THEORETICAL DEBATE IS COMPETITION), or in 'look at me, telling you what to do', in which the speaker is not literally telling the addressee to look at him but rather is calling the addressee's attention to his actions via the conceptual metaphor MENTAL INVESTIGATION IS VISUAL INSPECTION. Included as well are examples which operate on similar principles but are not part of a system which runs throughout the language and thus cannot be considered conceptual metaphors (as for example in 'I bit my teeth into that one," in which the speaker equates being fascinated by an idea to eating it, or 'can you chill out in the art work here,' predicated on the metaphor "tables are museums" which has, in this case, already been established in the discourse. This second category includes a smattering of other types as well, including those in which animacy is ascribed to inanimate things ('sin crouches at the

door', 'fear pulls us in'), and also the many expressions, so readily found in any language, predicated on the assumption that excrement is bad.

A metaphor can be viewed in terms of a logical syllogism: an MU provides one premise of a syllogism, and the other is supplied by the language user's knowledge of the conceptual systems of a language and/or of the world. The conclusion is the aspect of the source domain which is being applied to the topic, that which is being highlighted by the metaphor. Thus, for example, the metaphor 'they[children's bones]'re made of rubber' can be understood as

Bones are made of rubber.
Rubber is soft.
Therefore, bones are soft.

and the utterance 'I stuck up for you' as something along the lines of

I stuck up for you.
Things that stick up are prominent.
Therefore, I was prominent on your behalf.

Seemingly more complex metaphors can be analyzed this way as well: implicit in the statement that 'Erasmus laid the egg that Luther hatched' is the assertion that ideas are eggs, which are laid and hatch. Combined with the real-world knowledge of the teleology inherent to the idea of an egg (i.e., an egg is understood as part of the life cycle of the animal contained in it, not as an end of itself), this leads to the conclusion that ideas come into existence before they are fully actualized. One way to view an MU, then, is as any statement in which the first premise of such a syllogism is inherent, whether explicitly or implicitly. This includes many forms other than the A is B of explicit metaphors.

The set of ten conversations analyzed contained, on the basis of the criteria outlined above, 497 MU's, these comprising the data set for the study.

2. A Typology of Metaphorical Utterances.

One of the major goals of the study was to assess the types of information which people tend to refer to metaphorically in discourse, and the relative frequencies with which metaphor is applied to each type of information. The task poses the difficulty of identifying, in each metaphor, that to which the systematicity of a source domain is being applied.

There is a considerable conceptual morass involved in the problem of identifying the semantic domains involved in a specific metaphor, the major complicating factors being the division between surface and conceptual levels of source and target domains and differing theories as to the structure of conceptual and semantic domains (see Cameron 1999a). Much of this difficulty can be avoided through the simple linguistic test of paraphrasing metaphors as *x* is like *y* statements (*x* being the target), and the issue of what specific target domains are involved sidestepped by identifying them according to broad types (actions, persons, objects, etc.) rather than on a more specific level (e.g., causation, friends, musical instruments). This approach serves the study's purpose of identifying the types of information which people tend to profile metaphorically without forcing a consensus, where certainly none exists, on the literature assessing the nature of the semantic/conceptual domains underlying metaphor. By this approach, then, 'the calf' (referring to a child) is paraphrased as 'the child is like a calf,' a metaphor profiling a person's excess weight, and is categorized as a metaphor referring to a person (the

child). 'I threw it away' is paraphrased as 'discarding of something is like throwing it,' characterizing an action.

It should be noted that the judgment as to what type of information a metaphor is being used to refer to is made on the basis of what the metaphor refers to as opposed to what the metaphor highlights: 'the calf' highlights a child's excess weight, but the target to which some aspect of the systematicity of the source domain (in this case, the physical largeness of cattle) is being applied is the child. Therefore, the metaphor is classified as referring to a person rather than to an attribute or state.

In addition, metaphors are, by their nature as constructions which characterize one thing as another, often deceptive as to what type of thing they refer to. In most cases the division between the type of the source domain and the type of the target domain is fairly straightforward: in 'kids are a whip and a hairshirt' it's clear that, while the vehicle of the metaphor is a set of objects (whip and a hairshirt), the target is kids, and the metaphor refers to people. In other cases it's less obvious what sort of thing a metaphor refers to: 'she didn't get it' looks at first glance like a metaphor which refers to an action, because the conceptual metaphor by which understanding something is equated to physically apprehending something is so deeply engrained in our conceptual system, the systematicity and syntactic structures (i.e., transitivity) associated with actions almost invariably applied to the mental state of understanding something, that it takes a mental effort to recognize that 'she didn't get it,' refers to a state, not an action. The metaphor implicit in 'she didn't get it' is paraphrased as 'understanding is like physically apprehending (something),' and is categorized as referring to a state.

In reviewing the data, 11 categories pertaining to the type of information which a metaphor is used to refer to present themselves: persons, physical objects, actions, spatial representations, quantities, temporal representations, states, emotions, concepts, discourse referents, and speech acts, with frequencies as shown here:

TARGET TYPE	**TOTAL**	**%**
ACTION	148	30
SPEECH ACT	11	2
CONCEPT	125	25
EMOTION	83	17
PERSON	56	11
STATE	28	6
QUANTITY	18	4
TIME	10	2
OBJECT	10	2
SPACE	8	2
TOTAL	497	100

TABLE 1. TARGET TYPES BY FREQUENCY.

3. ANALYSIS.

With respect to the pervasiveness of metaphor in the conversations analyzed, this study found 497 MU's in ten conversations. The written transcripts of the corpus are broken up into lines,

each line containing no more than one intonation unit (defined by Du Bois et. al {1993:17} as "a stretch of speech uttered under a single, coherent intonation contour"), and as many as half of those lines (of which there are 11,836 in sum) consisting of either incomplete clauses, single word utterances, filled pauses, repetitions, or non-linguistic sounds (e.g., coughing, laughing, etc.). 1 out of every 23.8 lines is or contains an MU, placing the frequency of the presence of MU's within lines that could, potentially, contain an MU at or slightly below 1 out of 11.9 lines. Notably, while systems of metaphor occur across intonation units throughout the data set and MU's operating on the same mapping from source to target domain may occur on adjacent lines, individual MU's are bound within individual intonation units.

3.1 Distribution of Target Types.

The set of all MU's in the data set having been identified, the tokens were sorted according to the type of information which the metaphor was being used to profile, the conceptual target domain to which the systematicity of the source domain is applied. Most common in the data set, by a considerable margin, are the 30% of MU's which characterize actions, the majority of which occur in fixed idiomatic strings: 'check it out,' 'go after her,' 'talk me out of,' and 'come up with,' examples which also illustrate the frequency with which idioms describing actions involve conceiving of actions along some sort of spatial schema. Idiomaticity can be thought of as a continuum: highly fixed and lexically specified idioms such as the examples given above are at one end of the continuum, and novel, innovative utterances such as 'stringing complicated sentences together' or 'burped out' (meaning 'born') at the other. Most MU's referring to actions are grouped at or towards the idiomatic end of the spectrum, with relatively few innovative metaphors in the set.

An interesting subset of the actions category (treated as a discrete category in the table above) are MU's which describe speech acts, comprising 2% of the data set and 7% of actions. These include the constatives 'damn it,' 'go to our father in heaven,' 'to bring it up,' and 'talk me out of' all of which describe discourse events (condemning, prayer, mentioning, and dissuading, respectively), the potentially performative (they are not used performatively in the context in which they occur in the data set) 'stick up for you' and 'ask [someone] out,' and the decidedly performative 'f**k you.' Metaphorical performatives raise interesting issues for semanticists and philosophers of language, most notably that that which is accomplished through speaking them is not, on a literal, surface level, expressed in the utterance (as opposed to a statement such as 'I thank you,' in which thanking is both accomplished by, and a word in, the utterance). That the figurative, rather than the literal, meaning of a metaphor is accomplished through using it performatively, illustrates the extent to which metaphorical speech must be acknowledged even in a limited conception of language as a bearer of truth values.

Next most common, accounting for 25% of the MU's contained in the data set, are metaphors which refer to concepts, considered here to be any nominal taking a referent which is not physically concrete. This includes utterances such as 'the highlights,' 'side effects,' 'balancing force,' 'watery-eyed theories,' and 'the key question' as well as discourse referents, in which the metaphor refers to an entity which has been established in the preceding discourse and is not explicitly identified in the metaphor (e.g., 'it is paralyzed,' where 'it' refers to free will, 'how are you outside of that' where 'that' refers to a series of events which have just been discussed). Metaphors the target of which is a referent which has been established in the discourse comprise 19% of the concept category, 4% of the data set overall.

17% of the MU's in the data set refer to emotional states, the tokens revealing some interesting examples of the ways in which people refer to emotions. First, instantiations of Lakoffian conceptual metaphors for specific emotions (e.g., ANGER IS HEAT, DESIRE IS HUNGER, FEAR IS COLD) are surprisingly rare, almost unrepresented, in the data set. Conceptual metaphors which refer to emotions collectively or in general (STRONG EMOTIONS ARE MADNESS, EMOTION IS MOTION, EFFECT ON EMOTIONAL SELF IS CONTACT WITH PHYSICAL SELF) are more common, but still surprisingly underrepresented in the data set. This seems to be in large part because emotional states are rarely, in discourse, attributed directly to the people experiencing them, but are rather deflected onto the environment. The majority, rather, of metaphorical expressions of emotion deflect the emotion onto the environment (a statement which is true for literal expressions of emotion as well as metaphorical ones- utterances such as 'that's disappointing' are far more common than utterances such as 'I'm disappointed'), making expressions such as 'that's a pain in the neck' and 'that's Jeff's slice of heaven,' the type of MU referring to emotional states most frequently encountered in the data set. Many metaphors of this type characterize an emotional state in terms of an action, attributing agency to something external to the experiencer of the emotion, as in 'the light broke in on me' and 'that sends me out there.'

Other types of emotion metaphors certainly exist as well, however, both isolated metaphors ('he had a ball,' 'I was into it, 'are you going into purr mode') and those motivated by conceptual metaphors ('he blows up about it,' 'I'd go crazy'). One interesting intersection of the metaphorical and literal modes of referring to emotions comes when people refer to emotions by their literal names, but personify them, as in 'fear eats away at us,' or place them in the context of DIFFICULTY IS DIFFICULTY IN MOVING, as in 'worrying about that has got in the way' and 'pushed through his fears.'

The 11% of metaphors which refer to persons include explicit metaphors such as 'he's such a scumbag,' 'they're babies,' 'he was like a little Australian Sheepdog running around,' 'she married daddy to take care of her,' 'these two old windbags,' or any utterance in which a person or group of people are metaphorically categorized as something. All vocatives which occur in the data set are included in, and constitute a significant portion of, this category, including such examples as 'my brothers and sisters,' 'hey baby,' and 'honey.' The greatest part of the category is comprised of profanities, equations of people to taboo parts of the anatomy or to excrement: 'the little shit,' 'that twat,' 'asshole,' 'you are a lazy butt,' etc.

Metaphors which profile states represent 6% of the data set. These tokens include all metaphors the literal paraphrase of which involves an ongoing situation– a state of affairs– with examples including 'women aren't all over me,' 'they're stuck babysitting,' and 'she didn't get it.' Changes of state, as in 'get caught up in computers,' are included on the basis that no real action is inherent- while to get someone caught up in something would involve an action, to become caught up in something is simply to go from one state to another. As with emotions, changes of state are very often expressed, via metaphor, as actions undertaken by an agent, as in 'the world hit a point where there was no more objectively pristine land.'

Metaphors referring to quantities comprise 4% of the MU's in the study, 18 tokens which are all instantiations of the image schema by which numerically greater values are conceived of as higher, spatially, than lower numerical values: 'high card,' 'very high AIDS infection rate,' 'under thirty.'

In the 10 MU's (2%) which refer to temporal representation, time is referred to occasionally according to the conceptual metaphor TIME IS A LANDSCAPE WE MOVE THROUGH,

as in 'maybe somewhere down the road,' but much more frequently in spatial terms, as in 'talk long,' 'in the middle of studying,' and 'between the seasons.'

Objects are tangible and concrete, outside of the usual domain of metaphor. Metaphors referring to objects comprise just 2% of the data set, and serve to highlight some aspect of the object, as in 'they're made of rubber,' highlighting the softness of children's bones, 'those tables are museums,' referring to the fact that the tables are valued, and 'the shittiest speakers on earth,' profiling the poor quality of the speakers.

Least frequent are metaphors which describe orientation in space, 8 tokens (2%) which are mostly instantiations of metaphors ascribing container-like qualities (an inside and an outside, namely) to things which have no inherent container-like qualities ('women out there,' 'in the front,') and a couple of instances of image schemas applying a vertical image schema to the cardinal directions: 'up here,' 'up north.'

4. DISCUSSION.

The relative frequencies of types of metaphor in the discourse support the proposition that the function of metaphor is to represent the nebulous in terms of the concrete, the less-defined in terms of the more defined. Arranging the categories in ascending order of frequency with which they occur in the data set yields an approximate continuum of concreteness:

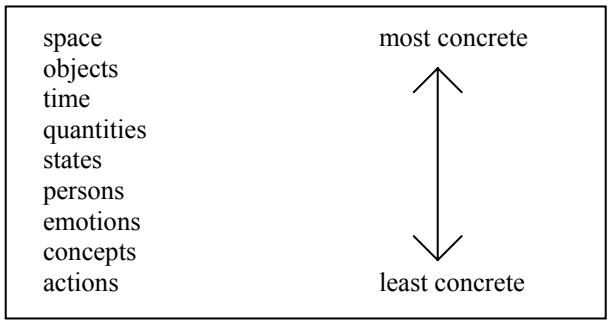

FIGURE 1. CONTINUUM OF CONCRETENESS.

At the top are objects and spatial representations, entities that we easily conceptualize without having to understand them in terms of something else, at the bottom concepts and emotions, nebulous concepts clarified by reference to another domain.

It is problematic, however, that actions appear at the very bottom of the continuum, below the intuitively more nebulous emotions and concepts. The rankings seem, in this case, to have been skewed by the sheer frequency with which actions are described in discourse, actions ascribed an artificially low place in the hierarchy by the fact that the number of metaphorical utterances referring to actions is high in proportion to the high percentage in discourse of utterances (both literal and metaphorical) which refer to actions. That the assignment of actions to the bottom of the continuum is anomalous is supported by the fact that emotions and concepts are frequently characterized, metaphorically, as actions: according to the view of metaphor as ascribing the systematicity of more concrete (higher on the continuum) domains to those of less concrete (lower on the continuum) domains, one expects targets to occur lower on the continuum than sources, as in the frequent characterization of time and of quantity as space. That emotions and concepts are both frequently characterized as actions in MU's suggests that actions would rank somewhere above concepts and emotions in a ranking which took into account ratios of

MU's referring to actions to the total frequency of all utterances referring to actions, both metaphorical and literal, in discourse.

4.1 DISCOURSE SYSTEMATICITY IN METAPHOR USE.

Some interesting issues are raised by the distributions of metaphor throughout the conversation analyzed. Cameron (1999a:16) describes three levels at which the systematicity of metaphors in discourse can be understood: Local systematicity, by which "within a particular text, related Vehicles may occur that develop an extended metaphor across several aspects of the Topic," discourse systematicity, referring to the fact that "within language use in specific discourse communities, related Vehicles may be drawn on," and global systematicity, the level at which "across texts from a range of discourse types and content, semantically linked Vehicles may occur, producing systems and layers of metaphors."

While discourse systematicity is outside of the scope of the current study (corpus data lacking information on the speech communities of the participants, and even where such information can be inferred, often failing to represent more than one member of a speech community: for example: the SBCSAE contains only one dialogue in which a preacher, a member of a specific discourse community, is a participant), the two other levels of systematicity noted by Cameron can be observed throughout the discourse. Global systematicity is evidenced throughout the conversations analyzed by the many MU's in the data set which are motivated by conceptual metaphors, as well as by the broad tendencies observed in the data set for certain types of things to be represented, through metaphor, as other types of things: quantities as vertical image schemas, for example, or emotions and states as actions.

Local systematicity occurs where a metaphors is 'explored,' the sytematicity of the target domain fleshed out by repeated references, often using innovative metaphors, to the source domain (Lakoff and Johnson, 1980, describe something similar when they describe utterances which take advantage of the 'unused' part of a metaphor). The phenomenon can be seen repeatedly throughout the discourse analyzed, in examples such as 'it pulled me under like a giant octopus or a giant shark,' 'sometime you go through something and you come out the other side so much better,' 'Erasmus laid the egg that Luther hatched,' and 'those tables are museums, could you please, chill out in the art work here?'. In each of these utterances, a metaphor is elaborated by repeated reference to the source domain.

Nor does such repeated reference to a metaphor have to occur, as in the examples above, within a single utterance. Conversational participants have a dialogic memory of metaphors, and explorations of a single metaphor can occur across considerable stretches of discourse, as when a speaker utters the line 'they like having people having to owe them- that's part of the reason they're not burning their bridges,' and 56 lines constituting 15 speech turns later, 'and I said to them, if you invite them, you'll also have to invite Liza and Antonio. You want them staying at the house, too? So they next thing you know, they dropped— at least that bridge, they weren't too unhappy about burning.'

One important aspect of local systematicity that Cameron does not include in her discussion of it is the tendency for it to be the case that once a metaphor assigning a particular source domain to a particular target domain emerges in a piece of discourse, that metaphor becomes pervasive in the discourse: *the* way of referring to the topic domain. In one conversation, for example, the two participants engage in a discussion on death. After 348 lines, consisting of 42 speech turns, of discourse riddled with metaphor but referring to the concepts of

life and death only in strictly literal terms, one participant utters the line, describing life, 'so you're running, you're running down the road, all the way to the very end.' This utterance exemplifies the sort of local systematicity which Cameron describes in which a metaphor is elaborated on, but it asserts another level of systematicity into the discourse as well: whereas LIFE IS A JOURNEY had not previously been instantiated in the discourse, once it is triggered by an utterance equating living life to running down a road which is ones lifespan, it becomes a pervasive metaphor in the discourse, the primary mode of referring to life and death. Death is referred to as 'standing at the end of the road,' and several times thereafter just as 'there,' referring back to the end of the road which equates to ones lifespan. The period of time preceding life is referred to as 'where I was' in the utterance 'maybe I'm just eager to get back to where I was' and again with 'where I was before I was born.' The current stage in life becomes 'here,' and a speaker characterizes her tendency, as a child, to think thoughts too mature for her age as 'I get a little ahead of myself.' The wish not to "get ahead of oneself," but to enjoy one's current stage in life, is expressed as 'my yearning is not to run ahead and... and get to the exit.' In another conversation, a pastor discusses the concept of fear. Throughout the discourse, fear is referred to either in literal terms or in metaphors treating fear as an obstacle to be overcome on a journey. Once fear is attributed animacy in the metaphor 'fear is crippling,' the attribution of agency to fear becomes pervasive: 'fear overcame me,' 'fear pulls us in,' 'fear entraps us,' fear keeps us moving,' 'fear eats away at you,' etc. The structure of metaphor goes far beyond isolated utterances, operating as a structuring force in dialogue.

5. CONCLUSION.

Metaphor is intimately bound with discourse, structuring the human communicative endeavor 1) at the pre-linguistic, conceptual level which by which we conceive of the world around us and organize the concepts which language serves to code (Lakoff & Johnson 1980, Lakoff 1987a, Sweetser 1992, Taylor 1995, Fauconnier 1997), 2) at the level of syntactic structure, dictating at sentence-level how ideas are expressed (Lakoff & Johnson 1980, Goldberg 1998), and 3) at the discourse level, affecting the overall structure of, and the ways that ideas are treated within, discourse events. The pervasiveness of metaphor in discourse, as well as the role it plays in structuring discourse at several layers, illustrates that metaphor is an essential feature in language. Furthermore, if syntax is conceived of as the means by which language is organized both at the sentence level and beyond, then metaphor is a powerful agent of such organization for which an adequate definition of syntax must account.

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ON SWEDISH FUTURE CONSTRUCTIONS

MARTIN HILPERT
Rice University

This paper is a corpus-based investigation of three Swedish constructions that are used to express futurity. The method of collostructional analysis (Gries and Stefanowitsch 2003) is applied to constructions with the auxiliaries ska 'will', skall 'shall', and komma 'come', which are future markers that have grammaticized to varying degrees. The aim of this paper is to investigate semantic differences between constructions with these auxiliaries. By analyzing the main verbs that co-occur with a given auxiliary, it can be statistically assessed what verbs are significantly attracted to the construction. It thus becomes possible to analyze the constructional semantics in terms of co-occurring lexical material. Conversely, it is also insightful to consider what verbs occur significantly less often than chance frequency with a given auxiliary. These procedures allow a fine-grained semantic description in both positive and negative terms.

1. INTRODUCTION.

This paper is a corpus-based investigation of Swedish constructions that are used to express futurity. In her monograph on Swedish future constructions, Christensen (1997:9) characterizes her own approach as purely theoretical, but suggests that an empirical study would be useful. The present work is intended to fulfil this function.

It is common for a language to have several grammaticized future constructions (Bybee et al. 1994:243). Swedish is no exception to this tendency. There is no morphological future construction, but futurity can be expressed periphrastically by means of the present tense in conjunction with a time adverbial, as well as with a range of auxiliaries, such as *ska* 'shall', *komma* 'come', and *tänka* 'think'.

(1) *Lena åker till Paris nästa år.*
Lena drives to Paris next year
'Lena will drive to Paris next year.'

(2) *Om några minuter ska han åka iväg.*
in some minutes will he drive away
'He will drive away in a couple of minutes.'

(3) *Blomberg kommer att inviga museet.*
Blomberg comes to inaugurate museum.the
'Blomberg will inaugurate the museum.'

(4) *Men först tänker vi bjuda er på middag!*
but first think we invite you for dinner
'But first we are going to invite you for dinner.'

A steady source of controversy in the literature on tense has been the question whether a given form actually qualifies as a future construction (Comrie 1989:51). Usually, a construction expressing futurity has a number of different uses as well. To illustrate this, a possible alternate reading of example (2) would be 'He shall drive away in a few minutes', which in some English dialects carries the meaning of obligation. In example (4), the meaning of futurity is coupled with a strong sense of intention on the part of the subject. The fact that a given language does not have a grammatical form with the sole function of future time reference could lead the researcher to deny that the language has future tense at all (see, e.g., Fleischman 1982). Linguists with a wider definition of future tense tend to arrive at the opposite conclusion, namely that there are several expressions of future tense (e.g., Bybee et al. 1994).

To avoid this controversy, the present analysis does not aim at a full explanation of the grammatical category of future tense in Swedish. Instead, it will explore meaning and use of three Swedish constructions which express, among other things, futurity. The investigated constructions consist of a future-marking auxiliary in conjunction with a main verb. The auxiliaries in question are *ska* 'will', *skall* 'shall', and *komma* 'come'. It is clear that these constructions are not an exhaustive list of future expressions in Swedish. The future markers *ska*, *skall,* and *komma* were chosen because they are generally viewed as the most common future constructions in Swedish (Teleman et al. 1999).

This paper takes the viewpoint of CONSTRUCTION GRAMMAR (Goldberg 1995) and GRAMMATICIZATION THEORY (Hopper and Traugott 1993). Within these frameworks, constructions are understood as polysemous units that have a number of conceptually interrelated functions. The present study uses the recent corpus linguistic methodology of COLLOSTRUCTIONAL ANALYSIS (Stefanowitsch and Gries 2003). Collostructional analysis measures the strength of association between lexical items and grammatical constructions, thus allowing a fine-grained semantic description of such constructions. The corpus used is the Stockholm-Umeå Corpus (SUC), which is a one-million word corpus that has been compiled in analogy to the English Brown and LOB corpora.

The aim of this paper is to investigate semantic differences between the Swedish future constructions. It has been argued on theoretical grounds that syntactic constructions, such as the English ditransitive construction, are meaningful in themselves (Goldberg 1995). Collostructional analysis allows this claim to be empirically refined. By examining the lexical items that occur within a given grammatical construction, it can be shown that some of these occur with much greater frequency than chance. On the basis of these statistical preferences, it is possible to empirically investigate the meaning of a given construction.

This paper uses the main verbs that are associated with Swedish future constructions as a basis for a semantic description of these constructions. Hopper and Traugott (1993) observe that grammaticized auxiliaries still carry some of their original meaning, a phenomenon which is called PERSISTENCE in the grammaticization literature (Hopper 1991:22). Persistence of lexical meaning can be observed in the Swedish future constructions through constructional polysemy. Besides 'futurity', these constructions frequently express 'obligation', 'volition', 'intention', or 'epistemicity'. While the polysemy of auxiliaries is a phenomenon that often evades objective description, co-occurring main verbs provide empirical evidence to flesh out the claim made by Hopper and Traugott (1993). If an auxiliary has grammaticized out of a verb of obligation, we expect it to co-occur with main verbs that semantically relate to this lexical source, even in present-day usage.

2. METHODOLOGY.

Collostructional analysis (Stefanowitsch and Gries 2003) situates itself in the framework of construction grammar (Fillmore et al. 1988, Goldberg 1995) while being a corpus-driven analysis of collocations (Sinclair 1991, Stubbs 1995, Hunston and Francis 1999).

The starting point of a collostructional analysis is the exhaustive extraction of all tokens of some grammatical construction from a corpus, such as Swedish *ska V* 'will V'. Chunks, such as an auxiliary in conjunction with a main verb, qualify as constructions in the technical sense of Goldberg (1995:4), because their meaning is not fully predictable from the meaning of their parts. But whereas Goldberg tries to characterize the meaning of constructions largely independently of the actual verbs that occur in the construction, collostructional analysis uses the collocating verbs to analyse the meaning of a given construction.

With an exhaustive concordance of a construction, it can be determined what verbs occur most frequently in that construction. Counting the examples will generate a list of verbs, which may already give a rough indication of the constructional semantics. However, a second step is necessary to establish whether a verb is actually attracted to a given construction. The overall frequency of any given verb needs to be taken into account to calculate its expected frequency inside the *ska V* construction. As some verbs are highly frequent even outside that construction, these verbs will be less distinctive for the construction than some other, less frequent verbs.

To calculate the expected frequencies of the verbs in the investigated constructions, all of their forms are extracted from the Stockholm Umeå Corpus. The observed frequencies of all verbs in the SUC and all verbs in the construction concordances can be interpreted through a statistical test of association strength, such as the FISHER EXACT test. Table 1 exemplifies the crosstabulation necessary for such a test with the main verb *vara* 'be' in the *ska V* construction.

	vara	¬ vara	ROW TOTALS
ska	108	1353	1461
¬ ska	23,986	149,807	173,793
COLUMN TOTALS	24,094	151,160	175,254

TABLE 1. CROSSTABULATION OF *SKA* AND *VARA*.

To provide the statistical test with the necessary information, all cells in the crosstable need to be filled with the respective token figures. Four pieces of information are essential. One necessary piece of information is how many instances of *ska vara* there are. A corpus search yields 108 tokens. In addition, the test needs to be told how many instances of *ska* and *vara* respectively there are in the corpus. In the SUC we find 1461 tokens of *ska*, and 24094 instances of *vara*. The fourth piece of information is the total number of verbs in the corpus. As the SUC as a whole contains 175255 verb tokens, it follows that it contains 175254 sequences of two verbs, allowing for intervening elements. These pieces of information account for the four figures in the outer corners of Table 1, and the remaining five figures can be arrived at by subtraction.

To calculate collocation strength, the four inner fields of Table 1 are fed into the Fisher Exact test. This test is more appropriate for the matter at hand than are other measures of association strength, because it does not make the assumption of normal, bell-shaped distribution. That has been identified as a shortcoming of tests such as CHI-SQUARE, as elements

in natural language data tend not to be normally distributed (Manning and Schütze 2000:175). Another advantage of the Fisher Exact test is that it can operate on very small sample sizes. When dealing with verbs in a given construction, frequencies below five are often encountered.

The methodology produces a list of verbs for each construction that are ordered according to their attraction to the construction. It thereby identifies not only those verbs that are most typical of a construction, but also verbs that are atypical of that construction. Taking into account both attracted and repelled verbs, we can characterize the construction in both positive and negative terms. It is of course possible to take these lists as input for more sophisticated statistical processing such as e.g. cluster analysis (Gries and Wulff 2005). This paper aims at a qualitative description of the Swedish future constructions which is informed by the results of a collostructional analysis.

3. SWEDISH FUTURE CONSTRUCTIONS.

In this section, the methodology outlined in the last section is applied to three Swedish constructions. Bybee and Pagliuca (1987) identify the concepts 'desire', 'obligation', and 'movement' as the most common lexical sources of future markers. Two of these sources are found in the investigated constructions.

The common modal *ska* 'will' is a shortened form of *skall* 'shall'. Both forms derive from the verb of obligation *skola*, which is etymologically related and close in meaning to English 'shall'. As will be shown, *ska* and *skall* differ semantically and pragmatically in present-day usage. The form *skall* is usually viewed as belonging to an elevated register which is used in written Swedish, while *ska* is associated with conversational register. The future auxiliary *komma* derives from the homograph motion verb *komma* 'come'. Table 2 illustrates the token frequencies of the different constructions. Expressions with *ska* constitute the most frequent type. Expressions with *skall* are almost as frequent, while the construction with *komma* is less frequently used.

auxiliary	*ska*	*skall*	*komma*
tokens	1461	1324	953

TABLE 2. TOKEN FREQUENCIES OF SWEDISH FUTURE CONSTRUCTIONS.

The following sections discuss each construction in detail, address previous work, and go through the steps of the collostructional analysis.

3.1 *SKA*.

The verb *ska* 'shall' derives from the older root *skola*. Christensen (1997: 170) characterizes *ska* as a polysemous verb which can express 'futurity', 'intention', 'obligation', and 'epistemicity', as illustrated in the following examples.

(5) *Om några minuter ska han åka iväg.*
in some minutes will he drive away
'He will drive away in a couple of minutes.'

(6) *Vad ska du göra i Berlin då?*
what want you do in Berlin then
'So what are you going to do in Berlin?'

(7) *Att patienten gett tillstånd ska antecknas i journalen.*
that patient.the gave permission shall note.PASS in journal.the
'It must be noted in the journal that the patient gave permission.'

(8) *Tony Blair ska ha gjort sin frus bästa vän, Carole Caplin, med barn.*
Tony Blair shall have done his wife's best friend Carole Caplin pregnant
'Tony Blair is said to have gotten his wife's best friend, Carole Caplin, pregnant.

The notions of 'futurity', 'intention', and 'obligation' are closely interrelated by CONCEPTUAL METONYMY. World knowledge tells us that intentions and obligations may eventually lead to future actions. Panther and Thornburg (2003:4) point out the OBLIGATION TO ACT FOR ACTION metonymy in examples like (9), which overtly expresses only an obligation but implies that the obligation actually led to action.

(9) *General Motors had to stop production.*

Similarly, the OBLIGATION TO ACT FOR ACTION metonymy may have led to the grammaticization of Swedish *ska* into a future modal, yielding examples like (5), which mainly code futurity but imply obligation.

Epistemic modality, as in example (8), is not a source of future meaning, but a development out of future meaning (Bybee et al. 1991:26ff). As future events are uncertain by nature, the semantic shift from future to probability occurs naturally in a wide variety of languages. For obligation-based lexical sources, Bybee et al. suggest a cline of semantic development with four stages. As examples (5) – (8) show, all of these meaning components are present in actual usage.

(10) OBLIGATION > INTENTION > FUTURE > PROBABILITY

There are 1461 examples of *ska* followed by another verb in the corpus. Table 3 shows the raw frequencies of the twenty most frequent verbs in this construction.

While Table 3 presents the verbs that speakers are most likely to hear in the *ska V* construction, it does not indicate whether these verbs are distinctive of the *ska V* construction. Table 4 lists the verbs that occur in the *ska V* construction according to their collostructional strength. The p-value shows strength of association, as computed with the Fisher Exact test. The lower the p-value of a given verb, the stronger it is associated with the construction. The table includes all verbs with a p-value of $p < 0.01$.

Swedish	*English*	*tokens*	*percentage*	*Swedish*	*English*	*tokens*	*percentage*
vara	be	108	7.39%	komma	come	20	1.37%
kunna	could	87	5.95%	ske	happen	19	1.30%
ha	have	66	4.52%	ge	give	16	1.10%
få	get	58	3.97%	finnas	exist	15	1.03%
bli	become	56	3.83%	försöka	try	14	0.96%
göra	do	49	3.35%	använda	use	13	0.89%
gå	go	37	2.53%	betala	pay	12	0.82%
ta	take	35	2.40%	stå	stand	12	0.82%
se	see	32	2.19%	behöva	need	11	0.75%
säga	say	21	1.44%	gälla	concern	10	0.68%

TABLE 3. RAW FREQUENCIES OF VERBS IN THE *SKA V* CONSTRUCTION.

Swedish	*English*	*p*	*Swedish*	*English*	*p*
bli	become	0.000000	åka	drive	0.000655
ske	happen	0.000000	gå	go	0.000780
göra	do	0.000001	kunna	could	0.000945
spara	save	0.000003	få	get	0.002219
betala	pay	0.000008	klara	cope	0.002333
gifta	marry	0.000015	ta	take	0.003456
försöka	try	0.000199	presentera	present	0.004402
hjälpa	help	0.000634	sluta	stop	0.009377

TABLE 4. COLLOSTRUCTIONAL STRENGTH OF VERBS IN THE *SKA V* CONSTRUCTION.

A comparison of Table 3 and Table 4 shows that the highly frequent verbs *vara* 'be', and *ha* 'have' occur in fact less often in the construction than expected, given their overall frequency. The three verbs that are most distinctive for the *ska V* construction are *bli* 'become', *ske* 'happen' and *göra* 'do', general verbs that are unspecific with regard to the event that is denoted. Unlike *göra*, the verbs *bli* and *ske* strongly prefer inanimate subjects, thus ruling out the interpretations of intention and obligation. Consider Table 5.

bli – 'become'		*ske* – 'happen'		*göra* – 'do'	
animate	*inanimate*	*animate*	*inanimate*	*animate*	*inanimate*
9	47	-	19	40	9
16.07%	83.93%	0.00%	100.00%	81.63%	18.37%

TABLE 5. ANIMATE SUBJECTS IN EXAMPLES WITH *BLI*, *SKA*, AND *GÖRA*.

The fact that the two most distinctive verbs exclusively code futurity suggests that the *ska V* construction is first and foremost a future marker, despite its pervasive polysemy. This contradicts a claim made in the literature that the meaning of *ska* is always modal and that future meaning is a secondary phenomenon (Törnudd-Jalovaara 1991:527). It is the case that many examples have modal overtones, but the data strongly suggest that future usage is not a marginal phenomenon. However, the third verb on the list, *göra* 'do', favors animate subjects and thus gives rise to interpretations in the way of intention and obligation. Of the remaining verbs, *spara* 'save money', *betala* 'pay' and *hjälpa* 'help' are strongly linked to the notion of obligation. The examples with *gifta* 'marry' all express the intention to get married. Likewise, *försöka* 'try' always conveys a future intention.

The verbs *vara* 'be' and *ha* 'have' occur in the *ska V* construction, albeit significantly less often than expected on the basis of their overall frequency. It is adequate to say that these general, highly frequent verbs are repelled by the construction.

3.2 *SKALL*.

The verb form *skall* 'shall' also derives from *skola*. The etymological relation has led researchers to reduce the difference between *ska* and *skall* to a matter of style and register (Christensen 1997:34). While the divergence of *ska* and *skall* is likely to have started as a purely stylistic difference, the corpus data suggest that these pragmatic issues have developed into substantial semantic differences. It is therefore warranted to treat *ska* and *skall* as distinct auxiliaries. Like its shortened counterpart *ska*, *skall* expresses 'futurity', 'intention', and to an even stronger degree 'obligation'. Consider the following examples.

(11) *Deng Xiaoping skall dö.*
Deng Xiaoping shall die
'Deng Xiaoping shall die.'

(12) *Skall vi åka, Kommissarien?*
shall we drive detective.the?
'Shall we drive, detective?'

(13) *Vi skall inte blint acceptera en filosofisk eller religiös tradition.*
we shall not blindly accept a philosophical or religious tradition
'We shall not blindly accept a philosophical or religious tradition.'

As in the examples with *ska*, it often cannot be unambiguously decided whether the primary meaning of an example in question is futurity, intention, or obligation. There are 1324 examples of *skall* followed by another verb in the corpus. Table 6 shows the raw frequencies of the twenty most frequent verbs in this construction.

Swedish	*English*	*tokens*	*percentage*	*Swedish*	*English*	*tokens*	*percentage*
vara	be	98	7.40%	bli	become	19	1.44%
kunna	could	82	6.19%	se	see	19	1.44%
ha	have	50	3.78%	betala	pay	18	1.36%
få	get	39	2.95%	tillämpa	apply	16	1.21%
anse	consider	31	2.34%	gå	go	15	1.13%
ta	take	26	1.96%	göra	do	15	1.13%
ske	happen	24	1.81%	komma	come	14	1.06%
finnas	exist	21	1.59%	anmäla	report	12	0.91%
ge	give	20	1.51%	pröva	prove	12	0.91%
lämna	leave	20	1.51%	använda	use	11	0.83%

TABLE 6. RAW FREQUENCIES OF VERBS IN THE *SKALL V* CONSTRUCTION.

Again, these figures have to be compared against the overall frequencies of the verbs to determine collostructional strength. Table 7 lists the verbs that occur in the *skall V* construction significantly more often than elsewhere (Fisher Exact, $p < 0.01$).

Swedish	*English*	*p*	*Swedish*	*English*	*p*
anse	consider	0.000000	vidta	begin	0.000004
ske	happen	0.000000	ordna	organize	0.000009
lämna	leave	0.000000	meddela	communicate	0.000033
betala	pay	0.000000	fördela	divide	0.000057
tillämpa	apply	0.000000	besluta	decide	0.000094
anmäla	report	0.000000	föra	lead	0.000397
pröva	examine	0.000000	avgöra	decide	0.001682
upphöra	stop	0.000000	behandla	deal with	0.001862
belasta	charge	0.000000	innehålla	contain	0.002246
gravsätta	bury	0.000000	bestämma	decide	0.003678
underrätta	inform	0.000000	ange	declare	0.005807
beakta	consider	0.000000	hjälpa	help	0.007369
avlämna	deliver	0.000000	ge	give	0.007448
avvisa	reject	0.000004	fungera	function	0.009213

TABLE 7. COLLOSTRUCTIONAL STRENGTH OF VERBS IN THE *SKALL V* CONSTRUCTION.

Taking collostructional strength into account reveals that the three most frequent verbs *vara* 'be', *ha* 'have', and *kunna* 'could', are in fact actively repelled by the construction. The most distinctive verb of the *skall V* construction is the mental verb *anse* 'consider'. The examples with *anse* all constitute legal definitions from legal and commercial texts. Like (14), all examples are in the passive voice.

(14) *I vilka fall en verksamhet skall anses som yrkesmässig anges i kap. 4.*
in what case an activity shall consider.PASS as professional declare.PASS in ch. 4
'In what case an activity is considered professional is discussed in chapter 4.'

While this usage appears highly specific and not prototypical, it is highly distinctive for the *skall V* construction. The collostructional analysis corroborates conclusions of previous accounts (Ewerth 1996, Christensen 1997) that speakers associate the construction with a formal register, in this case a legal setting. Additional evidence comes from examples with the synonym *beakta* 'consider', which behave similarly.

The second verb on the list is *ske* 'happen'. As in *ska V*, this verb tends not to occur with animate subjects. But whereas *ska* with inanimate subjects mainly codes futurity, *skall* usually expresses obligation on the part of some unexpressed agent, as in (15).

(15) *Betalning skall ske före månadens slut.*
payment shall happen before month.GEN end
'Payments must be made before the end of the month.'

The third verb is *lämna* 'leave'. Eighteen out of nineteen examples in the data display ditransitive usage. These examples are semantically very similar, coding the obligatory exchange of information. In example (16), a report must be sent from one institution to another. In the same vein, *anmäla* 'report', *underrätta* 'inform', *meddela* 'communicate' and *ange* 'declare' code communication in a formal setting.

(16) *Före den första december skall fonden lämna en årsredovisning till regeringen.*
before the first December shall foundation.the leave a year report to government.the
'The foundation shall deliver a yearly report to the government before December 1st.

As in *ska V*, we find *betala* 'pay' being attracted to the construction. A verb from the same semantic field is *belasta* 'charge'. Both verbs express the obligation of some financial transaction in the *skall V* construction. The verb *tillämpa* 'apply' also evokes a legal register when used in this construction.

3.3 *KOMMA.*

The auxiliary *komma* 'come' is regarded as the most fully grammaticized future marker in Swedish grammar, although the first attested examples are no older than the 17th century (Dahl 2000:320). Consider example (17) from 1636 (Christensen 1997:48).

(17) *Hvadh skeppen medh behörlig stycken [...] och ammunition kommer till att kosta [...]*
what ships.the with equipment and ammunition comes to INF cost
'What the ships with equipment and ammunition will cost [...]'

The meaning of the lexical source has been bleached out thoroughly, so that *komma att V* future in present day Swedish primarily codes prediction (Christensen 1997:190). Despite the high level of grammaticization, Christensen (1997:45) finds that the *komma att V* construction is

less frequent than *skola*-based futures or futurate uses of the present tense. The figures from the corpus data for *ska* and *komma att* corroborate this claim (cf. Table 1).

English *going to* future is a similar example of a motion verb grammaticizing into a future marker, but the deictic centre is reversed in the two constructions. Whereas the English construction is egocentric, the deictic centre of Swedish *komma att V* future is on the event that is going to happen. Another difference between *going to* and *komma att V* is the fact that early uses of *going to* required intention on the part of the subject. Dahl compares several European futures with verbs of coming and finds that none of these involve the notion of intentionality (2000:321). This poses a problem for a claim made in Bybee et al. (1994:270) that "all modal and movement future sources begin with human agents and move from the expression of the intentions of that agent to the expression of prediction". Even in example (17), which is a very early example, the subject is inanimate.

The *komma att V* construction does not imply either intention or obligation on the part of the subject. Neither is there an epistemic reading. The absence of the implicature of obligation can be explained through the fact that the meaning of the lexical source verb *komma* is about self-propelled motion towards some goal. The action of coming does not presuppose a physical or social force that obliges the agent to act.

There are 953 examples of *komma att V* in the corpus. Consider Table 8 for the twenty most frequent verbs and Table 9 for significantly attracted verbs (Fisher Exact, $p < 0.01$).

Swedish	*English*	*tokens*	*percentage*	*Swedish*	*English*	*tokens*	*percentage*
bli	become	59	6.19%	ge	give	13	1.36%
få	get	43	4.51%	öka	increase	12	1.26%
kunna	could	33	3.46%	ske	happen	12	1.26%
vara	be	29	3.04%	tänka	think	12	1.26%
se	see	19	1.99%	finnas	exist	10	1.05%
göra	do	17	1.78%	behöva	need	9	0.94%
påverka	influence	17	1.78%	kalla	call	9	0.94%
ta	take	17	1.78%	spela	play	9	0.94%
gå	go	15	1.57%	innebära	imply	8	0.84%
ha	have	14	1.47%	stå	stand	8	0.84%

TABLE 8. RAW FREQUENCIES OF VERBS IN THE *SKALL V* CONSTRUCTION.

Swedish	*English*	*p*	*Swedish*	*English*	*p*
bli	become	0.000000	kalla	call	0.000804
påverka	influence	0.000000	klara	cope	0.000970
öka	increase	0.000008	diskutera	discuss	0.001728
dominera	dominate	0.000020	omfatta	contain	0.001827
förändra	change	0.000025	skilja	differ	0.002510
ske	happen	0.000052	tänka	think	0.004715
spela	play	0.000220	glömma	forget	0.005444
överleva	survive	0.000273	bilda	form	0.005885
äga rum	happen	0.000415	ställa	put	0.008851
få	get	0.000710	ingå	enter	0.010884

TABLE 9. RAW FREQUENCIES OF VERBS IN THE *SKALL V* CONSTRUCTION.

Again the most frequent verb *bli* 'become' is also the most distinctive verb. As pointed out before, *bli* disprefers animate subjects. This tendency holds for the six most distinctive verbs of the *komma att V* construction. Table 10 illustrates the frequency of animate and inanimate subjects with these verbs.

bli – 'become'		*påverka* – 'influence'		*öka* – 'increase'	
animate	*inanimate*	*animate*	*inanimate*	*animate*	*inanimate*
11	52	0	17	0	12
17.46%	82.54%	0.00%	100.00%	0.00%	100.00%
dominera – 'dominate'		*förändra* – 'change'		*ske* – 'happen'	
animate	*inanimate*	*animate*	*inanimate*	*animate*	*inanimate*
2	4	0	5	0	12
33.33%	66.67%	0.00%	100.00%	0.00%	100.00%

TABLE 10. ANIMATE SUBJECTS IN EXAMPLES WITH DISTINCTIVE VERBS.

Along with the preference of inanimate subjects, we observe semantic similarities between these and other verbs in Table 9. A first group clusters around the verb *ske* 'happen'. The verbs *bli* 'become', *ske* 'happen', *äga rum* 'happen', and *hända* 'happen' form a group of general verbs denoting some event. All of these favor inanimate subjects. Example (18) illustrates this group.

(18) *All försäljning kommer därför att ske via bolaget i Tyskland.*
all sale come therefore to happen via company.the in Germany
'All sales will be handled by the company in Germany.'

A second group codes 'change'. The verbs *påverka* 'influence', *öka* 'increase', and *förändra* 'change', likewise favor inanimate subjects, as they denote abstract processes developing over time. See example (19).

(19) *Datoriseringen kommer att påverka arbetsinnehållet.*
computerization.the comes to influence work.content
'Computerization will influence the content of our work.'

A third group is about mental activity. The verbs *tänka* 'think' and *glömma* 'forget' code cognitive processes. Examples such as (20) hence require animate subjects.

(20) *Sent kommer jag att glömma en scen vid en besinstation i Skellefteå.*
late come I to forget a scene at a filling station in Skellefteå
'I will never forget a scene at a filling station in Skellefteå.

A single verb that is distinctive of the *komma att V* construction is *spela* 'play (a role)'. In all examples, *spela* is complemented by *en ADJ roll*, which makes it similar to the verbs in the 'happen' group. Similar to the examples in that group, the examples express abstract events with inanimate subjects.

(21) *Alexandria skulle därför komma att spela en underordnad roll.*
Alexandria would therefore come to play a minor role
'Alexandria would therefore get to play a minor role.'

Interestingly, only half of the subjects in the examples with the verb *överleva* 'survive' are actually animate in the first place. Again, this fits with the constructional meaning of some abstract process happening.

(22) *Några av dessa plan kommer till och med att överleva sekelskiftet.*
some of these plans come even to survive century.turn.the
'Some of these plans will survive the turn of the century.'

As for the repelled verbs, *vara* 'be' and *ha* 'have' are found significantly less often in the *komma att V* construction than expected. These highly frequent verbs express states, which clashes with the dynamic constructional meaning. The core meaning of the *komma att V* construction refers to an abstract process developing over time.

4. DISCUSSION.

The collostructional analysis has brought to light some distributional differences between the three Swedish future constructions.

The *ska V* construction typically goes along with the general verbs *bli* 'become' and *ske* 'happen', which favor inanimate subjects. These examples mainly code futurity. So despite the many modal uses of *ska*, it has to be conceded that it has become a fully grammaticized future marker. Another highly distinctive verb is *göra* 'do', which goes along with animate subjects and thus communicates modal meanings of obligation and intention. The verbs *betala* 'pay' and

spara ‘save money’ also point to the fact that the meaning of obligation, which derives from the lexical source *skola* ‘shall’, strongly persists in the *ska V* construction. It is thus inadequate to say that the meanings of intentionality and obligation have been bleached from the verb, since we find them present in a large number of examples. Rather, these meanings remain inactive when they are semantically incompatible with the subject in question.

The *skall V* construction occurs most distinctively with verbs that are used in a formal setting. The verbs in question are *anse* ‘consider’, verbs of communication, verbs of exchange of money and goods, *tillämpa* ‘apply’, and verbs of handling things that are used in a formal register, such as *vidta* ‘begin’, *ordna* ‘organize’, and *behandla* ‘deal with’. The *skall V* construction has an undertone of obligation which is also found in *ska V*, but which is much more pervasive with *skall V*. Another fact pointing to the formal register of the *skall V* construction is the high percentage of passive constructions (32.48%), which is much higher than with the other constructions, as shown in Table 11.

	ska	skall	komma
active	80.15%	64.88%	74.40%
middle	3.49%	2.64%	5.56%
passive	16.36%	32.48%	19.73%

TABLE 11. DISTRIBUTION OF VOICE IN THE FUTURE CONSTRUCTIONS.

The *komma att V* construction occurs most distinctively with a group of general verbs that require inanimate subjects and denote abstract events. A large group of co-occurring verbs describe abstract developments over time. The only coherent group of verbs that require animate subjects consists of the mental verbs *tänka* ‘think’ and *glömma* ‘forget’. The constructional meaning *komma att V* is that something abstract is going to happen, usually not planned but spontaneously. Independent evidence for this characterization is that the *komma att V* construction displays the highest percentage of middles of the three future constructions in Table 11. In examples such as (23), an event happens by itself, without any force exerted by an agent.

(23) *90-talet kommer att skilja sig betydligt från 70-talet.*
90-decade comes to differ self much from 70-decade
‘The 90s will differ a lot from the 70s.’

The main finding of this paper is hence that the investigated Swedish future constructions display an intricate division of labor. The *ska V* construction is the most general and unbiased construction with respect to animacy and state of mind of the subject. The *skall V* construction is used in formal contexts, and whenever obligation is strongly in focus. The *komma att V* construction is used for abstract processes and spontaneous events happening in the future. These characterizations largely corroborate previous findings on future constructions in Swedish (Christensen 1997, Dahl 2000), but also challenge some positions (Törnudd-Jalovaara 1991), thus demonstrating the viability of collostructional analysis as a useful empirical approach to grammaticization.

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A CULTURAL-EVOLUTIONARY PERSPECTIVE ON SEMANTIC CHANGE: THE ROLE OF NON-SOCIAL FACTORS IN THE SPREAD OF INNOVATIONS*

FRANK LANDSBERGEN
Leiden University
ROBERT F. LACHLAN
Leiden University

Cultural evolution is the concept of evolution applied to traits inherited by learning, which can therefore be applied to human language. In this framework, Croft (2000) proposes a distinction between the innovation of variants, which is a linguistic process, and the possible spread of variants, which is a social process. In this paper, we argue that non-social factors might play a role in the spread of variants as well. We illustrate this with a case study of the semantic change in English will and its Dutch counterpart willen, and present a computer simulation of this case to support our claim.

1. INTRODUCTION.

Language is a communication system that is passed on by social learning. To that extent, it is similar to other learned communication systems in the animal world, of which bird song is the most thoroughly investigated (e.g., Doupe and Kuhl 1999, Marler and Slabbekoorn 2004). It has been shown that the song of songbirds shows individual and group variation, and that it is subject to change over a number of generations (Catchpole and Slater 1995, Lynch 1996, Payne 1996, Lachlan and Slater 2003). This is an interesting finding, because it suggests that these processes are not bound to a particular system like human language or bird song, but that they are caused by general mechanisms that operate in any culturally transmitted system. Such change in learned communication systems is referred to as "cultural evolution" (e.g., Cavalli-Sforza and Feldman 1981: 10).

An evolutionary view on change has always been of interest to linguists (e.g., Schleicher 1863, Sapir 1921, Keller 1994), but a more elaborated framework was not given until Croft (2000). In this work, Croft presents a detailed account of how language change can be regarded as an evolutionary process, and what the benefits are of such an approach.

In this paper, we will adopt Croft's evolutionary account of language change, and discuss how it can be used in the case of the semantic change of English *will* and Dutch *willen*. We will argue that an evolutionary approach to such cases is a helpful heuristic, but will also take a critical look at a particular aspect of Croft's model, that of the spread of innovations. We will compare a scenario of change by a random spread of innovations with the scenario put forward by Croft.

In the next section, we will discuss this issue in more detail after a short introduction on cultural evolution and its application to language. This is followed by a case study of *will* and *willen* and a computer simulation of this case study to support our claims. Concluding remarks follow in section 5.

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2. Language Change as Cultural Evolution.

2.1 Principles of Cultural Evolution.

Detailed accounts of cultural evolution are given in Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985). Both studies present an attempt to apply evolutionary theory to the social sciences in a profound way. They are based on the underlying idea that evolution by selection is the logical outcome for any system when three conditions are met (Dennett 1995: 343): (1) a source of variation, (2) the presence of replication, and (3) the presence of differential fitness. Evolution may also take place without the presence of differential fitness. In that case, differential replication of traits occurs by chance, and evolution is the result of random drift.

Genetic evolution by natural selection is the obvious example of such a system: There is variation between individuals in a population, and (part of) this variation can be passed on to the next generation. Some individuals are better adapted to their environment and therefore have a greater chance of survival and reproduction. This process may lead to the evolution of the population.

However, the three conditions mentioned above are sometimes met in culture as well. Any habit, behavior, belief, idea, or action that can be learned and transmitted can be considered a cultural trait. Among these traits, there is ample variation within a population, and not all traits have an equal chance of being transmitted. This means that evolution can also take place in a system of cultural traits, such as language.

2.2. Cultural Evolution Applied to Language.

In recent years, the notion of cultural evolution in language has been the subject of several studies (e.g., Lass 1980, Keller 1994, Nettle 1999, Croft 2000, Janda and Joseph 2003, Livingstone 2003, Verhagen 2004). As mentioned in the previous section, Croft (2000) is the first detailed account of language change as a cultural-evolutionary process. He states that when viewing language as a culturally transmitted system, one first needs to be more precise about what exactly is transmitted. Croft argues that the *utterance* is the unit of transmission in language. Every time a word, construction, or phrase is uttered, it is transmitted and thereby reproduced. Different utterances can have different fitness, that is, there might exist a preference to use one form over the other. Such differences can eventually lead to a change in the language. Note that, with this definition, the fitness of the people *using* language does not play any role.

Learning in this perspective is tightly linked to language use. People use linguistic utterances to shape their linguistic knowledge. This view is therefore highly compatible with usage-based theories of language such as cognitive linguistics (Croft and Cruse 2004) and construction grammar (see Goldberg 2003 for a review).

When utterances vary in any respect from their conventional use, these can be considered "innovations" that give rise to variation within the system. Innovations can come into existence in many different ways, consciously and unconsciously, and in both speakers and hearers. For instance, they can occur because of an expressive need of a speaker, or by reanalysis of a heard utterance of a hearer. Innovations are similar to mutations in genetic evolution, in that they are altered versions of existing elements. They differ from mutations in that they do not necessarily need to come into existence by chance, but rather, functional factors might play an equally important, or perhaps more important role. It should be noted that innovations, or variants, can

occur in all different parts of language: an utterance can differ in phonological, morphological, syntactic, semantic or even stylistic respect from its conventional use. Any difference in the conventional use, or "form-function mapping" (Croft 2000: 117), of an utterance is considered an innovation.

With the basic elements defined, language change can now be described as a spread of an innovation through a population. Croft emphasizes that innovation (the creation of a variant) and propagation (the spread of a variant) are two separate and independent processes. The main argument for this claim is that, although the existence of an innovation is a necessary condition for its spread and therefore for change, its existence does not necessarily lead to spread, and to change. Whether or not an innovation successfully spreads depends on several factors acting as selection pressures, and Croft argues that these factors have a purely social nature. For example, Croft uses the social network theory (Milroy and Milroy 1992) as an example of the way the spread of innovations is bound by the social structure of a population. He also uses the speaker strategies proposed by Keller (1994); these strategies, or maxims, guide the use of linguistic variants in that speakers try to be socially successful in their use of the language.

We believe that social factors such as prestige and group structure indeed play a very important role in the spread of innovations, but that other factors might act as selection pressures as well. Croft's theory is usage-based in that the structure of an individual's language mainly depends on the linguistic input he or she receives in language use. This means that frequency of use plays a key role in the shaping of an individual's linguistic knowledge. Any utterance that will be perceived with a high enough frequency will therefore have its effect on this knowledge, whether this utterance is a conventional use or an innovation. Of course, social factors will affect the frequency with which individuals are exposed to input, and they might affect the impact utterances have when perceived. However, the existence of social-based propagation does not rule out the possibility that innovations may also spread by random chance.

Change by chance is also referred to as "random drift." In a random drift scenario, variants are not selected because they are adaptive or because there is a selection pressure favoring them, but by chance instead. This can lead to a stable situation without any change. However, accumulations of randomly selected variants can also lead to change. In the latter case, language change can occur without the presence of any selection pressures.

The frequency of utterances might also be affected by non-random, linguistic selection pressures. A first example would be when a word has two related meanings, A and B, with B an innovation based on the conventional meaning A. For meaning A, there are some near-synonyms, but for B there happen to be none. Without claiming that no other factors are involved, this situation will lead to a relatively higher frequency of use for variant B, since in at least some of the cases of A, a synonym will be used.

A similar scenario can be sketched without the existence of synonyms, and is given by Haspelmath (1999). Say that meaning A is lexical and B, the innovation, is functional. This is a very common path of grammaticalization (e.g., the English temporal marker *while* has its origin in the noun *hwile* 'time', 'moment'). Since functional elements are more frequently needed in language use than lexical elements, this will result in a higher relative frequency of variant B.

Both change by random drift and change guided by linguistic factors are alternatives to the scenario of socially-driven propagation given by Croft (2000). It is therefore interesting to study how these three different ways of propagation differ, and in what sense they are similar. In this paper, we principally focus on change by random drift, and implement computer models for both of the non-social processes of propagation.

3. A CASE STUDY OF ENGLISH *WILL* AND DUTCH *WILLEN*.

In this section, we give an overview of the semantic change of the verb *will* in English and its Dutch counterpart *willen* in a cultural-evolutionary framework. The goal of this section is not to present a detailed account of the change, but rather to show how the cultural-evolutionary approach can be applied to empirical data.

3.1 THE SEMANTIC DEVELOPMENT OF *WILL/WILLEN*.

The semantic change of English *will* has been extensively studied and is well-documented (e.g., Aijmer 1985, Bybee, Perkins and Pagliuca 1994, Traugott and Dasher 2002). The Present Day English auxiliary use with future tense meaning originates from a main verb use with a prototypical meaning 'to desire' in Old English: [1]

(1) *Wultu kastles and kinedomes?*
Want-you castles and kingdoms
'Do you want castles and kingdoms?' (1225)

(2) *If thou wolt live in vertu, thou most vice eschuie.*
If you want live in virtue, you must vice eschew.
'If you want to live in virtue, you must abstain from vice.' (1390)

As for Dutch *willen*, examples (3) and (4) show that Middle Dutch had a meaning that was similar to that of Old English. Unlike English however, this meaning has not significantly changed for Modern Dutch. The prototypical meaning of Modern Dutch *willen* is still volitional, as examples (5) and (6) show.

(3) *Hi dede daer al dat hi wilt.*
He did there all that he wanted
'He did there all that he wanted.' (1340)

(4) *Wij willen onse gebueren van Gendt hier binnen onser stede hebben.*
We want our neighbours of Gent here within our city have
'We want to have our neighbours of Gent here in our city.' (1470)

(5) *De KNVB wil over twaalf jaar het WK in*
The KNVB wants in twelve years the World Cup in
eigen land presenteren.
own country present
'In twelve years, the Dutch Soccer Association wants to present the World Cup in its own country.' (2006)

[1] Examples (1-2) are from the Oxford English Dictionary, (3-4) and (7-11) from the Middle Dutch Dictionary, and (5-6) were retrieved from the Internet via Google on 06-15-2006.

(6) *Summerschool: Ze willen dat we "skoel" zeggen!*
Summerschool: They want that we "skoel" say
'Summerschool: They want us to pronounce it as "skool"!' (2006)

The common view on the change of English *will* is that it came about by the implicature that, if a speaker is willing to do something, it follows that this will indeed happen in the future (Aijmer 1985). That is, apart from the original sense of volition, a future sense came into existence that also became part of the conventional meaning for *will*. When the original volitional sense was lost, only the future sense remained. Such a change from volitional to future use is not unique to English. It has been observed in languages such as Bulgarian, Swahili, and Romanian (Heine and Kuteva 2002) and Swedish (Hilpert, this volume), and is therefore regarded as a "path of grammaticalization."

Dutch *willen*, with an original volitional meaning as well, has not undergone this change. However, we find several occurrences of Middle Dutch *willen* with a future tense reading: [2]

(7) *Alse ghi wilt, so willic gaen.*
If you want, then will-I go
'If you want, then I will go.' (1275-1300)

(8) *Pieter antwoirde weder ende seyde: Dat willic u seggen.*
Pieter answered again and said that will-I you say
'Pieter answered again and said: I will tell you that.' (1470)

In fact, Middle Dutch *willen* shows even more variation:

(9) *Onse Heere God will hem sijn sonden vergeven.* ('may')
Our Lord God may him his sins forgive
'Our lord God may forgive him his sins.' (1413)

(10) *Ene kerke die van ouden welna wilde vallen.* ('threaten')
A church that of old-age almost wanted fall
'A church that threatens to collapse because of old age.'(1330)

(11) *Men wilse metter hant utelesen.* ('can')
One can-them with-the hand pick out
'One can pick them out by hand.' (1350)

Examples (7-11) clearly show that Middle Dutch *willen* was not exclusively used in a volitional sense, but that many other senses, among which the future sense, existed as well. For English *will*, Aijmer (1985) claims that its change was initiated with an extension from human to non-human subjects, which put the volitional sense on the background. However, Dutch *willen* was also used with non-human subjects, and this use led to new variants as well, as example 10 shows. Still, none of these variants have become a conventional meaning of *willen*.

[2] The translations of examples 7-11 are those given by the Middle Dutch Dictionary

In short, we seem to have a case in which we have a similar conventional meaning and similar other, yet non-conventional senses for both *will* and *willen*. In Middle English, one of these non-conventional senses, the future sense, spread and became the new conventional meaning of *will*. In Middle Dutch, non-conventional senses existed as well, but the conventional meaning did not change.

3.2 A CULTURAL-EVOLUTIONARY PERSPECTIVE ON *WILL/WILLEN*.

When viewing the case of *will/willen* from a cultural-evolutionary perspective, one first needs to map the elements of the theory to the empirical data. The conventional use of the verbs in both languages has the volitional meaning 'to desire'. In terms of the "form-function mapping", this means that the verbs with the form *will/willen* are used with the meaning 'to desire' in communication. We have seen that somewhere in Middle Dutch and Middle English, alternations started to appear in the form-function mapping of the verbs. An alternation at the syntactic level was the use of *will/willen* as an auxiliary, but we will not discuss this process here. At the semantic level, the verbs were occasionally used with a future sense. This different semantic use can be considered an innovation in the cultural-evolutionary framework.

The identification of this innovation raises two questions: (1) why *this* particular innovation, and (2) how did it, or did it not, spread? Unfortunately, a discussion of the first question lies outside the scope of this paper. However, it is a crucial topic in the study on directionality in language change (e.g., Haspelmath 1999, Traugott and Dasher 2002, Hopper and Traugott 2003), since there is no change without innovations, and restrictions on the kinds of innovations therefore restrict the possible kinds of change.

As for the second question, Croft (2000) would argue that the spread of an innovation, or the lack thereof, is governed by social factors. However, we have discussed how non-social factors might also play a role in this process. First, the innovation could spread through the population by random drift. Second, the relative frequency of the innovation compared to the conventional use might increase for more functional reasons. Possibly, newly-formed synonyms can have come up that lowered the frequency of the volitional use of *will*, while these synonyms did not play such a role in Dutch. Also, the innovation in English could have filled a "gap" in the semantic field of the future tense.

Is there evidence of such factors in English (and their absence in Dutch)? When looking at synonyms, the Oxford English Dictionary shows a meaning change of *want* from 'not to have', 'to lack' to 'to desire', but this change did not take place until the late 17th century, long after *will* had already started its own change. It can therefore be assumed that *want* has not affected the frequency of the conventional use of *will*.

Possible "gaps" in the semantic field of the future tense might also have caused a selection pressure for the future tense use of English *will*. Future tense in Middle English was expressed in two ways (Fischer 1992). One form expressed the future via the present tense, often combined with a lexical marker of future time elsewhere in the sentence. A second form that developed in Late Old English was the use of the periphrastic construction *shall* + infinitive. This construction was mainly used in contexts "in which a sense of obligation [was] present, in commands and instructions" (Fischer 1992: 264). The *be going to* construction was not used as future tense marker until much later (Bybee 2003). *Will* as a future tense marker came up around the same time as the *shall* + infinitive construction. According to Fischer (1992: 264), *will* was "mainly connected to the desire of the subject […]. It occurred especially in promises, wishes

and resolutions". Fischer also notes that there is a stylistic difference between the use of *shall* and *will* as future tense markers. "In biblical writings *shal* is preferred to *wil* […]. *Wil* seems to be a product of a more popular style." (Fischer ibid.). These two remarks could be an indicator of an expressive need for the innovative use of *will*. However, the Middle Dutch situation did not differ much from that of Middle English. Middle Dutch also expressed future tense by either present tense or *sullen* ('shall') + infinitive (Van Kerckvoorde 1993), yet the innovative use of *willen* did not spread in Dutch.

It should be stressed that a scenario in which a "gap" in the future tense creates a selection pressure is not a teleological kind of change. Neither the language itself, nor the language user is consciously filling up a "gap" in the language. The reason for a language user to "prefer" one variant over the other is a blind process, in the sense that this preference is not guided by factors concerning the global state of the language, but rather by local factors such as expressive need.

As mentioned in section 2.2, the relative frequency of an innovative use can also be higher than the conventional use, because the former can simply be used in more contexts due to its more functional meaning. This could have been the case for *will*, since its innovative use was more functional than its conventional use.

In short, there are several non-social factors that could have acted as a possible selection pressure for the spread of the innovative future sense use of English *will*, and even a random drift scenario should not be ruled out. In the next section, we will examine the effects of such factors with the use of an agent-based computer simulation.

4. AN AGENT-BASED SIMULATION OF *WILL/WILLEN*.

4.1 SET-UP OF THE MODEL.

In this section, we present a pilot version of an agent-based computer model of semantic change. A more detailed description of the model and its behavior can be found in Landsbergen, Lachlan, Ten Cate and Verhagen (2006).

Agent-based models simulate the behavior of individuals, or agents, in a population. By manipulating the individual behavior of the agents, the effect of this behavior on the population can be measured. Similar models have been used in studies on vocal learning in songbirds (Lachlan and Slater 2003) as well as in different linguistic fields (e.g., De Boer 2000 on sound change, Niyogi and Berwick 1997 and Yang 2000 on syntactic change).

Agents in the model possess a limited number of properties that are relevant to the topic of research, and which are represented by a set of parameters. In the model presented here, these properties concern characteristics such as the individual's communicative behavior and its social behavior. Individuals communicate with each other, and this communication shapes the individual's linguistic knowledge, in this case the semantics of the word *will/willen*.

In section 3.2, we have discussed that *will/willen* is a case in which there is variation in meaning for one form: a conventional 'volition' meaning and an innovative 'future' meaning. These different senses can be best described on a continuous scale, with 'volition' on one end and 'future' on the other. Uses in which both senses are present are then positioned between these two extremes, with the weight of each sense depending on the proximity towards both ends of the scale. In the model, we represent this meaning range on a [0, 1] scale, with values close to 0 representing a volitional sense, and values close to 1 a future sense. The linguistic knowledge

of the agents is a subset of the meanings on the [0,1] scale, and is marked by the lowest and highest values of the set. In Figure 1, such a possible set is represented by the gray area. This set is formed on the basis of the input agents get during communication.

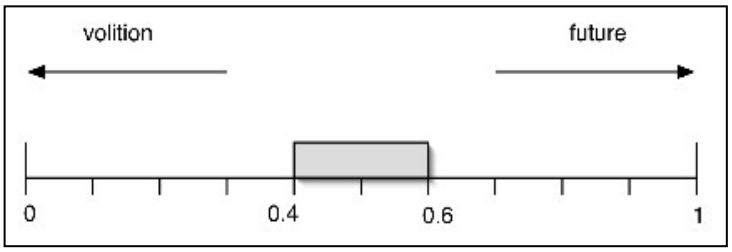


FIGURE 1. REPRESENTATION OF THE LINGUISTIC KNOWLEDGE OF AN AGENT IN THE POPULATION.

The simulation is run for 500 cycles we call "years", in a population of 100 agents. During each "year", there is a fixed amount of communication between agents, and a fixed amount of innovation. Although the definition of a "year" in the model is arbitrary, we have linked it to the life span of the agents to create a simulation of multiple generations. Agents have a maximum age of 70 years, after which they are replaced with an agent of age 0. These newborns start with one randomly chosen signal from a randomly assigned "parent". They then construct their linguistic knowledge on the basis of the input they receive during communication, similar to the "grown-ups" in the population. The only restriction is that for the first year, newborns are not allowed to be speakers in communication.

Each agent is involved in on average 500 communications per year, half of which are as speaker. During communication, two agents are randomly selected from the population, one speaker and one hearer. This means that there is an equal probability of communication between all agents, without any spatial or "social" restrictions. The speaker selects a random value from its set and exchanges this with the hearer. This value represents an utterance with a specific form-function mapping, that is, a fixed form with a variable function, the meaning of the verb which is represented on the [0,1] scale. The hearer compares the value of the utterance with its own knowledge. If the value lies outside the boundaries of its set, it will adjust them so that the value is now the new limit (whether this is the left or right limit depends on which original limit was closest to the uttered value). In this case, the speaker adjusts its set as well, so that the uttered value becomes its new limit (again, the limit that will be adjusted is the one closest to the uttered value).

Innovation in the model takes place a fixed amount of times. During every communication act, there is chance of 0.005 of innovation, in which one of the limits of a random agent is adjusted by a random value between [0, 0.05], causing either an increase or decrease in the set. Thus, innovations should be regarded as changes to the linguistic knowledge of an agent independent from communication.

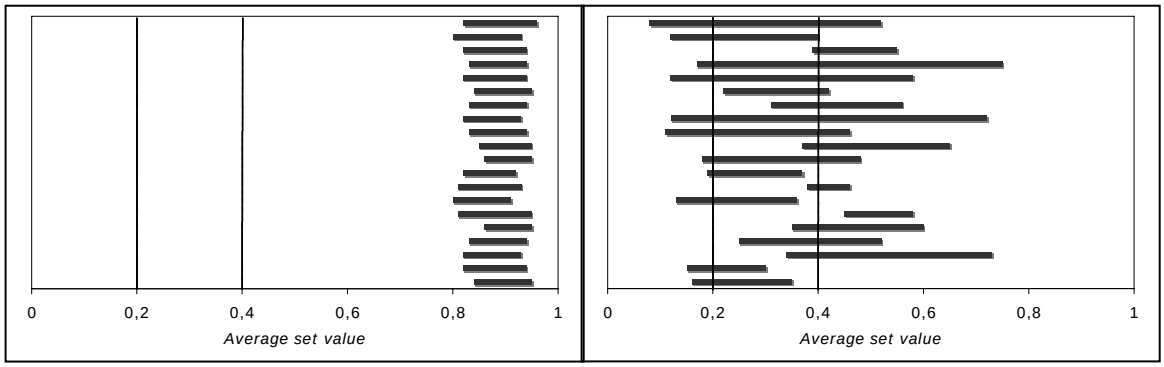
4.2 RESULTS.

To see how innovations can spread through a population without any social factors involved, we first look at the case in which there is a selection pressure present. This case was mentioned in

section 2.2, and relates to situations in which, for any reason (the existence of synonyms for the conventional meaning or the higher expressive need of the innovative meaning) the relative frequency of the innovative use is higher than the conventional use. This was simulated by a non-random probability for agents to select a meaning on the [0, 1] scale, with values close to 1 having a greater chance of being used than values close to 0.[3]

At the beginning of each run, agents start with a set that has boundaries [0.2-0.4], that is, a fairly 'volitional' meaning for the verb. Figure 2a shows the result after 500 years. Not surprisingly, the average "knowledge" of the individuals has shifted towards the right end of the scale.

In section 2, we also mentioned the possibility that innovations could spread by random drift. This was simulated by removing the selection pressure from the previous simulation. Figure 2b shows the results. It is clear that a random drift scenario as simulated here leads to a variety of results, especially when comparing it to the case of non-random change. First, there need not be any change at all, and the average linguistic knowledge remains very similar to its initial state. However, the set position can also move down the scale, towards a more 'future tense' meaning. In the runs in which this happened, this change was caused by an accumulation of randomly selected innovations. Second, the resulting size of the set varies substantially across different runs, which means both generalization and specification of meaning can occur.



(a) (b)

FIGURE 2. (a) AVERAGE SET POSITIONS ON THE [0, 1] SCALE FOR 20 RUNS OF 100 INDIVIDUALS AFTER 500 YEARS WITH A SELECTION PRESSURE FOR VALUES CLOSER TO 1.
(b) AVERAGE SET POSITIONS FOR 20 RUNS AFTER 500 YEARS WITHOUT A SELECTION PRESSURE, AS A RESULT OF RANDOM DRIFT. THE DOTTED LINES INDICATE THE INITIAL SET POSITION. SHOWN IS THE AVERAGE SET POSITION OF EACH POPULATION AFTER EACH RUN.

[3] This was done with a Gaussian distribution, so that $prob(s_i) = 1 - \left| 0.5e^{-\frac{1}{2}x^2} \right|$, with the meaning s_i part of the set of the speaker.

What the results show is that, without the presence of any social factors, the linguistic knowledge of agents can shift over time by frequency effects alone, if one assumes that agents structure their knowledge from usage. Although the chance of a shift from a volitional to a future meaning is much smaller than when selection pressures are at work, its possibility should not be ruled out.

Obviously, the results do not explain whether English *will* has changed because of the presence of a selection pressure or by random drift. If the former had been the case, this would lead to the question why such selection pressures did not have the same effect in Dutch. Again, the goal of this paper was to identify possible mechanisms other than social factors, and not to explain this difference.

5. CONCLUSIONS.

In this paper, we have used a cultural-evolutionary framework to discuss mechanisms of change. We have followed the framework presented in Croft (2000) and have applied it to the case of lexical-semantic change in English *will* and Dutch *willen*. The results from our simulations seem to suggest that the change of *will* and the lack of change of *willen* might just as well be caused by a random drift situation, as by a situation in which selection pressures are present in the former, and absent in the latter.

We argue that an evolutionary approach to language change is a very useful heuristic in the study of particular changes. Most importantly, it stresses the fact that change is not a phenomenon restricted to language, but a logical outcome in any system when certain conditions are met. This also means that the mechanisms of change in different parts of language, e.g., semantic changes compared to phonological or syntactic changes, do not necessarily have to be different.

In the study of language change, the evolutionary approach provides a framework in which the different factors that can have possibly played a role can be easily distinguished, such as innovation and the spread of innovations by different mechanisms. In doing this, different theories, such as sociolinguistics and usage-based approaches to language, are combined.

The mechanistic and quantitative character of the theory makes it possible to look at change in a more abstract way. We have presented such an approach with an agent-based simulation of semantic change, in which the meaning of a word is reduced to values on a one-dimensional scale. Also, the evolutionary approach gives rise to interesting questions about the nature of language change. For example, is there something like a constant innovation rate? How exactly does frequency play a role? In this paper, we have argued that frequency of use can be a factor in the spread of innovations as well, apart from social factors and we have used the agent-based simulation to support this claim.

In future work, the model presented here needs refinement in the sense that the existence of a selection pressure per se was built in. A next step would be to have such a selection pressure develop from within the system, for example by the existence of words in the same semantic field, and to study which factors determine the strength of such a pressure. Such a model can give more insight in the precise mechanisms that lead to the development of possible selection pressures, or of their absence. The model presented here has been a first step in this direction. Its results show that, already with a very simple model, factors can be identified that may play a crucial role in the semantic differentiation of similar words in related languages.

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THE ORAL NARRATIVE COMPETENCE OF TWO NON-NATIVE SPEAKERS OF ENGLISH: THE USE OF INTERNAL EVALUATION DEVICES

JAMES J. MISCHLER, III
Oklahoma State University

In this study the use of prosody and syntax as internal evaluation devices is investigated in the personal oral narratives of three non-native English speaker participants. Three international graduate students who are native speakers of both Hindi and Indian English participated in one-on-one conversations. The recorded discourse was then transcribed and an analysis of the internal evaluation devices was made, with a specific focus on prosodic markers and the use of the Historical Present tense (HP). The results of the discourse analysis indicate that prosody and the HP were used in varied and complex ways to comment on the point of the narratives. In addition, some evaluations, termed "superthemes," linked separate narratives in the discourse. The implications concerning the use and functions of internal evaluation devices in the participants' oral narratives, the linguistic analysis of non-native speaker data, and future research directions are discussed.

1. INTRODUCTION.

Labov (1972), in his work on linguistic variation in Philadelphia, viewed narrative as a language form in its own right that can uncover important, underlying processes of language and culture. Labov discusses several types of lexical, grammatical, and phonological structures that serve to communicate the "point" of a story and also indicates the speaker's point of view. In later research, Wolfson (1979; 1981) and Schiffrin (1981) analyzed personal narratives and provided insight into the use and function of the HISTORICAL PRESENT tense (HP), a grammatical structure found in English. Both Wolfson and Schiffrin found that the use of the HP served to mark a change in the narrative structure, and a switch to the speaker's own point of view, similar to the effects described by Labov.

The results of such research has provided the background for the study of personal narrative within the branch of functional linguistics. Two major characteristics of narrative: TEMPORALITY, the "temporal transition from one state of affairs to another" (Ochs and Capps 1996:23) and POINT OF VIEW of the speaker (Ibid 1996:25) are addressed and analyzed in this research. In addition, these studies focus on the overall function of first person narrative; that is, the use of narrative to communicate a particular point. Labov calls the point of a narrative the EVALUATION; the function of evaluation in narrative is to indicate why the story is "tellable" (also called the "So what?" question). The evaluation tells the listener why and how the story is important within the context of the current discourse. Wolfson and Schiffrin extend the evaluative function to the HP in their analyses (see Section 2.1 for discussion). In addition, both research lines studied linguistic forms that communicate the point of a story.

2. TYPES OF EVALUATION.

Evaluation in Labov (1972) takes two basic forms. These types of evaluative devices are EXTERNAL EVALUATION and INTERNAL EVALUATION. External evaluation intentionally interrupts

the flow of a narrative (i.e., serves as an "aside") to relay information needed for the listener to fully understand important aspects of the situation, or to explicitly delineate the narrator's point of view at the time, or to interpret the narrative discourse. Internal evaluation, conversely, does not interrupt the flow of the narrative. These devices are embedded in the grammatical, semantic, and discourse structures of the narrative in order to convey the point of the story. Forms of internal evaluation include intensifiers (including expressive phonology; e.g., vowel lengthening), comparators (e.g., negation and questions), correlatives (e.g., be + -ing), and explicatives (e.g., subordinate clauses which explain why or how an event occurred). In sum, narrators employ a variety of phonological, syntactic, or semantic resources to communicate the point of a story.

2.1 THE HISTORICAL PRESENT TENSE.

Wolfson (1979; 1981) and Schiffrin (1981) build an argument that the HP is also a form of internal evaluation that "allows the narrator to present events as if they were occurring at that moment, so that the audience can hear for itself what happened..." (Schiffrin 1981:59). Conversely, Schiffrin (1981:60) also notes cases in which "the relationship between the point of the story and the HP is more subtle: the point is embedded in the text in less obvious ways." As a result, the HP may mark the presence of the point of the story, but the point itself is not visibly present in the text. This issue will be investigated in the current study. Wolfson and Schiffrin view the HP as a syntactic form that does not interrupt the flow of the narrative; it is therefore another form of internal evaluation. These researchers would include the HP in Labov's list of internal evaluation devices.

3. INTERSECTION OF RESEARCH LINES.

It is the intersection between Labov's internal evaluative devices and Wolfson's and Schiffrin's analyses of the HP that an overlap occurs. If both of these forms can be used to explain the structure and functions of narrative, then their combined analytical power is potentially greater than either one alone. Therefore, the current research project is designed to investigate the "less obvious ways" in which the point of the narrative is communicated through internal evaluation devices. According to Wennerstrom (2001:219), another type of internal evaluation and one that has received less attention in the research literature is prosody. In fact, Labov (1972) included expressive phonology as a type of evaluative device, but only one form, vowel lengthening, was identified in that study. Therefore, the current study will combine the HP and expressive phonology as a way to increase the power of the discourse analysis. The purpose of this procedure is to develop a more detailed picture of evaluative devices, and to describe the types and functions of prosody in oral narrative.

3.1 "NON-NATIVE" ENGLISH AND INTERNAL EVALUATION.

In addition, it must be noted that the previous research cited above investigated evaluation in native speakers of English. This realization begs the questions, "Are these forms of evaluation found in the spoken English of nonnative speakers? If so, how, and in what ways?" The combination technique outlined above is potentially useful in studying the narratives of nonnative speakers because it may help to make the oral language structures under study more

salient, amenable to data coding, and therefore more easily analyzed. Thus, a second purpose of the study is to analyze the use and functions of internal evaluation in the narratives of non-native speakers of English. The narratives collected from the study participants will be analyzed for the presence of the internal evaluation devices described above.

3.2 THE PARTICIPANTS AS "NON-NATIVE SPEAKERS" OF ENGLISH.

Using non-native speaker data has some potential pitfalls for this particular study. The three participants in the study all have a similar language background in that all are second language learners of English. In addition, all three of the participants are native-born citizens of India. These facts add some complications to the label of "second language learner." India is a nation in which English has been an official language of government and education for over 50 years, and an unofficial language of government, education, commerce, and communication for over 200 years. This history was in large part a result of the colonization of India by Great Britain. As a result, the long history of British English in India confers a somewhat different cast on the term "non-native speaker" in that particular nation.

The development in India of an indigenized variety of English, called Indian English, further complicates the linguistic picture. Indian English is heavily influenced by standard British English (Das 1982:142), yet it also has its own distinctive lexical elements (Mufwene 1994:25). For the purposes of linguistic analysis, it is unclear if Indian speakers are second language speakers of British English, first language speakers of Indian English, or somewhere in between. The assumptions concerning language status of the speaker can heavily color the conclusions of linguistic analysis; therefore, these issues should be approached with care.

A closer look at English in India will help to shed some light on these issues. Gupta (1997:54) describes India as a "multilingual scholastic English" country; this nation has the following characteristics: a) a majority population of non-native speakers of English, b) the acquisition of English is gained principally through the school system (therefore, those with more schooling are generally more proficient in a standard form of English, particularly British English), c) proficiency in standard English is a mark of social class (a sign of prestige), and d) for some speakers, English is the primary means of communication. These four characteristics indicate that English has high social, economic, and scholastic status in India; as a result, as Mehrotra (1982:155) notes, many Indian nationals achieve high, even native-like, levels of proficiency in English, albeit a localized, indigenized form.

In light of these findings, to analyze the narrative data collected from the participants strictly as "non-native" language use increases the likelihood, discussed by Kachru (1995:239), of labeling divergent features as unplanned errors, rather than as innovative uses of language. A non-native approach would also require the application of a language standard; yet, the multilingual English competence of the participants makes the choice of an appropriate standard difficult. In sum, adhering to a strict "non-native" approach to the data analysis is also somewhat simplistic; the results of such analysis may not fully characterize the speakers' linguistic usage.

The standard of "communicative competence" is one way to break the methodological logjam. According to Ochs, Gonzales, and Jacoby (1996:360), researchers should "approach grammar as an interactional achievement of participants who creatively adapt language to their larger communicative needs." This approach can be applied to any speaker, including second language speakers, in as much as social interaction always requires constantly adapting language to fit the needs of the social situation. Labov (1972) used a similar approach in studying the

narratives of Black English Vernacular in Philadelphia. He did not assume that the participants' language variety would invalidate the research questions under investigation. Therefore, the methodological goal of the current study is to describe the language features used by the participants that meet communicative needs, rather than to evaluate those features against a prescriptive, external standard. This goal is also consistent, in my view, with the principles of descriptive linguistics as a field of inquiry.

4. RESEARCH QUESTIONS.

The research questions for the research project include the following.

1. What devices are used in the narratives of nonnative speakers to signal the major point(s) of a narrative?
2. How do these devices work with the HP to signal internal evaluation?
3. How do these devices influence the overall structure of the narrative?

5. METHOD.

5.1 PARTICIPANTS.

Two International Teaching Assistants (ITAs) who were students in a teaching skills course at Oklahoma State University volunteered to be the subjects in this study; both were male and between the ages of 25 and 27 at the time of the study. Both participants were matriculated graduate students in major fields of study at the university and passed the TOEFL test as part of the admission requirements at OSU. They were taking the teaching skills course in order to qualify for paid positions as teaching assistants at the university. As mentioned previously, both were native-born citizens of India; Hindi was their native language, and English was a second language. Each participant spoke a form of Indian English, which they began to learn informally in elementary school.

5.2 PROCEDURE.

The participants each engaged in a one-on-one conversation with the researcher. The researcher did not prepare topics in advance, in order to simulate casual, informal talk-in-interaction. However, the researcher did plan in advance to ask a particular kind of question during each conversation: "What happened?" or "Can you tell me a story about that?" These questions were inserted in the conversation when it seemed appropriate for the context of the talk.

The data collection procedure had two purposes. First, the procedure was designed to deal directly with some criticisms of data collection methods used in gathering narrative data. Goodwin (1990: 234-35) discusses the tendency to "extract" narratives from the discourses in which the stories arise. "Thus all too frequently, research investigating the internal structure of stories is based on those that are 'collected' by the researcher" (1990:234). The implications are that in some cases the discourse context within which the story was formed is lost, possibly changing the point of the story, while in others, direct elicitation of a story outside of a discourse context (e.g., "Tell me a story about…") may lead to changes in the internal narrative structure of stories. The procedure followed for this study was designed to answer these concerns by

collecting narratives that naturally occur within a larger conversation and social situation, rather than having the participant tell a story as a response to a research interview question.

Secondly, the procedure was designed to stimulate the production of narrative structure, particularly the COMPLICATING ACTION structure that Labov posited. Complicating actions often contain evaluative devices, including internal evaluation such as the Historical Present and expressive phonology. Therefore, I posited that by asking these questions, evaluative devices would be produced in the participants' narratives.

The conversations took approximately 20 to 30 minutes each, and each conversation was tape recorded in its entirety. After taping, the recordings were replayed to locate the narratives the participants told after the "What happened?" question was inserted. In sum, a total of seven personal narratives were collected from the three participants.

Each narrative was transcribed using the transcription system of Dubois (Du Bois et al. 1993). The Du Bois system was chosen for its detailed descriptions of prosodic cues, including intonation contours, pauses, and laughter, as well as Labov's expressive phonology evaluative devices (vowel lengthening, word stress). Thus, the analysis for the study will provide a more exhaustive description of prosodic evaluation devices used in the construction of a narrative. However, the symbols in the Du Bois system that indicate changes in pitch were not used because this aspect of analysis is complex and beyond the scope of the current study.

5.3 ANALYSIS.

The analysis of the narratives consisted of three parts. First, the transcripts were read for all the forms of expressive phonology devices detailed by Labov (vowel lengthening, word stress), as well as pausing (Chafe, 1994), and laughter, and he HP of Wolfson and Schiffrin. A case study method was employed in which the salient categories of data "emerge" by repeated reading of the texts. The initial analysis led to the marking of instances of Historical Present in the narratives. HP forms were marked in the "Tense" column on the left side of each transcript.

Second, the transcripts were read more closely to discover internal evaluative devices that appeared related to the HP structures previously marked. This led to the marking of a number of instances of expressive phonology and repetitions of key phrases; they were marked in the "Evaluation" column on the right side of each transcript, and arrows were drawn to point out the particular line in which each instance was found.

Finally, the repetitions of key phrases as well in combination with prosodic markers discussed earlier were specifically analyzed for possible systematic patterns. This step eventually led to the marking of the major evaluations category; this new category was defined as "evaluative statements that are repeated within a narrative that are communicated with 'evaluative force' (Labov 1972:378) to indicate a connection between the major evaluation(s) and the narrator's reasons for telling the story." The major evaluations are denoted as "Eval. 1" and "Eval. 2" in the "Evaluation" column on the right side of each transcript. In addition, these major evaluations were graphically linked on the transcripts by drawing lines between the evaluations and the instances in which they were repeated. The lines are found in the "Evaluation" column of each transcript. The results and conclusions provided below are based on the analysis procedures outlined above.

6. RESULTS.

There are several findings that resulted from the analysis. First, several internal evaluative devices were used in the narratives. These devices included Labov's expressive phonology category, including word stress and vowel lengthening, and laughter. Second, the participants also employed comparators (i.e., negation; modals) and correlatives (i.e., progressives).

6.1 EXPRESSIVE PHONOLOGY.

Both participants used expressive phonology in all four narratives. For example,
Participant 1 employed heavy stress on key ideas, as shown in (2). (Note: Stress is indicated by an exclamation placed before the stressed word).

(1) *...you !feel you are working-- is to work a lot,*
everybody used to work a lot

Another form of expressive phonology used regularly in the narratives is vowel lengthening. Like stress, this type was often used to indicate an idea that was part of the internal evaluation of the narrative. An example from the same narrative by Participant 1 is in (2); it is interesting that the narrator repeats the same word used in example (1), "feel," as the focus of evaluation in (2). (Note: Vowel lengthening indicated by = sign).

(2) *... so you fee=l,*
..kind of frustrated that you are not being of value,

Finally, both participants employed laughter as an internal evaluation device, often coupled with short inhaled or exhaled breaths. A sample from Participant 2 is shown in example (3). (Note: Laughter is indicated by the @ sign; exhaled breath is shown by Hx).

(3) *...so= <@ Hx @>,*
we are unable to do anything _
..finally we abandon the vehicle,

Example (3) also shows the "combinative" ability of expressive phonology in narrative. Participant 2 combines vowel lengthening, laughter, and exhaled breath to mark the key point in the narrative. The combined expressive power of these internal evaluations signals that abandoning a broken-down car on a lonely desert road was the major event in the story for the narrator.

6.2 HISTORICAL PRESENT TENSE.

The Historical Present tense (HP) is also found in the narratives of both participants. This structure is often used to indicate the point of the story, or to evaluate key ideas in the story. An example from Participant 1 is shown in (4). (Note: Historical Present tense is indicated by an underline; glottal stop is indicated by the percent sign).

(4) %- uh- y- you feel that u=h,
..okay,
I-- % I !can do it,
but,
some of it's not !happening

In addition, other evaluative structures occurred in concert with the HP; these occurred before the HP clause(s), within them, and after them. Participant 1, in example (4), used glottal stop, word stress, and vowel lengthening, in concert with the HP, to express, as an evaluative comment, the frustration he felt in working hard at his job yet not achieving the results he expected. Therefore, example 4 shows a "clustering effect" that Wennerstrom (2001:213) found, employing the combined evaluative power of expressive phonology and the HP to mark or intensify a major point in the narrative. Clusters occurred in every narrative in the dataset.

Example (3) shows the clustering pattern, as well. Several types of expressive phonology are combined to signal that a major point is coming next; then, the HP is used in *we are unable to do anything _ ...finally we abandon the vehicle* to indicate the major point and contributing to the speaker's evaluation of the story (i.e., "We had no other choice at this point."). In sum, the combination of expressive phonology and the HP in examples (4) and (5) intensifies the evaluative force of the internal evaluation of the narrative, indicating an answer to the "So what?" question and also expressing the speaker's point of view.

6.3 THE HP AND NARRATIVE POINT.

However, the HP clauses were not always used to signal the major point(s) of the story; major points were communicated at different places and "on several different levels," as Schiffrin (1981:61) found. This feature was shown in the presence of "major evaluations" in all of the narratives. Recall that major evaluations are defined in this study as "evaluative statements that are repeated within a narrative and are communicated with enough "evaluative force" (Labov 1972) to indicate a connection between the theme(s) and the narrator's reasons for telling the story. The major themes often occur after the end of the complicating action, where the overall effect of that result must be communicated. The theme is then repeated and other internal devices, such as expressive phonology, are added in several places, in order to increase the evaluative force of the theme. The reportability and significance of the story is enhanced by the additive force of repeating the theme and placing internal evaluation devices around it.

A typical example of this behavior is found in an extract of Narrative 2 and can be seen below. Participant 1 drives home the point that he feels he is not contributing very much of value in his job (Line 13). Major Evaluation 1 (marked "Eval. 1) indicates this feeling; it is repeated in Lines 8-13, ending with laughter in Line 14. Evaluative devices are used to counterpoint this feeling with the knowledge that Participant 1 is working a lot (Line 3). The theme of working long hours and the repetition of the theme in Line 6 are labeled "Eval. 2" in the "Evaluation" column. The laughter in Line 14 indicates the speaker's frustration that his hard work is not giving the results he expects. All of these features are shown in Figure 1. (Note: the repeated evaluations are shown with lines drawn to indicate the linked major theme statements; "Int." indicates expressive phonology used as an internal evaluation device; "Rep." indicates a repetition of the major evaluation).

Line	Speaker	Tense	Utterance	Evaluation
1	S2:	**HP**	Yeah, that de- you- you you kind of feel the end of the	Eval. 1
2	R:		[yeah, you know that-]	
	S2:		da=y yeah that-,	← Int.
3		**HP-prg**	...you !feel you are working-- is to work a lot,	Eval. 2
4		**P**	everybody used to work alot,	
5			..it not that,	
6		**HP-prg**	...in a company there are- there are not working people who aren't working.	← Rep.
7	R:		hm.	
8	S2:		At the end of the day,	← Rep.
9		**HP**	people si- slot for ten hours a day,	
10	R:		hm.	
11	S2:		...but you,	
12			..go back home and think,	
13		**P**	...<Q what- the difference did I make Q> _	
14			<@uh@>@@	← Int.

FIGURE 1. EXAMPLE OF "MAJOR EVALUATION" IN NARRATIVE 2.

From this sample it appears that the repetition of sentences or clauses at different points in a narrative constitutes another form of internal evaluation. Labov (1972:379) discusses the use of repetition as an intensifier when a word is repeated immediately after its initial use; however, in the current study, clauses, sentences, and themes were not repeated immediately, but later in the narrative. The repetition signals an important point or theme in the narrative; the immediate effect may still be intensification, but the effect spans the entire narrative, rather than one or two clauses. Therefore, in this case, repetition as an intensifier has an evaluative force beyond the local clause level.

6.4 THE HP AND OTHER INTERNAL EVALUATION DEVICES.

Third, internal evaluative devices occurred repeatedly prior to the HP clauses to build up the intensity leading to the major point (Schiffrin 1981:60), a type of foreshadowing, to emphasize the major evaluation. As an example, Narrative 3, shown below, shows the repetition of a major evaluation. Evaluation 1 is introduced in Line 5 and is repeated three times, the last in Line 15. Figure 2 shows the repetitions of the major evaluation and the phonological devices employed to build the intensity of the point.

Line	Speaker	Tense	Utterance	Evaluation
1	R:		so=,	
2		**(P-prg)**	...at that other company you were working at,	
3	S2:		[hm]	
4	R:	**(P)**	you didn't feel attached to it.	
5	S2:	**P**	oh I !did feel attached but then,	Eval. 1
6		**HP-prg**	..you're not making the difference,	
7		**HP**	..so you feel,	← Rep.
8			% a- y- you fee=l that u=h,	← Rep.
9			okay,	
10			<Q a- a- I can !do it Q>,	← Int.
11			..but,	
12		**HP-prg**	some of it's not happening,	← Int.
13	R:		oh.	
14	S1:		...(**H**) (1.0) so= _	
15		**HP**	..you !feel kind of frustrated definitely,	← Rep.
16			..at the end of the day.	

FIGURE 2. REPETITION OF EVALUATIVE THEMES IN NARRATIVE 3.

7. DISCUSSION.

The results of this analysis indicate that the narrators, all of whom are speakers of Indian English, use several types of expressive phonology as internal evaluation devices, including vowel lengthening, word stress, laughter, and audible breaths. These devices explain the speaker's view of each narrative, and complex themes and major points are developed within the narratives.

The interplay between expressive phonology and the HP is complex and serves as an additional form of internal evaluation. The participants often used these forms in a "clustering" pattern, combining prosody with the HP, a syntactic structure, to intensify evaluative points and to mark major points of the narrative. This finding supports Wennerstrom's (2001) analysis of the functions of prosody in narrative. Further study will bring out more details on the relationship between internal evaluations and the HP. In turn, research in this area has potential to shed greater light on the methods speakers use to communicate a personal point of view.

Finally, the construct of a "major evaluation" found in the study has features that are similar to the "supertopic" described by Chafe (1994:121); the basic themes in each of Participant 1's narratives form a single topic that spans all three narratives. An interesting technique in the development of superthemes is the use of repetition of certain clauses in one narrative. The evaluative force of the repetitions serves to mark certain themes, intensify their force across the entire narrative, and to link the marked themes to themes from other narratives in the discourse, resulting in a larger theme spanning the narratives and the discourse. The overall effect is one of increasing discourse coherence and cohesion.

The presence of the major evaluations also supports Schiffrin's (1981:61) contention that "because a story may make a point on several different levels, we may have to search further to find that point." In light of the results of this study, those "different levels" include looking outside of a single narrative to investigate how separate narratives in a conversation work together to develop over-arching evaluative themes. If so, then analyzing narrative as a construct within a larger discourse may reveal further insights into the social functions of narrative in discourse.

In addition, the presence of major evaluations in narratives may contribute to understanding of relativistic versus fundamentalistic approaches to discourse. To make sense of narrative situations, narrators either allow for dialogue that implicitly allows for a variety of possible solutions to problems (relativism) or "lay down one coherent, correct solution to the problem" (fundamentalism) (Ochs and Capps 1996:32). The major evaluations in the narratives of the current study allow the narrators to communicate a unified message that adheres to the "one correct solution" approach. Ochs and Capps discuss the advantages and disadvantages of each approach and the impact on communication and social relations. Major evaluations should be investigated in future research for these constructs, as well, as a resource for allowing dialogue or communicating a unified stance.

Further analysis of the dataset may also reveal some differences in the ways evaluative structures are used by Indian English speakers; however, this study shows that the patterns of use are productive and express a personal point of view. The Indian English narrators were found to use a wide variety of linguistic structures in English in complex ways to answer the "So what?" question and to relate their personal point of view on the narrative events. The use of internal evaluation was varied, complex, creative, and useful for expressing a wide range of meanings. In conclusion, the difference between the participants' use of English and those used by speakers of other varieties is one of degree, not of kind.

In sum, the current study shows that a wide variety of phonological devices, including vowel lengthening, word stress, and laughter, are used to signal the major point(s) of a narrative and as evaluative comments on the story. They were also used in various combinations to increase the intensity of the evaluation. In addition, the HP also indicated the point and evaluative comments. Finally, all of these devices were used to build major evaluations which served as themes which governed the direction of entire narratives. Overall, the speakers used all of these features for the "So what?" function and to indicate their personal stance on the story.

The study contributes two important ideas to the field of discourse analysis. First, a wide variety of phonological features, in concert with the HP, can be employed as evaluative comments on a narrative, both at the local clause level and at the discourse level. Second, the resourcefulness and creativity of language users (both L1 and L2 speakers) to employ an array of linguistic forms for complex communicative purposes is interesting and a subject worthy of further research.

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TOWARDS AN IMPLEMENTATION OF CONSTRUCTION GRAMMAR

MICHAELA POSS
Leiden University Centre for Linguistics

This paper gives an overview of a possible architecture of a Natural Language Processing (NLP) system based on Construction Grammar (CxG) assumptions. As CxG is born out of the idea that grammatical theories must come up with a more principled way of treating idioms, collocations, and all kinds of more or less fixed expressions, there is a strong emphasis on the treatment of these phenomena. As they usually are obstacles for NLP as well, the combination of the theory with a practical application seems at least promising. We present different kinds of fixed expressions which all demand specific computational treatment, namely fixed, semi-fixed, and syntactically flexible expressions and constructional idioms, show how these phenomena are treated in a Head-Driven Phrase Structure Grammar (HPSG) approach, and come up with an alternative approach based on Construction Grammar assumptions. Special emphasis lies on the design of the lexicon, as CxG assumes that underspecified phrasal patterns are stored in the lexicon as well.

1. INTRODUCTION.

Modern Natural Language Processing (NLP) systems suffer from various essential drawbacks:[1] One of the major obstacles is the successful treatment of multiword units (or expressions). As Sag, Baldwin, Bond, Copestake and Flickinger (2001) put explicitly: they are a pain in the neck for NLP. But not only practical applications have difficulties with all kinds of fixed expressions. Grammatical theories also often lack a proper and principled way of treating idioms, prefabs, etc. In this article, we will discuss the computational use of a grammatical theory that is born out of the idea that idiomatic expressions must play an important role in the model as well, namely Construction Grammar (CxG).[2]

The aim of this paper is to give an (not exhaustive) overview of those pillars of Construction Grammar that are crucial for a computational implementation. In order to model a fragment of a language that claims cognitive reality, at least due to one grammatical theory, it must be worked out in what way the underlying theoretical assumptions can be formalized and implemented. Therefore, I concentrate on one major claim within Construction Grammar, namely the idea that all form-meaning correspondences are constructions. This implies a rather specific design of the lexicon, which can be implemented in a computational system straightforwardly. We want to focus on the question how different kinds of multiword units can be integrated in the lexicon, how they can be retrieved, and what the organization of the lexicon could look like.

As this paper reports on work in progress, the formalizations lack the demanded degree of accuracy.

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[2] For recent interesting, computational approaches using CxG see e.g., Steels (2004), whose formalism "Fluid Construction Grammar" serves as language module for robotic agents or Bergen and Chang (2003), whose "Embodied Construction Grammar" attempts to simulate cognitive processes.

2. CONSTRUCTION GRAMMARS FROM A COMPUTATIONAL PERSPECTIVE.

Since the 1980's, Construction Grammar has seen the rise of a number of grammatical theories in which the classical notion of construction has a central position. As there are different constructionist approaches on the market, it is not reasonable to speak of Construction Grammar as a homogeneous framework. Langacker (2003) distinguishes three major streams within CxG: Cognitive Grammar (Langacker 1987, 1991), Construction Grammar (Goldberg 1995, Fillmore, Kay and O'Connor 1988), and Radical Construction Grammar (Croft 2001).[3] Nonetheless, all these approaches share a bundle of basic assumptions, which will drive our implementation and which are inter alia non-derivationality, monostratality, unity of grammar and lexicon, a cline from schematic to specific constructions that are all stored in the lexicon, the linking of constructions in an inheritance network, and unification as the motor that drives composition (Langacker 2003). Furthermore, all approaches define a construction as the pairing of form and meaning. A new construction must be established if the overall meaning of an expression cannot be deduced from other, hierarchically higher and therefore less specific constructions (Goldberg 1995).[4]

The most interesting point on this list, at least from our computational point of view, is the fact that CxG theories make no distinction between lexicon and grammar. All information with regard to semantics, composition, phonology, and pragmatics must be stored in the constructional entry. This, in addition to the fact that purely lexical as well as schematic phrasal entries are considered to be constructions, is the reason why many constructionists talk about a construction rather than a lexicon (see Goldberg 2003). If the theory accounts for the storage of lexically specific as well as schematic (phrasal) patterns, this seems to offer an interesting new perspective for an implementation.[5] Thus, the innovative point a system based on constructions may offer is a lexicon where apart from lexically specified entries, underspecified patterns are stored. Moreover, in the Construction Grammar framework, idioms and other kinds of idiosyncratic elements are treated exactly the same way and receive the same status as words (on the one end of the cline) or abstract schemas (on the other end of the cline). We will try to question what this means for a computational system. We do not plan to take sides of one particular CxG approach. This is not necessary because the ideas that drive our approach share common ground and can be found in all different streams within CxG. Furthermore, there is no such thing as a completely worked out formalization of any constructionist approach (apart from the so-called "construction-style HPSG", as in e.g., Riehemann and Bender (1999) and Sag (1997), that uses HPSG formalization) that could be adopted.[6]

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[3] The list of authors is not intended to be exhaustive, of course.

[4] Normally, at this point the notion 'non-compositionality' is used to define constructions. As the idea of compositionality is not formally worked out with respect to constructions, this definition is regarded to be tentative. As Kalman (URL: http://budling.nytud.hu/~kalman/course/konstr/index.html#) points out, "the definition of constructions […] is inherently circular", as a construction can only be defined with respect to other constructions. It cannot be the aim of this article to work this point out, but a logically more substantive definition of construction (or, as needed therefore, a clear position with regard to compositionality) should be on top of the list of desiderata. For the time being, I will stick to the idea that everything that has an idiosyncratic syntax or semantics that cannot be derived from its constituting parts, is a construction.

[5] For an argumentation in favour of underspecified phrasal patterns as part of the lexicon see Jackendoff (1997).

[6] A more concrete proposal is made in chapter 16 of Sag, Wasow and Bender (2003). This approach, Sign-Based Construction Grammar, differs from the approach presented here in a number of things. A major difference is the fact that it doesn't assume phrasal patterns to carry meaning. In a nutshell, a construction is a pairing of a daughter, the input, and a mother, the output. This approach is extremely powerful in the sense that it allows for the encoding

3. VARIOUS KINDS OF PAIN IN THE NECK.

Being a non-derivational, monostratal, unification-based approach, CxG falls into the family of grammatical theories like HPSG (Pollard and Sag 1994) and Lexical Functional Grammar (Bresnan 2001). In this paper, we will consult HPSG implementations for deeper insight into the problems that particular types of multiword expressions offer. The reason is a simple one: HPSG and CxG are comparable with regard to their design, but they differ with respect to strict lexicality. We would like to see whether doing away with strict lexicality can help overcome problems that arise in HPSG implementations.

Sag et al. (2001) provide us with a useful categorization of different sorts of multiword expressions that cause problems to computational HPSG grammars and parsers. The authors distinguish between fixed, semi-fixed, and syntactically flexible expressions, all of which demand special treatment during computation. In the following part, we will summarize the authors' main points.

Fixed expressions are those that are completely immutable, as for instance *by and large*, *kingdom come*, and *every which way*.[7] Due to their complete unflexibility, they behave like words and can be adopted in the lexicon as words-with-spaces and be retrieved from there without major problems.

Semi-fixed expressions do not cause insurmountable problems, either. In this category, Sag et al. (2001) put items that show no variation in word order, but allow for some flexibility with respect to inflection, reflexive form, or determiner selection (like e.g., *wet oneself*, *spill the beans*). What follows from that is that neither a compositional approach nor a string-type listing is an appropriate solution. The compositional approach would demand a lexicon entry for *spill* that gives the semantics 'reveal' and an entry for *beans* that gives the semantics 'secrets' in order to give the correct semantics of *to spill the beans*. This is not desirable, as it would let the lexicon explode on the one hand and could not deal with non-decomposable idioms such as *to kick the bucket*, where specific parts of meaning cannot be assigned to specific lexical items. Furthermore, overgeneration would be the result of such an approach, as the idiomatic reading would be productive apart from the one idiom where it usually occurs. A string-type listing approach leads to an explosion of the lexicon as well, as Sag et al. demonstrate: for the collocation *wet oneself*, more than 20 strings would have to be listed (all the possible combinations of *wet/wets/wetted/wetting myself/yourself/herself/himself/ themselves/oneself/itself*).

Sag et al. (2001) propose an analysis of semi-fixed expressions that makes use of the conventional HPSG-mechanisms, but where new ones are added. One of them is the insertion of a pointer in the lexical sign that determines the place in the—otherwise fixed—expression that can be inflected. The elements in question inherit their features from higher types (*kick* in *kick the bucket* inherits from the non-idiomatic *kick*), and the whole expression in turn inherits from its inflected part.

The third category, the syntactically flexible expressions, cover phenomena such as particle verbs like *break up* and *brush up on* and light-verb constructions as well as decomposable idioms like *let the cat out of the bag*. The expressions in this group cannot be listed as they allow for discontinuous realization (at least some of the particle verbs do), and

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of all kinds of idiosyncrasies, including uncommon syntactic combination of the daughters and non-compositional semantics of the mother.

[7] All examples from Sag et al. (2001).

regular syntactic mechanisms such as passivization (light verb constructions and decomposable idioms). The compositional alternative, again, is too powerful a mechanism, as it would not be able to rule out all the wrong collocations (as **to take a decision*). The mechanism introduced by Sag et al. (2001) is based on lexical entries with particular subcategorization frames. For example, there is an entry for *hand* that has a specification saying that it subcategorizes for *out*. The semantics of the whole idiomatic expression are captured in the KEY feature.[8]

The proposed approaches to computing the various kinds of multiword expressions are highly plausible from an HPSG perspective, where strict lexicality is assumed. But a lexical approach runs into trouble when it has to deal with even more flexible but nonetheless idiomatic expressions. What shall we do with idiomatic constructions where no single lexical item is stable? Are they an even bigger pain in the neck?

4. A CONSTRUCTIONAL IDIOM: THE DUTCH WAY.

Apart from idiosyncratic specific constructions, we also find more schematic patterns that carry unpredictable semantics. One such case is the widely discussed *way*-construction. For Dutch, Verhagen (2003) provided a constructional analysis for this phenomenon.[9] An example of the English *way*-construction is the following sentence: [10]

(1) *Pat pushed her way out of the room.*

Verhagen (2003) describes the idiosyncratic nature of this sentence as follows:
"[...], the subject referent creates a (possibly metaphorical) path and/or removes obstacles on it, and travels it, while a verb like *push* normally neither indicates movement of the subject nor the creation of something."

In other words, sentences that are instantiations of this particular construction provide additional sentential semantics that cannot be derived from the lexical items that constitute the sentence. Moreover, the overall sentence pattern does not give us the desired information about the particular semantics, too. Following from that, a particular construction can be established.

A glimpse of Dutch reveals that there is a comparable (but formally slightly different) construction. The following sentence is from the *Volkskrant* corpus:

(2) *Braid virus baant zich een weg door email.*
Braid virus *banen*-3rdSG itself a way through email.[11]
'Braid virus makes its way through email.'

[8] The KEY feature is used for semantic selection in Minimal Recursion Semantics (Copestake, Flickinger, Pollard and Sag in press).
[9] For an in-depth discussion of the English data, see Goldberg (1995).
[10] Verhagen (2003) argues for three distinct types of *way*-constructions, but in this article, we will merely focus on one particular type in the network of *way*-constructions and will refer to it as "the *way*-construction", knowing that this is not exhaustive.
[11] Glossing the verb *banen* is almost impossible, as it doesn't carry any semantics apart from the fact that it is "the verb that is used in this particular construction". The prototypical *way*-construction verb in German is the related *bahnen*, that carries the same features as the Dutch counterpart. In the English construction we find the opposite phenomenon: instead of taking a highly specific verb as the prototypical one, a relatively light verb, namely *make*, is chosen.

A sentence like this is what Verhagen (2003) calls a prototypical instantiation of the Dutch *way*-construction. Its prototypicality is due to two lexical selections: the verb *banen* is not only a hapax that can only occur in the context of this particular construction, it is also the most frequent verb that occurs in sentences of this type.[12] The prototypicality of *weg* is simply a matter of frequency. But there are alternations from the prototype. Consider the following sentences:

(3) *Twee bussen boren zich een weg naar het hart van Istanbul.*
Two buses drill themselves a way to the heart of Istanbul.
'Two buses make their way to the heart of Istanbul.'

(4) *De flits baant zich een gloeiend heet pad door de lucht.*
The lightning *banen*-3rd-SG itself a red hot path through the air.
'The lightning makes his red hot path through the air.'

In (3) we find the verb *boren*, which occurs rather unexpectedly. In (4) the instantiated verb is the prototype, but the nominal head of the direct object NP is not *weg* but *pad*, and the head takes an adjectival modifier. Moreover, there are even instantiations of the *way*-construction that do not choose any of the prototypical lexical items, like this complex NP:

(5) *een prachtige streek waarin zeven riviertjes zich een pad kronkelen*
a wonderful area where-in seven rivers-DIM themselves a path wind
naar de zee[13]
to the sea
'a wonderful area where seven rivers wind to the sea'

In light of these sentences, one has to wonder how to account for these data using a lexicalist approach. If the grammar licenses constructions because a lexical trigger evokes certain patterns, then there is no direct way to deal with the Dutch *way*-construction in an elegant manner. The verb is not predictable, the nominal head can alternate, even if it is only within a certain semantic paradigm, and the only completely stable element is the reflexive pronoun (but, due to frequency and variety of uses, we consider it to be not distinct enough). This implies that the Dutch *way*-construction should be considered a fully productive pattern. Being productive, lexical triggering as the computational mechanism is highly inefficient, as the complete paradigm of lexical triggers would have to carry the information that it could evoke a *way*-construction. Undoubtedly, for the verb *banen*, lexical triggering is a valid perspective, as it is fully predictable that the expression must be an instantiation of the way-construction. But as we adopt the CxG idea that the lexicon is a hierarchically ordered network of constructions and that instantiations of constructions (constructs, in other words) are not evoked by particular lexical items, we will have to find out which pieces of information have to be made explicit in the lexicon in order to be able to parse (and, in turn, generate) an utterance. Of course, lexical triggering in unambiguous cases like *banen* is technically a cheap solution, but as there are a whole bunch of

[12] Out of 92 hits in the *Volkskrant* corpus, 59 *way*-construction sentences instantiate the verb *banen*. The second-frequent verb is *vechten* ('fight') with no more than 7 hits (Verhagen 2003:35).
[13] Found on http://www.freewebs.com/maisjo/infooverdestreek.htm (01.02.2005).

constructions that do not allow for a (simple) lexical mechanism, we want to investigate a non-lexicalist method of recognition.

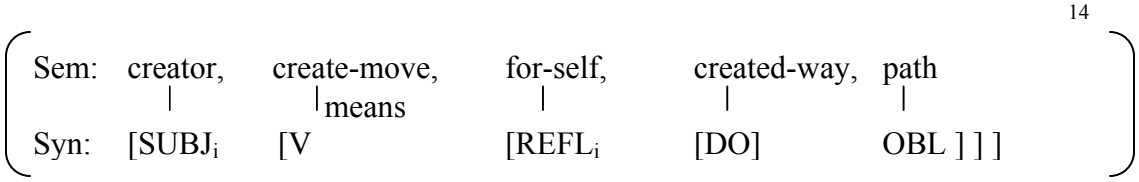
5. ANALYSIS.

The basic assumption underlying our approach is a cognitive one, actually: if the hearer is able to classify a sentence as an instantiation of the *way*-construction (and this is probably not what he will do, but he is able to construe the additional semantics that come along with it, even if there are neither *weg* nor *banen* involved to give a clear pointer to the construction), there must be unique features to the pattern that enable a unique classification. In other words, even if there is no lexical trigger, there must be a bundle of features that unmistakenly leads to the construal of the *way*-construction. These feature bundles can vary in amount and nature of features and must be established for every node and leaf of the construction network. In order to avoid redundancy, constructions inherit all the features that are specified for hierarchically higher constructions (in the same path). Multiple inheritance is the usual case, i.e., one particular utterance inherits from more than one construction.

So, what does the particular feature bundle for the Dutch *way*-construction look like? Let us consider our first example sentences again:

(6) *Braid virus baant zich een weg door email.*
Braid virus *banen*-3rdSG itself a way through email.
'Braid virus makes its way through email.'

Adopting Verhagen's notation, we can give a formal representation of the ingredients of a *way*-construction:



[14]

FIGURE1. FORMALIZATION OF THE DUTCH *WAY*-CONSTRUCTION.

This formalization is in accordance with the basic CxG tenet that formal and semantic features of a construction go hand in hand. What the figure shows is the following: the (abstract) construction is built up from meaning components that must occur in all particular constructs. The syntactic structure is obligatory as well: a ditransitive pattern with an oblique argument (i.e., a PP, usually).

The two sides of the description have no distinctive power in themselves. The semantic structure could also be represented by an utterance that does not make use of the *way*-construction, and a ditransitive sentence with an oblique argument is nothing particularly special, either. What makes it unique is the linking of those two layers (i.e., the lines between the

[14] From: Verhagen (2003:34). In the original figure, instead of DO, Verhagen writes "een weg". This is undoubtedly the prototype, nevertheless we would like to generalize a bit, and therefore we choose the grammatical function DO instead of the lexical instantiation. Furthermore, one missing right bracket is added.

semantic and syntactic structure, showing which semantic component is expressed by which constituent or vice versa).

If we take Verhagen's analysis and translate it into information that can be recognized automatically, the following reliable information is at least available.
The parser must find a parse of the following structure:

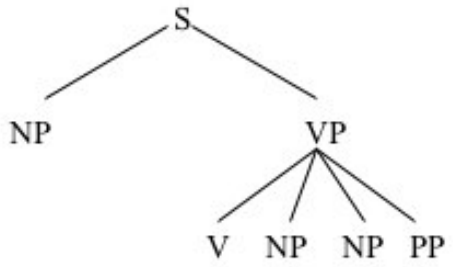


FIGURE 2. PHRASE STRUCTURE OF THE DUTCH *WAY*-CONSTRUCTION.

If the parser recognizes grammatical functions as well, the first NP must be the subject, the second NP must be the indirect object, and the third NP must be the direct object.
This is the syntagmatic information. But there is paradigmatic (or even lexical) information available, too. The indirect object NP must be instantiated by a member of the paradigm of reflexive pronouns and cannot be modified, furthermore the pronoun must show agreement with the number and gender features of the subject NP. The direct object NP carries specific lexical information, namely that the determiner must be indefinite. Additional semantic information is available as well, namely the NP must have PATH-semantics. In the process of choosing the right construction, this information narrows the list of possible candidates down to a rather small set. The PP adjunct must be a directional adverbial, and directionality is caused by the semantics of the preposition.

If we store all the reliable information in the schema above, we get the following picture:

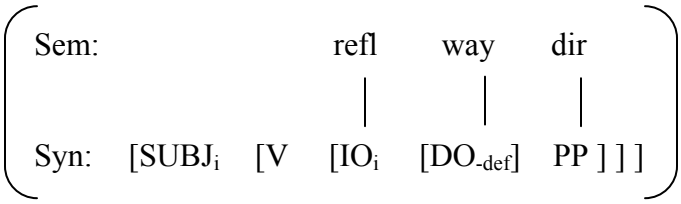


FIGURE 3. COMPUTABLE INFORMATION AVAILABLE IN THE DUTCH *WAY*-CONSTRUCTION.

Note at this point that this new schema is not a replacement for the one given above, it only mirrors the information that can be retrieved by a parser using conventional methods and that enables the system to distinguish this pattern from all other possible patterns. If the parser finds these features in the input sentence, it may categorize the sentence as an instantiation of the *way*-construction.

Once a construction is recognized, all the semantic and combinatorial features that its lexicon entry is enriched with must be applied. As the lexicon is organized as a hierarchically

ordered inheritance network, features are usually inherited from higher types and only construction specific information must be captured in constructional entries.

6. A WHOLE BUNCH OF CONSTRUCTIONS: THE NETWORK OF A LEXICON.

Being able to recognize a particular construction due to specific features is one thing, organizing them in a consistent inheritance network is another. The use of this kind of network is twofold: on the one hand, the theory suggests that all language knowledge is stored in an inheritance network. Therefore, trying to model (assumed) cognitively realistic structures that are based on the findings of Construction Grammar (or HPSG, or any grammatical theory that assumes this mechanism) will automatically have to rely on building inheritance networks. But there is also a purely technical argument for this kind of storing information, namely that redundancy can be removed from the system as much as possible. A construction inherits all the features from the higher, more abstract construction in the same path, but adds its own restrictions or features and can overrule inherited features. This means that there is no need to explicitly write down every feature of the construction in the local feature structure, for the only known element must be the path to the top node of the network in order to retrieve all the implied features. Because multiple inheritance is allowed, the particular constructions must be weighed in order to be able to deal with conflicting features. This mechanism has to account for the inheritance of syntactic as well as semantic features.[15]

Considering the different types of multiword expressions that Sag et al. (2001) describe as well as constructional idioms like the *way*-construction, the question arises how these formally very different kinds of structures can be stored in a coherent system. We imagine the lexicon of a CxG-parser to look as follows.

Let us start with the smallest items, the words (or rather strings without spaces). They are completely specified leaves of the inheritance network, i.e., there are no hierarchically lower daughters that inherit features from them.[16] Every string is provided with a feature structure that carries information about mother nodes in the hierarchy (e.g., "transitive verb" for an entry like *read*, when "transitive verb" in turn inherits all the features from "verb"). Combinatorial and word order information follows from the inherited structure and only restrictions on the inherited features have to be made explicit.

Fixed expressions like *by and large* are listed as words with spaces and they therefore count as fully instantiated constructions as well. They inherit their part of speech features from higher nodes.

Semi-fixed expressions can be treated in line with the approach by Sag et al. (2001), too. A collocation like *wet oneself* is listed as such, with the information that *wet* inherits from the non-idiomatic entry *wet* and *oneself* inherits from the non-idiomatic *oneself.* This ensures that the verb agrees with the subject, and as the inflected forms *myself, herself*, etc. will be listed in the

[15] We will not go into the details of the architecture of an inheritance network for Construction Grammar, as there is neither enough space, nor a consensus yet. For an overview of the topic, see the paper by Kalman, available from his homepage, URL: http://mebers.chello.hu.lkalman/papers/index.html. For working implementations with thoroughly worked out inheritance hierarchies, see the various HPSG implementation systems on the market, as for instance the LKB or the LinGo Grammar Matrix, URL: http://www.delph-in.net/matrix/. Another point that will not be dealt with in this paper is the feature geometry that will be used in a later stage of the ongoing project. For a first approach to a feature-logical formalization of Construction Grammar, see Kay (2002).

[16] Nevertheless, they can pass on features to constructions of the same level, like semi-fixed expressions or compounds, which adopt features from their parts.

feature structure of *oneself*, the agreement of the reflexive and the subject is guaranteed. Being a construction in its own right, *wet oneself* is able to override the semantic properties it inherits from *wet* and *oneself*. Instead, it assigns its own semantics as it is specified in the feature structure. The fact that the word order of semi-fixed expressions is rather stable can be accounted for by restricting the inherited linear features or word order patterns (as for instance the ability to be passivized of transitive sentences).

Such a constructional approach offers the possibility to treat syntactically-flexible expressions along the same lines as semi-fixed expressions. Different from the selection-based approach that Sag et al. (2001) choose, the constructions can be listed (like the *let-the-cat-out-of-the-bag*-construction or the *make-a-mistake*-construction). Just like the semi-fixed expressions, the syntactic features are (now to a much higher degree) inherited from the according lexical entries, but the semantics value that is assigned is the specific value of this construction. In terms of form and meaning, this means that the form is taken care of via inheritance, but the meaning comes purely from the construction.

Trying to establish a consistent treatment of all kinds of constructions, the schematic idioms have to be treated in exactly the same way. Syntactic features are inherited from less specific mother nodes, but in a different way than the constructions like the *make-a-mistake*-construction, the semantics of the *way*-construction cannot be assigned exhaustively in the feature structure of the construction itself, but must partially be inherited from the instantiated lexical items. Thus, the semantic structure of *Pat pushed her way out of the room* must combine the inherited semantic features from the lexical signs with the particular additional semantics of the *way*-construction. This semantic structure is partly inherited, as well, inter alia from the resultative-construction.

The fully schematic patterns, like the NP VP-construction, are first of all placeholders that help in recognizing more specific constructions, give information about combinatorial and word order possibilities, and pass their feature bundles to daughter nodes. Nevertheless, they have the same constructional status as the more substantial entries. The general organization of the inheritance network is shown in figure 4:

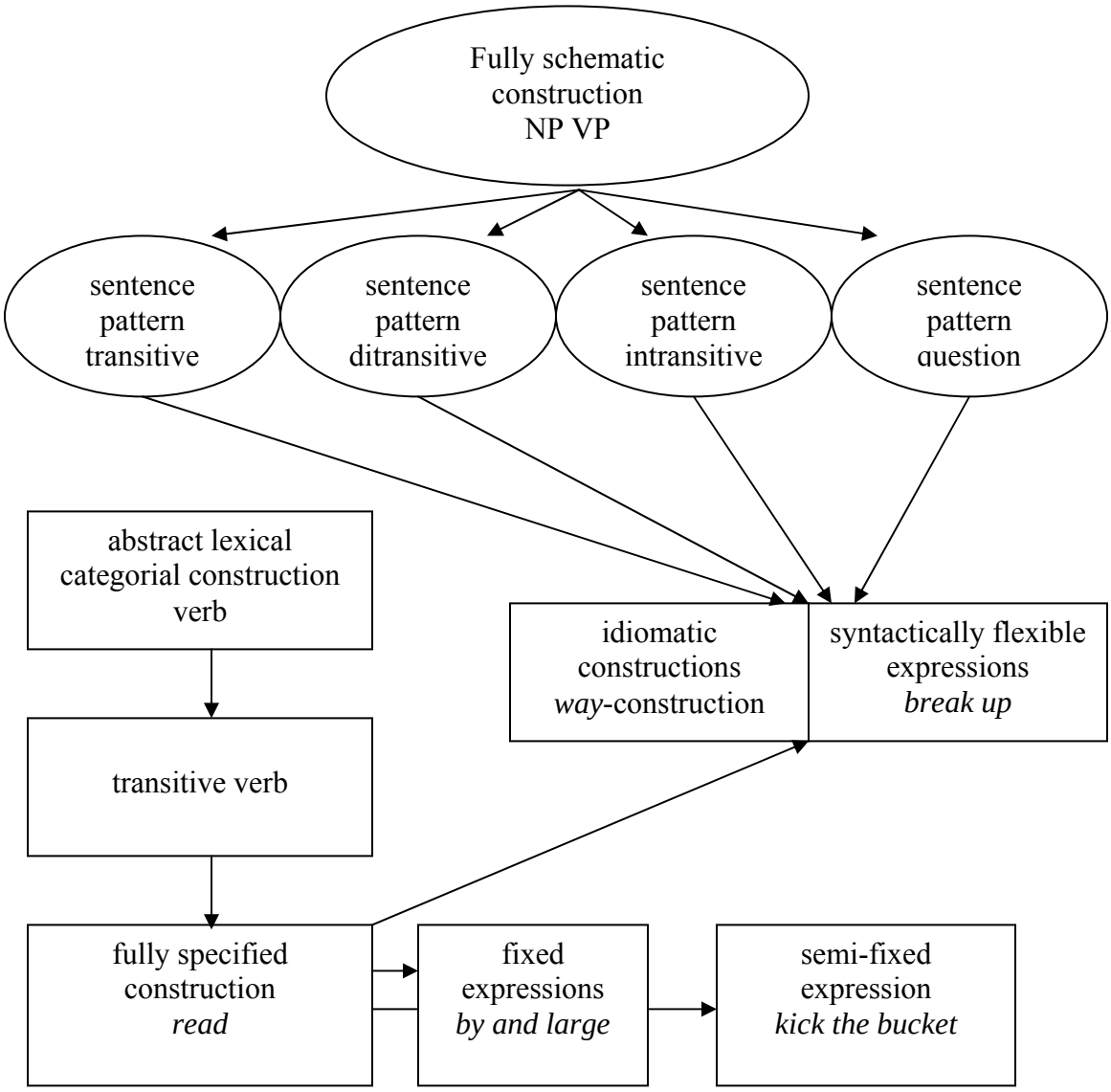


FIGURE 4. ORGANIZATION OF AN INHERITANCE NETWORK.

During parsing, the utterance in question dribbles through the inheritance network and has to find the correct path by checking the assigned features, which are of lexical, morphological, syntactic, and semantic nature. In the case of the *way*-construction, the described feature bundle functions as the pointer that makes a unique identification possible. But instead of building the semantics of the complete utterance compositionally (as would be the case for instance in a non-idiomatic construction), the meaning is captured in the constructional pattern itself and overrules the combinatorial semantics.

7. CONCLUSION.

In this paper, we presented an approach to the implementation of constructions. The idea of using Construction Grammar as the basic model for a wide-coverage NLP system is not farfetched, as it treats multiword expressions and constructional idioms, classic obstacles for NLP, as elements of grammar equal to traditional "core-grammatical" phenomena.

We discussed the way that a system based on HPSG treats three different kinds of more or less fixed expressions and added another set of data, namely the so-called constructional idioms. These kinds of constructions are not easily captured in a lexicalised approach, therefore we informally described a way how they can be dealt with in a non-lexicalist, constructionist system.

The methods that will have to be used in a CxG implementation remind us of HPSG-based systems, and one will not have to reinvent the wheel. Many, particularly formal, mechanisms are worked out very exhaustively for HPSG, and an orientation towards the HPSG-way of organizing inheritance networks will be very useful. The major difference is that a way must be found to integrate underspecified schematic patterns into the network as well. The analysis of the cognitively (and computationally) relevant building blocks of the Dutch *way*-construction has shown that a bundle of non-lexical information points to this particular construction. If this information is encoded in the schematic constructions as well as in the lexically specific ones (like e.g., the clustering of semantically related words), the parser might be able to cover usually difficult material. We are aware of the fact that there will be numerous questions and problems that will have to be solved, but this is nothing unusual when it comes to wide-coverage of natural language, and it will be an interesting challenge to see how far a formalized Construction Grammar can lead us.

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HOW CAN JAPANESE SPEAKERS TELL THE GENDER OF THEIR GIVEN NAMES?

MASAHIKO MUTSUKAWA
Michigan State University

The present study explores the relationship between sound and sense in Japanese. Japanese speakers can tell the gender of their given names when they first hear them. This indicates that there are phonological gender differences in Japanese given names. By analyzing the most popular male and female names in Japanese, this study shows that there are five types of phonological gender differences that determine the gender of Japanese given names: initial syllables, final syllables, heavy syllables, palatalized consonants, and length. The present study also reveals that the phonological gender differences observed in Japanese given names do not equally determine the gender but can be ranked based on their contribution in determining the gender of given names.

1. INTRODUCTION.

Japanese speakers can tell the gender of their given names even when they hear them for the first time. This indicates that there are phonological gender differences in Japanese given names. The present study discusses the phonological gender differences observed in Japanese given names and explains how the native speakers of Japanese judge the gender of their given names when they hear them.

This paper is structured as follows. Section 2 introduces five previous studies. Section 3 analyzes the most popular Japanese given names and introduces five types of phonological gender differences observed in Japanese given names. This section also reveals that the phonological gender differences do not equally contribute in determining the gender but can be hierarchically ordered based on their contribution. This study concludes in section 4 by summarizing the analysis.

2. PREVIOUS STUDIES.

Since de Saussure (1915), it has been assumed in the literature that the relationship between form and meaning is arbitrary. In some languages such as Japanese, however, some sounds have very specific meanings and values. This section gives a brief overview of five previous studies concerning the relationship between sound and sense: Jesperson (1922), Kindaichi (1978, 1988), Hamano (1998), and Makino (1999).

Jesperson (1922) is a milestone in this area of study. He claims that "there is a natural correspondence between sound and sense" (1922: 396) and discusses vowels as an example; "[T]he vowel [i] is felt to be more appropriate for light, and [u] for dark, as seen most clearly in the contrast between *gleam, glimmer, glitter* on the one hand and *gloom* on the other" Jesperson (1922: 401).

Kindaichi is a pioneer in this area of study in Japanese. In Kindaichi (1978), he analyzes onomatopoeic and mimetic words and discusses the relationship between sound and sense, as illustrated in (1).

(1) Kindaichi (1978) (cited from Makino (1999); translated by the author)

a. Alveolar Fricative /s/: calmness, softness, gentleness, or mentality (e.g., *sitosito* 'drizzling rain', *sinmiri* 'quietly', *uresii* 'happy', *kanasii* 'sad', *yasasii* 'gentle')

b. Alveolar Liquid /r/: smoothness or slipperiness (e.g., *surasura* 'fluently', *turuturu* 'slickly', *nurunuru* 'slimy')

c. Bilabial Stop /p/, /b/: burst, suddenness, or strength (e.g., *baribari* 'the act or the sound of tearing, chewing, or crunching something', *patto* 'burst', *bokan* 'the sound of explosion')

d. Palatal Glide /y/: weakness, softness, or slowness (e.g., *yotayota* 'waddle', *yoboyobo* 'totter')

e. High Back Vowel /u/: mentality (e.g., *uttori* 'enrapt', *ukiuki* 'intoxicating')

f. Mid Front Vowel /e/: vulgarness or negativeness (e.g., *hebereke* 'blotto', *teratera* 'greasy')

In Kindaichi (1988), he illustrates the relationship between sound and sense by contrasting vowels and consonants, and voiceless obstruents and voiced obstruents, as shown in (2).

(2) Kindaichi (1988) (translated by the author)

g. Vowels: (Umegaki 1961)

/i/: fineness, thinness, and sharpness
/e/: brightness or flatness
/a/: highness and largeness
/o/: roundness and heaviness
/u/: darkness and dullness

Consonants:

/k/: dryness and hardness
/s/: amenity
/t/: strength and masculinity
/n/: stickiness
/h/: lightness
/m/: roundness and femininity
/y/: weakness and softness
/w/: fragility

h. Voiceless Obstruents: pleasantness, smallness, pureness, or fastness (e.g., *korokoro* 'a mimetic word that describes something small rolling over')

i. Voiced Obstruents: unpleasantness, largeness, roughness, or slowness (e.g., *gorogoro* 'a mimetic word that describes something large rolling over')

j. Palatalized Consonants: inelegance

Hamano (1998) also analyzes mimetic words in Japanese and shows that there is relationship between sound and sense. Contrasting nasal sounds and velar sounds, Makino (1999) claims that nasal sounds represent mental closeness and velar sounds indicate mental distance. He also refers to Japanese given names and mentions that nasal sounds represent femininity. In the previous studies introduced above, only Kindaichi (1988) and Makino (1999) refer to masculinity and femininity in Japanese given names. Kindaichi (1988) claims that the alveolar stop /t/ sounds masculine and the bilabial nasal /m/ sounds feminine and Makino (1999) claims that nasal sounds are feminine. As shown below, however, these are not the only sounds that indicate masculinity and femininity.

3. ANALYSIS.

This section introduces the phonological gender differences observed in Japanese given names and discusses how the phonological gender differences determine the gender of given names.

3.1 PHONOLOGICAL GENDER DIFFERENCES IN JAPANESE GIVEN NAMES.

I collected the data for this study from Daiichi Seimei (1987) and Meiji Yasuda Seimei (website). First, from Daiichi Seimei (1987), I collected the most popular Japanese given names in each year from 1906 to 1985. Daiichi Seimei (1987) provides lists of the five most popular Japanese male names and female names in each year from 1906 to 1985. I divided the 1906 – 1985 time frame into four stages: 1906 – 1925, 1926 – 1945, 1946 – 1965, and 1966 – 1985. In each stage, I collected 100 male names and 100 female names. Only distinct names were included in the dataset for the present study, because the same names appear on the lists repeatedly. Second, Meiji Yasuda Seimei (website) provides a list of thirty of the most popular Japanese male names and female names annually. I adopted the lists for 2001 and 2002 as the data. As a result, 115 male names and 125 female names in total are included in the dataset for this study, as illustrated in Table 4. By analyzing the data, I found that Japanese given names have five types of phonological gender differences: initial syllables, final syllables, heavy syllables, palatalized consonants, and length. The rest of this subsection introduces these phonological gender differences.

	'06-'25	'26-'45	'46-'65	'66-'85	2001	2002	Total
Male Names	12	15	11	14	31	32	115
Female Names	15	16	14	19	30	31	125

(1906-1985: Daiichi Seimei (1987), 2001-2002: Meiji Yasuda Seimei (website))

TABLE 4. DATA.

First, initial syllables play important roles in determining gender. Table 5 shows the initial syllables of the most popular Japanese given names. Table 5 reveals that the names starting with vowels are feminine. Among 18 female names in the data starting with vowels, 17 names start with *a* (e.g., Akiko, Ayumi, Airi, Ayaka, and Aoi). The initial *a* in female names is becoming more popular, whereas in male names, this vowel is uncommon in initial position. Only three male names starting with vowels are observed in the data, i.e., Akira in 1926 – 1945

and 1946 – 1965 and Isao in 1926 – 1945. Second, the velar stop /k/ is more common in male names. 20.0 % of male names have the initial /k/ whereas 11.2% of female names have it. In 2001 and 2002, 12 male names, i.e., 19.0%, start with /k/ while only two female names, i.e., 3.3%, have initial /k/. This indicates that initial /k/ in male names is becoming more popular. Third, initial /s/ is more common in male names than in female names, but initial *sa* in female names is as common as in male names. Fourth, the alveolar stop /t/ is masculine, as Kindaichi (1988) claims. Six female names in total starting with /t/ are observed in the data, i.e., Tiyo in 1906 – 1925, Toshiko in 1906 – 1925 and 1926 – 1945, Teruko in 1926 – 1945, and Tomoko in 1946 – 1965 and 1966 – 1985; while there are 18 male names with initial /t/. In 2001 and 2002, there are no female names with initial /t/. Fifth, the fricative /h/ is found in both male and female names, but there are no male names starting with *hu* or *ho*. The name-initial *hu* and *ho* are feminine features. Sixth, as Kindaichi (1988) and Makino (1999) claim, nasal sounds connote femininity - particularly /n/. There is only one male name, Naoki, in the data that starts with /n/. Seventh, the alveolar liquid /r/ is observed in both male and female names; however, there are differences between the male and female names with respect to the vowel following initial /r/. In the male names, most of them start with *ryo* (e.g., Ryoo, Ryota, and Ryooma), while most of the female names start with *ri* (e.g., Rio, Riko, and Rina). Eighth, the voiced alveolar stop connotes masculinity and the voiced alveo-palatal affricate is feminine, although both are allophones of /d/. Finally, the palatal glide /y/ is the only initial sound that does not indicate the gender.

		V-	k-	s-	t-	n-	h-	m-	y-	r-	d-	j-	Total
Male	'06-'25	0	2	3	3	0	2	1	1	0	0	0	12
	'26-'45	2	2	2	4	0	2	2	1	0	0	0	15
	'46-'65	1	4	1	3	0	2	0	0	0	0	0	11
	'66-'85	0	3	1	3	0	2	1	3	0	1	0	14
	2001	0	7	4	2	1	4	2	5	5	1	0	31
	2002	0	5	6	3	0	5	0	6	6	1	0	32
	Total	3	23	17	18	1	17	6	16	11	3	0	115
Female	'06-'25	0	4	0	2	0	5	2	2	0	0	0	15
	'26-'45	1	3	2	2	1	2	3	2	0	0	0	16
	'46-'65	1	3	0	1	1	2	2	3	0	0	1	14
	'66-'85	3	2	0	1	2	1	4	4	1	0	1	19
	2001	7	0	2	0	3	4	7	3	4	0	0	30
	2002	6	2	2	0	2	5	8	2	4	0	0	31
	Total	18	14	6	6	9	19	26	16	9	0	2	125

TABLE 5. INITIAL SYLLABLES.

Next, the final syllables also play significant roles in determining gender. Table 6 shows the final syllables observed in the data. The final syllables have been changing over time. First, the masculine features *shi* and *ji* are observed in male names from 1906 to 1985, but in 2001 and 2002, no male names use these sounds in final position. Second, *ke*, *ta*, and *to* are observed in male names only after 1965. Third, the name-final *ko* is the most common female feature in the data. In 2001 and 2002, however, only two female names have it. Fourth, the female feature *ka* is

observed only after 1965 and the female feature *na* is popular since 2001. Fifth, the name-final *mi* is common in female names in the data, but in 2001 and 2002, *mi* is observed in both male and female names (e.g., Takumi (male name) and Natsumi (female name)). Sixth, the name-final syllable *o* is observed only in male names from 1906 to 1965. In 2001 and 2002, however, it is found in only female names (e.g., Mio and Rio). Seventh, the name-final *ki* is observed in both male names (1946–) and female names (1966–), but it is more common in male names than in female names. Finally, the name final *ma* is found only in male names in 2002.

		-shi	-ji	-ke	-ta	-to	-ko	-mi	-ka	-na	-o	-ki	-ma
Male	'06-'25	2	1	0	0	0	0	0	0	0	6	0	0
	'26-'45	4	1	0	0	0	0	0	0	0	7	0	0
	'46-'65	2	2	0	0	0	0	0	0	0	3	1	0
	'66-'85	4	2	3	1	1	0	0	0	0	0	2	0
	2001	0	0	3	6	5	0	1	0	0	0	8	0
	2002	0	0	2	5	5	0	1	0	0	0	6	5
Female	'06-'25	1	0	0	0	0	7	2	0	1	0	0	0
	'26-'45	0	0	0	0	0	16	0	0	0	0	0	0
	'46-'65	0	0	0	0	0	11	3	0	0	0	0	0
	'66-'85	0	0	0	0	0	7	6	2	0	0	1	0
	2001	0	0	0	0	0	1	3	6	6	1	3	0
	2002	0	0	0	0	0	1	3	7	7	1	1	0

TABLE 6. FINAL SYLLABLES.

Heavy syllables and palatalized consonants also indicate gender. First, heavy syllables are more common in male names than in female names. They are becoming more popular in male names. In 2001 and 2002, more than 55% of the male names in the data have heavy syllables. In female names, on the other hand, heavy syllables have been becoming less common since 1965. In 2002, only about 3% of the female names in the data have them. In Japanese given names, heavy syllables are observed in the first syllable. The only exception to this generalization is the male name *Shoozoo* where heavy syllables are found not only in its first syllable but also in its final syllable.

		uu	oo	n	Total
Male	'06-'25	0	3	0	3 (25.0 %)
	'26-'45	0	2	0	2 (13.3%)
	'46-'65	0	1	1	2 (18.2%)
	'66-'85	3	0	1	4 (28.6%)
	2001	6	9	3	18 (58.1%)
	2002	7	8	3	18 (56.3%)
Female	'06-'25	0	0	0	0 (0.0%)
	'26-'45	0	1	0	1 (6.2%)
	'46-'65	1	1	1	3 (21.4%)
	'66-'85	1	1	1	3 (15.8%)
	2001	3	0	0	3 (10.0%)
	2002	1	0	0	1 (3.2%)

TABLE 7. HEAVY SYLLABLES.

Second, palatalized consonants are observed only in heavy syllables. Palatalized consonants are observed only in male names from 1906 to 1945 and since 2001, while they are found only in female names from 1946 to 1985. I assume that the palatalized consonant is a masculine feature, because it is more common in male names and observed only in a heavy syllable, which is also a masculine feature. Kindaichi (1988) claims that palatalized consonants sound inelegant, as introduced in the previous subsection. However, the fact that palatalized consonants are commonly used in male names indicates that palatalized consonants sound not inelegant but masculine, because no one likes to use inelegant sounds in his child's name.

		kyo	shu	sho	ju	ryu	ryo	Total
Male	'06-'25	0	0	3	0	0	0	3 (25.0 %)
	'26-'45	0	0	2	0	0	0	2 (13.3 %)
	'46-'65	0	0	0	0	0	0	0 (0.0 %)
	'66-'85	0	0	0	0	0	0	0 (0.0 %)
	2001	0	1	2	0	1	2	6 (19.4 %)
	2002	0	2	2	0	1	3	8 (25.0 %)
Female	'06-'25	0	0	0	0	0	0	0 (0.0 %)
	'26-'45	0	0	0	0	0	0	0 (0.0 %)
	'46-'65	1	0	0	1	0	0	2 (14.3 %)
	'66-'85	0	0	0	1	0	0	1 (5.3 %)
	2001	0	0	0	0	0	0	0 (0.0 %)
	2002	0	0	0	0	0	0	0 (0.0 %)

TABLE 8. PALATALIZED CONSONANTS.

Finally, the length also indicates the gender. Male names and female names are different with respect to the length. First, there are male names consisting of four morae, but quadrimoraic

female names are not found in the data. Second, monosyllabic male names are observed in 2001 and 2002, whereas monosyllabic female names are not observed in the data. Third, the mean length of given names also shows the gender difference. As illustrated in Table 9, male names are longer than female names in general. With respect to the number of morae, male names are 3-mora long or longer while female names are 3-mora long or shorter. With respect to the number of syllables, male names have been becoming shorter. Before 1985, male names are about as long as or longer than female names. But, since 2001, male names are shorter than female names.

	Male					
	'06-'25	'26-'45	'46-'65	'66-'85	2001	2002
Syllable	2.83	2.87	2.91	3.00	2.45	2.37
Mora	3.17	3.07	3.19	3.36	3.03	3.0
	Female					
	'06-'25	'26-'45	'46-'65	'66-'85	2001	2002
Syllable	2.47	2.94	2.71	2.53	2.50	2.48
Mora	2.53	3.00	3.00	2.68	2.60	2.54

TABLE 9. LENGTH.

Thus far, I have introduced the phonological gender differences observed in the most popular Japanese given names. The phonological gender differences are summarized as in Table 10.

	Masculine	Feminine
Initial Syllables (Onset Cs)	· s- (excluding *sa*) · t- (especially *ta*) · ryo · d- · k- (2001–)	· Onsetless Syllables (especially *a*) · Nasals (*m*- and *n*-) · h- (*hu* and *ho*) · ri · j-
Final Syllables	· o (–1965) · shi, ji (–1985) · ki (1946–) · ke, ta, to (1966–) · ma (2002)	· ko, mi · ka (1966–) · na, o (2001–)
Heavy Syllables	· Yes	· No
Palatalized Cs	· Yes	· No
Length	· Monosyllabic Names · Quadrimoraic Names	

TABLE 10. PHONOLOGICAL GENDER DIFFERENCES IN JAPANESE GIVEN NAMES.

3.2 HOW CAN JAPANESE SPEAKERS TELL THE GENDER OF THEIR GIVEN NAMES?

In the previous subsection, I have introduced the five types of phonological gender differences observed in Japanese given names. In this subsection, I will discuss how these phonological gender differences determine the gender of Japanese given names. As shown below, these

features do not equally contribute to determining gender. They can be hierarchically ordered based on their contribution.

First, consider the names in (3). Each of them has one masculine feature and one feminine feature. Interestingly, however, none of them sound neutral: (3a) and (3b) sound masculine while (3c) and (3d) sound feminine. Why do they not sound neutral? If each feature equally contributes to determining gender, they should sound neutral. I assume this is because the final syllable plays more important roles than the first syllable in determining the gender of given names. In other words, the final syllable is ranked higher than the initial syllable as illustrated in (4).

(3) Male Names (a) *Masaki* (m- = Feminine, ki = Masculine)

(b) *Naoto* (n- = Feminine, to = Masculine)

Female Names (c) *Kazuko* (k- = Masculine, ko = Feminine)

(d) *Tomomi* (t- = Masculine, mi = Feminine)

Final Syllables >> Initial Syllables

Next, the names in (4) all sound masculine, although each of them has both one masculine feature, i.e., quadrimoraic, and one feminine feature, i.e., the initial syllable. These examples suggest that length is more significant than the initial syllable in determining the gender. Length and initial syllables are ranked as shown in (4).

(4) Male Names (a) *Motoharu* (Quadrimoraic = Masculine, m- = Feminine)

(b) *Naonori* (Quadrimoraic = Masculine, n- = Feminine)

Length >> Initial Syllables

Length plays a more significant role than the final syllable in determining the gender of given names. The names in (5) all sound masculine although each of them has both a masculine feature, i.e., quadrimoraic, and a feminine feature, i.e., the final syllable. Length outranks the final syllable, as in (5).

(5) Male Names (a) *Yosihumi* (Quadmoraic = Masculine, mi = Feminine)

(b) *Yukitaka* (Quadmoraic = Masculine, ka = Feminine)

Length >> Final Syllables

Finally, the given names in (6) and (7) reveal how final syllables, initial syllables, and heavy syllables contribute to determining the gender of given names. The names in (6) and (7) all sound feminine although they have the heavy syllable, which is a masculine feature. These

names suggest that the initial and final syllables are ranked higher than the heavy syllable. With respect to the palatalized consonant, I assume it is also ranked lower than the initial and final syllables and the palatalized consonant and the heavy syllable have the same ranking, because palatalized consonants are found only in heavy syllables in Japanese given names.

(6) Female Names (a) *Yooko* (ko = Feminine, Heavy Syllable = Masculine)

(b) *Yuuka* (ka = Feminine, Heavy Syllable = Masculine)

(7) Female Name (a) *Miiru* (m- = Feminine, Heavy Syllable = Masculine)

Final Syllables >> Heavy Syllables

Initial Syllables >> Heavy Syllables

Heavy Syllables = Palatalized Consonants

In sum, the five phonological features can be ranked as seen in (22), based on their contributions in determining the gender of Japanese given names. This ranking explains how the gender of Japanese given names is determined and how Japanese speakers judge the gender of their given names when they hear them.

(8) Length
|
Final Syllables
|
Initial Syllables
|
Heavy Syllables Palatalized Consonants

The ranking in (9) explains most Japanese given names. However, there are counterexamples to this ranking. All of the names in (9) share three common features: (i) they consist of two light syllables, (ii) they have feminine features name-initially, and (iii) they have masculine features name-finally. As shown in (10), final syllables are more important than initial syllables in determining the gender. This predicts that the names in (9) sound masculine, but, in fact, they all sound feminine. Why do they not sound masculine but feminine? I assume this is because bimoraicity (and disyllabicity) indicates femininity weakly. This idea is supported by the fact that female names in general are shorter than male names, as illustrated in Table 9, although male names consisting of two light syllables are possible and have been becoming more common. I assume that, when the feminine feature bimoraicity (and disyllabicity) is combined with another feminine feature in the name-initial position, the name sounds feminine even if it has a masculine feature name-finally. The ranking in (9) can be modified as in (10).

(9) Counterexamples

Female Names (a) *Aki*

(b) *Maki*

(c) *Miki*

(10) Length Bimoraicity (and Disyllabicity) + Initial Syllables
Final Syllables
Initial Syllables
Heavy Syllables Palatalized Consonants
Bimoraicity (and Disyllabicity)

4. CONCLUSION.

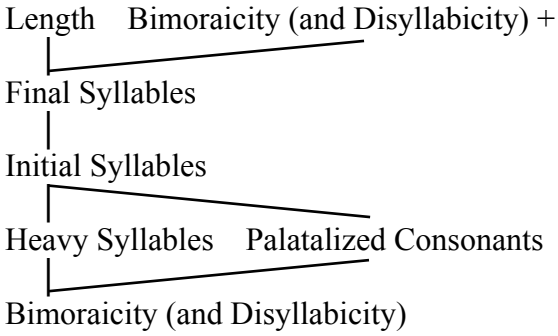
The present study has shown three things. First, there exists a relationship between sound and sense in Japanese given names. Japanese given names show phonological gender differences, which can be categorized into five groups as in Table 25. Second, the phonological gender differences observed in Japanese names have been changing over time. Third, the phonological gender differences do not equally determine the gender of given names. They can be hierarchically ordered based on their contribution in determining the gender, as in (26).

The present study accounts for how the gender of Japanese given names is determined and how Japanese speakers can tell the gender of their given names even when they hear them for the first time. It has not been explained in this study, however, why non-native speakers of Japanese cannot judge the gender of Japanese given names. Future study should include analyses of given names in other languages and examine the three questions: (i) Are the phonological gender differences observed in Japanese given names universal?, (ii) Is the ranking of the features developed for Japanese given names universal?, and (iii) if they are not universal, how are they different between languages?

	Masculine	Feminine
Initial Syllables (Onset Cs)	· s- (excluding *sa*) · t- (especially *ta*) · ryo · d- · k- (2001–)	· Onsetless Syllables (especially *a*) · Nasals (*m*- and *n*-) · h- (*hu* and *ho*) · ri · j-
Final Syllables	· o (–1965) · shi, ji (–1985) · ki (1946–) · ke, ta, to (1966–) · ma (2002)	· ko, mi · ka (1966–) · na, o (2001–)
Heavy Syllables	· Yes	· No
Palatalized Cs	· Yes	· No
Length	· Monosyllabic Names · Quadrimoraic Names	

TABLE 11. PHONOLOGICAL GENDER DIFFERENCES IN JAPANESE GIVEN NAMES. (=Table 10)

(11) (= (24))



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MODELING TRANSMISSION IN LANGUAGE CONTACT: THE IMPACT OF ENGLISH ON GERMAN

ALEXANDER ONYSKO
Universität Innsbruck, Austria

This article proposes a model of the transmission process in language contact which is based on the current influence of English on German. In the model, borrowing, conceptual transmission without SL-form, codeswitching, and interference are distinguished as different types of transmission from English to German. These types of SL-influence are discussed in a theoretical framework of stability of the languages in contact (cf. Coetsem 2000, Field 2002). Issues relating to the identification of SL-influence in the RL and to the productive use of transmitted language elements in the RL are also implied in the model. The model is illustrated with examples of English elements in a written corpus of the German newsmagazine Der Spiegel *(2000). The analyses show that, apart from stylistic effects of English codeswitches, the impact of English is primarily confined to the lexical level.*

1. INTRODUCTION.

One of the core issues in language contact is to define the influence that a source language (SL) exerts on a receptor language (RL). Ever since the pioneering works by Betz (1949, 1959), Haugen (1950), and Weinreich (1970), the question of how to classify transmission between languages has been the subject of intense discussion (cf. Clyne 2003, Coetsem 2000, Field 2002, Filipovic 1996, Poplack 1993, Thomason and Kaufman 1988). Amid recent fears of the increasing global influence of English, i.e., linguistic imperialism (cf. Gard and Hüppauf 2004), the description of the transmission process has gained further relevance. To provide an objective view, a theoretical framework is necessary which integrates the various phenomena of transmission and their possible impact in the RL. By proposing an exemplary synthesis of the major types of transmission from SL (English) to RL (German), this article takes a step towards an analytic depiction of the transmission process, which could serve as a stimulus for further research on the role of English as a source of language influence today.

The first section of this paper discusses the different types of transmission, i.e., borrowing, conceptual transmission without SL -form, interference, and codeswitching. This is followed by a discussion of the parameters of transmission in particular the notion of stability. The final section portrays the model, which is illustrated with examples of English influence in a corpus of the German newsmagazine *Der Spiegel* (2000) (corpus size of 5,223,451 word-tokens)

2. TYPES OF TRANSMISSION.

2.1 BORROWING.

In popular discussions of language contact phenomena the meaning of the term borrowing has bleached to refer to transfer from SL to RL in general. However, as Coetsem remarks "the generalized use of borrowing conceals crucial differences in transmission" (2000: 38). These differences of transmission are not merely a matter of empty taxonomic considerations, but they are grounded in the fundamental Saussurean principle of the duality of the linguistic sign, i.e.,

the arbitrary relationship of form and meaning in the linguistic unit. Thus, if borrowing is considered to be a process of transfer of linguistic units, Saussure's postulate of the arbitrary integrity of form and meaning in the lexical unit can be applied to distinguish borrowing from other types of transmission.

From a cross-linguistic perspective Saussure's logic postulates that different languages establish their own arbitrary connections of form and meaning if lexico-genetic relationships are not relevant. On the lexical level, for example, the meaning of 'tree' takes different shapes in various languages, e.g., [triː] in English, [baum] in German, [arbr(ə)] in French, [djerevə] in Russian, [ʃu] in Mandarin Chinese, and [dɛtʃɛn] in Na-Dene (Chipewyan). Such cross-linguistic variation is an expected consequence of the principle of arbitrariness. This means that the arbitrariness of form and meaning restricts the chance that the same lexical unit is found in two languages. If, indeed, two strikingly similar units of form and meaning exist in separate languages, a borrowing relation between these lexical items is relevant. This lexical characteristic of borrowing is illustrated in the following figure.

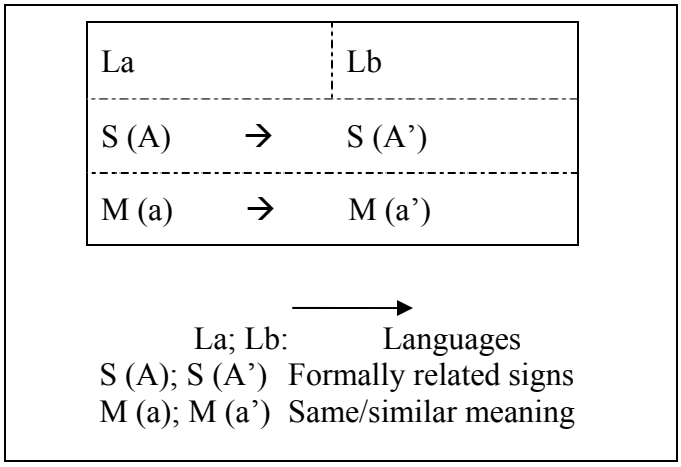

FIGURE 1. BORROWING.

As examples to the illustration, English terms such as *internet, cyberspace, online, cool, e-mail, computer, boom, manager,* and *team* appear as borrowings in German. These words retain their original unit of form and meaning even if only part of their semantic scope is transferred into German. The adjectival anglicism *cool*, for example, has entered the German language in its colloquial meaning of 'very good, excellent' and also denotes 'calm and self controlled behaviour'. However, *cool* is not used in its English sense of 'temperature'. Apart from varying degrees of semantic equivalence, the examples of borrowings are marked by their English word-form, which is usually imitated in German as in [buːm], [ˈsaɪbəspeɪs], [komˈpjuːtə], [ˈiːmeːl], [ˈmaenətʃə] and [kuːl].[1]

Having defined borrowing in terms of the transfer of lexical units, the question arises whether transmission is also possible as a split transfer of meaning and form. This is discussed in the following section.

[1] Transcriptions show possible assimilation processes in German, e.g., monophthongization of English diphthongs [ei → e] and devoicing of voiced fricatives [dʒ → tʃ].

2.2 CONCEPTUAL TRANSMISSION WITHOUT SL-FORM.

In contrast to lexical borrowing, conceptual transmission without SL-form is characterized by the disruption of the unit of form and meaning of the SL and the reproduction of meaning from the SL by language-inherent forms in the RL. This process pertains to the formation of calques (loan translations, loan renditions, and loan creations). Cultural-historical and etymological evidence is necessary in order to prove conceptual transmission without SL-form that leads to lexical creation in the RL. The following figure illustrates conceptual transmission without SL-form as a stimulus of lexical creation in the RL.

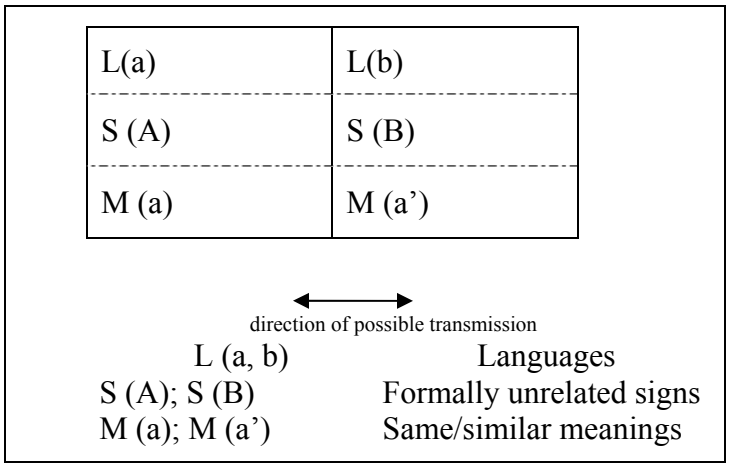

FIGURE 2. CONCEPTUAL TRANSMISSION WITHOUT SL-FORM.

In a scenario of conceptual transmission without SL-form the same meaning is represented by language inherent forms in L(a) and L(b), and so the possible direction of the conceptual transmission relies on historical evidence. The German term *luftkissenboot*, for example, followed the invention of the *hovercraft* in Great Britain in 1956 (http://www.hovercraft-museum.org/years.html, January 2005). In contrast to the English term *hovercraft*, which conceptualizes the function of the object, i.e., a craft that hovers, the German term *luftkissenboot* is lexically motivated by the physical properties of the object, i.e., a boat on air cushions (*luft* 'air', *kissen* 'cushion', *boot* 'boat'). This shows that the German language has established its own intrinsic connection of form and meaning to represent the transferred concept 'hovercraft'. Further examples of conceptual transmissions from English to German are calques such as *wolkenkratzer* (→skyscraper), *weltweit* (→worldwide), *gipfelkonferenz* (→summit conference), and *entwicklungsland* (→developing country). Since these terms consist of German lexical items which are combined according to productive compounding mechanisms in German, there is no word-formal evidence that would allude to English influence. Instead, the proof of a possible conceptual transfer relies on etymological knowledge, a lack of which renders conceptual transmission without SL-form a highly speculative issue of language influence (cf. Busse and Carstensen 1993, 1994, 1996). In general, conceptual transmission without SL-form also touches upon the question whether a strategy of literal translation can be considered a form of language contact.

To summarize the discussion so far, the arbitrary integrity of form and meaning in the lexical unit allows one to distinguish borrowing as the transmission of a capsule of form and

meaning from conceptual transmission without SL-form, which is characterized by the creation of a new lexical unit in the RL following a conceptual stimulus from the SL. Apart from its role in the definition of these types of transmission, the interrelation of form and meaning also characterizes the following phenomenon of transmission.

2.3 INTERFERENCE.

Interference is based on analogies of signs and structures in different languages. In a contact situation these similarities can lead to a transfer of lexical or syntactic information from SL to RL. Thus, the meaning of a term in the RL can acquire an additional meaning from a formal associate in the SL. This happened in the examples of the French and German verbs *realisér* and *realisieren*, which obtained the extra meaning 'to become aware of' due to influence from their English lexical correlate *realize*. The fact that interference is a valid psychological process can be inferred from the occurrence of *faux amis* or *false friends*. German learners of English, for example, tend to confuse the English words *sensible* and *sensitive* because in German *sensibel* means 'sensitive'.

In order to be able to speak of contact induced change, interferences need to become conventionalized in the RL. A few more examples of accepted lexical interferences are provided in Haugen (1950: 219), who notes semantic shifts in the American Portuguese terms *livraria*, which changed from 'bookstore' to 'library' due to semantic projection of English *library*, and *humeroso*, which added the English meaning 'humorous' from English *humorous*.

In addition to lexical influences, interference can also impact the structural level. Structural interference from the SL can increase the frequency of usage of a similar syntactic pattern in the RL or create a syntactic niche within the confines of an already existing structure. Schelper (1995: 15) notes the occurrence of *mehr* ('more') as a comparative marker of German adjectives which mirrors the English comparative structure *more* + adjective, as in the hypothetical example ***er ist mehr intelligent als sein vater*** [he is more intelligent than his father] instead of *er ist intelligenter als sein vater* which shows the regular formation of the comparative (adjective stem + suffix *–er*). Schelper also encounters structural interferences in the increased usage of possessive pronouns instead of the definite article in German (*er stützte seinen kopf in seinen arm* 'he supported his head with his arm'; ibid.).

While borrowing and conceptual transmission without SL-form mainly represent lexical transmissions, this section has shown that interference can work both on the lexical-semantic and structural-syntactic level. To continue the shift from lexical to syntactic units of transmission, the following section discusses codeswitching as another type of transmission in language contact.

2.4 CODESWITCHING.

Codeswitching relates to the embedding of sentential units of an SL into the matrix of the RL. While codeswitching and borrowing form a continuum of usage, borrowing is primarily a lexical issue (Clyne 2003: 71). Borrowings are integrated into the language system of the RL, and they can turn into productive lexical items. Multilingual competence is not a necessary precondition for the use and understanding of borrowings. Codeswitching, on the other hand, relies on multilingual competence since codeswitches follow the syntactic structure of their SL when embedded in the matrix language (RL). Thus, codeswitches are generally not reproducible in the

system of the RL with the exception of lexicalized codeswitches. In the latter case, few, typically short, codeswitches can develop into set phrases of the matrix lexicon. In *Der Spiegel* (2000), for example, the codeswitch *I'm not amused* has become a fixed expression that occurs in various contexts in full or abbreviated form as in the following phrases:

(1) *Die überraschte Queen, not amused, ließ ihn laut Augenzeugen abblitzen...* (45/241)
'According to eye-witnesses the surprised Queen, not amused, brushed him (George Bush) off…'

(2) *Traditionalisten in der Heimat sind not amused…* (27/70)
'Traditionalists at home are not amused…'

(3) *"I'm not amused," kommentiert Christian Olearius…* (21/94)
'I'm not amused, comments Christian Olearius…'

(4) *"I'm not amused," rüffelt der Karlsruher Umweltdezernent…* (39/ 86)
'I'm not amused, snubbed the head of the environmental department in Karlsruhe…'

The codeswitch has gained recent popularity as Queen Elizabeth's reaction to Prince Charles' unsteady love-life, and *Der Spiegel* has picked up the phrase to refer to the Queen's demeanour as in (1) and to British politics as in (2). In these examples the codeswitch is textually and thematically triggered. In (1) the Queen as the initial source of the codeswitch functions as its trigger while in (2) the reference to the traditionalists, i.e., conservative British politicians, establishes a thematic link to the source of the codeswitch. In (3) and (4), however, the codeswitch is decontextualized from its original reference and occurs in a German context. The response of the representative of a German bank in Hamburg and of the head of the environmental department in Karlsruhe indicates the autonomous use of the utterance as a lexicalized phrase in German while, stylistically, the codeswitch remains as a playful allusion to the Queen's English.

3. PARAMETERS OF TRANSMISSION.

In section 2 the transmission process has been subdivided into four major types according to the transfer of form and meaning and according to lexical and syntactic impact in the RL. These different types are not isolated phenomena, but they relate to certain parameters of transmission, which are discussed in this section. First of all, the notion of stability is introduced as a filter of transmission from SL to RL. Furthermore, the question of the identification of SL influence in the RL is briefly addressed, and, finally, the productive use of transmitted items is portrayed as a sign of the integration of SL influence in the RL.

3.1 STABILITY.

Stability is a crucial factor of the transmission process in language contact. In line with previous observations about variable borrowability of linguistic segments (cf. Haugen 1950, Weinreich 1970), Coetsem distinguishes between 'inherent' and 'subsidiary' stability which determine the

probability of transmission from SL to RL (2000: 58). Inherent stability relates to the fact that content items are most commonly transferred whereas structural elements resist borrowing to a great extent. Field's Principles of System Compatibility/Incompatibility (2002:40-41) correspond to Coetsem's notion of stability. Field describes a natural hierarchy of borrowability from content items (in particular concrete nouns) as most prone to transmission to fusional affixes as least likely transferred (2002: 117). Transmission is also dependent on the typological nature of the languages in contact. Thus, without reanalysis in operation, the RL will only borrow those items that lie within its structural range (ibid.).

The typological affinity between SL and RL is part of Coetsem's subsidiary stability, which also includes the attitude of speakers of the RL towards the SL. Furthermore, stability is influenced by the linguistic dominance of SL or RL.[2] While SL dominance decreases the stability of the RL and can lead to the imposition of structural elements, RL dominance mainly involves the transmission of lexical elements (Coetsem 2000: 73). Thus, SL dominance feeds codeswitching and interference and imposes its structural patterns on the RL as in the overgeneralization of SVO word order in the German speech of second generation German immigrants in Australia (Clyne 2003: Table 8.1). SL dominance also involves the borrowing of stable lexical elements (e.g., function words) and can result in the integration of borrowed morphemes that have entered the RL together with their lexical units.

In the case of RL dominance, the stability of the RL is high, and the RL is less permeable for structural influences from the SL. As a result, transmission has mainly lexical repercussions on the RL and follows the pathways of borrowing and conceptual transmission without SL-form. Codeswitching is less likely to appear and, if so, does not cause structural alterations in the RL. Interference mainly occurs on the lexical level where formal similarity between lexical units in SL and RL can trigger a semantic change of the lexical unit in the RL.

While this global understanding of SL and RL dominance can be generally projected onto the process of transmission, the notion of language dominance is in fact a highly complex issue that can work in opposing directions on different levels of the languages in contact. Despite the fact that the English influence on written German in the German newsmagazine *Der Spiegel* is a typical example of transmission from subdominant SL to dominant RL, which leads to primarily lexical influences of English in German (16,673 English word-types from a total of 287,301 word-types in *Der Spiegel* 2000), English plays an important role as a stylistic means of variation and wordplay and is commonly used with reference to an English-speaking background and for drawing the reader's attention to a particular item in the discourse. As an example of the stylistic implications of English, *Der Spiegel* (2000) includes a hybrid form of English and German, called FILSER-ENGLISCH, which is used to ridicule the English spoken by German politicians, as shown in (5).

(5) *Auch die Anfrage im Begleitschreiben, ob the "Edi," Edmund Stoiber, der nächste Bundeskanzler und Waigel wieder Finanzminister werden könne, beantwortete der ehemalige CSU-Vorsitzende in gekonntem Kauderwelsch.*
"What you about the next chancellor and his finance-minister said, can I only for my part answer, namely that I surely not more finance-minister be will. Heartley greetings and joyful Easter. Your true Theo." (Der Spiegel 2000: 16/284)
'To the inquiry in the accompanying letter if "the Edi", Edmund Stoiber

[2] Dominance is tied to socio-economical and political factors as well as to the areal diffusion of the languages in contact and to their numerical relation of speakers.

could become the next chancellor and Waigel could be finance minister again, the former CSU chairman replied in fluent gibberish…'

The humorous effect of this passage is created by the arrangement of English lexical items according to German word order as the result of a literal word for word translation of German phrases into English. Apart from this artificialized use of English in German, *Der Spiegel* (2000) exhibits various regular codeswitches, which often, but not exclusively, occur with reference to British and American contexts. These codeswitches frequently serve as stylistic tools as in the following examples of English idiomatic phrases in German:

(6) *Dann zaubert sich ein Lächeln in das Gesicht des Trainers, und er sagt leise, aber stolz: "That's it. Wir werden gewinnen."* (12/258)
'Then a smile flickered across the coach's face and he silently but proudly said: That's it. We will win.'

(7) *Da heißt es tapfer sein und immer daran denken: It's your life, it's your choice. Just do it.* (10/91)
'That means to be brave and to keep thinking: It's your life, it's your choice. Just do it.'

(8) *Was war der Kündigungsgrund? Naumann: It's time for a change, nach zwei Jahrzehnten.* (24/202)
'What was the reason for the dismissal? Naumann: It's time for a change, after two decades.'

From this selection of codeswitches, only the one in (6) relates to an English language cultural area. The switch represents the coach's reaction to the performance of his Oxford rowing crew in preparation for the annual rowing competition of Oxford and Cambridge on the river Thames. The codeswitch in (7) appears in an article on life as a single person in Germany and example (8) represents the justification of the German minister of culture for the dismissal of the head-organizer of the Berlin Filmfestival.

Altogether, the codeswitches in (6) to (8) function as formal insertions in the German text. They disrupt its unity and surprise the reader, who is unable to anticipate the codeswitch from the German context. At the same time these codeswitches lack substantial content information. English catch phrases seem particularly appropriate for this purpose since their widespread application in the SL also allows for their use in a variety of contexts in German. The examples in (5) to (8) show that even though the influence of English in the written German of *Der Spiegel* (2000) is generally perceived as a contact scenario of high stability (RL dominance), stylistic effects counteract this assumption when they rely on the imposition of English syntactic units in German.

The occurrence of codeswitching also relates to another factor of stability, which is the degree of monolingual or multilingual competence of a speaker. Thus, from the perspective of the RL, competence in SL and RL allows for a diverse range of transmission phenomena. Codeswitching and interference, for example, are based on competence in SL and RL. Bilingualism in SL and RL also contributes to lexical borrowing; however, it is not a prerequisite of borrowing since borrowings can enter the RL as neologisms from a monolingual point of view if their reference is clear to the speaker of the RL (e.g., SL object and name transferred to RL, as

in E. *rollerblade* → G. *rollerblade*). Apart from translation, lexical creation as a result of conceptual transmission would, supposedly, demand the least degree of bilingualism as imported concepts are reconstructed with lexical material of the RL.

In sum, the stability of the RL is connected to the degree of competence of the RL-speaker in the SL and is dependent on the inherent conditions of borrowability and the typological affinity of SL and RL. Furthermore, stability is also influenced by the socio-cultural environment which causes a relationship of language dominance between the languages in contact. The examples of codeswitching in *Der Spiegel* (2000) show that even when the RL is dominant, typically impositional types of transmission such as codeswitching can occur due to stylistic reasons. Altogether, the different factors of stability work as a variable filter in a scenario of transmission from SL to RL.

3.2 IDENTIFICATION.

The identification of SL influence in the RL operates on the levels of word form (synchrony) and word origin (diachrony). Theoretically, word origin is the key to prove SL influence. However, etymology is in fact often blurry and limited to the information in reference sources. In addition, etymology constitutes part of a speaker's encyclopedic knowledge which is variable and not intrinsically related to language recognition. While word form also bears its own limitations to identification (e.g., word formal assimilation of English borrowings in German as in *cake* → *keks* and inconspicuous word form in German as in *test*, *hit*, and *start*), form is the indispensable access point to language. Thus, word form serves as the primary channel to identify SL influence in the RL. After all, the identification of foreign elements in the RL is dependent upon the degree of bilingualism of the speaker in the RL and SL. If a speaker of the RL is exclusively monolingual, she would not be able to determine the SL. The question remains of how far a hypothetical true monolingual speaker of the RL would be able to recognize word formal differences of borrowings in the RL if they deviate from the phonemic and phonotactic conventions of the RL, e.g., the deviation of English borrowings from German graphemic – phonemic correspondences.

Even in the common scenario of speakers sharing some competence in RL and SL, the lack of word formal marking of SL elements in the RL (e.g., agentive suffix *-er* in English and German) can lead to borderline cases of SL influence as in the following examples: *film*, *glamour*, *boycott*, *reporter*, and *interview*. For these terms an etymological investigation proves helpful to identify English influence. In general, the identification of SL influence in the RL is a matter of the speaker's language awareness. In terms of research, however, identification is a vital prerequisite for the analysis of language contact phenomena. Thus, identification functions as a monitor of transmission, which is connected with the functions of the filter, i.e., monolingual and multilingual competence, and with the impact and reactions of the transmissions in the RL.

3.3 PRODUCTIVITY OF TRANSMITTED UNITS.

In accordance to King (2000: 83), Coetsem (2000: 115), and Picone (1996: 4), structural changes are perceived as being transmitted in the RL together with their lexical or sentential units. The transmitted structural elements need to become independent from their lexical and syntactic environment in order to augment the structure of the RL and occur in combination with native bases. The English plural morpheme *–s*, for example, has made its way into a variety of

European languages either as a novelty in the plural system as in Norwegian (Görlach 2002: 69) and Irish-Gaelic (Stenson 1993: 115) or, as in Dutch (Coetsem 2000: 115) and German (Görlach 2002: 7), it has led to an increase in the frequency of s-plural suffixation.[3] Apart from a few Irish words that show *–s* plural inflection, however, the English plural morpheme is generally restricted to borrowed bases and has not yet turned into a productive plural marker of native bases in Irish (Stenson 1993: 115).

In contrast to the increased stability of the RL against the autonomous use of borrowed structural units, the lexical productivity of borrowed units is a common consequence of the borrowing process. Indeed, as a frequent reaction to the influx of English in German, German integrates English terms to create a plethora of hybrid compounds as in *last-minute-lebensversicherung* ('last minute life insurance'), *krisenmanagment-kapazitäten* ('crisis management capacities'), *lehrstellenbewerber-Coaching* ('apprenticeship applicant coaching'), *computerreservierungsfirma* ('computer reservation company'), and *entertainmentveranstaltung* ('entertainment event') to name a few of the longest hybrid compounds from a total of 9,998 hybrid constructions in *Der Spiegel* (2000). Lexical productivity is also evident in the novel combination of borrowed bases in German (e.g., pseudo anglicisms such as *stuntking* 'king of the stuntmen', *baseballdress* 'baseball uniform' and *cheergirls* 'cheer leaders'). Autonomous semantic developments of borrowings in the RL are further signs of lexical productivity. Thus, borrowings can be subject to metaphorical extension in German as in the phrase *horizontaler Handshake* referring to sexual intercourse ('horizontal handshake', adapted from Doris Lessing in *Der Spiegel* 2000: 48/190).

As outlined in sections 2 and 3, the main types of transmission, the filter conditions, and the issue of the identification of SL influence in the RL can now be combined into a model of transmission in language contact. The following section will illustrate the interrelation between types, filter, and identification in a scenario of transmission from SL to RL.

4. MODEL OF TRANSMISSION FROM SL TO RL.

The model of transmission in Figure 3 is unidirectional in the sense that transmission is depicted as moving from SL to RL. The SL functions as the source and is assumed to remain stable throughout the process. The receiver of transmission, the RL, on the other hand, represents a variable entity with the potential for transmission-induced changes. Thus, the various processes of transmission are portrayed with their diverse impacts and their possible reactions from the perspective of the RL.

In a scenario of transmission from SL to RL, conceptual and systemic entities of the SL are, theoretically, transferable. Depending on the filter settings (degree of inherent/subsidiary stability; degree of monolingual and multilingual competence), concepts and structures of the SL will enter the RL through various channels, each of which impact the RL in specific ways and can trigger certain reactions. While IMPACT relates to the immediate effect of transmission, REACTION subsumes the possible consequences of transmission in the RL.

[3] *–S* is considered a separate, infrequent plural marker out of eight plural allomorphs in German (Russ 1994: 189). Pinker postulates that *–s* is, in fact, the default plural suffix in German (2000: 229).

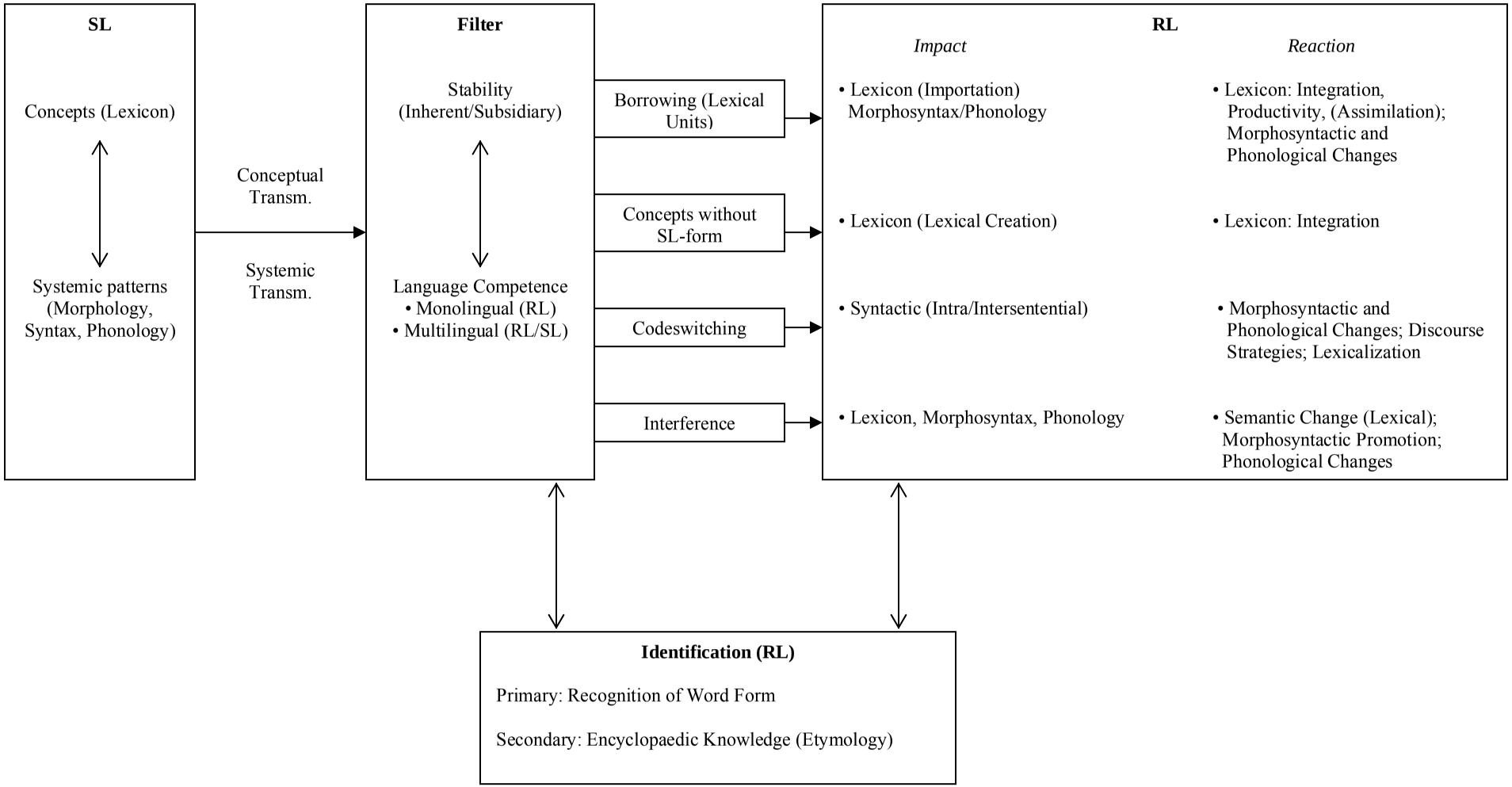

FIGURE 3. MODEL OF TRANSMISSION FROM SL TO RL.

According to the model, a concept can be imported together with its form, i.e., borrowing (e.g., E. *thriller* → G. *thriller*, E. *team* → G. *team*). Its immediate lexical impact can be accompanied by a structural or a phonological impact if the borrowing fails to blend into the morphosyntactic structure of the RL, e.g., lack of genitive case inflection of the noun: *des team* instead of *des teams* (*Der Spiegel* 2000: 41/110, 42/318), or if the borrowing retains its original phonological form in the RL which lies outside the phonetic conventions of the RL, e.g., *thriller* pronounced in German as [θrɪlə] although /θ/ is not part of the German phonetic inventory.

A possible lexical reaction to the borrowing of *team* and *thriller* is their integration into the German lexicon. According to their frequency of occurrence in *Der Spiegel* (2000), *team* and *thriller* appear to have reached that stage. *Team* is mentioned 308 times, and *thriller* occurs in 32 instances, and both are lexically productive as compound elements as in *teamarbeit* ('team work'), *teamfähig* ('team-able'), *thrillerautor* ('thriller author'), and *thriller-tradition* ('thriller tradition'). The structural deviance of *team* and the competence of a bilingual speaker to realize the interdental fricative /t/ in German have so far failed to trigger a structural or a phonological reaction in German, i.e., zero inflection of nouns in the genitive or the importation of /θ/.

Structural reactions in the RL can be influenced by the frequency of the SL-impact. The more frequent a transmitted structural or phonological unit or pattern appears in the RL, the more likely it might trigger a reaction of reanalysis and integration into the RL. As far as the lack of genitive marking of *team* is concerned, the form *des team* merely occurs twice in the corpus while its regularly inflected form (*des teams*) shows up eight times in the same corpus. The possibility of zero nominal-inflection of English borrowings in the genitive is supported by the redundancy of genitive case marking in German. The determiner that precedes a masculine or neuter noun in a genitive case construction takes a genitive form as in the example of the definite masculine and neuter articles *der/das* which change to *des* in the genitive case. So, the construction *des team* is already marked for genitive and an *–s* genitive suffix on the noun is functionally redundant.

Apart from borrowing, concepts can also enter the RL without their SL-form (cf. Figure 2). This causes a purely lexical impact in the RL as the transmitted concept is reproduced by a combination of RL-forms with word formational patterns of the RL (e.g., E. *air bag* → G. *luftsack*). As a reaction to this process, the neologism can be accepted and integrated into the lexicon or it can disappear again. Despite its mention in the dictionary of anglicisms, German *luftsack*, for example, is on the verge of being pushed into oblivion by the synonymous borrowing *airbag*. Thus, *luftsack* occurs only 19 times in *Der Spiegel* from 1994 to 2000 (it does not occur in 2000 at all) whereas the borrowed unit *airbag* amounts to 149 tokens during the same period.

As portrayed in examples (1) to (4) and (5) to (8), codeswitching impacts the RL on the sentential level. The phrasal units of the SL are embedded intersententially or intrasententially into the matrix language. The following examples illustrate inter/intrasential embeddings of English phrasal units in written German:

(9) *Sie wünscht sich "the same procedure as every year": Schatzsuche und Topfschlagen.* (33/109)
'She wishes the same procedure as every year: treasure hunt and find the pot.'

(10) *Klar hat er es nicht einfach zurzeit. A very challenging time. Nicht geeignet für irgendwelche Rührstücke.* (46/312)
'Of course it is not easy for him at the moment. A very challenging time. Not the right one for any sentimental actions.'

(11) *…das ist nichts für die Öffentlichkeit. It's too shocking. Doch gerade der Versuch, die Poster zu verhindern, erzeugte Gegendruck*. (18/313)
…that is not for the public. It's too shocking. But the attempt to prohibit the posters actually generated counterpressure.

In (9) the codeswitch occurs intrasententially as the object noun phrase of the reflexive verb *sich wünschen* ('to wish oneself') and consists of the head noun *procedure* embedded in a comparative construction. Interestingly, no obvious contextual trigger seems to account for the switch. The subject pronoun *sie* ('she') refers to a nine-year-old German girl from Hamburg whose divorced German parents would like to organize a birthday party for her. Example (10) portrays an intersentential switch with an English sentence fragment interposed between a full German sentence and another sentence fragment. The codeswitch in (10) can be explained from the context. *Er* ('he') in the clause preceding the switch refers to a manager of a German pharmaceutical company who, a few sentences earlier, is described as having worked in the USA for some time. The switch symbolizes a quotation of the manager's speech. The last example (11) shows a fully fledged intersentential codeswitch, in which the two matrix clauses and the embedded English phrase represent complete grammatical sentences. The codeswitch occurs in relation to a report on a controversial poster campaign of the American Breast Cancer Fund in San Francisco.

As with codeswitching, interference phenomena are also dependent on the speaker's competence in SL and RL. In contrast to Weinreich (1970: 48-55), who applies the term lexical interference as a hypernym for various kinds of lexical changes in the RL including loan formation, interference, as part of the transmission process in Figure 3, pertains to semantic changes and to the promotion of structural and phonological patterns in the RL caused by lexical, structural, and phonological similarities to the SL. Word formal analogy of signs in SL and RL can impact the RL by way of semantic interference. As a reaction of the RL, the semantic interference can become conventionalized (cf. section 2.3). Phonological interference (segmental and suprasegmental) is possible in near homonyms of SL and RL and, as mentioned in section 2.3, on the structural level, interference from English seems to promote the occurrence of certain structures in German as in the usage of the preposition *von/vom* in a periphrastic genitive construction analogous to the English *of*-possessive, e.g., *die Regierung von Helmut Kohl* (*Der Spiegel* 2000: 15/31) instead of *Helmut Kohls Regierung* ('the government of Helmut Kohl').

By and large the model in Figure 3 puts the various types of transmission in the greater context of the transmission process from SL to RL. The filter encompasses the notions of stability and of language competence which determine to what extent conceptual and systemic information is transmitted from SL to RL. Depending on the permeability of the filter (high to low stability of the RL, monolingual to multilingual competence of the RL-speaker), SL-information will enter the RL through the different types of transmission each of which can impact the RL in specific ways and can lead to further reactions of integration. Most of the facets of this model have been demonstrated with examples of English influence in a corpus of written German.

5. CONCLUSION.

This article proposes a model of transmission in language contact, which captures the influence of English in the German newsmagazine *Der Spiegel* 2000. According to the model, transmission from SL to RL is dependent on language inherent factors (borrowability and typological affinity) and on language external reasons (the socio-economic and cultural relationship between SL and

RL) which function as a filter of transmission. The cultural and socio-economic situation of the languages in contact is reflected in the notion of language dominance, which promotes the use of certain types of transmission and determines the possible impact of the transmitted elements in the RL. Thus, the influence of English in the German medium of *Der Spiegel* represents a stable contact situation (RL dominance), which is characterized by mainly lexical influences. The few instances of structural importations remain in situ and have not caused any lasting repercussions on German morphosyntactic and phonetic conventions. There is some evidence, however, that codeswitches are used as stylistic means of intertextual reference to English language cultural areas. In other instances codeswitches appear as purely semiotic tools to draw the reader's attention to a particular item in the discourse. In terms of the increasingly emotionally led debates about the influence of English, this model of transmission from English to German could serve as the basis of objective analyses of similar language contact situations.

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THE ROLE OF VISUAL REPRESENTATION IN A SIGNED LANGUAGE: EVIDENCE FROM NATIVE SIGNING DEAF CHILDREN ACQUIRING AUSLAN (AUSTRALIAN SIGN LANGUAGE

LOUISE DE BEUZEVILLE
University of Newcastle
TREVOR JOHNSTON
Royal Institute for Deaf and Blind Children & University of Newcastle

Researchers into the acquisition of classifier signs in signed languages have claimed that they can be described in linguistic terms (Kantor, 1980; Newport, 1984; Schick, 1987; Supalla, 1982). Due to unresolved problems with this analysis, researchers have begun to question the idea of a purely 'linguistic' analysis of classifier signs (Cogill-Koez, 2000b; Cogill-Koez, 2000a; Liddell, 2003b; Schembri, 2003), leading to a view that signed languages do not use linguistic means of representation to the exclusion of visual representation. In this paper, data elicited from 25 deaf children from deaf families on the acquisition of classifier signs is presented. The results are compared with the patterns of development for children learning spoken languages and other aspects of signed languages and learning how to represent concepts visually. This comparison shows that the stages that children pass through while learning classifier signs resemble those of the development of visual representation. The evidence is compatible with the interpretation of classifier signs as being primarily a visual system of representation, rather than an 'exclusively linguistic' system.

1. INTRODUCTION.

Classifier signs are a type of verb found in all documented signed languages, including Auslan. They are structured and behave very differently from the rest of the language, and are a central part of the native-like use of community signed languages. The form of these signs has a direct relationship to the referent (i.e., they are iconic) and this relationship is utilized while producing and comprehending novel forms. Despite this iconicity, context is still required for meaning to be apparent (for example an upright point finger could mean man, pole, or tree), and many conventions have to be learnt by signers.

Traditionally, each part of a classifier sign (the handshape, movement and location) has been analyzed as morphemic, creating polysynthetic multi-morphemic predicates (McDonald, 1982; Schick, 1987; Supalla, 1982). For the purposes of the comparison of different representational strategies used in signed languages presented in this paper, we will refer to this understanding of the structure and use of classifier signs as linguistic representation. That is, it has been assumed that classifier signs and their components form part of the formal, discrete, and combinatorial morpho-syntax of signed languages. Recent analyses, however, favor the view that at least parts of classifier signs are produced through gesture or visual representation (VR) rather than linguistic representation (LR) (Cogill-Koez, 2000b; Cogill-Koez, 2000a; Liddell, 2003b; Schembri et al., in press).

The aim of this research is to investigate which representational strategy children use when acquiring classifier signs in Auslan (Australian Sign Language)—visual or linguistic—and thus to contribute to the important debate over a homogeneous or heterogeneous view of signed

languages. The homogeneous view claims that all parts of the grammar of a signed language can be described in terms of a formal, discrete-combinatorial morpho-syntax, whereas a heterogeneous view recognises the existence of various representational systems, such as linguistic, visual, or gestural.

This view of signed languages as heterogenous does not mean that they are not authentic languages. Macken, Perry and Haas (1995) describe how various systems of representation do exist within ASL, as in spoken languages. So, in a comparison of written text and sign text, they claim that CPs function like diagrammatic features, spatially locating signs function like chart properties, and lexical signing is the equivalent of text. However, all systems of representation are equally valid components of a "language", and researchers over the past decades have been relying on a definition of language that was too narrow. Terms such as "grammar" need to be redefined to be systematically unambiguous (DeMatteo 1977).

This paper is based on data collected as part of doctoral research conducted by the first author of this paper on the acquisition of a form of classifier signs in Auslan by deaf children from deaf families. The 25 children researched are aged between 4 and 9 years old, have at least one deaf parent, and sign Auslan at home as their first language. Data were elicited from the children by a deaf, native signing research assistant through the use of video clips from the Verbs of Motion Production test (VMP) and interactive games. The VMP is an elicitation tool for classifier signs that has been used in a large number of studies, including one on Auslan (Schembri, 2001), and is the same tool originally used by Supalla (1982). Participants view 60 video clips (of the potential 120 in the VMP) showing objects moving about in space, and sign what they saw. This is very successful in eliciting object classifiers.

All interactions between the native signing deaf research assistant and the child were filmed and the 114 classifier signs elicited were then analyzed for handshape, movement (broken up into manner, path and direction), location, and "correct" classifier sign overall. Responses by 25 adult signers (Schembri 2001) are used as a basis for comparing the children's responses with native targets and this determines what is a "correct" response. The children's responses were transcribed and the data of target responses for each parameter was cross-tabulated with age of participant. In this paper only data on the handshape and movement parameters is presented.

2. The Development of Classifier Signs.

The few studies that have analyzed the acquisition of classifier signs have generally focused on only one of the three types (object classifier signs) and one of the three parameters (handshape) and included relatively few participants. For example, Ellenberger and Steyaert (1978) conducted a case study on one child; Kantor (1980) studied nine children; and Supalla (1982) looked at just three. Galvan (1989) had 30 children in his study, but they were not all native signers, and indeed some of the children only had exposure to a signed form of English. The exception to this is the study by Schick (1987), which used 24 native deaf signers and looked at all three parameters of all three types of classifier signs. All of the abovementioned studies have either set out to prove that classifier signs were constructed purely through processes of LR or else have taken that as a given.

The reluctance to consider the influence of VR in signed languages has come about because when acquiring classifier signs, children do not begin with analogue forms, but with discrete symbols, as happens with language. However, from the summaries of the research into

the VRs presented below, it can be seen that this is how VRs begin to develop as well. Children begin not with analogue forms, but with discrete symbols or schema.

Schembri (2001) discusses the need for "…all serious scholars of language to rethink assumptions about notions such as transparency, grammaticalization, discreteness, analogy, and duality of patterning as features that separate linguistic from non-linguistic communication". In other words, different systems of representation can share these features—not only linguistic systems but also visual systems.

3. THE DEVELOPMENT OF VISUAL REPRESENTATION.

Like classifier signs, drawings are created with a combination of iconic and conventional components. As the development of drawing pictures is the most researched field of the development of visual representation, it will be used here as a basis for the comparison of visual representation with classifier signs.

Just as for the development of language (Brown 1973), the stages in the development of drawing are neither fixed at certain ages, nor completely discrete: rather, there is continuity between the different stages (Thomas et al. 1990). Children begin by using simple shapes to represent various objects, and context is required for meaning to be apparent. For example, a circle with lines radiating out of it could be a hand, an eye with lashes or a flower. When meaning cannot be worked out, children will further differentiate the figure.

From 1;6 (one year and 6 months) to 2;0 or 2;6, children scribble, producing a small range of lines and shapes as representing actions and not objects. There is no communicative intent or premeditated intention (Luquet [1927], 1991). At around the age of 2;6, children begin to draw their first shapes, marking the beginning of symbolic realism. They now demonstrate an intention to represent visually. That is, their actions are guided by communicative intent, rather than any kinesthetic feedback they receive. They depict by drawing parts or components and locating them near other parts, much like building out of Lego (Thomas et al. 1990). However, in the process of putting parts together, the children go through a stage which is called synthetic incapacity or incapability (Luquet [1927], 1991; Piaget et al., 1956), where drawings may represent proportions, orientation, and the location of parts incorrectly (either no contact between the parts or internal parts exist outside the enclosed shape in which they should occur, such as eyes and nose outside of a head).

During symbolic realization, children develop particular drawings called schemas for particular classes of objects, regardless of details of individual members of that class. For example, when asked to draw their home a child will draw a classic house with a square and a triangular roof even if they live in an apartment. They will use a schema for something familiar, and then generalize it; for example, a man might become a dog as well (Thomas et al. 1990), and they will add details if they feel they are necessary for meaning to be understood.

From around 4;0 or 5;0 children's drawings begin to be more realistic, have more detail, show an internal ordering of parts, and use an increasing number of schemas (the stage of intellectual realism). They commonly attempt to produce depictions of objects showing all of their parts, regardless of whether they can be seen (Golomb 1992; Luquet [1927], 1991). This may be through transparency or x-ray drawings, or mixing orientations of parts of objects within the one picture (see Figure 1).

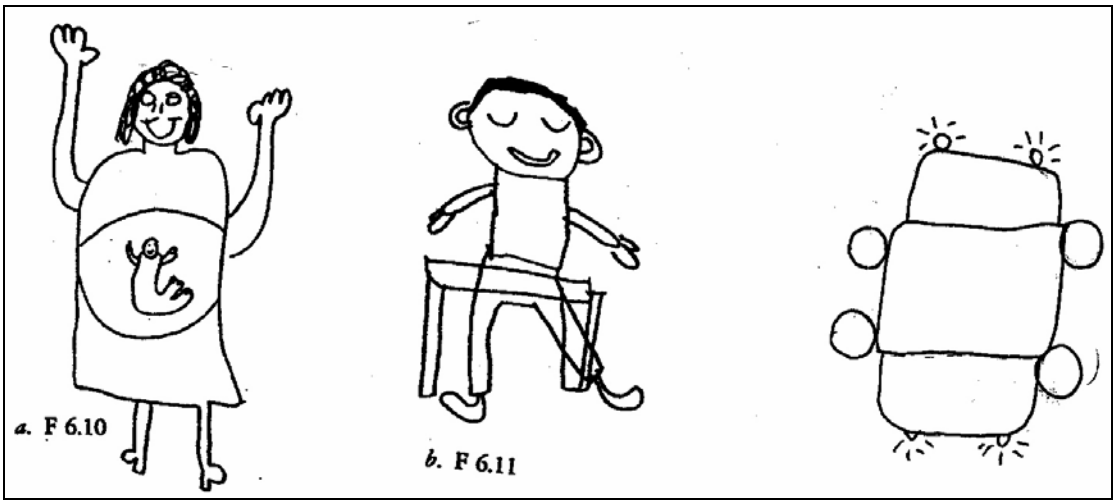

FIGURE 1. FIRST TWO REPRODUCED FROM THOMAS AND SILK (1990) INTENTIONAL TRANSPARENCY, UNINTENTIONAL TRANSPARENCY AND FOLDING OUT.

The shift to visual realism occurs sometime between the ages of 8;0 or 9;0. The techniques adopted for intellectual realism disappear gradually. Over time, transparency becomes occlusion, folding out and change of viewpoint become perspective, and children give up the canonical forms replacing them with forms that vary depending on the individual object, not the class. However, this is not the universal, natural, or inevitable endpoint in visual representation (Costall 1985; Hagen 1985). Not everyone achieves or strives for realism, even in the Western world. Most adult Westerners, if asked to draw a house, would draw something rectangular with a triangular roof.

4. PARALLELS BETWEEN VRS, LRS AND CLASSIFIER SIGNS.

Of the similarities between the development of classifier signs and that of LRs, some also parallel with the development of VR. They cannot be used as evidence against VR, and indeed can be used as evidence for VR. There are also similarities shared by classifier signs, and VRs that are not shared by LR support the view that signed languages are heterogeneous systems of communication.

With respect to similarities between classifier signs, LR and VR, it can first be noted that practice and exposure is essential for normal development to occur in all three (Galvan 1989; Newport 1984; Thomas et al. 1990; Tomasello 2003). Moreover, both linguistic and visual representation systems, and classifier signs, use symbols which are discrete and assembled following rules and conventions. Sign linguists have long used this as the basis for the belief that classifier signs are LR, as they see VR as only analogue in nature and LR as the only discrete-combinatorial system. Though apparently 'intuitively obvious', research into the structure and development of visual representation that we have cited clearly contradicts this assumption. Children also go through a process of differentiation in the development of VR and LR that resembles that of classifiers, where a general symbol, schema, phoneme or word is used generally until more detailed ones are acquired (Golomb 1992; Tomasello 2003).

With respect to differences between LR and VR, however, some features of the development of classifier signs parallel VR but not LR. Take, for example, timing: the onset, development and mastery of classifier signs occur at the same time as for VR, but much later

than for LR, as can be seen from ages identified for various stages in the research literature (Table 1).

	LR[1]	Classifier signs	VR[2]
Onset	0;10-1;0	2;0 onwards[3]	2;0-2;6
increasing use	2;0-4;0	4;0 onwards[4]	3;0 or 4;0
reasonable mastery	5;0 (school age)	8;0-10;00[5]	8;0-9;0

TABLE 1. TIMING OF DEVELOPMENT.

The process of synthetic incapacity that children go through (where parts are not located correctly with relation to one another, and things that should be together are often separated) could be a parallel for the phenomena reported by Supalla (1982) where children break movements down to produce the path and manner separately, rather than simultaneously as adults would. As this makes the resulting classifier sign less life like or "iconic" they have used this as evidence that the children cannot be representing things visually, but componentially, which these researchers have claimed proves their linguistic status. However, in synthetic incapacity, the child similarly makes the resulting representation less iconic through an inability to merge the parts. Thus componentiality is not adequate proof of LR.

Children learning to draw have to develop the range of schemas. They develop these gradually, and in the process may depict some things better and earlier than other things. This is also how the development of classifier signs occurs. The children learn handshapes for different objects or shapes gradually, rather than learning them all at once at a particular age (Kantor, 1980; Supalla, 1982).

5. THE DATA ON THE DEVELOPMENT OF HANDSHAPE AND MOVEMENT IN CLASSIFIER SIGNS.

The data in this section are from 25 participants using the VMP task discussed above. The acquisition of handshape and movement is discussed first in the context of the acquisition of classifier signs as linguistic representation and then the parallels between this data and what would be expected if a visual representation system were being employed to communicate are discussed.

5.1 FIGURE HANDSHAPE.

When a response included a handshape that had been used by at least one adult in the adult data, it was considered, and coded as, a target form. In analyzing the non-target responses made by the children, six possible reasons for diversity were identified:

(1) a different perspective on the object was represented (e.g., using a handshape to show the trunk of the tree rather than the standard one for branches);

[1] O'Grady (2005)
[2] Thomas and Silk (1990); Golomb (1992)
[3] Slobin et al (2003)
[4] Schick (1987)
[5] Kantor (1980); Schick (1987)

(2) a handshape from a preceding lexical sign was used in the classifier sign (e.g., the handshape used in TEACUP was itself displaced rather than a handshape that showed the shape, or the handling of a cup);
(3) a handshape from a preceding SASS (size and shape specifier, a type of classifier where hands trace the outline of an object) was used in the classifier sign (e.g., in the case of a cylinder falling, rather than use a handshape to represent the entity, the child might use a different handshape to trace its shape and then show this different handshape falling);
(4) a point finger was simply used to trace path, rather an entity or handling handshape displaced to show movement;
(5) a neutral handshape was used; or
(6) an incorrect handshape was used.

The first three of these possibilities are coded as appropriate, since they are strategies used by adults, though perhaps not to the same extent. The last three are not things that native signing adults did, so were considered inappropriate. The appropriate responses were then added to the basic target scores in order to give a more accurate picture of potentially "correct" responses for each age group. Both sets of figures are shown in response summaries as "target" and "appropriate" respectively (see Figure 2).

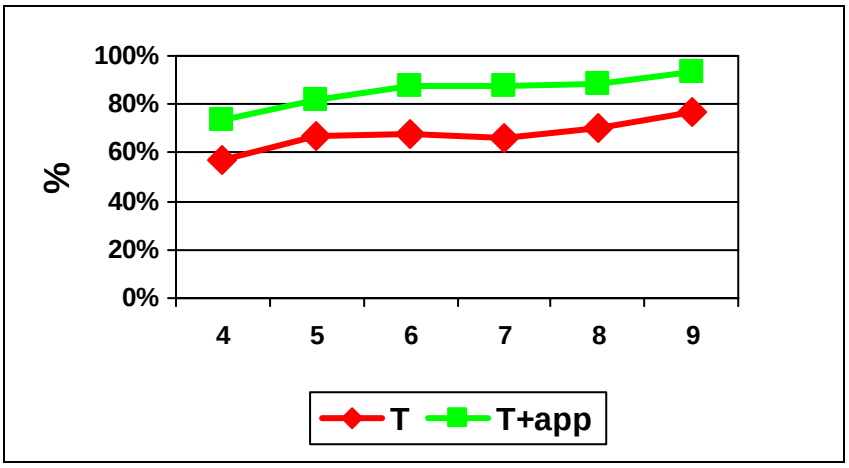

FIGURE 2. TARGET AND APPROPRIATE HANDSHAPES FOR THE FIGURE COMPONENT OF THE SIGN.

5.2 MOVEMENT.

According to traditional analyses (Supalla 1982), there are three parts to the movement in an object classifier sign. The first is the manner of the movement of which there are seven alternatives: linear, random, turn, bounce, jump, pivot and fall. The second is the path, which is where an object goes. For example, it could move from A to B or from A to B to C. Finally, signers have to consider the direction. This may be uphill, downhill, forward or backward. Forward is considered the default, and examples of the alternative three directions are less common in both real life and in the elicitation tasks than this default direction of forward. Figure 3 below shows each child's target results for manner, path and direction (where it is alternate to the default), as well as when all three parts of movement (manner, path and direction) were target within the one sign.

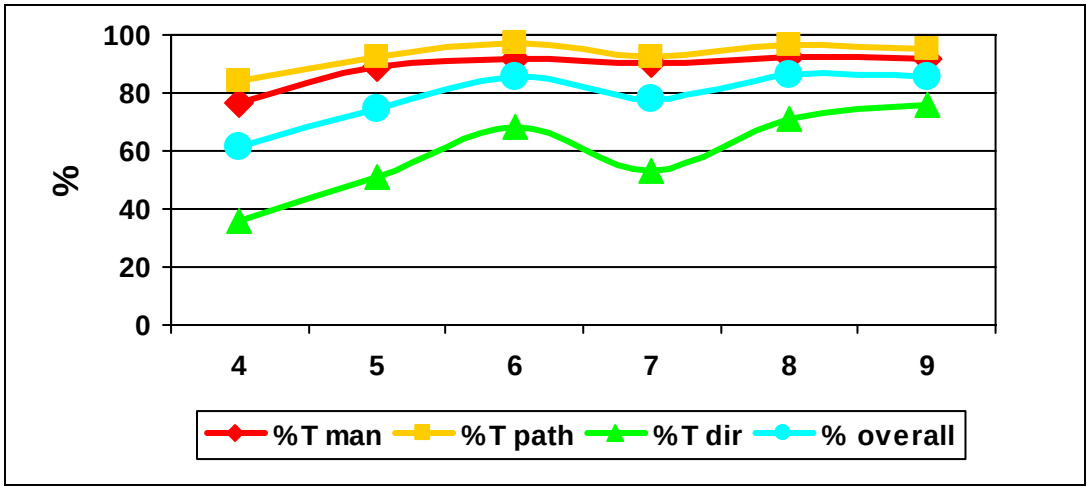

FIGURE 3. TARGET MANNER, PATH, DIRECTION AND MOVEMENT OVERALL.
(ALL THREE ASPECTS TARGET IN THE ONE SIGN)

For each error the children made with manner, there were 6 alternatives they could have chosen (of the seven manners, not counting what would have been appropriate). However, linear was substituted in 52% of the errors. This indicates a strong preference for a linear manner, which could therefore be considered the most general or basic manner. Path and manner were already almost at adult levels of production for the 5-year-olds, whereas direction was still considerably difficult for children in the upper group of 9-year-olds, with considerable variability in responses (57% to 93%). When they did not include the target direction, they would simply use the default forwards and straight direction.

5.3 CORRECT CLASSIFIER SIGN OVERALL.

In all of the components considered so far, both these presented and those not presented (location and secondary handshape) and in the signing of a correct classifier sign overall, there was a clear increase between all age groups, except for a small dip for the 7-year-olds (see Figure 4). When data is analyzed from the second round of filming, it will be possible to see whether the 7-year-olds are a particularly late developing group, or whether the next group of 7-year-olds also take a step backwards at this age. Although statistical analyses have not yet been applied, it is likely that these differences between age groups will be statistically significant.

Unlike the early acquisition of frozen signs (where the order of acquisition of the phonemes is: location, movement and then handshape (Marentette et al. 2000)) the pattern in classifier signs seems to be handshape, then movement and location, although we have seen that with respect to movement some aspects are easier to acquire (such as path) than others.

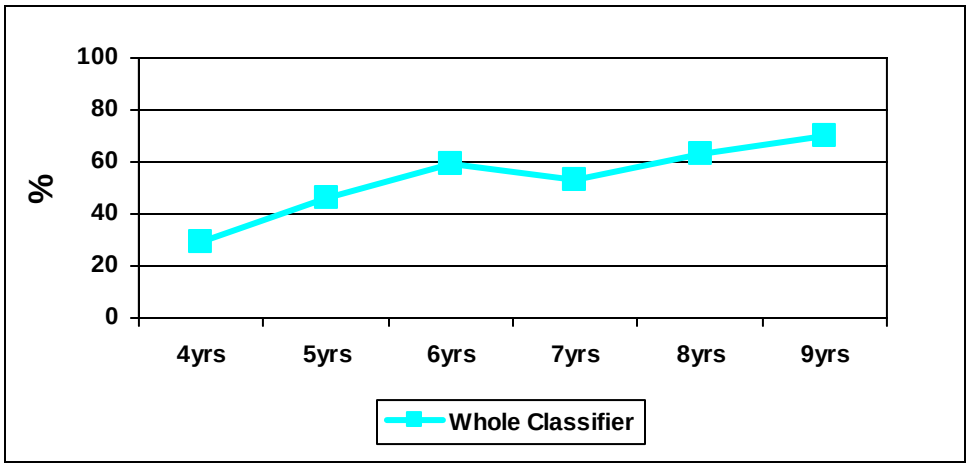

FIGURE 4. WHOLE CLASSIFIER SIGN CORRECT.

6. DISCUSSION.

From the similarities between VRs and LRs outlined in section 4 as well as the details given on the development of drawing in section 3, it is now possible to identify phenomena that can be seen in our data that indicate classifier signs could be reanalyzed as VRs. For example, the process of differentiation (through reliance on linear manner before learning to use others), could be used as evidence of the development of both visual and linguistic representation. Similarly, the use of schemas, incorrect use of space, synthetic incapacity, and the timetable of development, all potentially pattern better with the development of visual representation than with linguistic representation.

Take schemas for example. One element that could be seen as a schema in the development of classifier signs is the frequent use of the handshape representing 'two legs' for classifier signs involving the manners *jump*, *bounce* or *fall*. Children have a tendency to use this handshape, whether or not the referent has legs at all. It appears that until children have developed a wide range of schemas for different referents, they rely on 'two legs' as the basic schema to be used with these manners. Of classifier signs involving the manners *jump*, *bounce* or *fall* where the referent did not have any legs, the 9-year-olds substituted 'two legs' for the appropriate handshape 8% of the time, but 4-year-olds, who are yet to acquire many schemas for different referents, substituted 'two legs' 25% of the time.

Using frozen signs is another parallel to children relying on schemas when they do not know how to differentiate. This reliance can also be seen to decrease with age, with the 4-year-olds using a frozen form 13% of the time and the 9-year-olds just 3% of the time. If they were acquiring just another form of LR, it is unlikely they would have such a consistent increase in one particular form of a language over another.

With reference to the incorrect use of space, there is another phenomenon, though it is difficult to quantify. When 3 to 4-year-olds are developing an ability to draw, they will randomly locate things on page, sometimes going off the page (Tomasello 2003). Similarly, in my data, the 4 and 5-year-old signers here frequently sign outside signing space for classifier signs but not frozen signs. They will, for example, stand up and reach up high for something that moves uphill

into a high position, where an adult would just locate the reference at the top of the signing space.

Synthetic incapacity occurs where children cannot coordinate the parts of a depiction. The inability or difficulty children have in combining manner and path in a classifier sign could be seen as analogous to this phenomenon. Although in the past, this has been used as evidence of a lack of iconicity, and therefore that the structures are linguistic, it actually is only evidence that the structures are componential, as the same occurs in the development of drawing. This has been witnessed in just one example of one child (aged 5;0) in the data that has been collected and analysed to date.

Finally, the similarities between the development of classifier signs and drawing can be seen through the developmental timetable. One of the youngest children produced the one example of synthetic incapacity. Similarly young children produce more varied forms of the target handshapes (showing a higher proportion of semantically appropriate shapes rather than target) and they use frozen signs more often in place of classifier signs than older children. These two phenomena appear to occur because the younger children have not yet acquired as many schemas. As the children mature and their range of schemas increases, they begin to produce more accurate handshapes to represent different entities. At around the age of 8 or 9, children begin to master the system and their signing more closely resembles that of adults.

7. CONCLUSION.

Recognizing the influence of visual representation in signed languages in no way undermines their status as bona fide human languages. As mentioned at the beginning, the belief that in language all that is properly 'linguistic' must be completely discrete and combinatorial represents an extremely narrow view both of language and what is specifically 'linguistic'; it is also not the only view prevalent in contemporary linguistics. However, in the minds of some linguists, primarily those subsumed under formal theories of language, the idea of a completely discrete-combinatorial system of language clearly exists. The knowledge of the existence of other non-discrete coding strategies within language has been with us for some time, especially in the discussion of intonation in spoken language. With respect to signed language, for example, Liddell (2003) has raised the question and possibility of other extra-linguistic elements, such as the gestural use of space, as being fully integrated into the linguistic signal.

Preliminary data on the acquisition of classifier signs by children, presented in this paper, shows that these signs do not match a formal pattern of discrete linguistic elements. Rather the implication is that signed languages are heterogeneous, relying on not one, but two systems of representation in the overall communicative context, with children developing an ability not only to produce classifier signs, but to recognize a context requiring them and to switch between the two systems appropriately.

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FREQUENCY, AGE-OF-ACQUISITION, LEXICON SIZE, NEIGHBORHOOD DENSITY, AND SPEED OF PROCESSING: TOWARDS A DOMAIN-GENERAL, SINGLE MECHANISM ACCOUNT*

VSEVOLOD KAPATSINSKI
University of New Mexico[1]

This paper proposes a domain-general, single-mechanism account of type and token frequency, neighborhood density, age-of-acquisition, speed of processing, target degradation, habituation, preexposure, and desensitization effects. Evidence from priming, word recognition, and associative learning is combined to provide support for Local Activation Spread Theory (LAST), which proposes that memory is a localist associative network that contains both type and token nodes where all types are interconnected while a token is only linked to one type.

1. PREVIOUS ACCOUNTS.

Within Network Theory, Moder (1992) proposed that high token frequency weakens a word's connections to neighboring words. Priming occurs by the spread of activation from the prime to the target. Since high-frequency words have weak connections, they receive less activation from their neighbors and their neighbors receive less activation from them. This account does not explain why high token frequency also reduces identity priming where the prime and the target are the same word.

Ratcliff and McKoon (1988) proposed that the prime and the target form a compound cue used to access long-term memory. The greater the familiarity of the cue, assessed as a weighted sum of the familiarities of the prime and the target, the faster long-term-memory access can occur. The greater the frequency of the target, the smaller the prime's contribution to overall familiarity of the cue, hence the amount of priming observed is smaller when the target is very familiar, i.e. has high token frequency. This account predicts that high prime frequency should increase priming, since high-frequency primes would contribute much to the overall familiarity of the cue, while in reality high prime frequency reduces the magnitude of priming observed.

Plaut and Booth (2000) have proposed a distributed connectionist model as a way to account for frequency effects. In this model, the prime and the target are overlapping patterns of activation (which can be understood as ordered sets of 1's and 0's) superimposed on the same set of nodes. The more similar the prime and the target are, the more values they will have in common, hence the transition from the prime to the target will be less costly for the network when the prime and the target are similar: fewer changes to node activation values would have to be made. Nodes have sigmoid activation functions, hence more input activation is required to change a node's activation level by a fixed amount in the direction of a value (1 or 0) when the node's resting activation level is already close to that value. Hence, activation of a high-frequency node value during prime presentation will not improve the node's ability to take on

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[1] Currently at Indiana University

that value as much as when the value is mid-frequency. This account does not explain why prime frequency and target frequency influence the amount of priming. According to the account, it is only the frequency of the node values that the prime and the target share that should matter because the prime and the target do not have an independent existence. The importance of whole-unit frequency in priming is shown by priming asymmetries. For a given pair of stimuli, less priming is observed when the high frequency member of the pair is the prime than when it is the target in semantic (Koriat 1981, Chwilla, Hagoort, and Brown 1998), visual (Rueckl 2003), morphological (Schriefers, Frederici, and Graetz 1992, Feldman 2003), acoustic/phonetic (Goldinger, Luce, and Pisoni 1989) and phonological (Radeau, Morais, and Segui 1995) priming.

2. BASIC FEATURES.

2.1. ARCHITECTURE.

LAST proposes that memory is a localist associative network where every unit type - a word, a morph, a phone, a construction, a non-verbal stimulus – corresponds to a TYPE NODE, and every presentation of a type forms a TOKEN NODE, cf. Hintzman (1986). Evidence for the type/token distinction comes from several sources.

Moscoso del Prado Martin, Ernestus, and Baayen (2004) modeled the English past tense in a connectionist framework either presenting each present-past pairing the same number of times or the number of times proportional to the pairing's token frequency in the CELEX database. The network exhibited better performance on items it was not exposed to when the type-frequency based training regime was used. However, using a type-frequency-based training regime also leads to predicting same amounts of overgeneralization for regularized high- and low-frequency irregulars, while low frequency irregulars are actually regularized more often (Bybee 1995, 2001). Furthermore, using type frequency as a training regime leads to massive overgeneralization, since irregular forms are no longer frequent enough to withstand analogical leveling.

Albright and Hayes (2003) presented subjects with words that were highly similar to very frequent irregulars in hopes of obtaining analogies based on a single form. Their subjects almost never used the highly similar irregulars as analogical models, which was predicted by Albright and Hayes' Rule-Based Learner because of its bias in favor of rules that apply to more types. By contrast, when the present author trained a connectionist model over the same training corpus, using a token-based training regime, it found the high-frequency irregulars extremely attractive as analogical models. While for the subjects this was the experimental condition that most disfavored using an irregular, it was the most favorable context for irregular past tense formation for the connectionist model. Bybee (1995, 2001) and Moder (1992) have presented further evidence that type and token frequency have the opposite effects on morphological productivity.

Miller (1994) and Kapatsinski (2004) show that speakers store exemplar-specific information about words and phonemes they hear, such as their temporal duration, characteristics of the speaker's pronunciation, and so on, requiring token nodes. Miller found that speakers can reliably judge the goodness of different exemplars of a phoneme. Kapatsinski found that the same two words differing by a single segment are perceived to sound less similar to each other when the segment they differ by is artificially long than when it is artificially short, although the segment is phonologically identical in the two conditions, suggesting that phonological similarity judgments are based on comparing tokens. Finally, Hall (2003) has demonstrated that token-

based activation leads to habituation while type-based activation retards it.

Evidence for types comes from McLennan, Luce, and Charles-Luce (2003), who found that allophonic variation has no effect on the amount of repetition priming observed. In particular, for English speakers, using nonsense primes and targets, it does not matter whether both the prime and the target contain an intervocalic [t] or either the prime or the target contains a flap in the same position. This finding suggests that the stimuli containing [t] and those containing the flap were not mapped onto different types, unlike primes and targets produced by different speakers (Goldinger 1992) or in different fonts (Tenpenny 1995, Goldinger, Azuma, Kleider, and Holmes 2003), which produce less priming than primes and targets produced in the same voice or font. Finally, the existence of long-term cross-modal morphological priming (Marslen-Wilson, Tyler, Waksler, and Older 1994) and syntactic priming in the absence of lexical overlap (Bock 1989, Bock and Loebell 1990) suggests the existence of rather abstract type nodes. Further evidence of abstract types is provided by the fact that reaction times are modeled well by log word frequency, rather than the sum of log frequencies of voice-specific word representations.

In LAST, all types are connected to each other, although these connections vary widely in their strength, while a token is linked to only one type. That is, a separate token node is created for every unit segmented out of the speech stream. Thus, presentation of a sentence may result in the formation of token nodes for all the constructions, prefabs, words, morphemes, syllables and phonemes.

Evidence for full connectivity between types comes from Ratcliff and McKoon (1981), who found that degree of semantic relatedness between the prime and the target influences the magnitude of the priming effect but not how soon after prime presentation the effect can be observed; thus, closely related words and less strongly related ones appear to be equally close to each other. If this were not the case, activation spreading from the prime would take longer to reach distantly related targets than closely related ones. Therefore, more time would need to pass since prime presentation for the effect to be observed with distantly related targets than with closely related targets. Since no differences are found, activation must reach distantly related and closely related targets simultaneously.

Earlier spreading activation theories (Anderson 1983) dealt with this finding by proposing that activation spreads so fast that its spread cannot be detected. This assumption is not made in LAST. This leads LAST to predict that identity priming should be observed at a shorter prime-target stimulus-onset-asynchrony than associative priming. This prediction remains to be tested. The architecture is presented in Figure 1.

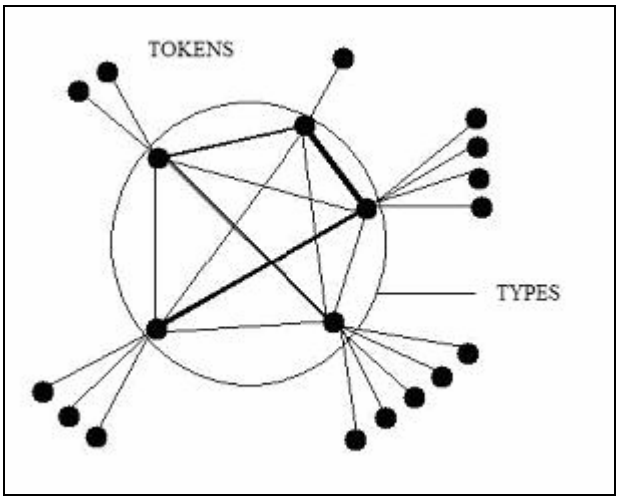

FIGURE 1. ARCHITECTURE OF MEMORY ACCORDING TO LAST[2]

2.2. LINK STRUCTURE.

In LAST, a LINK is a unidirectional channel of activation flow in that it only transmits activation from the HEAD of the link to its TAIL. Each CONNECTION in the network consists of two links such that the head of one link is the tail of the other and vice versa. Each link has a PROPAGATION FILTER (PF). The resting activation value (r-value) of a link's PF is directly proportional to how much activation is allocated to the link by its head. The PF, however, is not affected by activation spreading through the link it is located on (Sumida and Dyer 1992, Sumida 1997). If activation flowing through a link increased the PF's r-value, the link would strengthen whenever its head is activated, wrongly predicting that high token frequency words are better linked to their neighbors and therefore are better able to activate or prime them, against findings that high token frequency actually corresponds to reduced priming (see next section).

On the other hand, a link should strengthen whenever its head and tail are activated simultaneously (co-activated) to allow associative learning to occur. This would imply that the PF's r-value is raised whenever the head and the tail of the link are co-activated and hence that the PF of a link is a tail on a subsidiary link (LINKTRON) headed by either the head or the tail of the link the PF mediates. The influence of this linktron must, however, be counteracted whenever the head or the tail is activated in isolation. The following 12 structures are possible a priori (Figure 2). However, we will see in Section 2.4 that there are strong empirical constraints on possible structures.

2.3. DYNAMICS OF ACTIVATION SPREAD.

LAST proposes that each node has an ENTRANCE THRESHOLD and an EXIT THRESHOLD. After the entrance threshold is reached, activation can flow into the node. After the exit threshold is reached, activation is divided between the node itself and all links headed by the node. The amount of activation leaving a node is limited and as activation is leaving a node it is divided between all links connected to it. LAST differs from previous semantic networks models (e.g.,

[2] Lines represent connections, width of line represents connection strength, filled circles represent nodes. The circle surrounding the type nodes has no theoretical significance.

Anderson 1983, 2000, Neely 1991) in assuming that the node itself also participates in this competition so that the more links are connected to a node, the less activation will be allocated to any one link and to the node itself. Finally, LAST proposes the EQUITY PRINCIPLE, which states that the amount of activation allocated to a link is directly proportional to the strength of that link. However, while the strength of a link is equivalent to the resting activation level of its propagation filter, the strength of a node, lacking a propagation filter, is fixed. Activation stored in a node or a PF is assumed to decay as time progresses. The decay function is exponential or power-law based. Decay rate at a point of time is specific to the date of birth and size of a given ACTIVATION UNIT where an activation unit is a moving element defined by its current location as well as time and place of origin. Activation units created recently decay at a faster rate than those created long ago and the larger the activation unit, the slower its rate of decay. This size-dependent decay (SiDeD) hypothesis is unique to LAST and is the opposite of what is assumed by ART (Grossberg 1995).

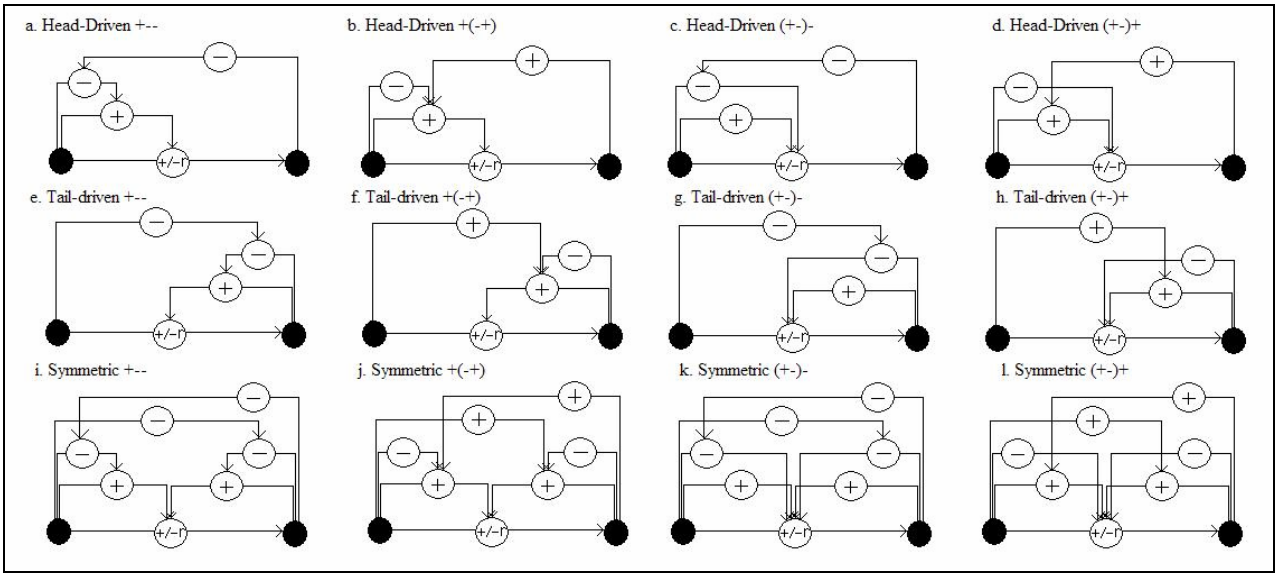

FIGURE 2. A PRIORI POSSIBLE LAST LINK STRUCTURES[3]

2.4. EMPIRICAL CONSTRAINTS ON LINK STRUCTURE.

If the structure of the link is symmetric, the strength of both links connecting two nodes is identical. If the structure is asymmetric, the DRIVING NODE of a link is the only one sending activation to the PF. A very robust finding is that if a stimulus A usually precedes stimulus B in a subject's experience, then priming would be much larger when A is the prime and B is the target than if the reverse is true (Koriat 1981, Chwilla et al. 1998). If A precedes B, B is at a higher level of activation when A and B become co-activated. This means that more activation will flow to the PF of the link driven by B. Since it is the A→B link that is strengthened more, it is A→B that is driven by B, hence links are tail-driven.

An increase in the token frequency of the driving node would mean less activation being

[3] Signs shown next to structure names indicate signs for PF r-values at progressively higher levels of embedding. Parentheses indicate same tail. If an r-value is negative, excitatory activation entering the node will become inhibitory when it leaves the node, where INHIBITORY activation reduces the r-value of nodes it enters.

sent to the PF's of links driven by the node since more activation would dissipate into the driving node tokens. Therefore, in a given connection, the link driven by the high-frequency node will, in absolute terms, be weaker than the link driven by the low-frequency node. For a given pair of stimuli, less priming is observed when the high frequency member of the pair is the prime than when it is the target in semantic (Koriat 1981, Chwilla et al. 1998), visual (Rueckl 2003), morphological (Schriefers et al. 1992, Feldman 2003), acoustic/phonetic[4] (Goldinger et al. 1989), and phonological (Radeau et al. 1995) priming. Since in priming activation must flow from the prime to the target, we may conclude that links are head-driven.

However, there is an alternative explanation for asymmetric frequency effects in priming: the size-dependent decay function that is also necessary to account for the longer duration of morphological and identity priming compared to phonological, semantic, and orthographic priming. If larger activation units decay more slowly, less priming should be observed when the prime is high frequency and the target is low frequency than when the prime is low frequency and the target is high frequency. The reason is that the major reduction in activation unit size occurs earlier in a unit's lifetime when the prime is high frequency than when the target is high frequency. As a result, activation spreading from the prime decays more before target presentation when the prime is high frequency than when the target is high frequency, resulting in decreased priming.

This account requires links headed by the high-frequency node to be absolutely stronger than those headed by the low-frequency node (because their PF's are driven mostly by the low-frequency node) but relatively weaker (because they have to compete with many type→token links). That is, the difference in node frequency must increase the amount of activation allocated to the driving linktron less than is decreases the amount of activation allocated to the link caused by the difference in node frequency, or $r_{Tt} > r_{linktron}$, that is, the amount of activation allocated to a type→token link must be greater than the amount of activation allocated to a linktron

This means that the learning of associations through link strengthening is a slow process, making one-shot learning the responsibility of unit/node formation. McClelland, McNaughton, and O'Reilly (1995) have reached the same conclusion based on the necessity for slow learning rates in connectionist networks.

Link structures provide predictions for associative learning.[5] The strength of an association after classical conditioning is measured by how likely the conditioned stimulus (CS) is to evoke the response typically associated with the unconditioned stimulus (US). Thus, the task responds to the strength of the connection leading from the CS to either the US or the response. If links were purely tail-driven, we would not expect the frequency of the CS to influence the strength of the CS→US or CS→response link, contrary to the findings (CS preexposure effect, Hall 2003). Thus, we must assume that, while the linktron headed by the tail of the link is stronger than the linktron headed by the head of the link[6], both exist, thus only i-l are possible structures.

Linktron PF's, unlike link PF's, are non-trainable. If this were not the case, the linktron headed by one of the linked nodes would strengthen or weaken one of the linktrons headed by

[4] The fact that inhibitory priming is reduced by high frequency as well as excitatory priming means that the effect cannot be accounted for by a ceiling effect.

[5] This is not to say that according to LAST language acquisition is simply associative learning. A hallmark of language acquisition is one-shot learning, which in LAST is accomplished by the formation of a new node.

[6] Note that this does not require the frequency of the US to have a greater influence on link strengthening than the frequency of the CS because the CS may be connected to the response directly and the US may have a strong connection to the response because of its intrinsic content.

the other node, upsetting the equilibrium and allowing the other node to strengthen the link when activated in isolation. This would wrongly predict that high token frequency increases associability and priming as long as the stimulus has ever been co-activated. If linktron PF's are non-trainable, (+-)+ structures are impossible because the linktron headed by the non-driving node has no effect. Therefore, only i, j, and k are possible structures.

Linktrons are fixed to have the same strength as the linktrons whose PF's they influence. That is, a linktron can be either able or unable to transmit activation.

Finally, we should note that for activation to spread from a node on a link to the PF of the link before activation from the head reaches the link's PF through the link, linktrons must be able to transmit activation faster than links, and linktrons whose tails are linktron PF's must be faster still.

3. THE LAST ACCOUNT OF THE FINDINGS.

In priming, when the prime is presented, matching types are partially activated. Whenever a type passes the exit threshold, a token node is created storing the information about that particular instance of the type, and activation starts to spread from the type node. Since the spread of activation from the node along type-token links occurs only after it has been activated, speed of the type node's recognition is directly proportional to its r-value: the lower the type node's r-value, the more input activation is needed to reach the level sufficient for recognition. Thus, the greater the token frequency of a type, the faster its recognition should occur. This is precisely what has been found by, e.g., Coltheart, Davelaar, Jonasson, and Besner (1977), Glanzer and Ehrenreich (1979), Gordon (1983), Norris (1984), Goldinger et al. (1989), Luce, Goldinger, Auer, and Vitevitch (2000), and Plaut and Booth (2000). Slow recognition feeds back to low experienced token frequency since slow processors would not recognize as many tokens of a type present in the environment as fast processors.

Once the prime type is activated, activation starts to flow out from it. As it is leaving the node, it is divided between the node itself and all links headed by the node, one of the links being tailed by the target, which has not yet been presented. Thus, the greater the number of links headed by the prime's type, the less activation will remain in the node and the less activation will be allocated to any one link. Given that every type is connected to all other types while a token is only connected to one type, the only factors influencing the number of links radiating from a type are its token frequency and the number of types in the lexicon. Therefore, the higher the token frequency of the prime, the less priming, including identity priming, should occur as found by, e.g., Scarborough, Cortese, and Scarborough (1977), Forster and Davis (1984), Norris (1984), Stark (1997), Perea and Rosa (2000), and Versace and Nevers (2003) for identity priming, by Moder (1992) for morphological priming, by Thomsen, Lavine, and Kounios. (1996) for semantic priming, and by Goldinger et al. (1989) and Luce et al. (2000) for phonological priming.

In addition, the smaller the size of the lexicon, the more activation is allocated to any one node, hence more priming in children and late signers (as found by, e.g., Perfetti and Hogaboam 1975, Simpson and Lorsbach 1983, Emmorey, Corina, and Bellugi 1995, Nation and Snowling 1998, Castles, Davis, and Letcher 1999), and faster recognition (and higher rated familiarity) of words learned early in life compared to words with the same token frequency learned later in life, indicating higher resting activation levels for early-acquired words (as found by Newman and German 2002, Zevin and Seidenberg 2004, and Ghyselinck, Lewis and Brysbaert 2004).

The finding that earlier-acquired words exhibit less priming (Barry, Hirsh, Johnston, and WIlliams 2001) is predicted because when the lexicon is small more activation will reach the propagation filter of a link when the nodes it links are co-activated. Thus, LAST predicts that early age-of-acquisition should be correlated with having many strong associates, as found by Steyvers and Tenenbaum (2005) for semantic associates.

Since slow processing leads to low token frequency, more priming should also be observed in slow word-recognizers when lexicon size is controlled, as found by Plaut and Booth (2000). The idea of type-token links is further supported by the finding that direct perceptual exposure to a type, which increases both its token frequency and resting activation level, leads to habituation, or less activation spreading to neighboring types, while associative activation received from another type leads to dishabituation because less activation is necessary to reach the exit threshold (Hall 2003).

Low frequency orthographic primes produce no inhibitory priming while high frequency orthographic primes significantly inhibit their targets (Drews and Zwitserlood 1995, Brysbaert, Lange, and van Wijnendaele. 2000). On the other hand, Goldinger et al. (1989) and Luce et al. (2000) observed that high-frequency primes inhibit targets less than low-frequency primes do in phonological priming. This pattern of results is accounted for by proposing that the function of amount of priming[7] by prime or target frequency is the same, regardless of modality (Figure 3). However, orthographic representations are acquired later than phonological representations, at a time when the lexicon is larger. Therefore, connections between orthographic representations will be weaker than those between phonological ones, since less activation will reach the PF's of links connecting orthographic representations after the same number of co-activations. Consequently, less activation/inhibition from the prime will reach the target in orthography resulting in greater incidence of associative activation not being let into the target node by the entrance threshold.

Lack of sensitivity to word frequency can also be observed if the priming is sublexical, occurring between parts of the prime and the target rather than between prime and target themselves. Radeau et al. (1995) review the literature on facilitatory phonological priming, which is based on word-final overlap, and finds that the priming is not sensitive to word frequency, indicating its sublexical locus. With sublexical priming, LAST predicts that the amount of priming should be influenced by the frequency of the sublexical units involved and not word frequency.

A finding inconsistent with the LAST account of priming (but predicted by the activation functional account of Plaut and Booth 2000) would be if low frequency primes produced some priming but the amount of this priming were less than that produced by high frequency primes. No such evidence exists at present (both prime frequency[8] and target frequency, cf. Schuberth and Eimas 1977, Neely 1991, Perea and Rosa 2000, exhibit an inverse correlation with amount of priming).

[7] By 'amount of priming' we mean the absolute magnitude of the change in the dependent variable (reaction time, brain wave latency and amplitude, error rate) due to related prime presentation compared to an unrelated prime.
[8] See citations above.

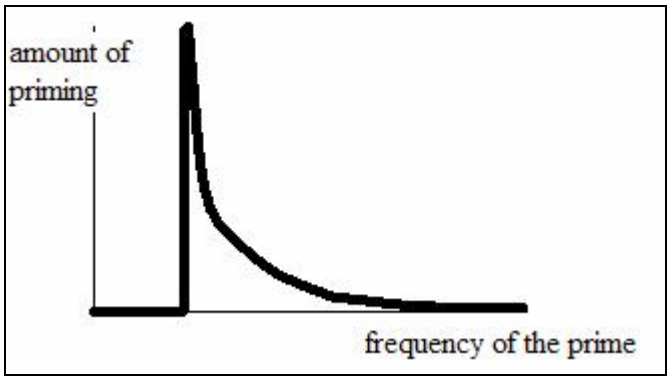

FIGURE 3. THE EFFECT OF THE FREQUENCY OF THE PRIME ON AMOUNT OF PRIMING HYPOTHESIZED BY LAST

Unlike similarity-based priming, identity priming can be observed with nodes with a very low r-value, since the input activation does not dissipate into the network before the prime type reaches the exit threshold and the entrance threshold is lower than the exit threshold. Stark (1997) has demonstrated that even visually presented pronounceable non-words produce identity priming and that, furthermore, they produce even more identity priming than low-frequency words.

LAST's Equity Principle states that the amount of activation allocated to a link is proportional to its strength (cf. Anderson 2000). If this is the case, we would predict that words that are semantically, phonologically, or orthographically similar to many other words, that is, words located in dense neighborhoods, should exhibit less priming than words located in sparse neighborhoods, since a link or node of a given strength will receive less activation in a dense neighborhood than in a sparse neighborhood. This is indeed what is found by Thomsen et al. (1996) for semantic priming and by Perea and Rosa (2000) for orthographic priming. In addition, since the source node's r-value is fixed, late-acquired words will exhibit more identity priming (since the source node would compete with weaker links) as found by Barry et al. (2001).

Even more direct evidence for the Equity Principle is provided by Anaki and Henik (2003), who find that if the target is given as an associate of the prime by a certain percentage of subjects in a free association task, there will be more priming between the prime and the target if the other associates of the prime are given by lower percentages of the subjects. For instance, suppose that 'mouse' is given as an associate of 'cat' by 50% of the subjects and 'nail' is given as an associate of 'hammer' by 50% of the subjects. Then if 'dog' is the next most popular associate of 'cat', produced by 45% of subjects, while 'tool' is the next most popular associate of 'hammer', produced by 10% of subjects, 'cat' will prime 'mouse' less than 'hammer' will prime 'nail' because the 'cat-mouse' connection has to compete for 'cat's activation with other strong connections while the 'hammer-nail' connection competes for 'hammer's activation only with weak connections.

The Equity Principle also explains the blocking effect in associative learning: if a US is already strongly associated with a CS (CS1), it is hard to associate with another CS (CS2) (Kamin 1969). This is because the linktron headed by the US and tailed by the PF of the US-CS2 link has to compete with a strong US-CS1 link, relative to the case in which the US has no strong associates. Consequently less activation will be allocated to the US-CS2's PF when US is strongly associated with CS1, leading to slower strengthening of US-CS2. Similarly, high-

frequency CS1's and US1's are harder to associate with a CS2 or US2 because the PF's of links being acquired have to compete with many type-token links headed by CS1 or US1 (what are known as the CS preexposure effect and the US desensitization effect, cf. Hall 2003 for a review).

A related phenomenon is proceduralization, where parts of a frequently practiced sequence of actions become strongly associated as a result of practice while the verbal descriptions of the actions become inaccessible from the action (Ryle 1949).[9] Since the actions in the sequence develop strong connections, less activation would spread from nodes corresponding to any one of the actions to associates that are not practiced every time the action is performed, e.g., the verbal descriptions of the actions.[10]

Further evidence for the Equity Principle in associative learning comes from the interference paradigm of Barnes and Underwood (1959) and McGovern (1964) who found that when subjects are asked to learn a list of A-C stimulus pairs after learning a list of A-B pairs, they can recall B when presented with A worse than subjects who are asked to learn C-D pairs after learning A-B pairs.

The last issue for which the Equity Principle is relevant is neighborhood effects in word recognition. The effects appear to be inconsistent: words from dense neighborhoods are found to be recognized more slowly (e.g., Goldinger et al. 1989, Luce and Pisoni 1998, Vitevitch and Luce 1998, Luce et al. 2000) or more quickly (e.g., Andrews 1989, Forster and Shen 1996, Huntsman and Lima 2002). This inconsistency is in fact predicted by LAST, because high density leads to more associative activation reaching the type node corresponding to the word to be recognized but to a lower proportion of both associative and direct (token-based) activation sticking to the node to raise its r-value. Thus, the system is unstable and effects are inconsistent.

Nevertheless, low-frequency words should be more likely to show facilitatory effects of neighborhood density because their resting activation level depends less on direct activation, for which high density has only inhibitory effects. This proposal is supported by evidence obtained by Metsala (1997), who found that high density has facilitatory effect for low-frequency words, while it has an inhibitory effect for high-frequency words. Indirect support for the hypothesis is also provided by the fact that most studies providing support for inhibitory density effects use acoustic stimuli, and acoustic stimuli have a higher r-value than orthographic stimuli due to a higher token frequency and earlier age of acquisition.[11]

A challenge to any single-mechanism account of priming is to explain why morphological and identity priming persist over several intervening items, while semantic, phonological, and orthographic priming decay rapidly (cf. Stockall 2004), although long-term semantic priming has been observed by Becker, Moscovitch, Behrmann, and Joordens (1997). LAST handles this dissociation by observing that the activation units reaching morphologically related neighbors are larger, and much activation also stays in the node from which activation begins to spread. Morphological priming involves identity priming of roots, which are much less frequent than the phonological units that are identity-primed in phonological priming (cf. Radeau et al. 1995). Because of the relatively low frequency of the source node, little activation

[9] See Whittlesea (2003) on evidence contradicting ACT's (Anderson 1983) view that the procedural/declarative distinction is a distinction between cognitive modules.

[10] The Equity Principle also explains transitional probability effects without postulating that speakers calculate probabilities: a word that is very probable is a word whose connection to the previous word in the processing sequence is strong relative to its competitors.

[11] However, facilitatory density effects may in reality be sublexical frequency effects or the effects of the density and ease of access of competitors.

dissipates into its tokens, leaving much activation in the source node and allowing much activation to spread to the target. Support for this notion comes from observing no priming with high-frequency shared morphemes, i.e. inflectional affixes (Emmorey 1989). Syntactic priming may be thought of as identity priming of schematic constructions (Goldberg 2006). Since in LAST, the larger the activation unit, the slower the rate of decay, we predict that identity priming and priming that relies on stronger connections should decay less rapidly.

Lateral inhibition predicts that words whose neighbors are neighbors of each other should be easier to recognize than words whose neighbors are not neighbors of each other. Altieri (2006) found that the exact opposite is the case. These results are inconsistent with lateral inhibition and consistent with spreading activation.

Phonological priming of word beginnings is always inhibitory when strategic factors[12] are controlled (Goldinger et al. 1989, Radeau et al. 1995, Luce et al. 2000). On the other hand, phonological priming of word ends is excitatory (Radeau et al. 1995).

While this finding is standardly explained by lateral inhibitory connections (McClelland and Rumelhart 1981), LAST suggests an alternative mechanism. A new phonological token is created whenever a word is presented auditorily but the semantics is activated associatively and formation of a new token does not result. Whenever a part X is activated when a whole AX is presented, a new token of X is formed. Therefore, less activation will spread to wholes containing X from X in the future. This would not apply to the whole containing X present in the environment (AX) since X and AX would be co-activated strengthening the X-AX connection and thereby, via the Equity Principle, additionally reducing the amount of activation that would reach other wholes containing X from X in the future, leading to slower recognition times for those wholes. Hence, we observe inhibitory priming for phonologically but not semantically similar items. This does not apply to word-end-based priming because word ends are usually not necessary for word recognition. Rather, the priming that occurs reflects simply faster access to the sublexical units in the word's end. A recent experiment with sound similarity judgments has shown that words that share frequent phonemes are perceived to sound less similar than words that share rare phonemes, supporting the idea that connections are stronger between words that share parts that occur in few, as opposed to many, words (Kapatsinski 2006).

Bybee (1995) and Albright and Hayes (2003) propose that high type frequency makes morphemes more productive. In LAST, this is predicted to occur: since a novel word is not associated with any of the competing morphemes when presented, its presentation results in the activation of words that are similar to the stimulus. Activation spreads through the type nodes corresponding to those words, activating the associated morphemes. The larger the type frequency of a morpheme, the greater the number of possible mediators that would allow activation from the novel word to spread to the morpheme. On the other hand, the higher the token frequency of the mediators, the more activation will dissipate into their tokens and hence the less activation will reach the associated morpheme, hence lower productivity of morphemes with high token/type ratio (Bybee 1995).

In production, high-frequency words are observed to show greater gestural overlap and coarticulation (Hooper 1976, Pagliuca and Mowrey 1987, Browman and Goldstein 1990, Bybee 2001:69-85). If articulatory targets are the relevant types (Browman and Golstein 1990), and activation flows from the preceding to the following target (Pulvermuller 2003), the following target will get activated faster in a high-frequency word, or a high-probability target sequence, leading to gestural compression.

[12] I.e., factors that are under the goal-oriented control of the subject.

Finally, it is often observed that frequency effects on reaction time are larger in language comprehension than in language production (e.g., Jescheniak and Levelt 1994). We would like to propose that this is because the incoming stimulus is matched to tokens, rather than types, such that the amount of activation allocated to an existing token depends solely on the degree to which the token matches the incoming stimulus. For a high-frequency type, many tokens would match the incoming stimulus, resulting in more activation flowing into the type. In production, there is no need to access the tokens, hence perception involves one extra frequency-sensitive stage in which frequency effects are facilitatory.

The existence of token units connected to the type node allows the type to carry no content, being defined by the weighted average of the contents of the associated tokens, hence allowing type content to drift gradually (cf. Pierrehumbert 2001 for a model of sound change along these lines). However, Baayen, Levelt, Haverman, and Desserjer (2005) have recently demonstrated that word frequency effects in picture naming are excitatory in immediate naming but inhibitory in delayed naming. This effect is predicted if naming can be accomplished by simply accessing the type, rather than accessing all the tokens. Activating a type is easier when the type is high-frequency because high-frequency types have higher resting activation levels, producing the facilitatory frequency effect in immediate naming. However, as the time from initial type activation increases, activation starts to leak out of the word type node into the tokens, producing inhibitory frequency effects in delayed naming. These results provide converging evidence for the possibility of producing a word without token access.

4. Future directions.

Link structures where two linktrons of opposite signs have the same tail but different heads (b and j in Figure 2) are unstable with the effect of the structure on the link's PF depending on, in part, the frequencies of the heads of the linktrons. Therefore, if a link strengthens whenever its head and tail are co-activated and not only when the co-activation occurs at a time when the head is less frequent and/or lower in neighborhood density than the tail, only i and k are possible asymmetric structures. Structure j displays a very interesting dynamic: whichever node is higher in frequency or density than the other loses the battle to control the linktron PF's tailed by linktrons with opposite-sign PF's. Since a node always inhibits its own excitatory linktron tailed by the link's PF and excites the other node's linktron leading to the link's PF, the higher-frequency/higher-density node is the only one that spreads activation to the PF of the link and thus is the only node responsible for strengthening the link. Therefore, structure j predicts that strength of the link is determined by whichever of the linked nodes is higher in frequency and/or higher in density. For i and k, both nodes influence the link's strength.

A problematic finding for the Equity Principle has been obtained by Zeelenberg (1998), who primed either A-C associations as well as A-B associations or only A-B associations. No effect of A-C presentation on the amount of priming produced by A-B presentation was observed, while the Equity Principle would predict that priming A-C should reduce A-B priming. However, the primed A-C associations were already strong, reducing the magnitude of the manipulation. More work is needed on this issue.

Another finding that is problematic for LAST is Plaut and Booth's (2000) observation of lack of a word frequency effect on semantic priming in poor readers who also exhibited more priming than controls matched for vocabulary size and exhibited a frequency effect in speed of word recognition. This finding is predicted by Plaut and Booth's (2000) model with the

assumption that the poor readers fall onto the linear portion of the activation function. A possible explanation is that these subjects are more likely to forget exemplars with low resting activation levels than good readers. While high-frequency words are connected to more tokens in the normal system, each of the tokens has a lower-resting activation level than the tokens of low-frequency types do, and hence is more susceptible to forgetting. This requires the increased opportunities for getting activation caused by high type frequency to not provide the token with full compensation for decrease in size and consequent increase in decay rate of activation units received on each occasion.

Finally, a problematic result has been reported by Murray and Forster (2004) who found that frequency rank order provides a better correlation with reaction time and accuracy in the lexical decision task than does log frequency, providing an argument for a model of lexical access based on serial search. A difference between log frequency and frequency rank order is that log frequency is absolute while frequency rank is relative. Given the existence of competition for recognition, a fairer comparison would involve log frequency relative to competitors and frequency rank relative to competitors.

Unlike in distributed connectionist models, which conceive of similarity as overlap between patterns of activation (e.g., Plaut and Booth 2000), in LAST similarity could strengthen connections between nodes, just as co-occurrence does, through co-activation. When two units share a part, the activation of the part will strongly activate both of the units containing it. Crucially, activation from the part will reach the wholes that contain it simultaneously, resulting in co-activation of the wholes. If two wholes share many parts, they will be co-activated strongly and often and hence will develop strong connections. However, similarity effects are observed even with nonce stimuli that the subject has not perceived before (e.g., Albright and Hayes 2003). This means that similarity relations, unlike co-occurrence relations should be available as soon as a new node is created, which suggests that similarity should in fact be conceived as overlap.

McClelland et al. (1995) suggested that the brain combines localist and distributed representation, such that the hippocampus and the superficial layers of the neocortex contain localist representations, which are linked to distributed representations in the deeper layers of the neocortex. We would like to suggest that the LAST type and token nodes form the hippocampal/superficial neocortex system, and are linked to distributed patterns of activity in deep neocortex. That is, a type node or a token node specifies a sequence of activity in the distributed system (for ways to specify sequences in a distributed system, see Pulvermuller 2003).

The size-dependent decay (SiDeD) hypothesis predicts that priming should decay more slowly with low-frequency, low-density primes and targets than with high-frequency, high-density ones. Furthermore, slower priming decay should be observed in small lexicons. In general, the greater the magnitude of priming at the minimum stimulus-onset-asynchrony at which priming can be observed, the slower its decay should be. We are currently working on an experiment to test this prediction using identity priming.

Hay (2001) found that affixes that tend to derive words that are more frequent than their bases (high-relative-frequency words) also tend to be less productive. This finding is straightforwardly explained if morphemes and words compete for activation during word recognition, such that if a word is recognized faster than its constituent morphemes, the morphemes' resting activation level is increased less than when the morphemes are recognized faster than the word. This is expected in LAST because when the morphemes are recognized

faster than the word, they receive direct activation due to token formation, while when the word is faster, the morphemes are activated associatively. Such a process would lead morphemes occurring in high-relative-frequency words to have a lower resting activation level than morphemes occurring in low-relative-frequency words. A prediction following from the account of the relative frequency effect offered above is that bases that occur in high-relative-frequency words should exhibit more identity priming, since they have fewer tokens associated with them. This prediction awaits testing.

Hay's results show that a full account of frequency effects must also include a model of segmentation. That is, how large and abstract are the units denoted by nodes. In LAST, a type is a unit that is sufficiently abstract for subjects to be sensitive to its frequency of occurrence and to be able to learn associations between it and other types. Frequency alone is insufficient to establish that some unit is stored as a node, since complex unit frequency can always be reduced to the frequencies of the parts and transitional probabilities between them. Minimally, learning an association between two existing nodes should be easier than creating a new node and associating it with an existing node. Based on this intuition, we have developed XOR learning, a general method of testing unithood that can also distinguish LAST from distributed models.

In XOR learning, subjects learn that stimuli A and B on their own are associated with a response, X, while A and B together are associated with a different response, Y. Thus, the subjects are forced to learn associations for the complex unit AB that could not be inherited from and are in contradiction with the associations of the unit's parts. If AB is already stored as a unit, it should be associated with Y more easily than if only A and B are stored.

If high frequency of co-occurrence can result in the formation of a complex unit, as predicted by LAST and other localist theories (Bybee 2002, Solan, Horn, Ruppin, and Edelman 2005), learning the AB-Y association should be easier when A and B co-occur than when they do not, controlling for the overall frequency of A and B. However, if high frequency of co-occurrence simply strengthens the connection between A and B, learning of the AB-Y association should be harder when A and B co-occur. If A and B are associated due to co-occurrence, presentation of A would activate B. In XOR learning, B is associated with a response incompatible with AB's response and would therefore interfere with the learning of AB-Y associations. Thus, XOR learning allows us to directly compare localist and distributed theories of mental representation. Even multi-layer connectionist networks, which can solve XOR problems, do not predict that co-occurrence of A and B should make predicting Y's occurrence easier.

5. Conclusion.

The basic idea behind this paper is to take a single mechanism: competition for a limited supply of spreading activation and see how much it can account for and what architectural assumptions must be made. The result, LAST, provides an explicit, testable account of frequency, neighborhood density, lexicon size, age-of-acquisition, target degradation, and speed of processing effects across tasks, domains, and species. We hope to have shown how bringing together evidence from different domains constrains a theory and makes previously unseen connections apparent and to have provided a range of testable hypotheses that would stimulate research in the area.

APPENDIX: INEVITABILITY OF LINK STRENGTHENING DUE TO COACTIVATION

This appendix answers the question of what needs to hold for links to be strengthened by coactivation of the linked nodes despite the addition of type→token links to each of the linked nodes. Strengthening in LAST means that the link AB will attract more activation ACT_{AB} after coactivation of A and B.

Before coactivation,

$$(1)\ ACT_{AB} = \frac{ACT_A \times r_{AB}}{\sum rn}$$

where r_{AB} is the r-value of the link AB, ACT_A is the activation that node A has prior to division, and

$$(2)\ \sum rn = r_T + r_{Tt} \times n_{Tt} + r_{\mu_{TT}} \times n_{TT} + r_{linktron} \times n_{linktron}$$

or the sum of strengths of the r-values of all links headed by A plus the fixed strength of the node.

After coactivation,

$$(3)\ ACT_{AB} = \frac{ACT_A \times (r_{AB} + \frac{ACT_B \times r_{linktron}}{\sum rn_b} + \frac{ACT_A \times r_{linktron}}{\sum rn_a})}{\sum rn + r_{Tt} + \frac{ACT_A \times r_{linktron}}{\sum rn_a}}$$

For the desired result, (3) must be larger than (1), or, assuming, for simplicity, ACT_A=ACT_B

$$(4)\ \frac{ACT_A \times r_{AB}}{\sum rn_a} - \frac{ACT_A \times (r_{AB} + \frac{ACT_B \times r_{linktron}}{\sum rn_a} + \frac{ACT_A \times r_{linktron}}{\sum rn_a})}{\sum rn_a + \frac{ACT_A \times r_{Tt}}{\sum rn_a} + \frac{ACT_A \times r_{linktron}}{\sum rn_a}} < 0$$

After reducing to a common denominator and simplifying that $\sum rn_b = \sum rn_a$ and ACT_A=ACT_B,

$$(5)\ r_{AB} \times \sum rn + r_{AB} \times \frac{ACT \times r_{Tt}}{\sum rn} + r_{AB} \times \frac{ACT \times r_{linktron}}{\sum rn} - r_{AB} \times \sum rn - \frac{ACT \times r_{linktron}}{\sum rn} \times \sum rn - \frac{ACT \times r_{linktron}}{\sum rn} < 0$$

$$(6)\ r_{AB} \times r_{Tt} \times \sum rn + r_{AB} \times r_{linktron} \times \sum rn - 2r_{linktron} \times (\sum rn)^2 < 0$$

Thus, we receive

$$(7)\quad r_{AB} \times (r_{Tt} + r_{linktron}) < 2r_{linktron} \times \sum rn$$

Since the sum of all r-values is a very large number, relative to any given r-value, this is guaranteed to be true in every network. Thus, the model can produce the desired behavior without any special parameter setting.

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[13] Here, JEP=Journal of Experimental Psychology (LMC = Learning, Memory, and Cognition, HPP = Human Perception and Performance), JPR=Journal of Psycholinguistic Research, JML= Journal of Memory and Language, JVLVB=Journal of Verbal Learning and Verbal Behavior, PP = Perception and Psychophysics, QJEP = Quarterly Journal of Experimental Psychology, LCP = Language and Cognitive Processes, PR=Psychological Review

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RECONSTRUCTING A TYPOLOGICALLY MARKED STRATEGY FOR ZAPOTEC RELATIVE CLAUSES*

JOHN FOREMAN
Utica College
PAMELA MUNRO
University of California, Los Angeles

Several Zapotec languages of Oaxaca, Mexico, display typologically remarkable relative clause structures: they employ resumptive pronouns for subject-headed and oblique-headed relative clauses, but not for object-headed relative clauses, a pattern that violates two "universal" claims of Keenan and Comrie's (1977) survey and thus must be extremely uncommon cross-linguistically. We argue that this relativization strategy is motivated by a Subject Parsing Constraint that also explains the use of resumptive pronouns in quantificational structures and an unusual backward binding construction. Since two of the languages with this unusual relativization strategy, Macuiltianguis Zapotec and Colonial Valley Zapotec, are from separate branches of the family, we hypothesize that this unusual pattern is reconstructable for Proto-Zapotec.

1. INTRODUCTION.

In this paper we examine relative clause structures in two modern Zapotec languages of Oaxaca and in an older variety of Zapotec (Munro 2002, Foreman 2006). Relative clauses in two of these languages are typologically extremely unusual, according to the claims of Keenan and Comrie (1977). The distribution of the relativization strategy used in these languages (by which resumptive pronouns are used in subject-headed but not object-headed relative clauses) suggests that this pattern, and the parsing constraint that appears to determine it, must be reconstructed for Proto-Zapotec.

The paper is laid out as follows: in Section 2, we present relevant background about these languages concerning word order and the form of pronouns. Section 3 describes the formation of relative clauses in each language, while Section 4 considers the typological rarity of the pattern of resumptive pronouns found in relative clauses in two of these languages, in which resumptive pronouns are allowed and sometimes required in subject-headed relative clauses. Section 5 suggests a parsing constraint that can account for the typologically unusual character of these relative clauses, with Section 6 providing additional support for this parsing constraint by showing that it extends beyond relative clause formation to other parts of the grammar. Section 7 presents our conclusion.

2. BACKGROUND.

Before considering relative clauses and resumptive pronouns, we present some background

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information concerning word order and the form of pronouns in the Zapotec languages under consideration.

The Zapotec languages, spoken in Oaxaca, Mexico, typically have a basic VSO word order and no nominal case marking, as illustrated in (1-3),[1] from San Lucas Quiaviní Zapotec (SLQZ), a language of the Valley branch of the family; Macuiltianguis Zapotec (MacZ), a language of the Sierra Juárez branch; and Colonial Valley Zapotec (CVZ), an earlier language of the Valley branch preserved in archival documents written by native speakers in 16th-18th century Colonial Mexico:[2]

(1) B-tòo'oh Jwaany gax:lyuh.
PERF-sell Juan land
'Juan sold the land' (SLQZ)

(2) Ruuni naan-qui'=ya' yíína'=to'.
HAB.make mother-of=1sG chili=DIM
'My mother is making yellow mole' (MacZ)

(3) t-acañe quela=huelaa leçaa casado=ni
HAB-help NOM=helper wife husband=3
'The wife-helper helps her husband' (CVZ; Doctrina 3, l.3)

All these languages use clitic pronouns to mark subjects and either independent or clitic pronouns to mark objects, again maintaining VSO order following the verb, as in the SLQZ, MacZ, and CVZ examples in (4)-(6):

(4) a. Gw-àa'izy=ëng Jwaany.
PERF-hit=3S.PROX Juan
'He hit Juan' (SLQZ)

b. Gw-àa'izy Jwaany la'anng.
PERF-hit Juan PRON.3S.PROX
'Juan hit him' (SLQZ)

c. Gw-àa'izy Jwaany=ëng.
PERF-hit Juan=3S.PROX

[1] Abbreviations used in this paper include ANAP : anaphoric, CMPL : complementizer, COMP : completive, DIM : diminutive, HAB : habitual, INV : invisible, IRR : irrealis, MS : male speaking (male possessor), NEUT : neutral, NOM : nominalizer, PERF : perfective, POSS : possessive, PREP : prepositional applicative, PRON : independent pronoun base, PROX : proximate, REL : relative, STAT : stative; 1, 2, 3, S, and P indicate person and number; D (dative), G (genitive), N (nominative) and A (accusative) indicate clitic pronoun series in MacZ. The equals sign indicates a clitic boundary, and a period is used to separate elements of a complex gloss.

[2] The CVZ data come from documents analyzed by the UCLA Zapotexts group led by Pamela Munro and Kevin Terraciano, whose contributing members currently include Xóchitl Flores, Michael Galant, Brook Lillehaugen, and Olivia Martínez. Past contributors are Lisa Sousa, Christina Esposito, John Foreman, Felipe Lopez, and Julie Morgenlender. Most documents were collected by Terraciano and Sousa from archives in Oaxaca and Mexico City (these are referenced with a town name and a year); we also cite data from a section of Feria's 1567 *Doctrina*.

'Juan hit him' (SLQZ)

(5) a. Bellia=nà bia'=nà'.
COMP.kick=3N horse=DIST
'He kicked the horse' (MacZ)[3]

b. Bellia bia'=nà'=nà.
COMP.kick horse=DIST=3A
'The horse kicked him' (MacZ)

(6) a. Beni castilla ta-calachi=ni çij=ni yoo
person Castille HAB-want=3 IRR.buy=3 land
'A Spaniard, he wants to buy the land' (CVZ, Zimatlán 1565, ll. 3-4)

b. a c-oçacana=to=ni
NEG IRR-mistreat=2P=3
'You are not to mistreat them' (CVZ, Doctrina 5, l.2)

Throughout Zapotec, most of the same clitic pronouns that mark subjects are also used to indicate obliques, such as genitives and the objects of many prepositions.[4] CVZ uses only a single third person clitic pronoun, *=ni*, as seen in (3) and (6) above. Both MacZ and SLQZ use additional clitics to express some third person genitives and obliques. (7) illustrates the MacZ genitive clitic pronoun *=nì*.

(7) Bellia=nà béttsi'=nì=á.
COMP.kick=3N brother.MS=3G=INV
'He$_i$ kicked his$_{i,j}$ brother' (MacZ)

In SLQZ, a normal third person clitic pronoun, like those in (4)a and (4)c, is used to express a genitive that is not coreferential with a preceding noun, such as the subject in (8)a; when the genitive is coreferential with a preceding noun, as in (8)b, the anaphoric clitic *=nìi'* is used:

(8) a. Gw-àa'izy bùunny behts=ëng.
PERF-hit person brother.MS=3S.PROX
'The person$_i$ hit his$_j$ brother' (SLQZ)

b. Gw-àa'izy bùunny behts=nìi'.
PERF-hit person brother.MS=ANAP
'The person$_i$ hit his$_i$ brother' (SLQZ)

3. RELATIVE CLAUSE STRUCTURES.

[3] In both MacZ examples in (5), *bia'* 'horse' is followed by the distal demonstrative clitic *=nà'*, which is phonologically distinct from the third person clitic pronoun *=nà*.

[4] Many locative prepositions in Zapotec are derived from body-part nouns; these and a few others mark their objects like ordinary genitives. (For discussion of such structures, see Lillehaugen 2003.)

The modern Zapotec languages SLQZ and MacZ employ quite different relativization strategies. SLQZ uses typologically unremarkable relative clauses like those in (9): a relativizer *nih* introduces the relative clause, which includes a gap corresponding to its missing head. As might be expected from SLQZ's VSO order and lack of case marking, relative clauses like the one in (9) are ambiguous:

(9) R-uhnybèe=nn bùunny-nih gw-àa'izy Jwaany.
HAB-know=1P person REL PERF-hit Juan
'We know the person who hit Juan' / 'We know the person who Juan hit' (SLQZ)

(We have underlined the relative clause in (9) and all other examples in this paper.) The underlined relative clause in (9) can thus correspond to main clauses like either (4)a or (4)b.

Relative clauses in MacZ, which use a *nu'* relativizer (10-13), are never ambiguous like those in SLQZ. Subject-headed relative clauses may have a gap, as in SLQZ, but this gap may optionally be filled by a resumptive clitic pronoun, such as =**nà** in (10):

(10) Nabiia'=ni=tè' bènnè' nu' gucchu(=**nà**) ittsa-icchá=lù'.
STAT.know=PREP=1SD person REL COMP.cut(=3N) hair-head=2SG
'I know the person who cut your hair' (MacZ)

(This resumptive =**nà** in (10) and all other resumptive pronouns are boldfaced in our examples.) (10) is thus literally 'I know the person who he cut your hair'.

However, MacZ object-headed relative clauses may not include a resumptive pronoun, as illustrated in (11):

(11) Carru nu' guyo'o Felipe=á(*=**nà**) bitappa'=nà.
car REL COMP.buy Felipe=INV(*=3A) COMP.break.down=3N
'The car that Felipe bought broke down' (MacZ)

If MacZ subject resumptive pronouns were always optional, as in (10), some MacZ relative clauses would also show the same ambiguity found in SLQZ relative clauses like that in (9). However, in potentially ambiguous contexts the subject resumptive clitic pronoun is obligatory in MacZ. While object resumptive pronouns are always prohibited in MacZ, the presence or absence of the subject resumptive pronoun clearly disambiguates the two possible structures in (12) and (13):

(12) Beyùú' nu' begwiia'*(=**nà)** Felipe=á nàáyá' naa=nà
man REL COMP.see*(=3N) Felipe=INV yesterday STAT.be=3N

béttsi'=yà'.
brother.MS=1SG
'The man who saw Felipe yesterday is my brother' (MacZ)

(13) Beyùú' nu' begwiia' Felipe=á(*=**nà**) nàáyá' naa=nà
man REL COMP.see Felipe=INV(*=3N) yesterday STAT.be=3N

béttsi'=yà'.
brother.MS=1SG
'The man who Felipe saw yesterday is my brother' (MacZ)

In contrast, resumptive pronouns are never allowed in SLQZ relative clauses with subject or object heads, even when such relative clauses are ambiguous, as in (9). Adding either subject or object resumptive pronouns in (9) results in ungrammaticality, as shown in (14):

(14) a. *R-uhnybèe=nn bùunny nih gw-àa'izy=**ëng** Jwaany.
HAB-know=1P person REL PERF-hit=3S.PROX Juan
'We know the person who hit Juan' (SLQZ)

b. *R-uhnybèe=nn bùunny nih gw-àa'izy Jwaany **la'anng**.
HAB-know=1P person REL PERF-hit Juan PRON.3S.PROX
'We know the person who Juan hit ' (SLQZ)

Resumptive pronouns occur in SLQZ relative clauses only with oblique (genitive or prepositional object) heads. These relative clauses include the anaphoric clitic *=nìi'* (as in (8)b), as in (15), a relative clause with a genitive head.

(15) R-uhnybèe=nn bùunny -nih gw-àa'izy behts=**nìi'** Jwaany.
HAB-know=1P person REL PERF-hit brother.MS=ANAP Juan
'We know the person whose brother hit Juan' (SLQZ)

Similarly, resumptive pronouns must also be used in MacZ relative clauses with prepositional object or genitive heads, as in (16-17).[5] In (16), the relative clause head is the object of the preposition *lààni* 'with'; in (17), the head is the possessor of *ni'a* 'leg':

(16) Bènnè' nu' bettsa'nàá'=yà' lààni*(=**nà**) naa=nà nu' Tagaayu'.
person REL COMP.get.married=1SG with*(=3A) STAT.be=3N REL Macuil
'The person who I got married to is from Macuiltianguis' (MacZ)

(17) Bee'=yà' belliu bènnè' beyùú' nu' gutittsa=ya' ni'a*(=**nì**)=á.
COMP.give=1SN money person man REL COMP.snap=1SN leg*(=3G)=INV
'I gave money to the man whose leg I broke' (MacZ)

CVZ relative clauses, which use a *ni/nij/ny* relativizer, look more similar to those of MacZ than to those of SLQZ. The CVZ relative clauses in (18-19) use the same locational/existential verb with a prepositional phrase complement; there is no resumptive pronoun in (18), but one occurs in (19). These examples come from the same archival document and presumably reflect a single speaker's usage, suggesting that when ambiguity is not possible, subject resumptive clitic pronouns may well have been optional in CVZ, just as they are in modern MacZ.

[5] Relativization of the object of a preposition does not require a resumptive pronoun in MacZ if the preposition is pied-piped with the relative pronoun.

(18) Alarij xoonoo xaana tobaa ny n-oo laoo layoo
item eight plant maguey REL NEUT-be.located on land
'Item, eight maguey plants that are on the land

late na-chaga Diego de Cordoba lacaa toba rij
where NEUT-border Diego de Cordoba same maguey this
where it borders (on that of) Diego de Cordoba, these same magueys

r-ootete=ya tio xteni=a Juan de la Cruz.
HAB-give=1S uncle of=1S Juan de la Cruz
I give to my uncle Juan de la Cruz' (CVZ; Coyotepec 1721-5, 16-18.)

(19) Anna ti-nij na benij guycha zijcanij, quij-raa looa xteni=ya
now HAB-say PRON.lS person sick thus IRR-all picture of=1S
'Now say I, the sick person, thus, all my pictures

de liensoo nij n-oo=**nij** lanij yocho-lijchi=ya
of linen REL NEUT-be.located=3 in house-house=1S
on linen that are in my house

r-ootete=yaa tio xteni=a Juan de la Cruz.
HAB-give=1S uncle of=1S Juan de la Cruz
I give to my uncle Juan de la Cruz …' (CVZ; Coyotepec 1721-5, 5-7)

Transitive subject relative clauses in CVZ also may have resumptive clitic pronouns, as in the two relative clauses in (20). So far, however, we have found no relative clauses that exhibit serious potential ambiguity and thus might suggest that such resumptive pronouns are required.

(20) … ti-yeliilachi=a Dios xi-bezuana=ya ni be-za=**ni**
HAB-believe=1S God POSS-lord=1S REL PERF-create=3
'… I believe in my Lord God, who created (and)

ni b-eni-chagui=**ni** naa
REL PERF-do-good=3 PRON.1S
who did good for me' (CVZ; San Sebastián Tectipaque 1610-1, 8-9)

Resumptive pronouns do not appear in our data in CVZ object-headed relative clauses, such as that in (21):[6]

(21) … yoo ni be-sa=ya monte (laca re lahui)

[6] We have no data on CVZ relative clauses with oblique or genitive heads.

house REL PERF-build=1S mountain same here middle
'…the house that I built in the mountains (similarly here in the middle)

n-oo lachi-na qui-onna bechi xini=a…
NEUT-be.located in.the-hand IRR-three brother child=1S
is in the hands of the three brothers, my children…' (CVZ; Ocotlán 1686-1,31-2,1)

While we must be cautious in conjecturing on the grammaticality of unattested sentences in CVZ (since we have no speakers to consult about judgments), it is likely that, as in MacZ, resumptive clitic pronouns could appear "optionally" in CVZ subject-headed relative clauses, but were not allowed in object-headed relative clauses. None of the object-headed relative clauses in the data analyzed include resumptive clitic pronouns. Of course we do not know for sure that CVZ did not allow object resumptive clitic pronouns, since we cannot prove such a negative on the basis of a closed corpus. However, if the proportion of subject resumptive clitic pronouns in the corpus were consistent over all relative clauses, we would certainly expect some object resumptive clitic pronouns to occur.

The CVZ relative clause structures, with subject resumptive pronouns allowed and object resumptive pronouns apparently disallowed, are thus more similar to those of modern Sierra Juárez Zapotec (MacZ) than those of modern Valley Zapotec. If CVZ is representative of the ancestor of modern Valley Zapotec, we can conclude that there has been a change in relative constructions over the past 280 years (the last resumptive pronoun use in CVZ is documented for 1721).

The similarity between the CVZ pattern and that of MacZ immediately suggests that this pattern may have reflected the relativization structure of Proto-Zapotec, the ancestor of both these languages. This is not a necessary conclusion, however; each language could have innovated it independently. This might have been likely if the CVZ-MacZ pattern were a common one, but it is not.

4. ZAPOTEC LANGUAGES AND THE TYPOLOGY OF RELATIVE CLAUSES.

The CVZ-MacZ pattern of resumptive pronouns in relative clauses is an unusual typological pattern. It has been observed that resumptive pronouns are not generally found in the subject position of relative clauses, and it has been further claimed that if resumptive subject pronouns are used in relative clauses, resumptive object pronouns should also be used.

In their study of relative clause structures in 26 typologically varied languages, Keenan and Comrie (1977) claim that "pronoun retention" (i.e., occurrence of resumptive clitic pronouns), among other features of relative clauses, follows an Accessibility Hierarchy of grammatical relations, by which subjects rank higher than direct objects, and so on, as detailed below in (22):

(22) *Keenan and Comrie Accessibility Hierarchy* (1977: 66)
Subject > Direct Object > Indirect Object > Oblique > Genitive > Object of Comparison

Keenan and Comrie observe that resumptive pronouns occur more commonly in positions at the bottom of the Accessibility Hierarchy than at the top: thus, for example, even in languages like Arabic, Fijian, and Welsh that allow resumptive pronouns in positions quite high on the Accessibility Hierarchy, subject resumptive pronouns are not allowed (Keenan 1976:32). Of

course, many languages, such as standard English, do not allow resumptive pronouns at all.[7]

Ariel (1999), based on a careful consideration of the occurrence of resumptive pronouns in conversational Hebrew as well as the typological data, proposes a "cognitively-based form-function principle" that "relative clauses where the head is highly accessible when the relativized position is processed take gaps [no resumptive pronouns], whereas relative clauses that maintain a relatively low degree of accessibility of the head when the relativized position is processed take resumptive pronouns" (2). This principle, she argues, predicts the hierarchy observed by Keenan and Comrie: subject heads are highly accessible within the relative clause, so resumptive pronouns tend to occur less often for subject heads than for objects or other positions lower on the hierarchy.

The pattern of resumptive pronouns in SLQZ, then, is quite typical. While resumptive pronouns are not allowed in subject and object positions (14), which are high on the Accessibility Hierarchy, they are allowed in lower positions, such as with genitive heads (15).

In contrast, the distribution of resumptive pronouns in MacZ and CVZ is unusual. Both allow, and MacZ sometimes requires, the use of subject resumptive pronouns in relative clauses, contrary to the expectations of Keenan and Comrie (1977) and Ariel (1999).

In fact, MacZ and CVZ violate a suggested universal. Keenan and Comrie postulate that at whatever point on the Accessibility Hierarchy a language begins to employ resumptive pronouns in relative clauses, it must use them with all lower positions which are relativizable (1977: 92). MacZ and (apparently also) CVZ do not follow this claim. While the highest point on the hierarchy—subject—allows (optional) resumptive pronouns, a lower position—namely, direct object—does not. This position can be relativized but it does not allow resumptive pronouns, as we have shown in (12-13).

In addition, MacZ provides a counterexample to a second universal proposed by Keenan and Comrie, which states that "any R[elative] C[lause]-forming strategy must apply to a continuous segment of the A[ccessibility] H[ierarchy]" (1977: 67). Thus, if a relativization strategy is available at any two points on the hierarchy, then it must also be available to all intermediate positions on the hierarchy.

This does not hold of MacZ, since resumptive pronouns in relative clauses are a strategy available only to a discontinuous segment of the hierarchy in that language. As we saw in (16-17) above, resumptive pronouns not only may appear in subject relative clauses in MacZ, but must be used in relative clauses with prepositional object or genitive heads. As seen in (11) and (13), however, MacZ does not allow resumptive pronouns in object-headed relative clauses. While resumptive pronouns can be used with subject, oblique and genitive relative heads, they cannot be used with objects, although these represent intermediate positions on the Accessibility Hierarchy. Thus, the relativization strategy employed (resumptive pronouns) is used across a discontinuous portion of the Accessibility Hierarchy, violating Keenan and Comrie's proposal.[8]

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[7] However, in conversation, particularly in complex constructions, English speakers often produce resumptive pronouns, as in example (i) from Comrie (1989:140); for some speakers, such constructions seem very natural.

(i) This is the road which I don't know where **it** leads.

We cannot say whether such pronouns ever occur in casual speech in SLQZ, but they are consistently rejected by speakers and have not shown up in our data so far.

[8] Keenan and Comrie (1977:85-6) discuss two languages in their sample, Hausa and Yoruba, which also exhibit resumptive pronouns on a discontinuous portion of the Accessibility Hierarchy. In these languages, resumptive pronouns are required for subjects and obliques, but not for direct objects. Keenan and Comrie suggest that the subject resumptive pronouns, based on their cooccurrence with subjects, should be considered as instances of agreement rather than as resumptive pronouns. Such an explanation will not work for MacZ and CVZ, however. As argued in Foreman (1999, 2006), the subject resumptive pronouns in MacZ are pronouns as evidenced by the fact

(We do not, unfortunately, have data regarding oblique heads of relative clauses in CVZ.)

To summarize, MacZ and CVZ resumptive pronoun usage is of typological interest in at least three ways:

> • First, subject resumptive pronouns are, in and of themselves, rare, even in languages that use resumptive pronouns.
> …But subject resumptive pronouns are not at all uncommon in MacZ and CVZ.
> • Next, if resumptive pronouns are possible with a subject they should be possible with all grammatical positions lower on the Accessibility Hierarchy.
> …Yet MacZ and CVZ allow subject resumptive pronouns but (certainly for MacZ and apparently for CVZ) not object ones.
> • Finally, resumptive pronouns occur in MacZ with a discontinuous portion of the hierarchy: with subjects, objects of prepositions, and genitives, but not with objects. This violates the assumptions of the Accessibility Hierarchy (and other such proposed linguistic hierarchies), which suggests that if resumptive pronouns occur at any two positions on the hierarchy, they will occur in all intermediate positions.

Therefore, the MacZ–CVZ pattern is sufficiently uncommon cross-linguistically that it is far less likely to have been innovated independently in two separate branches of the family than to reflect common inheritance. It thus follows that Proto-Zapotec probably had a system much like that of CVZ or modern MacZ. It is then SLQZ that has innovated as it developed from some language like CVZ to one with a system that is much more common cross-linguistically, without resumptive pronouns. But why, we may ask, should such a typologically – and cognitively – unexpected pattern occur in these languages?

5. A PARSING CONSTRAINT IN MACZ AND CVZ RELATIVE CLAUSES.

We argue that the MacZ-CVZ pattern reflects a parsing constraint in these languages, as outlined in (23):

(23) *Subject Parsing Constraint (SPC)*
If an overt NP immediately follows the verb and satisfies the verb's selectional restrictions for subject, parse it as the grammatical subject.

In neutral word order, the grammatical subject in these languages immediately follows the verb. Even if movement of an argument has occurred, listeners still look to this position for the subject. Only if there is no NP immediately following the verb that satisfies the verb's selectional restrictions do they interpret a dislocated NP as the subject.

Thus in a MacZ string like the relative clause in (24), *Felipeá* satisfies the SPC in (23) and therefore is parsed as the grammatical subject. The head noun by default must represent the object.

(24) bènnè' nu' begwiia' Felipe=á

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that they alternate with full postverbal NPs. Furthermore, although resumptive subject pronouns cooccur with topicalized subject NPs, resumptive object pronouns cooccur with topicalized objects in a completely parallel fashion. These object pronouns follow the subject—full or pronominal—and do not obligatorily form a contiguous string with the verb. They therefore cannot be analyzed as instances of agreement. The facts in CVZ seem similar.

person REL COMP.see Felipe=INV
'the person who Felipe saw' (MacZ)

Because of the SPC, the string in (24) can never be interpreted as 'the person who saw Felipe'. To get this interpretation, a resumptive pronoun is required, as in (25), where the resumptive pronoun following the verb satisfies the SPC. Since the head noun is coindexed with the resumptive pronoun, it is then interpreted as the subject:

(25) bènnè' nu' begwiia'=**nà** Felipe=á
person REL COMP.see=3N Felipe=INV
'the person who saw Felipe' (MacZ)

The SPC (23) thus overrides the universal tendency to avoid resumptive pronouns in relativized positions high on the Accessibility Hierarchy. This tendency reasserts itself, however, with objects. There is no parsing constraint on objects to override this general avoidance of resumptive pronouns, and object resumptive pronouns are ungrammatical (in MacZ) and missing (in CVZ).

When only the head NP can satisfy the subject selectional restrictions of a transitive verb in a relative clause, the subject resumptive pronoun is optional, as seen in (26). The full NP following the verb, *carruá* 'car', does not satisfy all of the conditions of the SPC and is not parsed as the subject. As a result, a resumptive subject pronoun may be used, but is not required.

(26) bènnè' nu' guyo'o(=**nà**) carru=á
person REL COMP.buy(=3N) car=INV
'the person who bought the car' (MacZ)

That a subject resumptive pronoun is possible at all in (26) is perhaps surprising, but could be due to a couple of different factors. Possibly the resumptive pronoun is used simply because there is a noun following the verb of the relative clause in (26), in effect satisfying the first part of the SPC. In fact, when neither condition of the SPC is met, as with intransitive verbs, MacZ generally blocks subject resumptive pronouns, as in (27):

(27) Beyùú' nu' ruyhiisi'(*=**nà**)=ni naa=nà béttsi'=nì.
man REL HAB.laugh(*=3N)=PROX STAT.be=3N brother.MS=1SG
'This man who is laughing is his brother' (MacZ)

Alternatively, perhaps the process that inserts subject resumptive pronouns can be active even in cases where it is not needed to satisfy the SPC. This would explain the appearance of subject resumptive pronouns in intransitive clauses in CVZ, as in (19).

6. ADDITIONAL EVIDENCE FOR THE SPC.

The SPC also offers an effective way to account for the occurrence of subject resumptive pronouns elsewhere in MacZ, such as with *wh*-movement and quantifier fronting constructions.

Similarly, the SPC apparently blocks an unusual backward binding construction found in MacZ, CVZ, and many other Zapotec languages.

Thus in (28), *wh*-movement of a subject does not force the occurrence of a subject resumptive pronoun, since the object cannot satisfy the SPC, just as relativization of a subject in (26) did not require a resumptive pronoun. In (29)a, however, the resumptive pronoun is required to avoid having the object *Felipeá* interpreted as the subject, which is what the SPC would require if the resumptive pronoun were not present. As in relative clauses, object resumptive pronouns are ungrammatical in *wh* questions, as seen in (29)b.

(28) Núú=ní rquiina'ni(=**nà**) ttu libru?
who=CMPL HAB.need(=3D) a book
'Who needs a book?' (MacZ)

(29) a. Núú=ní rquiina'ni*(=**nà**) Felipe=á?
who=CMPL HAB.need*(=3D) Felipe=INV
'Who needs Felipe?' (MacZ)

b. Núú=ní rquiina'ni Felipe=á(*=nà)
who=CMPL HAB.need Felipe=INV(*=3A)
'Who does Felipe need?' (MacZ)

Similar facts obtain with quantifier fronting, as in (30-31). When the object cannot be interpreted as a subject, as in (30), the subject resumptive pronoun is optional (the verb *rulaasi'* takes a genitive subject). When the object could be a possible subject, as in (31)a, the subject resumptive pronoun is required; if it were not present, the SPC would require *uncwitti'nà'* 'that guy' to be interpreted as the subject, yielding the meaning 'That guy doesn't like anybody.' Again, an object resumptive pronoun is ungrammatical, as shown in (31)b.

(30) Ànúúdi rulaasi'(=**nì**) indiayi'=nà'
nobody HAB.like(=3G) atole=DIST
'Nobody likes that atole' (MacZ)

(31) a. Ànúúdi rulaasi'*(=**nì**) uncwitti'=nà'.
nobody HAB.like*(=3G) guy=DIST
'Nobody likes that guy' (MacZ)

b. Ànúúdi rulaasi' uncwitti'=nà'(*=nà).
nobody HAB.like guy=DIST(*=3A)
'That guy doesn't like anybody' (MacZ)

The SPC also accounts for the distribution of "covert subjects" in an unusual backward binding construction found in a number of Zapotec languages, including CVZ and MacZ (Butler 1976, Black 2000, Avelino et al. 2004, Avelino 2004, Foreman 2004, Sonnenschein 2004, Foreman 2006). In this Covert Subject construction, a syntactic subject may be null when it is coreferential with the possessor of a following object. For example, in the MacZ sentence (32), there is no overt subject (as indicated by ∅); rather, the syntactic possessor of the object *carru* 'car' is interpreted as the semantic subject:

(32) Reyuuni ∅$_i$ carru què'=nì$_i$=à'.
HAB.fix car of=3G=DIST
'He$_i$ is repairing his$_i$ car' (MacZ)

In MacZ, this construction is only possible if the possessed object cannot satisfy subject selectional restrictions: thus, in (32), *carru* 'car' is not an agent capable of having repairs performed. Similarly in (33) below, *ttsi'iya'* 'my voice' cannot be the experiencer subject of *binna* 'heard', and therefore cannot be parsed as the subject, so the syntactic subject 'I' may be covert.

(33) Binna ∅$_i$ ttsi'i=ya'$_i$ llè'è radiu.
COMP.hear voice=1SG in radio
'I heard my voice on the radio' (MacZ)

In (34), however, a covert subject is not possible. *Niula chá'á* 'my wife' satisfies the experiencer selectional restrictions of the verb, so by the SPC it would have to be parsed as the subject if it were the first overt NP following the verb. Therefore, the covert subject construction cannot be used; the (boldfaced) subject *=ya'* 'I' must be overt to satisfy the SPC, leaving *niula chà'á* to be interpreted as the object.

(34) Binna*(=**ya'**) niula chá'=á llè'è radiu.
COMP.hear*(=1SN) woman of.1SG=INV in radio
'I heard my wife on the radio'

7. CONCLUSION.

We have shown in this paper that Macuiltianguis Zapotec (MacZ) and Colonial Valley Zapotec (CVZ) have typologically unusual relative clauses. Their use of resumptive pronouns across discontinuous sections of Keenan and Comrie's Accessibility Hierarchy (1977) violates several proposed universals, in contrast with more typologically regular languages like San Lucas Quiaviní Zapotec (SLQZ), a descendant of CVZ or some closely related language. Because this unusual relativization pattern occurs in separate branches of the family, it may be reconstructed for the ancestor of these languages, Proto-Zapotec.

The Subject Parsing Constraint (SPC) in (23) allows resolution of ambiguity in relative clauses and other cases of movement in MacZ and presumably also in CVZ, explaining why subject but not object resumptive pronouns appear in these languages. (Further investigation of other VSO languages may show whether this constraint occurs elsewhere.) In SLQZ, however, this constraint is not operative; avoiding resumptive pronouns is not conditioned by the SPC in SLQZ, which has reverted to the more common cross-linguistic pattern with resumptive pronouns used only for relative clause heads at the bottom of the Accessibility Hierarchy. MacZ, CVZ, and by extension Proto-Zapotec apparently share the SPC parsing constraint that through its interaction with more universal constraints against resumptive pronouns produces the typologically unusual distribution of resumptive pronouns we have described here.

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SO, DO YOU THINK METAPHORIC GESTURES ARE LIKE LINGUISTIC ELEMENTS?

MIKA ISHINO[*]
University of Chicago

In recent decades, metaphors have been seen as the primary basis of abstract thinking. It is widely known that not only language but also gestures reflect metaphoric thinking (e.g., Calbris 1990, Kendon 1993, McNeill 1992, Webb 1996). Some researchers claim that metaphoric gestures, similar to linguistic elements, have loose form-meaning relationships, sub-components, and standards of form. Focusing on gestural metaphors of anger among native Japanese speakers, this paper argues against this view. The present paper argues that metaphoric gestures are manifestations of underlying thinking (i.e., conceptual metaphor) which are grounded in our daily experiences, shared amongst the members of the same culture and/or society (cf. Lakoff and Johnson 1980). The results show that gestural and verbal metaphors share conceptual metaphors and metonymies which correspond to physiological effects of anger. Furthermore, the results suggest that especially for the Japanese culture, body parts play a major role in conceptualizing anger.

1. INTRODUCTION.

Since Lakoff and Johnson (1980), metaphors have been seen as the primary basis of abstract thinking for human beings. While in classic theory metaphors are regarded as just a matter of language, in contemporary theory they are thought of as a matter of cognition. It is now widely known that gestures also manifest metaphors (Calbris 1990, Cienki 1998, Ishino 2001, Kendon 1993, McNeill 1992, Webb 1996). These gestures are similar to ICONIC gestures which have close relationships to the semantic contents of concurrent speech in form but their semantic contents present abstract ideas and are called METAPHORIC gestures (or METAPHORICS) (McNeill 1992). For example, in (1), in retelling the cartoon he has just seen, a speaker moves up his both hands and offers a listener an "object."

(1) it [**was a Sylves**]ter and Tweety cartoon[1]

This gesture is a manifestation of CONDUIT METAPHOR (Reddy 1979). As observed from the speech, with this gesture, the speaker presents the idea of the cartoon and the speaker presents the concept as an entity in a bounded container. The concept is abstract, but the speaker makes it concrete by offering it via the gesture. In that sense, this gesture is metaphoric.

There are two contradicting views on the nature of metaphoric gestures (see details in section 2). The present study focuses on gestural metaphors indicating anger made by native Japanese speakers. Taking McNeill's GROWTH POINT THEORY perspective, I will argue that metaphoric gestures are manifestations of underlying thinking (i.e., conceptual metaphor and metonymy) which is grounded in our cultural or physiological experiences. Such experiences occur repeatedly in our everyday life and are shared among the members of the same culture and/or society.

[*] I would like to thank Sue Duncan for her insightful comments.

[1] Abbreviations: **bold**: gesture stroke, []: the onset and the end of gestural motions

2. BACKGROUND.

2.1 THE FIRST VIEW.

2.1.1 GROWTH POINT THEORY.

McNeill defines the GROWTH POINT (henceforth, GP) as the smallest psychological unit which combines imagery and linguistic categorical content (McNeill and Duncan 2000). It is inferred from the speech-gesture synchrony. For example, in Example (2) (McNeill and Duncan 2000: 144), the speaker moves both of her hands downward. The gesture stroke coincides with "it" and "do(wn)."

(2) and Tweety Bird runs and gets a bowling b[all and Ø drops **it do**wn the drainpipe][2]

The GP here is embodied in both the image of a cartoon character dropping a bowling ball and the categorical content of the linguistic segments (i.e., "it down"). According to McNeill and Duncan (2000: 144), the GP in (2) marks a significant departure in the immediate context in that "the gesture suggests visuo-spatial/actional thinking in which the downward movement of the ball due to the action of an agent was central." In the utterance in (2), the speaker distinguishes the GP as a psychological predicate from the context. In other words, the GP is manifested in speech and gesture as the significant meaningful element at the moment of speaking. Furthermore, McNeill and Duncan (2000) also note that the GP provides a way to infer the context as a background at the moment of speaking.

2.1.2 GESTURES AND DISCOURSE.

In the GP theory, gestures are assumed to be products of discourse, emerging dynamically at the moment of speaking. Furthermore, gestures, largely unbound by any code, freely reflect discourse functions. Therefore, gestures show the influence of various aspects of discourse. For example, discourse topics and cohesion generate repetition of gestures. Such gestures are first noted by Kendon (1972) and termed CATCHMENTS by McNeill (2000, in press). Catchments can be inferred from recurring features such as motion, space, orientation, and handshape. They do not necessarily occur consecutively. Each gesture in a catchment is shaped by its signified content and its relationship to the catchment and discourse context (McNeill 2000).

2.1.3 METAPHORIC GGESTURES IN THE GP THEORY.

In GP theory, spontaneous gestures as products of discourse incorporate the speaker's mental construction at the moment of speaking. As a consequence, in GP theory, they are distinct from emblems (i.e., gestures codified in a given community) in three ways. First, gestures including metaphorics are idiosyncratic (i.e., "no standards of good form").[3] Second, they are global in the

[2] Abbreviations: **bold**: gesture stroke, Underline: pre- and post-stroke holds, [ ]: the onset and the end of motion, Ø: zero anaphor

[3] Typology of gestures established in McNeill (1992) was replaced by dimensions later (McNeill 2000) since one gesture may display multi-dimensions. However, for the sake of convenience, in this paper I will refer to it as a

sense that "the meanings of the 'parts' are determined by the meaning of the whole" (McNeill 2000: 5). As seen in Example (2), we construe from the gesture as a whole that the hands of the speaker represent those of the cartoon character. The movement is the character's motion and these are not independent segments (or morpheme-like elements). Third, they are synthetic in the sense that one gesture can integrate multiple meanings. Therefore, gestures are different from linguistic morphemes.

2.2 THE SECOND VIEW.

2.2.1 METAPHORICS-AS-"MORPHEME" VIEW.

Some researchers characterize metaphoric gestures as having properties like linguistic elements. First, Webb (1996) argues that metaphoric gestures with more or less fixed form-meaning relationships are stored in memory. The evidence is that the same gestures with relatively stable meanings are used repeatedly by the same speaker. Webb (1996) gives conduit metaphoric gestures as an example, noting that these occur with high frequency in the discourse context she studied. Another example Webb (1996) provides is a PRECISION GRIP gesture (Also see Kendon 2004).[4] Based upon the fact that these metaphorics are produced repeatedly by a speaker, Webb (1996) argues that metaphoric gestures are not idiosyncratic and that they are stored in a lexicon of metaphoric gestures.[5] Müller (2004) also argues that conduit metaphoric gestures (PALM UP OPEN HAND gestures in her term), associated with the semantic features of giving and receiving objects, form gestural morpheme.

Second, Webb (1996) argues that metaphoric gestures have a shared lexicon in a given community in that different speakers make gestures with somewhat stable form-meaning pairings. Kendon (2004) mentions that Neapolitans' conduit metaphoric gestures have pragmatic functions of offering or presenting and provides general meanings associated with Neapolitan and English gestures. However, he notes that they have been conventionalized to some considerable degree in those cultures.

Third, Webb (1996) investigated whether metaphoric gestures contain sub-components with fixed form-meaning pairings. She contrasted gestures that share similar elements of form-meaning couplings but have some small formational differences. Her criteria for metaphoric gestures to have sub-components with form-meaning relationships is that if elements of form can be shown to have a meaning independent of the whole, and if they cannot be further analyzed into meaningful sub-components, then they are considered to have sub-components which have fixed form-meaning relationships. The other criterion is that they should occur at least twice in the corpus with the same meaning-form relationship. For example, Webb (1996) says that gestures occurring at the forehead irrespective of other components have a meaning related to 'mental.' Therefore, she analyzes the location (i.e., the head) of metaphoric gestures as one component which bears the meaning related to 'mental.' In this way, Webb (1996) concludes that metaphoric gestures are componential. Furthermore, Webb (1996) argues that these

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classified category (e.g., metaphorics, iconics, deixis, and beat).

[4] Precision grip gestures usually add speakers' attitude toward the speech (i.e., the speech content is being made precise). Precision gestures are made either with all the fingertips being brought together or with only the tips of the thumb and the forefinger being contacted.

[5] Webb (1996) defines a lexicon of metaphorics as a repository of their form-meaning pairings used repeatedly.

components may consist of a single feature such as handshape, location, orientation, or movement. Examining French gestures, Calbris (1990) associates features of gestures (e.g., motions, palm orientation) with fixed meanings. Hence, Calbris（1990）takes the similar assumption with Webb (1996), Müller (2004), and Kendon (2004) that metaphoric gestures bear somewhat loose form-meaning relationships. It is important to note that the metaphorics these researchers primarily focus on are gestures which have undergone some degree of conventionalization in a given culture.

2.3 CONCEPTUAL METAPHOR THEORY.

In Lakoff and Johnson's (1980, 1999) view, metaphors are means of understanding one thing in terms of another conceptual domain. They argue that metaphoric linguistic expressions are manifestations of underlying cognitive mechanisms and call them CONCEPTUAL METAPHORS. The conceptual domain which is used to understand another conceptual domain is termed the SOURCE DOMAIN. The conceptual domain that is understood via source domain is termed the TARGET DOMAIN. Conceptual metaphors are expressed as TARGET DOMAIN IS SOURCE DOMAIN. Cognitive linguists argue that metaphors are motivated by conceptual metaphors grounded in our experiences. Grady (1997) has further elaborated the notion of conceptual metaphors and terms conceptual metaphors which are directly motivated by universal basic human experiences PRIMARY METAPHORS. It is not surprising that linguistic metaphorical expressions which are manifestations of primary metaphors occur cross-linguistically.

2.4 LINGUISTIC EXPRESSIONS OF ANGER CROSS-LINGUISTICALLY.

The focus of this paper is on how anger is expressed gesturally in Japanese native speakers' discourse. Thus, in this section, I will give a brief overview of studies which examine linguistic expressions of anger in various languages. The study of Lakoff and Kövecses (1987) show that in American English, linguistic expressions indicating anger correlate with physiological effects of anger such as increase of body temperature, pressure, and redness in face and neck areas. In Japanese, verbal expressions of anger also correspond to these physiological effects of anger. However, Matsuki (1995) and Ishino (1998) show that in Japanese, specific body parts such as the belly, the chest, and the head serve as containers of anger in a very systematic way in that when anger is low-level, it resides in the lower part of the body (e.g., *hara* 'belly/stomach'). As anger intensifies, however, it rises to higher parts of the body (e.g., *atama* 'head').

2.5 *HARA* IN JAPANESE CULTURE AND LANGUAGE.

It is important to examine the status of *hara* 'the belly/stomach' in Japanese culture. In Japanese, conventionalized idioms containing *hara* are pervasive. For example, we Japanese make up our minds by deciding *hara* (as in *hara-o kimeru* 'to decide (a) belly'). We call a generous person *hutopparana hito* 'fat-bellied person'. In the past, Japanese warriors (i.e., *samurai)* used to cut their bellies to die in dignity (as in *hara-o kiru* 'cut (the) belly') and at present it metaphorically means taking responsibility. In Japanese, *hara-ga suku* '(the) belly get(s) empty' equals to 'be hungry' in meaning. *Hara-ga tatu* '(the) belly reise(s) up' equals to 'get angry' in meaning. As reflected in these linguistic expressions, *hara* plays a key role in the Japanese culture. It is viewed as a container of foods, a life, decisions, generosity, anger, responsibility, and so on in

the Japanese community.

3. METHOD.

Participants who know each other were asked to converse casually to one another in pairs for about 15 to 20 minutes. Participants were all native speakers of Japanese. In one setting, they were asked to talk about something that had made them angry recently, using concrete examples. In the other setting, subjects were asked to discuss the differences between two idioms indicating anger in Japanese, namely, *hara-ga tatu* 'the belly rises up with anger (i.e., 'to get angry')' and *atama-ni kuru* '(anger) come(s) to the head (i.e., 'to get angry')'. The conversations were videotaped with their permission. All 22 participants signed consent forms. The participants were told that they were participating in linguistic research. No mention of gesture was made until the recording was done. Speech and gestures were transcribed and analyzed from duplicated videos. Relevant gestures were coded by the procedures described in McNeill (1992). Then, applying Lakoff and Johnson's conceptual metaphor theory, conceptual metaphors and metonymies were inferred from the synchronization of speech and gestures.[6]

4. DATA ANALYSIS.

Often metaphoric gestures reflect the same conceptual metaphors or metonymies which are manifested in speech (Cienki 1998, Ishino 2001, McNeill 2005). However, in some cases, speech and gestures complement one another to co-express one idea unit (McNeill and Duncan 2000). In the sections to follow, I will show how metaphoric gestures which have not been conventionalized manifest conceptual metaphors and metonymies.

4.1 METAPHORICS REPEATED BY A SPEAKER.

This section will give examples in which metaphoric gestures are repeated by a speaker.

4.1.1 THE BELLY IS A CONTAINER FOR ANGER.

As mentioned earlier, the belly as a container for anger is manifested linguistically in Japanese. As a consequence, Japanese speakers make metaphoric gestures of anger at the belly area as in the following examples in (3) to (4). Just before the utterance in (3), A is talking about the differences between the two idioms (i.e., *hara-ga tatu* and *atama-ni kuru*) and what made her angry recently. She says she was mad at her student at a private school because he not only did poorly in the English vocabulary exam she gave him but he was yawning while she was scolding him. She says that that experience made her belly boil up rather than making her anger come to the head (i.e., *atama-ni kuru* 'to get angry').

[6] Due to space limitations, only fragments of the data will be provided in this paper.

(3) *toyuu[yori* ***hara nie* niekurikae n nen / a]re***[7]
rather belly boi* boil.up PRES EVD that
'Rather, the fact is that (my) belly boils up (with anger) with that.'

metaphoric <the movement of the boiling fluid as anger>& catchment 1: Slightly cupped RH whose palm facing the body makes a circular motion away from body four and a half times while RH rises from the belly to the chest.

As seen in (3), speaker A rotates her right hand slightly cupped at the belly and chest area and the gesture stroke coincides with linguistic metaphor of anger expressing her belly boiling up (i.e., *hara-(ga) niekurikae n nen are*). Hence, from the speech-gesture synchrony, the conceptual metaphors ANGER IS A HOT FLUID (BOILING UP) IN A CONTAINER and THE BELLY IS A CONTAINER FOR ANGER are inferred. Though the speech does not include the chest, the speaker's gestural motion is so large that it is done over a large area including the chest. It is natural in that when some fluid is boiling up, it vigorously moves around in the container and it rises up to the higher part of the container (in this example, the chest).

Continuing to talk about what it is like for the head to explode with anger as opposed to anger in the belly, the same speaker, A, 35 seconds later, in example (4), makes a metaphoric gesture which is similar to Example 3—this time with the left hand. In example (4), A says, 'but limited to when I get angry, anger gets welled up inside of the belly, you know' and she makes a gesture with the left hand which is slightly cupped and the hand rotates 5 and a half times in front of her belly facing her body while moving upward a little as it wells up to the level of the chest. She continues to say that anger itself does not well up in the head but she notices that instead blood wells up in the head when anger comes to the head. As shown, conceptual metaphors THE BELLY AND THE CHEST ARE CONTAINERS FOR ANGER, and ANGER IS A HOT FLUID IN A CONTAINER are inferred from example (3). Her utterance in (3) implies that when fluid is heated, it expands and so the level of it goes up in the container.

(4) *demo nanka* $Ø_{I}$ *okoru tokini kagitte wa: /*
but well get.angry when limited.to TOP
'But, well, limited to when (I) get angry,

$Ø_{anger}$ *[hara n* ***naka e tama* tamatte-iku n ya n ka: /*** *⁄….]*
belly GEN inside to well* welling.up-go NL COP NL FP[8]
(anger) gets welled up inside of the belly, you know.'

metaphoric <anger as a fluid in a container, the belly as a container for anger, the manner of anger accumulating>& Catchment 1: slightly cupped LH quickly rotates 5 and 1/2 times at the belly and the chest area while moving gradually to the higher level

[7] Abbreviations: **bold**: gesture stroke, Underline: pre- and post-stroke holds, [ ]: the onset and the end of motions, LH: left hand, RH: right hand, 2SH:2 similar hands, 2DH: 2 different hands, ^: beats superimposed on the gesture, *: self-interruption, @: the location of gesture, /: unfilled pauses, {$_{n}$ *speech*}: overlapped speech, %laughter: laughter, EVD: evidential marker, PRES: present tense

[8] $Ø_{anaphor}$: zero anaphor, COP: copula, FP: sentence final particle, GEN: genitive, NL: nominalizer TOP: topic

Gestures in (3) and (4) share meaning, movement, handshape, and location in common. Above all, their signified contents are anger in the belly. Hence, these two gestures form a catchment (henceforth, Catchment 1). Catchment 1 is generated by the discourse topic at the moment of speaking (i.e., anger in the belly) since the participants are discussing differences between the two contrastive idioms of anger including the two body parts. The GP in examples in (3) and (4) marks significant elements at the moment of speaking, that is, what anger in the belly is like as opposed to anger in the head. About 10 seconds later, Catchment 1 manifests for a third time in speaker A's gesture and speech though it is not shown in this paper.

4.2 METAPHORICS MADE BY MULTIPLE SPEAKERS.

This section will give metaphoric gestures made by more than one speaker.

4.2.1 THE BELLY IS A CONTAINER FOR ANGER.

Additional examples in which the belly is viewed as a container for anger are provided. In example (5), in a fragment of discourse, two female speakers who are close friends in their twenties are talking about the differences between the two idioms. They say that the difference is in the duration of anger coming into existence and staying in the body. They say that while the idiom, *atama-ni kuru* expresses the anger instantly coming to the head, anger in the belly stays there for some time. In (5)a-c, C makes two-handed gestures and the palms facing the belly move upward from the belly area. In (5)a-c, speech and gesture co-express how anger in the belly rises up in a *ZIWAA* manner (i.e., slowly but surely) from the belly. Then, in (5)d, D also makes a similar two-handed gesture[9]. These gestures in (5)a-d form a catchment (Catchment 2) since they share semantic content (i.e., anger in the belly), motion, and handedness. From Catchment 2, the conceptual metaphors THE BELLY IS A CONTAINER FOR ANGER and ANGER IS A HOT FLUID IN A CONTAINER are inferred. Then, in (5)e, while noting that anger stays in the belly for some time, D also makes a gesture that is similar to her own gesture in (5)d, but the motion is different. The gesture in (e) does not move upward. Rather, it points to the belly as a container for anger. This gesture displays two dimensions (i.e., metaphoricity and pointing). Significantly, on one hand, this deictic gesture indexes the referent physically there. On the other hand, it metaphorically points to the belly as a container for anger. The speech-gesture synchrony in (5)e shares the conceptual metaphor THE BELLY IS A CONTAINER FOR ANGER with Catchment 2. Soon after the example in (5)e and f, C points at the her belly area twice while saying that anger is deep in the belly with her right hand. Gestures in (5)e and f form a catchment in that they both point to the belly as a container for anger. This catchment of examples in (e) and (f) is also a part of Catchment 2 in that all of gestures in (5) are associated with the same location (i.e., the belly). However, the gestures in (e-f) (Catchment 2b) are slightly different in that they emphasize the body part as a container for anger and the gestures in (a-d) (Catchment 2a) emphasize the aspect of anger moving upward from the belly.

[9] D's gesture is also a motor mimicry. MIMICRY gestures are often generated to show the empathy and the closeness toward interlocutors (Hess, Philippot, and Blairy 1999).

(5) a. C: *hara {*$_1$*tatu tte [[nanka moo}* ***ZIWA{***$_2$ ***A:}/]***
belly rise.up QT well already ONOM[10]
'The idiom of anger rising up in the belly is, well, slowly but surely,'
ZIWAA = the manner of things advancing slowly but surely

metaphoric <the belly as a container for anger, anger as fluid> and catchment 2a:2SH Slightly cupped open hands whose palms facing the body move back and forth a bit while moving upward a little @ belly level

D: {$_1$*atama-ni kuru} / {*$_2$*un}*
head-to come yeah
'*Atama-ni kuru* (the idiom). Yeah.'

b. C: ***[WAA-****tte koo]*
ONOM-AD like.this
'(slowly but surely), like this'
WAA = a reduplicated part of *ZIWAA*

metaphoric and catchment 2a:2SH Slightly cupped open hands whose palms facing the body move away from the center @belly level and then move up to the shoulder level

c. ***[naka ka****ra /]]*
inside from
'From the inside.'

metaphoric and catchment 2a: 2SH Slightly cupped open hands whose palms facing the body move upward from the belly level to the chest level

d. D: *dai[[:bu* ***koo //]***
long.time like.this
'Like this, for a long time,'

metaphoric, and catchment 2a:2SH Slightly cupped open hands whose palms facing the body and finger tip toward the center of the body move away from the center while moving upward from the belly to the chest level

e. *[yappari* ***onaka ni /]***
as.I.thought belly in
'as I thought, in (the) belly,'

deictic <the belly>, metaphoric <the belly as a container for anger, anger as substance>, Catchment 2:2SH Slightly cupped open hands whose palms facing the body move away from the center @belly. (N.B.: The fingertips are obliquely down.)

[10] AD: ADVERBIAL MARKER, ONOM: ONOMATOPOEIA, QT: QUOTATION MARKER

C: *un*
yeah
'Yeah.'

D: *Ø*$_{anger}$ *aru tte{*$_3$ *yuuka}*
exist QT like
'Like, (anger) stays,'

f. C: *{*$_3$*un} [na^**ka no** ^**ho**oni a{*$_4$*ru] tte}/*
yeah inside GEN toward exist QT
'Yeah. (I feel) that (it) stays deep inside.'

deictic <the belly>, metaphoric <the belly as a container for anger, anger as substance>, Catchment 2b:RH Cupped hand whose palm facing the body points at the belly twice.

D: *{*$_4$*un}<n> / kan{*$_5$*zi-ga suru}*
yeah feeling-NOM do[11]
'Yeah, I feel so.'

C: {$_5$ *sonna kanzi}* *kamo naa*
that feeling might IP[12]
'It might be so.'

To recap, in this fragment of discourse, speakers talk specifically about anger in the belly. It is observed in the repetition of gestures whose gestural features are associated with the belly. The discourse topic (i.e., anger in the belly) has generated Catchment 2. The metaphoric gestures are also grounded in cultural experiences in Japanese culture in which the belly is conceived as a container for anger. Catchment 2a is based upon our daily experiences in that anger as a fluid rises up in a container when it is heated. Additionally, the speaker A's Catchment 1 is based upon the cultural and bodily experience. Given these data, some might conclude that in the Japanese culture, gestures made at the belly area have a sub-component whose meaning is associated with emotion in general, and anger specifically. However, as shown, gestures display dynamically what it is like for anger to rise up or boil up in the belly in that the image of anger in the belly as opposed to the one in the head generates gestures in the belly area. Thus, it is not correct to divide a gesture into sub-components. As shown, metaphoric gestures indicating anger in the belly in Japanese discourse emphasize what the speakers think significant at the moment of speaking (i.e., the image of anger coming from the belly, moving around in the belly, and moving upward). As shown, the repeated features display significant elements and cohesive ties at the moment of speaking in discourse.

[11] NOM: nominative case
[12] IP: interactional particle

4.2.2 THE HEAD IS A CONTAINER FOR ANGER.

As in English metaphorical expression of anger, (i.e., 'to blow one's top') Japanese has a conventional metaphor of anger including the head (*atama-ni kuru* 'anger comes to the head'). Thus, when asked to talk about what made them angry, many subjects make gestures at the head. In the example in (6), S talks about her having been angry at a middle-aged man who stalked her in a grocery store. While she was waiting in a line at the cashier, he was standing just behind her and untied the strings of the halter she was wearing twice. Then, she talks about her having succeeded in grasping his hand at the moment of his third attempt of untying them. Then, he gave her an unreasonable excuse and so she got angrier with him. While describing how she gets angrier, she uses the onomatopoetic *KATIN-to*. The onomatopoetic (or mimetic word) *KATIN-to,* whose figurative meaning is 'to be offended,' is accompanied by the stroke of gesture. In example (6), the speaker moves her right hand with an extended index finger slightly forward very quickly right next to the right side of her face. For an object to make a noise like *KATIN-to*, it should be a hard object because this onomatopoetic word is also used to denote the sound of a hard object hitting a hard object. Therefore, the conceptual metaphor, ANGER IS A PHYSICAL ENTITY, or A HARD OBJECT, is inferred from the linguistic expression. Furthermore, the location of the gesture (i.e., at the face) also indicates that the conceptual metaphor HEAD IS A CONTAINER FOR ANGER is reflected in gesture in (6).

(6) *[kotti- wa* ***KA****TI:N-to ki-te]*
this-TOP ONOM-AD come-and
'As for me, I am offended and'

KATIN-to kuru = the sound of a hard object hitting a hard object once strongly, the manner of being offended

metaphoric <anger as hard object in a container, the head as a container>: RH with an extended index finger at the right side of the face moves slightly away from the body quickly.

In example (7), a gesture that is similar to those in example (6) is made by a different speaker. They are similar in that these gestures are made using one hand with an extended index finger at the head level. Before uttering example (7), T talks about a person she saw at a telephone company and the person became impatient while he was kept waiting for a long time to pay his bill. In example (7), T describes the state of this impatient person being angry. The right hand with an extended forefinger rotates once right next to the right ear and the gestural stroke co-occurs with the onomatopoetic *BUTI-tto,* which denotes the sound/manner of the angry person's blood vessel being snapped off. The sharp rotating movement represents circulation of the blood being snapped off, and the place of the gesture (i.e., at the head) indicates that it is taking place in the head. That is, the angry person is metaphorically having a stroke. Thus, the conceptual metonymy INTERNAL PRESSURE STANDS FOR ANGER and the conceptual metaphor HEAD IS A CONTAINER FOR ANGER is inferred.

(7) *[tte moo* ***BUTI-tto*** *kirete-ru* *hito- ga* *i]-te*
QT already ONOM-AD snapped.off-PRES person-NOM exist-and
'There is a person whose (blood vessel) has been already snapped off (with anger) and'

BUTI-tto kireru= the manner or the sound of angry person's blood vessel being snapped off

metaphoric <internal pressure/stroke for anger, the head as a container>:RH with an extended forefinger rotates once right next to the right ear

As shown, gestures in (6) and (7) are very similar to one another in handshape and location. However, as observed from the speech, their signified contents are subtly different. Gestures spontaneously co-occurring with speech cannot be understood without speech. Even if gestures are similar to one another in form, they do not always mean the same thing. Examples (6) and (7) are good examples of that. More examples reflecting the conceptual metaphor, HEAD IS A CONTAINER FOR ANGER, are observed in the Japanese data examined for this study.

In summary, like the belly, the head is also viewed as a container for anger by Japanese speakers and this is reflected in both speech and gestures. The metaphors correspond to physiological responses of anger (Lakoff and Kövecses 1987). When one gets angry, the body temperature, blood pressure, and pulse increase. As a result, anger viewed as substance in a bodily container increases in volume and moves upward and comes to the top of the body. As seen in (6) and (7), the metaphoric gestures made at the head with an extended index finger are repeated across speakers. The relationship between the form of this metaphoric gesture and its meaning is not arbitrary. They are manifestations of underlying conceptual mechanisms based upon our bodily experiences of anger that occur repeatedly in our life (i.e., primary metaphor). As shown, the gestures in (6) and (7) dynamically express the pressurized blood vessel being snapped off, the head is a container for anger, or anger as a hard object hitting the head. Therefore, again, the gestural location at the head should not be analyzed as a gestural morpheme associated with anger. Rather, it should be considered to be motivated by the primary metaphor, HEAD IS A CONTAINER FOR ANGER.

4.2.3 INTERNAL PRESSURE FOR ANGER.

Finally, examples are provided in which the conceptual metonymy, INTERNAL PRESSURE FOR ANGER is reflected. As also seen in (7), not only speech but gesture manifests this metonymy of anger. Interestingly enough, in the following examples in (8)a-c, H first says that when anger comes to the head, he clenches his teeth. Then, he clenches his teeth without any word. Then, in response to this, his wife K gesturally mimics that and clenches her teeth and at the same time she also imitates it by uttering a mimetic *KIIKII*, which usually describes a voice with a high frequency or the sound of a metallic object scraping or bending. By this mimetic word, she iconically and metaphorically depicts the sound of clenching one's teeth. This metaphoric usage of the mimetic describing an angry person clenching his teeth is spontaneously created. Then, H also mimics K gesturally and verbally. Speech and gesture in (8)b partly overlaps with K's speech and gesture. However, in (8)c, H uses the onomatopoetic *KUU* which is slightly different from *KII* phonetically. This usage of *KUU* is invented by H at the moment of speaking since

there is no conventionalized meaning associated with anger or the internal pressure in this mimetic. H and K are a happily married couple in their twenties. As mentioned earlier, individuals who regard each other positively often imitate one another's speech and/or gestures (i.e., mimicry).

(8) a. H: Ø ha: kuisiba-ttyau toki tatoeba {[$_1$///]}
teeth clenched-has when for.example
'For example, (I) clench (my) teeth when (anger comes to the head).'

iconic <clench one's teeth>, metaphoric <internal pressure for anger>, and catchment 3:facial: The speaker clenches his teeth without any speech.

b. K: {$_1$%laughter} ***[KIIKIII{$_2$::]}//***
ONOM
'the state/sound of clenching one's teeth with anger'

mimicry of (a), iconic <clenching one's teeth>, and metaphoric <internal pressure for anger>:facial: The speaker clenches her teeth while shaking the head laterally.

c. H: ***{$_2$[KUU}{$_3$UU::}::]***
ONOM
'the state/sound of clenching one's teeth with anger'

mimicry of (a) and (b), iconic <clenching one's teeth>, and metaphoric <internal pressure for anger>, catchment 3 :facial:The speaker clenches the teeth while tilting the head a bit.

K: {$_3$%laughter}

As shown, facial gestures in (8)a-c are almost the same in form and meaning. Therefore, it can be analyzed as catchment (Catchment 3). I did not include (b) in catchment 3 since it has strong aspect of imitation of H in (a). In (8), these facial gestures are repeated by more than one speaker and repeated twice by the same speaker. Example (8)a is generated by the conceptual metonymy INTERNAL PRESSURE FOR ANGER and its mental imagery. At that moment of speaking, in the case of anger coming to the head, for H, it is like clenching one's teeth. It is new information in this part of the discourse and hence the GP is formed. Example (8)c is a repetition of H's own gesture and at the same time, that of his wife and her speech (i.e., mimetic). The GPs in (b) and (c) show the participants' social relationship and reveal communicative functions of gestures. In other words, in addition to the newsworthiness of the information and the conceptual metonymy, these gestures are repeated not because they are morpheme-like elements stored in a gestural lexicon but because they are communicated to the discourse participants via gesture-speech synchrony as a tie between the two.

5. CONCLUSIONS.

As Webb (1996) shows, the present study reveals that metaphoric gestures of anger in Japanese discourse are repeated. However, the present study argues that they are not stored in a gestural lexicon for three reasons. First, discourse topics and cohesive ties are manifested not only linguistically but also gesturally. Second, underlying metaphoric and metonymic thinking which is based upon cultural or social and physiological experiences generate repetitions of metaphorics. In other words, shared experiences we have as human beings or as members of a same society or culture generate the recurring gestural features. Third, mimicry (i.e., shared feelings, joint cognition, or mutual understanding) generates repetitions of metaphorics. In other words, feelings toward the addressee are manifested in gestural and/or verbal mimicry that happens to display metaphoricity (e.g., "I am like you," "I show how you feel") (Bavelas, Black, Lemery, and Mullett 1986). This suggests that those multiple aspects of metaphoric gestures are dynamically manifested in recurring features at the moment of speaking.

As Wilcox (2004: 43) mentions, I do not deny that in the process of the development of sign languages "gestures serve as a source of lexical and grammatical morphemes in signed languages." In addition to sign languages, it is true of emblems which are derived from metaphoric gestures. Calbris (1990), Kendon (2004), Müller (2004) and Webb (1996) all assume that metaphorics have sub-components with meaning-form relationship. They tend to ignore the fact that the conventionality of a given metaphoric gesture is a matter of degree. As shown, metaphoric gestures in my data, which have not been conventionalized much, are generated spontaneously and dynamically at the moment of speaking, incorporating discourse functions, our daily experience, and social relationships between discourse participants. As the GP theory assumes, spontaneous gestures, not limited to metaphorics, are global and synthetic beings. Those researchers who postulate the existence of gesture morphemes should take the nature and dynamic aspects of spontaneous gestures into consideration.

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A HISTORICAL STUDY OF VARIATION IN CLITIC CLIMBING WITH THE VERB *PODER* IN SPANISH SPIRITUAL PROSE[*]

SCOTT LAMANNA
Indiana University Bloomington

CLITIC CLIMBING (CC), in which an object pronoun moves from postverbal to preverbal position, is variable in Spanish. It has been linked to syntactic/semantic/pragmatic factors including semantic characteristics of verbs (Myhill 1988, Davies 1995), animacy (Myhill 1988, Davies 1995), and topicality (Myhill 1988). It exhibits both diachronic and synchronic variation (Torres Cacoullos 1999; Davies 1997, 1995). The current study examines clitic climbing in relation to the above factors. It focuses on the verb poder 'to be able, may, can', which occurred frequently with CC in previous studies (Myhill 1988, Davies 1995). Sex is included as a new variable to increase our understanding of synchronic variation in CC. Clitic climbing in Spanish spiritual prose is examined over several centuries (16th, 17th, late 19th/early 20th). Significant results for century and type of se are discussed, along with a possible influence of frequent tokens of non-anaphoric se on CC in general.

1. INTRODUCTION.

CLITIC CLIMBING (CC), in which an object pronoun moves from postverbal to preverbal position, is a variable syntactic phenomenon in Spanish which may or may not occur in a given construction. For example, the two sentences *Claudia puede hacerLO* 'Claudia can do IT' and *Claudia LO puede hacer* 'Claudia IT can do' are both grammatical. In the first example, the object pronoun *lo* has not been moved. The second sentence, in which *lo* appears before the conjugated verb, exhibits clitic climbing.

Variation in clitic climbing is influenced by the interaction of several syntactic, semantic, and pragmatic factors that have yet to be fully explained. The phenomenon has received a lot of attention in recent years as various studies have attempted to explain when CC is permitted and under what conditions it is most likely to occur.

1.1. SEMANTIC CHARACTERISTICS OF VERBS.

One factor which has been linked to CC is the semantics of the relevant verbs (Myhill 1988, Davies 1995). Davies (1995) compared different verbs in terms of the percentage of CC observed with each. He found that verbs varied along a continuum in their "degree of acceptability" of CC ranging from 76% for *ir + a* 'to (be) go(ing) to' to 0% for *esperar* 'to wait', *insistir en* 'to insist on', *soñar con* 'to dream about', and *haber que* 'to have to' (Davies 1995:373-4). Myhill (1988), on the other hand, examined the relative likelihood of CC with different semantic variants of the same verb. He examined a number of different verbs and found that when the verb had a more grammaticalized meaning and functioned more as an auxiliary,

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CC was favored, and when it had a less grammaticalized meaning and functioned more as a main verb, CC was disfavored (Myhill 1988). Examples (1) and (2) below from the verb *poder* 'to be able, may, can' are illustrative of this distinction. According to Myhill (1988), the basic meaning of *poder* is ability. In Example (1), *poder* exhibits this meaning and CC is not observed:

(1) …y ni siquiera sé cómo pude subir-ME al caballo…
and not even I.know how I.could raise-myself on.the horse
'…and I don't even know how I managed to get on the horse…' (Myhill 1988:232)

Example (2) demonstrates a more auxiliary meaning of *poder*, that of possibility (Myhill 1988). In this case, CC does occur:

(2) …un ataque LE puede venir a un viejo de mi edad…
an attack him can come to an old.man of my age
'It's possible for an old man like me to have an attack…' (lit. 'an attack can come to-him…') (Myhill 1988:232)

1.2. ANIMACY.

Occurrence of CC has also been linked to animacy (Myhill 1988, Davies 1995). CC is favored when the clitic is higher on the animacy hierarchy (AH) than the subject and disfavored when the subject is higher (Myhill 1988). Myhill cites the following as the animacy hierarchy that applies to CC in Spanish:

2nd person > 1st person > 3rd person human singular > other 3rd person (Myhill 1988:242)

The following examples show how the animacy hierarchy influences CC in Spanish. In example (3), the 2nd person subject is higher on the AH than the 1st person clitic, and CC does not occur. Example (4), on the contrary, shows a case in which the 3rd person subject is lower on the AH than the 1st person clitic and CC does occur:

(3) Puedes herir-ME cuántas veces quieres.
you.can wound-me as.many times you.want
'You can wound me as many times as you want.' (Myhill 1988: 242)

(4) Nada ME puede detener, ¿ves? Di-me una razón que ME pueda detener.
nothing me can stop you.see tell-me a reason that me can stop
'Nothing can stop me, see? Tell me something that can stop me.' (Myhill 1988:243)

1.3. TOPICALITY.

The animacy hierarchy can be overruled in Spanish if the referent lower on the AH is higher in topicality, meaning that it is more central to the surrounding discourse context (Myhill 1988). Example (5) illustrates this. The AH would predict the non-occurrence of CC, since the subject is

2nd person and the clitic 3rd person. The clitic is climbed, however, because its referent, *el perdón*, is salient at that point in the discourse:

(5) …esa zona donde podemos encontrar el perdón. Donde tú LO podrás encontrar.
that area where we.can get the pardon where you it will.be.able get.
'That area where we can get a pardon. Where you can get it.' (Myhill 1988:244)

1.4. DIACHRONIC VARIATION.

The issue of the relationship between CC and diachronic change is a complex one, and merits further investigation. At least one study has claimed a diachronic increase in CC frequency, specifically in auxiliary + gerund sequences such as *estar* + *diciendo* 'to be saying' (Torres Cacoullos 1999). An example of CC in this case would be *ella lo está diciendo* 'she is saying it'. She attributes this increase to the fact that this type of periphrastic construction has come to be treated more and more as a single unit in Spanish (Torres Cacoullos 1999:153). Evidence for this includes fixing of the position of the auxiliary relative to the gerund (today preposition is categorical, but in the past postposition was also possible(Torres Cacoullos 1999:152)), a decrease in intervening material such as locative expressions and adjectives, and a decline of multiple gerunds in association with the same auxiliary. It makes sense that CC has become more common as the auxiliary + gerund sequence has been increasingly analyzed as a single verbal unit, since clitics are always placed before a single finite verb in Spanish, as demonstrated in (6):

(6) Juan LO tiene.
Juan it has
'Juan has IT.'

Another study has claimed a historic decrease in frequency of CC in infinitival constructions, followed by a recent increase as yet only reflected in spoken Spanish (Davies 1997). Davies posits that this historic decrease was driven by an extension of post-infinitival placement of clitic pronouns from one related structure to another by analogy (Davies 1997:256-7). The post-placement of these pronouns first became categorical in preposition + infinitive structures as in (7)a, then was extended to the sequence of verb + preposition + infinitive as in (7)b, and finally was applied to verb + infinitive sequences as in (7)c.

(7) a. Mas por amor de darLES algo
'But for love of giving THEM something'
b. non dejan de darLES de comer
'they don't stop giving THEM (something) to eat'
c. y quisiese darLES una merienda
'and I/he/she would like to give THEM a snack' (Davies 1997:256)

Postposition of clitic pronouns after a preposition + infinitive sequence began to increase rapidly in the 1300's, an increase that was reflected to a lesser extent in the verb + preposition + infinitive sequence during the same time period but not manifested in the verb + infinitive

sequence until after the 1400's (Davies 1997:257). What such a scenario suggests, according to Davies, is a process of linguistic change, motivated by the structural similarity among these three sequences, which gradually spread from one to another.

The results of the studies cited above show two processes at work that have been affecting CC in different ways over recent centuries. On the one hand, CC has become strongly associated with certain periphrastic constructions and verbal meanings in a process of grammaticalization. On the other hand, it has decreased in infinitival constructions due to extension of clitic post-placement from the related preposition + infinitive sequence. One motivation for the current study was to see if there is any evidence of a frequent verb like *poder* leading the way in determining these overall patterns of diachronic change in CC.

1.5. SYNCHRONIC VARIATION.

Another aspect of CC that should be further investigated is synchronic variation. To date, such variation has been tabulated by country and register. Davies (1995) found that CC frequency did not vary much from country to country. Both Davies (1995) and Torres Cacoullos (1999) found that CC occurred with greater frequency in more informal spoken data than in more formal written data. In addition, Torres Cacoullos (1999) found differences between two written genres. For example, she found that CC occurred more often in novels (89% for *estar* 'to be', 86% for *ir* 'to go') than in essays (68% for *estar*, 45% for *ir*). The percentages for novels were very similar to those found in the corpora of oral data she examined (89% for *estar*, 93% for *ir*).

When the current study began, other types of synchronic variation in CC had yet to be investigated. For example, the influence of age, socioeconomic class, and sex on CC had never been systematically examined. Since studying the relationship between these variables and CC is an important way to expand our sociolinguistic knowledge of this phenomenon, the current study incorporated the variable of sex into the analysis.

1.6. RESEARCH QUESTIONS.

The research questions that guided the current study were the following: (1) Has the frequency of CC with the verb *poder* increased or decreased between the 16th and 19th/20th centuries? (2) Will the same factors found to influence CC in previous studies (semantics of verb, animacy/topicality of clitic vs. subject) also do so in this study of *poder*? (3) Are there significant differences between male and female writers in the frequency of CC with *poder*?

1.7. HYPOTHESES.

The following hypotheses were formulated in response to the research questions: (1) CC with the verb *poder* will be shown to decrease in frequency between the 16th and 19th/20th centuries. (2) CC will be shown to occur more frequently when *poder* has a more auxiliary meaning (epistemic reading), with clitics that are higher on the AH than the subject, and with clitics that are more topical than the subject. (3) Neither women nor men will be found to use CC more frequently (null hypothesis). The rationale for (1) was the result of Davies (1997), which indicated an overall decrease in CC in written Spanish over a similar time period. The rationale for Hypothesis (2) was the results of previous studies of semantic and pragmatic factors influencing CC (Myhill 1988, Davies 1995). Finally, the rationale for assuming the null hypothesis for sex in

(3) was the lack of any indication at the time the study began that one sex would use CC more often than the other. A number of studies of Spanish have shown very little or no effect of external social factors on syntactic variation (Silva-Corvalán, 2001:133). The variable of sex was nevertheless considered worthy of investigation due to the relative infrequency of sociolinguistic studies of syntactic variation in comparison with those focusing on phonological variables. It was thought that perhaps the lack of effect found in previous studies was due to the fact that not enough syntactic structures had been systematically investigated. This hunch seems to have been proven correct by a study of oral data from Caracas, Venezuela, carried out concurrently with the present study. Gudmestad (2005) found sex to be a significant factor influencing CC in that variety of Spanish.

1.8. GENRE.

In order to address the above issues, the genre of spiritual prose (including examples of biography, autobiography, and commentary) was chosen. It provides one of the few opportunities to access both men's and women's language over several centuries and has the advantage of keeping the variable of topic (the self, other people, and God/religious experience) relatively constant. Another advantage is that it includes many tokens of 1st and 2nd person referents, which facilitates examination of the effect of the animacy hierarchy on CC. In addition, it is a genre that has not been previously studied in regards to CC.

2. METHOD.

2.1. CORPUS.

The sources used in the current study included works by Santa Teresa de Ávila (*Libro de la vida*) and San Juan de la Cruz (*Subida del Monte Carmelo*) from the 16th century, the writings of various female authors and Nicolás Martínez (*Compendio de la vida, virtudes, y milagros del venerable siervo de Dios, el Hermano Alonso Rodríguez*) from the 17th century, and works by Sor Ángela de la Cruz (*Escritos íntimos*) and P. Luis Martín (*Memorias del P. Luis Martín,* Tomo I & Tomo II) from the late 19th/early 20th century. See Appendix 1 for complete information on the sources for the corpus.

The envelope of variation for the study was defined as contexts where CC could possibly occur in association with the verb *poder* (a form of *poder* adjacent to one or more infinitives and one or more clitics). For example, contexts such as (8), where CC actually does occur, and (9), where it does not, were included.

(8) el Venerable Alonso LA podía consolar
the Venerable Alonso her could console
'Venerable Alonso could console her' (*Compendio de la vida, virtudes, y milagros del venerable siervo de Dios, el Hermano Alonso Rodríguez*, p. 196)

(9) desde ahora puedes empezar a poseer-LAS
from now you.can begin to possess-them
'you can begin now to own them' (*Escritos íntimos*, p. 382)

The following procedure was used to select tokens for inclusion in the corpus. Where possible (in the case of the shorter works by the 17th century authors), the works in their entirety were examined and all relevant tokens as defined above extracted. For the longer works, a number of pages comparable to the shorter works were randomly selected for examination, and all tokens were taken from these pages. Thus for each of the three centuries for each gender, a comparable number of pages of text were looked at, and all tokens from those pages included in the study. In the case of the works by Santa Teresa de Ávila and San Juan de la Cruz, tokens were located by means of an electronic search for the different forms of *poder* using the Find function in Microsoft Word. A manual search was conducted with all other sources, due to the fact that they were only available in print format.

2.2. CODING AND VARIABLES.

Tokens were coded for the dependent variable (presence or absence of clitic climbing) and for eight (six linguistic and two extra-linguistic) independent variables.

2.2.1. DEPENDENT VARIABLE.

Clitics appearing in preverbal position were coded as (+CC), as in Example (8) above, while those appearing in postverbal position were coded as (-CC), as shown above in Example (9). Cases in which a clitic occurred between a form of *poder* and an infinitive were counted as +CC (e.g. *estuvo sin poder**se** mover de un lado* 'he was unable to move (himself) on one side' *Compendio* p. 171). This was done to follow the approach of Davies (1997), who counted both medial and initial position in his historical corpus as instances of CC.

2.2.2. INDEPENDENT VARIABLES.

Tokens were coded for eight independent variables. Two of these were extra-linguistic, namely the century when the work was written (16th, 17th, or 19th/20th) and the sex of the writer (male or female). The remaining six were linguistic variables. The first of these was the meaning of *poder*. The different readings of *poder* include an epistemic reading of non-exclusion (described by Myhill (1988) as possibility) and root readings including ability and permission (Sirbu-Dumitrescu 1988). The epistemic reading of *poder* includes instances where an assertion is being made about what may or may not happen. Uses of *poder* that fall into this category often refer to situations where no volition is involved. As Myhill (1988:246) puts it, "…poder…[is] given the reading of possibility…when the basic meaning is impossible because there is no person to plausibly attribute obligation or desire to…" An example from the corpus in which *poder* has an epistemic reading is given in (10) below, while a root reading of ability is illustrated in (11):

(10) Aquí despide por todas partes todas quantas cosas
le pueden venir
Here he.dismisses for all parts all as.many things
to.him may come
'Here he dismisses all around him whatever may come his way' (*Compendio* p. 97)

(11) pudo este año acompañar-LE en su viaje a Francia

he.could this year accompany-him on his trip to France
'he was able to accompany him this year on his trip to France'(*Memorias del P. Luis Martín*, Tomo II, p. 891)

The second independent linguistic variable was the position of the clitic relative to the subject on the animacy hierarchy. Clitics were coded as being more animate than the subject, less animate than the subject, or equal to the subject in animacy. Examples (4) and (3) above demonstrate clitics that are more and less animate than the subject, respectively. The equal category included two distinct components. Reflexive clitics were coded as equal in animacy to the subject because in this case, both the clitic and the subject have the same referent. An example of a reflexive clitic is given in (12) below:

(12) El niño SE baña.
the boy REFL bathes
'The boy bathes himself.'

The other component of the equal category involved cases where the subject and the clitic did not have the same referent, but the different referents occupied equal positions on the animacy hierarchy. The animacy hierarchy that applies to CC in Spanish (Myhill 1988) is repeated below:

2nd person > 1st person > 3rd person human singular > other 3rd person (Myhill 1988:242)

In Example (13) below, the subject is *el Señor* 'the Lord', which for purposes of the AH was considered to be the same as a 3rd person human singular referent. The clitic, *la*, refers to a woman, also an example of a 3rd person singular human referent.

(13) en un punto que el Señor llega LA puede dejar santificada
in a point that the Lord arrives her he.can leave sanctified
'The Lord can leave her sanctified the very moment he arrives.'

The third independent linguistic variable was the topicality of the clitic relative to the subject. Clitics were coded as being more topical than the subject, less topical than the subject, or equal to the subject in topicality. Relative topicality was determined for each token by examining whether the referent of the clitic or the subject was more prominent in the surrounding discourse context. Several factors were considered such as the relative importance of each to the main point of the discourse, the syntactic salience of each in the discourse, and continuity of the referent across several sentences or clauses. In a majority of cases, relative topicality was coded in the same way as relative animacy, in accordance with Myhill's (1988) assertion that the AH in Spanish serves as "a general indicator of topicality, and therefore holds in most cases" (Myhill 1988:244). Examples (5) and (3) above demonstrate clitics that are more and less topical than the subject, respectively. In the case of topicality, the equal category only consisted of reflexive clitics, which are necessarily equal in topicality to the subject since they both have the same referent.

Person and number of the verb and verb tense (preterite or other) were the fourth and fifth linguistic variables coded for. The variable of verb tense was divided in this manner due to the expectation that the preterite tense might be more likely to give an ability reading to *poder*, thus indirectly influencing CC. Because of the disproportionately large number of tokens of *se* found in the corpus, representing 51% of all clitics (155/304), each token was also coded for type of *se* (anaphoric, non-anaphoric, clitics other than *se*). The distinction between anaphoric and non-anaphoric *se* is explained in the Results section. An example of the coding procedure, taken from Isabel de Jesús, is provided in (14):

(14) Con todo esto, no ME pude escapar de una tía mía, que teníamos en lugar de madre.
With all this not myself I could escape from an aunt mine that we.had in place of mother
'With all this, I could not escape **(myself)** from an aunt of mine, who we had in place of a mother'
(*Vida de la venerable Madre Isabel de Jesús*, *Libro Primero*, cited in Arenal and Schlau 1989:212)

This token was coded as follows: +CC, 17th Century, female, root (ability), equal in animacy, equal in topicality, 1st person singular, preterite, absence of *se*. After the coding was completed, the data were subjected to a statistical analysis using SPSS 13.0 for Windows.

3. RESULTS.

In this section, overall results from the analysis of the data will be presented first, followed by results for each individual variable in order of significance (from most to least).

3.1. OVERALL RESULTS.

Before considering the influence of the independent variables on clitic climbing, the overall distribution of the different Spanish clitics in the corpus is worth noting. This information is provided in Table 1.

Clitic	Frequency	%
me '(to) me, myself'	39	12.8
nos '(to) us, ourselves'	5	1.6
te '(to) you (informal sing.), yourself'	5	1.6
lo 'him, it (masc.), you (formal masc.sing.)'	36	11.8
la 'her, it (fem.), you (formal fem. sing.)'	11	3.6
los 'them (masc.)'	9	3.0
las 'them (fem.)'	6	2.0
le 'to him, her, you (formal sing.)'	36	11.8
les 'to them, you (formal plur.)'	2	0.7
se (anaphoric) 'himself, herself, themselves, yourselves (formal)'	23	7.6
se (non-anaphoric)	132	43.4
Total	304	99.9*

* percentages do not add up to 100% due to rounding

TABLE 1: FREQUENCY OF INDIVIDUAL CLITICS PRESENT IN SPIRITUAL PROSE CORPUS

The most striking aspect of the clitic distribution presented here, which was already pointed out above, is the preponderance of tokens of *se* in the corpus, particularly non-anaphoric *se*. This is an important characteristic of the corpus which will be discussed in more detail below. It is also apparent from the table that the data consist of tokens representing a wide range of different clitics.

The first type of statistical analysis carried out for these data was a binary logistic regression. This test shows how well a set of independent variables predicts the values of a categorical dependent variable (in this case, clitic climbing). The results of this analysis are displayed in Table 2:

Variable	**Significance**
century	.000
type of *se*	.000
topicality	.252
meaning of *poder*	.266
verb person/number	.329
verb tense	.464
animacy	.819
sex	.835

TABLE 2: RESULTS OF BINARY LOGISTIC REGRESSION

All of the independent variables from the study were looked at together in this analysis to see how they interact with each other in predicting the absence or presence of clitic climbing. Significance refers to the statistical significance of each independent variable. The numbers reported are *p*-values and range from 0 to 1. They indicate the probability that the results obtained for each variable could have been produced by chance, with *p*-values less than .05

considered to be statistically significant. The analysis shows that both century and type of *se* are significant predictors of CC for this data set when the interaction among all of the variables is considered. None of the other variables turned out to be significant.

3.2. RESULTS FOR INDIVIDUAL VARIABLES.

This section presents results of chi-square statistical analyses of each independent variable as a predictor of CC when considered individually, rather than in interaction with the other variables as reported above. The chi-square tests presented here indicate whether the distribution of the data is random or not. If a given variable is identified as statistically significant, then the distribution is not likely to be due to chance.

3.2.1. CENTURY.

Hypothesis (1), that clitic climbing with *poder* would be found to decrease in frequency between the 16th and 19th/20th Centuries, was strongly confirmed. The data are presented in Table 3:

	16th Century		**17th Century**		**19th/20th Cent.**		**Total**
+CC	118	90.8%	72	78.3%	37	45.1%	227
-CC	12	9.2%	20	21.7%	45	54.9%	77
Total	130	100%	92	100%	82	100%	304

p is less than or equal to 0.001.

TABLE 3: CLITIC CLIMBING BY CENTURY

In the 16th Century tokens, CC is observed in a large majority of cases. The percentage drops off somewhat in the 17th Century, but CC is still strongly preferred. By the late 19th/early 20th Century, however, the data tell a different story. During this time period, a majority of clitics are not climbed. The percentage of climbed clitics is only half that observed in the 16th Century authors. As indicated by the *p*-value reported above, the distribution of this data is significant.

3.2.2. TYPE OF SE.

No hypothesis was put forward for this variable, since the decision to code for it was not made until after the data had already been collected. Table 4 displays the relationship between this variable and frequency of CC:

	anaphoric		non-anaphoric		Clitics other than *se*		Total
+CC	13	56.5%	115	87.1%	99	66.4%	227
-CC	10	43.5%	17	12.9%	50	33.6%	77
Total	23	100%	132	100%	149	100%	304

p is less than or equal to 0.001.

TABLE 4: CLITIC CLIMBING BY TYPE OF *SE*

The most noteworthy aspect of these results is the stark contrast in behavior between anaphoric and non-anaphoric *se*. CC occurs in only slightly more than a majority of cases of anaphoric *se*, whereas it occurs in the vast majority of cases of non-anaphoric *se*. This difference is statistically significant.

3.2.3. TOPICALITY.

Hypothesis (2) addressed topicality, along with two other variables, and stated that CC would be more likely to occur with clitics that are more topical in the surrounding discourse context than the subject. Before presenting results for this variable, it is necessary to address the issue mentioned previously of the large number of non-anaphoric *se* tokens found in the data. In these tokens, *se* has no specific referent, as seen in Example (15). Non-anaphoric *se* developed out of reflexive *se* (Clements 2006), shown in Example (12), repeated as example (16) below.

(15) No SE puede explicar con palabras.
no REFL can explain with words
'One cannot explain (it) with words.'

(16) El niño SE baña.
the boy REFL bathes
'The boy bathes himself.'

Non-anaphoric *se* tokens were originally coded as being equal in topicality, the same as tokens of reflexive *se*, due to the morphosyntactic similarity and common historical origin of the two types of *se*. There is good reason, however, to exclude these tokens from an analysis of the relative topicality of clitic and subject due to the transitivity-reducing function of *se* in these cases. According to a recent analysis of the properties of non-anaphoric *se*, it "has the function of reducing the Transitivity of a clause, and does so in one of two ways: either by decreasing the valency of the verb by one argument, from a valency of two to a valency of one, or by 'impersonalizing' the verb of an intransitive clause, whereby the presence of *se* disallows nominal or pronominal realization of the subject" (Clements 2006:241). In either case, the verb in question only has one argument, the subject, and *se*, although functioning as a clitic, is not really an object pronoun clitic. So a comparison of the relative topicality of subject and object is actually not possible in these cases.

Table 5 displays the results obtained for this variable with tokens of non-anaphoric *se* excluded from the analysis:

	+topical		-topical		equal		Total
+CC	47	71.2%	35	64.8%	30	57.7%	112
-CC	19	28.8%	19	35.2%	22	42.3%	60
Total	66	100%	54	100%	52	100%	172

+topical = clitic higher in topicality than subject; -topical = clitic lower in topicality than subject; equal = clitic equal to subject in topicality (reflexive)
p is less than or equal to 1

TABLE 5: Clitic-climbing by topicality of clitic relative to subject (tokens of non-anaphoric *se* excluded)

These results show that the part of Hypothesis (2) addressing topicality was not confirmed. CC was found to occur in a majority of cases under all three conditions: when the clitic was more topical than the subject, when it was less topical, and when the two were equal in topicality. Although the distribution of the data was not statistically significant according to the *p*-value reported above, it is worth noting that the percentage of CC was highest when the clitic was more topical than the subject. Contrary to expectations, though, the percentage was not lowest when the clitic was less topical, with cases of equal topicality showing the lowest frequency of clitic climbing.

3.2.4. MEANING OF *PODER*.

The first part of Hypothesis (2) stated that CC would be shown to occur more frequently with a more auxiliary meaning of *poder* (epistemic reading). Table 6 shows the results for this aspect of the hypothesis, which was also not confirmed:

	Root: ability/permission		Epistemic: non-exclusion		Total
+CC	195	75.0%	32	72.7%	227
-CC	65	25.0%	12	27.3%	77
Total	260	100%	44	100%	304

p is less than or equal to 1.

TABLE 6: CLITIC CLIMBING BY MEANING OF *PODER*

As can be seen from Table 6, CC occurs in a majority of cases both when the meaning of *poder* is ability (the basic meaning according to Myhill 1988) and when it is non-exclusion (called possibility by Myhill (1988) and considered by him to be a more auxiliary meaning of *poder*). The percentages of CC are quite close in each case and, not surprisingly, the distribution of the data is not significant.

3.2.5. VERB PERSON/NUMBER AND VERB TENSE.

Neither one of these two variables is a significant predictor of CC when considered independently. CC occurred in a majority of cases for all forms of the verb except for second person singular. However, since there were only two tokens in the corpus of the latter form, it should be noted that a different result may have been obtained with more tokens. As far as verb tense is concerned, percentages of CC were nearly identical for the preterite (75.0%, n=24) and other verb tenses (74.6%, n=280).

3.2.6. ANIMACY.

The second part of Hypothesis (2) was that CC would be found to occur more frequently with clitics that are higher on the animacy hierarchy than the subject. For the same reason as in the case of relative topicality, tokens of non-anaphoric *se* were excluded from the analysis of this variable. Table 7 shows the results for this aspect of Hypothesis (2), which was not confirmed:

	+animate		**-animate**		**equal**		**Total**
+CC	22	66.7%	45	69.2%	45	60.8%	112
-CC	11	33.3%	20	30.8%	29	39.2%	60
Total	33	100%	65	100%	74	100%	172

p is less than or equal to 1.
+animate = clitic higher on animacy hierarchy than subject; -animate = clitic lower on animacy hierarchy than subject; equal = clitic equal to subject on animacy hierarchy (reflexive or otherwise equal)

TABLE 7: CLITIC CLIMBING BY ANIMACY OF CLITIC RELATIVE TO SUBJECT (TOKENS OF NON-ANAPHORIC *SE* EXCLUDED)

As in the case of topicality, CC was found to occur in a majority of cases under all three conditions: when the clitic was more animate than the subject, when it was less animate, and when the two were equal in animacy. Counterintuitively, CC occurred most frequently when the clitic was less animate than the subject. However, since the distribution of the data is not significant, this result is likely to be due to chance.

3.2.7. SEX.

Hypothesis (3), which stated that neither female nor male authors would be found to use CC more frequently, was confirmed. This can be clearly seen in Table 8:

	female		male		Total
+CC	113	73.4%	114	76.0%	227
-CC	41	26.6%	36	24.0%	77
Total	154	100%	150	100%	304

p is equal to or less than 1.

TABLE 8: CLITIC CLIMBING BY SEX

The percentage of CC observed in male and female authors is strikingly similar. The *p*-value provided for Table 8 confirms that the distribution of the data is not significant. It can safely be concluded, then, that CC does not exhibit sociolinguistic variation on the basis of sex in the writings examined in this study.

4. DISCUSSION.

The first hypothesis for the current study was that CC with the verb *poder* would be shown to decrease in frequency between the 16th and 19th/20th Centuries. This hypothesis was strongly confirmed by the results presented in Table 3 above. These findings demonstrate the same general trend of diachronic decrease in CC reported by Davies (1997) in his study of an extensive corpus of written Spanish texts. Davies did not break down his results by individual verbs, but rather reported them in aggregate form. This study demonstrates that the general trend observed over this time period can be documented in the case of a single verb as well.

As mentioned above, Hypothesis (2) contained various components, the first of which involved the semantics of *poder*. It was hypothesized that CC would occur more frequently with a more auxiliary meaning of *poder* (epistemic reading of non-exclusion). CC was not shown to be significantly more frequent when the semantic variant of *poder* expressed non-exclusion than when it expressed the root meanings of ability or permission. In both cases, CC occurred in the majority of cases. These results should be interpreted with a degree of caution due to the significant imbalance in the data in the number of tokens representing each semantic variant. While a total of 260 tokens were found for the root readings, only 44 were found for the epistemic reading. More data need to be collected in order to more adequately address this issue.

Hypothesis (2) also predicted that CC would occur more frequently with clitics that are higher on the animacy hierarchy than the subject. This prediction was not confirmed by the data, which was surprising in light of Myhill's (1988) assertion that "CC is favored when the clitic is higher on the AH than the subject and disfavored when the subject is higher on the AH than the clitic" (Myhill 1988:241).

CC occurred in the lowest percentage of cases when the subject and clitic pronoun associated with the verb were equal on the animacy hierarchy. The percentage of CC in these cases was 60.8%, whereas for more animate and less animate clitics it was 66.7% and 69.2%, respectively. The lower percentage of CC for cases of equal animacy may be due in part to the characteristics of reflexive vs. non-reflexive clitics. Davies (1995) found a statistically significant difference in CC between reflexive and non-reflexive clitics, with the latter climbing more often than the former. It is not clear from Davies' data whether or not he counted cases of non-anaphoric *se* among his totals for reflexive clitics. If he did, the difference in percentage of CC between non-reflexive clitics (76%) and reflexive clitics (66%) would almost certainly be greater if these were removed, since non-anaphoric *se* tends to occupy the preverbal position.

The final component of Hypothesis (2) predicted that CC would correlate with clitics that are more topical than the subject, as asserted by Myhill (1988). As previously mentioned, results closely mirrored those for animacy. CC was found to be favored under all three conditions: when the clitic was more, less, and equally topical relative to the subject. It was found that CC occurs least often when a verb has a clitic pronoun and a subject as arguments and these are equal in terms of topicality. The percentage of CC in these cases is 57.7%, whereas for more topical and less topical clitics it is 71.2% and 64.8%, respectively. This difference again may be due to the lower frequency of CC in reflexive clitics, which are always equal in topicality with the subject.

The third and final hypothesis for this study was that neither women nor men would be found to use CC more frequently. The findings presented in Table 8 confirm the hypothesis. This outcome is not surprising considering the results of previous studies reported by Silva-Corvalán (2001), which found a minimal or non-existent effect of external social factors (such as sex) on syntactic variation. However, Gudmestad (2005) examined CC with *querer* and *ir* in oral samples of Venezuelan Spanish and found sex to be a significant factor for her data as a whole and for *querer*. CC occurred in 82.6% of *querer* tokens produced by females, but in only 59.5% of those produced by males. More research examining the relationship between sex and syntactic variation is needed to account for the discrepancy between Gudmestad's (2005) findings and those of the current study, which may be due to differences between written and oral language, between the different Spanish dialects investigated, or between the time periods involved.

One of the major findings of this study was the notable contrast in behavior between anaphoric and non-anaphoric *se*. CC is only slightly favored for instances of anaphoric *se*, whereas it is strongly favored for occurrences of non-anaphoric *se*, and the difference is statistically significant ($p \leq 0.001$).

One final note concerning the influence of non-anaphoric *se* tokens on CC in this study concerns the PARALLEL STRUCTURE EFFECT found by Torres Cacoullos (1999). She discovered that postposition of clitics in auxiliary + gerund sequences was more common in her Essays corpus (55% for *ir*, 32% for *estar*) than in her Mexico City corpus (7% for *ir*, 11% for *estar*). She attributed this to the fact that the Essays corpus included more instances of lone-standing gerunds, where the clitic is invariably postposed, and claimed that this structure may have encouraged a parallel structure in gerunds found in combination with an auxiliary. Example (17) shows a lone standing gerund, while (18) shows a gerund in combination with an auxiliary.

(17) mirándo-la
looking-her
'looking at her'

(18) está mirándo-la
is looking-her
'he/she is looking at her'

A similar parallel structure effect may be occurring in the data used for this study. In order to look for such an effect, instances of non-anaphoric *se*, anaphoric *se*, and clitics other than *se* were counted for each century, and the number of these that were climbed and not climbed was noted as well. The results are presented in Table 9:

	Non-anaphoric *se*		Anaphoric *se*		Clitics other than *se*	
Century	+CC	-CC	+CC	-CC	+CC	-CC
16th Century	66 93%	5 7%	5 83.3%	1 16.7%	47 88.7%	6 11.3%
17th Century	28 93.3%	2 6.7%	6 66.7%	3 33.3%	38 71.7%	15 28.3%
19th/20th Century	21 67.7%	10 32.3%	2 25%	6 75%	14 32.6%	29 67.4%

TABLE 9: CLITIC CLIMBING BY CENTURY AND TYPE OF *SE*

Disregarding the 17th Century momentarily, Table 9 shows that non-anaphoric *se* is the most commonly occurring type of clitic in both the 16th and the 19th/20th century. The percentage of CC for non-anaphoric *se* goes down between these two centuries, as it does in a similar fashion for anaphoric *se* and clitics other than *se*. The evidence from these two centuries is consistent with what we would expect to see if a parallel structure effect were at work in this corpus, with other clitics following the pattern of non-anaphoric *se*. While the 17th century data show a different pattern, non-anaphoric *se* tokens are not the most common type of clitic for this time period. This may explain why the other clitics follow a different pattern from the non-anaphoric *se* tokens in this century, decreasing their frequency of CC while the non-anaphoric *se* tokens maintain the same level of CC as in the 16th century. Regardless of the lack of a perfectly corresponding pattern, the large number of tokens of non-anaphoric *se*, where CC is very frequent, makes it reasonable to propose that the other clitics may have climbed more frequently than they would have in the absence of this influence, but the data reported above are not sufficient to determine this.

The case for a parallel structure effect can be made more convincingly by comparing the results obtained in the current study with those from another corpus. Table 10 gives aggregate results from Davies (1997:254) for the three verbs with which CC occurs most often in his corpus (*querer*, *deber*, and *poder*) and compares them with the results of this study of *poder* during roughly corresponding time periods:

Davies (1997) Corpus of historical Spanish	+CC	Lamanna (2006) Spiritual prose corpus	+CC
1600 (1556-1651)	68%	16th Century	90.8%
1700 (1660-1800)	29%	17th Century	78.3%
1800 (1833-1895)	18%	late 19th/early 20thCentury	45.1%

TABLE 10: CLITIC CLIMBING BY TIME PERIOD AND CORPUS

As Table 10 makes clear, CC percentages in Davies' (1997) corpus of historical Spanish are much lower than in the corresponding time periods in the spiritual prose corpus used in the current study. This difference provides additional evidence suggesting a parallel structure effect in the latter. It appears that the large number of tokens of non-anaphoric *se*, which overwhelmingly occurs in preverbal position, have an influence on other clitics, slowing down

the change from +CC to –CC documented by Davies (1997) for the language as a whole over this time period. This assertion must remain speculative, however, since Davies (1997) does mention that he only assigned to initial *se* 3/10 of the value of other clitics. This was done as a result of his assessment that cases of preverbal impersonal *se*, one type of non-anaphoric *se*, are not really examples of clitic climbing, since *se* in these cases does not correspond to the object of the embedded infinitive. However, there are two good reasons not to simply exclude these tokens from an analysis of clitic climbing. One is the fact that non-anaphoric *se* (including impersonal *se*) developed historically out of reflexive *se* (Clements 2006), which is a true object clitic. The other is that non-anaphoric impersonal *se* can appear in post-verbal position just like a true object clitic. This is demonstrated in Example (19) below, taken from the current corpus:

(19) si puede decir-SE más
if can say-REFL more
'if one can say more' (*Compendio* p. 11)

In addition to the above, Davies did not do an exact count of the different types of *se* tokens in his data. Without this information, and in light of the very large differences in CC frequency between the two corpora, the issue of whether this indicates a parallel structure effect in the current spiritual prose corpus must remain an unresolved one.

5. CONCLUSION.

The present study has shown that the frequency of CC with *poder* has decreased between the 16th and the late 19th/ early 20th Centuries. No significant differences regarding sex were found, nor did the meaning of *poder* show any significant effect on CC. Animacy/topicality of the clitic relative to the subject was also not significant. Century and type of *se* were significant predictors of CC when the interaction among all variables was considered.

This study has contributed to our understanding of CC by identifying the importance of the difference between the behavior of anaphoric and non-anaphoric *se*. While the clitic only climbs in slightly more than half of the cases of anaphoric *se*, CC occurs in the vast majority of cases of non-anaphoric *se*. As previously mentioned, these two forms differ in terms of transitivity, with non-anaphoric *se* being less transitive. The relationship between transitivity and many aspects of human language and discourse has been well-documented. Hopper and Thompson (1980:254-255) state in their Transitivity Hypothesis that "if two clauses (a) and (b) in a language differ in that (a) is higher in Transitivity according to any of the [transitivity] features,…then, if a concomitant grammatical or semantic difference appears elsewhere in the clause, that difference will also show (a) to be higher in Transitivity". The results of the present study suggest that CC in Spanish may be a syntactic marker of lesser transitivity, at least in the case of *se*, which would explain why it co-occurs with non-anaphoric *se* in this corpus. In a similar fashion, lack of CC may be a marker of greater transitivity and would therefore co-occur with anaphoric *se*. A fruitful direction for future research on CC may involve examining its relationship to the different aspects of Hopper and Thompson's (1980) Transitivity Hypothesis.

The results obtained here also suggest that non-anaphoric *se* may be exerting a parallel structure effect on CC with other clitics due to its frequency in the corpus. This finding is interesting in light of the EXEMPLAR MODEL discussed by Bybee (2002). This model states that speakers store mental representations of phonetic segments, morphemes, words, and other units

of linguistic structure as a cluster of EXEMPLARS. The exemplars are all the individual tokens of the linguistic item to which a speaker has been exposed. Most if not all linguistic structures show variation in the details of their realization by different speakers and by the same speaker at different times, and variants that occur more frequently are stronger within their exemplar clusters and can therefore influence the entire cluster in a specific direction. In addition, exemplar clusters are linked to each other through a complex network of mental connections that associate similar words, morphemes, and phonetic segments with each other. This model provides a possible justification for why non-anaphoric *se* might influence the behavior of other clitics in this corpus. Since non-anaphoric *se* is more frequent than the other clitics and the exemplars of the clitics are related to one another, the other clitics would be expected to mirror the behavior of non-anaphoric *se* by climbing more often than they would without this influence.

The conclusions reported here are tentative. More research should be done on a greater number of clitic tokens to confirm or refute the findings of the present study. In addition, CC should be investigated in detail with other Spanish verbs and/or genres to see if the results obtained here are generalizable beyond *poder* in spiritual prose.

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APPENDIX 1
CORPUS OF SPANISH SPIRITUAL PROSE

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EPISTEMOLOGICAL STANCE IN ENGLISH: AVOIDING BLAME IN POLITICAL SPEECH

ZAC WESTBROOK
University of New Mexico

This paper deals with linguistic expressions of epistemological stance in English, and the ways in which English speakers can manipulate these expressions in order to avoid taking responsibility when making claims. Specifically, I examine the relationship between these factors in the context of political speech. In addition to identifying, within the data, examples of phrase and clause constructions as expressions of epistemological stance (cf. Mushin 2001, JoAnne Neff, Emma Dafouz, Honesto Herrera, Francisco Martínez, Juan Pedro Rica, Mercedes Díez, Rosa Prieto, Carmen Sancho 2003, Thompson and Mulac 1991, Thompson 2002) within the data, I argue that English speakers - specifically politicians - lexically modify the expression of subjects within these phrases and clauses, and that these different expressions of subject have consequent pragmatic effects (cf. Sheibman 2004). The data for this paper is taken from a speech given by president George W. Bush, and from a declassified CIA intelligence briefing, both from October 2002. In comparing these examples with studies of journalistic responsibility and integrity (MacMillan and Edwards 1998, MacMillan 2001), I argue that varying the expressions of subject allows individual English speakers to dissolve, disperse, and detach an individual's responsibility by distancing themselves from sources and interpretations of evidence for a claim, especially when those claims are proven false.

1. INTRODUCTION.

In this paper I examine political speech in English to explore both how English as a language addresses traditional notions of epistemicity, evidentiality, and epistemological stance, but also how speakers can manipulate the language within its own methods of expressing these concepts in order to avoid taking responsibility for their claims. I argue that, because English frequently encodes epistemological stance and/or sources of information and evidence through accompanying phrase and/or clause structures, and does not use, for example, a basic set of obligatory grammatical markers as is the case in many other languages, speakers of English can exploit a variety of ways of controlling and managing the extent to which an individual is perceived to be responsible for his or her claims. I do not claim that the ability for a speaker to sidestep responsibility for his or her claims is a phenomenon unique to English; rather, I suggest that the overall lack of obligatory (grammatical) epistemological markers is advantageous for English-speaking members of the American public to distance themselves from a claim and limit responsibility in political speech. Specifically, I argue that the recent language used by the Bush administration and the CIA while making the case for the invasion of Iraq highlights this phenomenon, and that it was especially useful for limiting individual responsibility for the claims in the aftermath of the invasion and subsequently discovered absence of weapons of mass destruction (WMDs).

My analysis consists of two parts. Following an overview of relevant research into the expression of epistemological stance and evidentiality in English as entire phrases and complement-taking clause type constructions (Mushin 2001, Neff et. al. 2003, Thompson and Mulac 1991, Thompson 2002), I identify a number of examples within my data with the intention of augmenting this research and a general theoretical view of epistemological stance

and evidentiality in English. Additionally, I examine the expression of subject within these phrases and clauses and suggest a number of pragmatic effects (cf. Sheibman 2004). Specifically, through comparison to studies of journalistic integrity and responsibility (MacMillan and Edwards 1998, MacMillan 2001), I claim that manipulation of these subjects allows English speakers, and allowed the Bush administration and the CIA, to sidestep responsibility by obscuring connections between sources of evidence, claims based on that evidence, and the speaker making the claim.

2. BACKGROUND.

2.1 EPISTEMOLOGICAL STANCE.

The concepts of truth and reliability of information are addressed in languages around the world. In everyday speech, and in the most formal forms of language, users are pressed to address the relationship between what they say and what they know. As Gricean maxims of conversation suggest, we assume that each speaker of any language is, or at least should be, aware of the truth of his own statements. While many have noted basic differences in the ways different languages approach this problem, all methods involve the speaker's attitude towards knowledge (Chafe 1986). Because there is considerable variation in terminology within current research, this basic idea of the expression of speaker's attitude towards both his or her own commitment to the truth of a proposition (epistemicity) and/or the source of information for a proposition (evidentiality), for reasons of economy and for this paper, will be collectively referred to as epistemological stance from hereon.

2.2 SEMANTIC DISTINCTION.

Under the broader concept of epistemological stance, scholars have identified essential differences in the form and content of linguistically encoded expressions of speaker attitudes towards knowledge. As Ferdinand de Haan (1999:83) articulates, "Evidentiality deals with the source of information for the speaker's utterance, while epistemic modality concerns itself with the degree of commitment on the part of the speaker to his or her utterance." Another important factor of epistemological stance is how it manifests itself morphologically and syntactically. Languages such as Hidatsa and Central Pomo exhibit classical examples of grammatically encoded evidentiality (O'Grady et al., 2001).

2.3 HIDATSA AND CENTRAL POMO.

Hidatsa and Central Pomo are classic examples of languages with grammaticized systems of expressing epistemological stance. Speakers of Hidatsa (Fig. 1) must choose between five sentence ending morphemes for every utterance, and the indigenous North American language Central Pomo (Fig. 2) uses seven different enclitics as part of its evidential system (O'Grady et. al. 2001). In both languages, each morpheme can encode either or both the speaker's certainty of a statement as well as the source of that information.

Utterance-final Morpheme	English gloss
/-ski/	Speaker is certain of a statement's truth.
/-c/	Speaker merely believes the statement is true.
/wareac/	Speaker believes statement is common knowledge.
/-rahe/	Statement is based on an unverified report from someone else.
/-toak/	Truth of a statement is unknown to both the speaker and listener.

FIGURE 1. MARKERS OF EPISTEMOLOGICAL STANCE IN HIDATSA.

Enclitic	English gloss
/-?ma/	Indicates an established fact.
/-ya/	Indicates an eyewitness account.
/-?do:/	Indicates second hand verbal information (i.e., I was told).
/-nme:/	Indicates inference from auditory evidence (i.e., 'It rained' (I heard the drops)).
/-?ka/	Indicates inference from other evidence (i.e., 'It must have rained' (because everything is wet)).
/-la/	Indicates that the speaker was a participant in the event (i.e., I know because I did it).
/-wiya/	Indicates first hand experience (i.e., I know because it happened to me).

FIGURE 2. MARKERS OF EPISTEMOLOGICAL STANCE IN CENTRAL POMO.

The selection of the appropriate morpheme is extremely important in Hidatsa: "Speakers who utter a false sentence marked by the morpheme */-ski/* are considered to be liars. Had they used the morpheme */-c/,* on the other hand, it would be assumed that they simply made a mistake" (O' Grady et al. 2001:260). Here we can clearly see the connection between social expectations and forms of language. The existence of such a connection in Hidatsa raises questions about the ways in which social expectations and personal responsibility are expressed in other languages.

Although the specific number and types of grammaticized evidentials differ from language to language, there are common undercurrents among languages with grammaticized systems of evidentiality. First, with respect to use and social expectations, "these expressions (evidentials) are ubiquitous in discourse, if not grammatically obligatory" (O' Grady et. al. 2001:401). Secondly, there exists a basic set of the most common types of evidentials: (1) first-hand personal experience, (2) hearsay (often used to indicate that the speaker is quoting another's words), (3) nonverbal auditory evidence, and (4) inference from other evidence. Despite the idiosyncrasies of particular languages, it is clear that these languages have a particular regard for truth and reliability of information, and thereby require rather specific, and explicit denotations of epistemological stance. Within the framework of the functional approach to linguistics, and with respect to culture, one might wonder why some languages grammatically

encode epistemological stance while others do not, especially when we consider DuBois' dictum that, "grammars code best what speakers do most." If we examine linguistic form (i.e., grammar) in terms of meaning and usage, one might argue that since evidential languages extend maximal relevance and importance to explicit and rigorous expressions of epistemological stance, certain speech communities may have a higher regard for truth and reliability of information and, ultimately, the responsibility and credibility of each member of society.

2.4 ENGLISH.

The manifestation of epistemological stance differs from language to language with respect to grammar. English is usually described as lacking any explicit, grammatical system of epistemological stance (Chafe 1986, Mushin 2001): it is instead said to rely on a number of alternative methods to convey epistemological stance, including modal verbs, a number of adverbs and adjectives, and crucially, "miscellaneous idiomatic phrases" (Chafe, 1986).

As many have observed, modal verbs in English are particularly adept at conveying epistemicity. Modal verbs like *could, should, will, might,* and *can* implicitly communicate something about the speaker's opinion towards the truth or potential for truth of a proposition. Functioning quite similarly, adverbs like *certainly* and adjectives like *unlikely* also convey epistemological stance (Chafe 1986). However, the focus on English modal verbs is primarily occupied with speaker attitude and not evidentiality. Evidentiality in English is expressed by "miscellaneous idiomatic phrases," potentially rich linguistic devices that work quite well at expressing the source of reported information.

2.4.1 MISCELLANEOUS IDIOMATIC PHRASES.

In considering whole phrases and clauses as particular linguistic devices with particular functions, Sandra A. Thompson has discussed extensively the role of complement taking predicate clauses (CTPs) as "epistemic/evidential/evaluative formulaic fragments (EEEs) expressing stance towards the content of a clause" (Thompson 2002, 125). The traditional view of grammar holds that "complement clauses are prototypical instances of subordination;...A subordinate clause is...one whose profile is overridden by that of the main clause... *I know she left* designates the process of knowing, not of leaving" (Thompson 2002, 131). Conversely, Thompson argues that subordination is not only a misnomer for the process at hand, but that the complement clauses are not actually subordinate because the "CTPs and their subjects are stored and retrieved as formulaic stance markers" (Thompson 2002, 125). The significance of this study pertains to both English as a whole and its methods of communicating epistemological stance, as well as the language used in this data set. As we will see, there are a number of similar constructions within my data, and their epistemic and evidential natures are quite straightforward.

In a study of narrative retellings, Llana Mushin (2001) also identifies a number of clause type constructions in English with epistemic/evidential functions. In particular, she identifies reportive frames which serve to "contextualise the retelling as a retelling before any narrative information is divulged" (Mushin 2001, 130). For example, at the beginning of a story, tellers would say something like *So this woman is telling this story about…* in order to establish an understanding that the following story is based from second hand information. Although not complement taking predicates, these reportive frames further illustrate English's use of entire

phrases as expressions of epistemological stance.

In addition to reportive frames, Mushin identifies several examples of evidential indirect speech with which "parts of the narrative were represented as the product of some previous telling by being syntactically embedded under a verb of speech (*she said that...*)" (Mushin 2001, 130). She gives the following examples:

(1) a. *She said that the mouse looked like Elvis*.

b. *She said it was big*.

Mushin's examples of evidential indirect speech parallel the syntactic structure of Thompson's (2002) EEEs, as well as their purpose: to report second hand information.

As mentioned earlier, predicates play a central role in EEEs. JoAnne Neff et. al. conducted a corpus-based study aimed at analyzing how "writers construct stance by examining their use of devices of evidentiality, specifically, modal verbs (*can, could, may, might,* and *must*) and nine reporting verbs (*suggest, wonder, argue, explain, express, recognise, say, show,* and *state*)" (Neff et al. 2003, 211). There are two relevant components to their findings that are worth mentioning here. First and foremost, the syntactic structures in which these reporting verbs occur provide even more evidence for Thompson's (2002) assertion that EEE type phrases serve particular evidential functions and are not well described under the notion of complementation. Some examples from Neff et al.'s study are:

(2) a. *Statistics recently state that...*

b. *The pro-gun activists argue that...*

Secondly, since the study compared native and non-native speakers, discrepancies in the frequencies of certain reporting verbs emerged. For the most part, native English speakers made greater use of a wider variety of reporting verbs. This shows that English speakers are aware of the range of linguistic devices at their disposal for expressing epistemological stance. Additionally, it is reasonable to assume that because speakers are aware of the words they are using, they therefore exercise prudence in their selection. In short, English speakers can make special use of the lexicon when choosing the words they want to use to convey epistemological stance, and those choices can have pragmatic effects with regard to individual responsibility for a claim.

Again, from a Functional Linguistic perspective, we might ask why languages like English do not encode epistemological stance as part of a basic grammatical system. If grammars code best what speakers do most, it would appear that cultures using English have not expressed particular, fine-grained assertions of epistemological stance frequently enough for them to become part of the grammar. In other words, it is not entirely apparent that explicitly denoting epistemological stance has been practical enough to be condensed into, for example, a basic set of verb affixes (as are tense, and a number of other concepts).

2.5 The Pragmatics of Epistemological Stance in English.

The above section is not intended to suggest that epistemological stance is insignificant in English, nor that it is never important to English speakers. For example, the American legal system pays close attention to epistemological stance. Susan U. Philips writes,

> "...while we may normally consider second-hand information to be less reliable than first hand information, evidence law not only heightens our awareness of the distinction, but actively excludes the second-hand information outside of trials, and also distinguishes between the seen and the heard through the hearsay exclusion in ways rather difficult for most of us to grasp, let alone apply in ongoing interaction" (1993:258).

Obviously, the awareness of varying sources of information is not governed by grammar. It is possible however, that the importance of this awareness varies from culture to culture and is therefore reflected in the language.

Similarly, Jane H. Hill (2000) discusses the importance of truth and information in political speech. She writes, "The discourse of truth prescribes that political talk should be a source of 'information.' Politicians should reveal in detail specific positions and goals, permitting voters to make an 'informed choice'..." Even though English clearly values careful analysis of epistemological stance in some realms of society like law and politics, it inaccurate to describe it as "ubiquitous in discourse" or "grammatically obligatory." Instead, it seems that fine-grained assertions of epistemological stance in English are left to specific linguistic interactions, and are otherwise non-essential to everyday conversation. That is not to say that it does not occur in everyday speech, but rather that it does not occur frequently enough in English to become reduced to a grammaticized system.

3. Data and Analysis.

By definition, a credibility gap is "a discrepancy or disparity between words and actions" (Soukhanov 1996: 438). It is reasonable to assume that maintaining a good reputation and good credibility is generally culturally desirable and is particularly important for politicians and others that depend on good reputation. Thus, when politicians, for example, make claims, it makes sense that the language they use would be of particular concern as they attempt to balance the dual goals of being substantive and credible. It is the claim of this paper that English speakers have particular, idiomatic linguistic resources available to mitigate the role of individuals in making claims, and consequently mitigating the individual's own responsibility for the truth of those claims. The language used by the current Bush administration and CIA while making the case for the existence of weapons of mass destruction in Iraq provides a prime example of both the expression of epistemological stance in English and the cultural and pragmatic consequences of English's linguistic form. What follows are excerpts from remarks by the President on October 7, 2002 in Cincinnati, Ohio as he outlined the Iraqi threat, and an October 2002 National Intelligence Estimate declassified by the CIA on July 18, 2003.

3.1 MANIPULATING SUBJECT AND SOURCE DISTANCE.

Working from this data and focusing on phrases as expressions of epistemological stance, I propose that there are essentially three ways in which English speakers can manipulate the language used in expressing epistemological stance in order to avoid taking responsibility for a claim. As mentioned previously, these methods concern subject manipulation, and are useful for making the relationship between the evidence and the speaker ambiguous.

Because EEE type constructions are used with a wide range of lexical material, choosing the words to express subject in EEEs has important consequences for speakers and listeners. In another study, Joanne Scheibman (2004) considers the connection between subject expression and pragmatic consequence. In her analysis she writes,

> "In languages such as English that do not have a morphological or lexical inclusive/exclusive contrast, referentially ambiguous uses of 'we' in discourse have important functions. Expressions of group membership or maintenance of positive and negative face, for example, may motivate language users to align themselves with a diffusely conceived class of referents" (Scheibman 2004, 382).

Katie MacMillan and Derek Edwards (1998) discuss the notions of accountability in journalism in connection with the sources for information, and a continuous desire to maintain comfortable proximity to or distance from a source. The article focuses on a particular scandal among British newspapers involving the premature reporting of misinformation regarding the status of a socially prominent woman's decision to have an abortion. They write, "One way of dealing with that factual issue, once it became an issue of *journalistic* accountability, was to separate the reports from their sources, and isolate the sources as the origin of trouble and error" (MacMillan and Edwards 1998, 339).

The presence of EEE type structures requires that a speaker express subject, and presumably, that he or she be aware of who the subject is, whether or not he is included, and finally, whether or not the subject is explicitly referential. Within the data, there is a consistent alternation between third and first person subjects in the EEE type structures. Secondly, within these structures there is also a continuous alternation between referential and non-referential subjects. Consequently, even if a speaker chooses to reference himself by way of a first person plural pronoun for example, he need not specify who is included in the reference, nor does he need to specify the number of people involved. Interestingly however, because the reference is ambiguous, it also gives the speaker an ability to take credit for an assertion if he needs to by including himself in the reference, but also allows for his involvement to be drowned out among an ambiguous number of people included in a generic '*we'* if necessary. Thirdly, these subjects are routinely modified lexically. The effects of lexical modification are both obvious and significant. Most importantly, the subjects of the EEEs do not need to be human, or even animate. Thus, English speakers can creatively express the subject as things like '*satellite photographs'* and accomplish two things: removing any human involvement in either the source or interpretation of some evidence, and semantically augmenting the subject to extend more credibility to the evidence. Again, however, such ability allows English speakers to fault technology (i.e., satellites) for false information and avoid responsibility for a claim, even though the reference to technological means of intelligence gathering can simultaneously strengthen the appearance of a claim.

3.2 First Person Plural and Third Person Subjects.

As mentioned above, one of the most striking features of the collected examples of epistemological stance expression in the data pertains to the expression of a generic, first person plural subject within EEE type constructions**.** A fair number of examples from my data exhibit the use of a generic first person plural pronoun *we* in the place of the subject. The following are examples:

(3) a. *We judge that…*

b. *We assess that…*

c. *We know that…*

d. *We've also discovered…that…*

The use of this generic first person plural pronoun serves two purposes. In a possible case of misinformation, a generic *we* offers the language user the ability to avoid individual responsibility for a claim because there is neither a concrete reference to a specific number of people included in *'we,'* nor is there any indication of who else is included in *'we.'* Consequently, it is never clear exactly who is making a claim and/or interpretation, and an individual's role is easily lost in linguistic ambiguity. Using a plural first person subject disperses the credit for a judgment among an ambiguous group of people. In the case of WMDs not existing in Iraq, the United States Government easily sidestepped responsibility for those claims because the language was intentionally ambiguous in its reference (see above). We cannot tell from the language used who exactly was said to have known anything since '*we'* can refer to any number of people greater than one, and with no specific reference.

On the other hand, in a possible case of correct information or claims that prove true, the use of a first person pronoun would paradoxically allow the speaker to maintain some specific involvement for making a claim, in spite of the fact that there is no actual reference as to who exactly is reporting or making the claim. These examples clearly illustrate that "ambiguity, or fluidity, of expression of number and referentiality in first person plural pronouns can be socially and discursively functional in English conversation" (Scheibman 2004, 382).

Alternatively, when the subject is in the third person, credit for the judgment being cited as evidence for a claim is effectively assigned to a third party, which in this data, was usually inanimate. Referring to the subject of the EEEs in the third person removes the speaker from the interpretation of evidence and prevents him from being implicated later on if the source of that evidence comes into question. The following are examples of third person subjects being used in EEE type constructions:

(4) a. *Most agencies assess that…*

b. *Revelations after the gulf war starkly demonstrate…*

c. *International inspectors learned that…*

d. *Evidence indicates that…*

While the above examples of EEE type constructions reference specific sources for information, an individual speaker is easily omitted. In the event of false claims, it is strikingly apparent that blame is easily deflected to the third person references. By and large, manipulating the expression of subject in epistemological stance expression phrases allows English speakers to obscure and make ambiguous exactly who is making a judgment, and/or who is responsible for the information and evidence being used to support a claim. In either case, the language that President Bush and the CIA used was carefully chosen to not specifically include or explicitly mention any person(s) directly within the Bush cabinet.

3.3 NON-REFERENTIAL VS REFERENTIAL SUBJECTS.

Another interesting component of the observed evidential language from my data deals again with ambiguity and non-referentiality. Within the data there was an overwhelming occurrence of non-referential subjects compared to one referential subject. Additionally, while a number of the non-referential subjects were pronouns, there was also a consistent use of lexical items in the position of subject. The following are examples of the overwhelming abundance of non-referential subjects used in EEE type constructions within the data:

(5) a. *Former chief weapons inspector has said…*
vs.

b. *Surveillance photos reveal that…*

c. *Evidence indicates that…*

d. *We have seen that…*

e. *All agencies agree that…*

f. *Most agencies believe that…*

g. *Revelations…reveal that…*

h. *Some have argued that…*

Using non-referential subjects prevents any trace to a specific person, and effectively allows the speaker making the claim to avoid implication after the fact, even though elaborate descriptions of sources also give the appearance of stronger evidence. Additionally, the use of lexical items, and not pronouns, as subjects semantically strengthens and emphasizes the appearance of a source. Thus, even though most of the above examples simply indicate second-hand information, English users can describe them as '*revelations,' 'agencies*,' or '*surveillance,'* and give them a more professional, high-tech, and credible appearance. Most importantly, however, the use of non-referential subjects prevents the ability to trace any evidence or responsibility for a claim to

any specific person and simultaneously removes any individual role in making a claim.

3.4 Lexically Modified and Semantically Qualified Subjects.

A third approach to distancing sources through language involves lexically modified and semantically qualified subjects. MacMillan and Edwards (1998) noted that specific description of source actually enables news organizations to sidestep responsibility: "In contrast, the *Sunday Express's* daily equivalent cited the obstetrician (Bennett) as revealing the news 'exclusively' to it, and in focusing on him, implicated Bennett himself as blameworthy" (MacMillan and Edwards 1998, 328). In an almost identical manner, the language used by the Bush administration repeatedly references outside sources and sets the sources up for later implication and blame, if necessary. It seems that increasingly specific descriptions of sources are positively correlated with their ability to absorb deflected responsibility. There were a number of examples in my data of how subjects of EEEs were embellished and described in detail.

(6) a. *An array of clandestine reporting reveals that…*

b. *The best intelligence indicated that…*

c. *International inspectors learned that…*

This technique extends the best of both worlds to language users and especially to politicians as they make claims. In the case of misinformation, blame is easily placed on the shoulders of the 'expert' or 'technology,' while in the case of correct information, credit is easily taken for providing 'exclusive,' professional, and high tech sources. The effects of picking and choosing words to describe and/or occupy the space of the subject are quite straightforward. President Bush and the CIA deliberately embellished the sources of information and made no mention of any specific individual's role in making the claim. Thus, photos became '*surveillance photos*,' and intelligence becomes the '*best intelligence.'* Such language serves two ends: creating a stronger case for the claim, and preserving the ability to sidestep responsibility by emphasizing the source if that claim turns out to be false.

3.5 Additional Effects of the Phrase.

Although English has set word order, the phrasal unit in English is highly mobile. The grammar of English allows embedded clause atop embedded clause, and frequently there are pragmatic and emphatic consequences of this embedding. As a result, EEE-type constructions need not occur at the beginning of a claim. The positioning of the clause containing the basic claim at the front of the entire clause, with the EEE-type clause following, has two effects. First, the claim is made before it is certified, and secondly, the certification (EEE) is subdued and underplayed. This type of construction allows for nearly pure speculation to be put forth with confident assertion. Since English does not require that the clause containing the claim nor the verb within the clause be grammatically marked for epistemological stance, the result is separate cognitive processing for two phrases. Naturally, whichever comes first is emphasized. The following is an example from the data.

(7) a. *"The US probably would be the primary means by which Iraq would attempt to conduct Chemical Biological Warfare attacks on the US Homeland, although we have no specific intelligence information that Saddam's regime has directed attacks against US territory."*

The Bush administration made the claim that the U.S. would be victim to chemical and biological warfare attacks even though immediately afterwards they clarify the remarks to say that they actually had no such evidence. How two seemingly contradictive statements can be made in sequence and still have some effectiveness in convincing a country to go to war seems odd at first, but if we look at the language, it is apparent how placing the EEE type construction after such a bold statement downplays the source of evidence. When the claim is presented first, and as a declaratory statement, it is no wonder that less attention is paid to the evidence for that claim, if there is any at all.

4. CONCLUSION

The claim of this paper is not that English does not encode epistemological stance, nor that non-English speakers cannot sidestep responsibility for their claims. Rather, the claim is that the ways in which epistemological stance manifests itself in English are advantageous for speakers to limit their own role in making unverified claims, especially when the claims turn out to be false. The language used by the Bush administration in its push for war in Iraq provides clear examples of how English disperses, displaces, and dissolves individual responsibility by manipulating the expression of subject and consequently making ambiguous the relationships between speakers and their knowledge. It is certain, though, that deception is universal to all cultures and not a consequence of any particular language. However, there appear to be different methods of and different obligations (grammatical) for expressing epistemological stance in different languages. That alone raises the question of how each can influence a speaker's ability to manipulate his or her own language. The most important observation of this paper is that English speakers are not grammatically obligated to express epistemological stance. It is therefore possible that the methods for expressing epistemological stance in the English language are more conducive to sidestepping responsibility for a claim than those used in languages where epistemological stance is grammatically obligatory, and therefore more limited.

It should be noted that this phenomenon is part of the English language and is not limited to these data or political speech. And while the language that President Bush and the CIA used while making the case to go to war with Iraq was a prime example of language that was rich with linguistic expressions of epistemological stance, and circumstances where credibility and responsibility were very important due to the nature of the claims being made, more analysis of other data should be carried out.

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SECOND LANGUAGE ACQUISITION IN PRESCHOOL: A FUNCTIONAL ANALYSIS OF CHILDREN'S CONVERSATIONS IN A BILINGUAL CLASSROOM

BETHANY B. A. MULLER
University of New Mexico

The focus of this research is to investigate the influence that peers have on the development of a second language (L2) for preschoolers living in New Mexico. The data were collected in a dual-immersion preschool classroom where Spanish dominant and English dominant speakers were grouped together to work cooperatively on various tasks. Discourse analysis is used to determine the functions of early L2 language use and to analyze how children construct knowledge of an L2, negotiate meaning, and provide linguistic scaffolds to enable successful communication between speakers of different native languages. The data show that the L2 is being used for three primary linguistic functions by both groups of speakers. In these functions the essence of the motivational factors that lead an L2 learner to initiate use of the L2 is revealed. The primary motivational force behind early L2 production is to get the attention of one's peers.

1. INTRODUCTION.

Previous research on early bilingual acquisition has primarily focused on children raised bilingually in the home (e.g., with one parent speaking language x to the child and the other parent speaking language y) (Leopold 1939-49, Meisel 1990b, DeHouwer 1990). Studies conducted on second language acquisition address children and adults learning a foreign language in school (Cummins 1981, Krashen 1982) or as a result of relocation (Stevens 1999). Peer learning in regard to language acquisition has been addressed in the elementary grades (Fillmore 1991), and the few studies that focus on peer learning and preschool bilingual language development apply to preschoolers learning English as a second language in the United States (Chesterfield et al 1983). Children in these studies are exposed to the second language, English, both in the preschool and in the surrounding environment. This is a very different situation from English speaking toddlers in the U.S. trying to learn Spanish. The difference lies in the fact that as a majority language speaker, exposure to the L2 is usually limited to the classroom environment, whereas a non-majority language speaker acquiring the majority language as an L2 receives input both in and outside of the school. Therefore, the situation of majority language speakers acquiring a second language provides far more information about the true nature of how peers can influence L2 learning in a preschool setting.

Even though there are preschools in New Mexico with Spanish and English speakers mixed together, oftentimes there is little support for native English speakers to acquire the non-majority language, Spanish. Instead it is the speakers who speak the non-majority language that are told to assimilate to the majority language and culture. There are a few dual-immersion preschool and elementary school programs that support the development of both Spanish and English for all the students. These programs capitalize on the fact that in this area of the country we have a large enough population of native Spanish speakers and native English speakers to serve as linguistic models for each other in acquiring their respective L2s. The data for this research paper were collected in a dual-immersion preschool classroom that is part of a dual-

immersion elementary school. Parents who send their children to this school view bilingualism as a positive asset for their children to acquire. In this case, majority language speakers are seeking out a situation in which they can learn a second language because they value it.

The preschool setting facilitates negotiation and practice with language which is not available in an adult's or older child's classroom. Because the focus of preschool lies more heavily on the ability to communicate and get along with others than on learning academic skills, I believe that the types of peer interactions of preschoolers are more supportive of language learning than the peer interactions of older learners; therefore it is important to analyze the impact that peers in preschool have on language acquisition and not assume that the peer learning circumstances and outcomes of older learners are directly applicable. Ervin-Tripp (2000) also emphasizes the importance of studying peer interaction in children. "Peer interaction shows us how children provide structure to talk when they are on their own…With studies of peer interaction, we clearly have much more access to the features of talk that are aspects of child culture transmitted from child to child" (274). The discourse analysis component of this study provides insight as to how children construct knowledge, negotiate meaning and provide linguistic scaffolds to enable successful communication between speakers of different L1s. In order to improve instructional support of early L2 learning for both majority and non-majority language speakers, we must have a better understanding of the process of L2 acquisition for preschoolers working in peer learning groups comprised of Spanish and English speakers.

2. SOCIOCULTURAL THEORY.

This research is grounded in a sociocultural approach to understanding language and development. One of the major assumptions of sociocultural theory is that we must address language from a social and functional perspective (John-Steiner, Panofsky, and Smith 1994). Furthermore, individual and social processes act upon each other in a complex and interdependent fashion (John-Steiner and Mahn 1996). Vygotsky (1978) argued that an individual constructed knowledge while taking part in social and cultural activities. Therefore, a teacher in a classroom does not stand before the class as the keeper of knowledge to be given out to the students. The process of acquiring knowledge is the "transformation of socially shared activities into internalized processes" (John-Steiner and Mahn 1996, 192). This argument seems particularly insightful when considering the linguistic development of an individual. A child learns language by being part of a community of language users and relying on the knowledgebase and experiences of others within that culture to internalize language. It is not simply a cognitive transformation that takes place within the individual.

One particularly productive application of sociocultural theory is to educational research. In this regard, Minick et al. (1993) stress that the "institutional context of social interaction" should be given great consideration (6). Schools, as well as other institutions, have heavily routinized interactions between different people. Therefore the interactions cannot be analyzed without examining the context of the schools and the "way human social life is organized within them" (Minick et al. 1993, 6). One notable component of a typical public school classroom in the United States is that the children should listen while the teacher is talking, and in general, the teacher is given more time to talk than the students. This aspect of school life has deep historical roots in the system. When the children are playing or have center time, they are free to converse with their peers; but, this is usually not considered instructional time. In regard to L2 learning, however, bilingual conversations that take place while the children are engaged in play

oftentimes do lead to L2 development. Therefore, this is an important component of L2 acquisition to focus on in the classroom. Peers speaking different languages while engaged in a heavily contextualied activity can coincidentally create a zone of proximal development for each other specifically in regard to L2 learning. This idea is somewhat divergent from Vygotsky's idea of the zone in which a teacher or more experienced peer is mediating the learning process (Moll and Whitmore 1993, 39).

Sociocultural theory also emphasizes the importance of play on development (Mooney 2000). Make-believe play leads to intentional behavior, because in this type of play children often act out roles and must follow rules needed in order to play the role (Bodrova and Leong 2003). Children often take on the roles of adults (e.g., teacher, doctor, mother) and will act and speak in ways that represent these roles as they understand them. In my observations of preschoolers, I have seen this to be a source of L2 experimentation. When acting the role of the teacher, children will read a book or present a lesson to another "student" and use the language of the teacher, which may be the child's L2. Like private speech, this can be a form of practice with the L2 prior to using it in conversation with a native speaking interlocutor.

Preschool bilingual education programs draw on the socialization of toddlers, which supports key elements of the language learning process, such as motivation, and access to contextualized input. In order for an individual to learn a second language he or she must be motivated to do so (Moyer 1999). The desire to be involved in play with other children and a desire to explain or describe a situation provides a rich opportunity for the development of a second language. Fillmore (1991) suggests that in order to acquire knowledge of an L2 the learner needs "exposure to linguistic data in the form of situationally anchored speech produced by speakers of the language in the context of social interaction that involves the learner in one way or another" (54). Preschoolers' conversations are almost always situationally anchored or based on the children's surroundings.

3. Social Context of the Study.

The research site for this study is a dual-immersion elementary school located in the Southwestern region of the United States. The school has approximately 500 students and 75 teachers; approximately 50 of the teachers are bilingual in Spanish and English. During the 2001-2002 school year, more than 90% of the students at the school site were Hispanic and more than 95% received a free or reduced lunch. The school is known in the district and nationally as having an exceptional bilingual program. Data were collected in the preschool classroom, and the average age of the participants is four years. There are 15 children in the class: seven Spanish dominant speakers, five English dominant speakers, and three bilingual speakers.

4. Data Analysis.

The intent of this research is to discover what motivational factors lead a young L2 learner to attempt to use the L2 with his or her peers. A discourse analysis is used to categorize the functions of L2 utterances and answer the following research questions: what linguistic functions are used by L1 English speakers and L1 Spanish speakers working together in peer groups? Are these functions the same for the two groups of speakers? What do the selected utterances show us about how L2 language speakers construct knowledge of an L2, negotiate meaning, and make use of linguistic scaffolds in the L2?

An intervention was conducted to analyze the children's language use in different cooperative group settings. For the intervention, the children worked in groups of four at a designated table in the classroom on various projects. The children were videotaped while working in the cooperative groups so that the child-child conversations could be analyzed with as little interruption from the teacher/researcher as possible. There were two types of activities in which the children were engaged: 1) individual work completed in a group setting and 2) the completion of one group project that the children worked on together. For example, for one activity, the children threaded beads on a string to make their own necklaces. They were seated at the table together to share the beads, which were placed in a large bowl in the center of the table. As an example of a group project, the children constructed one large butterfly by gluing small squares of colored tissue paper onto a poster board cutout of a butterfly.

There were also two types of groupings in regard to the ratio of Spanish versus English speakers. One group type contained three Spanish dominant speakers and one English dominant speaker, whereas the other group type consisted of two bilingual speakers, one Spanish dominant, and one English dominant speaker.

From the discourse analysis of the children's conversations three functional categories of utterances emerged: (1) to get attention by providing new information, (2) to get attention following a repetitive theme in the conversation, and (3) private speech or practice with the L2. These categories reveal, in part, how second language learners construct knowledge of an L2.

4.1 GETTING ATTENTION BY PROVIDING NEW INFORMATION.

The following excerpts from the discourse analysis demonstrate how the children attempt to get the attention of another child by providing new information in the conversation. In example (1) a. Zoe, a Spanish speaker, is trying to get the attention of Jena, an English speaker. Zoe uses English in her efforts to converse with Jena, because Jena rarely uses any Spanish words even when in a group consisting of herself and three Spanish dominant speakers.

(1) a. Get Attention/New Information

Zoe:	*That's green,*
	…look it,
	…Jena look.
Jena:	*Cool.*
Zoe:	*You can open it--,*
	…It's orange.
	… Jena.
	You can put it red--,
	…You can put it red Jena.
	And you can put it red.
	See?
Jena:	*Cool.*
Zoe:	*Ow,*
	Hey-,
	…Don't paint me Jena,
	…no no no no pinting me,

…no pinting me.
…Ya me voy a mi casa…(MAKING BUTTERFLY FLY; GETS NO RESPONSE, LOOKS AT JENA AND SAYS IT IN ENGLISH.)
I go my house.
Jena: *I haven't did this.*

In example (1) b. Joshua, an English speaker, is attempting to use Spanish with his friend Sandro who is a Spanish speaker. They are identifying drawings of fellow classmates that are taped to the wall.

(1) b. Get Attention/New Information.

Joshua: *Esa Lisa.*
'this Lisa'

Oh, I--,
…I think that's Yolanda.
No,
…esha mata.
…Natasha?
…Bella?
…no.
Bella acá,
'Bella's there'

aquí Bella.
'Here's Bella'

Sandro: *Yo ya.*
'enough for me'

4.2. GETTING ATTENTION BY FOLLOWING A REPETITIVE THEME.

Examples (2) a. and (2) b. show how the children will attempt to get attention from another child or maintain their role in the conversation by following a repetitive theme in the discourse. The use of the repetitive theme demonstrates how linguistic scaffolding is utilized among young L2 learners in peer groups. This type of scaffolding would probably not take place in a traditional teacher-student relationship. In example (2) a. Lenny and Yolanda are Spanish speakers using their L2, English, with Jena, an English dominant speaker.

(2) a. Get Attention/Repetitive Theme.

Jena: *Look at all them.*
Guys look already.
Lenny: *Look already,*
…I have.

Yolanda: *Look me,*
…oh look this one.

Jena: *You're not doing it that fast.*
You have to try and find a lot.
Yolanda: *Loooook,*
…I got it first.

In example (2) b. the single English speaker in this group, Joshua, is using Spanish to follow the repetitive theme in the discussion of colors of paint.

(2) b. Get Attention/Repetitive Theme.

Sandro: *Este es yellow*,
'this is yellow,'

…es yellow.

Olivia: *Amarillo.*
'yellow.'

Joshua: *Amarillo.*
'yellow.'

Sandro: *Y tambien se puede decir yellow.*
'and you can also say yellow.'

Zoe: *Y esto es green.*
'and this is green.'

Joshua: *Es a a a ra mi llo.*
'it's yellow.'

Similar to the previous example, example (2) c. demonstrates an English speaker, Jena, in a group of three Spanish speakers, using a Spanish word previously heard in the conversation.

(2) c. Get Attention/Repetitive Theme

Henry: *Los chiquitos no se puede poner.*
'The little ones don't fit.'

Lenny: *Yo quiero un chiquito como el.*
'I want a little one like his.'

T: *Pues hay muchos.*
'well there's a lot of them.'

Jena: *These ones are chiquitos.*
'These ones are little.'

4.3. PRIVATE SPEECH.

The third functional category that emerged is that of private speech. In many cases the children appear to be practicing the L2 with the aid of private speech. Private speech is indicated when a child makes an utterance that is not directed at another child. There is no eye contact or gesture toward another child, and they often lower their voices or whisper. In example (3) a. Yolanda and Zoe are both practicing their L2, English, with the use of private speech.

(3) a. Private Speech (Spanish speakers using English private speech)

Yolanda: *Este es que,*
'this is what,'

…green.
I like this one.
This one my favorite. (ALMOST WHISPERING)
Zoe: *Dónde está--?*
'where is--?'

…dónde está mi brocha?
'…where is my brush?'

T: *Tienes que compartirlas.*
'you have to share them'

Zoe: *Mi brocha.*
'my brush.'

…My brush.

In example (3) b. Joshua is using private speech with a form of made up Spanish. Many of the words he says resemble Spanish words though they are not always correct. He often uses the word MATRAQUITO, or some form of it. His word is similar to the Spanish word mariquita, which means 'ladybug'. In his class they had been learning about ladybugs and butterflies, and I believe he is using the word MATRAQUITO to refer to his butterfly. Joshua is playing with the sounds and words in Spanish, which is accepted by the Spanish speakers of the group. Sandro and Zoe entertain his attempted use of Spanish by repeating his words or making them part of the conversation.

(3) b. Private Speech (English speaker using L2 Spanish private speech)

Joshua: *Catra mato.*

Sandro: *Hey [I like this]*.

Zoe: *[cato cato cato]*. (CHANTING; FOLLOWING JOSHUA'S MADE UP SPANISH)

Joshua: *Esha matraquitra.*
'this butterfly'

Sandro: *Quitra you.*

Joshua: *Etra--*,

Esa you.

Zoe: *Cuando acaba eso nos va a dar mas verdad?*
'when this is gone you're going to give us more, right?'

Joshua: *Esha ma-,*

Isha matraquito.
'this butterfly.'

Ok,

Look at my butterfly.

Ahh,

…Esha matraquito. (ANNOYED THAT THE BUTTERFLY MOVED)
'…this butterfly'

Sandro: *Que matraquito.*

5. CONCLUSIONS.

The goal of this research was to discover what motivates a young L2 speaker to use the L2 with his or her peers without being prompted by the teacher. There is evidence of L2 comprehension by all the children when they respond to their teacher during whole group activities; however, the more difficult task of L2 acquisition is production. The initial stages of L2 production are particularly difficult to capture and analyze. Referring to L2 learners, Lantolf (2003) talks about the importance of developing a level of proficiency in which the speaker uses the L2

"spontaneously without conscious awareness" and that the "language must be used at the level of operation as a tool for realizing specific concrete activities" (367). The current data show that in this bilingual preschool classroom the L2 is being used for specific linguistic functions. In these functions we find the essence of the motivational factors that lead an L2 learner to initiate use of the L2 when working in cooperative groups.

The primary motivational force behind early L2 usage is to get the attention of one's peers. This is accomplished by providing new information to an interlocutor as well as by following a previously introduced theme. When using the L2 as part of a repetitive theme, the children are not always trying to get the attention of one particular child but are often trying to create or maintain their role in the conversation. In Moll and Whitmore's (1993) study of a bilingual classroom they also found that both languages were used to forge social relationships and "to expand opportunities to obtain, create, and communicate knowledge" (37).

Another finding is that the type of activity, whether it was an individual or group project, had little impact on the amount of conversation and L2 usage. The ratio of the group, however, was critical. It was only in groups with a ratio of three Spanish speakers and one English speaker that an English speaker made any utterances in the L2, Spanish. If there were more than one English speaker in the group, then English dominated the conversation. In these particular groups the Spanish dominant speakers either spoke very little or used the L2, English. This result indicates that even at this early age the children have already made judgments about the status of each of these two languages. There are more Spanish speakers in the class than English speakers, and the teacher uses more Spanish throughout the day than English, yet English is still treated as the primary language. This finding leads to some pedagogical implications. In bilingual programs where there is a focus of L2 development of the non-dominant language of the surrounding society, the L2 learners need to be grouped with, and outnumbered by, native speakers of the L2. Because "learning and development take place in socially and culturally shaped contexts" (John-Steiner and Mahn 1996, 194), it is essential to carefully examine the classroom community to begin to understand the process of internalization of the second language. Hearing the L2 from the teacher is not enough if a higher level of proficiency is the goal. Teacher input appears to advance the students L2 levels of comprehension, but for the development of L2 production, peer interaction is critical.

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THE WORLD OF *WHAT*: NOT JUST A TOOL FOR MANAGING MENTAL SPACES IN DISCOURSE

DANIEL OLSHER
University of New Mexico

This paper analyzes the discourse functions of what *from a cognitive mental space perspective. What is a key tool in signaling the necessity of construction of new, content-specified mental spaces (Fauconnier 1994) as a discourse proceeds.* What *is noted as the 32nd most common word in the 5 million-word American Heritage corpus of American English (Carroll 1971: v, 565). In this paper I examine 392 tokens of* what *drawn from 13 conversations in the Santa Barbara Corpus of Spoken American English (SBCAE).* What *can signal the creation of various different types of mental spaces, but the most frequent use is to create spaces that contain processual semantics. This usage instructs the hearer to build a new mental space, using the processual specification clause following* what *as a blueprint for what the space should contain. The paper also outlines other ways in which* what *functions as a mental space constructor, including its use as a question word signaling the creation of a "response space", as well as in adjectival/intensifier constructions and* what if/for *constructions. These uses are contrasted with several uses of what in purely syntactic constructions that do not seem to be related to the creation of mental spaces. The uses of* what *are also shown to be shaped by the speaker's information-carrying needs, thus confirming the axiom of functional grammar that syntax follows pragmatics.*

1. INTRODUCTION.

What is the 32nd most common word in the five-million-word American Heritage corpus of English (Carroll 1971: v, 565), and this high frequency is not surprising for such a versatile word. As we will see, not only does *what* play a central role in speakers' efforts to create and manage mental spaces as they speak, but it also participates in a family of constructions which extend its mental-space semantics, and through its syntactic patterning, it offers an argument for the iconicity of syntax.

2. THEORETICAL BACKGROUND: MENTAL SPACES.

This paper describes a study of 392 tokens of *what* taken from thirteen conversations (around 75,000 words) in the Santa Barbara Corpus of Spoken American English (SBCSAE) (Du Bois 2000). Out of six different constructions containing *what*, four of them involved the management and creation of mental spaces, which together accounted for over 90 percent of the data. The importance of mental spaces to discourse may partially explain the high frequency of *what* in speech.

Since most of *what*'s constructions center around the concept of mental spaces, it is worthwhile to briefly review them here. For in-depth information, the reader is referred to Fauconnier (1994). Mental spaces are idealized metaphorical containers that are dynamically created whenever circumstances require language users to temporarily create 'alternate realities'.

Among other items, mental spaces can contain entities at various levels of abstraction, as well as connectors (Fauconnier 1994: 3-4), which represent 'hyperlinks' between entities and are similar to the referential mechanism used by humans to connect names to objects in the world.

An example would be the sentence *If I were you, I'd hate me* (Fauconnier 1994: viiii). Because counterfactual information is involved, this example requires the creation of a new space in which the speaker assumes the role of the listener in some other circumstance. In that space, there is a connection established between the speaker-as-listener (counterfactual) and the speaker (factual), which sets up the proper relationship between the entities involved and facilitates understanding.

3. THE WORLD OF *WHAT*.

As suggested above, six different constructions involving *what* were identified in the data. Four of these are based on the creation/management of mental spaces, and two are simple syntactic devices which can be explained as simplified schematizations over the mental-space constructions which have lost most of their mental space semantics.
Table 1 presents a numerical breakdown of the construction results.

Mental Spaces-Based Usages		**Rounded (Approximate) Relative Occurrence Percentages**
MS-1	**Specific Mental Space Construction** (includes space content specifier)	55%
MS-2	**Question Word** (interrogative semantics; constructs a 'response' mental space; has response specifier)	39%
MS-3	**Adjectival** (Has intensifier construction as a special case)	Negligible
MS-4	***What if/for* construction**	Negligible
Non Mental Spaces-Based Usages		
N-1	**Repetition**	4%
N-2	**Selector**	3%

TABLE 1. SUMMARY OF USAGES OF *WHAT* AND THEIR APPROXIMATE FREQUENCIES.

3.1 CONSTRUCTION MS-1: SPECIFIC MENTAL SPACE CONSTRUCTION.

We now discuss each of these constructions in detail. The prototypical form of this construction is <EPISTEMIC COMMENT> *WHAT* <SPECIFICATION CLAUSE>, where an 'epistemic comment' (cf. Complement Taking Phrase in Thompson 2002) is a statement of the speakers' feelings, opinions, or state of mind. An example would be *I don't know* in *I don't know what you gave him*.

This construction instructs the hearer to build a new mental space, and the specification clause following *what* provides instructions on what the space should contain. The process of going from specification clause to space contents makes use of a process I call SCHEMATIC TRAVERSAL, which is a metaphorical process of tracing through a situation while collecting events and the effects of these events through time. This notion is related to Langacker's (1999) notion of scanning, and is meant to imply the collection/gathering up of deep cognitive data such as experiences, relationships and relevant objects as one searches through memory.

A good example of this kind of traversal is sentence (5) below, where the phrase *what she was going through* involves starting at the beginning of an ordeal and following the participant's experiences as the event progresses, all the while collecting traces of events and relationships as they are encountered. The use of the words *go through* in this idiom in fact offer good evidence for the correctness of the 'journey' conceptualization inherent in schematic traversal.

In the construction at hand, then, the schematic traversal process is executed on the specification clause, and the traces thus collected are bundled up together into a new mental space. Overall the language user must:

a) create a new, empty space;
b) schematically traverse the action coded by the specification clause through its various stages;
c) collect all the experiences traversed, and
d) integrate these experiences into the space, together with any and all appropriate connector elements that may have been encountered during the traversal process.

Once established, when a new space is referred to in text it is most often treated syntactically as if it were a noun. Any sort of noun-referring expression may be used, from pronouns to full lexical NPs (i.e., *that thing you were talking about*). Below are some examples of this construction from the corpus.

(1) *Isn't that WHAT you gave the neighbor one time* (SBCSAE 11/158)[1]

Here, *what you gave the neighbor one time* acts a specification clause, indicating what should be in the new space, and acting as the source material for the process of schematic traversal.

(2) *What goes around comes around* (SBCSAE 3/1465)

[1] When quoting from the SBCSAE, the convention (SBCSAE conversation number/line number) is used.

This example is of course idiomatic, with both compositional and idiosyncratic meanings, but its overall form is motivated in terms of the construction described here. *What goes around* describes the contents of a mental space, one which requires a great deal of social knowledge to create. The schematic traversal process operates upon one's knowledge of society, namely those 'things that are likely to go around'. The value of the schematic traversal process in this example is that once all of these schematic events have been collected and the space created, all of the disparate events traversed can now be treated cognitively as a single entity, thus greatly simplifying their handling.

Looking at the discourse context, it is possible to see why the speaker may have chosen this construction; what was 'going around' in this case was a complex amalgam of ideas around the theme of 'nature's life cycle', whereby one organism becomes food for another and so on. The ability to treat a large amount of complex information as a single entity is a powerful technique for reducing cognitive load.

(3) *I'll call you when I know WHAT we're doing* (SBCSAE 10/1101)

What we're doing calls for a rather underspecified mental space, containing just the schematic outlines of various activities that could be undertaken during an evening.

(4) *And then will you let us know what the final verdict [is]?* (SBCSAE 8/1485)

Here, *the final verdict* selects for just the *conclusion* of a judicial process. Thus only *part* of the result of the traversal process is brought into the new space.

(5) *I didn't realize what she was going through* (SBCSAE 1/1238)

In example (5), *was going through* depicts a process of undergoing trying activities, and is a prototypical example of schematic traversal.

(6) *What happened happened* (SBCSAE 10/191)

The specification clause here consists of the single verb *happened*. This specification refers to some unspecified (but discourse-salient) sequence of events, and again requires recourse to (social) context in order to determine what is traversed over. The schematic traversal process is also hinted at by the speaker's use of a verb form as the specification clause.

(7) *Then what I'll do ... is,* (SBCSAE 8/262)

What I'll do establishes a placeholder for an unspecified sequence of actions that will be undertaken by the speaker. This is a useful device, because as the speaker fills in the gaps with further speech, each interlocutor has a mental space in which to 'store' the information that is to arrive next.

(8) *So they don't know what the hell they're doing.* (SBCSAE 4/471)

This case involves an overlay of two different constructions, *what the hell* (adjectival, section 3.3) and *what they're doing*, which is an instance of the construction covered in this section.

In the data, there appears to be a trend towards using more complex forms of reference (*that thing you were talking about* as opposed to *that)* in further discourse whenever complex mental space referents remain present in discourse for some time. This could be an iconic clue that the referent the hearer needs to locate (i.e. an assembled mental space) is a complex one.

3.2 CONSTRUCTION MS-2: QUESTION WORD.

This construction is very similar to MS-1 except that it has interrogative semantics. The question/answer process here involves the creation of a mental space as a 'container' for holding the response to the question. This construction can be employed in the case of questions which are so semantically rich that the uses of full mental spaces are necessary to contain their responses.

In this construction the specification clause works to provide the hearer some information about the expected response. The 'null' case, a specification clause that does not exist and cannot provide any information (i.e., *what?*), has grammaticized into its own construction (and even now has its own prosody), which is treated as construction N-1 in section 3.5 below. As an aside, the semantics for construction N-1 are exactly as we would expect with a null response specification clause; i.e., the response can be anything (although in practice the context is likely to have some contribution towards constraining the response even if the construction itself doesn't).

Some examples of this construction from the data:

(9) *What was that?* (SBCSAE 14/227)
(10) *What did she admit?* (SBCSAE 4/984)
(11) *What was the problem?* (SBCSAE 3/477)
(12) *What's his criticism?* (SBCSAE 12/122)
(13) *You wouldn't want to what? (SBCSAE 3/1056)*
(Here, the specification is provided by the earlier part of the utterance, which is in response to a previous statement 'Well I would think you wouldn't want to'.)

Answers to the questions posed by this construction are in general unconstrained other than a bias towards the semantic field called for by the response specification.

(14) *It had a, … one of those ... bottoms that -- ... what do you call it.* (SBCSAE 11/320)

Here we see the fairly routinized expression *what do you call it*, where *do you call it* is the specification of the response space contents. The speaker is using this construction to set up a temporary space with certain constraints in order to help her recall a particular object. This usage may perhaps tell us something about the value of mental spaces in the functioning of memory, as the setup of expectations together with a response space would seem to be an excellent method for facilitating a specific retrieval.

(15) *I have to use a um, .. what, this abrasive sponge* (SBCSAE 3/1400)

Again here, *what* is used to help with retrieval of a particular object name.

(16) *Gee I don't know what it is about this guy I mean.* (SBCSAE 2/1318)

What it is about this guy specifies a very abstract (yet semantically constrained) space and will act as a placeholder for increasing detail in future discourse.

(17) *What, me worry?* (From MAD Magazine)

This (very marked) last example is an interesting hybrid. There is an implied specification phrase after the word *what*, evidence for which is the special prosody that would be required on *what* if this phrase were spoken. The prosody (and syntactic markedness) in fact take the place of the explicit specification phrase, which could be glossed as 'what (sort of crazy thing) do you think' or 'what are you concerned about'. The new mental space is then filled with social knowledge as well as minor schematic traversal on the semantic field of 'worrying'.

3.3 CONSTRUCTION MS-3: ADJECTIVAL (INTENSIFIER CONSTRUCTION AS A SPECIAL CASE).

What can be used to create an entity with the behavior of an adjective in the syntax.This construction takes the form *what* <noun> <NP>.

This construction is a special case of Question Word (MS-2), but has extremely marked syntactic behavior and is thus a separate construction. The construction inherits the behavior of Question Word in that question response and memory retrieval processes are involved.

Some examples:

(18) *The bar generation? In what sense bar generation.* (SBCSAE 6/1721)
(19) *What price freedom?* (Constructed Example)

This is a highly marked construction, and one instance of it was located in the corpus. However, an informal search of the Internet did reveal its use, commonly as titles for articles.

The intensifier construction is a special case of the construction, whereby a purely schematic adjective is created and which takes on its meaning (in most cases a great deal) via convention.

(20) *What a jerk you are (SBCSAE 2/153)*
(21) *Oh my God, what a story. (SBCSAE 2/1253)*
(22) *What a guy. (SBCSAE 4/933)*

The schematic adjective thus created does not appear to create any sort of referent that can be used in further discourse (beyond agreement/disagreement).

3.4 CONSTRUCTION MS-4: *WHAT IF* CONSTRUCTION.

The case of *what if* appears to be excellent evidence for the analysis in this paper, as it represents a simple extension from construction MS-1, involves schematic traversal of a possible world,

and is based upon the creation of a mental space in order to hold the details of the (likely counterfactual) world which is being discussed.

Examples of this construction:

(23) *WHAT if worrying about that, has got in the way* (SBCSAE 5/382)

In this example, *worrying about that* acts as a specification clause.

(24) *WHAT if you took the same ... spacesuit? ... And you put another spirit into it.* (SBCSAE 5/641)

Similar to what we see with construction MS-1, the phrase after the word *what* commonly has the semantics of a process. We now move to the non-mental-space-based constructions containing *what*.

3.5 CONSTRUCTION N-1: REPETITION.

This construction is purely syntactically driven, in that what is simply inserted in the place of a syntactic constituent that needs to be repeated. Mental spaces are not involved as it this construction is just a request for repetition; with *what* placed in the location of the utterance that needs clarification.

Examples:

(25) *Does she have a WHAT* (SBCSAE 2/318)
(speaker replies 'a man')
(26) *The little WHAT?* (SBCSAE 2/467)
(utterance is not followed up)
(27) *WHAT? (SBCSAE 12/425)*
(in response to an interrupted utterance - the listener is responding to a fault in heard communication, and not necessarily posing a question, which would arguably be a case of the Question Word construction).[2]

Because this construction is so independent of both syntactic and semantic constraints, it shows a great deal of flexibility in its use.

3.6 CONSTRUCTION N-2: SELECTOR.

This construction involves choosing from a constrained set of alternatives. It appears to be a simplified version of the mental space construction MS-2, where the response has become so constrained that a mental space is no longer required to hold the response. This construction also makes use of the '*what* + specification clause' syntax that is common to *what*'s other constructions, and its syntactic exponents include <*what* NP> and <*what* NP clause>.

For example:

[2] I thank an anonymous reviewer for pointing this out.

(28) *I don't know WHAT number that is* (SBCSAE 6/1603)
(29) *You don't know WHAT station it was on?*(SBCSAE 2/845)

The semantics of what may be selected from are not limited to number;[3] for example, *what day did he say he would come* (constructed), *what guy are you talking about* (constructed), and *what color is that* (constructed) are all selector constructions involving different semantic domains.

4. THE STRUCTURES OF THE *YOU KNOW WHAT* AND *GUESS WHAT* DISCOURSE MARKERS ARE MOTIVATED.

These discourse markers are variations on the construction MS-2 (Question Word) and involve the creation of a new maximally underspecified space which is to be filled up by the speaker. It is easy to see the motivation for these constructs; if a new space is not created before the speaker begins communicating information on a new topic, the listener may assume that this information is to be related to an old topic/space and thus find themselves confused. These phrases have their own distinctive (somewhat marked) prosodies; this may be because they signal a large change in the current 'processing landscape' of the hearer and thus require maximum attention.

5. SYNTAX AND *WHAT*.

Having now covered the constructions in detail, we can see that *what*'s various forms of syntactic representation may in fact be iconically motivated. Most of its constructions are realized as *what* plus a specification clause, and from an information processing perspective, *what* plus some sort of tightly-temporally-linked specification are in fact the minimum that is required. Moreover, in *what*'s specification clauses, we often see the use of 'action-like' syntactic forms which are plausibly iconic for the process of schematic traversal.

We can find further evidence of iconicity by looking at the question-word construction, which is similar to the specific-mental-space construction, but requires a very different type of specifier phrase; instead of coding for schematic traversal, it codes for the expected *response*. The differing syntax of this construction reflects this difference, as in question word *what* is followed directly by a copula, and then a simplified specification phrase. The copula provides signaling ('this is a question') and possibly separation ('this clause is not as important as, say, an MS-1 specification clause') functions.

As for the adjectival (*what a guy*) and selector (*what time*) constructions, while rather different from each other semantically, they both require immediate indications of what is to be commented on, and this is what we see syntactically. What might be otherwise considered to be their 'strange' syntax can in fact be motivated by the information needs of the tasks these constructions carry out.

Lastly, with the repetition construction, we see exactly what we would expect; there is no common syntactic exponent other than the word *what*. The construction cuts across all syntactic boundaries, which is reasonable because there is no common set of information processing needs across different instances of the construction. In this construction one can use *what* to substitute

[3] This text is itself an instance of construction MS-1.

for any sequence of words whatsoever (likely as they may be to coincide with intonation/processing unit boundaries).

6. CONCLUSIONS.

In this paper we have examined six different constructions (and associated variations thereof) involving the word *what*, and have reviewed the mental space and semantic behaviors of each. We have seen that *what* offers a mechanism for managing the content and creation of mental spaces in discourse, as well as how it participates in a family of constructions, each with interesting semantics.

We have also briefly examined the power of schematic traversal, shown its relationship to specification phrases and discussed its possible role in reducing cognitive load. Lastly, we have touched upon the connection between syntax and information structure, and how *what*'s syntactic patterning may be instructive in this regard.

7. QUESTIONS FOR FUTURE RESEARCH.

In the data, the apparent majority of spaces created by construction MS-1 (Specified Mental Space) did not remain in discourse very long. It would be valuable to do a systematic study on this to determine if this is in fact so, and perhaps more importantly to find out what this tells us about the importance of short-lived mental spaces to discourse and information structure. In the same vein, we might also ask how and why language users are helped by creating mental spaces when they are having trouble locating words/concepts in memory.

It would also be valuable to explore the system of extensions that have developed around the major constructions (such as selector, etc.) to determine why and how exactly these have developed, and it would be worthwhile to ask if there is a role for schematic traversal in any other cognitive processes (as there certainly is for Langacker's notion of scanning).

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A CORPUS-BASED STUDY OF RELATIVE PRONOUNS IN SPANISH ESSAYS BETWEEN THE 17TH AND 19TH CENTURIES*

FLEUR VAN DER HOUWEN
University of Southern California

This paper is a quantitative and qualitative study of the relative pronouns que (that), el cual (which), quien (who), and el que (the one that) in a corpus of ± 35,000 words of Spanish essays written between the 17th and 19th centuries. The study analyzes these relatives in four linguistic environments: 1) restrictive vs. nonrestrictive relative clauses, 2) animacy of the antecedent, 3) presence vs. absence of a preposition, and 4) grammatical function of the relative pronoun in its clause. The data support Arias Alvarez' (1994) claim that modern Spanish, unlike 16th century Spanish, permits quien with an overt antecedent in contexts without prepositions. The study shows that quien has changed with regard to the animacy; whereas quien in the 16th century is found with inanimate antecedents, this does not seem to occur in modern Spanish. Furthermore, there has been a change in frequency of especially que and quien [+animate] regarding the grammatical function each fulfills in its clause. Arias Alvarez' claim that que has remained stable is therefore not supported.

1. INTRODUCTION.

There have been various studies on relative pronouns in Spanish that describe what kinds of relatives were used in Old and Medieval Spanish, and how relative pronouns developed from Latin (Par 1926, Elvira 1989, Snyder Gehman 1982, Cabrera Morales 1994, among others). These studies indicate that there have been significant changes in the relative pronoun system of Spanish before the 16th century.

There seem to be very few studies, however, that fill in the gap between the 16th and the 20th century. The only study, to my knowledge, that attempts to 'bridge' the relative pronoun system from the early 16th century as compared to the relative pronoun system of modern Spanish, is Arias Alvarez (1994). Her study finds very few changes and indeed, on the surface, nothing much seems to have changed, the same relative pronouns are still around and they occur still in the same contexts. This apparent stability may be the reason why this period has not gotten much attention. However, the fact that there has been a visible change with regard to one relative pronoun, *quien* (who), which now is found without prepositions, suggests that below the surface subtler changes are taking place. This expansion of the use of *quien* can be seen as a process of simplification; however, since seldom only one element is affected, other elements in the system may have come under pressure (Silva-Corvalán 1994: 3):

> simplification involves the higher frequency of use of a form X in context Y (i.e. generalization) at the expense of a form Z, usually in competition with and semantically

* I would like to thank Carmen Silva Corvalán and Ed Finegan for their advice when I initially wrote this paper. I would also like to thank three anonymous reviewers for their suggestions. Of course, remaining flaws are my responsibility.

closely related to X, where both X and Z existed in the language prior to the initiation of simplification. Thus X is an expanding form, while Z is a *shrinking* or *contracting* form.

The underlying assumptions of this study are that:

- Linguistic elements are defined by the place they occupy in opposition to other elements;
- There is a general tendency toward 'economy' (or simplification/regulation) of a language as system;
- By simplifying the function of one element, tension elsewhere in the system is created; hence, there is constant change.

The aim of this study is to present patterns rather than an account of all possible (i.e. attested) combinations of contexts and relative pronouns. If we want to know if a certain feature has changed and how the change came about over the course of time, single examples may be misleading; the occurrence may be due to the personal style of a writer or speaker, or it may be an error. This study is, therefore, corpus-based, though limited to one register. The register of essays was chosen in the hope of finding a more extensive use of different relative pronouns. [1]

With a corpus-based approach, this study attempts to provide both quantitative and qualitative analyses showing not only what relative pronouns are possible in a certain context, but also what the preferred contexts are for a specific relative pronoun; that is, how frequently a specific relative pronoun occurs in a specific context. A comparison of these frequencies in different synchronic states may then give insight into the stability or debility of the system. The same form may be found in the 16th and 20th centuries, but its frequency and/or preferred context may have changed.

The paper is organized as follows: after a comparison of the relative pronoun system of two synchronic states, that of the 16th century and that of the 20th century, the linguistic features analyzed are explained and the results of the analyses are presented.

2. Background of This Study.

2.1 Relative Pronouns Analyzed.

In this study I analyze the distribution of four relative pronouns: 1) *que* 'that / who/ which'; 2) *quien* 'who'; 3) *el cual* 'which / who'; and 4) *el que* 'the one that / he who.' *Cuyo* 'whose' and neutral forms *lo que* and *lo cual* will not be discussed. An example of each, coming from the corpus used for the present study, is given in (1) to (4).

(1) *No pequeña suerte alcanza el peregrino incierto del lugar y camino QUE busca con grande anhelo y diligencia si halla un compañero a su igual QUE haga el mismo viaje QUE él deseaba. (Martínez, 17th century)*

[1] The corpus used for this study is a selection of essays (see appendix 1) and is available online at: http://ensayo.rom.uga.edu/antologia/.

'Not little luck strikes the pilgrim unsure of the place and way THAT he searches longingly and diligently if he finds a companion like him WHO makes the same journey THAT he desired.'

(2) *Fabio Quintilian fué también gran crítico, EL CUAL, en el libro de sus Instituciones oratorias, hace un largo y acertado juicio de los poetas, oradores y historiadores insignes. (Cascales, "Al Licenciado Andrés de Salvatierra", 17th century)*
'Fabius Quintilianus was also a great critic, WHO, in the book Oratorical Principles, makes a long and sound judgement of distinguished poets, orators and historians.'

(3) *Dura y tremenda cosa es que el marido, por QUIEN dejó una mujer a sus padres, que fueron en lo natural los autores de su vida, se la quite a ella. (Zabaleta, Error V,17th century)*
'It is a hard and terrible thing that the husband, for WHOM the woman left her parents, who were by nature the authors of her life, kills her.'

(4) *No solamente se han de hacer estos honores a los vivos, sino también a LOS QUE generosamente murieron en la batalla, y a sus sucesores, pues con sus vidas compraron la vitoria. (Saavedra Fajardo 17th century)*
'Not only must these honors be given to the living, but also to THE ONES THAT generously died in the battle and their successors, because with their lives they bought the victory.'

2.2 LINGUISTIC CONTEXTS OF RELATIVE PRONOUNS.

The four relative pronouns are analyzed for their distribution in four linguistic contexts, which are discussed more extensively in section 3.2: here I give a brief overview. A first factor analyzed is whether the relative pronouns occur in restrictive (RRC) or nonrestrictive (NRRC) relative clauses. For example, *The passengers(,) who had been waiting for a long time were tired* can be analyzed as a RRC meaning that only those passengers who had been waiting for a long time were tired, or it may be analyzed as a NRRC in which case the relative clause describes the passengers in general. In writing the intended reading is generally indicated by the absence (in a RRC) or use of (in a NRRC) a comma after the antecedent which is relativized. A second feature analyzed is the animacy of the antecedent. In the previous example, the antecedent *the passengers* was [+ animate]; in *THE BOOK that I read* the antecedent *the book* is [- animate]. Third, the presence vs. absence of a preposition is analyzed. The above examples are all [- preposition]. *The girl WITH whom she lives* is an example of [+ preposition]. And lastly, the grammatical function of the relative in the clause is taken into account. In *The passengers WHO asked first got on the next flight* the function of the relative pronoun *who* is the subject (S) of the relative clause; for another example, in *The book THAT I read* the relative pronoun *that* is the direct object (DO) of the relative clause.

2.3 A COMPARISON OF THE 16TH AND 20TH CENTURY.

The relative frequencies of the relative pronouns in the first three linguistic contexts discussed above are compared and the results are summarized in Table 1.[2]

	restrictive				nonrestrictive			
	que	*quien*	*el cual*	*el que*	*que*	*quien*	*el cual*	*el que*
+ animate – prep.	o m	*o m*	- -	*o m*	o m	- M	o m	- -
+ animate + prep.	- -	o m	o m	o m	- -	o m	o m	o (m)
- animate – prep.	o m	- -	O -	- *M*	o m	- -	- M	o m
- animate + prep.	o m	O -	o m	- M	o m	O -	o m	o m

o: 16th century
o: *16th century, only found if antecedent is covert*
m: 20th century
m: *20th century, only found if antecedent is covert*
(m): 20th century, no examples given but mentioned as possible
- : no examples given and not mentioned as possible
CHANGE**:** highlighted

TABLE 1. DISTRIBUTION OF RELATIVE PRONOUNS IN 16TH CENTURY CASTILIAN PROSE. (BASED ON DATA PROVIDED BY KENISTON 1937A AND ARIAS ALVAREZ) AND OF MODERN SPANISH (BASED ON DATA PROVIDED BY KENISTON 1937B, GILI Y GAYA, ALARCOS, BELLO AND LOPE BLANCH (1984)) WITH REGARD TO RRC/NRRC, ANIMATE/INANIMATE AND PRESENCE/ABSENCE OF PREPOSITION.

Comparing the relative pronoun system from the 16th century (based on examples and claims in Keniston (1937a) and Arias Alvarez (1994)) with that of the 20th century (based on data provided by Keniston (1937b), Gili y Gaya (1961), Alarcos (1999), Bello (1988) and Lope Blanch (1984)), the following can be noted with regard to the factors analyzed so far:

- *que*: no qualitative change.
- *quien*: in the 16th century *quien* is found in the context [- animate, + preposition]; in 20th century *quien* is not possible in this context according to the standard grammars.[3]
- *quien*: in the 16th century *quien* with an overt antecedent was always preceded by a preposition; in the 20th century it is found without prepositions in NRRCs.
- *el cual*: whereas *el cual* was found in the 16th century and not in the 20th century in RRC [- animate, - preposition], this situation is reversed in regard to the NRRC, where [-

[2] The feature 'animate' includes personified antecedents. In the present study, no distinction is made between relatives *que*, *el que, and quien* with overt or covert antecedents, although it will be indicated in the tables if, for example, *el que* with a covert antecedent is found in contexts where *el que* with an overt antecedent is not found.
[3] Lope Blanch (1984), however, has data from Mexico that point in the direction that *quien* is sometimes used with inanimate antecedents.

animate, - preposition] is a possible context for *el cual* in the 20th century but not attested in the 16th century.

- *el que*: no examples of *el que* in RRC [- animate] are found in the 16th century; *el que* in this context is found in the 20th century.

It must be noted that the table is based on examples and claims from grammars. None of the grammars give quantitative information other than an occasional indication that one form occurs more or less frequently than another form.[4] In the next section, the corpus used for the present study is described, and the linguistic factors RRC vs. NRRC, animacy of the antecedent, the presence vs. absence of prepositions, and the grammatical function of the relative pronoun in its clause, which are analyzed in section 4, are discussed.

3. METHODOLOGY.

3.1 DATA.

The corpus consists of essays written in three periods between 1600 and 1900. The register of essays was chosen in the hope of finding higher frequencies of a variety of relative pronouns. For 20th century Spanish it has been shown, for example, that literary written Spanish has higher frequencies of *quien* than spoken Spanish (Butler 1992).

The essays come from a collection made available on the internet by J.L. Gomez. From the 17th century 14,175 words are analyzed from essays written by four different authors, born between 1580-1610. The data for the 18th century consist of 7,549 words coming from two different authors born in 1741 and 1742 respectively. The data for the 19th century consist of 13,965 words coming from three different authors born between 1803 and 1839. None of the essays has more than 3,500 words. Table 2 summarizes the number of words analyzed per period. [5]

Period in which the authors were born:	1580-1610 (17th century)	1741-1742 (18th century)	1803-1839 (19th century)	Total
number of words	14,175	7,549	13,965	35,689

TABLE 2. NUMBER OF WORDS ANALYZED PER PERIOD FROM ESSAYS.

[4] With regard to the 16th century, the table is based on examples that were found by either Keniston or Arias Alvarez; any (partly) empty cells in the table could be due to the character and/ or quantity of texts analyzed.

[5] Because the publication date does not always coincide with the date it was written (one of the essays was published posthumously for example), the periods that are compared are based on the year of birth of the author. I will refer to the respective periods as centuries for ease of reference. The period 1580-1610 will be referred to as the 17th century, although two of the authors were in fact born at the end of the 16th century.

Table 3 presents the frequencies of the relative pronouns *que*, *el cual*, *cual*, *quien*, *el que*, *cuyo*, and the neutral relatives *lo que* and *lo cual*. Frequencies are presented in actual counts, percentages, and per 1000 words. These frequencies are given to present a general impression of the relative pronouns used, and to see if there are any differences in frequency of a certain relative pronoun over the centuries. In section 4 the relatives *que, quien, el cual* and *el que* will be analyzed with regard to different linguistic contexts in which they may occur, in order to see if a change in frequency is related to a specific feature such as the animacy of the antecedent or grammatical function of the relative in its clause.

	17th century	18th century	19th century
	N / % (per 1,000 w.)	N / % (per 1,000 w.)	N / % (per 1,000 w.)
que	172 /68% (12.13)	137 / 82% (18.14)	198 / 78% (14.18)
el cual	3 / 1% (0.21)	2 / 1% (0.26)	12 / 5% (0.86)
quien (es)	34 / 13% (2.40)	6 / 4% (0.79)	15/ 6% (1.00)
el que	45 / 18% (3.17)	22 / 13% (2.91)	29 / 11% (2.08)
Total	254 / 100%	167 / 100%	254 / 100%

TABLE 3. FREQUENCY OF RELATIVE PRONOUNS PER PERIOD, IN NUMBER (N), PERCENTAGE (%) AND PER 1,000 WORDS (PER 1,000 W.)

The relative pronoun *que* is, as in the centuries before and after the ones investigated, the pronoun that is most frequently used, and has increased compared to the other relative pronouns since the 17th century from 54% to 72% in the 19th century; an increase of 18%. *El cual* shows an increase of 3.1%, and *quien* shows a decrease, from 11% in the 17th century to 5% in the 19th century. With regard to *el que* and *el cua,l* there are no noticeable differences in terms of percentages.

3.2 LINGUISTIC FACTORS CODED.

As mentioned above, four factors are analyzed in this study: 1) the type of relative clause, that is, restrictive or nonrestrictive, 2) the animacy of the antecedent, 3) the presence vs. absence of a preposition, and 4) the grammatical function of the relative in its clause. In the qualitative comparison made in section 2, it is shown that except with regard to *quien,* fairly little has changed qualitatively since the 16th century in regards to first three factors. These three factors are analyzed quantitatively in section 4 in order to see whether the frequencies with which the relative pronouns occur in these linguistic contexts also remain stable. In addition, a fourth linguistic factor is analyzed, the grammatical function of the relative in its clause. This factor was not taken into account by Arias Alvarez (1994) but proves to be important, as is shown in section 4.4. Below I explain and exemplify each factor. In section 4 the results of the analysis are presented.

3.2.1 RESTRICTIVE VS. NONRESTRICTIVE RELATIVE CLAUSES.

As is briefly discussed in section 2.1, RRC restrict and specify the antecedent, NRRC give further information about the antecedent without limiting its possible referents. In order to code

the relative clauses I will follow the criteria proposed by the Real Academia (1975), Keniston (1937b) and Trujillo (1990). The Real Academia gives the following criteria for distinguishing between RRCs and NRRCs (summarized from §3.20.2):

a. A RRC specifies and restricts the antecedent, whereas a NRRC only expresses a quality or circumstance of the antecedent
b. The RRC is intimately related with its antecedent, the NRRC is separated from its antecedent by a brief pause in spoken language or a comma in written language
c. A NRRC is independent with regard to the main clause and can therefore be omitted. The RRC cannot be omitted without consequences. This can be seen if we would omit the relative clause *que sabe hacer algo de un modo perfecto […]* 'that knows how to do something in a perfect manner […]' from […] *El hombre que sabe hacer algo de un modo perfecto […] no es nunca un trabajador inconsciente* (cited in Alarcos § 396) 'The man that knows how to do something in a perfect manner […] never is an unconscious worker'.

Keniston (1936a §15) makes the following observation:

> "It should be remarked that a parenthetical relative is found most frequently after a specific antecedent, that is to say, one that needs or permits no further identification, such as a personal pronoun, a proper name, or a noun modified by a determinative."

The above criteria from the Real Academia and the observation by Keniston are used to distinguish between RRCs and NRRCs as they occur in the essays. Although criteria b, the use of a comma indicating a NRRC, is not used as a deciding factor if any of the other criteria point to the fact that the relative cause should be analyzed as restrictive. Cases that cannot be analyzed unambiguously according to above criteria were left out from the analysis.

3.2.2 Animacy of Antecedent.

The antecedents were coded for animacy. Relative pronouns that do not have overt antecedents, as is sometimes the case with *el que* and *quien,* were also coded for this feature. Institutions representing humans were considered animate (the government, the armies, etc.).

3.2.3 Presence or Absence of a Preposition.

The presence or absence of a preposition is analyzed because it is an important factor to at least one relative pronoun, namely *quien*. As was shown in section 2, the presence or absence of a preposition was a decisive factor in the 16th century, as the relative *quien* with an overt antecedent could not occur without a preposition. It was also shown that the presence of prepositions favored some relatives (*el cual*) and disfavored others (*que*).

3.2.4 GRAMMATICAL FUNCTION OF THE RELATIVE IN ITS CLAUSE.

The grammatical function of the relative in its clause has been a decisive factor in the history of the Spanish relative pronouns *que* and *quien*. In Old Spanish, there was a high correlation between *qui* (later replaced by *quien*) for the function of nominative or 'subject' and *que* was used for the function of accusative or 'direct object' (Ridruejo 1977 p21, cited in Elvira 1989). Considering the importance of grammatical function it should not be ignored in the analysis.

The following are examples of relative pronouns functioning as a subject (S), direct object (DO), indirect object (IO), circumstantial complement (CC) and object of preposition (OP) respectively. The only relatives that are found in the function of indirect object of their clause are *el que* and *quien*. An example of *el que* with the function of indirect object in its clause is found in (9).

(7) S: *En esta ocasión llegó un gran pintor QUE venía de Roma* (Martínez, 17th century)
'On this occasion a great painter arrived WHO came from Rome'

(8) DO: *Una de las utilidades QUE produce la ley justa es la paz*: (Zabalata, Error V 17th century)
'One of the utilities THAT just law produces is peace:'

(9) IO: *No solamente se han de hacer estos honores a los vivos, sino también a LOS QUE generosamente murieron en la batalla, y a sus sucesores, pues con sus vidas compraron la vitoria*. (Saavedra, Empresa XCVII, 17th century)
'Not only must these honors be made to the living, but also to THE ONES THAT nobly died during the battle.'

(10) CC: Una reperesentación en QUE los hombres son mujeres y las mujeres son hombres. (de Larra, La nochebuena de 1836, 19th century)
'A performance in WHICH the men are women and the women are men.'

(11) OP: *de allí adelante su ocupación había de ser el lanificio, de QUE tanto se preció Aragne, y tanto Minerva, y no menos deben preciarse todas las Buenas casadas*. (Cascales, A doña Antonia Valero de Eslava, 17th century)
'From then on her occupation had to be that of spinning , THAT both Aragne and Minerva valued so highly, and not less should all good married women take pride in it.'

4. RESULTS OF THE ANALYSIS.

The factors discussed above are analyzed quantitatively in order to see whether there is a correlation between these factors and the use of the relative pronouns *que, el cual, quien,* and *el que*, and, if there is such correlation, whether it has been stable since the 16th century. In section 4.1 the factor RRC vs. NRRC is investigated; in 4.2 the animacy of the antecedent; in section 4.3 the presence or absence of a preposition; and in 5 these factors will be combined and a comparison is made with the earlier tables 1-3 with regard to the relative pronoun system in the 16th and 20th centuries.

4.1 RESTRICTIVE VS. NONRESTRICTIVE CLAUSES.

In this section the data are analyzed by clause type, testing the hypothesis that there is a correlation between the type of clause, RRC or NRRC, and the selection of a relative pronoun. Figure 1 gives a general distribution of the RRCs and NRRCs as they were found in the essays from this period to verify that the texts are comparable, that is, that there is not a great discrepancy between one century and another with regard to the types of clause themselves. There is, in terms of communication, no reason to expect shifts in the frequency of use of a RRC or a NRRC within a register.

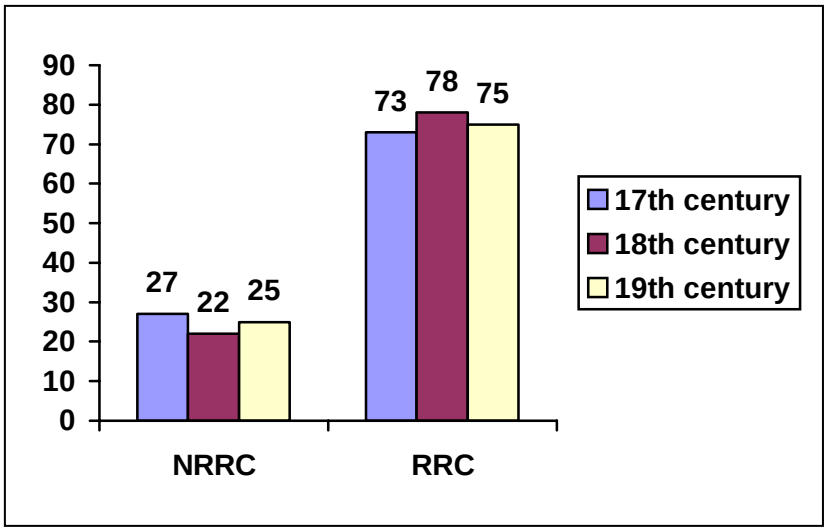

FIGURE 1. RELATIVE FREQUENCY OF NRRCS AND RRCS IN THE 17TH, 18TH AND 19TH CENTURY.

Figure 1 shows that the distribution of the relative pronouns over NRRCs and RRCs is, as was expected, very similar in all three centuries: the RRC is the most frequent with 73%, 78% and 75% for the 17th, 18th and 19th century respectively. The NRRC is less frequent with 27% in the 17th, 22% in the 18th, and 25% in the 19th century. Butler (1992) records a distribution of 84.9% RRCs vs. 12.1% NRRCs in a corpus of spoken Madrid Spanish; this lower percentage of NRRCs may be due to the register difference rather than a diachronic difference. Table 4 presents the frequencies of the relative pronouns in the RRC and the NRRC.

		que	*quien*	*el cual*	*el que*
RRC	17th	116 /62.4%	27 / 14.5%	0 / 0%	43 / 23.1%
	18th	105 / 80.2%	4 / 3.1%	0 / 0%	22 / 16.8%
	19th	148 /77.5%	12 / 6.3%	4 / 2.5%	27 / 14.1%
NRRC	17th	56 / 82.4%	7 / 10.3%	3 / 4.4%	2 / 2.9%
	18th	32 / 88.9%	2 / 5.6%	2 / 5.6%	0 / 0%
	19th	50 / 80.6%	2 / 3.2%	8 / 12.9%	2 / 3.2%

TABLE 4. DISTRIBUTION OF RELATIVE PRONOUNS ACCORDING TO CLAUSE TYPE.

Table 4 shows that although *que* is most frequently used in both RRCs and NRRCs, there has been a change in frequency. In the 17th century *que* was used in 62.4% of the cases to introduce a RRC, and in 82.4% of the cases to introduce a NRRC: a difference of 20 percent. In the 19th century this difference is only 3.1 percent. The other side of the coin is that *el cual* has an increased percentage use since the 17th century and concurs with *que* in NRRCs. *Quien* and *el que* are more frequently found introducing a RRC, except in the 18th century where the percentage in NRRCs (5.6%) is slightly higher than the percentage of RRC (3.1%). The actual counts are very low, however (total of 6 for the 18th century). It must be noted that no distinction is made at this point between relative pronouns, particularly *el que* and *quien*, with covert and overt antecedents. The relative pronouns that have a covert antecedent were all coded as restrictive.

El cual is not found in the 17th and 18th century in RRCs, whereas there are four cases found in the 19th century. This is rather unexpected, although the frequency of *el cual* in general is higher in the 19th century (4 cases in RRCs and 8 cases in NRRCs). An example of *el cual* restricting its antecedent is found in example (12).

(12) *Así, la sociedad contemporánea, hija de* ***aquella psicología*** PARA LA CUAL *la nota característica del espíritu es el pensamiento, no ve en el hombre más que la inteligencia, y en la inteligencia, el entendimiento;* (Giner de los Ríos, 19th century)
'So, contemporary society, daughter of **that psychology** FOR WHICH the characteristic feature of the mind is thought, does not see in men more than the intelligence,and in the intelligence, the understanding;'

4.2 ANIMACY OF THE ANTECEDENT.

A second factor that may in part determine the selection of the relative pronoun is the animacy of the antecedent. The results of the analysis are shown in table 5.

		que	*quien*	*el cual*	*el que*
Animate	17th	49 /40.5%	33 / **27.3%**	1 / 0.8%	38 / **31.4%**
	18th	34 / 70.8%	6 / 12.5%	0 /0%	8 / 16.7%
	19th	73 / **65.8%**	13 / 11.7%	3 / 2.7%	22 / 19.8%
Inanimate	17th	123 / 92.5%	1 / 0.8%	2 / 1.5%	7 / 5.3%
	18th	103 / 86.6%	0 / 0%	2 /1.7%	14 / 11.8%
	19th	125 / 88.0%	1 /0.7%	9 /6.3%	7 / 4.9%

TABLE 5. DISTRIBUTION OF RELATIVE PRONOUNS ACCORDING TO ANIMACY OF THE ANTECEDENT.

The results show that although there are no qualitative differences between the 17th and 19th century, there are quantitative changes. Whereas *que* in the 17th century is only found in 40.5% with an animate antecedent, this percentage increases to 65.8% in the 19th century, a difference of 25.3 percent. The use of *quien* and *el que* with animate antecedents, on the other hand, has decreased since the 17th century (by 15.6 and 11.6 percent respectively). Or, looking at it

differently: in the 17th century animate antecedents were relativized by *que* in 40.5% of the cases and inanimate antecedents in 92.5% of the cases: a difference of 52 percent. In the 19th century this difference is 22.2 percent; that is, the factor [+/- animate] of the antecedent was a much stronger factor in the 17th century than in the 19th century.

4.3 PRESENCE VS. ABSENCE OF PREPOSITION.

A third factor that may influence which relative pronoun is used is the presence vs. absence of a preposition.

		que	*quien*	*el cual*	*el que*
Present	17th	30 / 48.4%	14 / 22.6%	2 / 3.2%	16 / 25.8%
	18th	15 / 51.7%	3 / 10.3%	1 / 3.4%	10 / 34.5%
	19th	21 / 37.5%	13 / 23.2%	9 / 16.1%	13 / 23.2%
Absent	17th	142 / 74%	20 / 10.4%	1 / 0.5%	29 / 15.1%
	18th	122 / 88.4%	3 / 2.2%	1 / 0.7%	12 / 8.7%
	19th	177 / 89.8%	1 / 0.5%	3 / 1.5%	16 / 8.1%

TABLE 6. DISTRIBUTION OF RELATIVE PRONOUNS AND THE PRESENCE VS. ABSENCE OF PREPOSITIONS.

Table 6 shows that the presence vs. absence of a preposition has become an increasingly important factor, with regard to the relative pronoun *que* especially. In the 17th century there is, with regard to *que*, a 25.6 percent difference between presence vs. absence of the preposition (74% -51.7%), whereas this difference is 52.4 (89.8% – 37.5%) percent in the 19th century. Thus the preferred context was [- preposition] in the 17th century already, but this preference has become stronger: *El cual* to *quien* and *el que* are favored in contexts with prepositions.

Arias Alvarez' claim that *quien* in NRRC was not found without prepositions was not found in the 16th century, but is possible in the 20th century. This is only supported in this study by the qualitative comparison of the grammars from the 16th and 20th century (see section 2). The only case of *quien* without a preposition in the 19th century is a case of *quien* with a covert antecedent in a RRC (found in Larra, *La sociedad*, 19th century): a context in which *quien* has also been attested for the 16th century (Keniston 1937a).

4.4 GRAMMATICAL FUNCTION OF THE RELATIVE IN ITS CLAUSE AND ANIMACY OF THE ANTECEDENT.

The last factor analyzed is the grammatical function of the relative in its clause, cross tabulated with the animacy of the antecedent. To save space, tables (7a-b) show the frequencies of the relative pronouns with regard to their grammatical function of subject, separated by animate (7a) and inanimate (7b) antecedents.

[+ animate]		*que*	*quien*	*el cual*	*el que*
Subject	17th	45 / 50.6%	18 / 20.2%	1	25 / 28.1%
	18th	31 / 75.6%	4	-	6 / 14.6%
	19th	70 / 74.5%	3	2	19 / 20.2%

TABLE 7a: DISTRIBUTION OF RELATIVES WITH ANIMATE ANTECEDENTS WITH THE GRAMMATICAL FUNCTION OF SUBJECT IN NUMBERS. (NO PERCENTAGES ARE GIVEN FOR COUNTS LOWER THAN 5, BECAUSE OF THE UNRELIABILITY OF SUCH PERCENTAGES)

[- animate]		*que*	*quien*	*el cual*	*el que*
subject	17th	43 / 88%	-	-	6 / 12.0%
	18th	44 / 80%	-	-	11 / 20%
	19th	61 / 95.3%	-	-	3

TABLE 7b: DISTRIBUTION OF RELATIVES WITH INANIMATE ATECEDENTS WITH THE GRAMMATICAL FUNCTION OF SUBJECT IN NUMBERS. (NO PERCENTAGES ARE GIVEN FOR COUNTS LOWER THAN 5, BECAUSE OF THE UNRELIABILITY OF SUCH PERCENTAGES)

Tables 7a and 7b indicate that the increase of *que* in contexts with animate antecedents, noted in table 5, occurs for the most part at the cost of *quien* in the function of subject. Whereas for *quien* [+ animate, + subject] in the 17th century 18 cases are found, only 3 are found in the 19th century. For *que* [+ animate, + subject] 45 (50.6%) cases were found in the 17th century, in the 19th century this has increased to 70 (74.5%) cases.

The overall frequencies of *que* have increased since the 17th century, except in the function of IO [+ animate]. In this context *quien* is competing with *el que* in the 17th century, but it is the only relative found in the 19th century.

5. CONCLUSION.

The comparison of the 16th century with the 20th century in this study confirmed Arias Alvarez' finding that *quien* with animate overt antecedents may in the 20th century be used without prepositions, which was not possible in the 16th century. A comparison between Keniston's grammars of the 16th and 20th century also indicates that whereas *quien* could occur with inanimate antecedents in the 16th century, in the 20th century *quien* is only found with animate antecedents.[6] These two changes indicate that there has been a reanalysis of *quien* with an overt

[6] See footnote 5

antecedent from [± animate, +preposition] in the 16th century to [+animate, ± preposition]. The comparison of the 16th and 20th century does indicate other differences, *el cual* in the 16th century was found in RRC [- animate, – preposition] but not in the 20th century. On the other hand, *el cual* is attested in the 20th century in NRRCs [- animate, – preposition]. Considering the fact that *el cual* is not once found in the context [- animate, – preposition] in either a RRC or a NRRC in the 17th, 18th and 19th century, is a fairly good indication that the use of *el cual* in this context is at least rare.

The qualitative comparison did not, however, show any changes for *que*. *Que* was found in both the 16th and the 20th century in the same contexts. The quantitative results in this study for the 17th, 18th and 19th century give a more refined picture; it has been shown that *que* [+animate] is competing with and, possibly, replacing *quien* [+animate] in the function of subject of its clause.

I hope to have given evidence that a combined quantitative and qualitative study is essential to reveal more subtle, underlying changes. Whereas a qualitative study confronts the analyst with the end result, such that either a form occurs in a certain context or it does not, a quantitative analysis reveals patterns and directions of change, which may eventually lead to changes on the surface.

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