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Foreword

This is the ninth in the series of working papers published by LOGOS, the Student Linguistics Society at The University of Calgary. These papers represent the current research in progress of students and faculty members and as such should not be considered in any way final or definitive. Appearance of papers in this volume does not preclude their publication in another form elsewhere.

Included in this volume is an excerpt from a University of Calgary M.A. thesis titled "On the Nature and Development of Graphic Competence" by Diana Elizabeth Gibbons (1982: 47-102).

We wish to thank Kathy Officer and Lynda Costello for typing most of the papers in this volume. We also wish to thank Aleks Steinbergs for proofreading this issue. The Students' Union and the Graduate Student Association of the University of Calgary provided LOGOS with financial support which aided our endeavours. Finally, we wish especially to thank the contributors to this volume for their stimulating papers, and to encourage readers to submit articles for inclusion in the next issue.

The editors of this volume were Mary Pepper, Marilyn Phillips, Lorna Rowsell and Aleks Steinbergs.

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Doublets, *Cultismos*, and Their Relation in Castilian Spanish

James M. Anderson

1. Introduction

The traditional explanations for differences in the phonological shape of doublets and repeated by most texts on the history of the Spanish language, revolve around the notion that one of the pair evolved normally in the speech habits of the lower classes while the other in its pristine form can either be attributed to a direct borrowing from an older stage of the language, or was preserved among the conservative speech of the upper classes of society.

While this view has certain merit, as there are indeed double forms in Spanish that can only be attributed to *cultismos*, such as *artejo* 'knuckle', and *artículo* 'article, joint', etc. in which the latter remains nearly unchanged from its Latin original *articulum*, the notion has been generalized to encompass all doublets including those in which little evidence supports the learned/non learned dichotomy.

2. Development of Doublets

One prolific source of doublets in Spanish derives from both the modification of the word-initial cluster /pl/ in medieval Spanish on the one hand, and its retention on the other. The change of /pl/ to /λ/ has been considered as the popular and regular course of events for this sequence. Forms containing /pl/ are equated with *cultismos*.

	lleno	'full, plenty'		llage	'wound'
plenum	pleno	'joint session, full'	plaga	plaga	'plague, affliction'
	lluvia	'rain, shower, abundance'		llano	'plain, flat'
pluvia	pluvia	'rain' (poetic form)	planu	plano	'plan, design'
	llegar	'to arrive'		llanta	'a type of cabbage'
plicare	plegar	'to fold'	planta	planta	'plant'[1]

A number of /pl-/ words which did not become /λ/, however, can only with difficulty be considered *cultismos* as they appear in the language at the time of the earliest vernacular documentation in the 10th and 11th centuries, and are not words that would be restricted to a particular class of society.

placer	< placēre	'pleasure'		pluma	<	plūma	'feather'
playa	< plagia	'beach'		plomo	<	plumbu	'lead'
plaza	< platea	'town square'		plural	<	plūrālis	'plural'
plazo	< placitus	'term' 'space of time'		plañir	<	plangĕre	'to grieve'

Similarily, lexical forms containing initial /kl-/ display a set of doublets in which one member has become /λ/.

clave	>	llave	'key'	clamare	>	llamar	'to call, name'
		clave	'keystone, code'			clamar	'to call, whine, demand'

There remains a body of words that appear in the earliest literature, however, containing /kl-/ and which by only a long stretch of the imagination could be considered learnèd forms. Compare *claro* 'clear,' *clavo* 'nail,' and *clima* 'climate' from Latin *clarus*, *clavus*, *clima*.[2]

Equated with /pl-/ and /kl-/ is the initial cluster /fl-/ which is also supposed to have had a 'regular' development into /λ/ but out of the approximately six original Latin /fl-/ words that survived directly into medieval Spanish, four have preserved /fl-/.

flaco < flaccum		'lean'	flojo	<	flūxus	'lax'
fleco < flueco	< flŏccum	'fringe'	flor	<	florem	'flower'

One developed into a doublet:

flammam	>	llama	'flame, blaze, violent passion'
		flama	'flame, excessive ardor'[3]

and one reduced /fl-/ to /l/ *lacio* < *flaccidum* 'flaccid' (Var. *llacio*) alongside a learnèd doublet *fláccido*.

It is, of course, difficult to imagine that common words such as *flor*, *flojo* and *flaco* were vocabulary items restricted to only the upper classes. It is equally inconceivable that these words were not present in all phases of the language since they have undergone all the 'normal' changes except the one in question which palatalized /fl-/ to /λ-/ as in *flamma* > *llama*.[4]

In most cases where /p,k,f/ plus /l/ became /λ/, doublets arose, c.f. *planu* > *plano/llano* but, contrary to standard treatments of the subject, this development need not imply that one form was used by the lower echelons of society (*llano*) and the other was preserved only among the speech habits of the privileged classes (*plano*). This mutually exclusive view of these words suggests that the two forms in question had the same meaning which was often not the case. Similarly, the retention of the clusters in a number of common words (*flor*, *claro*, *plaza*) clearly indicates a tendency to preserve them among all classes.

Perhaps the question to be asked, apart from obvious learnèd forms, is not why these initial clusters remained, but in fact why they palatalized in some words. Nor does it seem simply a matter of time before the change catches up with the unpalatalized forms, that is, a change still in progress, since the modifications appear to have been completed by the fourteenth century.

If we reject the *cultismo* hypothesis for the development of some doublets, such as the forms discussed above, it would be expected that at some point in time the original etymon gave rise to two competing forms in free variation, one, say, containing /pl-/ and the other /λ/, for example *flor/llor* irrespective of social class. One form simply lost out to the other, or they both persisted, c.f. *plaga* and *llaga*. Those that continued as doublets carried two meanings for each word, one of which disappeared in favour of the other, c.f.

plicare	'arrive'	(A)	>	llegar (A) (B)	>	llegar (A)
	'fold sails'	(B)		plegar (A) (B)		plegar (B)

Latin *plaga* encompassed the meanings (1) blow, wound, injury, misfortune; (2) plague, pestilence, infection, affliction, annoyance. Both *plaga* and *llaga* were used in the 13th century to mean 'wound,' but by the beginning of the 17th century, *llaga* had taken over the meaning of 'wound' exclusively and *plaga* was reserved for 'affliction.'

The situation may have been somewhat as follows: (W = wound, A = affliction).

plaga W A

llaga W A — plaga W A

llaga W — plaga A

For this word and others, however, the historical documentation is at best ambiguous with regard to free variation of the forms. *Plaga* was employed by Berceo[5] with one of its Latin meanings, i.e., 'wound.' Presumably it could also mean for him 'affliction, plague, etc.' A little later in the same century we find *llaga* for 'wound.' Did the authors of these later documents reserve *plaga* for 'affliction,' etc.?

plaga W A

llaga W — plaga W A

llaga W — plaga A

If this were the case free variation was not a factor.

3. Conclusion

In recent decades an impressive body of evidence has accrued which amply demonstrates that diachronic phonological changes do not necessarily depend on phonetic factors but are sometimes motivated by other considerations. One of these non-phonetic inducements to change may relate to the underlying polysemous characteristics of a word in which diverging semantic properties invite phonetic modifications.

The original etyma of those words that underwent the modification had two meanings in Latin or later in Hispano-Romance and semantic considerations may have prompted a modification in form to differentiate them in a clear and unambiguous manner.[6]

The extended meanings were no doubt at first simply metaphorical but as the semantic pressure mounted to clearly separate them, a phonological change took place. In words such as _flor_ which did not develop doublets, metaphorical aspects of the word (_el flor de su juventud_) are still closely associated with the original meaning.

Certainly a broad range of particularly underlying doublets in Spanish and other languages (cf. English _person/parson_), need further elaboration before authoritative etiological statements enter the literature on language change.[7]

Footnotes

1 According to Corominas:

> 'el tratamiento de pl- indica que ha de ser cultismo, aunque muy antiguo y pronto generalizado.'

A similar view is taken with regard to all forms containing /pl-/.

2 Clearly learnèd are forms such as clausa from Latin clausam alongside llosa in which au regularly became o.

3 Both forms were recorded in the middle of the 13th century and in spite of a good deal of semantic overlap, they need not be considered in free variation but rather as stylistic variants appropriate to specific contexts. Cf. also pluvia and lluvia.

4 The evolution of flojo from fluxum involved such changes as /-m/ > /ø/, /-u/ > /-o/, /ú/ > /ó/, /ks/ > /ys/, /ys/ > /š/, /š/ > /x/. It is difficult to accept the idea that learnèd influence affected only the initial cluster of the word.

Some words which contain and maintain the consonant cluster in question are clearly learnèd or borrowed and have not undergone the normal phonological modifications, e.g., clausa in which /au/ did not monophthongize as it did, for example, in causa > cosa. Others are borrowed words such as flanco from French flanc (which replaced lado from Latin latu) and others appear in the language for the first time in recent times, e.g., fleo from Greek phleōs first recorded in Spanish in 1925.

No doubt some modifications of /p k f/ plus /l/ to /λ/ have been influenced by analogy as perhaps was plōvere > llover.

5 The period of Berceo's literary output was between 1220-1250. For plaga with the meaning of 'wound,' c.f."Como Don Cristo sovo, sedié crucifigado: con grandes clavos preso, grand plaga al costado." (Milagros de Nuestra Senora.)

6 Sometimes homonymic differentiation is consciously achieved in the orthography of a language as was the case with Spanish barón 'baron' and varón 'male' > Germanic baro- 'noble male.' Compare also English flour and flower.

7 Semantic inducements may also, to some degree be responsible for differences in form such as la mañana 'morning' and el mañana 'tomorrow.'

Many of the phonological changes that led to doublets in Castilian appear to have begun in the northwest of the Hispanic peninsula and also affected Portuguese, c.f. plano/chão.

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Teenage Labelling: "Are you a Jock or a Freak?"

Janet P. Bowes

1. Introduction

There are three classes in speech that reveal personal characteristics of the speaker: those that indicate membership in a group, those that characterize the individual and those that reveal changed states of the speaker. In this paper I am dealing with the indicators of group membership, the group markers. A group-marked vocabulary is social, it reflects the members' interests and reinforces group solidarity (Laver & Trudgill, 1976). The subject matter is related to the activities of the group (Browen & Fraxer, 1976). Physical appearance and situation are important factors in determining a person's group membership (Siles, Scherer & Taylor, 1976).

The social groups of a high school can be identified by the way their members dress, act and speak. Students wishing to be identified with one of these groups modify their appearance and behaviour to match the target group's norms. The language use that the students adopt is one of the ways they achieve solidarity within the group. It seems very important for peer groups to conform to language use (Labov, 1975).

Labelling of the social groups by others also has an effect on language use and behaviour. The different aspects of interaction become predictable because of the preconceived notions of the participants (Scherer, 1976).

I conducted a brief survey of a small group of students from a high school in Southwest Calgary. It is considered by the students to be an athletic school. Most of the students come from average to above average homes. By the general consensus of the students I interviewed, the total list of social groups is: the Jocks; the Freaks (Heads); the Punks (Rockers); the Snobs; the Preppies; the Brown-Noses or Homework Gang and the Hosers or Nerds.[1] Not all students used all of these labels and for one person a Nerd is the same as a member of the Home-Work Gang. Whereas for others, the Hosers and Nerds are synonymous. They are people that do not belong to a social group for one reason or another. They may be depressed, not accepted or not social.

It is significant that some social groups gave fewer labels than others. They either assigned different group memberships or simply did not notice the niceties of the divisions in the school. All students agreed on the descriptions to fit each type and how a student would be identified. All groups are co-ed except for the Snobs. A Snob is usually a female. Also, a Jock male is not completely synonymous with a Jock female. Many of the students interviewed felt that none of the labels applied to them and they thought of themselves as being normal.

My son is in Grade 11 at the High School. I used him as an informant and a contact. He arranged for two groups of self-considered normal people and one group of Punks to come to our house where I interviewed them. I also asked a girl who associates with Freaks to arrange an interview. She interviewed three normal-Freak groups and one male Jock in the girls' bathroom at school. Three male Jocks were interviewed by myself at the school. Most of the interview groups had at least three people in them and were co-ed. They were all selected by other students except the three male Jocks who were selected by virtue of being in Phys-Ed 30 and of being considered Jocks by their Phys-Ed teacher. There were a total of eight interviews. Questions were asked to obtain labelling, subjective evaluations and self-evaluations.

2. Social Group Identity

The biggest factor in identifying a person as a member of a social group is by appearance. Secondary factors are: how a person behaves, talks, and who they hang around with.

When asked: "If you wanted to change your image, how would you go about it", most answered: "change appearance", then realizing that it was not enough to look the part, many added: "start doing things that the (target) group does", and girls said: "get a Jock boyfriend".

The two main groups at the school are Freaks and Jocks, with the Punks being a conspicuous minority. A typical Freak is a person who wears leather or denim jackets, faded blue jeans, black T-shirts, concert shirts, red and black or green and black checked lumber jackets. A Freak guy has long hair; a Freak girl wears lots of make-up. They use drugs and hang around the "Freak Doors" or the "Seven-Eleven" (store). They mainly talk about drugs, how they feel, parties, sex, weekends and parents. A Freak is often stoned in class.

A typical Jock has short, styled hair, wears sport clothes, rugby pants, shirts with their name or a University logo on it, and running shoes. A Jock is cooperative at school and is considered aggressive and rough by others. Jocks hang around the cafeteria and the school foyers in large groups. They talk about sports, weekends, parties and sex.

Preppies and Snobs can be confused with Jocks. They wear expensive designer sports wear and designer jeans. They look down on Freaks, especially the girls. They are interested in fashion and status and doing well at school. Some of the girls protect their reputations by only being seen with girls.

Typical Punks wear lots of black leather, dog chains around their wrists, dog collars around their necks, bizarre or dyed hairstyles, uneven haircuts - really wild clothes. The girls wear lots of make-up. A lot of Punks wear earrings and have tattoos. They keep to themselves, are considered low in status, rebel against everything, complain and act tough. They talk about fights and weekends. The girls talk about their boyfriends, clothes and hairstyles, and the boys talk about music. Their taste in music sets them apart from the other social groups.

All of the students agreed that each group used words that were uniquely identified with that particular group. Freaks curse a lot, talk slow, and mumble "like they're burnt out". Just about all their words have to do with drugs. The Jocks sound "normal" and only differ in a few adjectives and their sports vocabulary. The girl Jocks and the Preppies use some stock "Val Girl" (Californian) phrases which are used in fun by some, but have become part of the repertoire of others. The Punks are thought to have a good sense of humour. Their list is unique in that they reported most of the words themselves and only a few of the words - "gig", "slamming", "thrashing" and "skanking" are related to Punk-specific activites.

Freak Words and Phrases:	hey man what's happening hey man hey suds hey bud (freak)
Terms for Drugs:	cents-a-mill drugs hoots tokes (joint) bakeables hash joints dooby

splif
oil
red weed
bennies
lewds

Terms for feelings during and after taking drugs (many of these terms are now used not only when under the influence of drugs, but when tired or feeling good, etc.):

far-out
freak-me-out (oh wow, bizarre)
mellowed out (relaxed)
mellowing out
potent (strong or bizarre)
potent (stoned)
baked
cooked
raunchy
fried
zapped
dead
wired
buzz
wreck
stoned
I'm flying

Typical Phrases:

let's party tonight
friggin eh (that's great eh)
give 'er a buddy
wow, I got really baked last night
wanna get baked
wanna go for a toke tonight
munchies (food, need for food, originally the hunger for incredible edibles (food) having come down from a high on drugs)

Jock Words and Phrases:

raps (training times)
hey baby, wanna go to track
awesome (terrific, bizarre)
excellent (terrific)

Girl Jock & Preppies' Words and Phrases:

like you know (you understand)
totally
barf me right out the door (gross, disgusting)
gag me with a spoon

grody me max
grody
for sure
awesome
like totally

Punk Terms:

grim (bad)
loads (a lot of)
coke - loads
deef (definite)
tons (lots of)
rank (provoked, out of control behaviour)
narli (far-out)
gigs (band engagements)
thrash (the violent dance of Punks)
skanking
slamming
bitching-babe (good looking girl)

This is not an exhaustive list of expressions from each group. These words were collected from the students as being typical of these groups.

The labelling and descriptions of the typical member and language use all involve stereotypes. It is not the nature of this report to verify the students' intuitions, but rather to discover how the perceived notions about social identities are related to language or affect language.

3. The Function of Language for Social Grouping

All of the students interviewed believed that certain words were in the domain of certain groups. So although all students obviously have access to all of the words, these words are markers for the social group using them. When persons from different groups interact an attempt is made to modify their language to fit the person they are addressing (Giles, Scherer & Taylor, 1976). A girl who is probably a Freak said that she would never talk to her Jock girlfriend about parties or Freaks, but she would talk about her boyfriend. She said: "...talking to Jocks, like Lisa or Sue-Ann, don't talk about parties...or Freaks at all. I'll talk about my boyfriend or something like that, something that I can relate to them about...you're try'n to relate to the person you're talking to." (MIII:300)

A Jock group noticed that Freaks dropped a lot of their jargon when they were alone. "The 'hey man' is just between themselves.

If you talk to them they talk normally...just do it to act like that in a group - identify themselves...out of the group...just regular." (J2:96)

The Punks seem to be generally ignored and one Punk said: "I just don't sit around and say I'm stoned for a hippie." (P:171)

Most of the students are aware of the different vocabulary items, but they are not necessarily a part of their verbal repertoire. Some words are misused by out-group students. Most people use Punks and Punkers interchangeably but the Punk group interviewed felt that Punks was the acceptable label. Also, a type of activity called "slamming" is called "slam dancing" by outsiders. "People who don't know anything about it call it slam dancing...girls don't thrash...not (guys) dancing, never call it dancing mega insult...girls just stand around and watch." The misuse of these words is one way of identifying the speaker as an outsider. The correct usage would reinforce group solidarity.

The lexical items identified with Freaks are mostly to do with drug use. The use of the terms, that is, the talking about drugs may serve a solidarity function. Many of the students who felt that they might be labelled as Freaks did not use drugs as much as the Jocks believed. "If you do drugs once they think you're a Freak... they (Jocks) do it at the same time, they just don't talk about it." (MII:180) The Punks and the "normal" students observed that sometimes it was the one who never mentioned drugs who was most heavily into them.

Choice of topic in conversation is important too. It is not enough to be in Phys-Ed and to be good at sports to be considered a Jock. You have to talk sports, have what is called a Jock mentality. What a person talks about can be more indicative of social grouping, than what a person does.

4. The Effect of Labelling on Language Use

When a student is labelled, certain assumptions are made concerning his or her personality. For the categorized student, some aspects of language use become restricted. Topics, participants and even the situations where conversations might take place become predictable.

All the students talk about their social life, but Jocks tend to talk to other Jocks about sports in the cafeteria or the foyer; Freaks talk about drugs and being under the influence of or recovering from drugs in the bathrooms, at the "Freak Doors" or at the "Seven-Eleven"; and Punks talk about music to other Punks.

As mentioned earlier, some of the interview groups used fewer labels when categorizing the students. The Punks feel that almost everyone is a Freak or a Jock. Some of the average-to-Freak people believed that the Punks and Jocks thought of them as Freaks whether they were or not. "Jocks call us Freaks, think we smoke, do drugs. If you do drugs once they think you're a Freak...they do it at the same time just don't talk about it." (MII:175) "Punks and Jocks see us as Freaks, but we don't see ourselves as Freaks." (MIII:307)

So, although many students felt that they were normal, they perceived that they were treated as Freaks by the Jocks. "Freaks - they think they are normal, but not to us." (J2:50) They feel uncomfortable being around Jocks, so they hang out together at the "Freak Door" or in the bathrooms or go off-campus. Thus, being mislabelled by the Jocks as Freaks has the effect of restricting who they can talk to and where. "The Freaks are all in a group, they all hang around in one spot. The Jocks get three-quarters of the school whereas the Freaks take a quarter of it...the Jocks are all over the school, in the hallways and everywhere, the Freaks are right at the "Freak Doors"." "What do you do at lunchtime? We sit in the bathroom, we seclude ourselves...there are not many places you can go, that aren't overruled by Jocks. If you go in the cafeteria you feel totally out of place - same with the foyer...give you dirty looks."

The students that felt that they were not labelled, said that they had a lot more freedom of choice when it came to activities and subjects to talk about. Topics then are not so restrictive for "normal" people, but they find that they are restricted in choice of participants outside of the "normal" group. They find many Jocks unapproachable and change their choice of topic and use different lexical items when addressing Freaks.

5. Conclusion

Only about twenty-four students were interviewed, but there was agreement in the labelling and descriptions of the social groups, even if there was not agreement about group memberships or size. Even though the sample was small there was great consistency. The use of stereotypical labelling predicts the nature of the interactions between the students as they modify their language use to meet the requirements of the situation, whether to adjust their vocabulary for an outsider or to reinforce their solidarity with an insider. It is not just topic and lexical use that varies according to the participants, but also the situation of the interaction as the behaviour of the students varies according to their social grouping or assigned social grouping. The need to belong to a social group and the result of being labelled as a member of a social group has a great effect on the language use of the students of this high school.

Footnotes

[1]The Brown-Nosers, Homework Gang are probably idiosyncratic terms. I also heard "goodie-goodies". "Mellow-guy" was also heard - he/she is a type of Freak - mellow is a positive attribute to a Freak or semi-Freak. "Boods" is also heard occasionally It refers to "Budlins", a head-shop that used to exist downtown.

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The Other Consonant in Turkish Prefixal Reduplication: A Working Paper

Michael Dobrovolsky

1. Introduction

In Modern Standard Turkish, certain adjectives can be intensified by a reduplicative prefixing process which copies the initial CV of the stem and adds a third consonant. The prefix is stressed. Main word stress falls on the prefix, and stem stress is reduced:

a.	kará	'black'	kápkarà	'jet black'
b.	temíz	'clean'	tértemìz	'spotless'

(Note the 'leftstress' pattern of Turkish stress placement, as opposed to the 'rightstress' pattern of substantives and certain phrases.)

Studies of this process have attempted to explain the selection of the consonant introduced by reduplication on one basis or another: sonorancy, place of articulation, major class features, etc. In general, the predictive identification of the new consonant has resisted all attempts at explanation. It is clear that the novel consonants are limited to m, r, p, and s (in other words, neutralized to one nasal, one liquid, one continuant and one non-continuant obstruent). But a given stem-initial consonant does not invariably cooccur with a given prefix final consonant: thus we find belli → besbelli 'obvious → unmistakeably obvious', but beyaz → bembeyaz 'white → snow white'. It is well known, though, that all V-initial adjectives reduplicate with Vp, as in ačɨk → apačɨk 'open → wide-open'. A test conducted with six native speakers of Turkish by Beck (1975) suggests that there is no productive rule governing the choice of the new prefix consonant, although there are general limits within which a choice of new consonant is determined. Underhill (1980) notes that there are only about 50 or so adjectives that reduplicate in this manner, and that new forms cannot be made. Beck's study, however, suggests that speakers are quite willing to create new forms on the spot, but are not always in agreement as to what the novel consonant should be.

Perhaps a more interesting question concerning the shape of these morphemes is this: why should the form of the prefixes be CVC- at all? Turkish generally avoids consonant clusters and tends toward an optimal CV syllable structure with certain well-defined

CC sequences permissible in various syllabic positions and across syllable boundaries. It is of course uncontroversial to suggest that Turkish may have different constraints on the sequencing of consonants word-internally versus across morpheme boundaries. But the question is not whether Turkish has this or that sequential phonotactic constraint, but why it should have developed one particular strategy of reduplication and not another. Even if ..*sm*.., ..*pk*.., etc. sequences can occur across morpheme boundaries, they do not *necessarily* occur there. Why should Turkish reduplication not be of the form *kara* → *kakara*, *temiz* → *tetemiz*, or, alternatively *kara* → *kapakara*, *temiz* → *teretemiz*, etc.?

It is of interest to note that there are some adjectives for which the reduplicative form is CVCV-, i.e., which have a copied vowel inserted after the new consonant; there are also a few adjectives that take a reduplicated form in CVCVC. I will briefly comment on these forms as well.

The main proposal of this paper is that at the nonsurface level of phonological representation the reduplicative prefix (henceforth, REDUP) is a separate word. This accounts for the fact that the prefix is closed with a C, since there is a morpheme structure condition (MSC) in Turkish requiring virtually all native monosyllables to end in a C: the analysis also provides an explanation for the retracted stress pattern.

2. REDUP as Word: MSC Evidence

First, consider the data showing that Turkish monosyllabic morphemes end in C. There are no monosyllabic N, Adj, or Adv of the form CV. There are some CVV monosyllables, but they are all derived from forms in underlying CVC. (Alternatively, it may be incorrect to view Turkish long vowels as monosyllabic.)

There are exceptions such as enclitics (*ve* 'and') and bound suffixes which cannot possibly be analyzed as separate words for a number of reasons (such as *-de* LOC). Interestingly, those suffixes which abstract analyses (such as Dobrovolsky 1975 or Özkaragöz 1980) suggest are preceded by an internal word boundary or have a higher predicational status are either CVC (*-miş*) or are suffixes which show characteristics of separate words (stress precedes them) but which are harmonically bound to the preceding stem (*mi* 'INT', *me* 'NEG'). Other systematic exceptions include the recently invented names for letters of the alphabet (*a*, *be*, *ce*, *ge*, *de*, etc), a few borrowed words such as *bu* 'smell', *ma* 'water'; specialized words such as *se* 'three at dice'; the subset of demonstrative pronouns *bu*, *su* and *o*, which are morphophonemically bu(n), su(n) and o(n), and the native word su 'water', which is morphophonemically su(y).

Otherwise, substantive (N or Adj) and adverbial monosyllables in Turkish are of the form

ip, at, ak, göz, beš, üc, yem, on, el, var, etc....

and substantival or adverbial monosyllables like *pa, *te, *ka, *me, etc. cannot be found.

3. REDUP as Adverb

There is evidence supporting the claim that the reduplicative 'word' is an adverbial.

I shall claim that the reduplicative prefix is in essence an intensifier of the same type as the nonreduplicative adverbial intensifier čok 'very'. Čok intensifies substantive or adverbial forms:

c. čok iyi 'very good'
d. ipiyi 'very good'

but not reduplicated forms:

e. *čok ipiyi

(The latter can be produced nonseriously, which demonstrates its anomalousness. One of the six subjects in Beck's study accepted čok for REDUP to a certain extent, but not in a clearly patterned way.) This complementarity of distribution and general equivalence of meaning suggests an equivalence of function between these elements.

Comparative and superlative usage is also complementary with reduplication. Note:

f. daha iyi 'better'
g. en iyi 'best'

but not

h. *daha ipiyi
i. *en ipiyi

I will consider čok to be a 'relative intensifier' or first degree of comparison, and REDUP to be an 'absolute intensifier'.

There is a parallel in English with the use of other intensifiers like *darn/damn*. One rarely hears *?*very darn/damn good* although *pretty darn/damn good* is acceptable. (Interestingly, *not very damn good* is acceptable, but this is a separate issue.) The same can be said of intensifiers like *super*: *a super day* is acceptable, while **a very super day* is not. The parallel I am calling attention to is not exact: but it seems to be the case that the *very* intensifier in English cannot occur with all other intensifiers.

In Turkish, there is a difference in emphasis between using *čok* and using the REDUP to intensify, but it is not the difference between 'very' and 'too'. (This distinction—when it is made in Turkish at all—employs another word: for a succinct discussion, see Underhill, (1980:62-63.) REDUP appears to be an 'absolute intensifier' in that it cannot occur with the unmarked intensifier *čok* (nor with other degree adverbials like *birčok* 'quite a few' or *biraz* 'a few'.

4. Why Leftstress?

I now turn to a consideration of the fact that these REDUP forms show the leftstress pattern with reduction of the stem stress. At first, one might be tempted to hypothesize that some sort of stress retraction is taking place. Stress retraction seems to be associated semantically in Turkish with 'emphatic' forms; cf. the parallel in the vocative, which shows a process of retracting stress to the left until it lands on the first closed syllable of the word, or on the first syllable of the word if no closed syllable intervenes (Foster 1969:252), (Zimmer 1970). Incidentally, I think this classification of the retracting stress as 'vocative' is debatable; the same, generally 'emphatic' retraction pehnomenon is common to other languages as well (the closed syllable condition aside); cf. French, which also shows this retraction: *garsón → gárson!*

There is an even more compelling reason for the appearance of the word-initial retracted stress in these forms. The stress pattern of these forms is simply that of compounds. The leftstress with reduction pattern is parallel to that of compound nominals like *él čàntasɨ* 'handbag', *íš bànkasɨ* 'commercial bank' or compound adverbials such as *gülé gülè* 'faretheewell' or *güzél güzèl* 'beautifully', all of which are leftstressed with stress reduction on the right. An analysis of REDUP forms as consisting of underlying separate words provides a natural rationale for the appearance of the compound stress pattern.

Note that these leftstressed nominal and adverbial compounds are different in kind both phonologically and semantically from the partial rightward reduplication of the type <u>čoǰúk moǰúk</u> 'children and all that', on which the stresses fall pretty evenly.

5. Derivation

The derivation of the REDUP forms that I am proposing here reflects an intersection of predictable and partially predictable elements which are best represented as separate underlying words. The logic of this derivation is (tentatively) as follows:

Grammatical Prerequisite: Intensify adjective of REDUP class.

1. copy #CV or #V to create intensifier; insert word-final boundary;
2. close form with a C according to MSC for separate words;
3. assign branching node labelled ADV PHRASE above REDUP and ADJ;
4. assign word stress to REDUP form and adjective by rule;
5. assign compound stress (leftstress) to the newly created adverbial;

Indented rules apply to all lexical items in the language whose structural description (SD) is met. This approach thus reveals a clear distinction between rules which are specific to the reduplication process and those which are more general and which the reduplication process supplies with appropriate forms.

As indicated above, there are existing analyses of Turkish which have proposed underlying forms (UFs) with word-internal word boundaries. These reduplicative forms provide another set of data which support these abstract 'isolating' analyses of Turkish, though admittedly the details of removing word-internal word boundaries are not yet satisfactorily worked out.

6. REDUP in CVCV or CVCVC

I think it is likely that the REDUP forms may be losing their underlying separate word status for some speakers. The fact that the new consonant is quasi-predictable is evidence of this.

Additionally, the more the internal word boundary is felt to weaken in these forms, the more alternate forms we can expect, as the constraint on C-final monosyllables will no longer be operative. It will be interesting to see if a metrical or autosegmental analysis might provide some rationale for the alternative forms.

Contrary to this view, there is no doubt that there is still productivity involved in the production of these forms. As noted above, native speakers are willing to attempt new forms. Another indication that this process is still felt to be productive is supplied by bilinguals. The English-Turkish bilingual children of a colleague of mine in Turkey were fond of creating intensive reduplicated adjectives in English such as 'wimwonderful' on the Turkish pattern. It seems to me that the separate word status of the REDUP element is connected with productivity; for those speakers who analyse REDUP forms as frozen, there is less likelihood of productivity than for speakers who analyze it as a separate word. (Of course, even frozen forms may provide a basis for productive analogies, a problem which makes the status of the words produced by the bilingual children less clear.)

If we accept the word boundary analysis as the correct characterization of the REDUP phenomenon, it provides us with some explanation for why speakers disagree on which words can be reduplicated in this manner. Those for whom the reduplicated forms have no internal boundary (who view them as unit morphemes) probably also have a restricted class of these words in their lexicons; those who are still performing the word boundary analysis are more given to productive innovation.

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Graphic Competence

Diana E. Gibbons

Section 1

1.0 Invented Spelling

The invented spellings of pre-schoolers first described and analyzed by Read (1971) are significant in more than one respect. First, they are completely spontaneous and entirely free from the effects of instruction. The children who produce invented spellings know the names of the conventional symbols and how to form them, but they have virtually no direct knowledge of any conventional sound-grapheme correspondences and cannot read. Second, the spellings do not vary qualitatively from child to child. This uniformity, along with lack of instruction, suggests that preliterate writers possess some natural ability to exploit the phonetic properties of the sounds in the letter names of the English alphabet and to direct this ability to the production of spellings.

Thirdly, as previously mentioned, these children have not yet learned to read (hence the use of the term 'preliterate'). However, not only can they not read conventional English orthography, they are unable to even read back their own writing. Normally, literacy is considered to be bi-directional. That is, it involves both the ability to write and to read one's own writing and the writing of others. The lack of concern for decodability among preliterate writers is probably a function of their level of cognitive maturity since the child's thinking in the pre-school years is characterized by the irreversibility of operations. For example, a pre-schooler cannot understand that adding three plus two involves the reversal of the same mathematical operation used in adding two plus three. In a similar way, the preliterate writer evidently does not view reading as being related to his writing activities.[1]

Just as modern alphabets developed chronologically from pictograms, so we can trace a child's orthographic development ontogenetically from pictures to a sophisticated representation of his linguistic knowledge. From simple drawings of concrete objects in his world, the preliterate speller at around age four can represent the sounds and syllables of words suing the little knowledge he has of conventional alphabetic symbols. For example, *U* is used for *you*, *R* for *are*. This use of a letter name to represent consonant-vowel or vowel-consonant sequences has been termed a <u>Letter Name Strategy</u> and characterizes the preliterate writer's first attempts at spelling.

The next stage of development corresponds to the realization that sound units smaller than the syllable demand representation. At this stage, the child has the ability to segment the consonant element from syllabic letter names in order to represent consonant sounds.

Examples of this include *LADE* for *lady*, where the letters *L* (/ɛl/) and *D* (/di/) are used to represent /l/ and /d/, respectively. Other examples of this are *NJN* for *engine*, *RME* for *army* and *YL* for *while* (Read 1971).

An extrapolation of this segmentation strategy to diphthongal letter names (for example, /ay/ (*I*)) allows a representation of the lax vowels that comprise the first components of diphthongs. Thus, the children spell *cat* as *KIT*. Lax vowels which cannot be represented in this way do not appear at this stage. The tense vowels /iy/, /ey/, /ow/ and /uw/ present little difficulty as they can be represented by the letters *E*, *A*, *O* and *U*, respectively. The representation of lax vowels other than /a/ begins to appear at the next stage in the child's orthograhic development. Relying on a sophisticated understanding of phonetic similarity, the children represent lax vowels with a letter whose name includes a tense vowel with the same place or articulation. Thus, the letter *A* (/ey/) would be used to represent the lax vowel /ɛ/ (which is also a front mid vowel). The following table of vowel representations illustrates other examples of this strategy. The example words are taken from Read (1971), C. Chomsky (1976) and Beers and Henderson (1977).

Table 1

Vowel Representations in Invented Spelling

TENSE/LAX VOWEL PAIR	LETTER USED FOR TENSE VOWEL	LETTER USED FOR LAX COUNTERPART	EXAMPLE WORD TENSE VOWEL	EXAMPLE WORD LAX VOWEL
[iy], [ɪ]	*E* ([iy])	*E*	BET (beat)	FLEPR (Flipper)
				FEHEG (fishing)
[ey], [ɛ]	*A* ([ey])	*A*	BAK (bake)	BAD (bed)
				HARE (cherry)
[uw], [ʊ]	*U* ([uw])	*U*	BUT (boot)	TUK (took)
				LUKS (looks)
[ow], [ɔ]	*O* ([ow])	*O*	BOT (boat)	BODM (bottom)
				WOTR (water)

Another instance of the segmentation strategy commongly found in invented spelling involves use of the letter *H* to represent the sound [tš] as in *cherry* (*HARE*). Here the children are segmenting the letter name [eytš] (*H*) in which the last phonetic element corresponds to the initial sound of *cherry* (/tšɛriy/). The children also use the letter *H* to represent the fricative /š/ as in *fishing* (*FEHEG*). Read claims that the children represent /š/ in this way because of the phonetic similarity (in terms of place of articulation) between /š/ and /$\widehat{tš}$/. However, it is possible that the children are actually extending the segmentation strategy since the fricative /š/ is a component of the affricate /$\widehat{tš}$/.

As the child expands his system of graphic representation in the manner illustrated above, a developmental shift from a syllable-based system to an alphabetic type takes place. It should be noted, however, that the later spellings still reflect relatively superficial phonetic properties. Thus, the various allomorphs of the plural are spelled differently—*dogs* as *DOGZ* and *cats* as *KITS*. In an orthography that represents morphophonemic units, such phonetically predictable alternations would be subsumed under one symbol (for example, *S*).

The evidence presented here from the writings of preliterate children refutes the notion that orthographic ability is dependent on instruction. What is even more interesting is that children continue to spontaneously devise such a system despite instruction. This fact came to light through the work of Beers and Henderson (1977). Developmental sequences similar to those just outlined were noted after a six-month longitudinal study of first graders undertaken by the above authors. The children here, although older and in receipt of some formal instruction, 'invented' and developed exactly the same kind of system as Read's pre-schoolers in their free creative writings.

By carefully studying twenty-five children, Beers and Henderson not only confirmed Read's outline of invented spelling development, but were also able to more fully characterize the developmental sequences in which spelling strategies emerged beyond the pre-school years. For example, the representation of lax vowels followed an orderly and consistent pattern of development. Initially lax vowels were omitted, and then were represented by a tense vowel whose letter name bore a phonetic relationship to the desired lax vowel. For example, *get* would first be spelled *GT*, then later as *GAT*. These examples again illustrate the children's reliance on articulatory features and the surface phonetic level of oral language as a basis on which to select spellings.

As Beers and Henderson studied children beyond the age of Read's pre-schoolers, they were also able to examine maturational shifts in criteria for selecting letters to represent sounds. This type of shift is illustrated by the different spellings of medial /t/ Beers and Henderson uncovered over the six-month period of the study. At first, /t/ as in *sitting* was spelled as *D*. Intervocalically /t/ becomes a voiced flap, and is therefore phonetically closer to [d] than to [t]. In the early stages, then, the children select a spelling for intervocalic /t/ based on phonetic criteria. However, later spellings of this sound as *T* or *TT*, reflect a knowledge of the phonological relationship between the phonetic voiced flap and the voiceless stop /t/. At this stage, then, the children seem to take into account more abstract phonological information in determining possible spellings.

In summary, young children from around age four are capable of devising a systematic orthographic system despite lack of instruction in conventional sound-grapheme correspondences. The creation of such a system is made possible partly through the use of successively more sophisticated strategies which exploit the syllabic nature and phonetic properties of letter names. The fact that preliterate children devise similar and consistent systems, despite dialect differences, suggests that the ability to represent one's spoken language orthographically is not a function of instruction, but has its roots in some underlying mental mechanisms common to all regardless of level of literacy.[2]

To further elaborate on this important point, let us now examine the coordination of skills associated with the invented spelling (actually observed) of *SEDRLI* for *Cinderella*. Initially, the child probably attempts to segment the syllables of the word in order to determine whether they correspond to any familiar letter names. The first syllable /sɪn/ does not; therefore some other approach must be employed. Since the letter *S* (/ɛs/) contains the sound /s/, the first segment of *Cinderella* can be spelled with this letter. The lax vowel /ɪ/ is more problematic, but can be represented by the letter *E* whose name (/i/) has similar phonetic properties (it is also a high front vowel). Needless to say, this kind of phonetic analysis presupposes both a knowledge of the phonetic properties of vowels and the ability to exploit articulatory similarities in the manner just noted.

The next two segments of the word, /n/ and /d/, are both consonants with the same place of articulation. The child apparently feels that it is somewhat redundant to represent both consonants in these cases thus omission of homorganic preconsonantal nasals is a common strategy in invented spelling. Thus, the letter *D* is used for both /n/ and /d/ in the case under discussion.

The next syllable /ər/ contains both sounds in the letter name *R* and so can be represented by straightforward exploitation of the Letter Name Strategy. A second application of this strategy allows the use of *L* (/ɛl/) to represent the homophonous syllable /ɛl/.

Finally, to create a representation for the last sound /ə/ in *Cinderella*, a search must be made through the letter names of the English alphabet for one which contains a phonetically similar sound. The symbol *I* (/ay/) is chosen, apparently because it is the only vowel letter name which contains a lax vowel.

Today's creation of *SEDRLI* for *Cinderella* will be just as much a mystery tomorrow for the writer as it is for a parent or teacher unaware of the intricacies and complexities of invented spelling. The pre-school speller is unique among writers in his lack of concern for the decodability of his words and his imperturbability over the unidirectional, non-communicative nature of his efforts. Nonetheless, these characteristics of the preliterate writer do not appear to inhibit the development and use of this remarkable ability.

From the illustration of the *Cinderella* example above, it can be seen that the phenomenon of preliterate writing evidently must involve more than just the ability to recognize and use spelling strategies.

Strategies can be constructed and exploited only if the knowledge which underlies them is organized in some coherent way. It should be obvious that spellings like the one just discussed would be impossible if the writer could not draw upon the organizational skills of graphic competence to coordinate the perceptual, linguistic, metalinguistic and cognitive skills that underlie this type of spelling activity.

Since the invented spelling system of pre-school writers is developed without the benefit of formal instruction or varied experience, it constitutes a fairly direct manifestation of the organizational skills referred to as graphic competence. For this reason, invented spelling can also provide us with a unique tool for investigating graphic competence in literate children and adults as well. The rest of this thesis is devoted to the discussion of my attempt to use data from an invented spelling task in order to determine whether the combined effects of linguistic and cognitive maturity as well as years of orthographic experience bring about changes in the graphic competence of older persons.

Section 2

DESCRIPTION AND DISCUSSION OF THE STUDY

2.0 Introductory Remarks

In an attempt to explore the nature and development of graphic competence, I designed and conducted an experiment using an invented spelling task. I shall present a description of this experiment in section 2.1. The results of this study with ensuing discussion follows in section 2.2. A summary of the research findings is presented in section 2.3.

2.1 Description of the Study

2.1.1 Subjects

In order to trace any qualitative developmental changes that might come about as the result of age, maturation and instructional experience, four groups of subjects were selected. These were: twenty students at the grade two level (age range 7.3 years to 8.10 years, with a mean age of 7.10 years), twenty-eight students at the grade five level (age range 10.4 years to 11.3 years with a mean age of 10.9 years), nineteen students at the grade eight level (age range 13.4 years to 15.1 years, with a mean age of 13.10 years) and ten adult university students. The entire grade two and grade five population of a suburban elementary school in Calgary was considered as subjects for the first two groups while the total grade eight population of a junior high school in the same suburban area was considered for membership in the third group. Subjects were excluded from participating in the study if they were not native speakers of English or if they were identified as having encountered severe problems in learning to read and write. Only the first of these criteria was found to apply and some subjects were excluded on this basis.

Grade two students were chosen for their cognitive and linguistic immaturity. This group has only received a minimal amount of formal instruction in spelling yet has some knowledge of English orthography. Grade five students were chosen for two reasons. First, their performance would help illustrate the possible effects of three more years of formal instruction on spelling performance. Second, the students in this group could be expected to exhibit concrete operational thought rather than the pre-operational thought of the grade two students (Piaget 1972). Grade eight students have experienced three more years of formal instruction than the grade five students. Besides being more developed cognitively, they are also more mature linguistically, having acquired complex rules such as the vowel shift which may play a role in the acquisition of the spelling patterns found in related word pairs such as *collide/collision* and *profane/profanity* (Moskowitz 1973). The university students were chosen as a sample of literate, cognitively and linguistically mature adults.

2.1.2 Design

For the rationale behind the design of this study it is necessary to go back to Read's analysis and description of the writing of pre-schoolers. It will be recalled that these preliterate children developed a uniform, albeit unconventional, system of orthographic representation based on knowledge of letter names even though they had received no instruction or exposure to the sound-letter correspondences of the traditional system. Besides establishing the experience-independent nature of this phenomenon, invented spelling provides valuable insights into the type of organizational ability that humans draw upon during the acquisition of an alphabetic orthography. Since the invented spelling system of these young writers is developed without the benefit of instruction or an ability to read, it constitutes a fairly direct manifestation of the special organizing and coordinating ability that I am calling graphic competence.

The invented spelling task in this study is, in essence, an attempt to replicate, in persons of various ages and of varying orthographic experience, the dilemma faced by the pre-schoolers. Using a task comparable to that required of the preliterate writers, it is hoped to gain insights into the mind's representational faculty so that inferences can be made about the nature of graphic competence. By examining the performance of subjects of varying experience and educational, cognitive and linguistics maturity, an attempt can be made not only to characterize the cognitive foundations of graphic competence, but also to trace any qualitative and quantitative developmental changes.

There are three particular properties which characterize the invented spellings of young children. As noted in chapter one, they are: the Letter Name Strategy (the use of a single letter to represent VC or CV sequences as well as diphthongal letter names), the use of letter names containing an affricate to represent a homorganic fricative (which I shall call the Consonant Segmentation Strategy), and the use of diphthongal letter names to represent lax vowels with the same approximate place of articulation (which will be called here the Diphthongal Segmentation Strategy). The opportunity to exploit these three strategies was incorporated into the design of the invented spelling task. A novel mini-alphabet was designed comprising eight symbols. Each symbol was allocated a corresponding letter name. The alphabet is reproduced below.

Table 2

Alphabet Used for Invented Spelling Task

Ɣ	/yu/	Ф	/sa/
Л	/$\widehat{t\check{s}}$e/	Ж	/ma/
Г	/ay/	Д	/ʌw/
Ю	/ub/	Δ	/ri/

After learning the alphabet, the subjects were asked to spell a series of nonsense words presented orally with the help of a tape recorder. The first set of nonsense words was presented during the second day of the experiment and the second set during the third day. The two sets of words are listed below in Tables 3 and 4.

Table 3

First Set of Nonsense Words

/sʌw/	/bʌt͡š/
/yum/	/sayb/
/sum/	/t͡šab/
/t͡šʌb/	/ʌsub/
/ras/	/sar/

Table 4

Second Set of Nonsense Words

/mub/	/ʌsub/
/sut͡š/	/ušmu/
/sʌwt͡š/	/sar/
/bʌt͡š/	/yam/
/šaym/	/yumb/
/rus/	/risay/
/ras/	/t͡šʌb/
/t͡šab/	

In an attempt to replicate the predicament faced by preliterate writers, the nonsense words were structured so that there were more phonemes than letters (thirteen versus eight). Table 5 lists the consonant and vowel phonemes used in the words written by the subjects.

Table 5

Phonemes Used in the Invented Spelling Task

CONSONANTS	VOWELS
/m/	/i/
/b/	/u/
/s/	/ʌ/
/š/	/a/
/t͡š/	/ʌw/
/r/	/ay/
/y/	

There were no letter names consisting solely of either a lax vowel, a stop, a fricative or an affricate, although all of these types of sounds were found in the words that had to be written. At no time was information regarding possible sound-symbol correspondences divulged. Like the preliterate writers, the subjects literally had to invent their own spelling system.

After the written part of the task was completed, a random selection of six subjects from each group took part in taped interviews. These subjects were asked to read back the words they had written. They were then asked if they could recall why they had selected the letters they did to spell the words.

Let us speculate, for a moment, on the complexity of the task facing these subjects as they attempt to produce plausible spellings for the nonsense words. I shall use the word /sar/ as an example. The subject must first realize that the word is made up of sounds that somehow have a correspondence to the letters of the alphabet he has just learned. He then has to establish some criteria by which the sounds and symbols can be related. A systematic search through the alphabet is instigated to determine a possible basis for sound-symbol correspondences. Let us assume that the basis he selects is the syllable structure of the word. A search is now made through the alphabet for letters whose names might contain syllables similar to those in /sar/. Let us suppose the subject starts with the initial CV sequence /sa/. He then realizes there is a letter whose name is just this sequence and can now partially represent the word /sar/ with the symbol Φ (/sa/). But he cannot apply this syllable strategy to the rest of the word. He must, therefore, establish another criterion if he is to represent the final /r/ in /sar/. A search is now made through the alphabet for letters whose names contain the /r/ sound and he realizes that if he segments the consonant from the letter name /ri/, he is left with the sound he wishes to represent. Now he must coordinate all these mental processes to ultimately produce a plausible spelling for /sar/.

The above example illustrates that much is involved in the successful production of a plausible spelling on an invented spelling task. The speller must be able to organize and coordinate his existing perceptual, linguistic and cognitive faculties to devise and then implement spelling strategies like those described above. These spelling strategies, in turn, result in a systematic spelling of a nonsense word. The ability to organize and coordinate pre-existing knowledge to produce spellings (graphic competence) is therefore a crucial factor in producing results on the invented spelling task.

Once the results of the invented spelling task had been gathered, the first avenue of investigation was to ascertain the extent to which the subjects could find a plausible graphic representation for the nonsense words. One point was allocated for each phoneme that received a plausible graphic representation correctly positioned in the word. No points were awarded for a non-plausible correspondence between a sound in the nonsense word and the symbol chosen to represent it. A plausible representation was one where the sounds in the letter name bore some phonetic or interference relationship to the target sound or sounds. A phonetic relationship occurs when the letter name contains a sound or sounds which bear an articulatory resemblance to the phonemic unit(s) being represented. An interference relationship occurs when a symbol in the novel alphabet has the same name as an English letter (for example, Y *(/yu/)—U*). An interference strategy is, then, the practice of using the novel symbol to represent the same sounds as does the English letter bearing the identical name. The following illustrates examples of plausible and implausible representaitons.

Plausible Representations

a. Phonetic relationship

/sar/: Ф Δ - a letter name strategy is being used to represent the first two sounds in the word with one symbol

Ф Ж Δ - each of the three sounds in the word is segmented out of a letter name (/sa/, /ma/ and /ri/, respectively).

/bʌtš/: Ю Д Л - each sound is segmented out of a letter name (/ub/, /ʌw/ and /tše/, respectively.

b. Interference relationship

/bʌtš/: Ю Y Л or Ю Ю Л - the lax vowel /ʌ/ is represented by a symbol (Y or Ю), whose name contains the sound /u/. In English orthography, the symbol *U* /yu/ is used to represent the lax vowel /ʌ/ and this practice is extended to the nonsense word.

Implausible Representations

/sar/:	Ф Ю Δ	- no sound contained in the letter name /ub/ bears a phonetic or interference relationship to /a/, the target sound.
	(-) Γ Δ	- omission of any representation of the initial sound.
/bʌtš/:	Ю Δ Л	- the name of the symbol /ri/ bears no relationship to the target sound /ʌ/.
	Ф Y (-)	- the name of the symbol /sa/ bears no relationship to the initial sound /b/; no representation of the final sound /tš/.

No points were awarded if the whole word was written with more than one extra symbol. For example, if /sar/ was represented by five symbols the score for that word was zero as the representation was assumed to be random. This condition was applied to each subsequent scoring of the data.

The results obtained from this analysis will be used to determine the extent to which the subjects can produce a plausible representation of a word, how they arrive at these representations and possible variations (qualitative or quantitative) in the performance of each group.

A one-way analysis of variance (ANOVA) with six planned comparisons for between group means using the Statsitical Package for the Social Science ONEWAY was chosen as the statistical test. Any difference where $p < .05$ was considered to be significant (i.e., $\alpha = 0.05$).[3]

2.1.3 Procedure

All subjects involved in the experiment participated in three sessions, held on a Monday, Wednesday and Friday of the same week in early April. The subjects were told that an alphabet was being devised for an unnamed foreign language and that the purpose of the experiment was to investigate people's ability to learn this new alphabet. The subjects were told that if the alphabet proved easy to learn, it might be adopted for the unnamed language. No more than fifteen subjects were dealt with at any one time.

The first of the three experimental sessions was devoted to teaching the alphabet. The subjects were shown the symbols which were written on large flash cards, were told the corresponding letter names and asked to repeat it. They were also given a sheet illustrating the eight symbols and told to trace and then write the symbols. Absolutely no information was given on possible correspondences between the symbols and the sounds. The subjects learned very quickly and were asked to continue their learning at home using any means, visual, auditory or kinaesthetic, with the proviso that they not write anything in any alphabet other than the one being taught.

The second session began with a review to determine whether everyone could recite, recall , recognize, identify and write the alphabet. The subjects were then tested to see whether they had mastered the alphabet. Criterion for mastery was a score of one hundred percent on a recognition test as well as one hundred percent on a production test which required the subjects to write the symbols as the examiner called out the names of the letters in random order. The main purpose of these tests, then, was to establish that when the subjects later began to write words, any 'errors' or difficulties that might arise could not be the result of an inability to visually discriminate among the symbols, memory or a failure to make the necessary auditory discriminations. The novelty of the spelling task lay in the demands that it made on the subjects' organizational competence.

Once it had been ascertained that all subjects had mastered the alphabet, they were then instructed to attempt to write the first set of nonsense words (see Table 3). The third and final session was conducted in the same way as the second with a review, a test and then instructions to write the second set of nonsense words (see Table 4).

2.2 Results and Discussion

The invented spelling task was designed to have the subjects draw upon basic organizing principles (graphic competence) to produce a spelling system that is independent of any conventions learned from an external source. In sections 2.2.1 to 2.2.9, I shall present and discuss the findings from the invented spelling task.

2.2.1 Overall Performance on the Invented Spelling Task

2.2.1.1 Results

If the subjects can produce plausible spellings to a degree that suggests that their performance is not random (i.e., over fifty percent), we can assume that they are approaching the task in a systematic, organized way. In other words, the ability to produce plausible spellings more than half the time should establish the existence of at least a rudimentary form of graphic competence. Moreover, a comparison of overall performance of the subjects in the different age groups will help determine the degree of stability in graphic competence over time. Table 6 presents the scores which reflect the subjects' overall ability to provide plausible spellings for the nonsense words presented in the second and third sessions.

Table 6

Mean Scores and Standard Deviations for Plausible Representations of 25 Nonsense Words (79 Phonemes)

Possible Score = 79

GROUP	MEAN SCORE	(S.D.)
Grade 2	52.10	(9.37)
Grade 5	63.00	(8.09)
Grade 8	64.90	(5.45)
Adult	68.80	(4.34)

The overall analysis of variance of mean scores showed differences (F = 15.2, $p < .001$). The planned comparisons exhibited differences as follows: grade two was consistently different from the other three groups ($p < .001$), grade five was significantly different from the adults (t = 2.84, $p < .01$) and grade eight was also significantly different from the adult group (t = 2.07, p = .05). No significant differences were found between grade five and grade eight (t = 1.0, p = .32). It should be noted that the degree of difference between groups is not the same. There is less difference between grade five and the adults than between grade five and grade two. Furthermore, there is even less difference between grade eight and the adults. It appears, then, that all groups can 'invent' a spelling system in a very short period of time and that success in this endeavor increases with age. The increase in this ability is most marked between grade two and grade five.

2.2.1.2 Discussion

To the extent that Table 6 demonstrates that subjects in all four groups are able to create a systematic orthography, we can say that the existence of graphic competence as an organizational ability that is independent of instructional experience has been established. Moreover, with Read's (1971) data collected from children younger than the subjects here, it can be stated that graphic competence is in place and is accessible at around four years of age.

Although the results most definitely indicate the presence of graphic competence in the grade two subjects, their overall performance on the invented spelling task is significantly lower than that of the other groups. In order to investigate whether serial processing and ordering of letters contributed to this phenomenon, the data was scored in the following three ways, assuming a left-to-right ordering of letters to be 'correct.'[4] First, a point was awarded for a plausible representation of the first consonant if, and only if, it occurred in its correct position in the words. Second, a point was awarded for a plausible spelling of the second consonant, if and only if, it appeared in its correct serial position. Third, one point was awarded for the presence of the first consonant, regardless of where it appeared in the word. By comparing the scores calculated by these three techniques, it was possible to gain some insights into the effect of serial processing on overall performance. The results are shown below.

Table 7

Plausible Representation of First Consonant
in Correct Serial Order

Possible Score = 25

GROUP	MEAN SCORE	(S.D.)
Grade 2	19.55	(3.19)
Grade 5	22.07	(2.65)
Grade 8	22.84	(1.64)
Adult	23.40	(1.17)

No significant differences occurred between grade five and grade eight ($\underline{p} > .2$) or between grade eight and the adults ($\underline{p} > .3$). Grade two, however, performed significantly different from all other groups ($\underline{p} < .01$). Significant differences were also noted between grade five and the adults ($\underline{p} < .05$).

Table 8

Plausible Representation of Second Consonant
in Correct Serial Order

Possible Score = 25

GROUP	MEAN SCORE	(S.D.)
Grade 2	14.50	(5.51)
Grade 5	20.71	(2.59)
Grade 8	21.68	(2.96)
Adult	23.10	(1.29)

The same pattern of differences were found on these results as for the results illustrated in Table 7.

Tables 7 and 8 (where points were awarded only if the sounds to be represented were written in the correct serial order), show that for the youngest children, and to a lesser extent for the grade five children, serial processing adds to the level of difficulty of the task. This can be more readily seen if we compare the results shown in Tables 7 and 8 with the results obtained from scoring the data with no penalty for incorrect ordering of the letters that were representations of the first consonant. Table 9 records this latter set of results.

Table 9

Plausible Representation of First Consonant in any Serial Order

Possible Score = 25

GROUP	MEAN SCORE (S.D.)
Grade 2	21.55 (3.17)
Grade 5	24.03 (2.31)
Grade 8	24.63 (0.68)
Adult	24.80 (0.42)

Grade two was significantly different from all other groups ($p < .001$). Grade five, grade eight and adult do not differ from each other.

Two facts can be noted here. First, the youngest children attain a higher mean score when no penalty is imposed for incorrect serial ordering of letters. Second, even without this penalty, the grade two children still differ significantly from all the other groups. It would seem, then, that grade two's lower overall performance (see Table 6) is only partially attributable to a weaker serial processing ability.

Another possible explanation for the youngest group's lower overall performance on the invented spelling task relates to cognitive development. If we compare the ages of the groups that participated in the experiment, we see that only the grade two subjects are likely to be functioning in the pre-operational mode of thought. Piaget (1972:30) notes that this stage of cognitive development is characterized "by the beginning of decentring and the discovery of certain objective relationships." The pre-operational child is only beginning to be able to objectively assess the relationships involved in a cognitive task. Because he is equipped with a "semi-logic that lacks inverse operations" (*ibid.*:32), a child at this stage does not fully understand that the volume of water contained in a long, narrow vessel remains constant when it is poured into a container of a different shape. The child at this stage, then, can apply spelling strategies to particular words in an invented spelling task, but he would not necessarily see that the same strategy can be applied in other instances. Because each spelling problem tends to be seen as an isolated task, unrelated to previous ones, the child can be expected to make somewhat *ad hoc* use of his graphic competence. Although this type of reasoning will often produce the same result as a more mature concrete operational reasoning, it is much less efficient. The child may well be able to develop and apply strategies that produce plausible spellings, but these strategies are not readily transferred to other stimulus words. Although the child is capable of producing plausible spellings, the task may well be more effortful for him, resulting in a lower score.

The subjects in our study who were eight years or older would likely be functioning cognitively at the level of concrete operations or formal operations. This would give them an advantage over the seven-year olds in that they would have an increased ability to simultaneously consider multiple aspects of the task, to think about the relationships among them and to instantiate the various operations required to arrive at a plausible spelling. These older subjects have the ability to transfer what seems to be a workable strategy to other situations and therefore to perform more consistently. As Piaget states, "the final operational structure appears as a result of a continuous constructive process; . . . the internal relationships of the system acquire necessity and cease to be constructed successively without connection with the preceding ones" (Piaget 72:36).

The preceding remarks offer only a possible explanation for the lower overall scores of the grade two subjects. Even if features of cognitive development could be correlated with the operations required for invented spelling, the actual level of cognitive functioning of the subjects would have to be determined by independent means before a genuine causal explanation could be proposed.

It is important to note at this point that even though performance on the invented spelling task may be affected by level of cognitive development, there is no reason to believe that this factor affects the subjects' underlying graphic competence. All the subjects examined in this study exhibited the ability to coordinate the different types of knowledge associated with spelling to the extent necessary to develop a rudimentary orthography. The differences in performance noted above seem to relate to the subjects' ability to systematically and consistently make use of their organizational skills rather than to the presence of these skills *per se*.

This said, let us now turn our attention to particular spelling strategies used by our subjects in their attempts to develop an orthography.

2.2.2 The Letter Name Strategy

2.2.2.1 Results

Overall, the subjects used the Letter Name Strategy in 81.1 percent of the cases where it was feasible. Table 10 shows the extent to which it was used by each group.

Table 10

Letter Name Strategy

Possible Instances = 12

GROUP	MEAN SCORE	(S.D.)
Grade 2	7.60	(1.98)
Grade 5	10.10	(1.61)
Grade 8	10.47	(1.07)
Adult	11.30	(1.06)

The overall analysis of variance again showed differences ($\underline{F}$ = 17.91, $\underline{p}$ < .001). The planned comparisons showed that the grade two group differed significantly and consistently from all other groups ($\underline{p}$ < .001). No significant differences were noted between grades five and eight while the difference between the grade five and the adult group attained a level of significance ($\underline{t}$ = 2.63, $\underline{p}$ < .05). It is evidently the case, then, that all subjects are able to exploit the Letter Name Strategy, but that the ability to do so increases with age with the most significant increase being at the grade five level.

2.2.2.2 Discussion

Table 10 clearly illustrates that the older the subject, the more likely he is to use the Letter Name Strategy. At first glance, this appears to be a somewhat curious finding in that both Read (1971) and Beers and Henderson (1977) assert that the Letter Name Strategy appears at an early point in the development of spelling strategies. However, a more careful consideration of the concept of 'developmental sequence' reveals that the findings in Table 10 are not at odds with Read's and Beers' and Henderson's statements. A developmental sequence is a series of orderly stages that the learner passes through, beginning with his first attempts at a new task. There is no reason, then, to expect the older subjects to omit an early stage simply because they are older when they first attempt invented spelling. We might expect, though, that the older subjects will become proficient at employing a given strategy in a shorter time. This is essentially what the results in Table 10 suggest. Further consideration of the nature of development helps increase our understanding of the older subjects' greater expertise with the Letter Name Strategy.

Development can be regarded in more than one way. First, there is 'replacive' development in which strategies which manifest themselves at one stage are abandoned and replaced at a later stage by a different and presumably more complex or sophisticated strategy. An illustration of this from motor development would be the replacement of primitive reflexes such as the moro and rooting reflexes with more sophisticated voluntary motor movements. In the case of language acquisition, a similar type of replacive development is thought to occur as the child masters the phenomenon of pronominalization. In the early stages, the principle adopted by the child specifies that a pronoun can only be coreferential with a noun phrase (NP) that immediately precedes it. Therefore, in the early stages of acquiring the rules for pronominalization, the child will make correct judgments about coreferentiality in sentences such as S.1 and S.2.

S.1 *He likes John.*

S.2 *John saw his mother.*

According to the linear precedence strategy, *he* in S.1 cannot be coreferential with *John* since the pronoun precedes the NP. Similarly, in S.2, *John* can be coreferential with *his* as the NP precedes the pronoun. However, the child will make incorrect judgments about sentences like S.3 and S.4.

S.3 *John shocked him.*

S.4 *His mother likes John.*

In S.3, the NP *John* precedes the pronoun *him*, and the child will incorrectly judge the NP and the pronoun to be coreferential. In S.4, *his* precedes *John* and the child will erroneously assume that the pronoun and the NP are non-coreferential.

At a later point in the language acquisition process, the use of principles based on linear word order appears to be completely abandoned in favour of a new principle based on structure. As stated by Reinhart (1981), this principle rules out a coreference relationship between an NP and a c-commanding pronoun.[5] This principle allows correct judgments on coreferentiality in all the above sentences.

In addition to replacive development, there also exists a cumulative type of development in which earlier strategies are not abandoned in total. Either an earlier strategy becomes more elaborated or other later strategies are simply used to supplement it. In the case of motor development, for example, the child learns to walk before he can run, but does not abandon walking once he is capable of running.

A similar situation exists in linguistic development with respect to the rules governing sentences such as *Mary asked Bill to leave* and *Mary wanted Bill to be on time*. Early in the language acquisition process, the subject of the infinitival structure is taken to be the first NP to the left (i.e., *Bill* in the examples above). Subsequently, this strategy is supplemented (but not abandoned) by a set of exceptions involving structure types like *Mary promised Bill to arrive on time* (in which *Mary*, not *Bill*, is subject of *arrive*).

A third type of development involves the more effective use of an already existent skill or strategy. This is arguably the least drastic form of development and this appears to be what affects the Letter Name Strategy. The older subjects are using exactly the same strategy as the younger subjects, but they appear to be able to use it more readily and on a greater number of appropriate occasions. Closer scrutiny of Table 10 (use of the Letter Name Strategy) shows the subjects falling into three groupings, apparently paralleling the different stages of cognitive development described by Jean Piaget (1972). The first group comprises only the grade two subjects, the second grades five and eight and the third group is the adults. The ages encompassed by each of these groups corresponds closely with usual norms for Piaget's pre-operational, concrete operational and formal operational stages, respectively. Consistent with my earlier discussion of quantitative changes in performance (section 2.2.1.2) it could be hypothesized that the higher the stage of cognitive development, the greater one's ability to efficiently draw upon the Letter Name Strategy and to recognize the appropriate conditions for its application.

I shall now present the results bearing on the subjects' representation of tense and lax vowel elements in an effort to determine whether any quantitative and/or qualitative differences are evidenced. First, let us look at the data pertaining to plausible representations of tense vowels.

2.2.3 Representation of Tense Vowels

2.2.3.1 Results

Table 11 illustrates the extent to which the subject were able to devise a plausible representation for a tense vowel.

The overall analysis of variance again showed differences ($\underline{F}$ = 8.35, $\underline{p}$ = .001). The planned comparisons yielded the following differences: grade two was consistently different from all other groups ($\underline{p} < .005$), grade five differed significantly from the adults ($\underline{t}$ = 2.14, $\underline{p} < .05$) and grade eight and the adult group also differed ($\underline{t}$ = 2.10, $\underline{p} < .05$). Again it should be noted that the differences between grade two and the other groups are greater than the differences among the other three groups.

Table 11

Plausible Representation of Tense Vowels

Possible Score = 11

GROUP	MEAN SCORE	(S.D.)
Grade 2	7.20	(1.57)
Grade 5	8.78	(1.64)
Grade 8	8.73	(1.45)
Adult	10.00	(1.33)

2.2.3.2 Discussion

Tense vowels which occur before or after a consonant can be represented by means of two strategies. First, the subjects can segment a letter name containing a tense vowel (for example, /yu/ or /ub/), thereby representing only the tesne vowel element. Alternatively, the subject can exploit the Letter Name Strategy using, for example, Y (/yu/) to represent the first two phonemes in /yum/ or HO (/ub/) to represent the VC sequence in /mub/. The adults' superior ability to represent tense vowels (see Table 11) is probably a reflection of their overall increased use of the Letter Name Strategy.

2.2.4 Representation of Lax Vowels

2.2.4.1 General Results

Table 12 illustrates the extent to which the subjects could find a plausible representation for lax vowels.

Table 12

Plausible Representation of Lax Vowels

Possible Score = 13

GROUP	MEAN SCORE	(S.D.)
Grade 2	6.90	(2.40)
Grade 5	4.28	(2.69)
Grade 8	4.21	(1.98)
Adult	3.80	(2.09)

Once again, the overall analysis of variance showed differences (F = 6.52, $p < .001$). Planned comparisons yielded the following contrasts: grade two differed significantly and consistently from all the other groups, but there were no significant differences between any two of the remaining three groups.

2.2.4.2 Discussion

Because lax vowels cannot be represented with the help of the Letter Name Strategy (the earliest and perhaps most basic spelling strategy), they constitute more of a challenge to the creative speller than do tense vowels. The lower scores recorded in Table 12 confirm Beers and Henderson's (1977) findings on the relative ease with which tense vowels are represented.

Of even more interest here, however, is the fact that the youngest children are significantly better than the older groups at representing lax vowels. One cannot help but wonder why maturity does not enhance the ability to produce plausible lax vowel representations as it does for the tense vowels. Table 12 actually shows a decrease with age. However, notice again that the subjects fall into the same three groupings as in previous tables. In order to attempt an explanation of this curious phenomenon, let us look at how the lax vowels were represented. For both lax vowels, (/ʌ/ and /a/), qualitative differences among the groups can be observed. I shall begin by examining the various representations of /ʌ/.

2.2.5 Representation of /ʌ/

2.2.5.1 Results

Table 13

Representation of /ʌ/

Possible Score = 6

GROUP	Д (/ʌw/)		Y (/yu/)		Г (/ay/)		Ю (/ub/)	
	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)
Grade 2	0.80	(1.05)	1.95	(1.84)	0.35	(0.58)	0.25	(0.44)
Grade 5	1.25	(1.37)	1.00	(1.33)	0.32	(0.72)	0.07	(0.26)
Grade 8	0.79	(1.18)	1.84	(1.86)	0.16	(0.37)	0	(0)
Adult	1.10	(1.01)	0.60	(1.07)	0.50	(0.97)	0.10	(0.31)
	$F = 0.78$, $p > .05$		$F = 2.70$, $p > .05$		$F = 0.64$, $p > .05$		$F = 2.47$, $p > .05$	

No significant differences were found between any two groups along these measures. However, a casual observation can be made. All subjects appear to encounter difficulties with the vowel /ʌ/ (for all groups it was represented in only about half of all possible instances).

2.2.5.2 Discussion

Due to the nature of the design of the alphabet and the stimulus words, two different strategies could be exploited to arrive at a plausible spelling for /ʌ/. First, the subject could draw upon the segmentation strategy, segmenting the letter Д (/ʌw/). An alternate manifestation of the segmentation strategy involves exploiting the phonetic similarity between /ʌ/ and /a/ and using Г (/ay/) to spell /ʌ/. (Conversely, Д (/ʌw/) was also sometimes used as a spelling for /a/.)

Second, the interference relationship between the English letter *U* (/yu/) and the letter Y (/yu/) in the novel alphabet could be exploited. Thus, /ʌ/ could be spelled by an analogy with English orthography where *U* is used to represent /ʌ/ as in *cut, but,* etc. Alternatively Ю (/ub/) could also be used to provide a plausible spelling for /ʌ/, on the assumption that the subjects first segmented the /u/ from the letter name and then exploited the interference relationship in the manner outlined above.

2.2.6 Representation of /a/

2.2.6.1 Results

Table 14 illustrates the various representation produced for /a/.

Table 14

Representation of /a/

Possible Score = 5

GROUP	Г (/ay/)		Д (/ʌw/)		Ф (/sa/) or Ж (/ma/)	
	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)
Grade 2	1.15	(1.30)	0.95	(1.14)	1.10	(1.29)
Grade 5	0.22	(0.68)	0.82	(1.24)	0.61	(1.13)
Grade 8	0.11	(0.31)	0.21	(0.41)	0.95	(1.17)
Adult	0.30	(0.67)	1.00	(1.05)	0.20	(0.63)

No significant differences were found in the various groups' use of Д (/ʌw/) and Ф (/sa/) or Ж (/ma/) ($\underline{F} = 2.14$, $\underline{p} > .1$ and $F = 1.73$, $\underline{p} > .1$, respectively). Significant differences between the groups were revealed in the use of Г (/ay/) ($\underline{F} = 6.58$, $\underline{p} < .001$). The planned comparisons for that measure showed differences as follows: grade two differed consistently from all the other groups ($p < .05$) but none of the other three groups were different from each other at the .05 level.

2.2.6.2 Discussion

Like the lax vowel /ʌ/, /a/ is relatively difficult to represent, with a plausible spelling evident in only a little over half the cases in which it was required. However, unlike the representation of /ʌ/. the subjects appear not to have a choice of strategies in the case of /a/ where only segmentation produces a plausible spelling. However, the segmentation strategy can be exploited in two different ways; applying to a diphthongal letter name (in the case of Г (/ay/) and Д (/ʌw/)) or to a syllabic letter name in the case of Ф (/sa/) and Ж (/ma/).

Table 14 reveals that the youngest children were best able to segment Г in their attempts to spell /a/. This brings us to the question of why maturity is not reflected in an increased use with age of the segmentation strategy to represent lax vowels. It should be noted that graphic representation which requires the segmentation of diphthongal letter names is relatively difficult for all subjects. While subjects can, to some extent, perceive the phonetic relationship between /ʌw/ and /ʌ/ and /ay/ and /a/, the relationship between /ay/ and /a/, for older subjects, is apparently weaker, more tenuous or qualitatively different. In producing a spelling for /a/, the older subjects seem less able or willing than the youngest children to segment [a] from /ay/. The difficulties encountered by the older groups are probably the result of their more complete knowledge of English phonology. It is believed that English speakers over age eight have acquired a vowel shift rule which relates pairs of sounds like /ay/ and /ɪ/, as in *divine/divinity* (Moskowitz 1973). This knowledge may make the older subjects more likely to perceive /ay/ as an indivisible phonological unit. If indeed this is the case, it is the only example to date where greater linguistic maturity appears to have a quantitative effect on performance. If this line of reasoning is correct, one could make certain predictions in regard to other lax vowels had they appeared in the nonsense words. For example, if there had been a letter name /ey/ and the subject had been asked to find a representation for /ɛ/, one would expect adults and children to perform equally well (as they did when attempting a representation of /ʌ/) since /ɛ/ and /ey/ are not related by the English vowel shift rule.

At least two conclusions can be drawn from the fact that maturity did not seem to influence the subjects' ability to segment Д (/ʌw/) to spell /a/ or /ʌ/.[6] First, the segmentation of diphthongs, unlike the Letter Name Strategy, is not influenced by level of cognitive development. Alternatively, it could be concluded that the segmentation of diphthongs is developmental, but that the amount of exposure that our subjects received to invented spelling was not sufficient to allow us to detect the developmental nature of this strategy. The reader will recall that Beers and Henderson (1977) claim that this strategy appears later in the developmental sequence. Had our task given the subjects more opportunities over a longer period of time to exploit this segmentation strategy, developmental differences might well have been noted. Despite the limitations imposed by the data, it is clear, however, that all subjects, regardless of age and previous orthographic experience, are able to draw upon their basic underlying graphic competence to direct their attention to the phonetic properties of letter names.

2.2.7 Interference as a Means of Representing /ʌ/

The use of the letter name Y (/yu/) (see Table 13) was considered a manifestation of the interference strategy for the reasons previously stated (see section 2.2 and 2.2.5.2). The statistical analysis, however, revealed no significant differences at the .05 level in its use by any two groups. Although it cannot be denied that the subjects sometimes resorted to their knowledge of English orthography, the fact that there were no significant differences in performance related to age or orthographic experience downplays the significance of the interference strategy. It would seem that the influence of a previously learned orthography does not significantly enhance or impede the subjects' ability to develop a system of graphic representation.

2.2.8 Representation of /š/

Read's pre-schoolers commonly used a letter name containing an affricate to represent a homorganic fricative. For example, the fricative /š/ in *fishing* was represented by the letter *H* (/e͡tš/) whose name contains an affricate with the same place of articulation as /š/. The invented spelling task in this present study was designed so that this particular strategy could also be exploited. Thus, the alphabet contained a letter Д (/t͡še/) containing an affricate while two of the nonsense words included the sound /š/ (/šaym/ and /ušmu/). Table 15 shows how the subjects represented this sound.

2.2.8.1 Results

The analysis of variance showed significant group differences in the use of both Ф (/sa/) ($\underline{F} = 3.01$, $\underline{p} < .05$) and Л (/t͡še/) ($\underline{F} = 2.86$, $\underline{p} < .05$) to represent /š/. No significant group differences were found for the use of Ф Л (/sa, t͡še/) to represent /š/. The planned comparisons showed that grade five and the adults differed significantly

Table 15

Representation of /š/

Possible Score = 2

GROUP	Φ (/sa/)		Φ Л (/sa,tše/)		Л (/t͡še/)	
	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)	MEAN SCORE	(S.D.)
Grade 2	0.95	(0.76)	0.05	(0.22)	0.50	(0.69)
Grade 5	1.14	(0.71)	0.04	(0.19)	0.61	(0.79)
Grade 8	0.68	(0.88)	0.31	(0.58)	0.84	(0.83)
Adult	0.40	(0.52)	0.02	(0.42)	1.30	(0.67)

in their use of both Φ and Л ($p < .01$ and $p < .05$, respectively). Grade five also differed from grade eight ($p < .05$) on the former measure (Φ), while grade two and the adults differed significantly ($p < .01$) on the latter (Л).

2.2.8.2 Discussion

As Table 15 illustrates, the subjects represented the fricative /š/ in three different ways. first, let us attempt to establish the criteria on which these representations were based. Although it was hoped that the interviews might clarify this issue, of the twenty-four subjects who were interviewed none were able to elucidate their choice of a spelling strategy. A typical answer was, "It seemed the closest." Although the subjects apparently lacked awareness of why they chose a particular symbol, it is possible to propose a probable explanation.

The choice of Φ (/sa/) or Л (/t͡še/) both involve perceiving some phonetic similarity between /š/ and the consonant part of the letter name. The choice of Φ (/sa/) indicates that manner of articulation is the more salient feature (both [s] and [š] are fricatives). Choosing Л (/t͡še/), on the other hand, indicates that place of articulation is more salient (both [t͡š] and [š] are palatals). In contrast, choice of Φ Л (/sa, tše/) would seem to reflect an interference strategy rather than an attempt at segmentation. In English, /š/ is represented by either the digraph *sh* for example, *ship*) or the trigraph *sch* (for example, *Schlitz*). Some subjects evidently attempted a 'translation' of the *sh* or *sch* conventions. The Φ would correspond to the letter *s*, while the Л would be needed to represent the *h* or the *ch*.

The data in Table 15 suggests that the selection of manner of articulation as the criterion for judging phonetic similarity decreases with age. This is offset by a corresponding increase in reliance on place of articulation. Thus, whereas the grade two and grade five subjects prefer to select a letter (Φ) whose name contains a sound with the same manner of articulation as the target sound, the adult subjects select place of articulation, as evidenced in their preference for Л, as the more salient feature. Grade eight subjects are almost evenly split between the two criteria. It seems, then, that a shift in the assessment of phonetic similarity begins between grade five and grade eight. This may indicate the same type of developmental shift that Read (1973) reported in his study on the perception of the *tr* sequence.

Another factor which may have influenced the subjects' attempts to spell /š/ relates to segmentation. Whereas the use of Φ (/sa/) to represent /š/ only involves segmenting the phoneme /s/ from the neighbouring vowel, the use of Л (/t͡še/) necessitates a much more sophisticated segmentation operation. In the latter instance, the phoneme /t͡š/ is not only segmented from the neighbouring vowel but is further analyzed and then segmented to realize one of its phonetic components [š].

As was previously mentioned, there appears to be some evidence that the representation of /š/ can be influenced by previous knowledge of English orthographic conventions. However, only 11.3 percent of the /š/ spellings reflected the use of the interference strategy. This confirms the earlier suggestion (section 2.2.7) that graphic competence can be drawn upon to create and develop a novel orthography with only minimal reliance on the interference strategy.

2.3 Summary

In 2.1 and 2.2, the design, procedure and results of the experimental study were presented and discussed. Data collected from the invented spelling task was analyzed to determine whether subjects at four different levels of maturation and experience could draw upon the organizational skills comprising graphic competence to spontaneously devise their own orthographic system. Factors which might affect group performance, (for example, cognitive and linguistic maturity, and serial processing skills) were examined. In addition to showing that graphic competence was available to all groups of subjects, I also attempted to draw conclusions about the effect of cognitive development, linguistic maturity and orthographic experience on the subjects' use of their organizational abilities to exploit specific spelling strategies. In the section that follows, I will attempt to unify the preceding discussion and analysis by presenting some general conclusions about the nature and development of graphic competence. Some pedagogical implications and suggestions for future research will also be offered.

Section 3

3.1 Conclusions

The results of the experimental study discussed in section two suggest that the ability to spell results from the coordination of several component subskills with the help of the organizational capacity I have been calling graphic competence. According to the view developed in earlier sections, graphic competence organizes and coordinates factors such as attentiveness and attention, memory, visual and auditory perceptual skills and processes, linguistic knowledge, metalinguistic knowledge and general cognitive capacities, thereby allowing the acquisition of an alphabetic orthography. Graphic competence not only allows letters to be assigned to a sound or syllable, but also permits the systematic exploitation of perceived phonetic similarities and the transfer of previously acquired orthographic knowledge to the system under construction.

Since all groups, regardless of age and experience, are able to devise a spelling system in a short period of time, the results would seem to support the claim that the basic underlying graphic competence is relatively resistant to maturational change and unaffected by instruction. The ability to invent systematic spellings first described by Read (1971) is therefore not confined to pre-school children but is also an attribute of older children and adults. Nonetheless, there are some qualitative and quantitative differences in the overall performance of the various groups. It was suggested in earlier discussions (see section two) that these differences may be attributable in part to developmental change in cognition which allow older subjects to more readily exploit certain strategies (for example, the Letter Name Strategy). Moreover, serial processing difficulties were apparent for the grade two children and, to a lesser extent, for the grade five subjects. Since correct ordering of symbols constituted one of the criteria for plausibility, this factor contributed to some degree to the lower overall performance of the younger children.

While there is no evidence to suggest that graphic competence *per se* is subject to the effects of maturation of development, the quantitative differences in the use of strategies, like the Letter Name Strategy and segmentation, may be associated with development. The use of the Letter Name Strategy, for example, increases in frequency with age. It is a highly productive strategy and is used wherever possible even by subjects who have demonstrated their ability to segment syllabic letter names into their phonetic components.

The segmentation of the diphthongal letter names /ʌw/ and /ay/ to provide a representation for the lax vowels /ʌ/ and /a/ constitutes another example of the effect of development on spelling performance. Although subjects of all ages used this strategy, the older subjects exhibited a decreased ability to segment /a/ from /ay/. As noted in section 2.2.6.2, this curious development pattern (which involves an apparent reduction in spelling skill) may result from the older subjects' increased linguistic maturity. Their linguistic knowledge, which takes /ay/ to be a phonemic unit, results in an alternation between, for example, /ay/ and /ɪ/ in related words like *divine/divinity*. The phonemic status of /ay/ in the adult phonology may, in turn, make segmentation of the diphthongal letter name /ay/ more difficult for adults than for children.

While the available evidence from the segmention of diphthongal letter names does indicate that this strategy is subject to the effects of linguistic development, the data from all the lax vowel representations precludes the claim that the segmentation strategy follows an orderly developmental pattern. As the representations of /ʌ/ and /a/ effected by the segmentation of /ʌw/ revealed no significant differences at the .05 level between any two groups, there is insufficient evidence at this point to indicate whether maturation or development (other than a specific types of linguistic maturity) plays a role in the ability to segment diphthongal letter names.

The data pertaining to the subjects' attempts to represent the fricative /š/ also prevents us from making definitive statements about the effects of development on the segmentation strategy. This data suggests that the adults may be able not only to segment syllabic letter names into phonemes but also to factor a phoneme (in this case /t͡š/) into its phonetic components. If, indeed, this was the processing strategy used by the adults, it would suggest that the ability to segment may increase with age. However, it is not clear from the available data that this was the strategy exploited by the adults. The use of ʃl rather than Φ to represent /š/ may reflect a difference in the criterion employed to judge phonetic similarity rather than a superior ability to segment. Thus, these older subjects' significantly higher use of ʃl may indicate that for them place of articulation (both /š/ and /tš/ are palatals) is the feature which determines phonetic similarity. This contrasts with the younger subjects' preference for Φ which indicates that manner of articulation (both /š/ and /s/ are fricatives) is the more salient feature.

The identification of an interference relationship between the letter names of the novel alphabet and those of English orthography forms the basis for the remaining major strategy used by the subjects. This interference strategy, however, appears to play only a minor role in the production of representations on the invented spelling task. As noted earlier (see section 2.2.7), the clearest example of this involved the selection of the letter which has the name /yu/ for the lax vowel /ʌ/. The lack of any significant differences or orderly increase or decrease in the use of this strategy prohibits us from describing it as developmental in nature. The relative infrequency of the interference strategy strengthens the claim being made here that graphic competence, which coordinates the types of knowledge required to create an orthography, is not dependent on or significantly affected by instruction.

In summary, then, some of the strategies which aid in the creation of a spelling system do show signs of being affected by maturation and development. However, all the subjects in this experimental study, regardless of age and previous orthographic experience, were able to coordinate their existing perceptual, linguistic, metalinguistic and cognitive skills to create a systematic orthography. This leads us to the conclusion that humans' unique ability to spell is crucially dependent on the graphic competence which allows the organization and coordination of the various subskills associated with the graphic representation of language.

3.2 Implications

The findings reported here on graphic competence and on the characteristics of various spelling strategies have implications for issues within applied linguistics, particularly with respect to the teaching of early spelling in both native and second langauges.

We have seen how subjects from age seven years to adult are capable of spontaneously developing an orthography which provides at least a rudimentary representation of speech by employing principles and strategies that are largely unaffected by the spelling patterns of their native language. This leads us to conclude that in a second language learning situation, one would be able to 'invent' or devise an orthography for that language. As it is well accepted that articulatory performance in second langauge learners does not reflect the sum total of competence (Neufeld 1980) and because writing bypasses peripheral articulatory mechanisms, the second langauge learner's invented spelling could provide insights into the nature and organization of his phonological system at any given point in time. Therefore, periodic scrutiny and analysis of the second langauge student's spontaneous spellings could serve as a useful diagnostic tool, helping the teacher to trace and assess the state of the student's phonological development in the second language he is learning.

Janet Beattie (personal communication) has provided some interesting examples of the way in which ESL students' understanding of English phonology is reflected in their spontaneous writing activity. According to Beattie's data, Japanese students (who cannot distinguish /l/ and /r/) often confuse *L* and *R* in their spelling (*CLANE* for *crane; VERAGE* for *village*; *LEINDEER* for *reindeer*) while German students (who neutralize the voiced-voiceless distinction in word-final stops) often interchange *P* and *B* or *T* and *D* at the end of English words (*WRIDE write; WEPP web; HAD hat* and *SOLT sold*. Hebrew students (who are not familiar with /h/) were observed to arbitrarily insert and delete the letter *H* in their attempts to spell English words (*EILL hill; AT hot; HAIR PLAIN airplane*). It would seem, then, that just as the study of the spelling activity of a preliterate child can provide insights into the state of his phonological knowledge (Read 1973), so the creative orthography of the second langauge learner will reflect his perception of the sound structure of the language he is attempting to learn.

In addition to using nonconventional spontaneous spellings as a diagnostic tool to gauge the state of the second language learner's phonology, the ESL teacher should naturally also undertake the task of guiding the transition from invented spelling to the traditional orthography of the language being learned. In doing this, however, the teacher must recognize that the orthography which the adult's (or child's) graphic competence allows him to develop spontaneously will differ from the conventional spelling system of the language he is learning. Rather than bombard the learner with the conventional spelling rules, the teacher should perhaps allow and encourage the student to make use of his graphic competence to initially develop his own 'natural' orthography. This initial system should then be gradually modified until the transition to the conventional orthography is complete. Such an approach has been successfully implemented at the elementary school level as described by C. Chomsky (1975 and 1976) and Paul (1976). These reports suggest that the transition to standard English orthography takes place in an orderly developmental sequence and that the spontaneous spellings of the children can be used to dictate the rate at which conventional spelling patterns are introduced. Since the study of graphic competence presented here has shown that adults make use of the same principles and strategies as do young children, there is good reason to believe that an approach to spelling instruction that has been proven valuable in an elementary school setting would also be of benefit to adults who were learning to spell.

3.3 Limitations of the Present Study and Suggestions for Future Research

An exploratory study like the one presented here is always limited in the scope of its investigation. Now that my basic discussion of graphic competence is complete, I would like to offer some suggestions about how further insights into the nature of spelling processes could be gained.

The cross-sectional data presented here, which was based on the spelling of only twenty-five words in two sessions, gives us only a glimpse into the developmental nature of the strategies used by both adults and children. A longitudinal study might be designed to answer the following questions:

a. How would spelling strategies change over time?

b. Would there be an increase in the use of some strategies and a decrease for others?

c. Which strategies are more subject to change or phasing out?

d. Would decodability eventually become a concern? The subjects in this study were remarkable in their lack of concern for the readability of what they had written. When asked in interviews to read back some of their spellings, those who could not were quite nonplussed.

e. Would subjects modify the alphabetic symbols (for example, with diacritics) to denote specific linguistic features? Such a practice would obviously enhance decodability, but it was never manifested in the present study.

The small number of symbols in the alphabet (eight) and phonemes in the 'language' (thirteen) obviously limited the amount of data that could be collected. A further study might include more symbols and sounds. For instance, additional lax vowels could be included in the stimulus words to determine whether the strategies used for representing these sounds in my study can be generalized to other words involving different lax vowels. The inclusion of more sounds might also invoke other as yet undiscovered strategies and principles for forming graphic representations. The question of interference from a known orthographic system could also be pursued in more detail.

Another interesting question has to do with whether or not the presence of morphophonological information in the stimulus words would cause adults and children to differ in their attempts at graphic representation. Would adults be more able to identify this kind of information and would this be manifested in their spellings? A study by Jehn (1982) based on the work here suggests that adults still showed a preference to spell words phonetically even when they had the opportunity to use letters to represent morphophonological units. However, as Jehn's subjects had only two sessions in which to 'develop' spelling strategies, it is still possible that morphophonological strategies would emerge in a longitudinal study.

No attempt was made in this study to examine individual differences in spelling performance. The examination and comparison of individuals rather than groups would give additional insight into the way in which a person organizes his existing knowledge to produce graphic representations. A cursory examination of subjects' performance in the pilot experiment which preceded the present study (O'Grady and Gibbons 1980b) showed some evidence of inconsistency in an individual's spelling of various words despite the fact that the inconsistent spellings could still be considered plausible representations of the target sounds. Thus a single subject might spell /sar/ as ΦΔ on one occasion, but as ΦΓΔ on another. Pursuing this point might well shed some light on the spellers' apparent lack of concern for decodability.

Another fruitful kind of study might involve additional groups of subjects. For example, it would be interesting to compare the performance of 'atrocious' spellers to that of normals on the type of task demanded here.[7] An examination of the performance of such a group might reveal defects in their basic graphic competence or quantitative and qualitative differences in their implementation of certain strategies. Would they perhaps demonstrate a lack of segmentation ability or inflexible adherence to a particular strategy? An analysis of data collected from atrocious spellers might well provide insights into the way in which they identify and organize patterns, thereby giving more clues about the processes that produce spelling errors.

Other groups which should be included in further studies are adult illiterates and those whose previous graphic representational performance has been restricted to non-alphabetic orthographies (for example, Chinese speakers). If adult illiterates could produce plausible spellings to the same extent as the subjects here, this would indicate that graphic competence does not atrophy through disuse and would substantiate the claims made here about the stability of graphic competence. The performance of literate speakers of Chinese, which employs a logographic orthography, would provide valuable data about the availability of the strategies manifested in the spellings of our English-speaking subjects to writers who are not used to providing a detailed phonetic record of speech. Data gathered from this type of study would shed further light on the role of experience in the development of graphic competence.

Still another group whose invented spelling could be studied in future research consists of preliterate children. The remarks presented in this thesis have made frequent reference to the preliterate writings of young children (for example, Read 1971), at times comparing their spelling performance with the performance of the subjects in this present study. A future study would allow a more valid comparison if it included preliterate children as subjects as well as older, literate children and adults.

In this study, it was suggested the differences in overall performance among the groups may be partially explainable in terms of their differing levels of cognitive development. In particular, it was noted that the transition from the level of preoperational thought to concrete operational thought appears to significantly affect the nature and use of various spelling strategies. However, it is important to note that the only assessment made of the subjects' level of cognitive functioning was based on their chronological age and grade placement. A future study should take into account more detailed information on the subjects' level of cognitive functioning based on actual empirical study.

3.4. Concluding Remarks

In conclusion, we should note one of the major problems that exists in theoretical linguistics and in other sciences which attempt to characterize mental structures. The problem is one of determining the connection between theoretical models and the results of experimental work. Spelling research to date has largely been carried out by two groups of investigators—the psychologists who have investigated the perceptual and cognitive faculties involved in writing and the educators who assess the pedagogical implications of these studies. A third group of researchers who could make a valuable contribution to the study of spelling ability consists of linguists who are attempting to characterize the grammar of the language which the speller must draw upon to produce a written form. It is this grammar (i.e., the system of phonological, morphological, syntactic and semantic knowledge) that provides the speller with the linguistic units (sound, syllables, words, etc.) for which he must ultimately find a graphic representation.

What has been lacking to date is an integration of the three areas of research in an attempt to explain how the wedding of perceptual skills, cognition and linguistic knowledge can result in the uniquely human achievement known as literacy. Further research into all of these areas with the emphasis on how they are organized and coordinated will hopefully lead us to a more comprehensive understanding of spelling ability. By attempting to identify and characterize the organizational skills comprised in graphic competence, I have tried to make an initial contribution to this important research program.

Footnotes

[1]It is unknown how many children actually produce invented spellings. Although Read's work was confined to some twenty children, the number of known invented spellers is increasing as more educators and researchers become aware of the phenomenon.

[2]Elizabeth Stever (1980) investigated the effect of dialect differences on spelling development. She found that although a partricular dialectical pronunciation will determine the actual letter used to represent a sound, it does not affect the type of strategy used.

[3]Because of the unequal numbers in each group, a verification test employing the same statistical package and analysis was run. For this verification test, a random selection of ten subjects from each age level was used. The results were essentially the same, showing the inconsequentiality of the unequal numbers.

[4]As the 'language' of the invented spelling task was unknown to the subjects, it cannot be stated with certainty that the subjects would order the letters in the words in a left-to-right direction. It must be said though that, in interviews with the six subjects randomly chosen from each group, all those interviewed claimed that they had assumed that the letters of the words should be wirtten in the same left-to-right horizontal order as in English words.

[5]**A** c-commands **B**, if the first branching node above **A** dominates **B**. For further details, see Reinhart (1981).

[6]Notice that /ʌw/ is not involved in the vowel shift rules as /aw/ is.

[7]A group of this type was originally included in the study but was subsequently rejected as there was concern over whether they were sufficiently poor spellers to make legitimate comparisons.

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Late Acquisition of Reflexive and Reciprocal Pronouns: A Pilot Study

Josephine Patterson

1. Introduction

Certain aspects of the acquisition of the adult system of anaphora have recently been debated by psycholinguists. One of these aspects is the child's acquisition of reflexives and reciprocals. Two linguists, Solan (1978) and Matthei (1978), have conducted research on children's understanding of the Specified Subject Condition (SSC), a restriction on bound anaphora considered by some syntacticians to represent the adult grammar of reflexives and reciprocals. It states:

> *In:* ... X [α...Y...]...X...
>
> *No rule can involve X and Y where α contains a specified subject distinct from Y and not controlled by X, except where Y is in Comp.*

For example, the SSC accounts for the grammaticality of the following sentences which involve reciprocal constructions:

1. *The boys want to vote for each other.*
2. **The boys want Max to vote for each other.*

It accounts also, for the grammaticality of the following reflexive constructions:

3. *Mary wants to vote for herself.*
4. **Mary wants Max to vote for herself.*

Their results leave several questions open. The study by Matthei (1978) of reciprocals, and the study by Read and Hare (1977) of reflexives, suggest that children may still not know the restriction on bound anaphora at age 6.[1] However, results of an experiment on reflexives by Solan suggest that restrictions on reflexives are understood at age 6 and that it is these restrictions that are overgeneralized and cause errors on backward anaphora at age 6 (Solan 1981:70-71). Thus the results of both Matthei and Solan agree that there is no sharp cutoff at which children start to interpret sentences as adults do. The open question is what auxiliary hypotheses children are adopting in the process of acquiring adult hypotheses.

To summarize the current debate, it is not yet certain to what extent children have acquired the SSC at age 6. The exact interrelationship of the various anaphoric domains is unclear. No researcher seems to treat the question of whether reflexives and reciprocals are acquired at the same time, probably assuming that they are, since both require the same structural restriction. Since there are open questions about children's hypotheses and strategies in acquiring the grammar of anaphora, a pilot study was devised to "test these unsettled waters" and suggest direction for an expanded experimental design.

2. The Pilot Study

2.1 Method

In this pilot study, no attempt was made to include a sufficient number of tokens for a full statistical analysis. Three tasks were involved: comprehension, imitation and production.

The comprehension task was modelled after Matthei (1978). Subjects were interviewed alone. A list of twelve randomly ordered sentences (two tokens each of six different structures) were read one by one by an experimenter. After each sentence was read the subject acted out the sentence using dolls. Four dolls were present and mentioned in the various sentences (Barbie, Ken, Wayne Gretzky and his girlfriend, Vicki). The children recognized the dolls and because they had moveable parts it was easy for the subjects to do the acting out. A list of the sentences by type and token appears in Table A together with the scoring code. The number in parenthesis after each sentence represents its position in the actual order of presentation. Type (a) sentences were designed to test processing of the verb *seem* and its effect on the choice of antecedent. Types (b) to (d) are considered neutral. Types (e) and (f) compare the child's reaction to the use of a definite or reflexive pronoun in prepositional phrases. We would note that grammaticality judgments for the (f) type sentences seem somewhat difficult since even some adults accept the definitie pronoun as a reflexive in these cases. Nonetheless, for scoring purposes only those subjects choosing an antecedent outside the clause containing the pronoun were given a correct rating in these sentences.

The second task was a production task based on the imitation of five sentences similar to the (e) and (f) types of the comprehension task. Because there were very few errors even in the youngest group, we have excluded analysis of this task from the present study.

The final task required that the child observe a scenario which one experimenter acted out using the dolls. Having watched the actions, the child was asked who had done what. This resulted in a freely produced sentence. Three sentences were elicited in this manner. When responses were unclear, the child was given a probe. The children seemed to like watching an adult play with the dolls and readily created sentences. The questions and scenarios used in this task appear as type (g) to (i) in Table A. The entire procedure, even with a fourth task done for another study took from 10 to 15 minutes per subject.[?] All subjects were tested in two five-hour school days.

Table A

Type	Token	Correct Answers	Incorrect Answers
a	1. Barbie seemed to Vicki to pinch herself. (1) 2. Ken seemed to Wayne to pinch himself. (4)	Barbie pinches herself. Ken pinches himself.	Vicki pinches herself. Wayne pinches himself.
b	1. Wayne told Vickie that Barbie pinched herself. (5) 2. Barbie told Ken that Wayne pinched himself. (10)	Barbie pinches herself. Wayne pinches himself.	Vicki pinches herself. Ken pinches himself.
c	1. Barbie said that Vicki pinched herself. (7) 2. Ken said that Wayne pinched himself. (2)	Vicki pinches herself. Wayne pinches himself.	Barbie pinches herself. Barbie pinches Vicki. Ken pinches himself. Ken pinches Wayne.
d	1. Barbie wanted Vicki to pinch herself. (9) 2. Ken wanted Wayne to pinch himself. (12)	Vicki pinches herself Wayne pinches himself.	Barbie pinches herself. Barbie pinches Vicki. Wayne pinches Ken.
e	1. Vicki said that Barbie put some perfume on herself. (11) 2. Wayne said that Ken put a pencil beside himself. (6)	Barbie puts perfume on herself. Ken puts pencil beside himself.	Barbie put perfume on Vicki. Ken puts pencil beside Wayne.
f	1. Vicki said that Barbie put some perfume on her. (3) 2. Wayne said that Ken put a pencil beside him. (8)	Barbie puts perfume on Vicki. Ken puts pencil beside Wayne.	Barbie puts perfume on herself. Ken put pencil beside himself.
g	What is Barbie doing?	She is putting perfume on herself. Probe = on whom?	
h	What are Barbie and Vicki doing?	They are putting perfume on each other. Probe = on whom?	
i	Now what are they doing?	They are putting perfume on themselves. Probe = on whom?	

2.2 Subjects

The 31 subjects were all students in grades 1, 3, 4 and 6 at an elementary school in Calgary, Alberta, Canada. The age range was 6 years, 2 months to 11 years, 9 months. The school has a bilingual (French-English) program, and students are listed in Appendix A as either B (bilingual) or R (regular). All students considered in the results speak English at home. Two students who speak another language at home and who performed in a markedly different manner from that of the other subjects, were eliminated. That the effect of true bilingualism is evident is itself an interesting finding.

For the purposes of the Results (Appendix A, Tables 1-3), subjects were divided into three groups:

Group 1 - grade 1, ages 6 years, 2 months to 7 years, 2 months
- 10 subjects: 4 boys, 6 girls

Group 2 - grade 3, ages 8 years, 1 month to 8 years, 9 months
- 9 subjects: 5 boys, 4 girls

Group 3 - grades 4 and 6, ages 10 years to 11 years, 9 months
- 12 subjects: 5 boys, 7 girls

2.3 Results

Results can be seen in Appendix A, Tables 1-3. It is best to consider these data and means in terms of what is "going on" in children's late acquisition of reflexives and reciprocals. The following trends can be distinguished:

(i) There remains much misunderstanding of the *seem* construction even in Group 3 (Table 3), where responses were only about 50% correct. The effect of age may be significant since, until the age of 7, no subject responded correctly to token (a) *Barbie seemed to Vicki to pinch herself.*

(ii) One subject (No. 11, Group 3), at age 11 years, 7 months, gave what could be called the complete adult response to every item. Indicative of these complete adult responses are the √ responses to token (f) *Vicki said that Barbie put some perfume on her*, when subjects begin to choose an antecedent outside the clause containing the pronoun. Prior to this time, younger children clearly use the definite pronoun as if it were a reflexive. The choice of adult response increases from 20% in Group 1 to 44% in Group 2 to 83% in Group 3. The fact that the experimenter tended to use contrastive stress on the definite pronoun in token (f.2) shows up in a slightly increased non-reflexive choice, especially in Group 3 (50% for (f.1) *Vicki said that Barbie put some perfume on her*, 83% for (f.2) *Wayne said that Ken put a pencil beside him*).

(iii) The results of the production task seem to indicate that children sometimes produce the reflexive instead of the reciprocal until Group 3, when their response for tokens (7-8) are 100% correct. In Group 2, two subjects still use the reflexive for (7) *putting perfume on each other* as did four subjects in Group 1. Along with the two subjects using the definite pronoun instead of the reflexive, this means that 60% of subjects up to age 7 did not produce the reciprocal. In addition, over 30% of the subjects (one was not given a probe) did not produce the reflexive but, instead, produced the definite pronoun in token (6) *putting perfume on herself.* Two of these were the abovenoted exceptions, who produced the definite pronoun for (7). One of these produced the definite pronoun even for the reflexive in (8) *putting perfume on themselves.*

(iv) The least surprising trend in these data is that production of correct formal features of the reflexive is a very late acquisition. Children in Group 3 are still using the form *theirselves* or some variation of it 42% of the time. In Group 2, it was 78%, practically unanimous deviation from "standard English".

2.4 Discussion

These results have a number of implications. They suggest that acquisition of the complete adults system for reflexives and reciprocals continues well into grade 3 and that formal aspects of it are being learned as late as 11 years, 9 months.

There are indications that children in grade 1 are still trying to figure out how domains of anaphora fit together. Even if comprehension is not affected, perhaps production lags behind, leading to confusion of definite pronoun, reflexive and reciprocal. It seems to be a late step in acquisition of the complete adult system for children to link *him* or *her* with an antecedent outside the clause. We have come full circle from Group 1, where some children use *him* or *her* as if they were reflexive.

This lag in production, seen in errors made on the production task, suggests a tentative developmental sequence: an insight into children's auxiliary hypotheses. Although a child in grade 1 would never produce the sentence *Barbie is washing her* (instead of *herself*), several subjects do produce the sentences: *Barbie is putting perfume on her* (instead of *herself*); *They are putting perfume on -em* (instead of *themselves*). The child is using the definite pronoun as the reflexive at least in this prepositional phrase structure. There might be a series of stages that children go through while constructing the adult grammar. The system might look like this:

(i) Children confuse *himself* with *him*, etc. For example, a child produces: *She is putting perfume on her* instead of *She is putting perfume on herself.*

(ii) Children confuse *themselves* and *each other*. For example, a child produces: *They are putting perfume on theirselves* instead of *They are putting perfume on each other.*[3]

(iii) Children make proper distinctions. For example, a child uses *her* to mean *She is putting perfume on another person.* A child also uses reflexive and reciprocal pronouns correctly and distinguishes between them.

There are explanations for such a sequence in the acquisition of the several domains of anaphora. Children must learn pronoun interpretation (a discourse rule), reciprocal and reflexive interpretation, bound anaphora restrictions and the backward anaphora restriction (structural restrictions and sentence rules). Solan (1978:178-80) explains how the real complexity for children is in grasping the system as a whole, understanding the relationship among all these systems. The two different domains of interpretative strategies and structural restrictions do not overlap but "the inability to integrate various linguistic domains limits the possibilities of incorrect hypotheses and also inhibits the positing of certain correct ones".

3. Conclusion

As a pilot for an expanded experimental design, the study has suggested several alterations. The production task would include an adequate number of tokens and would reverse the order of presentation in the series on reflexives and reciprocals so that reflexive would precede reciprocal as well as the other way around. Comprehension tasks would be devised to compare comprehension and production at various stages. Tokens using constructions with *promise* and *persuade* might further test children's willingness to violate the SSC. A test for mastery of *seem* would also be useful. The sample should be expanded to test students at age 5 to see what results there are on the production and comprehension tasks at the age when Solan claims acquisition of the SSC. Adults would be tested to see how their judgments on tokens such as (f) *Vicki said that Barbie put some perfume on her* would differ, if at all, from those of older children. No children in a bilingual program would be used.

The focus of the study would be late acquisition of reflexives. The adult grammar of anaphora would be outlined as a context for the relevant reciprocal and reflexive interpretation rules and bound anaphora restriction. Certain subtle features of reflexive usage, especially the use of reflexive in prepositional phrases, would be studied. Since many of these reflexives are ambiguous and adult judgments may vary, some experiments could test children's use of contrastive stress. Hypotheses would be formulated in order to determine steps in late acquisition of the adult grammar. They would specifically test current theories that complex structural constraints are learned late because they are more marked, and because the data is not rich enough (low frequency), and that some complex structural constraints are never learned.

Thus, an expanded design could provide further evidence for a developmental sequence in children's attempts to form a theory of anaphora and, in addition it would examine acquisition of subtle features of the anaphoric domain.

Footnotes

*I wish to thank Karen Taylor-Browne for making arrangements to test students, and Dr. William O'Grady and Ron Smyth for guidance and comments. This paper is an adaptation of a project for Dr. O'Grady's course on child language acquisition.

[1]Six year olds in the Read and Hare study violated the restrictions on bound anaphora by choosing *the boy* as coreferential with *himself* in the following sentence: (40) *The boy thought that the man hurt himself.* (Solan 1978:99).

[2]See the paper in this issue of Calgary Working Papers in Linguistics 9 (1983) by Karen Taylor-Browne, titled "Acquiring Restrictions on Forwards Anaphora: A Pilot Study" for questions that students answered before this study.

[3]It is interesting that several adults say that *Barbie and Vicki are putting perfume on themselves* is equivalent to *Barbie and Vicki are putting perfume on each other.*

APPENDIX A: TABLE 1

Sentence Type					a		b		c		d		e		f				
Group	Subject	Sex	Pro	Age															
1	1	M	R	6;02	x		✓	✓	✓	x	x	✓	✓	x	✓	x	✓	✓	theirselves
	2	F	R	6;05	x	x	✓	✓	✓	✓	✓	✓	✓	x	x	x	her	theirselves	theirselves
G	3	M	R	6;06	x	x	✓	✓	✓	✓	✓	✓	✓	x	x	x	✓	✓	theirself
R A	4	F	B	6;08	x	x	✓	✓	✓	✓	✓	✓	✓	✓	x	x	✓	✓	theirselves
D E	5	F	B	6;10	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	x	x	✓	✓	theirself
	6	M	R	6;10	x	x	✓	✓	x	✓	✓	✓	✓	✓	x	x	her	on the both of them	theirselves
1	7	M	R	6;11	x	x	✓	✓	x	x	✓	✓	x	✓	x	✓	her	on them both	on 'em
	8	F	R	7;00	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	no probe	themselves	✓
	9	F	B	7;02	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	theirselves
	10	F	B	7;02	✓	✓	✓	x	✓	x	x	✓	✓	✓	x	x	✓	theirself	theirselves
	Average response in %				70% x	60% x	100% ✓	80% ✓	80% ✓	70% ✓	80% ✓	100% ✓	90% ✓	70% ✓	20% ✓	10% ✓	60% ✓	40% ✓	90% ✓
LEGEND B = bilingual program R = regular program ✓ = correct x = incorrect					1. Barbie seemed to Vicki to pinch herself.	2. Ken seemed to Wayne to pinch himself	1. Wayne told Vicki that Barbie pinched herself.	2. Barbie told Ken that Wayne pinched himself.	1. Barbie said that Vicki pinched herself.	2. Ken said that Wayne pinched himself	1. Barbie wanted Vicki to pinch herself.	2. Ken wanted Wayne to pinch himself.	1. Vicki said that Barbie put some perfume on herself.	2. Wayne said that Ken put a pencil beside himself.	1. Vicki said that Barbie put some perfume on her.	2. Wayne said that Ken put a pencil beside him.	What is Barbie doing? (She is putting some perfume on herself.) Probe = On whom?	What are Barbie and Vicki doing? (They are putting some perfume on each other.)	What are they doing now? (They are putting perfume on themselves.)

APPENDIX A: TABLE 2

Sentence Type					a	b	c	d	e	f			
Group	Subject	Sex	Pro	Age									
2	1	M	R	8;1	x : x	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	x : x	✓	✓	theirselves
	2	F	B	8;1	x : x	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	✓	✓	theirselves
G	3	M	R	8;2	x : ✓	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	x : x	✓	themselves	theirselves
R A D	4	F	B	8;5	x : x	✓ : ✓	✓ : ✓	✓ : ✓	x : ✓	✓ : x	✓	theirselves	✓
E	5	M	B	8;5	x : x	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	x : ✓	✓	✓	theirselves
	6	F	B	8;6	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	✓ : ✓	x : x	✓	✓	theirself
3	7	M	B	8;8	x : x	✓ : ✓	x : ✓	✓ : ✓	✓ : ✓	✓ : x	✓	✓	theirselves
	8	M	R	8;9	x : x	✓ : ✓	x : ✓	✓ : ✓	x : ✓	x : ✓	✓	✓	✓
	9	F	B	8;9	✓ : x	✓ : ✓	✓ : ✓	x : ✓	✓ : ✓	x : ✓	✓	✓	theirself
	Average response in %				78% x	100% ✓	78% ✓ 100% ✓	89% ✓ 100% ✓	78% ✓ 100% ✓	33% ✓ 44% ✓	100% ✓	78% ✓ 22% other	100% ✓ 78% incorrect form
LEGEND B = bilingual program R = regular program ✓ = correct x = incorrect					1. Barbie seemed to Vicki to pinch herself. 2. Ken seemed to Wayne to pinch himself.	1. Wayne told Vicki that Barbie pinched herself. 2. Barbie told ken that Wayne pinched himself.	1. Barbie said that Vicki pinched herself. 2. Ken said that Wayne pinched himself.	1. Barbie wanted Vicki to pinch herself. 2. Ken wanted Wayne to pinch himself.	1. Vicki said that Barbie put some perfume on herself. 2. Wayne said that Ken put a pencil beside himself.	1. Vicki said that Barbie put some perfume on her. 2. Wayne said that Ken put a pencil beside him.	What is Barbie doing? (She is putting some perfume on herself.) Probe = On whom?	What are Barbie and Vicki doing? (They are putting some perfume on each other.)	What are they doing now? (They are putting perfume on themselves.)

APPENDIX A: TABLE 3

Sentence Type					a		b		c		d		e		f				
Group	Subject	Sex	Pro	Age															
3	1	M	B	10;0	x	x	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
	2	F	R	10;0	x	✓	✓	✓	✓	x	✓	✓	✓	✓	x	x	✓	✓	✓
	3	M	R	10;0	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GRADE	4	F	B	10;0	✓	✓	✓	x	✓	✓	x	✓	✓	✓	x	✓	✓	✓	theirselves
	5	F	B	10;1	x	x	x	✓	✓	x	x	✓	✓	✓	✓	✓	✓	✓	themself
	6	F	B	10;1	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
4	7	M	R	10;1	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	8	M	B	10;3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	theirselves
	9	F	R	10;5	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓ probe	theirselves
GRADE	10	M	B	11;6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
	11	F	B	11;7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	12	F	B	11;9	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	theirselves
6	Average response in %				42x 58✓	50%	92✓	83✓	100✓	83✓	83✓	92✓	100%✓		50✓	83✓	100%✓	100%✓	100%✓ 42% incorrect form
LEGEND B = bilingual program R = regular program ✓ = correct x = incorrect					1. Barbie seemed to Vicki to pinch herself. 2. Ken seemed to Wayne to pinch himself.		1. Wayne told Vicki that Barbie pinched herself. 2. Barbie told Ken that Wayne pinched himself.		1. Barbie said that Vicki pinched herself. 2. Ken said that Wayne pinched himself.		1. Barbie wanted Vicki to pinch herself. 2. Ken wanted Wayne to pinch himself.		1. Vicki said that Barbie put some perfume on herself. 2. Wayne said that Ken put a pencil beside himself.		1. Vicki said that Barbie put some perfume on her. 2. Wayne said that Ken put a pencil beside him.		What is Barbie doing? (She is putting some perfume on herself.) Probe = On whom?	What are Barbie and Vicki doing? (They are putting some perfume on each other.)	What are they doing now? (They are putting perfume on themselves.)

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Acquiring Restrictions on Forwards Anaphora: A Pilot Study*

Karen Taylor-Browne

I. Introduction

This paper is designed to report on two parallel experiments on English first language acquisition of definite noun phrase anaphora. Under particular investigation were restrictions on coreference in sentence types (1) to (6) and their "mirror image" forms in (7) to (9). In each type of sentence subjects were asked whether the underlined full noun phrase could act as an antecedent for the pronoun.

(1) Near Barbie, she dropped the earring.

(2) Across Vicky's bed, she laid the dress.

(3) In front of Ken, on the bus which takes the children home from school, he saw a friend.

(4) Close to Ken's bike, which was parked in the bike rack, he found the ball.

(5) According to Barbie, she is pretty.

(6) Amongst Ken's friends, he is well liked.

(7) According to her, Vicky is the nicest girl in town.

(8) Near him, Wayne found the programme.

(9) Above her head, Vicky watched a spider.

Our research was primarily designed to test the viability of data which might clarify some seeming disparities in the results of previous experiments in this area. Before reporting our results, therefore, we will provide a background of previous acquisition studies of definite noun phrase anaphora. Having presented our findings, we will review the methodological problems of our research and the implication they have for our own as well as other experimentation. Finally, we will discuss our results in terms of previous work in acquisition of forwards anaphora.

II. Background to the Experiments

In 1969, Carol Chomsky did the first acquisition study of definite noun phrase anaphora. She looked at the three structures illustrated in sentences (10) to (12):

(10) Pluto thinks he knows everything.

(11) He found out that Mickey won the race.

(12) After he got the candy, Mickey left.

Coreference judgements were provided by children aged 5;0 - 10;0. The results suggested that by the age of 5;6 the majority of children would correctly block coreference in sentence type (11) while allowing coreference in types (10) and (12). Chomsky concluded that at about age 5;6 children must learn to use some structural principle which controls all forms of definite NP anaphora. She made no attempt to explain what that principle was.

In 1976, Lawrence Solan continued Chomsky's work with a specific theoretical framework in mind. He called the restriction which would control anaphora the Backwards Anaphora Restriction (BAR). The BAR has the effect of combining linear order with the dominance principles of Reinhart's (1976) c-command, and Lasnik's (1976) k-command.[1] The result is a restriction which is sensitive to clausal structure and linear order. Solan provides interesting research support for his proposal,[2] and ensuing work by Tavakolian (1977) and Lust and associates (1977, 1980 a & b) tends to corroborate the directionality constraints implicit in his approach. Lust et al. (1980) argue for an approach to anaphora which distinguishes production and interpretation. They suggest that production is controlled by a linear surface structure constraint which controls backwards anaphora in a manner similar to the BAR, but that interpretation is controlled by pragmatic constraints. They provide data which suggest that by age 8 children will correctly interpret type (2) sentences as blocked.

In 1981, David Ingram and Catherine Shaw reported on a study which tested our type (1) sentences. They discovered that children of the same age as those tested by Lust et al. rarely blocked coreference in these sentences. They point out that their 100 subjects aged 3;0 to 7;11 seem to manifest a stage by stage approach to learning anaphora. Five main stages are outlined, and each stage represents a restructuring of hypotheses of the previous stage into more sophisticated hypotheses with more precise restrictions. The final stage is a non-directional surface constraint like c-command.

Lust and Clifford (1983) appear to question this stage by stage developmental approach by arguing that a single non-linear structure (c-command) is controlling the child's use of anaphora much earlier, but that the essentially right branching pattern of English confuses the child. This results in faulty judgements on sentences like types (1) and (2). In spite of low levels of blocking they claim that children evidence "sensitivity" to c-command on these sentences and on types (13) and (14) illustrated below.

(13) Under the foot of Ernie, he put the pillow.

(14) Under Big Bird, quickly, he threw the choo choo train.

Evidence for their conclusions comes from a battery of imitation and act-out experiments with children aged 3;5 to 7;11. The act-out results on the type (1), (2), (13) and (14) sentences have a mean of .85 of 2 correct, or less than half. Mirror image forms of these sentences act as the comparative models, and a mean of 1.08 of 2 are correctly interpreted.

The data appear somewhat inconclusive, and given the previous results of Lust *et al*. (1980) and Ingram and Shaw (1981), there does seem to be a conflict. We assumed that this conflict might be resolved if the precise age at which children mastered these forms could be established.

III Experiment One

1. Materials: A list of twenty-seven sentences was made from the nine sentence types listed in Section I. In addition, two tokens each of type (10) and (11) sentences were included as baseline/distractor items. The sentences were developed to include the names of two male and two female dolls we felt the children would recognize: Barbie and Ken; Wayne Gretzky and his girlfriend Vicky. The names were used across the tokens and the final list was randomized. The resulting list was recorded on a Uher 4000 tape recorder to ensure that the subjects would all hear the same reading for each token. One sentence, the first on the tape, was discarded from the scoring.[3] The final list, first by type and token and then in random order, appears in Appendices I and II.

To be noted is the fact that several of the sentences have verbs subcategorized to take NP, PP whereas the remainder have no such subcategorization. This results from our original design which had contained many more sentences. This design had to be severely restricted by the time constraints we encountered in doing the experiments.[4] The subcategorized forms are indicated in both Appendix I and Appendix III by the addition of a lower case "s" beside the token number.

2. Procedure: We used the same technique employed by Carol Chomsky and Ingram and Shaw. The subjects were interviewed individually in the presence of two experimenters. They were asked to identify the four dolls, and, if they did not know all the names, they were familiarized with them. They were told that they would hear some sentences played on the recorder, and would be asked a question about each sentence. Examples followed:

Sentence: Before Wayne went out, he read the newspaper.
Question: Who read the newspaper?

Sentence: Across Ken's chair, he threw the jacket.
Question: Who threw the jacket across the chair.

The subjects were told their responses could be:

(1) The person (doll) mentioned in the sentence,
(2) The other doll of appropriate gender,
(3) Either.

Several trial sentences followed to ensure that the children knew the dolls' names and understood the task. They were assured that the tape would be replayed if they wished to hear any sentence again.

The introduction, playing of the tape, and the questioning was done by the experimenter whose voice was on the tape. The second experimenter recorded answers on a key which listed the question, the possible answers and a place for comments. All the original group of subjects were also tape recorded.

Throughout the entire experiment the subjects were regularly probed with the question "Could it be anyone else?" We also encouraged them to explain their responses if they could.

3. Scoring: In the original data the responses were recorded as follows: N = non-coreferential, R = referential, E = either, and ? = incorrect for gender or other idiosyncratic response. These answers were simplified to ± blocked. Any response of E was considered to be -blocked. Two sets of figures were made to account for ? responses. One considered the response as + blocked, the second eliminated the response altogether. Tables and graphs show the mean of these possibilities. The proportion of blocked responses was tallied in raw numbers and percentages.

A 60% criterion was used to group the performance of the individual subjects. This criterion was that established by Ingram and Shaw after they discovered that adult subjects blocked only 84% of type (1) sentences.

4. The Subjects: The original group was made up of thirty children: ten from Grade one, ten from Grade three and ten from Grade four. They were pupils in a public elementary school in Calgary, Alberta.

The age range had been established on the basis of a pre-test of two eight year old and two ten year old children. The eight year olds consistently allowed coreference in the obligatorily blocked forward cases; the ten year olds rarely did so. We assumed that by testing a close range of ages from eight to ten, we would see an adult response pattern emerge. The Grade one group was included to capture any developmental sequence.

As our testing progressed, we discovered that the majority of children were not blocking necessary cases even at age ten. Consequently we included a small group of Grade six pupils.

Although we had requested that all the children be native speakers of English, we discovered that several were not. These were eliminated from the sample, leaving our numbers unbalanced.

Approximately half of each group have considerable exposure to French in their school programme; the others receive instruction almost exclusively in English.[5] We could see no trends resulting from this difference but we note this distinction in our Appendices III and IV. Groups were roughly balanced for sex, but we saw no differences arising from this factor. Table I provides a breakdown of the final four groups.

Table I - Subjects by grade, school programme, age range & sex

	Group I	Group II	Group III	Group IV
Grade	1	3	4	6
Total Number	10	8	9	6
Age Range	6;2 - 7;3	8;1 - 8;9	10;0 - 10;5	11;6 - 12;2
Sex) M	5	5	5	3
) F	5	3	4	3
French Prog.	4	5	5	3
Age Range	6;8 - 7;3	8;2 - 8;9	10;0 - 10;3	11;6 - 11;9
Regular Prog.	6	3	4	3
Age Range	6;2 - 7;0	8;1 - 8;9	10;0 - 10;5	11;10 - 12;2

5. Results: Table II presents the eleven constructions with numbers of blocked responses given in percentages across the four groups. Table III shows the numbers of subjects who attained the 60% criterion for the sentences considered to be blocked. Our judgement of which sentences are blocked comes from Reinhart's (1981) notion of c-command.[6] Complete results for all subjects are contained in Appendix III while Appendix IV gives raw numbers and percentage tallies by group and school programme.[7]

Table II - % of blocked constructions by group				
Sentence Type	Group I	Group II	Group III	Group IV
1	12%	35%	26.7%	70%
2	25%	18.8%	27.8%	58.3%
3	35%	31.2%	16.7%	58.3%
4	20%	12.5%	8.3%	33.3%
5	12.5%	9.3%	11.1%	8.3%
6	21.5%	15.6%	13.9%	12.5%
7	35%	25%	44.4%	50%
8	23%	31.2%	38.8%	58.3%
9	10%	25%	16.7%	16.7%
10	0%	0%	0%	0%
11	76.5%	93.8%	88.9%	100%

Table III - Number of subjects reaching 60% criterion				
Sentence Type	Group I	Group II	Group III	Group IV
1	1 = 10%	2 = 25%	3 = 33%	4 = 67%
2	1 = 10%	1 = 12%	2 = 22%	2 = 33%
3	0	1 = 12%	0	2 = 33%
4	0	1 = 12%	0	1 = 17%
11[8]	3/5 = 60% (7) = 70%	7 = 88%	8 = 89%	6 = 100%
No. in Group	10	8	9	6

These data would suggest that until Grade six, there is no consistent pattern of restriction being used by the majority of children on any of the blocked forwards types. It would appear that only type (1) sentences are blocked even at that age.

These very low scores motivated us to attempt the same experiment with adult subjects. We felt that few conclusions could be drawn from the child data without an adequate idea of adult responses.

IV. Experiment Two

The method, procedure and scoring were identical for the adults except that only one experimenter was present.

1. <u>The Subjects</u>: The subjects were ten University of Calgary students. Four were graduate students in Political Science; the remainder were undergraduates in various disciplines. None had anything more than a passing knowledge of linguistics or fluency in a language other than English. They were evenly balanced by sex.

2. <u>Results</u>: Table IV presents the results for each sentence type. Table V shows the number of subjects who reached 60% criterion for the predicted blocked cases. Complete results appear in Appendices III and IV listed under Group V.

Table IV - Adult responses in percentages

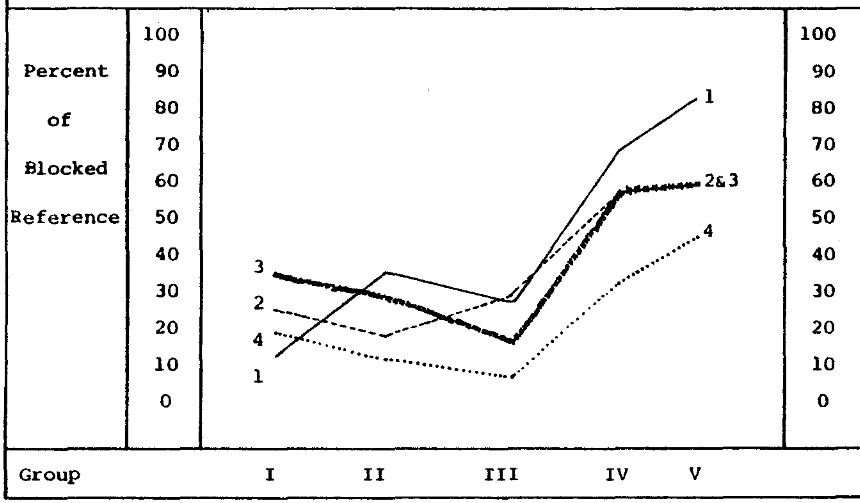
Sentence Type	Percentage Blocked
1	84%
2	60%
3	60%
4	45%
5	46.8%
6	35%
7	90%
8	40%
9	15%
10	0%
11	100%

Table V - Adults reaching 60% criterion

Sentence Type	Number of 10
1	9
2	5
3	3
4	3
11	10

We can see that with the exception of types (1) and (11) there is little evidence that a clear majority of adults correctly control the necessary restrictions, if the c-command predictions are correct. Factors such as depth of embedding of the noun in the noun phrase, and the distance between the noun and the pronoun are not covered by the c-command notion. However, as the graph in Table VI illustrates, these factors do seem to have some effect on the responses of the various groups.

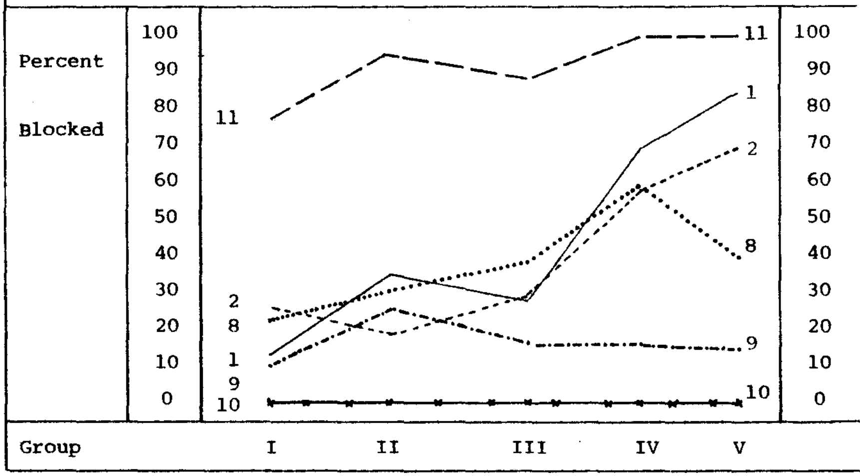
Table VI - % of blocked reference for all groups on sentences (1)-(4)



Sentence (3) is a distanced form of sentence type (1). Similarly type (4) is a distanced form of type (2). The increased distance between the full noun phrase and the pronoun would appear to result in a lower level of blocking for the adults and for the Grade six group. The younger children have very random patterns of response. The factor of distance does not appear to act alone, however. In types (2) and (4) the antecedent is genitive. This gives it both distance and greater depth of embedding in the NP. If distance were the only factor operating, we would assume that sentence types (3) and (4) ought to have the same level of blocking. Our results suggest that for groups IV and V this is not the case in spite of the fact that the average number of syllables between the genitive noun and the pronoun is smaller than the distance between the regular noun and the following pronoun. This would tend to support a view that depth of embedding may be a factor independent of distance and of importance to a correct theory of anaphora.

A factor which has been discussed in the literature, but which is not relevant to the c-command hypothesis is direction. In the graph in Table VII we show the relationship between sentence types (1), (2), (8), (9), (10) and (11). Type (8) is the mirror image of type (1) and type (9) mirror images type (2). Only the adult group shows a dramatic mirror image effect for all the types. Group IV blocks coreference in type (8) sentences at almost 60%. The younger groups show very random responses. The youngest groups block sentence type (8) more frequently than the obligatory blocked form (1). Types (9) and (2) fluctuate across the three youngest groups with the results of group II being particularly interesting: They block type (9) more than type (2). This would suggest that the directional factor is somewhat uncertain at these younger ages.

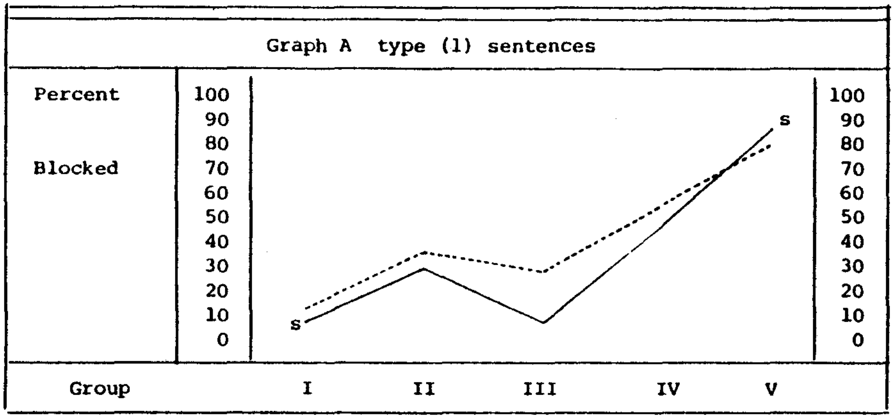
Table VII - % of blocked reference for sentence types 1,2,8,9,10&11

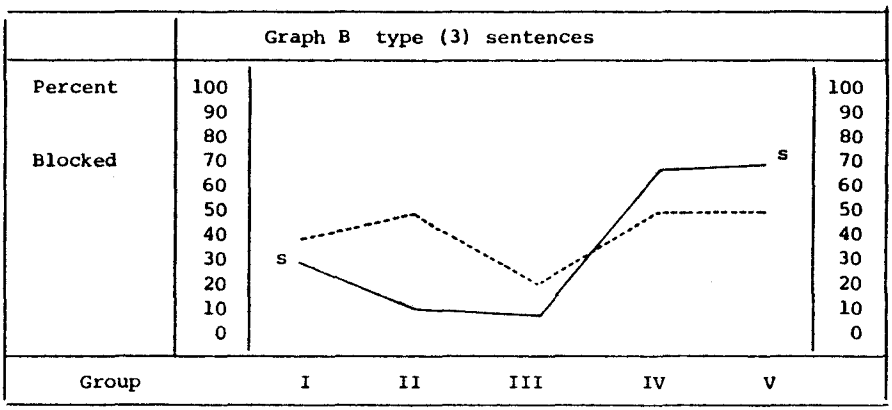


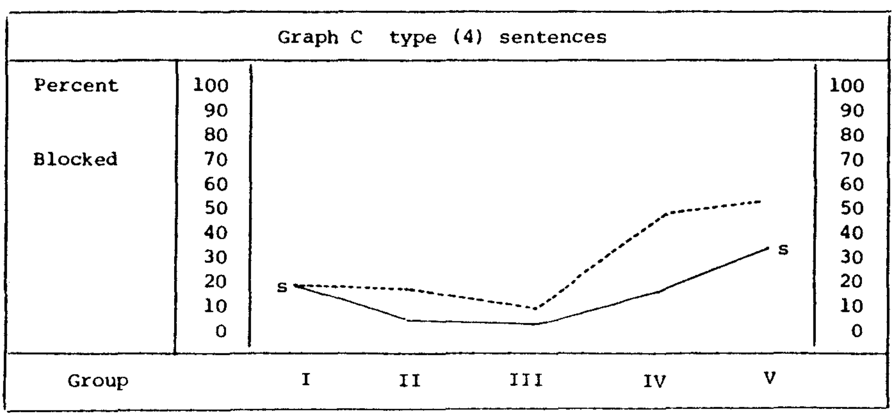
Comparing the results of the baseline forms (10) and (11) with those of the preposed prepositional phrase forms we see a dramatic difference. Type (10) is consistently allowed by all groups, and type (11) is blocked at a very high level by all groups with groups IV and V blocking 100%. We realize that some of these sentences had pragmatic clues, but these do not appear to create any marked differences in blocking. The differences which appear to be most fundamental exist for all preposed prepositional phrase types, and we would conjecture that this is caused by their more marked nature.

Another factor present in our design is that of verbal subcategorization. Unfortunately, in eliminating sentences from our original design, we inadvertently eliminated all uncategorized forms of type (2) sentences. Looking at the various tokens of types (1), (3) and (4) we cannot discover any clear pattern of response based on the verbal type. The graphs in Table VIII illustrate the differences.

Table VIII- % of blocked responses for sentences subcategorized with verbs taking NP, PP compared with those without subcategorization







Because we have such a small number of tokens, we feel it is impossible to make any claims about the effect of subcategorization. It does not seem to have a significant influence on the blocking patterns across the various sentence types used in our experiment. To suggest that we can, as a result, ignore semantic properties is not justified when we look at the differences in responses to type (5), (6) and (7) sentences across the groups. Table IX lists the tokens and the response patterns.

Table IX - Type (5), (6) and (7) sentences: number of blocked responses by token

Type	Sentence	Group I	II	III	IV	V
5	In Vicky's opinion, she is very popular.	0/10	1/8	2/9	0/6	6/10
	As far as Barbie is concerned, she knows everything.	2/10	0/8	0/9	1/6	1/10
	As for Wayne's sister, he took her skiing.	1/10	0/8	1/9	1/6	4/10
	According to Barbie, she is pretty.	2/10	2/8	1/9	0/6	8/10
6	Around Vicky's house, she becomes very rude.	1/10	2/8	2/9	1/6	6/10
	Beside Ken's sister, he looks like a giant.	4/10	0/8	1/9	0/6	1/10
	In Barbie's neighbourhood, she is considered friendly.	2/10	0/8	2/9	0/6	1/10
	Amongst Ken's friends, he is well liked.	2/10	3/8	0/9	0/6	1/10
7	According to her, Vicky is the nicest girl in town.	3/10	2/8	4/8	3/6	9/10

Although the differences between the adults and children on some of these sentences is striking, we would not wish to suggest that the contrast results strictly from the semantic categories. Rather, we feel that pragmatic reasons may control the responses. This was illustrated quite pointedly by one of the adult subjects who said "I think I'll be meaner to Barbie." after blocking reference in 5_1 and then allowing it in 5_2. Such a statement suggests that the subject imputes considerable egotism to anyone making positive statements about themselves, and that such a demonstration is not usual. Children may not be aware of this distinction. In order to determine exactly which factors would affect judgements, we would need considerably greater control of the tokens used.

3. Possible Strategies for Processing: Amongst those subjects who blocked all type (1) to (4) sentences, there were one or two who quickly identified different tokens as belonging to a specific type of sentence. One also related types (1) and (3), and (2) and (4). She stated that the extra material made no difference to the fact that these were preposed prepositional phrases. She did not use these words, but simply rehearsed the sentence with the prepositional phrase at the end of the sentence before making her judgement. This subject was an English minor who had never had a course in linguistics. The other subject who blocked all these forms had received an English public school education.

Another less sophisticated analysis was used by some adults and a few of the older children. It involved the use of reflexive pronouns. Several subjects said that if the pronoun represented the noun, one would say "himself" or "herself". Those subjects who used this strategy were unable to rephrase the sentence using a reflexive when we asked them to do so.

Both these strategies suggest some awareness of phrase structure. At the same time, they were explained by the more gregarious of the subjects, and one might require significantly greater probing to discover whether these strategies were related to general trends in the whole population, or whether these were isolated instances. We might also conjecture that the ability to analyze and respond to these tasks might vary with the type of education or the general exposure to language of the individual subjects. As our study had made no provisions for questioning the subjects on their background, we can have no clear picture of the relationship between such factors and the type of responses on the task. This leads us to a general evaluation of the study.

V. Deficiencies of the Study

The most obvious problems with this study comes from the uneven and limited numbers of tokens used for the various sentence types. We realize that reasonable statistical reliability can only be achieved by providing an eight by eight matrix of tokens and subjects for each sentence type. Without these numbers we cannot judge whether the tokens are reliable, whether ordering of tokens creates response differences or whether subcategorization plays an important role in subject judgement. In addition, we risk making hypotheses based on inadequate evidence, or evidence which can easily be the product of numerical chance.

A second limitation was the inadequate provision for extensive probing of the subjects. The strategies we did see being used might represent only the intellectualization of a minority of the subjects.

Closely related to the latter problem was the fact that we had very little background information about our subjects. With detailed studies of reading habits, we might readily determine whether different response patterns on the more marked forms could be related to literary exposure or educational level.

A relatively simple problem to solve was that presented by using dolls of different sex. Many of the questionable responses related to incorrect gender response. Such gender problems would not arise with dolls of the same sex. However, this difficulty might actually relate to pragmatic or general knowledge considerations. Our sentences did not rule out differences based on semantic or pragmatic considerations. Future research would require very careful pre-testing to diminish these effects.

Despite these problems, we feel that our study provides insights for the improvement of methods in general. Fundamental amongst these is the need for careful evaluation of adult responses to experimental tasks. We cannot expect children to know something that adults do not. By using our own judgements of grammaticality we may completely overlook problems which adults untrained in linguistic theory may reveal. We cannot hope to learn how children acquire structures if we do not know what the majority of adults have acquired.

VI. Discussion

In presenting our results, we note that with the exception of sentence type (1), the majority of our adult subjects did not block a convincing number of those sentences predicted to have blocked reference. We acknowledge that our adult subjects had a mean of 60% blocking on the limited numbers of type (2) and (3) sentences. However, considering the fact that the subjects were university students, one would expect that their control of standard English might be superior to that of the population at large. This being the case, we might go so far as to assume that a truly representative population would block less than 50% of these sentence types. Such a low level of response creates an apparent, if not real, problem for any theory of language acquisition based on c-command. Before any condemnation of c-command could be made, however, we might be wise to consider several factors; foremost amongst these is the rarity of the construction under investigation.

The preposed prepositional phrases we have looked at, do appear to be highly marked. If they are sufficiently rare, we might assume that the majority of people would never encounter enough instances to "trigger" the acquisition of the c-command restrictions. If a relationship could be found between literary exposure and the control of these forms, this defense of c-command would have some validity. Before this could take any reliable form, we would also need to know how frequent such forms are in literature, and exactly how many instances constitute a sufficient number for acquisition. This would appear to be a long and arduous process.

Another defense of the c-command hypothesis also relates to the rarity of these forms. It may be that the majority of people would consider them to follow the topicalized pattern of type (5) and (6) sentences. If one considers the prepositional phrase as being topicalized, then the c-command restriction would no longer prevent co-reference between the elements in the topicalized phrase and the following pronoun. However, if the defense of c-command relates to such an analysis, we would need to prove that the subjects were aware of factors such as verbal subcategorization since such characteristics would determine the place of attachment of the phrases. This would appear a less difficult task than the previous defense demands.

Finally we might suggest that an entirely different theory is needed. The elements of depth of noun phrase embedding and the distance between the referents would be amongst the elements such a theory would need to encompass.

VII. Conclusion

Although our research has little statistical significance, it does suggest several things. Primary amongst these is the fact that our knowledge of adult grammars must be considerably increased before we can effectively use child subjects to prove or disprove theories of grammar. The adult subjects we use in this study illustrate very different patterns of understanding than that imputed to children in previous studies. This being the case, it is difficult to suggest a specific age of acquisition of a particular structural restriction controlling anaphora. What we do see, however, is that an adult-like pattern of response is attained at about age eleven.

Given previous demonstrations that backwards anaphora is controlled much earlier than this, we would assume that a stage by stage theory of acquisition is reasonably well founded. Exactly how many stages children pass through in acquiring the necessary restrictions is not readily revealed by our work although at least three are present amongst the subjects we used: (1) all forms of forwards anaphora are accepted, whereas the blocked backwards forms are controlled; (2) blocked backwards and blocked forwards forms which are not examples of preposed prepositional phrases are correctly controlled; and (3) blocked backwards and straightforwards cases of blocked forwards types are blocked, but additional forms of preposed prepositional phrase forms are added to the repertoire of most people, if, within the sentence containing the preposed prepositional phrase, the noun and pronoun are immediately adjacent. Whether a fourth and fifth level can be defined is beyond the bounds of this study.

Footnotes

*I would like to thank the following people for their contributions towards the preparation of this paper: Dr. William O'Grady, for suggesting the topic and giving much needed guidance and encouragement; Ron Smyth for providing insights into experimental techniques; Dr. Guy Carden for updating the bibliography with needed papers and conference notes; Josephine Patterson for helping with the experiments; my friends and former colleagues who allowed us to interrupt their routines so that we could have the necessary subjects; and last but not least, the subjects, whose uniform good will and co-operation made the whole study a pleasure.

[1]The BAR is stated as follows:

> ($Pro_i \ldots NP_i$) is impossible if
>
> a) Pro and NP are clausemates and Pro governs NP; or
>
> b) Pro and NP are not clausemates and Pro c-commands NP.

Govern is a restatement of Lasnik's k-command and is formulated:

> A k-commands B if the nominal cyclic node dominating A also dominates B.

C-command is stated as:

> A c-commands B if the branding node α_1 almost immediately dominating A either dominates B or is immediately dominated by a node α_2 which dominates B and α_2 is of the same category type as α_1.

[2]One aspect of Solan's which raises doubt is his lack of explanation of the high co-reference for sentences like "The horse hit <u>him</u> in the <u>sheep's yard</u>." For the 7 year old children this sentence type had 44% co-reference judgements: the highest of all the sentences tested. For the 8 year olds it had 22%, a rate much closer to the sentences Solan felt might be grammatical in some dialects than to the 14% scored on the next lowest sentence type.

Also of interest is the fact that "govern" seems somewhat unnecessary as the sentences used in Solan's work either operate at the level of c-command or at s-command.

[3]The discarded token was "on Barbie's bed table, she laid the necklace." We felt that the response pattern for adults was quite different for this token and for several subjects who re-read it as the last time as well as the first. We found the judgement was reversed, and decided that the position was affecting judgements. This not have shown up with the children, we feel it illustrates the importance of including enough tokens of each type to later analyze the importance of positioning and token reliability. By deleting this token we realized that the 60% criterion level in fact became 100%. This is the case with all sentence types with few tokens and is one of the most severe limitations of this study.

[4]Our original design had included 10 examples of type 1 sentences, five with verbs subcategorized for NP, PP and five without. We had five each of types 2,5, and 6 and five much shorter forms of 3 and 4 combined. In order to increase the numbers and length of type 3 and 4 sentences and include types 7 and 11 we were forced to abandon the original test. We realized this would create statistical problems but felt it better to include the extra types for a pilot study. We were additionally restricted by the fact that this experiment was immediately followed by another on reciprocal and reflexive acquisition. We had been allowed access to our subjects at the personal discretion of the school principal and had promised not to detain any subject more than 15 or 20 minutes. Consequently our experiment could not exceed 10 minutes.

[5]All children in the Calgary Public Schools receive some French instruction beginning in Grade 4.

[6]See footnote 1 above.

[7]The double scores for some sentence types results from the fact that we have made two calculations of responses. Those children who responded with questionable answers were scored as if the questionable answer was a blocked response and then as if they had not responded at all. Final percentage calculations were the mean of these results.

[8]The two series of numbers for Group I represent the difference between children whose answers were scored as questionable (i.e., totally unrelated to the task referents) and those who gave reasonable answers for both tokens.

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Appendix I

Sentences by Type and Token

Type 1: Simple preposed PP: NP precedes Pro.

1. Near Barbie, she dropped the earring.
2. In front of Wayne, he saw a dog.
3. Behind Wayne, he heard a noise.
4. Beside Barbie, she found a quarter.
s 5. In front of Wayne, he stood the pop bottle.

Type 2: Preposed PP with possessive NP preceding Pro.

s 1. Across Vicky's bed, she laid the dress.
s 2. Under Wayne's desk, he put the lunch box.

Type 3: Preposed PP with heavy NP. NP precedes Pro.

1. In front of Ken, on the bus which the children take home from school, he saw a friend.
s 2. Beside Barbie, on the couch in the living room, she stood the box of chips.

Type 4: Preposed PP with Possessive NP and heavy NP. NP precedes Pro.

1. Close to Ken's bike, which was parked in the bike rack, he found the ball.
2. Near Ken's goal, which was at the sunny end of the rink, he dropped the glove.
s 3. On top of Wayne's desk, which was covered with papers, he put the new book.
4. Under Ken's model plane, which was on the bedroom shelf, he carefully placed the stand.

Type 5: as for/according to NP precedes Pro.

1. In Vicky's opinion she is very popular.
2. As far as Barbie is concerned, she knows everything.
3. As for Wayne's sister, he took her skiing.
4. According to Barbie, she is pretty.

Type 6: Background information plus copular verb.

1. Around Vicky's house, she becomes very rude.
2. Beside Ken's sister, he looks like a giant.
3. In Barbie's neighbourhood, she is considered friendly.
4. Amongst Ken's friends, he is well liked.

Type 7: as for/according to Pro precedes NP

1. According to her, Vicky is the nicest girl in town.

Type 8: Preposed PP. Pro precedes NP.

1. Near him, Wayne found the programme.
2. Beside him, Ken dropped the wallet.

Type 9: Preposed PP with possessive Pro. Pro precedes NP.

1. Above her head, Vicky watched a spider.
2. On her hanger, Vicky hung the coat.

Type 10: Good Forwards Anaphora

1. Ken's mother said that he was sick.
2. Wayne knows that he has the most points in the league.

Type 11: Blocked Backwards.

1. She waited outside while Vicky was changing.
2. He was glad that Wayne was coming.

Appendix II

Sentences in Order of Presentation

1. Near him, Wayne found the programme.
2. Around Vicky's house, she becomes very rude.
3. She waited outside while Vicky was changing.
4. Near Barbie, she dropped the earring.
5. Beside him, Ken dropped the wallet.
6. Across Vicky's bed, she laid the dress.
7. Close to Ken's bike, which was parked in the bike rack, he found the ball.
8. Above her head, Vicky watched a spider.
9. Ken's mother said that he was sick.
10. In Barbie's neighbourhood, she is considered friendly.
11. On top of Wayne's desk, which was covered in papers, he put the new book.
12. In Vicky's opinion, she is very popular.
13. Beside Barbie, on the couch in the living room, she stood the box of chips.
14. In front of Wayne, he saw a dog.
15. As far as Barbie is concerned, she knows everything.
16. He was glad that Wayne was coming.
17. Near Ken's goal, which was at the sunny end of the rink, he dropped a glove.
18. Under Wayne's desk, he put the lunch box.
19. As for Wayne's sister, he took her skiing.
20. Beside Ken's sister, he looks like a giant.
21. According to her, Vicky is the nicest girl in town.

22. Behind Wayne, he heard a noise.

23. In front of Ken, on the bus which takes the children home from school, he saw a friend.

24. Wayne knows he has the most points in the league.

25. In front of Wayne, he stood a pop bottle.

26. On her hanger, Vicky hung the coat.

27. Beside Barbie, she found a quarter.

28. Under Ken's model plane, which was on the bedroom shelf, he carefully placed the support stand.

29. According to Barbie, she is pretty.

30. Amongst Ken's friends, he is well liked.

APPENDIX III

Group		I										II							
Subject Age		1 6;2	2 6;5	3 6;6	4 6;8	5 6;10	6 6;11	7 6;11	8 7;0	8 7;2	10 7;3	1 8;1	2 8;2	3 8;2	4 8;5	5 8;5	6 8;8	7 8;9	8 8;9
Type	Token	M-Re	F-Re	M-Re	F-Im	M-Re	M-Im	M-Re	F-Re	F-Im	F-Im	M-Re	F-Im	M-Re	F-Im	M-Im	M-Im	F-Im	M-Re
1	1	R	N	R	R	R	R	R	R	R	R	R	N	R	N	N	R	R	R
	2	N	R	R	R	R	R	N	R	R	R	R	N	R	R	N	R	R	R
	3	N	R	R	R	R	R	R	R	R	R	R	N	R	R	N	R	R	R
	4	N	R	R	R	R	R	R	R	R	R	R	N	R	N	N	E	R	N
	5 s	N	R	R	R	R	R	R	R	R	R	R	N	R	R	N	E	R	N
2	1 s	N	N	R	R	R	R	R	N	R	R	R	N	R	R	N	R	R	R
	2 s	N	R	R	R	R	R	N	R	R	R	R	N	R	R	R	R	R	R
3	1	R	N	N	N	R	R	R	R	R	R	N	N	R	R	R	N	N	R
	2 s	N	N	R	R	R	R	R	R	N	R	R	N	R	R	R	R	R	R
4	1	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R	R
	2	N	N	N	R	R	R	R	R	R	N	R	N	R	R	R	R	R	N
	3 s	N	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R	R
	4 s	R	N	R	R	R	R	N	R	R	N	R	R	R	R	R	R	R	R
5	1	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R
	2	N	R	R	R	R	R	R	R	N	R	R	R	R	R	R	R	R	R
	3	N	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	4	N	N	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R
6	1	N	R	R	R	R	R	R	R	R	R	R	N	R	N	R	R	R	R
	2	N	?	N	R	R	R	R	N	R	R	R	R	R	R	R	R	R	R
	3	N	R	R	R	R	R	R	R	N	R	R	R	R	N	R	R	R	R
	4	R	N	R	R	R	R	R	R	R	N	R	R	R	R	N	R	R	N
7	1	N	?	E	N	R	R	R	R	E	N	R	R	R	N	R	E	N	R
8	1	N	?	N	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R
	2	N	R	N	R	R	R	R	R	R	R	R	N	R	R	N	N	N	R
9	1	N	R	N	R	R	R	R	R	R	R	R	N	R	N	N	R	R	R
	2 s	R	R	R	R	R	R	R	R	E	R	R	N	R	R	R	R	R	R
10	1	R	?	R	R	R	R	R	R	R	R	E	E	R	R	R	E	E	R
	2	R	?	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
11	1	N	?	?	N	?	R	?	R	N	N	N	N	N	N	N	N	N	N
	2	?	N	N	N	N	R	R	N	N	N	N	N	R	N	N	N	N	N

Legend

M= male
F= female
Im= French immersion
Re= regular
S= verb subcategorized for NP, PP
R= coreferential
N= non-coreferent.
E= either
?= curious answer

APPENDIX III (cont'd.)

Group		III									IV						V									
Subject		1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10
Age		10;0	10;0	10;0	10;1	10;1	10;1	10;2	10;3	10;5	11;6	11;7	11;9	11;10	12;0	12;2	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult
Type	Token	M-Re	F-Im	F-Im	F-Im	M-Re	F-Im	M-Re	M-Re	F-Re	M-Im	F-Im	F-Im	F-Re	M-Re	M-Re	F	M	M	F	M	M	F	F	M	F
1	1	R	R	N	R	N	N	N	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	2	R	R	R	R	N	N	N	R	R	N	N	N	N	R	N	N	N	N	N	N	N	N	N	R	R
	3	E	R	R	R	N	N	N	R	R	R	N	R	N	R	N	N	N	N	N	N	N	E	N	E	R
	4	R	R	R	R	E	N	E	R	R	N	N	R	N	E	N	N	N	R	N	N	N	N	N	E	N
	5 s	E	R	R	R	R	N	E	R	R	R	N	R	N	R	N	N	N	N	N	N	N	N	N	E	N
2	1 s	R	R	R	R	N	N	N	R	R	R	N	N	N	N	N	N	N	R	N	N	N	E	N	E	R
	2 s	E	R	R	R	N	E	N	R	R	R	E	R	N	R	N	N	R	R	N	N	N	R	N	E	N
3	1	R	N	R	R	E	E	R	R	N	N	E	R	N	R	N	N	N	R	R	E	N	N	N	E	R
	2 s	R	R	R	R	N	E	R	R	R	N	N	N	N	R	E	N	N	N	N	N	E	E	N	E	N
4	1	E	R	R	R	N	N	R	R	R	N	N	R	R	R	N	N	N	N	R	R	N	E	N	E	R
	2	R	R	R	R	R	E	R	R	R	N	R	R	N	E	N	N	N	R	R	N	N	R	N	E	N
	3 s	E	R	R	R	N	E	R	R	R	R	E	R	E	E	E	N	R	R	R	R	E	E	N	E	R
	4 s	R	R	R	R	E	R	R	R	R	R	R	R	N	R	N	N	N	R	R	N	E	N	N	E	R
5	1	R	R	R	R	N	N	E	R	R	R	E	R	R	E	E	N	R	R	N	N	E	N	N	E	N
	2	E	R	R	R	R	E	R	R	R	N	E	R	R	E	E	R	R	N	R	E	E	R	E	E	R
	3	E	R	R	N	R	R	R	R	R	R	R	R	R	R	N	E	N	R	N	N	E	R	N	E	R
	4	R	R	R	R	E	N	R	R	R	R	R	R	R	E	E	N	N	N	N	N	E	N	N	N	R
6	1	E	R	R	R	N	N	R	R	R	R	N	R	E	E	E	N	N	N	R	N	N	E	N	R	R
	2	R	R	R	N	N	R	R	R	R	R	E	N	R	R	N	N	N	N	N	E	E	E	N	N	N
	3	E	R	R	R	R	N	R	R	R	R	R	R	R	R	E	R	N	R	R	R	E	R	R	R	R
	4	R	R	R	R	E	E	R	R	R	R	R	R	R	R	E	E	N	R	R	R	E	R	R	E	R
7	1	R	R	R	E	E	N	N	N	N	N	E	R	R	N	N	N	N	N	N	N	E	N	N	N	N
8	1	R	R	R	R	N	N	N	R	R	R	N	R	R	N	R	N	R	N	R	N	R	R	R	E	R
	2	E	N	R	R	N	N	N	R	R	N	N	N	N	N	R	N	R	N	N	E	N	N	E	E	R
9	1	R	R	R	R	N	N	R	R	R	R	N	R	R	R	E	N	R	R	R	R	N	N	E	E	R
	2 s	R	R	R	R	R	N	E	R	R	R	E	R	N	R	E	R	R	R	R	E	E	R	E	R	R
10	1	R	R	R	R	E	E	R	R	R	R	R	R	R	R	E	E	R	R	R	E	E	R	R	E	R
	2	R	R	R	R	R	E	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
11	1	N	N	N	E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	2	N	N	N	E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

APPENDIX IV

Group	I				II				III				IV				V	
Type	Im	Reg.	Total	%	Im	Reg	Total	%	Im	Reg	Total	%	Im	Reg	Total	%	Total	%
1	0/20	6/30	6/50	12	12/25	2/15	14/40	35	6/25	6/20	12/45	26.67	10/15	11/15	21/30	70	42/50	84
2	0/8	5/12	5/20	25	3/10	0/6	3/16	18.75	1/10	4/8	5/18	27.78	2/6	5/6	7/12	58.3	12/20	60
3	2/8	5/12	7/20	35	4/10	1/6	5/16	31.2	1/10	2/8	3/18	16.67	4/6	3/6	7/12	58.3	12/20	60
4	2/16	6/24	8/40	20	3/20	1/12	4/32	12.5	1/20	2/16	3/36	8.3	3/12	5/12	8/24	33.3	18/40	45
5	1/16	4/24	5/40	12.5	3/20	0/12	3/32	9.3	3/20	1/16	4/36	11.1	1/12	1/12	2/24	8.3	19/40	47.5
6	2/16	6 (7)/23 (24)	8 (9)/39 (40)	21.5	4/20	1/12	5/32	15.6	3/20	2/16	5/36	13.89	2/12	1/12	3/24	12.5	14/40	35
7	2/4	1 (2)/5 (6)	3 (4)/9 (10)	36.7	2/5	0/3	2/8	25	2/5	2/4	4/9	44.4	1/3	2/3	3/6	50	9/10	90
8	0/8	4 (5)/11 (12)	4 (5)/19 (20)	23	5/10	0/6	4/16	31.2	3/10	4/8	7/18	38.8	4/6	3/6	7/12	58.3	8/20	40
9	0/8	2/12	2/20	10	4/10	0/6	4/16	25	2/10	1/8	3/18	16.67	1/6	1/6	2/12	16.67	3/20	15
10	0/8	0/12	0/20	0	0/10	0/6	0/16	0	0/10	0/8	0/18	0	0/6	0/6	0/12	0	0/20	0
11	6/8	10 (5)/12 (7)	11 (16)/15 (20)	80	10/10	5/6	15/16	93.8	8/10	8/8	16/18	88.89	6/6	6/6	12/12	100	20/20	100

Im = French Immersion Reg. = Regular Programme

FROM STUDENT PAPERS

In a lighter vein, we are including here some of our favorite lines culled from the papers and exams written by students in introductory linguistics courses at U. of Calgary, over the years.

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It is correct in saying there are no organs of speech because there aren't. Speech is made with sounds and for making sounds we need organs but not for speech itself. On the other hand, organs are useful for the production of speech because if we had no organs we would not be able to speak. For example, if we had no vocal folds there would be no 'sound' in our voice, it would only be air moving in different ways and places. If we had no lungs we could not move our air and therefore would have no speech.

The mouth, tongue, and lips are the organs of speech. Sapir is saying that language was created by the organs of speech sounds. Like for the caveman he learned to pronounce the word au by hitting his thumb with an axe. Because he had the mouth, lips, and tongue. Our organs of speech cannot inevitably not pronounce words. These parts are made to pronounce words (enunciate). The tongue, lips, mouth are not just organs like the liver. These (parts) are used for speech. Liver is not an organ of speech.

Adult (2nd language learners) are almost like Washoe the chimp in that they must be exposed to the 2nd language and trained to speak the 2nd language on a constant basis.

Dogs, cats, and birds have a form of verbal communication which is in common with human language. These animals, as are humans, are also interchangeable.

For Hockett, minimal pairs were a delight.

Q. What is the relationship between pidgins and creoles?
A. They have the same song.

Consonants differ from vowels. Consonants are consonantallic and vowels are vowelic.

Styles of speech occur within a dialect when individualism is wanted.

Q. "Indicate at which stage of the language acquisition process a child would be likely to produce the following utterance:
wanna give Joey truck?"
A. formal to eternity stage

Overgeneralization usually occurs when a child makes up a linguistic rule and sticks to it.

Dog barks may mean "hello, there's a cat outside or let me out". What's for dinner always means the same thing.

Animal communication is arbitrary (eg. "chirp-chirp" means "get the worms" and "chirp-cheep" means "build a nest").

Paralanguage: French and Patois (a pair of languages?)

Commissive Sentence: I have linguistics anymore.

Silbo: -the parts that go into making up a language
-terrible spelling of 'syllable'
-a piece of ribbon that goes at the edge of your window

Diachronic Linguistics: languages which do not keep a steady time in their language-speak about past, future and present