

Child morphology and morphophonemic change

A controversy has raged for nearly a century over the influence of the child on linguistic development (see for example, Jespersen 1922).^{*} In recent research there has been some attention given to the child's role in phonological change (Stampe 1973, Dressler 1974, Drachman 1976), and some comparisons drawn between child syntax and syntactic change (Baron 1977, Slobin 1975) but reports on the child's role in morphophonemic change have either been very general, or largely anecdotal. The present paper is an initial attempt to explore the relation of morphophonemic change and the acquisition of morphology in a more systematic and detailed way.¹ It is based on progress made recently in the understanding of the acquisition of morphological systems. Several authors have formulated general principles which seem to govern the acquisition process (Slobin 1973, Simões — Stoel-Gammon 1977). These principles will be compared to the principles proposed to describe the general properties of morphophonemic change, such as the hypotheses of Kuryłowicz (1949), Mańczak (1958, 1963), and Vennemann (1972a). It is recognized that none of the principles applying to acquisition and change is absolute, for morphology seems always to admit exceptions. Furthermore, the entire framework is still rather general, as there is no well-articulated theory that explains the intricate interaction of formal and semantic properties in morphology. However, a close look at child morphology suggests a more elaborate framework that will be useful in the study of both the acquisition process and the process of change.

Given certain principles governing acquisition and change, the purpose of this paper is to ask whether the two sets of principles do in fact coincide in enough cases to make child language a plausible source for morphophonemic change. It is not enough, however, to show that the two processes exhibit similar characteristics, because this does not necessarily establish a causal relation between them. It will be necessary in addition to explicate the mechanism for implementation of a morphophonemic change originating in the language acquisition process. While I will make

some suggestions concerning the latter point, I cannot treat this problem in any detail. I will concentrate instead on making a systematic comparison of the output of child morphology and morphophonemic change and I will give a detailed analysis of one aspect of the acquisition process which has interesting implications for both synchronic and diachronic morphophonemics.

1 There are two types of principles that have been formulated in an attempt to describe the dominant tendencies in child language and in morphophonemic change: principles based on semantic criteria and principles based on formal criteria. We begin with the semantic principles.

In language acquisition it is often observed that the forms of one inflectional category will predominate in the child's speech, largely replacing other related inflectional forms. For example, a widespread (if not universal) tendency is for children to use only the singular forms of nouns for a long period of time (Rūke-Draviņa [1959] 1973). The singular form tends to be used in all situations before the singular/plural distinction is made semantically, and it continues to be used even when the concept of plurality is evident, as in the phrase "two shoe" (Rūke-Draviņa [1959] 1973). The semantic concept is present before the formal marking of it appears. Until the proper formal marking is acquired, then, one inflectional form tends to replace all others, in this case the singular form of the noun replaces the plural form. This situation can be summed up by the generalization:

- A. Singular noun forms are acquired before plural noun forms.

Similar generalizations concerning the acquisition of inflectional morphology are as follows:

- B. Present tense is acquired before past tense (Rūke-Draviņa 1959; Bates 1976; Simões — Stoel-Gammon 1978).
- C. Indicative mood is acquired before the subjunctive (Rūke-Draviņa 1959; Simões — Stoel-Gammon 1978).
- D. The third singular verb form is acquired before other persons (Rūke-Draviņa 1959; Bates 1976; Simões — Stoel-Gammon 1978).

It should be borne in mind that there are always exceptions to such generalizations in the speech of individual children. For instance, some verbs may be acquired initially in their first singular present indicative forms, while the majority appear first in the third singular.

These generalizations from the study of child morphology are paralleled by generalizations based on the study of analogical change. Particularly striking are four hypotheses by Mańczak (1958, 1963).

Hypothèse VI: Les formes de l'indicatif provoquent plus souvent la réfection des formes des autres modes que vice versa (1958:387).

Hypothèse VII: Les formes du présent provoquent plus souvent la réfection des formes des autres temps que vice versa (1958:388).

Hypothèse XIII: Les radicaux et les désinences du singulier subissent moins de changement analogiques que ceux et celles des autres nombres (1963:30).

Hypothèse XIV: Les radicaux et les désinences de la troisième personne subissent moins de changements analogiques que ceux et celles des autres personnes (1963:34).

These four hypotheses of Mańczak are the only ones that are based on semantic categories with the exception of three that deal with the very specific cases of geographic names and proper names. It is striking that the four dominant morphological categories he isolates are the same four that were isolated quite independently in the language acquisition literature.

Kuryłowicz (1949) also formulates some general principles of analogical change, although his approach is quite different from Mańczak's. Kuryłowicz's formulas refer to relation among forms in a grammar, and are stated in terms of the base form of a paradigm:

Formule II: Les actions dites "analogiques" suivent la direction: formes de fondation → formes fondées, dont le rapport découle de leurs sphères d'emploi (1949:23).

The comparability of the content of this formula to the language acquisition data rests heavily on the meaning of "sphères d'emploi". The accompanying illustrations and the discussion in Kuryłowicz 1968 indicate that the base form is chosen largely on semantic criteria, such that the stem of the semantically unmarked form of the paradigm usually serves as the base form.² Examples given are: nominative singular vs. other case forms, present vs. other tenses, indicative vs. other moods, and third person singular vs. other persons (Kuryłowicz 1968:75).

The parallelism between the semantic principles governing analogical change and the acquisition of morphology, then, are quite striking. It must be remembered, however, that in both realms the choice of an unmarked category may be determined by language-specific factors. For

instance, in the Russian aspect system the imperfective is unmarked with respect to the perfective aspect (Jakobson 1932), while in Spanish and Portuguese the preterite is unmarked with respect to the imperfect (Comrie 1976).

Simões and Stoel-Gammon suggest a few other generalizations concerning the order of acquisition of different semantic oppositions. They observe that tense, aspect and mood differentiations appear before the differentiation of person, and that person markers are distinguished before number markers in verbs. The parallel for morphological change would be the generalization that certain semantic oppositions (those that are acquired later) are subject to loss before others (those that are acquired earlier). Thus we might predict that person markers on verbs would be lost before tense, aspect and mood markers, and this we know to be generally true (e.g. as in English and Irish).

Kuryłowicz's Formula V may perhaps apply here:

Formule V: Pour rétablir une différence d'ordre central la langue abandonne une différence d'ordre plus marginal (1949:31).

Again Kuryłowicz refers to the relations among forms in a grammar, without providing details concerning the criteria used in establishing the relation.³ Still the formula suggests an interesting hypothesis: that certain morphological distinctions are more central or basic than others, and that these central distinctions are more stable over time. We will see below that the language acquisition data gives valuable information concerning the status of morphological oppositions in a language, and that this information provides accurate predictions concerning morphophonemic change.

2 On the basis of data concerning the acquisition of forty different languages, Slobin (1973) formulates a series of "Operating Principles" that describe some of the analytic strategies evident in child language. Several of the principles have to do with the acquisition of morphology. They are all based on criteria relating to the formal expression of morphological categories. We will compare Slobin's principles to formal principles formulated to describe morphophonemic change.

Slobin's first principle dealing strictly with morphological form is:

Operating Principle E: Underlying semantic relations should be marked overtly and clearly.

This is a very general principle and corresponds to the very general

principle of linguistic change that Vennemann (1972) calls Humboldt's Universal:

Humboldt's Universal: Suppletion is undesirable, uniformity of linguistic symbolization is desirable: Both roots and grammatical markers should be unique and constant (1972:184).

Vennemann explicitly relates this principle to the acquisition process, saying that it is an "innate principle of linguistic change" (1972:184). How well this principle describes the strategies of children can be seen by comparing Slobin's descriptions of the more specific manifestations of Operating Principle E with other generalizations concerning morphophonemic change.

The first specific instance of Operating Principle E is:

Universal E 1: A child will begin to mark a semantic notion earlier if its morphological realization is more salient perceptually (*ceteris paribus*) (Slobin 1973:202).

Slobin adds: "The notions of 'more salient perceptually' and '*ceteris paribus*', of course, are in need of more precise definition" (p. 202). One of the instances of perceptual saliency that Slobin mentions is the position of the grammatical marker with respect to the rest of the word. He proposes that suffixes and postpositions are acquired earlier than prefixes and prepositions. No comparable principle of change has been suggested, although the well-known preponderance of suffixing and postpositional languages over prefixing and prepositional languages (Greenberg 1957) is probably relevant here.

One of Mańczak's hypotheses concerning analogical change seems to point to some significance for perceptual saliency.

Hypothèse V: Les désinences monosyllabiques sont plus souvent remplacées par des désinences polysyllabiques que vice versa (1958:323).

It is not unreasonable to assume that polysyllabic desinences have greater perceptual saliency than monosyllabic desinences, provided that the segmental and suprasegmental composition of the desinences are also comparable. Beyond this, however, it is difficult to draw conclusions from Slobin's Universal E 1, without a well-defined notion of perceptual saliency.

Slobin's Universal E 2 is much clearer:

Universal E 2: There is a preference not to mark a semantic category by \emptyset ("zero morpheme"). If a category is sometimes marked by \emptyset and sometimes by some other overt phonological form, the latter will, at some stage, also replace the \emptyset (p. 202).

A footnote restricts this principle to semantically marked categories, since children do seem content to leave inflections off nominative singulars, third singular present forms, etc. Universal E 2 has a clear parallel among the principles governing analogical change, Mańczak's Hypothesis IV.

Hypothèse IV: Les désinences zéro sont plus souvent remplacées par les désinences pleines que vice versa (1958:321).

Slobin's Universal E 3 does not have such a clear parallel in morphological change:

Universal E 3: If there are homonymous forms in an inflectional system, those forms will tend not to be the earliest inflections acquired by the child; i.e. the child tends to select phonologically unique forms, when available, as the first realization of inflections (p. 203).

Slobin provides only one example to substantiate this hypothesis, the example of the choice of the masculine and neuter *-om* by Russian children as the expression of the instrumental case, rather than the more frequent feminine *-oy*. The latter suffix has five different homonyms in the adjective declensions, while the suffix *-om* has only one homonym, also in an adjective form.

Andersen (1974) mentions morphological changes motivated by the avoidance of homonymy, in which a synonymous inflectional marker with few or no homonyms replaces a marker with many homonyms. To my knowledge, however, no one has proposed a general principle of the form of Kuryłowicz's and Mańczak's, which predicts that morphophonemic changes will result in reduced homonymy more often than in increased homonymy. There is a need then to examine a number of cases of this nature. Let us consider here one example.

In many Spanish dialects of the Americas, the distinction between second and third conjugation is being lost. Except for the infinitive and forms related to this infinitive, i.e. the future and conditional, in the standard language these conjugations are distinct only in the first person plural of the present, e.g. 2nd conjugation *comemos* vs. 3rd conjugation

vivimos. In the 2nd conjugation, the 1st plural present form is distinct from the 1st plural preterite form, but in the 3rd conjugation there is no distinction:

(1)		2nd conjugation	3rd conjugation
	present	<i>comémos</i>	<i>vivimos</i>
	preterite	<i>comímos</i>	<i>vivímos</i>

Some dialects have merged the two conjugations by extending the non-homonymous theme vowel *e* of the 2nd conjugation into the 3rd conjugation, giving a unique marker for 1st plural present (Rosenblat 1946):

(2)		2nd conjugation	3rd conjugation
	present	<i>comémos</i>	<i>vivémos</i>
	preterite	<i>comímos</i>	<i>vivímos</i>

While this is the sort of example predicted by Slobin's principle, it does not support a significant tendency in diachrony for the avoidance of homonymy, since in related dialects, the opposite change has occurred, creating greater homonymy: the vowel *i* has replaced *é* in the present tense of the 2nd conjugation, giving *-ímos* for both present and preterite.

Without more data it is rather difficult to assess the validity of Slobin's Universal E 3, and its relation to morphophonemic change. It should be observed here, however, that some language acquisition strategies may disappear too early in the language acquisition process to be of much significance to linguistic change. The diachronic changes we are discussing here take place on the edges of the system, or at the difficult, unstable points in the system. In relation to child language, the changes take place among items that would be acquired late, and the changes occur because such items are not acquired, or are only partially acquired. Therefore, the very first strategies of the child, which (s)he abandons early in the process may not relate at all to morphophonemic change. This should be borne in mind when considering Slobin's Operating Principle F and Universal F 1.

Operating Principle F: Avoid exceptions.

Universal F 1: The following stages of linguistic marking of a semantic notion are typically observed:

- (1) no marking,
- (2) appropriate marking in limited cases,
- (3) overgeneralization of marking (often accompanied by redundant marking),

(4) full adult system (p. 205).

Operating Principle F is not too different from Operating Principle E. Its parallel in historical linguistics is well-known. It is the second half of Sturtevant's paradox, that analogical change creates regularity.

In Universal F 1 we see the various stages of acquisition of an inflection system. Stage (1) is extremely early; here all inflection is simply ignored. In stage (2) some marking occurs, and individual inflected words may be used appropriately, but they have been learned by rote, and no general rules have been formulated. In stage (3) there is abundant evidence of rules, since they are overapplied, and even forms that were correctly used in stage (2) are subject to the over-application of the rules. To attain stage (4), the full adult system, the rules must be properly restricted and exceptions appropriately marked. For changes in a full complex morphological system, stages (1) and (2) are transitted too early to be of importance. The changes we describe as analogical occur because of the overgeneralizations characteristic of stage (3), and the failure to acquire the restrictions and exceptions necessary to match the adult system.

In stage (3) are found both analogical extensions of markers and analogical leveling of alternations. Kuryłowicz's first formula describes extensions:

Formula I: Un morphème bipartite tend à s'assimiler à un morphème isofonctionnel consistant uniquement en un des deux éléments, c.-à-d. le morphème composé remplace le morphème simple (1949:20).

As examples of this phenomenon, Kuryłowicz gives the extension of German umlaut, *Baum* > **Baum-chen* > *Bäumchen* in diminutive formation, and in plural formation, *Wald* > *Wälder*, *Huhn* > *Hühner*.⁴ The other sort of overgeneralization characteristic of stage (3) is comparable to analogical leveling, i.e. the failure to produce a morphophonemic alternation. An example in child language is the failure to produce the stem vowel alternation in a Portuguese verb such as [komu] *como* (1st singular present) [kɔmi] *come* (3rd singular present), where the child's forms are [kɔmu], [kɔmi]. Mańczak's Hypothesis II describes levelling:

Hypothèse II: L'alternance du radical est plus souvent abolie qu'introduite.⁵

In the next section analogical levelling in children's speech is examined in further detail.

Slobin's final Operating Principle dealing with morphological form may be the most important.

Operating Principle G: The use of grammatical markers should make semantic sense.

Universal G 1: When selection of an appropriate inflection among a group of inflections performing the same semantic function is determined by arbitrary formal criteria (e.g. phonological shape of stem, number of syllables in stem, arbitrary gender of stem), the child initially tends to use a single form in all environments, ignoring formal selectional restrictions (p. 206).

This means that a one-to-one relation between sound and meaning is preferred (Humboldt's Universal again), and that semantic criteria for formal expression are easier to learn than phonological or other arbitrary criteria. There are numerous examples in recent theoretical discussions which show that reanalysis and changes in non-automatic alternations (extensions or levelling) are motivated by semantic criteria rather than phonological criteria. Among the examples are the case of Maori suffixes discussed by Hale (1971), and the parallel example of French liaison consonants discussed by Klausenberger (1976) and Baxter (1975), the cases of rule inversion in Vennemann (1972b), and the cases of reanalysis in Skousen (1975) and Hooper (1976a). Most of these cases can be explained by the Semantic Transparency Principle of Vennemann (1972b):

“Usually in natural language, a semantic derivation of secondary conceptual categories from primitive ones, tertiary from secondary ones, etc., is reflected in a parallel syntactic or morphophonological derivation” (p. 240).

Thus the formal manifestation of a secondary category should be made up of the form of the primitive category, plus some modification, e.g. an affix, a stem change. This principle is proposed as a mechanism of change through reanalysis in the language acquisition process. It should be noted that Vennemann's principle subsumes a number of the other principles we have discussed, in particular the semantically-based principles of section 1, and some of the principles based on formal criteria, i.e. the avoidance of zero markers, and the principles behind extension and levelling. Slobin's observation suggests what I have argued (in Hooper 1978), that this semantic principle overrides all others, that the choice of

the basic category is a purely semantic choice, and that for non-automatic alternations, the semantic criteria are primary, and formal criteria such as phonological predictability are secondary.

To conclude this section, then, closer examination of the language acquisition process and of morphophonemic change confirms our suspicions of a striking correspondence, such that categories and formal properties that are acquired late tend to change under the influence of categories and formal expressions that are acquired early. The child language data reveals that semantic and cognitive development precede the formal expression of a distinction. Semantic characteristics are primary, basic and acquired first, while the formal properties are added later. It follows that the formal complexities would be eliminated in favour of a more transparent sound-meaning relation. Thus levelling, extension and reanalysis of various types should be common morphophonemic changes, since they represent a move toward more direct expression of semantic categories. Furthermore, the order of acquisition of the semantic categories predicts that the unmarked categories will exert an influence over the marked categories rather than vice versa.

3 We turn now to an examination of the details of the acquisition of alternating, inflected forms, to see if the details support a relation between child language and morphophonemic change to the same extent that the general principles do. We are relying primarily here on the descriptions by Stoel-Gammon (1976) and Simões — Stoel-Gammon (1977) of four children acquiring the Brazilian Portuguese inflectional system. We will examine the way the acquisition process gives internal structure to a paradigm, influencing both the inflectional desinences and the stem alternations. We will discuss the implications for morphophonemic change as they arise.

In the Brazilian Portuguese verbal system, there are only two person distinctions indicated by inflection, the first person vs. the second/third person. (We will refer to the latter simply as the third person.) There are three conjugation classes, but distinctions between these classes are not made for every inflectional category. The forms for the singular in the present indicative are as follows:

	1st conjugation	2nd conjugation	3rd conjugation
infinitive	<i>falar</i> 'speak'	<i>bater</i> 'hit'	<i>abrir</i> 'open'
first sg.	<i>falo</i>	<i>bato</i>	<i>abro</i>
second/third	<i>fala</i>	<i>bate</i>	<i>abre</i>

Simões and Stoel-Gammon report that the first forms used by children

are the third singular forms, and they are substituted for all other forms. For instance, the third singular form is used in contexts where first person is clearly intended semantically. It is used with the first singular pronoun *eu* 'I' when this form appears. The appearance of the pronoun means of course that the semantic category has been acquired. Finally, the first person inflection *-o* appears on the verb. This distinction between first and third person singular is among the first distinctions to be marked by inflections.

A subclass of second and third conjugation verbs have a vowel alternation in the verb stem, such that if the third singular form contains the low vowels [ɛ] or [ɔ], the first singular form will contain the vowels [e] or [o] in second conjugation and [i] or [u] in third conjugation.

(3)	2nd		3rd	
	conjugation		conjugation	
infinitive	<i>comer</i> 'eat'	<i>beber</i> 'drink'	<i>dormir</i> 'sleep'	<i>conseguir</i> 'get'
first sg.	<i>c[o]mo</i>	<i>b[e]bo</i>	<i>d[u]mo</i>	<i>cons[i]go</i>
third sg.	<i>c[ɔ]me</i>	<i>b[ɛ]be</i>	<i>d[ɔ]me</i>	<i>cons[ɛ]ge</i>

Initially children produce first singular forms for these verbs with the proper inflection *-o*, but with the stem vowel as it is found in the third singular form (Stoel-Gammon 1976; Simões and Stoel-Gammon 1977). The first singular form, then, is built directly on the third singular stem:

(4)	<i>c[ɔ]mo</i>	<i>b[ɛ]bo</i>	<i>d[ɔ]mo</i>	<i>cons[ɛ]go</i>
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This sequence of events bears a clear relation to historical change. Note first that the inflectional suffix is acquired before the stem vowel alternation. This implies that the alternations are more susceptible to loss through levelling than the inflectional suffixes are, a generalization that is clearly supported by the historical facts (Mańczak 1958; 1963). Note secondly that the mechanisms by which root alternations are levelled, if the levelling has its source in child language, is by substitution of the neutral, third singular stem, for the stem in the other category. That is, a stem vowel is not changed to a vowel that is like that of the third singular stem, but rather, a new first singular form is constructed, using the third singular as the base.

Thus the acquisition of the stem forms shows the influence of the third singular on the first singular form within a single tense. The acquisition of the inflections in the other tenses, however, shows the influences, not of the other persons within the tense, but rather of the inflection for the same person in the other tenses. This is especially clear in the imperfect

tense. (The imperfect is acquired after the preterite, but I treat the imperfect here to illustrate the influence of the inflections on one another.) By the time the imperfect is used, first and third singular forms are already distinct in the present and preterite tenses. In Portuguese, the first person singular forms of the imperfect are identical to the third person singular forms: e.g. *ele queria* 'he wanted', *eu queria* 'I wanted'. One of the children studied by Simões and Stoel-Gammon (1978), however, differentiated these forms, using the first singular marker *-o* from the present tense on the imperfect verbs. The child used the form *sabio* for *sabia* 'I knew', and *querilo* for *queria* 'I wanted'. The form *querilo* is particularly interesting. For the third singular form *queria*, the child used the form *querila*. Her first singular form was built on the third singular base *queril* plus the first singular inflection of the present tense (Simões — Stoel-Gammon 1978:16). The third singular stem affects the form of the stem in the other persons of the same tense, but the first person inflection affects first person forms across tenses. This generalization helps us understand the stages in the acquisition of the preterite person markers.

In the adult language the preterite forms are as follows:

(5)	1st conjugation	2nd conjugation	3rd conjugation
infinitive	<i>falar</i> 'speak'	<i>bater</i> 'hit'	<i>abrir</i> 'open'
first sg.	<i>falei</i>	<i>bati</i>	<i>abri</i>
third sg.	<i>falou</i>	<i>bateu</i>	<i>abriu</i>

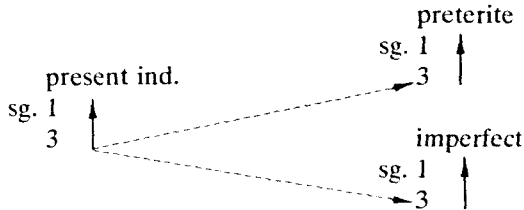
The third singular forms for each conjugation class have a different inflection, *-ou*, *-eu* and *-iu*, and the first singular forms have two inflections, *-ei* for first conjugation, and *-i* for second and third. As with the present tense the children initially used the third person singular form with all subjects. Interestingly enough there is no evidence of confusion of conjugation classes for the third singular forms. Simões and Stoel-Gammon indicate that even from the earliest usage of preterite forms, the third singular forms are inflected correctly according to conjugation class.

This correct assignment of conjugation class is not, however, carried over to the first singular forms when they are acquired. Instead, the first conjugation inflection *-ei* is used for all first singular forms, giving, e.g. *comei* for *comi*, and *bebei* for *bebi*. This overgeneralization is somewhat perplexing in view of the fact that the children were already making correct conjugation class assignments for the third singular inflection. It can be explained, however, if we bear in mind that the third singular form affects the form of the *stem* of the first singular, but not the inflection. The influence on the inflection comes from the other existing first singular inflection, i.e. the present tense inflection. The present first singular

inflection is the same for all conjugation classes, *-o*, and thus offers no model for differentiating conjugation classes.

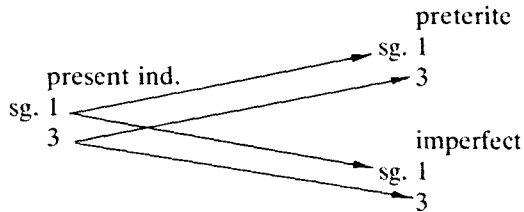
Projecting now from this data, the direction of influence for stems is as follows:

(6) STEM



While the direction of influence for person markers is:

(7) PERSON MARKERS



4 If child language is the source of morphophonemic change, then the direction of influence schematized in (6) and (7) will apply to diachronic change. Thus (7) predicts that a person marker in the preterite or imperfect can be replaced by the marker of the same person in the present tense. This diachronic hypothesis in turn implies a hypothesis about synchronic systems: that verbal inflections for person are very likely to be the same across tenses. Many examples of such systems are known, e.g. Latin person inflections, *-o* or *-m*, *-s*, *-t*, *-mus*, *-tis* and *-nt*, occur in every tense and aspect category. Unfortunately, the existence of such a system does not imply prior analogy of the form illustrated in (7), since situations of the predicted type can arise in another way as well. If person markers on verbs develop diachronically from subject pronouns, the identity of person markers across tenses is built into the system from its origin. Thus only attested morphophonemic changes can provide support or falsification for (7) as the direction of diachronic change. This is in contrast with (6) which provides a testable synchronic hypothesis.

The diachronic hypothesis derived from (6) is that a third singular stem

form may replace the stems for other person categories of the same tense, but a non-third person stem in one tense will not replace the stem for the same person in another tense. For example, a first singular present stem form will not exert influence over a first singular form in some other tense. Thus the high vowel in Portuguese 1st singular present *sigo* (from *sequir*) will not show up at any point in first singular preterite *sequi*.⁶ This hypothesis is testable, but it would be difficult to construct an appropriate corpus on which to test it.

The synchronic hypothesis that corresponds to (6) is more easily testable. The synchronic hypothesis is that alterations in verb stems will be restricted by tense, or aspect, but not by person.⁷ That is, there may be a special stem or stem change that occurs in all persons of a particular tense or aspect, but there will not be any such stem or stem change that occurs in a particular person across tenses. Thus we find quite often in Indo-European language a special stem form for different tenses: the Germanic strong verbs had different stems for present, preterite and participle forms,⁸ Old Irish strong verbs had present, subjunctive, future, preterite stems, Latin shows stem changes of several types in the perfect aspect, just to name a few. What we do not find is a special stem for, e.g. the first person singular throughout several tenses.

This hypothesis concerning synchronic states may be tested by examining stem alternations in a number of languages in order to determine whether these alternations ever correspond to person categories across tense or aspect categories. The hypothesis was applied to forty-four languages out of a fifty-language stratified probability sample constructed by Revere Perkins (Perkins 1978). The sample consists of one language from each phylum according to the Voegelin and Voegelin (1966) classification, as long as no two languages belong to the same geographical-cultural grouping according to Kenny (1974). This sampling method ensures the widest possible distribution, and controls for genetic similarity and areal influence. Only forty-four of the fifty languages were used in the present study since adequate information about morphology on the remaining six was not yet available.

Languages which do not have person inflections on verbs are not relevant for the study, and were thus excluded.⁹ This amounted to twenty-six languages, and left eighteen on which the hypothesis could be tested. Of these eighteen, there were two (Santa Cruz, a Papuan language, and Pawnee, a Macro-Siouan language) for which no stem alternations were reported. In two other languages (Kutenai, of undetermined genetic affiliation, and Ojibwa, Macro-Algonquin) stem alternations occur, conditioned by a number of affixes, but no clear semantic correlation emerged. The remaining fourteen languages have stem alternations that

correspond to tense, aspect, finiteness, number, animacy of direct object, but never to person. This generalization covers all verb stem alternations reported in the individual grammars, even alternations in highly irregular verbs.¹⁰

(8) Languages with verb stem alternations

Language (family)	Stem alternation corresponds to:	Stem alternation corresponds to person:
Acoma (Keres)	number	no
Basque (Undetermined)	tense	no
Burushaski (Undetermined)	tense/animacy of DO	no
Classical Nahuatl (Aztec-Tanoan)	tense	no
Diegueño (Hokan)	aspect/number	no
Georgian (Caucasian)	tense	no
Ket (Undetermined)	aspect/tense	no
Miwok (Penutian)	tense/aspect	no
West Greenlandic (American-Arctic- Paleo-Siberian)	tense	no
Quileute (Chimakua)	aspect	no
Serbo-Croatian (Indo-European)	tense/finiteness	no
Temiar (Malaya)	aspect	no
Touareg Berber (Afro-Asiatic)	aspect	no
Western Apache (Na-Dene)	tense/number	no

These findings overwhelmingly support the synchronic hypothesis and by implication the diachronic hypothesis. If morphophonemic stem changes by person across tenses occurred, then we would find some cases in which alternations correspond to person. Since no cases of this sort were found, we can conclude that changes of this type are extremely rare, if they exist at all.¹¹

It should be noted that not all verb stem alternations are the result of morphophonemic change. Their original source is, of course, phonetic change. If the phonetic change is conditioned by the phonological proper-

ties of the tense marker, then the alternation will, from its beginning, correspond to a tense category, and morphologically-conditioned change need not be involved. Thus some stem alternations found may have a purely phonetic source and are therefore irrelevant to the study of morphophonemic change.

By the same token, it is possible for stem alternations to be conditioned by the phonetic properties of a particular person marker, giving rise to a stem alternation that corresponds to person across tenses. Since such a development is clearly possible, the synchronic hypothesis is stated too strongly, and is stronger than it needs to be to test the diachronic hypothesis.

Given the possibility of a stem alternation corresponding to person developing from a phonetic source, the findings of the cross-linguistic survey are all the more striking. The data suggest that stem alternations corresponding to tense and aspect categories are relatively stable, whether produced under phonetic or morphological conditioning, while similar alternations corresponding to person are less stable.

It cannot be over-emphasized that a rather modest amount of language acquisition data has suggested a strong hypothesis concerning diachronic morphophonemics and the synchronic organization of verbal paradigms, and that this hypothesis has withstood an extensive cross-linguistic survey. This is shining proof of the relevance of child morphology to the study of morphophonemic change. In the remaining sections, we discuss the implications of these findings.

5 The direction of influence for stems in the language acquisition data follows quite mechanically from the fact that tense distinctions are made earlier than person distinctions. This is true of Latvian (Rūķe-Draviņa [1959] 1973), and Italian (Bates 1976) as well as Portuguese (Simões — Stoel-Gammon 1978:27). There is a stage (A) in which the third singular present forms substitute for all others. This is followed by a stage (B) in which the present form is restricted to the present and the third singular preterite form substitutes for all preterite forms. Then person is differentiated in the two tenses (C and D). This is shown schematically in (9).

(9)

	present	preterite
A. sg. 1	3rd sg. present form	
3		

		present	preterite
B. sg.	1	3rd sg. present	3rd sg. preterite
	3		

		present	preterite
C. sg.	1	1st sg. pres.	3rd sg.
	3	3rd sg. pres.	preterite

		present	preterite
D. sg.	1	1st sg. pres.	1st sg. preterite
	3	3rd sg. pres.	3rd sg. preterite

Note that there is never a point at which the first singular present form is substituted for the first singular preterite form, thus providing no opportunity for the stem of the former to influence the latter.

If person distinctions were acquired before tense distinctions, the following hypothetical stages would result:

(10)

		present	preterite
A'. sg.	1	3rd sg. present form	
	3		

		present	preterite
B'. sg.	1	1st sg. present	
	3	3rd sg. present	

		present	preterite
C'. sg.	1	1st sg. present	
	3	3rd sg. present	3rd sg. preterite

	present	preterite
D'. sg. 1	1st sg. present	1st sg. preterite
3	3rd sg. present	3rd sg. preterite

In this case the first singular present stem would substitute for the first singular preterite, allowing for the possibility of influence by person across tenses. Since this is not the order of acquisition of person and tense, however, we do not expect to find such substitutions historically.

It might be argued that the child's method of organizing and attacking the verb morphology is determined by the organization inherent in the system itself, and not by the child's cognitive development. That is, the existence in Portuguese of a class of verbs with a different stem for the present and the preterite (e.g. *fazer* 'do, make', *ter* 'have', *por* 'put, place') leads the child to organize the system the way (s)he does. This argument cannot hold, however, since there is no evidence that the child grasps this organization from the beginning. Rather the child tends to treat these verbs as having the same stem in the present and preterite. Simões and Stoel-Gammon (1978:15) report the following stages in the acquisition of the preterite forms for *fazer*: (Adult forms: *fiz*, *fez*, *fizemos*, *fizeram*)

- Stage 1: *fez* repetition of third singular irregular form
 2: *fazeu* regularization of third singular form
 3: *fazei* first singular form with first conjugation inflection
 4: *fazi* first singular with second/third conjugation inflection
 5: *fiz* memorization of the irregular form

The tendency to make tense distinctions before person distinctions is not provoked by the formal properties of the conjugation system, but appears to depend upon the inherent nature of time versus person categories, and the cognitive development of the child. I cannot speculate further on why tense distinctions are made before person distinctions, nor what it is about the grammatical categories of tense and person that influence their hierarchical relation. Rather I will restrict myself to some general remarks concerning the relevance of such hierarchical relations to morphophonemic change.

5 The child's pattern of substitutions, the order of acquisition, and the distribution of stem alternations cross-linguistically provide evidence about the internal organization of verbal paradigms. In particular, we find that the persons within a tense are more closely related to one another

than they are to persons across tenses.¹² Or, to state the organization in another way the tenses are more autonomous (Zager 1978) than the persons within a tense.

Two predictions concerning morphophonemic change follow from this distinction. On the one hand, as Bolozky (1978) has suggested, forms that are more closely related (or less autonomous) are more likely to influence one another in morphophonemic change. The result is that the closer semantic relation is reflected in a closer phonological relation. Thus the data we have examined here predicts that morphophonemic stem changes are more likely within the persons of a tense, with the third singular influencing other forms, than they are among different tenses, with e.g. the third singular present affecting the third singular, and ultimately all persons of a past or future tense. Forms that are less closely related (or more autonomous) are less likely to influence one another, and are more likely to move apart both phonologically and semantically. Common examples of this sort involve words related by so-called derivational morphology, but the phenomenon is also found in inflectional morphology in the form of split paradigms. Here again we find evidence for the hierarchical organization of paradigms, since verbal paradigms tend to split along tense lines, never along person lines across tenses. Thus English *go* takes its past tense from *wend*, and English *be* has non-finite forms from OE *bēon*, present tense forms deriving ultimately from IE **esmi*, and past tense forms from OE *wesan*.

The relative autonomy of the tenses is represented in schema (6) above by the dotted line between the third singular present form and the other third singular forms. It is especially evident in the acquisition of the third singular preterite forms. As we mentioned above, the three conjugation class distinctions are made in the third singular preterite, and the children acquiring these forms rarely confused the conjugation classes, even though third singular present forms make only two conjugation class distinctions. This would suggest that third singular preterite forms are initially learned as unanalyzed wholes, and entered in the child's lexicon as separate words. The children are not so successful with the conjugation class membership of first singular preterite forms, suggesting that these forms are not learned as separate items, but are generated from the third singular stem form, by adding *-ei*, the first conjugation marker of first singular preterite. This process reflects the lesser autonomy of the persons within the tense.

7 It should be apparent, then, that child language data contains precisely the clues needed for the understanding of evolutive morphophonemic innovations, and the organization of synchronic systems.

Using child language data we have been able to refine considerably certain predictions concerning the direction of morphophonemic or analogical change. Mańczak predicts that the third singular will affect other persons and the present other tenses, but his hypotheses do not rule out the possibility of some other person in the present affecting the stem of the same person in another tense. We have, however, only scratched the surface since we have only examined the relation of two categories, person and tense. Presumably, similar relations can be established among all morphological categories, given appropriate information concerning the child's order of acquisition and patterns of substitution. For instance, it would be interesting to study the relation of person to number, and of tense to mood, just to name a few.

The productivity of such a line of research may be illustrated by examining another case from the Brazilian Portuguese data, the acquisition of gender and number in adjectives.

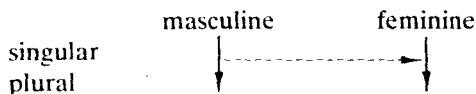
In both Latvian and Portuguese (Stoel-Gammon 1976), gender distinctions develop before number distinctions. In Portuguese, before gender distinctions emerge, the masculine singular form of the adjective is usually (but not always) used in all contexts (stage A) (Stoel-Gammon 1976). Then the two genders are distinguished (B) and lastly number (C):

(11)

	masculine	feminine
A. singular plural	masculine singular	
	masculine	feminine
B. singular plural	masculine singular	feminine singular
	masculine	feminine
C. singular plural	masculine singular	feminine singular
	masculine plural	feminine plural

For the purposes of levelling in the stem, the direction of influence would be as in (12). This organization allows the possibility of the singular forms affecting the plurals or of the masculine singular affecting the feminine,

(12)



but disallows the possibility of the masculine plural form affecting the feminine plural, even though this would be a case of a relatively unmarked category affecting a more marked category.

Certain Portuguese adjectives have stem vowel alternations similar to those found in verbs. A typical adjective paradigm with the alternation is:

(13)		masculine	feminine
	singular	<i>n[o]vo</i>	<i>n[ɔ]va</i>
	plural	<i>n[ɔ]vos</i>	<i>n[ɔ]vas</i>

The acquisition of the alternation supports our hypothesis. When the gender distinction first emerges, the stem vowels are used correctly. Thus, for stage B the general masculine form is *n[o]vo* and the feminine is *n[ɔ]va*. The plural forms are then based directly on these two, giving the following forms for stage C:

(14)		masculine	feminine
	singular	<i>n[o]vo</i>	<i>n[ɔ]va</i>
	plural	<i>n[o]vos</i>	<i>n[ɔ]vas</i>

The lower vowel in the masculine plural is acquired very late (after the child has been in school several years) (Stoel-Gammon 1976).

There are several interesting points to observe in this process. The masculine and the feminine forms are relatively autonomous, appearing with a difference in vowels established right from the beginning. The plural forms, however, are based quite directly on the singulars in each gender, and share a common stem vowel. This seems to indicate that the relation between singulars and plurals is much closer than the relation between masculines and feminines (at least in Portuguese). Finally, we can observe that the vowels of the feminine forms seem to be no help at all in acquiring the masculine plural form, a definite indication of the hierarchical organization of the inflectional system.

8 To this point, then, we have seen that the very general principles of morphological change parallel nicely the general principles of the acquisition of morphology. We have also seen that the details of the acquisition process suggest a mechanism, substitution, for analogical levelling. The

acquisition data also provide evidence concerning the way the child organizes paradigms, and a hypothesis that can be checked against morphophonemic changes. We turn now to one more fact that points to a relation between language acquisition and morphophonemic change.

The treatment of highly frequent irregular forms also forms a nice parallel between morphophonemic change and child language. In early stages children produce frequent irregular forms correctly, apparently having learned them by rote, without imposing any analysis on them. In some cases, once the child has formulated some rules, the irregular forms are remade on the basis of regular forms, as shown for *fazer* above, with the irregular forms re-learned later. In other cases, however, irregular forms are treated as irregular throughout the learning period. Thus high-frequency monosyllabic verbs in Portuguese do not undergo the same regularization process as other verbs, but are learned more or less by rote (Simões — Stoel-Gammon 1978). Because of their high frequency the forms of these verbs are available to be learned by memorization, and this type of learning is desirable because the highly irregular monosyllabic verbs are difficult to analyze on any regular pattern. These facts correspond well to the facts of morphophonemic change, where it is observed that the highly frequent forms are the most resistant to analogical levelling (Schuchardt [1885] 1972; Paul [1890] 1970; and see also Vincent, this volume). In fact, the general pattern of lexical diffusion of analogical changes supports the hypothesis that such changes come about by imperfect learning (Hooper 1976b). The less frequent forms tend to be regularized early because their forms are not reinforced to the extent that the forms of frequent items are.

9 It is time now to bring adult speakers into the picture. Jespersen (1922) points out that adults also produce analogical formations. He argues that "The important distinction is not really one of age, which is evidently one of degree only, but that between the first learners of the sound or word in question and those who use it after having once learned it" (1922:178). Jespersen also notes that the conditions under which analogical formations come about are the same for both adults and children: "Some one feels an impulse to express something, and at the moment has not got the traditional form at command, and so is driven to evolve a form of his own from the rest of the linguistic material" (p. 163). But while the conditions under which analogical formations are produced may be the same for adults and children, it is not clear that the resulting forms will be the same. Differences will surely result from the fact that adults know more of the system than children do. This is unavoidable, and probably trivial. The important question is whether or not the adult's

analogical formations are governed by the same principles as the child's. Unfortunately, adults' analogical formations have not been studied as systematically as children's speech and analogical change. However, from what we know about the latter two areas, we can infer that the adult's morphological system, and thus his analogical formation must be based on the same principles as are evident in child language, and that the adults must to some extent participate in the implementation of morphophonemic change.

The parties responsible for morphophonemic change are either (1) adults, (2) children or (3) both. (I discard "neither" as a possible answer on the assumption that it is the speakers of the language who produce these changes.) We have seen that the principles governing morphophonemic change are quite similar to the principles governing the acquisition of morphology. If it is the adults, rather than the children, who are responsible for morphophonemic change, then these same principles must govern adult morphological systems, and cause them to produce the requisite sorts of analogical forms.

If, on the other hand, the major blame is to be laid on children, we cannot help but implicate the adults, for it is they who let the little ones get away with it. For a child's analogical innovation to effect a change in the language at large, it must be acceptable to the speech community. As Andersen (1974) points out, analogical innovations, which are deductive innovations, can be accepted by the speech community, despite their deviations from the norm, because "they manifest the underlying structural relations of grammars" (p. 24). In other words, the child's innovations will succeed in producing a change if the speech community (including the adults) can view the innovation as compatible with the system as internalized in their own grammars. An example would be the widespread acceptance of *brung* as the past tense and past participle of *bring*. This form follows the dominant pattern of verbs in *ing*, which practically all form the past participle in *ung*, and furthermore tend to replace the past tense with the past participle form. My own experience is that I cannot correct my son every time he says *brung*. However, when he produced the form [fowt] as a past tense of *fight* (possibly on the basis of the forms *write*, *wrote*), all communications ceased, and he learned very quickly that he had to use *fought* (or *fighted*) if he wanted to be understood. The form [fowt] never appeared again. Thus even if children are the primary innovators, successful morphophonemic changes depend to a large extent on the speech community, which inevitably includes adults. Again, we are led to the conclusion that the principles that govern morphophonemic change and acquisition also govern the adults' morphological system.

Thus under any of these views of morphological change, it is necessary to assume that the adults participate, and that the adult system is constructed on the same principles as the child's system. We cannot, then, expect to find the party responsible for morphophonemic change by comparing children's analogical formations to those of adults, since they will in all likelihood manifest the same properties (except, of course, that the adult has a more complete system on which to base his creation).

Children are, however, the more likely candidates. They are much more often in a situation where innovation is required, since they have not mastered all the forms of the adult system. The facts at hand, then, suggest a scenario such as that described above, in which children create the innovations, and their interlocutors (of all ages) either reject them totally, as in the case of [fowt], or tolerate them, overlook them in the interest of getting the message. The tolerated innovations eventually become accepted changes.

One final remark concerning general linguistic theory seems in order. We have seen in this preliminary attempt at a systematic comparison of child morphology and morphophonemic change that there seems to be a single set of principles at work determining the structure of these two processes. Further, I have just argued that these same principles must govern adults' morphological systems as well. It follows, then, that even the study of synchronic morphology, and particularly the development of a theory of morphophonemics, must proceed from the study of language acquisition and diachronic morphophonemics.

Notes

- * A number of clarifications of the ideas presented here have come from discussions with Henning Andersen, Deborah Keller-Cohen, and David Zager. I would like to thank Caroline Stoel-Gammon for making her paper available to me in prepublication form, and for commenting on my interpretation of the data. I am especially grateful to Revere Perkins for allowing me to use the sample of grammars he so painstakingly has collected.
1. In this paper, the terms morphological change and morphophonemic change will be used as defined in Andersen (1969 and this volume). Morphological change refers to "changes in the relations among linguistic signs", while morphophonemic change refers to "change in the relations among variants (allomorphs) of signantia". The changes we will be concerned with are changes in the variants of morphemes, thus they are morphophonemic. It will be shown, however, that these changes are determined quite directly by the relations among linguistic signs and their order of acquisition. We are studying, then, child morphology, but morphophonemic change.
 2. However, Kurylowicz (1968) indicates that the form from which all other forms are phonologically predictable may be chosen as basic even if it does not occur in the unmarked category. In Hooper 1978 I have argued that for morphologically-

conditioned alternations morphological criteria take precedence over phonological criteria. The language acquisition data and the diachronic data support this view.

3. The example he gives here concerns the loss of case marking and the retention of number marking in Romance. It is not clear that this is a morphological change pure and simple, since it is accompanied by a complete change in the syntactic structure of the language. Nor is case as a morphological category necessarily lost, since word order restrictions and prepositions develop to mark grammatical relations.
4. As with Kuryłowicz's other formulae the basic terms remain undefined. When a stem change accompanies the addition of a desinence, one doesn't know if the stem change is an alternation, i.e. suppletion scheduled for levelling, or a meaningful element, i.e. a bipartite morpheme scheduled for extension.
5. Mańczak 1958 seems to think that Kuryłowicz's Formula I is in direct contradiction to his own Hypothesis II. However, Kuryłowicz's formula clearly deals with stem changes that are considered morphemes, i.e. associated with meaning, while Mańczak's hypothesis refers to arbitrary alternations. If this distinction is made, as Kruszewski advocated, the two principles are both valid. The problem (see note 4) is how to make this distinction.
6. The case of Italian *-iamo* discussed by Vincent (this volume) would appear to be a counter-example to several of the claims made here, since for some verbs stem changes occurred with the first plural (and no other persons) of the present indicative. Such a change goes against the hypothesis that the indicative affects other moods, and that a person category in one tense, aspect or mood cannot affect a person in another. The explanation for this case, however, fits in well with the rest of the child language data. The first plural subjunctive in Italian has the same form as the first plural imperative. Given a fairly early acquisition of imperatives, well before subjunctives (Rüke-Draviņa 1959; Bates 1976) and probably before first plural of the indicative, it is quite plausible that this substitution took place in just the way the child language data examined here would predict, that when the time came to use a first plural indicative form, the imperative, which was already acquired with first person markings, was substituted. This example raises the question of the order of acquisition of imperatives and indicatives. In Portuguese the third singular present indicative has the same form as the singular familiar imperative, so that it is not clear whether the basic form the child uses is an indicative or an imperative. However, in Latvian and Italian where such a formal difference exists, the third singular indicative precedes the imperative (Rüke-Draviņa 1959; Bates 1976).
7. For the purposes of the present study, I have lumped tense and aspect together in order to avoid the difficulty of distinguishing them. The important distinction I make here is between person categories on the one hand and categories such as tense, aspect and mood on the other.
8. Stem changes in Germanic strong verbs sometimes coincide with singular/plural distinctions within a single tense, or with a single person category within a tense (e.g. Old English preterite: *band, bunde, bundon*), but never with a single person in more than one tense.
9. To qualify as person inflections, the morphemes in question must:
 - (1) agree with the subject (or mark subject if no overt nominal is present)
 - (2) occur contiguous to the verb and its affixes
 - (3) occur in a fixed position
 - (4) be obligatory in any finite clause (except for third person which may be \emptyset)
 - (5) be distinct from, and occur with, subject pronouns
 - (6) signal at least 3rd and non-third person (as opposed, e.g. to markers that signal only inclusion or exclusion).

10. The second column of the chart list some of the categories that major stem alternations correspond to. It is not intended as an exhaustive list, it is only illustrative of the types of alternations reported.
11. During the conference at Boszkowo, Jonathan Kaye (Université de Québec à Montréal) reported an analogical formation in the speech of pre-adolescent Quebecois speakers. According to Kaye the third person plural imperfect of *être* occurs in the speech of these children as *sontait* [s5te], presumably formed from the third plural present *sont* [s5] by the addition of [te]. If only morphological conditioning is involved in this change, it provides a counter-example to the hypothesis defended in the text. I have not had access to further data on this formation.
12. It is perhaps no accident that our traditional method of presenting paradigms on paper reflects nicely their internal organization, since verb forms are always presented in groups according to tense, aspect and mood. Does the other possibility illustrated below with a Spanish verb, seem strange because we are unaccustomed to it, or because it is at odds with our internal grammars?

	1st sg.	2nd sg.	3rd sg.
pres. ind.	<i>amo</i>	<i>amas</i>	<i>ama</i>
pres. subj.	<i>ame</i>	<i>ames</i>	<i>ame</i>
preterite	<i>amé</i>	<i>amaste</i>	<i>amó</i>
imp. ind.	<i>amaba</i>	<i>amabas</i>	<i>amaba</i>
imp. subj.	<i>amara</i>	<i>amaras</i>	<i>amara</i>
future	<i>amaré</i>	<i>amarás</i>	<i>amará</i>
conditional	<i>amaría</i>	<i>amarías</i>	<i>amaría</i>

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