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FOREWORD

This is the thirteenth in the series of working papers published by LOGOS, the student Linguistics Society at the University of Calgary. These papers represent current work 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.

We extend our thanks to the contributors to this volume and encourage readers to submit articles for inclusion in the next issue. The editors of this volume were Heather Ayotte and Joyce Hildebrand.

We wish to extend special thanks to Joyce Hildebrand for her invaluable assistance in the preparation of this issue.

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Conditional Variability

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1.0 Introduction

Conditional statements are presumed to be understood by both speaker and listener. If the conditional statement is true, all parties concerned presume that the statement is true for some reason. When a speaker asserts, "If kangaroos had no tails they would topple over," then both speaker and listener know exactly what the statement means and whether or not it is true even if there are in fact no kangaroos in the world without tails. Asserting that conditional statements are understood and known to be true or false is one thing. Stating exactly what it is that is understood or known is quite another.

In this paper it will be shown that when a conditional statement is understood or known to be true, a number of implicitly specified variables are given more or less concrete values. Each of the variables will be defined and examples will be employed to demonstrate their use in conditional evaluation. From time to time this analysis in terms of variables will be contrasted with a 'possible worlds' analysis of conditionals. The purpose of this paper is not to argue against the possible worlds analysis but rather to provide an alternative to that analysis.

2.0 Background

In logic conditional statements are symbolized ($A \rightarrow B$) and are of the general form "If A is the case then B is the case." They are false if and only if the antecedent, A, is true and the consequent, B, is false.

There are two types of conditional statements: the material conditional, symbolized as above or sometimes with a 'hook' symbol; and the strict conditional, which asserts the necessity of the corresponding material conditional, symbolized variously with the 'fish-hook' or entailment symbol.

Conditional statements were intended to correspond with similar statements in natural language; the idea was that sentences like "If it rains I'll get wet" could be represented in formal notation and given truth values

by deduction from other formalized sentences. This ambition was never realized. A large class of conditional statements, called variously 'subjunctive conditionals' or 'counterfactuals' resisted analysis into the strict or material conditional form. By 'counterfactuals' I mean the following forms of conditional statements: statements with false antecedents such as "If Oswald had not shot Kennedy then he would be alive today", causal statements and statements which predict into the future such as "If it rains the river will rise", and subjunctive statements such as "If he had ambition he would go far."

The failure to analyze counterfactuals in terms of material or strict conditionals has two related causes. First, many counterfactuals, although true, are not necessarily true. There are some instances in which the antecedent may be true, the consequent false, and the statement as a whole true. Second, many laws of inference such as 'strengthening the antecedent' which are valid for material and strict conditionals are not valid for counterfactuals.

A recent development in philosophy has been the analysis of counterfactuals not as material or strict conditionals but rather as a distinct conditional connective with its own rules of inference: the variably strict conditional (see Lewis 1973a and Stalnaker 1968). This analysis comes with a price: the truth of a variably strict conditional is determined on the new analysis not by the state of affairs in the world but rather by the state of affairs in a possible world. The possible world selected is one in which the conditional is no longer counterfactual - what was false has become true, what was in the future has now occurred - and is selected on the basis of relevant similarity with the actual world if the corresponding conditional is true in the possible world.

The possible worlds analysis of conditional statements has severe problems. How can we select a possible world on the basis of similarity if at least part of that similarity might depend on the truth of the very counterfactuals we are trying to analyze? I am not concerned to press that argument here. Rather, I wish to focus on an alternative. The suggestion is this: counterfactuals are variable because of implicit variables in the counterfactual conditional relation. These variables, if stated explicitly, may be employed in part to provide the framework of an analysis of counterfactuals which occurs in this world and not in some possible world.

3.0 Component Strength

Conditional statements may vary in strength according to the truth values of the components A (the antecedent) and C (the consequent). I am not concerned in this paper with how the truth of A and C is established. I merely wish to indicate that, if determinable, it is determinable in a variety of manners.

Let us first consider the antecedent A. The antecedent A may be true or false. In the latter case, the conditional is called a counterfactual, or more precisely, contrary-to-fact conditional. In cases where A is true, although the term 'counterfactual' still misleadingly applies, perhaps the term 'factual conditional' is more appropriate.

There are also some cases in which the antecedent may be undetermined or undeterminable; consider, for example:

- (1) If it rains tomorrow the crops will grow.

The antecedent "it rains tomorrow" is neither true nor false, for tomorrow has not yet occurred. An antecedent which is a tautology will always be true; an antecedent which is a contradiction will always be false. Depending on the semantics chosen, there may be a wide range in between.

Like the antecedent, the consequent may be of varying truth value. In many cases (and most especially in many of the examples we choose to discuss) the consequent is known to be true or false. Even if the consequent is false the conditional itself may be true. This is most clearly demonstrated by the material conditional: if A is false and C is false then $A \rightarrow C$ is true.

For our purposes the most interesting cases are those in which the truth value of the consequent is not known, undetermined, or in some other way not certainly true and not certainly false. The recognition that the truth values of the components of conditionals may vary serves almost immediately to prevent some philosophical errors. For example, Eisenberg (1969) argues that all counterfactuals must be explicable by the 'conjunction analysis' as follows:

- (2) $[(x) (Mx \rightarrow Px)] \& [Mz \rightarrow Pz] \& [-Mz] \& [-Pz]$

The relevant portions of this analysis for this discussion are the negations $[-Mz]$ and $[-Pz]$. As Williamson (1970) points out, the antecedent and the consequent need not be false for the statement to qualify as a counterfactual.

Suppose the following example:

(3) If Wayne had been here it would have been a good party.

The counterfactual may be true, but someone may respond,

(4) Wayne was here and it was a good party, but you were in the kitchen all night, didn't see him, and missed all the fun.

We may thus allow that the truth values of the components may vary. The components may be absolutely true or false or, depending on the semantics, anywhere in between.

Let us examine a little more precisely the ways in which the truth values of the components may vary. First, the components of the counterfactual may vary because the truth of various propositions is variable in the world. For example, something may be 'possibly' true. It might rain tonight, for example. That does not mean that it is true, but it is also misleading to say that it is false. That "it will rain" is possibly true is a fact about the world; the truth value of "it will rain" is therefore variable.

Sometimes propositions which are 'possibly' true might have their truth values fixed more precisely in terms of 'probability'. For example, "This atom of uranium will decompose" is a statement which has a certain precise probability of being true. Such a probability value is not arbitrary; the rate of uranium decomposition just is a probability function.

Second, components of a counterfactual may also vary because of how much (or how little) we know about the world. The most common occurrence of this is in the statement of statistical hypotheses such as "The NDP is supported by forty per cent of Canadians." Variable truth values in such instances are explicitly stated: "samples of this size are accurate to five per cent nineteen times out of twenty."

In other cases the variable quality of our knowledge of some statement cannot be so precisely measured. Statements like "I'm reasonably certain" or "I have little doubt" express this. The nature of our determination affects this variable; if we see that the car is red we are quite certain that the car is in fact red; if we are told by a friend that the car is red then we are less certain.

4.0 Saliency

Counterfactual truth may vary as determined by relevant or 'salient' factors. These factors are best described using an example. Consider the following pair of counterfactuals (from Quine 1960:222):

(5) If Caesar had been in command (in Korea) he would have used the atom bomb.

(6) If Caesar had been in command he would have used catapults.

By 'context' we mean the situation in which one or another of these counterfactuals would have been asserted: a political science class, perhaps, or a history seminar. 'Saliency' is determined by context. It refers to those qualities of Caesar which are the most important to the discussion taking place. Which of (5) or (6) is true will depend on what quality of Caesar's is most salient. In this case, if Caesar's primitive knowledge of technology is most salient, then (6) will be true. If Caesar's ruthlessness is most salient, then (5) would be true.

On the possible worlds analysis, statements about Caesar's use of the bomb or catapults are analyzed as above in terms of saliency and context. The possible world selected for reference will be the one which is most similar to the actual world with respect to these salient qualities. On the analysis presented in this paper, saliency is employed directly in the determination of truth values for counterfactuals. Saliency is presented in terms of a closely related notion, vagueness.

To show how this works, let me consider an example.

(7) If it reaches -40 tonight, Calgary will be the coldest city on the Prairies.

It might reasonably be argued that Calgary is not on the Prairies; rather it is in the foothills, and so could not be the coldest city on the Prairies no matter what. Whether or not this counterfactual is true depends on how 'Prairies' is defined. Since it is not a precise geographical region its boundaries are vague. On some accounts, Calgary is on the Prairies, on others it is not. In fact 'Prairies' refers to not just one geographical area but many, each differently defined. Some such definitions are not complete definitions; the eastern border of the Prairies is not defined at all but the western border is defined as 'east of Calgary'.

On this analysis we mean by 'salience' the specification of exactly which of the varying specifications of some vague term will be employed. What we know of Caesar is vague at best. We know that Caesar lived in ancient Rome and that he was a brilliant though somewhat ruthless tactician. To assess the pair of counterfactuals above we must define Caesar more precisely: "Caesar the ancient Roman" or "Caesar the ruthless". If choosing between either of the two options we may have to consider the truth values of each proposed definition of Caesar. These may vary just as truth values for the different components of a counterfactual vary.

5.0 Connective Strength

The strongest form of the conditional connective is necessary implication. That is, if A is true and known to be true and the connective is expressed $A \rightarrow C$ then C must be true and known to be true. Both the material conditional and the strict conditional are conditional connectives of this form. If the conditional is true, then if the antecedent is true, the consequent must be true. Showing one instance in which the antecedent is true and the consequent false shows that the conditional is false.

As discussed in section 2 above, both Lewis and Stalnaker propose a third type of conditional, the variably strict conditional. This conditional is employed to symbolize what we mean when we use counterfactuals. It should be clear that the strength of the variably strict conditional does not lie somewhere between the strength of the material and strict conditionals, for the strength of the latter two is identical. The variably strict conditional is a form of conditional which has a weaker connective strength than either the material or strict conditional. This difference may be characterized as follows. If A is the antecedent and C is the consequent and $A \rightarrow B$ is the variably strict conditional, then if A is true C might not be. The variably strict conditional is not necessarily truth or falsity preserving. We may illustrate this using the previously mentioned rule of strengthening the antecedent.

Suppose some conditional statement ($A \rightarrow B$) is true. According to the rule of strengthening the antecedent, if some C is conjoined with the antecedent A then the resultant conditional $((A \& C) \rightarrow B)$ remains true. This law is valid for material and strict conditionals but not valid for variably strict conditionals. Conjoining some C to the antecedent can change the truth value of the corresponding conditional. The variably strict conditional may be more or less strong depending on how much or how little needs to be added to the antecedent to cause a change in truth value.

It would be a mistake, I suggest, to suppose that there is only one type of variably strict conditional. They might be quite strong or they may have no strength at all. The failure to recognize this latter possibility lies at the heart of many criticisms of Lewis and Stalnaker. Consider, for example, the following argument proposed by Bennett (1974). According to Bennett, Lewis's analysis fails in the case of the 'accidental' even-if conditional.

Consider the following conditional:

(8) If London is a large city then Jupiter has twelve moons.

If is the case that Jupiter would have twelve moons whether or not London were a large city. If London actually is a large city then, on the possible world account, we should check and see whether Jupiter actually has twelve moons; if it does the conditional is true. If London is not a large city, then according to the possible worlds theory we should consult the nearest possible world in which London is large and count the moons of Jupiter; if there are twelve then the counterfactual is true. On the possible worlds story there would in fact be twelve moons since the size of London does not affect the number of moons possessed by Jupiter.

Bennet argues as follows. While it is consistent to maintain that, in the nearest possible world, Jupiter has twelve moons, it is also consistent to maintain that, in the nearest possible world, Jupiter has thirteen moons. The truth of the accidental conditional is thus, to Bennett, undetermined. Bennett employs this argument to support the alternative 'regularity' theory of counterfactuals. But the regularity theory demands that, if there is no regular relation between the antecedent and the consequent, the counterfactual is false. But why should we say that? It is not determined that Jupiter has twelve or thirteen moons given that London is or is not a large city and so the conditional is neither true nor false.

The accidental conditional is an extreme case. There is no strength to the connection. The conditional is therefore possibly true and possibly false, nothing more. At the other extreme are the material and strict conditionals. The conditional is necessarily true or necessarily false. It is reasonable to suggest that a range of possibilities lies in between. I will suggest just a few of them. Natural or physical laws may be one example. The laws of nature, as Hume demonstrated, are not necessary laws. Many such laws, such as Newton's laws, once considered true, are now generally considered false. We consider the possibility of failure to be a factor when evaluating currently accepted laws. It is not a logical contradiction to entertain their falsity. The

variable strength of such laws is sometimes expressed in an explicitly conditional form: if true, a law. Though weaker than the strict or material conditional, the conditional which expresses a law of nature is nonetheless stronger than an accidental generalization.

A further variation of strength may be the case of non-lawlike non-accidental conditionals. The "dimes in the pocket case" is one such case. Suppose I put my hand in my pocket on Canada Day, 1987, and retrieve a handful of dimes. It is true that, in Canada, all dimes are made of nickel. I could then say:

(9) If I had put my hand in my pocket on Canada Day, 1987, all the coins I would have found would have been made of nickel.

This clearly is not necessarily true. It does not even appear to have the strength of a law of nature. But neither is the conditional an accidental conditional; there is some sort of connection between placing my hand in my pocket and touching nickel.

Although it seems clear that different strengths of a conditional connective are possible, it is not clear how to quantify that variable. What we want is a syntax which will first allow for such a range of values and second determine a syntactic relation between the varying strengthened conditionals within that range. In the next section I shall outline a syntactic structure which permits this determination.

6.0 The Domain of the Conditional

What makes a necessary statement necessary? On the Leibnizian thesis a statement is necessary if it is true in all possible worlds. In conditional terms, a conditional is necessarily true (is of greatest strength) if it is a universal statement. We have seen that not all conditionals are necessarily true; there are varying shades of strength. Therefore universality, a condition suggested by a number of analyses and the first conjunct of Eisenberg's, above, will be sufficient to describe only some small number of counterfactuals.

A law of nature is not a necessary statement. On some possible worlds a law of nature might be different from the laws of nature in the actual world. But laws of nature are expressed in the general form

(10) For all x , if Fx then Gx .

Both necessary truths and laws of nature employ the universal quantifier. Mere use of the universal quantifier will not be sufficient to distinguish between the two. A finer distinction is required. Let me suggest the following.

Consider the size of the domain of the conditional: that is, within what world, worlds, or parts of worlds a conditional is intended to be true. A necessary conditional is intended to be true in all possible worlds. A lawlike statement is intended to be true all over this, the actual, world. We might say that universality expresses the success rate of a conditional within its intended domain. The strength of the conditional may therefore be evaluated according to these two variables: the size of its domain, and its success rate within that domain. A reduction of the domain or a reduction of the success rate may weaken the conditional connective. Exactly how this is to be spelled out is probably a fascinating task and I hope one day to finish it.

7.0 Propositions

During the course of this paper I have not clearly distinguished between counterfactual propositions and counterfactual statements. Let me accomplish this now. The proposition

(11) Brakeless trains are dangerous.

does not refer only to one train but rather to a large number of trains. It is expressed counterfactually as follows:

(12) If any train has no brakes then it is dangerous.

The proposition expressed by (12) is intended to correspond with specific 'instances', in this case, specific trains, as follows:

(13) If train 1 has no brakes it would be dangerous.

(14) If train 2 has no brakes it would be dangerous.

(15) If train n has no brakes it would be dangerous.

The idea is that if each of the instances is true then the proposition as a whole is true. But propositional truth is not an all-or-nothing venture; some instances may be false while the proposition is true. Suppose, for example,

(16) Train 4489 has no brakes and is not dangerous.

Train 4489 also has no engine and has not moved since 1959. Even though (16) is an exception to the general rule that does not mean that the proposition is false. It is true in most cases.

A proposition is a statement that corresponds to more than one instance. Since not all instances need be true for the proposition to be true the strength of a proposition may vary. Propositional variability may be quantified according to the domain of the proposition and the success rate (proportion of true instances) within that domain.

8.0 Causal Counterfactuals

A great number of the counterfactual propositions we assert every day are causal propositions. By that I mean the assertion that some A causes some B to occur. Causal propositions, like other propositions, correspond to a set of instances. If we assert that A causes B then we assert that A1 causes B2, and so on.

There remains a problem to be resolved. Suppose you heat some water. The water boils; that is, little bubbles form and steam rises. The cause of the water boiling is the heat; the symptoms are the steam and bubbles. We could say, quite accurately, that the heat caused the bubbles and the steam. But now it is equally possible to say that, if there are bubbles, then there will be steam; that is, that the bubbles cause the steam to rise. The relation between the heat and the steam is quite different from the relation between the bubbles and the steam; the first is a causal relation, the second an apparently accidental relation.

At the same time, however, the strengths of the two conditionals will be the same. That is, the domain in both cases will be the same (the system described above). The universality will be the same. The truth values of each instance of this proposition will be the same. Yet typically we assert that the causal relation is stronger than the accidental relation. The distinction between the causal conditional and the accidental conditional is contained in the idea of 'causal dependency'. The idea is that the steam and the bubbles depend on the heat, and not each other, in order to occur. A

relation of dependency is an asymmetric relation. That is, if A depends on B then B does not depend on A. Accordingly we test for dependency by testing pairs of counterfactuals: $(A \rightarrow B)$ and $(B \rightarrow A)$. But both $(A \rightarrow B)$ and $(B \rightarrow A)$ will be true in exactly the same instances even in relations of dependency.

We have to consider the contraries of both: $(\neg A \rightarrow \neg B)$ and $(\neg B \rightarrow \neg A)$ (Lewis 1973b). If a relation of dependency exists then in some instances where the effect B is not present the cause A will be present and yet in very few instances where the cause A is not present will the effect B be present. The causal proposition is therefore a complex proposition which depends on the truth values of four corresponding counterfactual propositions. More formally if

(17) $A \rightarrow B$

is a causal proposition then the four corresponding propositions will be

(18) $A \rightarrow B$

(20) $\neg A \rightarrow \neg B$

(19) $B \rightarrow A$

(21) $\neg B \rightarrow \neg A$

each of which will be given a truth value which corresponds to the number of instances in which it is true.

Lewis (1973b) expresses this theory within the context of a possible worlds analysis of counterfactuals but it is not necessary to refer to a possible world to establish the variably strict truth of each of the propositions in question. We therefore retain the strength of Lewis's proposal while omitting the weakness.

9.0 Summary

In this paper it has been shown that a number of variables are implicitly given concrete values when a conditional statement or proposition is asserted. First, the antecedent and the consequent of the conditional may have varying truth values depending on how certain they are in the world and how well they are known. Second, features of the world which are relevant to the evaluation of the conditional which are more or less vaguely defined will be defined precisely. Third, the strength of the conditional connective will vary depending on its intended domain and its intended success rate within that domain. Fourth, conditional propositions which correspond to sets of instances will vary with respect to the number of instances over which the conditional is intended to be true. Fifth, some

conditional propositions will correspond to sets of several other conditional propositions and will be evaluated with respect to the truth value of each of the other conditional propositions.

Given a clear specification of each of these variables it is possible to state exactly what is understood when a conditional statement is understood. In addition, such a clear specification of the variables will specify exactly what must be true for the conditional to be true. It should be understood that conditional truth is not an all-or-nothing venture and that some conditionals will be partly true or even have no truth value at all, depending on the variables. None of these variables requires reference to some possible world for specification. Therefore the analysis proposed in this paper provides a viable alternative to the possible worlds analysis.

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Seville Pronunciation: The Phonetics and Phonology of 'Aspirated S'

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It is generally assumed that the phonology of Andalusian (and therefore of Sevillian) Spanish is readily derivable from that of standard Castilian by the application of a few simple rules:¹

- (1) the distinction between /s/ and /θ/ is lost: /θ/ → /s/ 'seseo'
's-using' or, in part of the region, /s/ → /θ/ 'ceceo', 'θ-using';
- (2) the distinction between /y/ and /ʎ/ is lost: /ʎ/ → /y/;
- (3) final /s/ is 'aspirated': /s/ → /h/ / __ [+cons]
#

My investigations in the Province of Seville, carried out in 1981 and 1983, have shown not only that the above rules are oversimplifications, but also that there are additional differences that cannot be accounted for by strictly phonological rules.

As a basis of comparison, so that it can be seen how deviant the consonant system of Seville Spanish really is, I should like to review briefly the consonants of Standard Spanish, i.e., the upper-class urban speech of Old and New Castile.²

Standard Spanish has three voiceless stops: /p, t, k/, which are normally unaspirated. /t/ is dental or interdental, not alveolar. The point of articulation of /k/ varies, like the /k/ of English, German and many other languages, according to the following vowel. /p, t, k/ occur initially, between vowels, after liquids, after /s/, /θ/, and after nasals, but not in the same syllable. They do not occur word-finally or syllable-finally. They are in tautosyllabic clusters only with /l/ and /r/. There is one voiceless affricate /tʃ/, which is usually not considered to be in the same set with /p, t, k/ though its distribution is similar, the only difference being that /tʃ/ does not form clusters with /l/ and /r/.

Corresponding in point of articulation to the voiceless stops are /b, d, g/, voiced fricatives with stop allophones. The stop allophones occur only

after silence and after nasals. It is customary to consider the stop allophones primary, but in reality, the fricative allophones have less restricted distribution, and in connected speech (as contrasted with citation forms) the fricative allophones occur more than four times as frequently as the stops.

Slightly different from /b, d, g/ are two other voiced fricatives that are sometimes mistakenly treated as semivowels. The palatal /y/ and the labiovelar /w/ are regularly stops ([j] and [g^w]) only after nasals. Utterance-initially they may be either fricative or occlusive. /y/ is roughly to /č/ as /b, d, g/ are to /p, t, k/, but /w/ has no voiceless counterpart. English-speaking linguists often consider /y/ and /w/ to be the same as the non-syllabic /i/ and /u/ of the diphthongs in bien and puerta, which I believe is erroneous.³

There are three nasals, which contrast word-initially and between vowels. They occur after /s, θ, l, r/ of a preceding syllable, and before all consonants, but assimilate completely to the point of articulation of a following consonant so that there is no contrast among nasals in syllable-final position. Word boundaries are not obstacles to this assimilation (except in some dialects, eg. Riomba, Ecuador, where all word-final nasals are velar.)

There are four voiceless fricatives /f, θ, s, x/, all of which occur initially and intervocally. /f/ alone forms tautosyllabic clusters with /l, r/. In many parts of the Spanish-speaking world /f/ is bilabial. The /s/ of Std. Peninsular Spanish is not lamino-alveolar like the /s/ of English and South American Spanish, but apical and somewhat retroflexed. It is usually called "cacuminal s". Those unfamiliar with the sound often mistake it for [ʃ]. /θ/ and /s/ can occur syllable-finally. They both assimilate to the voicing of a following voiced consonant, as in desde [dézde], mismo [mízmo], razgo [fæðgo], whereas /f/ and /x/ do not. /l/ occurs initially, medially, finally, and in the clusters already mentioned. There is an apical trill /R/ and an apical flap /r/, which contrast only between vowels. Elsewhere the contrast is neutralized. Only /R/ can occur word-finally, e.g. andar, parte. /R/ occurs regularly in some regions, while /r/ occurs in others. I shall say nothing about /ʎ/ at this point, because in the real language it has merged completely with /y/. It is alive only in textbooks, on the stage, and in regional (non-standard) dialects.⁴

Between the standard Spanish of Spain, which I have been dealing with up to now, and standard Latin American varieties, the principal phonological difference is supposed to be that /θ/ and /s/ are merged as

lamino-alveolar /s/. In the lowland or coastal regions of Latin America and in the South of Spain (the region of Andalusia) there is, in addition to the merging of /θ/ and /s/, the so-called "aspiration" of this merged sound in word-final and syllable-final positions. That is, /s/ is converted to [h] so that Estos hombres hablan español 'these men speak Spanish', sounds [éhtonómbreháblanehpañól]; the voiced velar fricative [x] is replaced by the same glottal or pharyngeal spirant [h], and final /l/ and /r/ are weakened and confused. In non-S-aspirating varieties of Spanish, e.g. Mexico City, word boundaries generally count for nothing phonologically. For example, all of the following pairs or triples are absolutely homophonous in normal speech:

- | | |
|--|---|
| 4 a) es puerta /espuérta/
espuerta | b) es tamal /estamál/
está mal |
| c) con padre /kompádre/
compadre | d) es de aquí /ézdeaki/
(d)esde aquí |
| e) la sabes
las aves /lasábes/
las sabes | f) el hecho
el lecho /elécho/
helecho |
| g) el hado
el lado /eládo/
helado | h) son hombres /sonómbres/
son nombres |

In most S-aspirating varieties, however, word-final /s/ is treated as syllable-final even when it is followed by an initial vowel, and so it is converted to /h/. Therefore la zebra [lasébra] 'the zebra' and las hebras [lahébra] 'the fibres' do not sound alike, but la junta [lahúnta] 'the group' and las unta [lahúnta] 'he greases them' do. This merger of /x/ with part of the distribution of /s/ is a considerable deviation from the standard sound system, but is trivial compared to what else happens in the Spanish of Seville.

Before speaking of what happens to /s/ in Seville, I would like to say a few words about some other supposed differences between Andalusian and Castilian.

First, the non-distinction of /s/ and /θ/. It is widely supposed that all of Andalusia, like Spanish America, has lost the distinction by shifting /θ/ to /s/, and it is chiefly for this reason that it is generally believed that

American Spanish comes from Andalusia (cf. Izzo, 1984). But way back in the 1930's Espinosa and Rodríguez-Castellano, who were then fieldworkers for the never-published Spanish dialect atlas, found that almost all of eastern Andalusia -- Almería, Jaén, Córdoba, and N.E. Granada -- have the Castilian distinction between /s/ and /θ/. Of the area where the distinction does not exist, about two-thirds has shifted /s/ to /θ/ rather than /θ/ to /s/. That is, much more of Andalusia is ceceosa than seseosa. Strangely, the ceceo area includes all of the province of Seville excepting the capital city itself, which is seseosa.

Another misconception about Andalusia⁵ is that it is all yeista ('y-using') while the rest of Spanish distinguishes /ɾ/ from /y/. In fact, in all of East Andalusia (where /s/ and /θ/ are distinct) this merger occurs; but this is also true of most of New Castile and much of Old Castile. On the other hand, in many places in West Andalusia⁶ /ɾ/ still exists. In fact, there are three towns within ten km. of the city of Seville where /ɾ/ still exists. This, in my opinion, casts considerable doubt on the belief that yeísmo originated in Andalusia and spread from there.

Another interesting and important point is that in approximately the same region of East Andalusia where the /s/ ~ /θ/ distinction exists, the sound corresponding to standard /x/ is in fact [x], whereas in Western Andalusia it is [h]. This would seem to be an unimportant phonetic variation, but it is not, for it is in exactly the same area where [x] exists that the old [h], which came from Latin /f/, is also lost. In all places where standard /x/ is [h], the old [h] from Latin /f/ is preserved, and is merged with it (and also with the [h] which comes from the aspiration of intervocalic /s/). This means that East and West Andalusia have significantly different phonological systems. It also appears to mean that West Andalusia was a backwater at the time the rest of Spain was giving up [h] under the influence of Old Castile (starting around 1400), so that when the change of Old Spanish /š/ to Modern Spanish /x/ finally arrived (after 1500), it simply put the still retained [h] in place of /š/, instead of adopting the new sound [x].

Strange things happen to /l/ and /r/ word-finally and syllable-finally. Word-finally, they both drop, except in the article el Std. [el] 'the' and the demonstrative aquel Std. [akél] 'that'. The /l/ of these two words is retained as such only if the following noun begins with a vowel: aquel hombre [akelóm-bre] 'that man'; el animal [elanimá] 'the animal'. Before a consonant, /l/ changes to /r/, as does every /l/ before a consonant within words; so we have er policía [érpoliśia] 'the policeman'; aquer papé

[akérpapé] *'that paper.'* Otherwise, they are dropped in word-final position. Hence we have singular versus plural nouns like piná [piná] (Standard pinar [pinár]) *'pine grove'*, perá [perá] (Std. peral [perál]) *'pear tree'*, vs. pinare [pináre] *'pine grove'* and perale [perále] *'pear trees'*, where superficially /l/ and /r/ appear to be part of the plural endings, i.e. á + le/re. Final /l/ and /r/ are not preserved in liaison. Unlike the other kinds of Spanish I have encountered, Seville Spanish has no horror of hiatus. Two examples I caught on the fly were "Eso no puede ir ahí" [ésonopwedeíai] *'that can't go there'* --four vowels in a sequence -- said by a woman whose husband was trying to put too big a package into the trunk of their small car; and "Usted lo puede corregir a él" [uthélopwédekórehiaé] *'you can correct him'* --three full vowels in a sequence-- said to me regarding a supposed mistake in Spanish made by an Argentinian friend.

Within words there is also no syllable-final /l/. It is not dropped, but is replaced by /r/; so carta *'letter'* is [kártá] but caldo *'broth'* is [kárdó], which in Standard Spanish means *'thistle'*. A further complication is that infinitives, which normally drop final /r/ like other words, keep it before the enclitic pronouns te, se, nos and os, and assimilate it, with distinctive lengthening, before me, le, and lo. So *'to say'* is /desi/ (Std. /dešir/), *'to say that'* is /desi éso/ but *'to say to you'* is /desirte/, and *'to say to him'* is /desile/ (Std. /deširle/).

Returning now to /s/: since /s/ in the standard language can occur at the end of words (and very frequently does, since it makes nouns and adjectives plural, and verb forms 2nd singular) and since all the sounds can occur word initially, /s/ can, in principle, occur before all the sounds of Spanish, including itself. Since in Standard Spanish, and practically all other varieties, /s/ disappears before /t/: los romanos [lořomános] *'the Romans'*, etc., there is nothing very remarkable about the fact that it also disappears in Seville. /s/ before nasals and before /l/ in Seville (and other /s/-aspirating areas) becomes a voiceless anticipation of the nasal or /l/, so mismo *'same'*, las manos *'the hands'*, asno *'donkey'*, isla *'island'*, etc., are [mĩmpmól], [lařmpmáno], [áño], [ĩlla], etc. These voiceless sounds are usually considered to be phonologically /h/ and are transcribed [h]. I do not quarrel with this, but phonetically they are not glottal spirants but voiceless nasals and voiceless laterals.

When final /s/ comes before pause, it is lost entirely in Seville and many other s-aspirating regions. In some part of Eastern Andalusia, and possibly in parts of the Carribbean, the former presence of final /s/ is

indicated by a difference in vowel quality (cf. Navarro 1939), but in Seville the lost /s/ has left no trace whatsoever: parque [párke] 'park' and parques 'parks'; loco [loko] 'crazy' and locos 'crazy, pl'; gente [hente] 'people' and gentes 'peoples', sound exactly alike.

Word-final /s/ in Seville is also lost when it precedes /č, s, f, h/. There are examples of this in Table 2. La(s) choza(s) 'the hut(s)'; la(s) sábana(s) 'the sheet(s)'; la(s) fuente(s) 'the fountain(s)'; la(s) gente(s) 'the people(s)'; all sound the same in singular and plural - unless the speaker is being very careful, in which case [h] or even [s] may appear, just as in English horseshoe and clothes are normally [hóršu] and [kloz], but can be [hórřšu] and [klotz] in hypercorrect speech.

When /s/ comes before voiced fricatives /b, d, g/ the result is voiceless fricatives [ɸ, θ, x]. What I think is important, and what has not been recognized, is that these voiceless fricatives are distinctive sounds (taxonomic phonemes) in contrast with the other sounds in the dialect. I did not at first realize this, and was lead to the realization indirectly. In many speakers, both in Spain and Spanish America, /f/ is bilabial rather than labio-dental; but in Seville I could get no one to say or even to accept my pronunciations of fuego 'fire', fuentes 'fountain', defiende 'defends', with [ɸ] for /f/. I attributed their rejection to purism. I was sure they used bilabial /f/ when I was not around. It was only when I began trying to find out what happened when /b/ came after /s/ that I realized that in Seville /ɸ/ was a separate phoneme and not the one that occurred in fuego, etc. The same thing happened with /x/. One of my informants often corrected my repetition of his pronunciation of words like gente 'people', José 'Joseph', insisting I say [hente] instead of my normal [xente]. Only when I asked him how to refer to all the members of the Gómez family, and he answered los Gómez [loxóme], did I understand why he didn't want me to say [x] in gente, gemelo 'twin', hijo 'son', etc. Likewise, s + ʒ → θ, for example, a las doce 'at twelve o'clock', is [alaθóse]. So, the combinations of /s + b, s + g/ and /s + y/ do not merely give a [h] allophone of /s/, but result in the creation of the sound contrasts /ɸ/ vs. /f/, /x/ and /č/ vs. /h/ that the other varieties of Spanish do not have, while the combination of /s + ʒ/ creates a θ/s contrast, which does exist in Standard Spanish, but with a completely different distribution in the lexicon.

Table 1
Consonants of Standard European Spanish
 Principle phonemes, allophones and examples

/p/	[p]	pan, plan, campo, mapa, España, prado	/m/	[m]	mamá, San Pedro, samba, campo
/t/	[t̟]	tanto, hasta, tres, gato, otro		[ɲ]	enfermo, en frente
/k/	[k]	coco, pisca, clima, crema, banco	/n/	[n]	no, Ana, pan, canto
/č/	[č]	mucho, chico, rancho		[ɲ]	banco, San Jose, pongo
/b/	[θ]	cabo, cabra, cable, desbastar, dos veces	/ñ/	[ɲ]	caña, ancho
	[b]	Vamos! cambio, bronco	/f/	[f]	fuerte, flaco,
/d/	[ð]	nada, desde, madre		[p]	café
	[d̟]	Dónde?, caldo	/θ/	[θ]	cinco, vez veces
/g/	[ɣ]	soga, una gata, desgranar, algo		[ʒ]	juzgar, luz verde
	[g]	Gómez, mango, un gato	/s/	[ʃ]	solo, misa, más. esto
/ʎ/	[ʎ]	(obsolescent) calle		[z]	desde, mismo, más blanco
/y/	[j]	ayer, calle	/x/	[x]	jota, ojo, monje
	[j̟]	inyectar, un lleno	/l/	[l]	Lalo, alma, peral, claro
/w/	[ɣ]	agua, dos guantes	/r/	[r]	caro, grado
	[g]	un huarache, guante	/R/	[r̄]	carro (parte, amar)

N.B.: [t̟, d̟, ð] are apico-dentals; [ʃ, ʒ] are slightly retroflexed (concave tongue) apico-alveolars, [r̄] indicates an apico-alveolar trill.

Table 2

Modification of Consonants by /s/ in Seville

/s/ + consonant		
sp, st, sk → p ^h , t ^h , k ^h	sθ, sð, sɣ, sy → θ, ð, x, ɣ	s ---> zero/ {c,s,f,h*} (pause)
España [ep ^h aña] hasta [át ^h a] estos casos [ét ^h ok ^h áso] busca [búk ^h a]	las vacas [lapáka] desde [déðe] a las doce [alaðóse] disgusto [dixút ^h o] los gómez [loxóme] los Yuste [loɣút ^h e]	las chozas [laçósa] las sábanas [lasáðana] las fuentes [lafwénte] los gemelos [lohemélo] *Std. /x/ = Seville [h] Seville also has [h] from Latin /f/ where Std. Spanish has 0.
Word-final /s/ before initial vowel		
s --> h / ____ * V		
los obreros [loho ð réro] vas a venir? [báha ð ení] qué te has hecho? [kéta h éçho]** **but: tú vas a venir? [túb a bení], vamos a ver [bamo a bé]; and: mis hijos [misí h o], los ojos [losó h o].		

The last context for syllable-final /s/, which is first in Table 2, is before voiceless stops. Inexplicably it has never before been noticed that this results in aspirated voiceless stops. Everyone "knew" that /s/ became [h], so that is what everyone heard: aspiration followed by voiceless stops instead of voiceless stops followed by aspiration. *Pasta* is [pa^hta], *caspa* is [ka^hpa], *busca* is [bu^hka]. Such words are transcribed [pahta] etc. in the linguistic atlas of Andalusia. Here are some minimal pairs: *pata* 'leg', *pasta* 'dough', *capa* 'cape', *caspa* 'dandruff', *ata* 'he tries', *hasta* 'until', *pica* 'it stings', *pisca* 'a pinch'. I have transcribed aspirated [t] with a dot under it. It is not actually retroflex, but it is alveolar, whereas unaspirated /t/ is dental.

I shall attempt an explanation of these strange goings-on in terms of articulation. If we simply neglect to articulate any voiceless consonant while continuing to make it voiceless, the automatic result is merely expiration, i.e. [h] or aspiration. In the beginning of the shift of a consonant to [h] there is probably at first only relaxation of the articulation, then an articulatory gesture toward the articulation that has little or no acoustic effect, then finally, no articulation at all. This is what appears to have happened in the Old Spanish change of [f] to [h], the Florentine change of [k] to [h], the Proto-Greek change of [s] to [h], etc. If syllable-final /s/ ceased to be articulated in Seville Spanish, the result must have been a chunk of voiceless breath preceding the next sound, which is approximately what there still is in some American dialects. But the chunk of voicelessness could easily combine with the next segment, making it partly or fully voiceless. Or, put another way, the following segment could be articulated too soon, while the voicelessness was still there. What was formerly the following segment is now simultaneous with the voiceless breath, and is therefore a voiceless segment. The voicelessness of the former /s/ is added to whatever used to follow the /s/. So [m] becomes [m̥], *θ* → *p̥*, *ð* → *θ̥*, etc. In the case of the voiceless stops, since they are already voiceless, they become aspirated, which is merely *extra*-devoiced because of increased delay in voice-onset time. (An aspirated voiceless sound is merely more thoroughly voiceless than an unaspirated one.)

But I would like to emphasize that, although the phonetic explanation of these changes is simple, their effect on the phonological system is profound. The number of consonant phonemes is nearly doubled; and there is a contrast between /h/ and /x/, between /f/ and /p/, and between aspirated and unaspirated voiceless stops - phenomena which do not occur, so far as is known, in any other Neo-Latin dialect.

There are two things about Seville /s/ that I have not yet mentioned although they are both illustrated in Table 2. The simpler one is on the very last line of the Table. When a word which begins with a vowel has its second syllable beginning with /h/, the final /s/ of a preceding word is retained, so that mis hijos 'my sons' and los ojos 'the eyes' are not [mihího] and [lohóho] but [misiho] and [losóho]. The other is that final /s/ is dropped from verbs where its presence does not distinguish one form from another. In ¿Vas a venir? 'Are you going to come?' [báhábēni] the presence of /h/ signals second person and distinguishes 'Are you going to come?' from 'Is he going to come?' ¿Va a venir? [bábēni]. But in [túbábēni] (Std. [túbaʃábēnir]) the presence of the subject pronoun tú signals second person, and [h] is generally omitted. Likewise, the first person plural ending -mos, which is unambiguously first person plural whether the s is there or not, is generally reduced to [-mo], no matter what follows it. So, instead of [bámohabé] (Std. [bámoʃabèr]) we have [bámoabé] for 'let's see'. Unfortunately, everything I have mentioned is further complicated by the fact that Sevillanos know that their way of speaking is "incorrect", and on different levels of formality they make varying degrees of effort to conform to the standard, so therefore there is considerable variation, and there are many exceptions to that which has been presented here.

Notes

1. Cf. for example, Castro 1924, García de Diego 1959: 350-352, Llorente 1962
2. Probably still the most thorough treatment of standard European Spanish phonetics is Navarro 1918 (with new editions and reprintings up to the 1960's), cf. also Alarcos Llorach 1961.
3. There was considerable controversy concerning the phonological status of Spanish non-syllabic /i/ and /u/ in the 1950's. A typical specimen is Stockwell 1955.
4. Although /ɬ/ > /y/ is considered to be characteristically Andalusian (and American), as noted at the beginning of this paper, parts of Andalusia and America preserve the $\lambda \sim y$ contrast while most of Castilla la Nueva has lost it.
5. And, incidentally, about Spanish America, and therefore another mistaken reason for thinking that American Spanish is Andalusian.
6. Especially in the province of Huelva, but also in the province of Seville.

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Nuclear Phonology and Aspiration and Flapping in English*

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1.0 The element of unpredictability in syllable structure

Linguists have long been preoccupied with the idea of proposing universal principles of syllable structure that would, in particular, predict the position of the nucleus and the syllable boundaries in a given sequence of segments. Various approaches to this problem have been proposed including those based on the relative phonological strength of the segments (cf. Hooper 1976) and the distributional approach which attempts to relate word internal syllable boundaries with word initial and word final boundaries (cf. Kurylowicz 1960).

The difficulties involved in the former type of approach, which attempts to state universal rules of syllable boundary placement in terms of segmental strength hierarchies such as (1), are readily apparent.

(1) Glides Liquids Nasals Fricatives Stops

Given an intervocalic sequence C_iC_j , where i and j refer to the strength of the C 's on the Consonantal Strength Scale, it does seem to be the case that (2a) generally (universally?) holds; i.e., heterosyllabication is evident. However, in the event that the strength relation between the two C 's is reversed, the syllable boundary cannot be placed by any universal rule, as shown in (2b). In this case, language specific variation prevails. Even closely related dialects such as Icelandic and Faroese can vary in subtle ways as shown in (2c) (cf. Vennemann 1972, and Murray and Vennemann 1983):

- (2a) If VC_iC_jV and $i \leq j$ then $VC_i\$C_jV$ (e.g. $a_i\$ta$, $ar\$ta$, $ak\$ta$ etc.)
b) If VC_iC_jV and $i > j$ then $V\$C_iC_jV$ (e.g. $a\$tra$)
OR $VC_i\$C_jV$ (e.g. $at\$ra$)
c) Faroese $\acute{e} \$pli$ Icelandic $ep\$li$

Bell (1976) discusses a number of claims made by proponents of the distributional approach and clearly demonstrates that all proposals to date have counterexamples. For example, one of the most sweeping genera-

lizations made by those accepting the view that a distributional definition of the syllable is possible is formulated by Bell (1976:225) as in (3):

- (3) If an intersyllabic sequence of consonants is analyzable into permissible word-initial and word-final clusters, then the syllable boundary does not fall between non-permissible clusters.

Although Bell (1976) notes that the principle in many cases holds true, counterexamples can be found. He discusses the case of Huichol which has word initial *pt-*, *pk-*, and *mt-* and no word final consonants. These clusters also occur word internally between vowels and, contrary to (3), the word internal clusters are syllabified *Vp\$ iV*, *Vp\$ kV*, and *Vm\$ iV* (cf. McIntosh 1945):

- (4) Counterexamples to 3
 a) word initial: *pt-*, *kt-*, *mt-*
 b) word final: NO CONSONANTS
 c) word medial: *-pt-*, *-kt-*, *-mt-*
 d) syllable structure: *Vp\$ iV*, *Vk\$ iV*, *Vm\$ iV*
 e) *pti\$ u\$ k'a\$ i* 'he ate'
pep\$ ta\$ k'i\$ ka 'you will sing'

The heterosyllabication of word internal clusters results in syllable structures which do not occur word finally (i.e. *-C\$*) in contradiction to the general principle in (3).

Although some recent studies continue to assume the validity of the distributional approach to syllable structure (e.g. Kahn 1976, Kiparsky 1981, Selkirk 1982), they do not show signs of improving on the traditional approaches. Indeed, Bell (1976) concluded that all attempts to define the syllable in terms of the distributional properties of segments are doomed to failure. Bell's conclusion is inevitable if one accepts the arguments in Vennemann (1987) where it is proposed that an identical sequence of segments, even within the same language, may vary in three different ways according to syllable structure:

- (5 a) positioning of the nucleus: e.g. a sequence *Crn* may be *Crn* or *Crn*,
 /lantr̩n/ vs. /epr̩n/ (*lantern*, *apron*)

- b) number of syllables; in some dialects the difference between *peddling* and *pedaling* is one of syllable structure; cf. disyllabic /pedlɪŋ/ vs. trisyllabic /pedlɪŋ/
- c) placement of syllable boundary; e.g. the sequence *Vk/V* may be divided *V\$ k/V* or *Vk\$/V* in German; cf. *e\$ k/lɪç* for *eklig* 'disgusting' but *jek\$/lɪç* for *jeglich* 'each'. (In the latter division, the syllable boundary corresponds with an assumed morpheme boundary.)

Accordingly, although tendencies cannot be denied, it must be concluded that syllable structure is not totally predictable on the basis of universal principles relating word initial/final cluster possibilities with word internal syllable boundaries, nor in terms of segmental strength hierarchies.

2.0 Syllable structure and ambisyllabicity

It might be argued that the aspects of syllable structure discussed in section 1 do not justify the outright rejection of approaches to segmental organization based on the placement of syllable boundaries. Rather, it is only necessary in a given sequence of segments to mark the nucleus and specify the syllable boundaries with (partially) language specific rules. It is, however, more complicated than that. Vennemann (1987) demonstrates that in any such approach, it is necessary, at least for some languages such as Standard German (and probably English), to introduce the notion of ambisyllabicity.

The introduction of ambisyllabic segments into phonological analyses has frequently bothered linguists. For example, Picard (1984:56) states:

Ambisyllabicity is simply one of those ad hoc devices which seem to pop up once in a while albeit in slightly different guises, and which, much like the so-called sonority hierarchy, appears to have little or no substance.

Although some linguists have argued that the notion of ambisyllabicity need not be introduced into syllabic phonology (e.g. Selkirk 1982), Vennemann (1987) cites clear evidence indicating the necessity of postulating ambisyllabic segments in German. In this language, lax vowels can only occur in closed syllables:

- (6 a) *Rock* /rɔk/ 'skirt'
- b) *Roggen* /rɔgən/ 'rye'

It would seem, at first glance, that a $VC^{\$}V$ structure must be posited for German to account for the open lax vowel in *Roggen* /rɔgən/ 'rye'; viz. /rɔg\$ən/. However, this language also has a syllable final devoicing rule. Accordingly, a structure such as $Vg^{\$}(V)$ should be susceptible to the process:

- (7 a) /tag/ > [tak]
- b) /rɔg\$ən/ > *[rɔkən]

In assuming ambisyllabicity, however, it can be stated that the /g/ in *Roggen* both closes the first syllable (thus allowing /ɔ/) and begins the following syllable (and is accordingly not subject to devoicing). German, then, seems to present a strong case in favour of ambisyllabicity.

Consequently, if one accepts the idea of introducing syllable boundaries in order to make generalizations about a language or language in general, it would seem that the concept of ambisyllabicity necessarily follows, at least for some languages. But, as Vennemann (1987) asks, does it make sense to state within a syllabic phonology that a segment is, at the same time, in weak offset position and strong onset position of the syllable?

3.0 Syllable structure, prosody, and bonding

In the above two sections, we have discussed two characteristics of syllable structure which have disturbed linguists; the element of unpredictability in the placement of syllable boundaries and the necessity of introducing segments with ambisyllabic status. Furthermore, it should be noted that syllable boundaries are notoriously difficult to pin down; they can vary significantly, particularly in relation to speech tempo (cf. Bailey 1978, Kahn 1976). Stress, for example, has the effect (at least in stress timed languages) of drawing marginal segments towards the peak; cf. *t* in *entire* vs. *entity* with aspiration in the former and possible flapping in the latter. Is this to be accounted for on the basis of syllable boundaries, and if so, where are they to be placed? Given the difficulties involved in theories based on syllable boundaries, it would seem desirable for linguists to begin developing new approaches to segmental organization. One possible approach would be to express the organization much more directly in terms of the cohesion relations holding among segments. In such an approach,

syllable structure would be epiphenomenal to the cohesion relations of the language.

The foundations of such a theory are found in Bell (1979) and in Kreitmair (1984) (cf. also the discussion in Vennemann 1987). Kreitmair's approach, the most developed of the two, can be summarized as follows. He introduces five types of bonding:

- (8a) segment sequence bond denoted by (-); this bond defines the sequence of segments; e.g. b-U-k, *book*.
- b) complex segment bond denoted by (=); this bond binds a segment sequence into complex segments such as affricates or diphthongs, e.g. German d-a-m-p-f, *Dampf*.
- c) nucleus bond denoted by (\sqcap); this bond binds segments into complex nuclei. It may play a role in the equivalence of $\bar{V}/(-\bar{V}\bar{V})$ and $\bar{V}C$ as constituting heavy syllables regardless of the number of segments which follow;
e.g. $\bar{V}\bar{C} = \bar{V}$ (cf. also Clements and Keyser 1983).
- d) syllabic bond denoted by (.); this bond binds segments into syllabic complexes, e.g. a+k+a+w+n+t, *account*.
- e) body bond denoted by ('); this bond accounts for the greater cohesion of segments in the body of the syllable (i.e. the nucleus plus preceding segments) as evidenced by coarticulation phenomena as opposed to the rhyme of the syllable (i.e. the nucleus plus following segments), e.g. b+l+i+n+k., *blink*.

He also assumes the following affinities which are responsible for the presence or absence of bonds:

- (9 a) peak affinity
 - b) peak environment affinity
 - c) sequence affinities
 - i) onset affinity
 - ii) offset affinity

In Vennemann's (1987:27) discussion of Kreitmair's approach, he summarizes the characteristics of these affinities as follows:

Peak affinity is the affinity between syllable peaks and the other segments bonded to it by the syllabic bond... Peak environment affinity is the affinity between syllable bonded segments standing before and after the peak; this affinity is responsible for the degree of compatibility of onset and offset types. Sequence affinities are the affinities between contiguous segments within onsets and within offsets.

Vennemann labels theories of segmental organization based directly on such relations Nuclear Phonologies. In a Nuclear Phonology only the placement of the nucleus would have to be given (although in certain individual cases as mentioned above, other syllable structure information might have to be supplied, e.g. Germ. (/e\$klɪç/ vs. /jek\$ɪɫç/) and all bonding relations would follow from the affinities. It seems to me that such an approach can be applied fruitfully to recalcitrant problems in English phonology.

4.0 Previous treatments of aspiration and flapping in English

The set of problems to be dealt with is that of flapping and aspiration in English as these are clearly related to various bonding relations. Previous treatments have encountered a number of difficulties. For example, Kahn's approach to the difference in aspiration of *p* in words such as *capon* and *depart* can be summarized as follows (cf. Picard, 1984: 48):

"/p,t,k/ are aspirated if and only if they are both syllable-initial and non-syllable final."

§

Thus, the ambisyllabic *p* in *capon* (*capon*) is not aspirated, whereas the syllable initial *p* in *depart* (*de\$part*) is.

There are at least two major problems with Kahn's approach as Picard notes. First of all, Kahn's syllable structure assignment rules would generate the following structures (for details, cf. Kahn, 1976: 32f.):

- §
- (10 a) after
- §
- b) Boston
- §
- c) bodkin
- §
- d) napkin

Since, however, there is no evidence of ambisyllabicity in the latter two cases, Kahn must introduce arbitrary conventions to yield what he believes are the correct syllable structures. (10c) is blocked by assuming that *dk*- belongs to a class of universally prohibited clusters. (10d), however, (a relatively frequent cluster) must be blocked by assuming that it is a highly marked one. It is unclear, however, if this cluster is in any way more marked than *fl*-in (10a). Accordingly, Kahn's introduction of heterosyllabication of *bod§kin* and *nap§kin* is somewhat arbitrary.

Secondly, as Picard also notes, the analysis is observationally inadequate. On the basis of Kahn's syllable structure assignment rules, structures such as *pal§try* and *coun§try* result. In these forms, however, the *t* is not aspirated or, at least, shows less aspiration than *t* preceding a stressed vowel; cf. *páltry* vs. *poltróon*. This difference in aspiration can not be accounted for in Kahn's approach.

5.0 A nuclear treatment

In this section, I would like to provide a bare sketch of a nuclear treatment of aspiration and flapping in English. The discussion here will be limited to *t* only, on the assumption that the treatment of *p* and *k* parallels that of *t*. Furthermore, *sc* sequences are not considered as they appear to show no variation whether word initial or word internal. In both cases an unaspirated variant is found; cf. *still* and *distill*. The data to be considered are found in (11):

- (11) Aspiration
 - a) Tom
 - b) atomic
 - c) attribute
 - d) artistic

f) **attribute**

h) artist

b) *congréssional*

b) k+ə+n-g+r+é+š...

34

(14) Peak Affinity

- a) The peak affinity of a (marginal) segment increases when the peak is stressed.
- b) The peak affinity of a (marginal) segment increases with proximity (linear closeness) to a peak.

Assuming further that:

- (15 a) the stressed peak has primacy over the unstressed peak.
- b) segments to the left of the peak are more susceptible to bonding than segments to the right of the peak (in recognition of coarticulation phenomena) and,
- c) peak affinity can only bond sequences that have onset/offset affinity,

then the following bonding relations can be proposed:

(16) Bonding relations

- a) Stressed Peak (Maximal body and syllabic bonding)
All (marginal) segments/sequences compatible with the onset/offset affinities are bonded to a stressed peak.
- b) Unstressed Peak (Minimal body and syllabic bonding)
 - 1) The immediately preceding (marginal) segment (and only this segment) is body/syllabic bonded with an unstressed peak.
 - 2) All unbonded (marginal) sequences are syllabic bonded to the closest (unstressed) peak.

There is then a tentative hierarchy here; viz. (16a) has priority over (16b1) which, in turn, has priority over (16b2). The hierarchy is intended to reflect a) the primacy of stressed peaks over unstressed peaks and b) the tighter bonding to the peak of segments to the left of the peak than of segments to the right (cf. (15) above).

Focusing on only relevant portions of the data in (11), we have the body and syllabic bondings in (17). All sequences compatible with the onset/offset affinities are bonded to the stressed nucleus.

(17) Stressed Peak (Maximal body and syllabic bonding)

- a) t+á-m (Tom)
- b) ...t+á-m... (atomic)
- c) ...t+r+í-b... (attribute)
- d) ...t+í-s... (artistic)
- e) ...æ-t (cat)
- f) æ-t... (átribute)
- g) æ-t... (atom)
- h) á-r-t... (artist)

In accordance with (16b1), we have the body bonding in (18a-c); i.e., the segment preceding the unstressed nucleus is bonded to it:

(18) Unstressed Peak (Minimal body bonding)

- a) ...r+í... (átribute) (cf. 11f, 17f)
- b) ...t+á... (atom) (cf. 11g, 17g)
- c) ...t+í... (artist) (cf. 11h, 17h)

In accordance with (16b2), the unbonded liquid is bonded to the unstressed nucleus:

- (19) á-r... (artistic) (cf. 11d, 17d)

In summary, we have the following bonding relations:

- (20 a) Tom t+á-m
b) atomic ə-t+á-m...
c) attribute ə-t+r+í-b...
d) artistic ə-r-t+í-s...
e) cat k+æ-t
f) átribute æ-t-r+í...
g) atom æ-t+ə-m
h) artist á-r-t+í...

I would like now to formulate three constraints to account for the distribution of the aspirated, unaspirated, and flapped / observed above. Before I do that, however, it is necessary to introduce two definitions to facilitate the statement of the conditions:

(21) Definitions

- a) a free segment: absence of left-syllabic bonding
- b) a tied segment: presence of left-syllabic bonding

We can now formulate three constraints for a nuclear phonology of English. These apply at a regular or regular to fast speech tempo.

(22) Positive constraints (for regular to fast speech tempo)

- a) a free *t* is aspirated
- b) a tied *t* is not aspirated
- c) a tied body-bonded *t* is flapped

Finally, it should be noted that the lack of aspiration in forms such as *Atlantic* (vs. aspiration in *attribute*) requires no special treatment. A *t*/*l* sequence cannot be body bonded since there is no onset affinity of *t* and *l* in English. The *t* is not free in *Atlantic* but is rather bonded to the previous unstressed nucleus. Accordingly, a necessary precondition for aspiration is not met. Furthermore, the lack of flapping in forms such as *after*, *actor*, etc. (vs. flapping in *artist*) also requires no special treatment in the phonology of English since the lack of flapping is a consequence of the following universal (cf. Perry 1977, Murray 1987):

Voicing cannot be turned off and then on again in the same syllable.

Consequently, flapping is impossible in $\acute{a}\text{-}f\text{-}t\text{-}r$ (*after*) and $\acute{a}\text{-}k\text{-}t\text{-}r$ (*actor*) since $f\text{-}D$ and $k\text{-}D$ are in violation of the universal but possible in $a\text{-}r\text{-}t\text{-}l\text{-}s\text{-}t$ (*artist*) since $r\text{-}D$ would not be blocked by the universal.

6.0 Conclusion

One reaction to Nuclear Phonology will probably be: Doesn't it raise more questions than it answers? That should not be a major concern. First of all, it is in a very early stage of development. Secondly, by enabling us to at least pose questions which have never been asked before, it will I believe prove to be a useful tool in our exploration of the intricacies of segmental organization. For example, it was mentioned above that approaches based on syllable boundaries would have difficulty accounting for the assimilation in fast speech *congressional* (with *na*) vs. slow speech *congressional* (with *na*). Would it be assumed that the segments are attracted to the **UNSTRESSED** peak in faster tempos; slow *congressional* fast *congressional*. In a nuclear phonology, such assimilations are not problematic. Bonding strength increases with speech tempo and assimilation is an expected consequence of such tightly bonded structures.

At least three goals of future research can be outlined:

- a) to provide in-depth analyses of the bonding relations and affinities evident in individual languages
- b) to determine the extent and in which ways the language specific bonding relations can deviate from unmarked or preferred syllable structure; e.g. in English body bonding of *trV-* may occur but not of *rtV-*. Such body bonds reflect relatively preferred syllable structures in accordance with a markedness theory relating the organization of segments within the syllable in terms of relative phonological strength
- c) to determine the role of the various bonding relations in sound change; e.g., a difference in bonding may be the source of differential developments such as Spanish *gordo* 'fat' with [b] but *mondo* 'world' with [d].

Notes

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1-Ascension vs. Causative Clause Union in Modern Hebrew

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1.0 Introduction

An assumption has been made that there are two types of causative clause union in Modern Hebrew (Cole 1976). Subsequent to reviewing Cole's work an interesting imbroglio transpired when it came to light that perhaps his premise is wrong. Perhaps the structures that he labels as having undergone clause union do not involve union at all. In this paper we shall examine the possibility that this observation may be true. The framework to be employed will be that of Relational Grammar (Perlmutter and Postal 1974, 1983). The following formalisms are important to the current discussion:

- (1) Terms: Subject = 1
 Direct Object = 2
 Indirect Object = 3
Nonterms: Chomeur = CHO
- (2) Chomeur Condition: If a nominal A bears a given term relation in stratum-I, and if a nominal B bears the same relation in stratum-I+1, then A bears the chomeur relation in stratum-I+1.

This condition explains that chomeurs are basically created by displacement of one grammatical relation by another. Typically, chomeurs are created in 2-1 advancement (passivization) when the advancing 2 assumes a 1 status and consequently creates a 1-CHO. Chomeurs are also created in 1-ascension when the embedded 1 ascends to a 2 status in the matrix clause and places the remainder of the embedded clause en chomage.

- (3) Relational Succession Law: An ascended nominal must take on the grammatical relation of its host.

This law refers to the downstairs clause as the 'host' of the ascension. If the host bears a 2 relation, then the ascende from the downstairs clause will bear a 2 relation in the upstairs clause. If the host bears a 1 relation, then the ascende from the downstairs clause will bear a 1 relation in the upstairs clause. One consequence of this type of ascension is that the host is

placed en chomage according to the Chomeur Condition.

Given the possibility that Cole's premise may be flawed, it seems reasonable to ask: If the structures do not represent clause union, what do they represent? What particular process can accurately account for the data? The theory being posited here is that, instead of clause union, what we are looking at is the phenomenon of 1-ascension.

To begin the investigation we need to first look at the differences between causative clause union and 1-ascension, and see which of these the Hebrew data concurs with. Then, since we are claiming that 1-ascension accounts for the data, we will have to look at several tests which support this notion over that of clause union.

To become familiar with the contrast between union and ascension it is helpful to consider the findings of Don Frantz (1981) which expose a similar phenomenon in French. He explains that French has two types of causative structures but only one of these involves union. The following examples are taken from his article to provide clear evidence of the point he makes. His claim is that in the following sentences, (4) and (6) are the nonunion causatives while (5) and (7) are the actual union structures.

- (4) Je laisserai Jean boire.
I letfut J. drink
- (5) Je laisserai boire Jean
I letfut drink J.
- (6) Je laisserai Jean boire le vin.
I letfut J. drink the wine
- (7) Je laisserai boire le vin à Jean.
I letfut drink the wine to J.

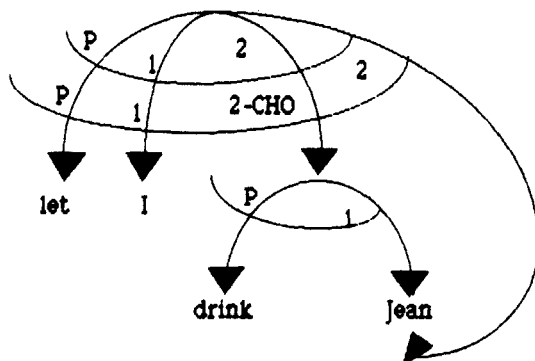
Frantz makes the observation that in (4) *Jean* is a final-2 as a result of 1-ascension (subject to object raising), where the downstairs final-1 ascends to become the 2 in the matrix clause. Note that it is positioned to the right of the predicate. In (5), however, *Jean* is still a final-2 but is the result of clause union. In this latter case note the positioning of *boire*. Instead of *Jean* being placed to the right of the predicate, *boire* assumes this position.

Frantz explains this by saying that after union, the original downstairs predicate (now a predicate emeritus, according to Frantz), is more closely linked with the matrix predicate. It is no longer sitting in the downstairs clause as in ascension, since one of the consequences of union is that the two original clauses collapse. Because of this, a predicate 'complex' is formed which consists of the matrix predicate and the predicate emeritus. What we are trying to establish here is that after union the two predicates are somehow linked, and superficially this is borne out by their adjacency in the sentence.

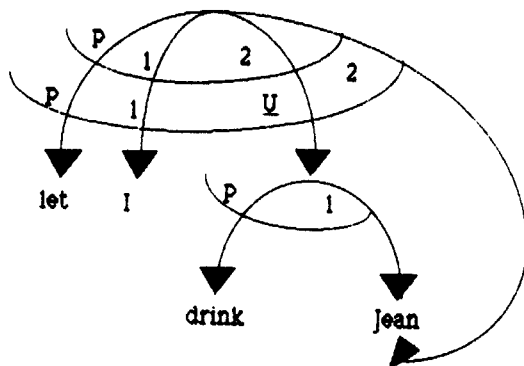
In addition to this, sentences (5) and (7) also demonstrate a significant difference. In (6) *boire* is an infinitive and *Jean* is a final-2 (similar to (4)). In (7), however, after clause union *Jean* is a final-3 and is therefore marked with the preposition *σ*, which is used elsewhere in the language to mark nominals bearing this grammatical relation.

For clarity, the relational networks for (4) to (7) are presented below in (8) to (11).

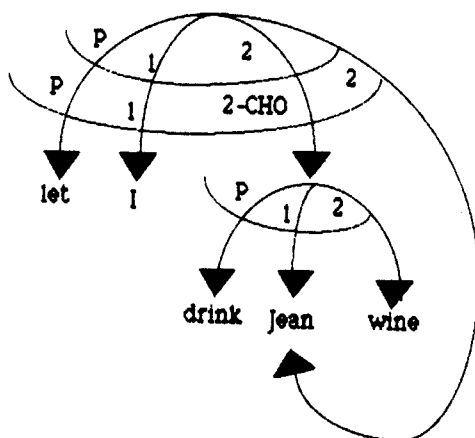
(8) Ascension



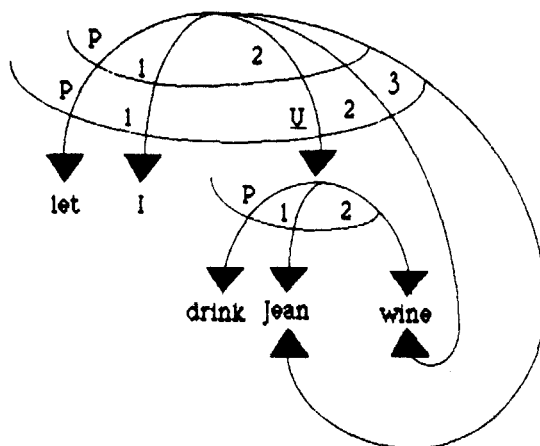
(9) Union



(10) Ascension



(11) Union



Further to his argument, Frantz demonstrates that, since in the case of ascension, two independent predicates remain, both can be negated. In the union structures, however, any attempt to negate only the predicate emeritus will yield ungrammatical results.

2.0 Word Order & Case-marking

With this introductory information as a point of departure, let us examine the data from Hebrew and see how it responds to this type of analysis.

Consider the following sentences:

- (12) Mary natna et hashever le John.
M. gave ACC the book to J.
'Mary gave the book to John.'
- (13) Ilana amra she Mary natna et hashever le John.
I. said that M. gave ACC the book to J.
'Ilana said that Mary gave the book to John.'
- (14) Ilana hichrach et Mary latet et hashever le John.
I. caused ACC M. to give ACC the book to J.
'Ilana made Mary give the book to John.'

Sentence (12) is a simple monoclausal structure which demonstrates the case marking and ordering of elements. Sentence (13) exemplifies a biclausal structure, in which *she* indicates the boundary between the matrix and embedded clause. Notice that there is no overt case marking on *Mary*. This contrasts with *Mary* bearing accusative case marking in (14) which is the causative construction.

Upon examining (14) we note several salient characteristics which Frantz claims are indicative of nonunion causatives. In particular, the *downstairs* predicate is not immediately adjacent to the main causative predicate, suggesting that they are not linked together to form the complex that is typical of union. Secondly, as we have mentioned, the original embedded *i* (*Mary*), bears an accusative marker which suggests that it has undergone *i*-ascension (subject to object raising).

3.0 Negation

In addition, if we attempt to negate the predicates in (14) the following sentence results.

- (15) *Iana lo hichrach et Mary lo latet et hashever le John.*
M. not caused ACC M. not to give ACC the book to J.
'Iana did not make Mary not give the book to John.'

It appears, initially at least, that what Cole (1976) has described as union is *i*-ascension. To substantiate this, however, we are going to have to put our theory to further tests.

4.0 Mono- vs. Biclausal

It is understood that in causative clause union two clauses collapse to form a single clause, and the elements of the original complement clause take on grammatical relations in the matrix clause. If union has occurred in the structure that we are examining, we expect then that we are dealing with only one clause.

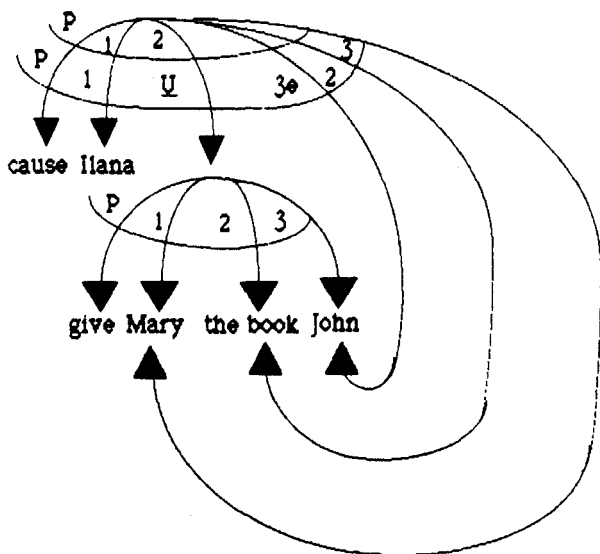
In addition, Perlmutter and Postal (1974) claim that the changes in grammatical relations in causative clause union can be accounted for by assuming the following characteristics of clause union:

(16)

- a) Downstairs (embedded/complement) final-2 of a transitive clause becomes an upstairs 2 in the union stratum.
- b) Downstairs final-1 of a transitive clause becomes an upstairs 3 in the union stratum.
- c) Downstairs final-1 of an intransitive clause becomes an upstairs 2 in the union stratum.

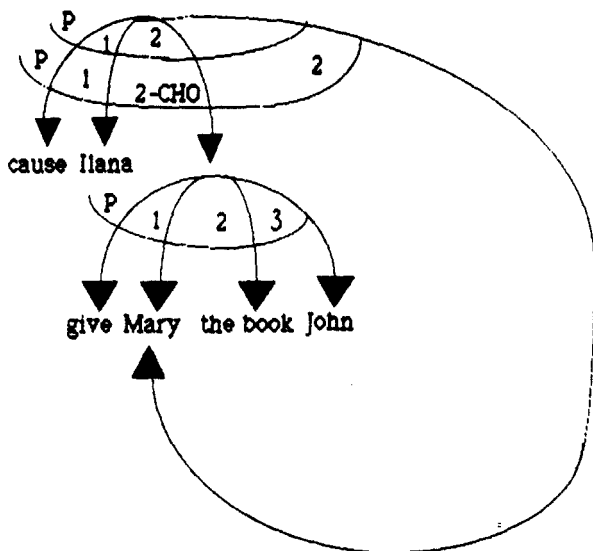
Given these notions, if we were to assume that in (14) union had occurred, (17) provides the resulting relational network.

(17)



If however, 1-ascension has occurred, then in addition to the case marking and positioning of elements that we have already noted, we should also find evidence of an internal clause boundary. Were we to assume that ascension had occurred, the relational network would be as follows in (18):

(18)



Because the downstairs 1 has ascended as a 2, the initial 2 must be put *en charge*. In this particular case we know that the complement 1 ascends as a 2 as a result of the Relational Succession Law.

We are claiming that 1-ascension has occurred and not union. To this point we have noted the characteristics of each, and determined that one of the most salient differences is that in union the internal clause boundary is destroyed, while in 1-ascension it is preserved.

If we can find tests that are sensitive to the presence or absence of the internal clause boundary, we should be able to determine with an even greater degree of definitiveness whether 1-ascension or clause union has occurred. In many languages passive constructions, topicalization and the use of reflexives vs. pronominals are affected by the presence or absence of an internal clause boundary. Let us take each one of these and determine, independent of causative clauses, if they exhibit sensitivity to internal clause boundaries in Hebrew. Should we find that they are affected, then by applying these tests to the causative structures we may find the necessary evidence to either support or refute our claim that 1-ascension has occurred in structures like that of (14).

In the pages that follow the embedded clause in the biclausal structure is bounded by brackets '[...]'. For the sake of clarity this is also

done in the causative structures. It may seem presumptuous at this point to have included brackets in the latter case when as of yet, we have not proven that there is indeed an embedded clause. But the inclusion of brackets in these structures at least indicates where those internal boundaries could occur if we are looking at 1-ascension and not causative clause union.

4.1 Passive Constructions

Consider the following sentences:

- (19) Mary natna et hashever le John.
M. gave ACC the book to J.
'Mary gave the book to John.'
- (20) Hashever nitan le John al yeldei Mary.
the book was given to J. by M.
'The book was given to John by Mary.'

As an aside, it is important here to note that 3-2 advancement (dative movement) does not occur in Hebrew. The following sentences demonstrate this fact and additional evidence is also cited in Cole (1976).

- (21) Natati le Omer et hatopouach.
(I)gave DAT O. ACC the apple
'I gave the apple to Omer.'
- (22)**Natati et Omer et hatopouach.
(I)gave ACC O. ACC the apple
'I gave Omer the apple.'
- (23) Hem shalxu le David et haouga.
They sent DAT D. ACC the cake
'They sent the cake to David.'
- (24)**Hem shalxu et David et haouga.
They sent ACC D. ACC the cake
'They sent Davide the cake.'

In (21) and (23) the indirect object is marked with the DAT case. It should be noted here that in either instance, the indirect object could also occur in the position after the direct object. According to the informants that were consulted for this paper, however, the order of constituents that appears in (21) and (23) is the most common.

In (22) and (24) when the indirect object is made to advance to direct object and thus bear ACC case marking, the result is ungrammatical. This was confirmed unanimously by all informants.

Referring back to the structures in (19) and (20), (20) represents the passive counterpart of the monoclausal construction in (19). Given that 3-2 advancement does not occur in Hebrew, there is no instance where *John* (the indirect object) can be promoted to 1. It appears that only 2's are subject to passivization.

The following series of sentences display the passive pattern in biclausal structures.

- (25) *Ilana amra [she Mary natna et hashever le John].*

I. said [that M. gave ACC the book to J.]

'Ilana said that Mary gave the book to John.'

- (26) *Ilana amra [she hashever nitan le John al yeldei Mary].*

I. said [that the book was given to J. by M.]

'Ilana said that the book was given to John by Mary.'

- (27)***Hashever neamra al yeldei Ilana [she Mary natna le John].*

the book was said by I. [that M. gave to J.]

The book was said by Ilana that Mary gave to John.'

(25) represents a straightforward biclausal structure that does not involve any causative predicates. In (26) it is possible to passivize within the embedded clause. In (27), however, passive is not permitted across the internal clause boundary. In other words, the final 2 of the downstairs clause cannot be advanced to 1 in the matrix clause, although it can advance to 1 within the embedded clause.

Now let us consider what might happen when we examine the causative constructions.

- (28) *Ilana hichrach et Mary [latet et hashever le John].*

I. caused ACC M. [to give ACC the book to J.]

'Ilana made Mary give the book to John.'

Based on (28), if union has occurred we would expect that *the book* should be able to undergo passive because it is the final-2 (see relational network (17)). Since there are no internal clause boundaries, we would also

assume that there is nothing preventing it from advancing to subject position. Note the results in (29). (Brackets have not been included because we are assuming that causative clause union has occurred.)

- (29) **Hashever hochracha al yeldei Ilana Mary natna le John.
 the book was made by I. M. gave to J.
 The book was made by Ilana Mary gave to John.'

The predicted results of union are clearly ungrammatical. On the other hand, if 1-ascension has occurred, we would expect that *Mary* (after ascending to 2 in the main clause), should be able to undergo subsequent passivization. Note the grammatical result in (30).

- (30) Mary hochracha al yeldei Ilana [latet et hashever le John].
 M. was made by I. [to give ACC the book to J.]
 'Mary was made by Ilana to give the book to John.'

If we take a straightforward biclausal structure and attempt to passivize the entire embedded clause, we get the grammatical sentence in (31).

- (31) [She Mary natna et hashever le John] neamra al yeldei Ilana.
 that M. gave ACC the book to J.] was said by I.
 'That Mary gave the book to John was said by Ilana.'

In (31) the entire embedded clause functions as a direct object and can thus undergo passivization. Native speaker response to this structure was that it was cumbersome but considered grammatical. This confirmed that clausal 2s can undergo 2-1 advancement.

With the causative structure, however, if the lower subject has ascended to the matrix clause and puts the remainder of the embedded clause *en chomage* (re: (18)), then any attempt to passivize the embedded clause should be ungrammatical. Note the results in (32).

- (32) **[latet et hashever le John] hochracha Mary al yeldei Ilana.
 [to give ACC the book to J.] was made M. by I.
 'To give the book to John was made Mary by Ilana.'

This latter exercise does not definitively indicate that the remainder of the embedded clause is a 2-CHO. To confirm this we would have to establish tests that are sensitive specifically to 2-CHO's. It does, however, tell us that the remaining embedded clause (after 1-ascension) is not a 2.

The examples involving passive indicate that in the causative structure there is a clause boundary to which the process of 2 to 1 advancement is sensitive. This could not be accounted for if the structure was the result of causative clause union.

4.2 Topicalization

Some languages will not permit an embedded direct object or indirect object to move to the beginning of the matrix clause by Topicalization. (33) to (35) exemplify topicalization in monoclausal sentences.

- (33) Mary natna et hashever le John.
M. gave ACC the book to J.
'Mary gave the book to John.'

- (34) Le John Mary natna et hashever.
to J. M. gave ACC the book
'To John, Mary gave the book.'

- (35) Et hashever Mary natna le John.
ACC the book M. gave to J.
'The book, Mary gave to John.'

(33) represents a simple clause containing both a direct object and indirect object. When the indirect object is topicalized in (34), the result is grammatical. Likewise, in (35) when the direct object is topicalized, the result is grammatical. These examples demonstrate that as long as the direct object and indirect object are in the main clause, they can be topicalized.

Our concern, however, is with what happens when the indirect object and direct object of an embedded clause are topicalized to the matrix clause. Examples (36) to (38) demonstrate this possibility.

- (36) Ilana amra [she Mary natna et hashever le John].
I. said [that M. gave ACC the book to J.]
'Ilana said that Mary gave the book to John.'

- (37)**Le John Ilana amra [she Mary natna et hashever].
to J. I. said [that M gave ACC the book
'To John, Ilana said that Mary gave the book.'

- (38)**Et hashever Ilana amra [she Mary natna le John].
 ACC the book I. said [that M. gave to J.]
 The book, Ilana said that Mary gave to John.'

The embedded clause boundary is marked by *she* in these examples. (36) indicates that *John* is the indirect object and *the book* is the direct object of the lower clause. In (37) an attempt is made to topicalize *John* to the matrix clause. In (38) *the book* is topicalized to the main clause. In both cases the results are ungrammatical.

Thus we have confirmed the claim that in Hebrew the indirect object and direct object from an embedded clause cannot be topicalized to the main clause. Using this paradigm let us now see if the causative structures pattern in the same way. If they do, that is if the embedded indirect object and direct object cannot be topicalized to the matrix clause, we can conclude that the existence of a clause boundary must be prohibiting this type of topicalization. On the other hand, if the results are grammatical, it would make sense to say that the causative structure is probably a result of union because no clause boundary exists to prevent topicalization. Let us examine the data.

- (39) Ilana hichrach et Mary [latet et hashever le John].
 I. caused ACC M. [to give ACC the book to John]
 'Ilana made Mary give the book to John.'

- (40)**Le John Ilana hichrach et Mary [latet et hashever].
 to J. I. caused ACC M. [to give ACC the book]
 'To John, Ilana made Mary give the book.'

- (41)**Et hashever Ilana hichrach et Mary [latet le John].
 ACC the book I. caused ACC M. [to give to J.]
 The book, Ilana made Mary give to John.'

(39) depicts the causative structure before topicalization. (40) and (41) indicate the results when we attempt to topicalize the indirect object and direct object (respectively) of the embedded clause before the matrix clause. Both attempts yield ungrammatical results.

Now examine (42).

- (42) Et Mary Ilana hichrach [latet et hashever le John].
 ACC M. I. caused [to give ACC the book to J.]
 'Mary, Ilana made to give the book to John.'

(42) provides evidence that *Mary* is in the matrix clause, otherwise the results would be ungrammatical.

From this we can conclude that there must be a clause boundary that is prohibiting the indirect object and direct object from being able to topicalize. If this is the case, then clause union has not occurred here. The fact that *Mary* has been able to topicalize in (42) is a strong indicator that it has ascended to the matrix clause.

4.3 Reflexives vs. Pronominals

The final test involves reflexives and pronominals. Two principles will be exploited:

- (43) a) reflexives must have clausemate antecedents
b) pronominals must not have clausemate antecedents.

(The notion of 'clausmate' is taken to mean 'within the same clause' and it will be assumed in the following examples that the principles apply to the final stratum of each cycle.)

As we have done with the other tests, let us first see how these principles work on simple and embedded clauses before applying them to the causative clauses. Sentences (44) and (45) exemplify monoclausal structures.

- (44) John_i haber et atsmo_i.
J. likes ACC himself
'John_i likes himself_i.'

- (45)**John_i haber (et) oto_i.
J. likes (ACC) him
'John_i likes him_i.'

In (44) where *himself* refers to *John* the sentence is grammatical because the reflexive (*himself*) must have a clausemate antecedent and it does. Principle (43b) tells us that a pronominal cannot have a clausemate antecedent, but in (45) because there is only one clause, the pronominal does have a clausemate antecedent and is thus ungrammatical. Now examine the biclausal structures in (46) and (47).

- (46)** John_i amra [she Mary haber et atsmo_i].
 J. said [that M. likes ACC himself]
 'John_i said that Mary likes himself_i.'
- (47) John_i amra [she Mary haber (et) oto].
 J. said [that M. likes (ACC) him]
 'John_i said that Mary likes him_i.'

As in the topicalization examples, *she* marks the boundary of the embedded clause. We know that reflexives must have clausemate antecedents. In (46), however, the coindexing indicates that *himself* refers to *John*. Since *John* is outside of the embedded clause in which *himself* occurs, the results are ungrammatical.

In (47) the converse occurs. Here the coindexing indicates that the pronominal *him* in the embedded clause has as its antecedent *John* in the matrix clause. Since pronominals cannot have their antecedents as clausemates, the results are ungrammatical.

Before seeing how the causative structures perform with respect to this patterning of reflexives and pronominals, let's speculate on what could happen. If union is involved in the causative structure that we have been examining we would predict that:

- (48) a) since union results in the formation of one clause, use of reflexives should be grammatical because they require clausemate antecedents.
- b) since union destroys the original boundary between matrix and embedded clauses, the use of pronominals should be ungrammatical because they cannot have clausemate antecedents.

On the other hand, if union is not involved as we suspect, then the matrix and embedded clause boundaries should be intact and we would anticipate the following:

- (49) a) if a reflexive occurs in the embedded clause, and has its antecedent in the main clause, the results should be ungrammatical because reflexives require clausemate antecedents.
- b) if a pronominal occurs in the embedded clause and has an antecedent in the matrix clause, the results should be grammatical since pronominals cannot have clausemate antecedents.

With these predictions in mind, consider sentences (50) and (51).

- (50) John_i hichrach et Mary [li haber (et) oto_i].
J. caused (ACC) M. [to like (ACC) him]
'John_i made Mary like him_i.'

- (51)**John_i hichrach et Mary [li haber et atsmo_i].
J. caused ACC M. [to like ACC himself]
'John_i made Mary like himself_i.'

It is clear from the results in (50) and (51) that the patterning follows the predictions that we established in (49) a) & b) in which clause union has not occurred. When we began this investigation, however, the aim was not merely to show that clause union has not occurred, but to show that 1-ascension has occurred.

In light of this reminder, let us now examine the following two critical sentences.

- (52) **John_i hichrach (et) oto_i [li haber Mary].
J. caused (ACC) him [to like M.]
'John_i made him_i like Mary.'
- (53) John_i hichrach et atsmo_i [li haber Mary].
J. caused ACC himself [to like M.]
'John_i made himself_i like Mary.'

Again, we know that pronominals cannot have clausemate antecedents. In (52) then, if union has occurred we could correctly predict that this would be ungrammatical. But if we suspect that 1-ascension has occurred we should still be able to justify the ungrammatical results. Since *him* is the ascended nominal from the embedded clause, and since it now stands in the same clause as its antecedent, the ungrammatical results can still be accounted for.

In addition, 1-ascension can still account for the grammaticality of (53). If *he* was the original embedded subject that got promoted to direct object position of the matrix clause (and thus reflexivized), we would expect the results to be grammatical because reflexives require clausemate antecedents.

5.0 Conclusion

The structure that we have been examining most certainly appears to be a product of 1-ascension rather than clause union. The arguments that have been used to substantiate this claim involve the following notions:

- 1) Case marking
- 2) Word order
- 3) Negation
- 4) Passive Constructions
- 5) Topicalization
- 6) Use of Reflexives vs. Pronominals

Regardless of the problem of 1-ascension vs. union, further investigation needs to be done with Hebrew data to see if there really are any clause union structures that involve other causative predicates. Based on this information, it would be interesting to reconsider Cole's (1976) claim and see if two types actually do exist.

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