of Grammatical Development

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WARNING:  This chapter was produced by optical scanning from the original
and still contains MANY errors that will have to be corrected.
It is provided just as an initial version and will be fixed eventually.

Hungarian is a member of the Ugric branch of the Ugro-Finnic language family. In the pre-Christian era the ancestors of the modern Hungarians inhabited an area between the Volga and Dnieper rivers in Central Asia. Subsequent migrations brought them into close contact with Turkic peoples in the area north of the Black Sea. Around 800 A.D., the Hungarians, who call themselves Magyars, entered the Carpathian Basin, occupying most of the area of modern Hungary. They have remained in the Carpathian Basin up to the present date, maintaining close contact with speakers of Slavic, Germanic, Romance, and Turkic languages. Despite these close contacts and despite massive lexical borrowing, Hungarian maintains many of its original Ugro-Finnic characteristics. These include vowel harmony, pragmatically flexible word order, an elaborate set of "agglutinative" case suffixes, an extensive system of aspect markers, verb-object agreement, placement *of the noun* in the singular when there is a quantifier that is in the plural, a basic SOV word order, and a tendency toward incorporation of the object into the verb. As we see below, each of these characteristically Ugro-Finnic features of Hungarian provides interesting data that can be brought to bear upon hypotheses regarding language acquisition strategies. We also see that many of these data are directly relevant to the universal operating principles that have been suggested by Slobin (1973), MacWhinney (1978), and others.

## 1. DESCRIPTIVE SKETCH OF HUNGARIAN

This sketch examines five major areas of grammar: phonology, morphology, morphophonology, ordering, and agreement. It uses as its basic reference the two-volume descriptive grammar assembled by the Hungarian Academy of Sciences (Tompa, 1970). Unfortunately, that grammar is only available in Hungarian. For those who do not read Hungarian, the only reference that is of any value at all is the textbook *Learn Hungarian* by Bánhidi, Jókay, and Szabó (1965). This textbook provides a fairly good account of Hungarian morphology and phonology, but it is weak in the areas of morphophonology, ordering, *and* lexical structure.

## 1.1. Phonology

There *are* at least *three* major types of phonological patterns: segmental patterns, phonotactic patterns, and morphophonological patterns. Here we briefly examine patterns of the first two types; the morphophonological patterns of Hungarian are considered in a later section.

TABLE 14.1 Hungarian
Consonants

| | | | Labial | Labio-dental | Alveolo-dental | Alveolo-palatal | Palatal | Velar | Glottal |
|---|---|---|---|---|---|---|---|---|---|
| stop | voiceless | short | ɒ | | t | | tv | k | |
| | | long | pp | | tt | | tty | kk | |
| | voiced | short | b | | d | | gy | | |
| | | long | bb | | dd | | ggy | gg | |
| frricati | voiceless | short | | f | sz | s | | | |
| | | long | | ff | ssz | ss | | | |
| | voiced | short | | v | z | zs | | | |
| | | long | | vv | zz | zzs | | | |
| affrica | voiceless | short | | | c | cs | | | |
| | | long | | | cc | ccs | | | |
| | voiced | short | | | dz | dzs | | | |
| | | long | | | ddz | ddzs | | | |
| glides | voiceless | short | | | | | | | h |
| | | long | | | | | | | hh |
| | voiced | short | | | l | | | | |
| | | long | | | 11 | | jj | | |
| trills | voiced | short | | | r | | | | |
| | | long | | | rr | | | | |
| | voiced | short | m | | n | | ny | | |
| | | long | mm | | nn | | nny | | |

## 1.1.1. Segmental Patterns

The Hungarian sound system is summarized in Tables 14.1 to 14.3. The
letters between slashes are International Phonetic Association symbols for each
phoneme. The letters outside the slashes are the symbols of standard Hungarian
orthography. Table 14.1 displays the system of 44 consonants; Table 14.2 sum-
marizes the phonetic status of the 14 vowel phonemes (e and é are dialect
variants); and Table 14.3 displays the seven groupings relevant to the pho-

TABLE 14.2
Hungarian Vowels

| | Back | | | | | | Front | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rounded | | Spread | | Central | | Rounded | | Spread | |
| | Short | Long | Short | Long | Short | Long | Short | Long | Short | Long |
| High | u | ú | | | | | ü | ű | i | i |
| High Mid | | | | | | | | | | é |
| Mid | o | ó | | | | | ö | 6 | é | |
| Low Mid | | | | á | | | | | e | |
| Low | | | | | a | | | | | |

TABLE 14.3
Hungarian Vowel Harmony Groups

|     | Back | Front | Front Rounded |
| --- | --- | --- | --- |
| 1. | u | | ü |
| 2. | ú | | ű |
| 3. | o | e,ë | ö |
| 4. | ó | | ó |
| 5. | a | e | |
| 6. | á | é | |
| 7. | ja | i | |

nological processes of vowel harmony (explained below). Note that the phonetic basis of groups 6 and 7 is fairly opaque.

### 1.1.2. Phonotactics

Hungarian has several phonological rules that operate both within and between words. We will call such general phonological rules phonotactic rules. Phonotactic effects on vowels in Hungarian are quite different from those in Indo-European. Vowel sequences are never diphthongized except in some foreign words with /au/. However an epenthetic *1)1* may be inserted into some vowel sequences. Thus *fiú* becomes *fijú* and *fáért* becomes *fajért.* This process is subject to stylistic, tempo, and dialect variation.

Consonants show an allophonic accommodation of place to the following consonant or vowel. Thus /k/ is velar in *kutya* but palatal in *kicsi* and /n/ becomes labiodental /m/ in *honfi.* Voicing also assimilates regressively in consonant clusters. Thus *kapd* is pronounced *kabd.* This assimilation involves a series of allophonic alternations, since phonemes like /m/ that do not have a voiceless counterpart do not devoice. If a dental or palatal stop precedes a fricative, the stop and fricative merge into a long affricate that has the place of articulation of the affricate. Thus, *hegycsúcs* becomes *heccsucs* and *egyszer* becomes *etsser.* Similarly, dental palatal stops followed by /j/ become long palatals. Thus *hagyja* becomes *haggya* and *kutja* becomes *kuttya.* Finally, long consonants shorten in clusters. Thus *benn van* becomes *ben van* and *sarkkör* becomes *sarkör.*

Vowel harmony operates both phonotactically and morphologically. Phonotactically, Hungarian words avoid the combination of any of the back vowels (u,ú,o,ó,a,á) with any of the front vowels (ö,ő,ü,ű, and e). However this pattern has numerous exceptions, particularly for recent loan words.

### 1.2. Morphology

Hungarian morphemes can be divided into stems and affixes. In this section we review the most important types of affixes.

The largest class of Hungarian affixes is the class of formative suffixes or *képzők*. These are parallel to suffixes like *-ate, -ness, -some, -al,* and *-ly* in English. Like their English counterparts, most of these suffixes are fairly low in productivity. Nonetheless, as we will see in the section on child neologisms (particularly Table 5), there is a fair amount of evidence for some productivity for at least 25 formatives. There are also a few morphemes that are traditionally regarded as formatives, but which really act like productive inflections. These include the comparative suffix *-bb,* the superlative that uses the prefix *leg-* along with the suffix *-bb,* the hyperlative which adds the prefix *leges-* to the superlative, and the infinitive *-ni.* All of these "formatives" function much like inflections.

There are 25 nominal case suffixes in Hungarian. However only about 15 of these can be freely combined with any noun in a fully inflectional way. These include the nine locatives (inessive, illative, elative, superessive, sublative, and delative, adessive, ablative, allative), the dative, the instrumental, the accusative, the terminative, the causal-final and the translative-factitive. The sounds and meanings of these 18 case suffixes are as follows:

1. Inessive: stative position inside an enclosure, *-ban, -ben.*
2. Illative: moving toward toward a position inside an enclosure, *-ba, -be.*
3. Elative: moving away from a position inside an enclosure: *-ból, -ből.*
4. Superessive: stative position on a horizontal surface, *-on, -en, -ön, -n.*
5. Sublative: moving toward a position on a horizontal surface, *-ra, -re.*
6. Delative: moving away from a position on a horizontal surface, *-ról, -ről.*
7. Adessive: stative position at a point, *-nál, -nél.*
8. Ablative: moving toward a position at a point, *-hoz, -hez, -hoz.*
9. Allative: moving away from a position at a point, *-tól, -től.*
10. Nominative: the unmarked form of the noun, the first mover (there is no passive in Hungarian).
11. Accusative: the direct object or element most affected by the action of the verb, *-t, -ot, -et, -öt, -at.*
12. Dative: the recipient or indirect object of the verb, *-nak, -nek.*
13. Instrumental/comitative: resembles English 'with', *-val, -vel.*
14. Terminative: movement up to an end *-ig.*
15. Causal-final: reason for an action, *-ért.*
16. Translative-factive: changing to a state, *-vá, -ve.*

The other flectional suffixes in Hungarian are called "signs" or *jelek.* They include the plural, the possessives (marked on the noun possessed), and the verbal inflections. Plurality merges with the various possessive suffixes to yield a set of portmanteau forms. Thus, although *-ok* is the sign of the plural and *-om* is the sign of first person possession, the combination of plurality and first person

singular possession yields not -*okom* but -*aim.* Also, when a possessive occurs with the accusative, the accusative may be optionally deleted.

For both the possessive markers on the noun and the actor-agreement person markers on the verb, Hungarian has six basic persons—the same six as in English. In addition, when a first person singular acts on a second person there is a seventh type of verbal suffix (I - you). The personal suffixes have one set of six forms for transitive verbs with definitive objects: ~*m, -d, -ja, -juk, -játok,* and -*ják* and another set for intransitive verbs or transitive verbs with indefinite objects: -*k, -sz,* zero, -*unk, -tok,* and -*nak.* There are four basic inflected tense/aspect/mood forms of the verb: present, past, conditional, and imperative, marked by zero, -*t, -na,* and -*j,* respectively. The combination of the tenses with the person markers involves a series of irregularities suggesting that at least some of the combinations are portmanteaus.

Nouns may be derived from stems that are themselves nouns or from other parts of speech such as verbs and adjectives. Whatever the source of the stem, the basic order of morphemes in the noun is as follows:

1. Hyperlative *(leges-),* must be used along with 2 and 5.
2. Superlative *(leg-):* must be used with 5.
3. Stem:
    a. Base (noun, verb, adjective, adverb)
    b. Compound
    c. Complex verb
4. Derivational formative:
    a. Denominative *(-ven, -ék, -né, -ász, -one, -zat, -ista, -nok)*
    b. Non-productive nominalizer (-*t, -aj, -ék, -alom, -ékony, -dalom, -mány, -vány, -dék, -lék, -tyú, -tyü, -óka)*
    c. Productive nominalizer *(-ó, -atlan, -as)*
5. Comparative *(-bb),* numeric *(-ad)*
6. Adjectival nominalizer *(-ik)*
7. Substantivizer *(ság)*
8. Adjectivalizer *(s)*
9. Diminutives (various), adjectivalizer *(-i)*
10. New formatives *(-féle, -béli, -szerű)*
11. Plural, possessive, (6 different morphemes)
12. Signs of possessor *(-é, -ei)*
13. Case markers (26 different morphemes)

The noun stem may appear by itself or with a derivational formative of position 4 above. The derivational suffixes noted under (4a) must attach directly to a simple verbal base which they nominalize. However, the derivational suffixes noted under (4c) can attach to a complex verb. Thus, a verb like *vált-oz-tat-hat* 'change-PROG-POT' (= 'can be changed') can add the nominalizer -*atlan* to form *vált-oz-tat-hat-atlan* (= 'unchangeable") which can be further inflected to

produce say, *vált-oz-tat-hat-atlan-ság-om-nak* (= 'for my unchangeableness'). Complex verbs without nominal derivation may also take nominal inflections as in *me-het-n-ék-em* 'go-POT-COND-lSG-my' (= 'my being able to go') from the verb *me-het-n-ék* with the suffix *-em* 'my' added on. (See also *nem-töröd-öm-ség* 'not-care-my-ness' (= 'my not caring'). Note also that even phrasal compounds with postpositions (see below) may serve as stems as in *munka-nélkül-i* 'job-less-characterizer' (= 'a jobless person'). The basic order of morphemes in the verb is as follows:

1. Separable prefix *(igekötő*—around 30) such as /?tʲ-'in' or *meg-*'completive'
2. Stem:
   a. Base (noun, verb, adjective, adverb)
   b. Compound
   c. Complex noun
3. Derivational formative
   a. Deverbative *(-ong, -g, -kod, -kol, -gál, -doz, -dokol, -an, -dogál, -int, -ámlik, -ul)*
   b. Non-productive verbalizer (*-//, -asz, -izál, -iroz, -fikál)*
   c. Productive verbalizer *{-ol, -oz, -ít, -ul}*
4. Causative *{-at, -tat)*
5. Frequentative *(-gat)*
6. Passive *(-ódik, -kódik -ozik, -kozik)*
7. Potential *(-hat)*
8. Tense, mode, participles
9. Person (7 different morphemes)
10. Interrogative (*-e*)

As in the case of nouns, the stem may appear by itself or with a derivational suffix of position 3. The derivational suffixes listed in (3a) must attach directly to a simple verb base. The derivational suffixes listed in (3b) attach to a simple noun base which they verbalize, and the derivational suffixes listed in (3c) can attach to a simple base or a complex noun. Thus, the denominative adjective *nagyságos* 'big-ness-ish' (= 'royal') can add *-oz* to form *nagy-ság-os-oz* 'big-ness-ish-act' (= 'to act like royalty').

## 1.3. Morphophonology

Hungarian has a large set of morphophonological rules which alter morphemes when they appear in combination. These rules are of two basic types: free and bound. Free phonological rules serve to modify the shape of a phonological feature or cluster of features in some general phonological environment. Bound phonological rules or morphophonological rules modify the shape of phonological features on the basis of the presence of specific lexical items.

Formal presentations of the most important morphophonological rules are given in MacWhinney (1978, pp. 21-26). Hungarian has five morphophonological rules that are so productive that they could almost be stated as free phonological rules. These five rules are: fronting harmony, rounding harmony, linking vowel insertion, final-a lengthening, and final-e lengthening. The first two rules make suffix vowels agree with the fronting and rounding of the last vowel of the stem. Thus *ház-ben* becomes *házban* and *kör-ok* becomes *körök.* Whereas the effect of FRONTING HARMONY extends from the stem onward through any number of suffixes, the effect of ROUNDING HARMONY extends to only the first or second suffix after the stem. For patterns 1 to 5 of Table 14.3 these rules fully determine the shape of the suffix vowel. However, patterns 6 and 7 contain further irregularities. The third highly productive rule, LINKING VOWEL INSERTION, is a complex but highly general rule that breaks up clusters by inserting a vowel from vowel harmony pattern 3 (see MacWhinney, 1978, p. 24). For example, it takes *ablak-t and converts it to ablakot,* while leaving *rizs-t* unchanged. The two remaining highly productive rules are FINAL-A LENGHTENING and FINALS LENGTHENING. These rules convert words tike *pipa-k* to *pipák* and words like *csésze-k* to *csészék* by making both /a/ and *Itl* lengthen before any suffix.

   Most of the rules of Hungarian phonology are clearly bound to specific lexical items. These rules do not apply generally and must be restricted to a particular set of morphemes in the lexicon. Bound rules can help determine the selection between the various ailosegments of the allomorphs of a given morpheme. For example, INTERNAL VOWEL SHORTENING chooses between the *IÁI* and the /a/ and between zero and /a/ in the allomorphs *madár* and *madara* of the morpheme 'bird.' Note that, although we may talk about selecting between allomorphs, the actual activational process is selecting between alternative segments or competing ailosegments. *Madár* is the "citation form," i.e. the form that appears in the nominative when no suffixes are attached. It is also the form that is used when the suffix begins with a consonant. When the suffix that follows *madár/madara* has allomorphs which begin with a vowel, the rules choose the "oblique form" *madara* as in *madara-m* 'bird + my'. This contrast between a citation from and an oblique form is quite general for Hungarian bases. Other rules that choose between oblique and citation forms include INTERNAL VOWEL DELETION by which *tükör-ök* becomes *tükrök,* V-INSERTION by which *ló-t* becomes *lovat,* J-INSERTION by which *kabát-a* becomes *kabátja,* V-ASSIMILATION by which *ház-val* becomes *házzal,* and VOWEL HARMONY for classes 6 and 7 by which *olvas-i* becomes *olvassa.* These rules are discussed in MacWhinney (1978, pp. 22-28). Other selections not discussed there include:

   1. The choice between allomorphs with either *-j* or length. This applies to the imperative and three of the present definite suffixes. It makes *olvas-ja* become *olvassa* and *olvas-játok* become *olvassátok.*

2.  The choice between allomorphs ending in -*t* and those ending in -*sí*, -*CCS*, or -*ssz* before the imperative. This rule makes *lát-j* become *less* and *bomlaszt-j* become *bomlassz*. Actually, this pattern utilizes three separate but parallel rules.

3.  The choice of a linking vowel of pattern 5 as opposed to pattern 3 when the suffix is separated from the stem by at least one other inflectional suffix. This pattern makes *mond-t-om* become *mond-t-am*.

4.  The choice between the second person singular verb suffixes -*ol* and -*sz*. The former is used with sibilant final verb and the latter is used elsewhere.

5.  The choice between a series of verbs ending in either -*sz* or -*ud,* as in *alud om* which becomes *alszom*. (This group also uses V-INSERTION and INTERNAL VOWEL DELETION.)

6.  A series of nonproductive rules selecting between allomorphs for a handful of highly irregular words. For example the choice between the stem allomorphs *falu* and *falus* 'village' is rule-governed, but the rule only applies to this noun. Another small class of nouns deletes its final vowel as in *varj-a* for *varjú-a*. Others change the shape of the vowel as in *meze-je* for *mező-je*.

7.  The assimilation of the final z of the definite article *az, ez* to the consonant of the following suffix as in *at-tól* for *az-tól*.

8.  The use of the *az* form of the definite article before nouns beginning with a vowel and the *a* form before nouns beginning with a consonant.


The assignment of lexical stress in Hungarian is extremely simple and regular. Stress always falls on the first syllable of the word. Secondary stress peaks may also occur on the subsequent syllables numbered 3, 5, 7, 9, 11, etc. However, this post-initial iambic stress pattern is far less perceptible than the initial syllable primary stress pattern. Sentences also have characteristic stress patterns. Declaratives show a steady decline in pitch throughout the clause. Questions have a rise on the penultimate syllable followed by a drop on the final syllable. However, questions marked by the particle -*e* use declarative intonation. In any clause with a finite verb, the item before the verb receives the main sentential stress, particularly when it is pragmatically focused.

## 1.4. Ordering

In this section the word "ordering" is used to refer to the system of rules governing the ordering of morphemes into words and sentences. The ordering of morphemes in Hungarian is governed by two types of rules: free rules and bound rules (MacWhinney, 1982). Bound rules are bound to particular morphemes in the lexicon whereas free rules order morphemes on the basis of the roles they play in a given clause.

The placement of affixes about a stem can be adequately controlled by a series of rules bound to each affix. These rules must specify two types of information. First, if the item is a prefix, the rule must specify that it precedes the stem.

Similarly, if the item is a suffix, the rule must state that it follows the stem. In a language like Hungarian where there arc often several suffixes after a stem, some of them derivational and some inflectional, it is also necessary to specify the order in which these suffixes are attached to the stem when more than one suffix appears. This can be done by associating a strength parameter with each affix. When several suffixes are lexicalized, they then enter into competition with one another (Bates & MacWhinney, 1982) and the ones with the highest strength index end up closest to the stem. For example, the plural always appears before the inessive in Hungarian. By giving the plural a higher strength index than the inessive, the child will produce the correct form *ház-ak-ban* 'house-PL-LNESS' rather than the incorrectly ordered form *ház-ban-ak* 'house-INESS-PL'. There are, of course, alternative ways of controlling affix order. For example, some affixes may be positioned in relation to other affixes as well as in relation to the stem. However, the placement of affixes by bound rules with strength indices offers a general solution to the task of affix ordering.

An interesting problem is presented by the fact that case markers appear as suffixes after nouns but as prefixes before personal pronouns. Thus, 'to Emery' is *Imré-nek* 'Imre-DAT' while 'to you' is *nek-ed* 'DAT-2SG'. One way of describing this alternation is to say that the meaning 'DAT' maps onto two different morphemes *nek-* and *-nek.* The former has the allomorphs *nek-* and *nak-* and the bound positional pattern: *nek-* + nucleus. The latter has the allomorphs *-nek* and *-nak* and the bound positional pattern: nucleus + *-nek.* Children seem to have particular difficulty acquiring these alternative morphemes, as we will see later.

Within the noun phrase there is the following sequence of possible elements:

1.  deictic determiner
2.  postposition (same as in 15)
3.  possessor (this may be a complex noun phrase)
4.  dative marker on possessor (optional)
5.  article (definite or indefinite)
6.  locative modifier
7.  complex phrase
8.  quantity modifier ('four', 'many[1], etc.)
9.  evaluative modifier ('nice', 'useful')
10. size modifier
11. color modifier
12. substance, provenance modifier
13. function modifier (this position may involve compounding)
14. head noun
15. postposition

An example using each of these 15 positions is: *ez alatt a jó barátomnak az itteni sokszor használt három öreg nagy fekete gumi eső kabátja alatt* 'this under the

good friend+my+DAT this the here many+times used three old big black rubber raincoats under' (= 'under these three often-used big old black rubber raincoats of my good friend')- Similar patterns are used to order strings of adverbs.

In addition to these patterns for the placement of the operators on the noun, there are a series of patterns governing other minor sentence elements. These include:

1. FAMILY NAME + CHRTSTIAN NAME: This is the opposite of the English pattern. Example[1]. *Bartók Béla* (= 'Béla Bartók').

2. NEGATIVE + NEGATED: This applies to the negation of a single constituent. Example, *ez nem alma* 'this not apple' (= 'this isn't an apple').

3. NEGATIVE + PERSON: Clausal negation places the negative before the verb that carries the person-number markers. Example: *nem megy-ek* 'not go+ IPS' *(-* 'I'm not going').

4. FOCUS + PERSON-MARKED: The main information focus occurs before the verb that is inflected for person. (The word expressing sentential negation always receives primary focus.) Examples: *én csirkét ettem* 'I chicken+ACC ate+ IPS' (= 'I ate chicken') *neki mennie kell* 'DAT+3SG go+3SG must' (— 'he must go') and *el akar menni* 'away wants go + INF' (= 'he wants to go away') where *csirkét, mennie,* and *el* are focused.

5. TOPIC + COMMENT: The topic precedes the comment. (But see rules 6 and 10.) Example: *János # labdát rúgott* 'John ball+ACC kick+PAST' (= 'John kicked the ball') where *János* is the topic and *labdát rugóit* is the comment.

6. COMMENT + AFTERTHOUGHT: Afterthoughts (Hyman, 1975) follow the comment. Example: *Elment a János* 'away + went the John' (=  'John left').

7. # + INTERACTIONAL: Interaction markers like 'please', exclamations, and vocatives are the first elements in a sentence. Example[1]. *Marcsi, gyere ide* 'Mary, come here'.

8. DIRECTIONALITY + PERSON-MARKED: The separable verbal prefix occurs before the verb that is inflected for person unless there is some other primary focus positioned by rule 4. Example: *Megettem a bogyót* 'Up+ate+lSG the berry+ACC (= T ate up the berry').

9. IMPERATIVE + DIRECTIONALITY: The separable verbal prefix follows the imperative.

10. INTERROGATIVE + COMMENT: The interrogative precedes the comment but follows the topic (i.e., rule 5 takes precedence over rule 10). Example *Éva hova ment?* 'Eva, where went?'

11. ACTION + DEFINITE OBJECT; The definite object follows the verb, unless it is focused and placed before the verb by rule 4. Example: *János megrugta a labdát* 'John PERF+kick+PAST the ball + ACC. Indefinite objects, on the other hand are always considered to be focused and are ordered before the verb by rule 4 above.

12. MAIN + SUBORDINATE: The complements of modal verbs (which are marked for person) follow them. However focused complement verbs precede according to rule 4.

13. ACTION/PROCESS + x: Elements not ordered by the above strong rules follow the verb.

14. CONJOINER + CLAUSE: This is as in English.

15. TOPIC + ANTITHESIS: Some conjunctions like 'however' follow the topic, whereas in English they begin the clause.

16. RELATIVE PRONOUN + RELATIVE CLAUSE: This is as in English.

17. ACTION/PROCESS + VOLNA: The conditional acts tike a verbal postposition.

Relativized clauses always have a relative pronoun which almost always begins the clause in nonpoetic discourse. The relative is inflected to display its role in the subordinate clause. In many cases the relative ties in to a deictic head in the main cluause which is inflected to mark the role of the subordinate clause in the main clause. These two pronouns may assume any independent role as in *azzal ehetek csak amit a kezembe adtál'* that+INSTR eat+POT+ 1SG just what +ACC the hand+ISG+INESS give+PAST+2SG. (= Til be able to eat just whatever you put in my hand')- The deictic element is usually a deictic pronoun but may be a personal pronoun. In a few cases the head may be highly anaphoric and, hence, ellipsed. If there is a full noun, it may serve as the head with or without a deictic determiner. Because role marking occurs on two elements— one in the main clause and one in the relative clause—the positioning of the relative clause is remarkably free. Thus, the English sentence *The dog pushes the cat that kisses the lion* can also appear in Hungarian as *The cat that kisses the lion, that one pushes the dog* and *The dog that the cat pushes kisses the lion* can also appear as *The cat by pushed dog kisses the lion.* Many other orderings of each of these sentences are also possible.

Conjunction and complementation are often double-marked with an antecedent deictic pronoun in the main clause and a conjunction in the coordinate or subordinate clause. Thus, Hungarian has a large number of main clause-subordinate clause conjunction pairs such as *addig—ameddig* (= 'from then—until then'), *ahány—annyi* (= 'so many—that many'), *ott—ahol* (= 'there—where'), *akkor—amikor* (+ 'then—when'), etc. There are at least 40 possible pairs of this type (Tompa, 1970, pp. 343, 354, 411). They give rise to sentences like *Then I'm going to the store, when you come home* or *So many eggs I've got, as so many chickens.* Here again, word order can be remarkably free. The main or nonconditionalizcd clause may occur either first or second. The conjunction of the main clause may be deleted or not. The only restriction is that the conjunction in the subordinate clause must always be present.

Complementation follows similar rules. Verbs describing speech acts and mental acts usually take both the deictic accusative *azt* in the main clause and the relativizer *hogy* at the beginning of the complement. Thus, Hungarians say *That I*

*think, that he is going,* for / *think that he is going.* The deictic pronoun can be omitted in some cases. In the case of factive or stative verbs like *seem, appear,* etc., *az "it" is replaced by úgy* 'so' or deleted altogether.

## 1.5. Agreement

Hungarian has an exceptionally rich system of agreement marking. The ten most important patterns are:

   1.  Agreement of the noun with the number of the modifier so that a quantity modifier takes a singluar noun.

   (Quantity (Entity))---->((Quantity) (Singular (Entity))).

Thus, Hungarians say 'many tree' rather than 'many trees'.

   2.  Agreement of the verb with the number of the noun, so that a quantity modifier takes a singluar verb:

   ((Actor (Quantity (Entity))) (Action)) ---- > ((Actor (Quantity (Entity)))(Singular (Action))).

Thus, Hungarians say 'many tree goes' rather than 'many trees go'.

   3.  Agreement of the verb with the number of the actor, so that a plural marker takes a plural verb.

   ((Actor (Number (Entity))) (Action))-----> ((Actor (Number (Entity))) (Number (Action))).

This is the same as in English.

   4.  Agreement of the topic with the number of the nominal comment in copulatives.

   ((Topic (Deixis (Entity)))((Comment ((Number)fEntity)))-----> 
   ((Topic (Deixis (Number (Entity))))(Comment ((Number) (Entity)))).

Thus, as we do in English, Hungarians say 'those, doctors' (= 'those are doctors') rather than 'this, doctors'.

   5.  Agreement of the verb with the definiteness of the object.

   ((Object (Definite (Entity))) (Action)) -----> ((Object (Definite (Entity))) (Def (Action)).

to the sentence *meg-ett-em a hús-t* 'PERF-ate-lSG the meat-ACC the *-em* on *megettem* is in the definite conjugation because the direct object *húst* has a definite article.

6.   Agreement of the negative with the imperative mode on the verb:

(Neg (Imp (Act)))- - ->((Neg (Imp)) (Imp (Act))).

Thus, imperatives like *mutasd* 'show' are negated by the negative imperative *ne* rather than the standard negative *nem*.

7.   Agreement of the verb with the case marking of an associated locative phrase occurs whenever the locative is directional:

({Direction (Topology (Place))) (Act))---- >
((Direction (Topology (Place))) (Direction (Topology (Act)))).

Thus, Hungarians say 'I in+went the house+in[1].

8.   Agreement of the infinitive verb in the obligatory mode with the person and number of the actor:

((Actor (Person-Number (Entity))) (Obiig (Act)))---- >
((Actor (Person-Number (Entity))) (Oblig (Person-Number (Act)))).

Thus Hungarians say 'DAT-3SG must go-3SG.POSS\

9.   Agreement of the demonstrative adjective with the number and case of the noun:

(Dcixis (Role (Number (Entity)))) ---->
((Role (Number (Deixis))) (Role (Number (Entity))).

Thus, Hungarians say *az-ok-kal afá-k-kal* 'that PL-COM the tree-PL-COM' (= 'with those trees')

10.   When the clause is negated, all major indefinite constituents must also be negated:

(Neg ((Role (Indef (Entity))) (X) (Act)))- - -&CT
(Neg (Role (Indef (Entity)))) (X) (Neg (Act)).

Thus, Hungarians say 'No one is not going nowhere to do nothing for no one'.


## 2. SOURCES OF DATA

An extensive bibliography of Hungrian research up to 1972 can be found in MacWhinney (1974, pp. 803-812) and Slobin (1972, pp. 130-40). That bibliography lists 96 titles; in addition there are at least 30 further publications on the topic that have appeared since 1972. The Hungarian child language literature includes diary studies, phonetic analyses, vocabulary counts, reviews of the literature, studies of motherese, psycholinguistic investigations, sociolinguistic

comparisons, research on the relation of cognition and action to language, and theoretical position papers. However, most of the basic data to be discussed in this present chapter arc diary data on errors, neologisms, and the order of emergence of grammatical devices. Fortunately, most of these data are of relatively high quality, in fact, the work of Balassa, Kenyeres, and Meggyes compares favorably with the best diary literature in any language. Although some of the other sources of diary data are less complete and less sophisticated, the data themselves seem to be accurate and reliable. Wherever reference is made to the diary literature, the reader who is interested in examining the actual data should consult pages 220-605 in MacWhinney (1974).

The present chapter focuses on data on the acquisition of the grammatical structure of Hungarian. Because almost all of the available data relate exclusively to the acquisition of expressive language, this chapter has almost nothing to say about the acquisition of receptive language. Furthermore, data on phonological development are not considered except as they relate to those phonotactic processes that impinge on morphophonological development. In the area of morphophonology, the relevant data are summarized in my monograph on the acquisition of morphophonology (MacWhinney, 1978). The major findings of that monograph are summarized in the section below on "spellout." In the section below on "ordering," the analysis of early combinatorial patterns offered in MacWhinney (1975b, 1976) is extended to later, more complex sentence productions, following the analytic framework I proposed in MacWhinney (1982). Finally, the section below on lexical retrieval deals with the use of semantic structures in lexical retrieval. That section is based on data that can be found in chapters 5 and 7 of my dissertation (MacWhinney, 1974, pp. 338-457 and 509-605).

## 3. THE OVERALL COURSE OF DEVELOPMENT

In this section I provide a brief informal characterization of the way in which Hungarian children pass through the major stages of language development. The reader should bear in mind that all of what I have to say here pertains exclusively to the acquisition of language by middle-class children in Budapest. On the most general level, Hungarian children learn language very much like children the world over. During the first year, they cry, babble, and coo. I have not been able to detect any significant differences between the babbling of Hungarian children and those of American children. However, there are clear individual differences between Hungarian children, with some children babbling more than others, some earlier than others, and some more expressively than others. Some children show a sharp demarcation between the period of babbling and the period of the first words; others do not.

Hungarian children are given a great deal of encouragement by their parents and by others to express themselves through vocalization and gesture early on. Adults express a fair amount of interest in these vocalizations of very young children, often overwhelming the small child with ebullience and attention. There is a set of typical things that the young language learner is expected to know. As in other countries, these include the child's name, his age, the names of his siblings and so on. In addition, children are expected to know the sounds produced by the various farm animals, the numbers up to ten, the names of the colors, and the names of various foods. Hungarian peasant culture sanctioned a wide variety of baby-talk forms (see MacWhinney, 1974 for a summary), many of which have survived in the current largely urban/suburban society. However, systematic, across-the-board baby-talk modifications of the phonology arc now rarer than in the past.

Children speak their first word at around 12 months. The earliest reported words include the Hungarian equivalents of words like 'here'[1], 'there', T, 'want', 'come', 'please', 'mother', 'father', and so on. As has been noted for other languages, early words generally refer to family members, common animals, body parts, general locations, household items, and so forth. During the period from 12 to 18 months children continue to add to their lexical inventory without producing many two-word utterances. Although Simonyi reports a two-word utterance at 9 months *(ka pi,* or *katona pipál* 'soldier smokes'), most children produce no word combinations before 18 months.

Because Hungarian is an agglutinative language, and because word order is so variable, the acquisition of individual words assumes a particularly central role in the child's development of communicative competence. In fact, the clearest indicator of the level of development of a Hungarian child is not so much the length of the sentences s/hc can produce as the morphological complexity of the words contained in those sentences. The model that will be developed in the body of this chapter holds that all grammatical patterns develop out of what are originally unanalyzed single lexical items. However, the child's learning mechanism sets limits not only on the size and shape of unanalyzed lexical items, but also on the ways in which these unitary items can be subjected to subsequent analysis.

Consider first that many of the words acquired during the "pre syntactic" period contain inflections. Thus, on a purely descriptive level, the claim of Stern and Stern (1907) that syntax or ordering precedes morphology is clearly wrong for Hungarian. However, it is difficult to demonstrate any productivity for these early inflections and I have argued (MacWhinney, 1975b) that many of these early forms are not morphological combinations, but rather "amalgams" or unanalyzed units. The exact shape of early inflected forms supports this analysis. Thus, verbs are often learned in the second person singular imperative, body parts in the third person singular possessive, foods in the accusative, tools in the instrumental, and so on.

I have often had it pointed out to me, by both linguists and nonlinguists alike, that even in their earliest words, Hungarian children almost never make errors in vowel harmony. The vowel harmony rules are fairly complex and one might be inclined to view this avoidance of error as a fairly remarkable accomplishment. Although the data currently available do not prove this conclusively, it appears that vowel harmony patterns are used both accurately and productively by 2;6. Errors in the most general vowel harmony rules seldom occur past 2;6 and the errors that occur in 3-year-olds arc not errors in classifying the harmony type of the stem, but overgeneralizations of vowel harmony to create new suffix allomorphs.

In general, children have no problem at all with the agglutinative nature of the Hungarian language. They are quite content to add strings of suffixes to stems. The problems that arise are not with the attachment of these suffixes, but with the irregularities governing the selection of allomorphic variants.

At this earliest time, we find the largest numbers of gross semantic extensions and violations of part-of-speech category. This is also the time when phonological substitutions are rampant. In both phonology and semantics, children vary markedly in the precision of their forms. Some children use a small set of words rigidly and accurately. Other children have such a mushy phonology that they can barely be understood. One of my subjects used the sound *tit* at I; 10 for *ír* 'write', *én* 'me', *itt* 'here' and *inni* 'drink'[1]. Another subject (Andi at 2;0) would on occasion speak long strings with errors of all types from which I could often decipher less than 60% of the material.

Children enter the two-word period around age 1;6. Word-order errors are quite rare, even at the youngest ages. Affix-order errors seldom occur and errors in the ordering of major constituents are extremely difficult to detect because Hungarian allows so much flexibility in pragmutic ordering. I have reported (MacWhinney 1975a) that between 85% and 100% of the first utterances produced by Hungarian children can be generated by a set of simple rules specific to individual lexical items. Following Braine (1976), these were called POSITIONAL PATTERNS. For example, young children are quite systematic in ordering the adjective before the noun or suffixes after stems. In each case, there is an item which can be viewed as a "operator" being ordered with respect to another item which functions as the "nucleus."

Shortly after the appearance of these first pivot-like constructions, the child also begins to produce utterances using positional patterns that are not specific to single lexical items. The most important of these patterns are those which order the topic before the comment and the focused item before the verb. Of these, the fatter pattern seems to come in first. However, it appears in a very particular form in sentences in which the verb itself is initialized. This leads to the interesting consequence that children who are learning a language which is essentially verb-final use verb-initial (VSO, VOS, VO, VS) ordering in their earliest productions. Similar tendencies to verb-initialization appear in other languages in

which the verb is not usually initial, such as German and Japanese. This early use of verb-initialization in non-verb-initial languages can be viewed as indicating a universal tendency in early child grammar toward fronting of the most active element in the sentence.

The most important suffixes enter between 1;8 and 2;8. (The data on the order of emergence of these suffixes are given in Tables 14.9 and 14.10.) Hungarian provides an interesting test case for theories like that of Brown (1973) which attempt to predict the order of acquisition of grammatical morphemes on the basis of semantic complexity. In Hungarian the formal complexity of the various grammatical markers is held constant by the fact that nearly all of the major markers arc suffixes. Moreover, all of these suffixes are subject to the same basic set of rules of vowel harmony and many are subject to the rules of linking-vowel insertion. This situation contrasts sharply with the one in English where some grammatical markers are articles, some suffixes, some auxiliaries, and some discontinuous morphemes. In order to disentangle the roles of formal complexity and semantic complexity in determining the order of acquisition of grammatical morphemes, an examination of the data on Hungarian acquisition could prove quite useful. My own interpretation of Tables 14.9 and 14.10 is that the primary determinant of the order of acquisition is not semantic complexity, but semantic reliability and applicability. For example, I see no reason to believe that the conditional is more complex semantically than the infinitive. However, the infinitive enters long before the conditional. On the other hand, the infinitive in Hungarian is much more frequent than the conditional. In general, it seems to me that applicability is the primary determinant of the order apparent in Tables 14.9 and 14.10. Unfortunately, a more precise evaluation of this claim would require more detailed data on frequency in both the child's speech and the speech directed to the child. However, when the new word frequency dictionary of the Hungarian language appears, some more reasonable estimates of this relation can be made.

Another way of studying the emergence of grammatical functions is through experimental study of children's elicited productions. A study by MacWhinney and Bates (1978) examined the use of six grammatical devices in expressing relative givenness and newness. The devices were: the definite article, the indefinite article, pronominalization, contrastive stress, ellipsis, and initialization. Child speakers of English, Hungarian, and Italian from ages 3 to 6 were asked to describe several series of pictures in which elements increased or decreased in givenness and newness. Both the Hungarians and the Italians made more use of initialization of normally non-initial elements than the Americans. However, contrary to the claims of functionalist sentence perspective linguistics (Firbas, 1964), initialization did not show any clear relation to givenness. Rather, it showed a weak relation to increased newness. Most interestingly, initialization increased with age in Hungarian, indicating the acquisition of an ability to use alternative word orders.

In all three languages, ellipsis was used to mark increased givenness. However between ages 3 and 5, there was a general drop in the use of ellipsis in all three languages. This drop had a different shape in each of the languages. In Hungarian, 3-year-olds used particularly high levels of subject ellipsis, reflecting a tendency in colloquial Hungarian. By age 5, the Hungarians were still using more subject ellipsis than the Americans, but the size of this difference had decreased. There was very little use of pronouns by the Hungarians at any age. When pronouns were used, they tended to express increased newness or contrastivity, rather than increased givenness as in English. This contrastive use of pronouns is a basic difference between the English and Hungarian that seems to be present even at age 3.

Finally, there was evidence that use of the definite article increases markedly between ages 3 and 5 in Hungarian. This rise is steeper than the rise in English during this period. This seems to reflect the fact that the definite article in Hungarian is used in a variety of contexts each of which must be acquired separately. 1 analyze (MacWhinney, 1984) these various contexts as polyscmes of the definite article. Although definite articles are used to express increased givenness, this use alone cannot explain the extent of the increase of definite article use in Hungarian children. Rather, it appears that the definite article is also being used to express exophora, cataphora, metaphora, set operation, and inference, as well as the basic function of anaphora or givenness.

It may be that some devices serve functions that cannot be adequately studied in the context of static picture descriptions. Recently, I have collected descriptions of two simple films from Hungarian 3-year-olds, 5-year-olds, 10-year-olds, and adults. In these descriptions, the youngest Hungarians made much more extensive use of VSO and VOS word orders than the older subjects. One way of looking at the use of alternative word orders in Hungarian is to view them as by-products of the demands of the process of sentence production (Bock, 1982). In the case of the movie descriptions, where actions like "chasing" and "hitting" were repeated across scenes, it may have been easiest for the children to begin their descriptions with the verb. However this kind of explanation of variable word order use must be supported by evidence that a given order is somehow easier for a specific stimulus than some other order. Such evidence is not yet available.

One other area of grammatical function that deserves study in its own right is the contrast between the definite and indefinite conjugations of the verb. This contrast involves a fairly complex set of interactions between semantic and syntactic patterns. Intransitive verbs are always indefinite, as are verbs whose objects are indefinite. However, for young children, the unmarked form of transitive verbs is not the indefinite, but the definite. This is because children spend most of their time talking about the here and now in which objects are usually definite. However, some verbs are more likely to take indefinite objects than others. For example, when talking about eating, we often refer to the thing

being eaten generically or indefinitely. However, Hungarian adds a further twist to this contrast by conjugating verbs like *eszik* 'eat'[1] in the irregular *-ikes* conjugation. In this conjugation the definite replaces the indefinite in the first person singular. Further complexity is added by the fact that the second and first person pronouns are considered to be indefinite when functioning as objects. Possessed objects, on the other hand, are always definite. Despite these various complexities, and despite the frequency with which speakers must make a choice between the definite and indefinite conjugations, Hungarian children make few errors in choice of a conjugation after the age of around 3;6. Exactly how they learn to control this system is a question that has not yet been given adequate attention.

Some of the last acquisitions of the Hungarian child are in the areas of morphophonology, case-marking, derivation, and lexical acquisition. In morphophonology, the most persistent errors are in the application of those morphophonological rules that apply to a small set of items. In section 6 these errors are discussed as violations of rules that are bound to specific lexical items. For example, an error such as *tetöje* for *teteje* 'my roof involves a rule that applies to only a handful of stems. Such errors are usually among the last in Hungarian acquisition. In case-marking, the child tends to confuse markings such as 'from inside' and 'from on top of or 'to the top of and 'to the side of. In many cases the selection of the correct case-marking depends on the specific cases governed by specific verbs. Governance errors of this type are listed in Table 14.4 of section 7. They generally disappear by age 6. Other late errors involve item-specific limitations on the semantic range of the bases to which derivational affixes are attached. Errors of this type are discussed extensively in section 8. Late lexical acquisitions include temporal adverbs, certain coordinating conjunctions, and some of the postpositions. Data from one child on late acquisitions of this type are given in Table 14.7 in section 8.

Because ordering is pragmatically variable, few of the child's productions are clear ordering errors (compare Berman, 1985). However, incorrect agreement and improper use of conjunctions and negatives persist until around 6;0. In the data from movie descriptions that I have recently collected, the emergence of complex means of expression between the ages of 5 and 10 was particularly impressive. The use of relative clauses, tense shifting, and backgrounding is quite extensive in the 10-year-old sample. Hungarian 10-year-olds also made more extensive use of causative verbs and other types of verbal conflations than English-speaking 10-year-olds. Although the major grammatical devices all make their appearance before age 5, there is a continual growth in children's ability to express shades of meaning up to at least age 10.

A large proportion of city children enter nursery school at around 1;6 and then enter preschool at around 3;6. Both at home and in school, children are exposed to a rich array of highly structured verbal activities. It is my general impression on the basis of 14 months of observation in Hungarian nursery schools and

preschools that Hungarian children develop the basic lexical items at least as soon as or perhaps sooner than American children. Even at the youngest ages, most children show an active interest in verbal engagements with both adults and children. The nursery school curriculum places particular emphasis on learning through group participation in songs, games, and rhymes. Two unifying themes of the nursery school curriculum developed by the Ministries of Health and Education are that young children should be encouraged to develop their musical abilities through choral singing and their verbal fantasies through story-telling and story-learning.

There are certain clear changes in the use of language in the nursery school between the ages of 1;6 and 2;6. In the second year, children use language mostly in its directive function. They attempt to request objects and protest against mistreatment. In the third year, other functions of language begin to blossom out. Children joke with one another, making funny sounds and pretending to babble. They use language to control coparticipation in games with toys and imaginary objects. Some children engage in extensive soliloquies, whispering to themselves as they play. By 3;0 a few children begin to tell short stories about trips to the zoo, the Danube, the country, and so on. Young children differ widely in the extent to which they use elaborate techniques of argumentation. Before 3;0, rhetorical structure has very little in the way of hierarchical control. However, between 3;0 and 6;0, there arc major advances in this area and most children learn to hold their own in argument.


## 4. THE COMPETITION MODEL


In 1978, I presented a model of morphophonological acquisition (MacWhinney, 1978) called the "dialectic model." That model relied heavily on both the basic logic and the specific proposals that Dan Slobin presented in his 1973 article on universals in language acquisition (Slobin, 1973). The current elaboration of the model also makes extensive use of the work that Slobin has done in the interim and which is reported upon in this volume (Slobin, 1985). Whereas the .1978 version of the dialectic model dealt only with morphophonology, the present version deals with grammar in general. In addition, the present version treats grammatical processing as a fully dynamic process based on interactive competition between items and patterns (Anderson, 1983, MacWhinney, Bates, & Kliegl, in press; Thibadeau, Just, & Carpenter, 1982). This processing model, called the "competition model," is now integrated as a fundamental conponent °' the overall model. Because of the increased role of competition in this second version, we now call the entire model the "competition model." Note that the central role of the dialectic remains unchanged.

The dialectic of error monitoring component of the model is fairly simple. It begins by adopting three basic terms from dialectic philosophy. These are the notions of a thesis, an antithesis, and a synthesis. A THESIS is something that is produced by the child, while an ANTITHESIS is some piece of information that does not match the thesis. For example, a child may say the word *wifes* and moments later remember that s/he should have said *wives*. In this case the thesis would be the initial form *wifes* and the antithesis would be the second form *wives*. When a child encounters such an opposition between a thesis and an antithesis, s/he attempts to construct a SYNTHESIS to resolve the opposition. In the *wife$ — wives* example, the child attempts to decide under what conditions an *If I* can be altered to a *Ivl*. The pattern governing this alteration is a new synthesis. In general, development can be viewed as the continuous construction of new syntheses to resolve disequilibria between theses and antitheses.

Each of the three basic structures (i.e. thesis, antithesis, synthesis) can be associated with one of the basic processes of the model: APPLICATION, MONITORING, AND ACQUISITION. A thesis can be generated during either speaking (expressive application) or listening (receptive application). In expressive application, the speaker has an INTENTION which s/he converts into an EXPRESSION. In receptive application, the listener has an AUDITION which he converts into a RECEPTION. The expression is the thesis of expressive application and the reception is the thesis of receptive application.

The next step in processing is the monitoring of the thesis. Monitoring checks the accuracy and adequacy of the thesis and provides the system with information on the extent to which its goals have been attained. In the current implementation of the model, the goals arc:

  1.  to be fully "expressive" by converting all underlying semantic intentions into linguistic forms;
  2.  to be fully "receptive" by developing an understanding of input utterances that fully parses their content;
  3.  to be formally "accurate" by using linguistic devices in the same way that adults use these devices
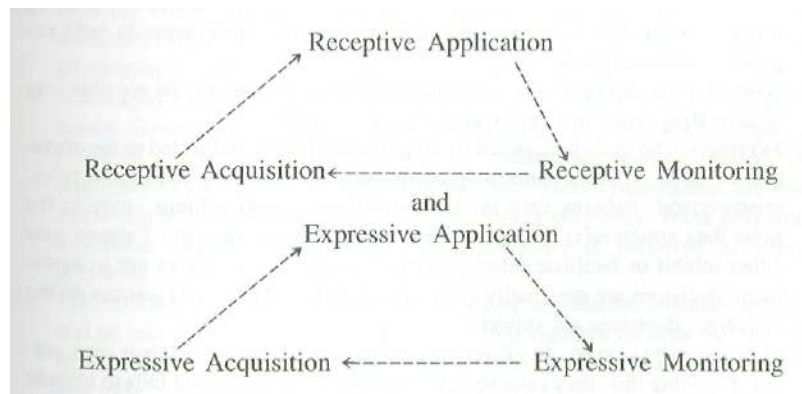
Monitoring that checks for the first goal is called EXPRESSIVE TALLYING; monitoring that checks for the second goal is called RECEPTIVE TALLYING; and monitoring that checks for the third goal can be either EXPRESSIVE CRITICISM or RECEPTIVE CRITICISM. When performing tallying the system is monitoring for impasse. When performing criticism, the system is monitoring for error. In some cases, monitoring may detect an antithesis to the thesis formed by application. When this occurs, we can say that an "impasse" or "error" has occurred and the system is in disequilibrium. Equilibrium can be restored by a process of acquisition which searches for a new synthesis to resolve the conflict between the

thesis and the antithesis. This newly formed synthesis then may become a new thesis when it is used subsequently in application. Because every synthesis can eventually become a thesis, there is a continuing resolution of opposites which results in the cycle given below:

```
                    Application
                     (thesis)

        Acquisition ←----------- Monitoring
        (synthesis)              (antithesis)
```
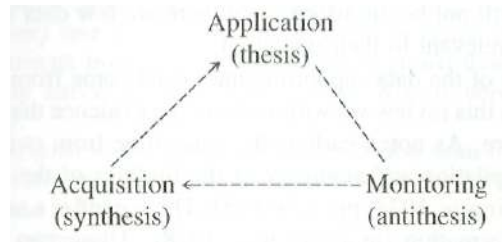
The central claim contained in this diagram is that, for a given piece of data, processing must follow the order that is indicated by the three arrows: application must follow acquisition; monitoring must follow application; and acquisition must follow monitoring.

This basic hypothesis can be coupled with the fairly commonplace observation that sometimes the child is engaged in reception (listening) and that sometimes s/he is engaged in expression (talking). This means that there are actually two dialectic cycles:

```
                  Receptive Application

    Receptive Acquisition←----------- Receptive Monitoring
                         and
                  Expressive Application

    Expressive Acquisition ←----------- Expressive Monitoring
```

These two loops represent the basic metaprinciple of the dialectic:

> MRTAPRINCIPLE: In both reception and expression, language processing operates in terms of the dialectic cycle of application, monitoring, and acquisition.

'he notion of a dialectic can be elaborated into a full model of language acquisition. Aspects of this elaboration are discussed in MacWhinney (1978, 1982). For

our present purposes, it is sufficient to examine the competition model in terms of the set of Operating Principles listed below. These Operating Principles lead to a series of predicted behavioral consequences for each of the three processes to be analyzed—spellout, ordering, and retrieval. This paper does not completely review the predictions of the model: the four Operating Principles which deal with monitoring will not be discussed since there are few data in the Hungarian literature that are relevant to their operation.

Although much of the data supporting the model come from languages other than Hungarian, in this review we will focus on the evidence that comes from the Hungarian literature. As noted earlier, the data come from two major sources. The first is a compilation and summary of the findings of the Hungarian diary literature {MacWhinney, 1974, pp. 219-608). The second is a set of experiments in elicited word formation (MacWhinney, 1978). These two sources will be referred to as "the diary literature" and "MacWhinney (1978)."

## BASIC OPERATING PRINCIPLES OF THE COMPETITION[1] MODEL

1. ROTE: Speakers can use full retrieval of a lexical item as one possible way of activating items in both expression and reception.
2. ANALOGY: Speakers can use construction of an item on the basis of patterns implicit in the lexicon as one possible way of activating items in both ex pression and reception.
3. COMBINATION: Speakers use combination of lexical items as one possible way *of activating and* reception.
4. PATTERNS: The units juxtaposed by combination may be subjected to the opera tion of three types of patterns: predispositions, free rules, and bound rules.
5. COMPETITION: Patterns vary in strength. When several patterns apply to the same data structurc(s) they compete in terms of their strength. Patterns may cither inhibit or facilitate other patterns. When all data sources are in agree ment, decisions are maximally quick and confident. When data sources do not converge, decisions are slower.
6. EXPRESSIVE TALLYING: In expression children can "listen" to their own out put. By doing this, they can check to see if what they have said fails to include a part of what they wanted to say.
7. RECEPTIVE TALLYING: Children can check to see if they do not understand a part of a string.
8. EXPRESSIVE CRITICISM: When children "listen" to their own output, the repre sentation of a combinatorial form can facilitate retrieval of a weak rote item.

---

•Technical terms used in formulations of Operating Principles are explained at relevant points in the text.

Children can then check to see if there is a discrepancy between the weak rote receptive form and the combinatorial expressive forms.

9. RECEPTIVE CRITICISM: In receplion, children sometimes note a discrepancy between the sound of the correct forms which children near and they attempt to match these forms.

10. STRENGTHENING: Every time a rule or item applies successfully, it gains in strength. Every time a rule or item applies unsuccessfully, it loses strength. Losses in strength from incorrect application are greater than increments ob tained during activation. Thus, rule reliability is more important than rule applicability.

11. AMALGAM ACQUISITION: Children acquire new lexical items by making a new association between a sound and a meaning. The clearer the representation of both the sound and the meaning, the earlier the acquisition.
   - Clarity is enhanced when clusters are presented by themselves or against a background of known information.
   - Phonological clustering is determined by intensity, pitch, and juncture. Re cent segments and stressed segments are stored most clearly.
   - Semantic clustering is determined by propositional relatedness.

12. AMALGAM ANALYSIS: The child first attempts to analyze words into clear continuous morphemes. Analysis occurs primarily during parsing in receptive application.

13. INFERENCE: During parsing, the child can infer aspects of the semantics of new items on the basis of the words with which they are concatenated by ordering patterns.

14. MERGER: When two sound strings are synonymous but not homophonous, the mismatch can be resolved by weak allomorphy, or strong allomorphy. Weak allomorphy merges the two allomorphs by setting up an archisegment. Strong allomorphy establishes the allomorphs as an archifcaturc and merges the poly-semes. Strong polysemy *establishes* separate morphemes. Weak allomorphy *is* preferred to strong allomorphy. Similarly, when two meaning clusters are represented by homophonous sound strings but are not synonymous, the mis match can be resolved by weak polysemy or strong polysemy. Weak polysemy establishes separate morphemes.  Weak polysemy is preferred to strong polysemy.

15. RULE FORMATION: When the form produced by application contains an error and no rule has been applied, a new rule is hypothesized on both the free and bound levels. Rules must be formulated in terms of already available features and units.

## 5. COMPETITION IN THE LEXICON

Ine competition between rote, analogy, combination, and patterns in the lexicon !s governed by a set of principles derived from the study of interactive activation models of lexical processing (McClelland & Rumelhart, 1981) and principles of

pattern-matching in production systems (Anderson, 1983). Thinking of both items and patterns as "rules," such models state the following principles for activation:

1. **Strength of rules:** The strength of rules reflects the frequency and recency of their successful firing. Stronger rules receive more activation. To illustrate this, note that common irregulars like *went* tend to resist overregularization more than less common irregulars like *sent.*

2. **Specificity:** The matcher rewards rules for having features matched. Thus, in word recognition, *cat* is better than bat as a match to /k/-/ae/-/t/, since it matches three segments and *bat* only matches two. A special case of this is the superiority of portmanteau forms to their analytic counterparts. In French, both *du* and *de + le* compete for the masculine partitive. However, because *du* is more specific, it gets more activation.

3. Accuracy: The matcher penalizes rules for having too many features, i.e. for having features that are not active in working memory. Thus, when matching to /k/-/ae/-/t/, the item *bat* will be penalized for the failure to match a /b/.

4. **Data refractoriness:** The pattern matcher attempts to assign each active element in working memory to a single rule. This means that if a particular element matches more than one rule there will be an inhibitory relationship set up among these elements. This is what prevents multiple competing rules from applying to the same goal. As McClelland and Rumelhart (1981) note, this inhibitory relationship makes "the rich get richer and the poor get poorer" in that good guesses are supported and poor guesses eliminated.

5. **Top-down support:** If there is considerable activation of a particular action element, it will support the production patterns that led to it, As we will see, this can lead to the phenoncmon of haplology.

These principles govern pattern-match ing and activation in the lexicon. In the current formulation, the lexicon is understood to contain three types of mappings:

1. Phonology: morpheme-to-segment mappings (e.g. the morpheme "dog" has the segments /d/-/aw/-/g/)

2. Semantics: morpheme-to-meaning mappings (e.g. the morpheme "dog" has the meanings [+animal|, [+object], [+warm-blooded], [+furry], etc.)

3. Syntax: morphemc-to-syntactic-pattern mappings (e.g. the morpheme "the" precedes nouns, but can be separated from them by other material)

Note that each of these systems is being given a highly lexicalist definition. Our phonology is lexicalist, as is our syntax and semantics. MacWhinney and Sokolov (in press) explain the rationale behind this lexicalist perspective and give details on the representations.

In this chapter we will consider Hungarian data on the acquisition of phonology, syntax, and semantics. As we examine each system, we will consider how the 16 Operating Principles of the dialectic model help us to understand the data on Hungarian acquisition, as well as relevant data on the acquisition of other languages.

## 6. APPLICATIONS OF THE MODEL TO THE DEVELOPMENT OF PHONOLOGY

First, we will examine the data currently available on the acquisition of the Hungarian phonology. This system takes a set of morphemes that have been activated by the speaker and maps them onto a set of segments or sound units. Note that this conception of phonology is highly lexicalist and includes all of morphophonology within psychology. Apart from direct morpheme-to-segment mappings, segment activation is also governed by a series of patterns called MORPHOPHONOLOGICAL RULES. Morphophonological rules govern the shape of affixes and stems when they co-occur in words. As an example of a morphophonological rule, consider the pattern in English which alters the final *HI* of *wife* to a /v/ in the word *wives*. This change is not necessitated by the phonology of English-—a plural such *as fifes* is perfectly good phonologically. Rather it is an allomorphic or morphophonological fact that we say *wives* rather than *wifes*. In the competition model, the morpheme "wife" activates both *if I* and /v/ after the /al/. However, the morphophonological rule for retrogressive voicing assimilation adds additional activation to the *Ivl* and this segment dominates over the *Hi* in the final output.

Because English is essentially an analytic language, it presents few very good examples of clearly productive morphophonological alternations. In Hungarian, however, morphophonological processes are very numerous and productive. Moreover, unlike Turkish (see Aksu-Koc, & Slobin, 1975), the irregularity and complexity of Hungarian morphophonological processes present the child with a major acquisitional challenge.

### 6.1. Rote, Analogy, and Combination (Operating Principles 1, 2, and 3)

Operating Principles 1, 2, and 3 hold that children use rote, analogy, and combination as alternative processing strategies in both expression and reception.

#### 6.1.1. Rote (Operating Principle 1)

The general consequence of the use of rote (Operating Principle 1) is as follows:

CONSEQUENCE PHONOLOGY 1A: Some affixes are used by some speakers in only a limited number of combinations, are not applied to new stems, and arc not subject, at first, to morphophonological regularization.

The familiar developmental pattern of (1) correct use of a few common forms, (2) overgeneralized use, and (3) correct use of all forms (Ervin, 1964) is also well-documented in the Hungarian literature. For example, I found (MacWhinney, 1974, p. 653) that my subject Zoli at age 1;8 controlled 16 different verbs in the past tense, all of them correctly. At this age, usage was correct despite the complexity of the rules needed to form these words by combination. However, around age 2;0, errors in past tense formation started to increase, indicating that Zoli had ceased relying on rote and had begun to produce past tenses by combination. This developmental shift between rote and combination can therefore be viewed as one important source of the U-shaped learning curves (Strauss, 1981) so commonly observed in language development.

I have shown (MacWhinney, 1975b; 1978, p. 80) that Hungarian children make fewer morphophonological errors on common irregular words than on rarer irregular words and that there are fewer errors on regular real words than on nonce words. Both of these effects indicate that children rely on rote to produce at least some inflected forms. Frequent forms can become well-memorized because they are heard so often. (Compare consequence spellout 10a.) Presumably, the strong receptive (auditory) image for these words serves to support the accuracy of the expressive (articulatory) form. There can be no such advantage for nonce words which, by definition, children have never heard before.

The diary literature shows that, even before they have learned to put two words together, children use words containing unanalyzed affixes. Similar observations have been made for English by Brown, Cazden, and Bellugi (1968, p. 41) who note for example that some children use *can't* before they use *can*. These observations may be stated in a general form:

CONSEQUENCE PHONOLOGY 1B: Stems may be acquired in an inflected form before they are acquired in their citation form, when the inflected form expresses a high frequency meaning (although usually the reverse pattern holds).

In English, one could hold that words like *can't* and *don't* are not really inflected forms at all. The Hungarian examples are far less ambiguous, since it is clear that the relevant forms display *bonafide* inflections. For example, Kenyeres (1926) reports that his daughter Eva used the inflected Hungarian word *kenyeret* 'bread + accusative' at 16 months, even before she had produced her first two-word sentence. In fact, early inflected words often contain case markings typical for the noun. Thus, in early vocabularies, foods are often in the accusative, tools are often in the instrumental, body parts are often in the possessive, and locations are

often in the locative (MacWhinney, 1974, p. 346). Similarly, activity verbs are often in the imperative, whereas state or process descriptions are often in the third person singular (compare Clancy, 1985). In MacWhinney (1975b, 1978), these rote pairings of stems with affixes are called amalgams.

### 6.1.2. Analogy (Operating Principle 2)

Operating Principle 2 holds that the second major way of activating items in spellout is through analogy. Analogy is defined as a process which creates new forms not through the combination of pieces but by extending patterns that are implicit in already existing rote lexical items. In MacWhinney (1978) this process was said to operate on the basis of a single exemplar. However, within the current framework of an interactive competition model, it makes more sense to think of analogy as gathering information simultaneously from all forms that resemble the target (Stemberger, 1982).

It would be a mistake to try to draw too sharp line between analogy and combination. Rather, analogy is best understood as the initial phase in the process of rule formation. If an analogy is successful, it can soon become formalized as a rule (Operating Principle 15). If it is unsuccessful, it is not reinforced. In the interactive competition model, forms that serve as the bases of an analogy may be primed in several ways. Phonologically, they are primed or activated by their resemblance to the target. Semantically, they are primed if they contain components of the intended meaning. Experimentally, they can be activated by use of a priming technique developed by MacWhinney (1974) for children and Ohala (1974) for adults. Using this technique, subjects are asked first for the plural of, say, *scarf*. Presumably, they respond with *scarves*. They are then asked to form the plural of the nonce word *narf*. If they use *scarf or* words like it as the basis of the analogy, they should respond with *narves* as the plural. According to this line of reasoning, if analogy is in fact used to produce inflected words, the following consequence should hold:

> CONSEQUENCE PHONOLOGY 2A: For some speakers on some forms, morphophono-'logical priming produces increased numbers of morphophonologically analogous forms.

Using the priming technique, I found (MacWhinney, 1975b, 1978) that, in Hungarian, analogy played a very minor role in morphological formations. In the period between 3;0 and 5;1, there was no significant effect of priming on analogical formations. In fact, in my 1975 study, many apparent analogies such as *narves* actually occurred directly after the child had produced a non-analogic real plural like *scarfs*. In my 1978 study, however, there was some evidence for occasional use of analogy by both the 2;6-2;9 group and the 6;8-7;5 group (ages which had not been included in the 1975 study), but analogy appeared to be used

in two very different ways at these two ages. Two-year-olds relied on analogy because they had not yet acquired a reliable set of morphophonological patterns. Older children relied on analogy in those particular cases where rules had marginal productivity and the phonological shape of forms provided partial cues to the application of the rule (Köpcke & Zubin, in press).

The strongest evidence for the operation of analogy occurs when a form is produced for which there is only one possible analog. This is the classical "proportional analogy" that is so often discussed in historical linguistics. If one assumes that proportional analogy requires a STRICT rhyme between the basis and the target, then the following consequence should hold:

> CONSEQUENCE SPEILOUT 2B; Occasionally speakers produce forms for which there could be only one possible morphophonological analog.

For example, one might expect that, on occasion, children would produce forms like *draught,* cf. correct *drank* on the basis of the analogy *drink : draught:: think : thought.* Only a few such single-possible-basis analogies have been reported in the child language literature. One is the form /fowt/ for *fought* produced on analogy with *write/wrote* that Bybee (1978, p. 42) observed in her son at age 5. Another is the form "tuth" for *tooth* on the analogy tuth:teeth::foot:feet noted by Ann Peters (personal communication) in her son at age 6;0. However, such single-possible-basis analogies may be more common than hitherto suspected. In South Serbian, the only analog for *visel* (past of *vide* 'see') was *ide: isel* ('to go[1]). The fact that such a weakly supported analogy can become institutionalized suggests that many speakers may have produced the form *visel* independently.

### 6.1.3. *Combination (Operating Principle 3)*

The third major way of activating items in spellout is combination. Operating Principle 3 holds that one way of producing expressive forms is by combination. Combination competes directly with rote and analogy in the context of lexicalization in the competition model. In morphophonology, combination works to build up a word out of two or more pieces. Early combination is blind to the rules of morphophonology—it allows morphemes to combine without regard to their particular allomorphic shape.

> CONSEQUENCE PHONOLOGY 3A: Morphophonological errors include all possible combinations of allomorphs, even ones that cannot be derived from analogy.

In practice, it is very hard to establish that a given error cannot be a result of extended analogy. However, if analogy is limited to proportional analogy, there are certain errors that cannot be attributed to analogical processing. I report a few such clear cases in MacWhinney (1974, 1978). The most common type involved a combination of a frequent stem morph like *pingvin* 'penguin' with a frequent stem allomorph like *-k* 'plural' to produce *\*pingvin-k* 'penguin-PL' for the correct *pingvin-ek.* Since there is no real Hungarian plural that ends in *-nk,* this form could not have been produced by proportional morphophonological analogy. Similarly, at age 2;2,0, my subject Zoli produced *\*ló-unk* 'horse-ours' as a combination of *ló* and *unk,* although word-internal sequences of /óu/ almost never occur in Hungarian. An even clearer case is the error *\*lov-n* 'horse-SUPER' in which the allomorph *lov* 'horse' is juxtaposed to an allomorph of the superessive *-n* without a linking vowel. In this case, the final *-vn* is an error both allomorphically and phonotactically. Here, proportional analogy seems to be even more strongly precluded. However, I believe that, if analogy is formulated in a sufficiently dynamic fashion, it may be possible to generate errors like these. Such a formulation would allow analogy to extract implicit patterns that extend over large numbers of lexical items, it seems to me that it is impossible to find particular errors that could not be generated by an extended analogy of this type. However, it remains to be seen whether extended analogy can also account for major developmental shifts in the types of forms produced by spellout.

## 6.2. Patterns (Operating Principle 4)

As soon as the child begins to combine morphemes, s/he begins to acquire the rules that alter their shape. Operating Principle 4 holds that, when operating combinatorially, the child may use any of three types of patterns: predispositions, free patterns, and bound patterns. Let us examine the consequences of the use of each of these three types of patterns.

### 6.2.1. *Predispositions*

The most primitive and general type of pattern is the phonotactic predisposition (Ingram, 1979). Phonological predispositions are conceived of as universal processes which favor certain types of assimilations and simplifications in the articulatory output. For example, the predisposition for vowel harmony would

reduce /daedi/ to /daedae/. Stampe (1969) argues that such simplifications are unlearned consequences of the way we control our vocal apparatus. Unfortunately, in many cases, it is hard to separate the action of a phonotactic predisposition from that of an allomorphic rule. In fact, it is often the case that predispositions support learned rules.

> CONSEQUENCE PHONOLOGY 4A: Forms for which the effects of a phonotactic predisposition summate with those of a learned allomorphic rule will appear earlier than forms using the same rule to which no predisposition applies.

In Hungarian it is difficult to distinguish the predisposition to vowel harmony from the highly applicable fronting harmony rule. I found (MacWhinney, 1978) that at 2;6 children tended to block rounding harmony for the nonce form *önyv* and produce *önyvek.* The high percentage of *önyvek* productions were explained in terms of a predisposition to block rounding harmony after certain clusters. This analysis was based on the Academy grammar (Tompa, 1970) which states that words like *könyv* taking unrounded linking vowels (as in *konyv-ek)* form a natural phonological class in which there is a final consonant cluster that begins with a nasal or a liquid. However, a closer examination of the Hungarian lexicon suggests that no such class exists. Therefore, my explanation of the high percentages of use of *önyvek* by even 3-year-olds may have to be reconsidered. It may be the case (Matthew Rispoli, personal communication) that *önyvek* is being produced on analogy with *könyvek.* These two accounts could conceivably be tested by using nonce stems like *runty* that have no close analog in the lexicon. If *önyvek* is actually being formed by analogy with *könyvek,* we would expect Hungarian children to produce *önyvek* as the plural of *önyv* much more than *runtyek* as the plural of *runty.*

### 6.2.2. *Free patterns*

The second type of allomorphic pattern is the free pattern. These rules apply generally whenever a given set of phonological features appears in the correct phonological environment. If such rules exist, the following consequences should hold:

> CONSEQUENCE PHONOLOGY 4B: At least some learned rules apply obligatorily in a given phonological context without regard to lexical or allomorphic facts.

This type of rule can be typified by the Hungarian rule of final vowel lengthening that was discussed above. This rule alters stem final /a/ to /a:/ and /e/ to /e:/ before suffixes. Because there is no word-internal tendency to lengthen prefinal /a/ {*malac* is a good Hungarian word), this pattern cannot be simply a predisposition. However, like the pattern of fronting harmony, this pattern is acquired well

before age 2;0. In fact, I reported (MacWhinney, 1978) a correct generalization of final vowel lengthening to a nonce stem at age 1;8,6. This remarkably early control of an allomorphic rule is perhaps the earliest demonstration available in the child language literature of the productivity of a morphophonological rule. In effect, the child has learned this rule not as a (bound) morphophonological rule, but as a (free) phonological rule.

Another example of morphological rule with very high productivity is Hungarian fronting harmony. This rule applies to morphological combinations in order to convert all suffix vowels into back vowels when the stem has back vowels and into front vowels when the stem has front vowels. The rule applies to most every combinatorial morphological formation in the language and has only a few exceptions. The major exceptions are a few suffixes such as *-nek* 'first person singular conditional', *-ik* 'third person plural definite', and *-i* 'third person singular definite' which have only one front vowel allomorph. However, in testimony to the extreme productivity of fronting harmony and in support of Consequence spellout 4b, we find reports of errors such as *\*-nák,* for *-nek, \*-jek* for *-ik,* and *\*-je* for *-i* in which the "missing" harmonizing allomorphs have been "created" in line with harmony patterns 6 and 7. In fact, there is even one report of the extension of vowel harmony to the postposition *is* 'also' to form *os* as in *\*mama os* 'mama also' for the correct form *mama is*.

### 6.2.3. *Bound rules*

The third type of pattern is the bound rule. Morphophonological rules are generally bound rules. Bound rules are limited in generality to precisely those morphemes that illustrate a given alternation. For example, the *wife-wives* alternation in English must be controlled by a rule that applies only to words that exhibit the /f/-/v/ alternation since it cannot apply to *fife* or *sheriff.* Because English has such a limited set of affixes, bound rules perform little work in our language. However, in Hungarian, the same alternation may occur with up to 26 case suffixes. Therefore, bound rules can function as important and useful predictors of allomorphic form. In order for a bound rule to apply to a new stem, the alternative segments of the allomorphs of that stem must be acquired. This fact lead to the following consequence:

> CONSEQUENCE PHONOLOGY 4C: Bound rules only apply to new morphemes once the allosegments activated by that rule have been acquired.

Experiment 2 in MacWhinney (1978) examined the application of the internal vowel deletion selection to nonce stems. This rule takes *bokor-ok* and converts it to *bokrok.* To use this rule, the subject must know that *bokor* has the allomorph *ookr.* He can then produce *bokrok, bokrot, bokros, bokrod,* and so on. Children were taught two allomorphs of each new nonce stem and then were asked to use

these allomorphs in a new case. Five-year-olds showed some ability to apply selections in a productive way. However, the results of the study were partly equivocal and further research on this topic is needed (see Bybee & Pardo, 1980).

The principle of top-down support in interactive activation leads the pattern matcher to accept rote output that contains a match to an affix as if it actually contained that affix.

> CONSEQUENCE PHONOLOGY 4IX Partial regularity will facilitate morpheme recognition and the production of derived forms.

Bybce and Slobin (1982) have found support for this consequence in regard to English past tense formations. Menn and MacWhinney (in preparation) discuss this process in some detail, reviewing further evidence in support of this consequence.

## 6.3. Competition (Operating Principle 5)

In phonological processing, both segments and morphemes compete for slots in the output. When allomorphs do not compete for the same position in a word, the child must learn that only one allomorph of a set may be used at a time. This means that when one allomorph is selected, the others must be inhibited. While the child is learning to do this, errors of overmarking arc quite frequent. Some of these overmarkings may involve placement of a combinatorial suffix onto a correctly inflected rote form, as in *shoeses.* However, errors such *asfootses* point more clearly to allomorph competition, since both plural suffixes are probably being used productively.

> CONSEQUENCE PHONOLOGY 5A: When children already know one allomorph of a morpheme and then acquire another, for a brief time they may use the new allomorph along with the old to produce overmarkings. This will occur primarily when the two allomorphs compete for at least partially different syllable-structure positions.

This type of error is illustrated in English by forms like *\*shoeses* and *\*hopeded.* Hungarian errors such as *\*pingvin-k-ek* and *\*lo-k-ak* (MacWhinney, 1975b) also provide good evidence for this consequence. In these errors *pingvin* 'penguin' and *ló* 'horse' are the bases. The forms *\*pingvink* and *Hók* arc incorrect plurals and the forms *\*pingvinkek* and *\*lókak* are overmarked plurals. Since the single plurals are also errors, rote is probably excluded and it thus appears that two plural allomorphs have been combinatorially attached to the bases. Note that the allomorphs *-k* and *-ok* are not in headlong competition, since *-k* is targeted for the

syllable coda and *-ok* is targeted for positioning as a separate syllable. There are reports of 42 such reduplications in the Hungarian literature (MacWhinney, 1974, pp. 348-352, see also MacWhinney, 1976, pp. 400-401 and Aksu-Koc & Slobin, 1985). These reports include even more complex reduplications such as *\*rámomra* 'to+me+me+to' in which both the sublative *(-rá)* and the first person singular *(-om)* are reduplicated.

The current formulation of the process of competition views affixes as attempting to open up a slot vis-á-vis some stem. Generally, the affix which the speaker is attempting to order is related to the stem s/he is trying to produce. However, it may happen that more than one affix is active at a given time. In such cases, deciding which affix goes with which stem can become a problem.

> CONSEQUENCE PHONOLOGY 5B: When several scmantically-unrclatcd affixes become activated at the same time, they may be attached to the wrong stems.

In Hungarian, transitive verbs have case frames that can activate two, three, and even four case suffixes. Occasionally, children attach the wrong suffix to the wrong noun. Similar errors can also be observed in adults (see Stemberger, 1982, for English data). In her daughter at age 2, Meggyes (J971, p. 50) reports several suffix-anticipatory substitutions of the form: NOUN A—SUFFIX A + NOUN B—SUFFIX B - - -> NOUN A—SUFFIX B + NOUN B—SUFFIX B. Meixner (1971) reports one suffix metathesis of the shape: NOUN A—SUFFIX A + NOUN B—SUFFIX B - - -> NOUN A—SUFFIX B + NOUN B—SUFFIX A. The suffixes in these errors are case markers. Such errors could be given a purely phonological interpretation. By this account, suffix metathesis would be just like *Napa Valley - -> Napey Valla.* Stemberger (1982) argues against the phonological interpretation of such errors, pointing out that adult English transpositions seldom involve whole syllables, whereas affix transpositions often do. Meggyes reports several other sentences indicating that the various affixes activated by a verb may be competing against each other for suffix slots. In these sentences, a surface case form seems to have come from a noun that never reached the surface. Thus, *építem a Sömpikét* 'build+I the Sömpike +ACC Sömpike is Meggyes" daughter's nickname was used when the required for was *építem a* (Sömpikének *(a házát)* 'build+I the Sömpike+for (the house+ ACC)' It may be that each verb automatically activates a set of case suffixes. If a given noun role is not lexicalized, its suffix may become attached to another noun. In Japanese, Clancy (1985) reports similar errors in which adpositions are reversed about nouns. Errors of this type appear to be no more frequent in child language than in adult language and may well be interpreted as processing errors. However[er]> it is not clear how one can really distinguish performance errors from competence errors. In the interactive activation model, no strict separation is being made between competence errors and performance errors. Activation is the pri-

mary determinant of both correct production and erroneous production and activation may be a function of either long-term learning in the child or the current state of the system.

Competition may also arise between forms that are spelled out by rote and forms that are spelled out by combination. In processing terms, these two modes of activation are viewed as operating in parallel. Both may achieve some activation of output phonological segments. However, the one that achieves the strongest activation of output segments is the one that "wins" the competition. In general, strong rote forms should dominate in this competition, because they are highly automatized ways of fully spelling out a meaning. If rote forms are not fully strong and automatized, combination emerges as a viable alternative. Thus, highly frequent words should be produced by rote, whereas less frequent words are more likely to be produced by combination.

CONSEQUENCE PHONOLOGY 5C: At a given age, common irregular forms are subject to a smaller percentage of morphophonological overregularizations than infrequent irregular forms. Overall, there are fewer errors on common words than on rare words.

As was noted earlier, I have shown (MacWhinney, 1975b; 1978, p. 80) that this consequence holds for Hungarian. Thus, overgeneralizations of the regular plural to frequent words like *ló* 'horse' (i.e. *\*lók* 'horse+PL' for *lovak)* are propro-tionally less frequent than overgeneralizations of the regular plural to infrequent words like *dam* 'crane' (i.e. *\*darúk* for *darvak)*. This consequence has also been supported for English (Graves & Koziol, 1971), Arabic (Omar, 1974), and German (Walter, 1975; MacWhinney, 1978).

Usually, combination and analogy generate the same output. In such cases, when they lead to similar output, they work in concert to increase the activation of forms. However, competition can occasionally emerge between the forms spelled out by combination and those spelled out by analogy. In such cases, combination dominates quite strongly over analogy whenever there are strong rules governing allomorph selection. However, when the rules are not strong, analogy is as good a bet as combination.

CONSEQUENCE PHONOLOGY 5D: When the rules governing a certain type of combination arc opaque and full of exceptions, children and adults make comparatively more use of analogy.

This consequence is supported by data from Hungarian (MacWhinney, 1978, p. 34), German (MacWhinney 1978, p. 69) and Russian (Zakharova, 1958). In Hungarian, I found that 2-year-olds were particularly susceptible to the priming techniques described above for *narf* and *scarf*. However, 6-year-olds continued to be sensitive to primes for minor rules.

## 6.4. Rule Acquisition (Operating Principles 10 and 15)

The tenth Operating Principle of the dialectic model holds that every time an item or pattern applies successfully (i.e. does not lead to an error), it gains in strength. Note that "success" and "error" are defined here entirely by the operation of the process of monitoring. When monitoring detects no mismatch between the child's system and data taken from the outside, then application is judged to be successful. Any rule that has applied without the detection of an error is strengthened. Rules that are highly APPLICABLE will soon become strong rules. However, rules must also be entirely RELIABLE. If rules lead to mismatches that are detected by monitoring, they will be significantly weakened. In general, this means that the child will attempt to acquire the most applicable rule that is also correct.

When a rule or form is newly learned, its applicability leads to some early successes. These successes lead the child to apply it wherever possible. Thus, *goed* is used along with *jumped* and *wanted* by English-speaking children and *ouvrié* is used instead of *ouverte* by French children (Clark, 1985). However, after a while, incorrectness catches up with applicability and these overgeneral rules are reined back.

The basic Darwinian[3] principle expressed in Operating Principle 10 has a series of important consequences. The first consequence is identical to consequence spellout 5c above.

> CONSEQUENCE PHONOLOGY 10A: Common irregular forms are subject to a smaller percentage of morphophonological overregularizations than infrequent irregular forms.

Of course, common forms occur more often than uncommon forms and therefore have more errors overall. But, as Kuczaj (1978) has shown for English past tense marking, the percentage of errors declines for more common forms before it declines for less common forms. In Hungarian, I found (MacWhinney, 1975b) better performance on the plural of the common noun *ló* 'horse' than on the rarer noun *dam* 'crane'. Presumably the child learns the irregular plural *lovak* 'horses' so well that it almost always wins out over the regularized combinatorial form *'lok.* In the case of *darvak* 'cranes' the child has only a weak rote form and combination ends up producing \**daruk.* Similar results are reported by Berman (1985) for Hebrew.

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Until we achieve a fuller understanding of the neuronal basis of item and rule strength, it will not be clear whether the principle involve here is Darwinian or Lamarckian in nature. If neurons adapt in the direction of their use, the principle seems to be Lamarckian. If potential connections drawn out of a very large set are weeded out by failure, the principle would appear to be Darwinian. In neither case is the notion of strengthening Skinnerian.

The second major consequence of Operating Principle 10 relates to the relative strengths of the different allomorphs of a given morpheme.

CONSEQUENCE PHONOLOGY 10B: The first productive uses and the first over-generalizations of an affix will make use of the allomorph that is most applicable (across types).

Here a distinction is being made between type frequency and token frequency. The English past tense alternation found in *sing/sang* is high in token frequency, because the verbs *sing* and *ring* are high frequency items. However, the pattern applies to few types, since it only operates on about seven verbs in English. Note that Operating Principle 10 only strengthens the allomorph of an affix after combination has applied. When a form is produced by rote, the affix is not applied as a separate item and, hence, cannot be strengthened. This means that strengthening of weak alternative segments of allomorphs will occur only when forms are produced by combination rather than by rote. Since high token frequency items are likely to be produced by rote, the affix allomorphs used in their formation will not always be used. This leads to the surprising consequence that affixes should be more likely to be used for forms whose frequency is somewhat lower. Thus the first productive allomorph should be the one that combines with a large variety of stem types whose individual token frequency is not too high. Reflecting this, Consequence phonology 10b defines applicability in terms of types. However, it is important to note that the basic definition of applicability is more general. If a morphophonological rule applies in 20% of the words produced by a speaker, its applicability is twice that of rule that applies in 10% of the cases. However, in order to estimate the likelihood of a rule having applied, we must also be able to estimate the likelihood that the form was produced by rote. In those cases where rote applied, the rule itself was not applied and applicability is lower.

As Clark (1985) notes, Guillaume's (1927) data on the overgeneralization of French verbal suffixes indicate that the more applicable first conjugation suffixes dominate over the more frequent (in tokens) second and third conjugation suffixes. These data indicate that the number of the types with which an allomorph combines is probably more important than the simple frequency of its potential appearances in determining allomorph strength. This interpretation has also received experimental support in a recent miniature linguistic system study by Lederberg and Maratsos (1980).

In most cases the allomorph that is most frequent in terms of the types in which in appears is also the most frequent in terms of the tokens in which it appears. In such cases, support for Consequence phonology 10b is fairly straight-forward. Such support has come from Arabic, English, French, German, Latvian, Russian, and Spanish. Since the writing of the review of these data in MacWhinney (1978), additional support for this consequence has been reported

for Quiche (Pye, 1979), Dutch *(-en* suffix, Snow, Smith, & Hoefnagcl-Hohlc, 1980), German (verb stems and plural and adjectival affixes, Mills, 1985), Hebrew (plural and feminine suffixes, Bcrman, 1985, Levy, 1979), and Polish fSmoczyiiska, 1985). For example, Smoczyriska notes that, in Polish, the earliest genitive is *-a,* the first nonfeminine prepositional is -w, and the earliest first oerson present is *-tn*. In each case, the earliest allomorph is also the most frequent. In French, Clark (1985) finds that both *que* and *qui* function interchangeably as relative pronouns. To the child, *que* and *qui* may at first appear to be allomorphs. Since *qui* is the most frequent of the two, it is the one first overgeneralized. Of course, *qui* and *que* are not allomorphs, but different morphemes each using different ordering frames. However, the child may not realize this at first.

The Hungarian data also support Consequence phonology 10b. First, consider a small group of Hungarian suffixes *-m, -t, -k, -s, -d,* and *-n* which insert either *lol* or *I'AI* when following back vowel stems. Thus, *ház + m* becomes *házam* 'house + my', but *hug + m* becomes *húgom* 'little:sister + my'. Most stems take *lol,* but a significant number of high frequency, older words take instead /a/. Both *lol* and /a/ are low-vowels in regard to harmony (see Table 3) and selection between the two is not a vowel-harmony issue. The diary data show that errors such as *házom* are far more frequent than errors such as *\*húgam.* In other words, applicable allomorphs such as *-om* and *-ok* are more likely to be overgeneralized than infrequent allomorphs like *-am* and *-ak.* Second, consider the allative suffix *(-hoz, -hez, -hoz)* which presents another example of the importance of allomorph frequency. The only back vowel allative allomorph is *-hoz,* whereas front vowel words can take cither *-hez* or *-höz* depending on rounding harmony. Because back vowel words are about as numerous as front vowel words, adults use *-hoz* about as frequently as *-hez* and *-höz* combined. In fact, I found (MacWhinney, 1978) that, in the earlier periods, many children used *-hoz* as their only allative allomorph. Here again frequency in the adult language seems to be mirrored in child usage. On the other hand, in cases where two allomorphs are of roughly equal frequency, both are overgeneralizations of front vowel allomorphs *(\*bokor-ben* 'bush-in' for *bokor-ban)* are about as frequent as overgeneralizations of back vowel allomorphs *(\*szék-on* 'chair-SUPER' for *szék-en).*

In a few cases, the early overextension of a strong allomorph may become extremely marked. For example, Clark (1985) cites a case in which a Spanish 2-year-old used the feminine article *la* almost exclusively, even when masculine *el* was required. In such cases, it may be that the child has simply not yet acquired as a free form. Once *el* is acquired, the disproportionate use of *la* should taper off.

Consequences phonology 10a and 10b have also received support of a somewhat different and interesting type. Bybee (1980), Bybee and Brewer (1980), and Zager (1980) have examined in some detail the effects of frequency and

markedness on leveling between and within paradigms in language change. Their results indicate that Consequences phonology 10a and phonology 10b may hold not only for child language but also for language change.

There are at least four additional consequences of Operating Principle 10 These further consequences result from the interaction of the two parts of Operating Principle 10 when considered in relation to the framework of Operating Principles 1, 2, 3, and 4. The first part of Principle 10 holds that rules will gain in strength when they are highly APPLICABLE across form types. The second part holds that rules will lose strength if they are not also RELIABLE in their application. Therefore, the strongest rules are those that maximize both applicability and reliability. However, reliability cannot be sacrificed for applicability. All rules must be essentially reliable, and the problem is to find the most applicable rules that are also reliable (MacWhinney, Pléh, & Bates, in press).

The principle operates so that more applicable rules are acquired before less applicable ones.

CONSEQUENCE PHONOLOGY 10C: Rules are acquired in order of applicability.

This consequence has been supported by data from Finnish and German (MacWhinney, 1978, p. 82) as well as by my analysis (MacWhinney, 1978) of the order of acquisition of 15 Hungarian rules. In that study, the relative applicability of each of the 15 rules was calculated by determining the number of words (types) to which it might apply. The reliability of each rule was found by examining the relative proportion of words (types) to which it applied correctly. The free rules were all higher in applicability than the bound rules, and most of them were acquired before the bound rules. In general, applicability correlated with order of emergence at 75. However, this correlation was not perfect. When reliability was also considered, the correlation rose to 1.00. These results show quite clearly that both applicability and reliability are important determinants of the order of acquisition of morphophonological rules.

Berman (1985) cites an interesting example of the results of Consequence phonology 10c for Hebrew. Words like *Simla* 'dress[1] undergo two alternations in forming plurals like *smalot*. One alternation changes final /a/ to /ot/. This alternation is extremely general and is acquired early as a modification. However, the change of /iC/ to /Ca/ is far less general and learned much later and with a fair amount of difficulty as a bound rule.

Some bound rules apply to only a handful of items or perhaps only one item. The extremely late acquisition of these patterns in Hungarian supports Consequence spellout lOd. For example, at age 8;2, Eva Kenyeres produced the error * *szavat* for *szót* 'word+ACC. This error is an overgeneralization for the rule which chooses between allomorphs like *szó-* and *szav-* or *hó-* and *hav-*. The only exception to this selection is *szót* which must be learned by rote. The fact that the

error *szavat* is not reported earlier, indicates that the bound rule probably is learned quite late. Another bound rule which still causes problems in school-age children is the rule that changes *161* to /ej/ in the possessive. There are only four stems that could use such a selection. Similarly, the various rules selecting between the allomorphs *ev-* and *ett-, falus-* and *falu-, ul.* and *-an, -ott* and *-on,* and *szár-* and *száraz-* arc extremely limited in applicability and errors in their use continue until at least age 4 (MacWhinney, 1974, pp. 391-397).

As was noted above, children will eventually abandon any rule that is not correct. However, as Slobin (1973) has noted in the discussion of his Operating Principle F ("avoid exceptions"), it may take them a while to realize that some overly general formulation can occasionally lead to errors. The fact that reliability exerts its force only in the long run after at least a few errors have occurred leads to this consequence:

> CONSHQUF.NCH PHONOLOGY 10D: Rules that apply quite generally, but which are actually bound rules, are acquired initially in an overgeneral form.

Consequence phonology lOd is well-supported for Hungarian (MacWhinney, 1978, pp. 36, 37, and 42). Thus, INTERNAL VOWEL DELETION, INTERNAL VOWEL LENGTHENING, and V-assimilation are all acquired initially in an overgenera-lized shape. Formulations of bound morphophonological rules as free rules are also reported by Levy (1979) for Hebrew, where final /a/ is taken to be a general predictor of selection of /ot/ as a plural. Note that in all these cases there remains some tendency to treat the rule as free even after the initial period of over-generalization is checked.

Operating Principle 10 feeds into Operating Principle 15. Operating Principle 15 governs initial formulation of rules on the basis of errors detected by monitoring or on the basis of the construction of an analogy. If the analogy is to be stored or if the error is to be eliminated, a rule must be articulated. Operating Principle 15 holds that the child will formulate the rule in both a bound and a free version. Consequence spellout 11f held that bound rules may be initially applied as free rules. However, this does not mean that the child has not also formulated the pattern as a weaker) bound rule. Since both types of rules continue to be present, the weakening of one simply leads to "growing room" for the other.

> CONSEQUENCE PHONOLOGY 15A: When free rules are eliminated as incorrect, bound mles remain in force.

thus, when Hungarian children stop overgeneralizing internal vowel deletion as in *motrok* for *motorok,* they do not then fail to correctly form *bokrok* instead of *bokorok* (MacWhinney, 1978). Although children try to formulate rules in a maximally general form, there

are definite limits on the kinds of hypotheses they tend to entertain. In particular children must first formulate rules in terms of units that are already available' Thus, it makes sense to formulate a rule for, say, front vowels or for dental stops It makes far less sense to formulate a rule in which, say, dental clicks, lateral fricatives, and front rounded nasal vowels are treated as a single class.

CONSEQUENCE PHONOLOGY 15B: Modifications are first formulated in terms of characterizable features in a simple way by phonetic parameters.

I found (MacWhinney, 1978, p, 34) that there was a gap of almost 4 years between the times of attainment of similar levels of control on the two parts of the supposedly unitary rule of final vowel lengthening. Children acquired the /a/ to /a;/ alteration by around 2;6 but still had trouble on /e/ to /e:/ at 6;8 to 7;5. It is clear that these two alterations are in no sense a single rule. The fact that these superficially parallel processes are not acquired in parallel is not too surprising when one considers the phonetic facts: /a/ is low, back, short, and lip-spread; /a:/ is middle, back, long, and somewhat tense; /e/ is low, middle, mid-to-front, short; and /e:/ is mid-to-high, front, long, and very tense. The ratio /a/ : /a:/ :: /e/ : /e:/ is very abstract indeed and there is no evidence that preschoolers ever treat /a/ and /e/ as members of a single class. Thus, it appears that children follow some commonsense principle of phonological concreteness, defining morphophonological rules in terms of phonetic parameters.

## 6.5. Item Acquisition (Operating Principle 11)

The Hungarian literature is also rich in information on the determinants of the order of acquisition of lexical items. Operating Principle 11 holds that the child's first conventional lexical items are formed by the association of a single intona-tionally-delimited phonological package with a package of semantic intentions the child wants to express. This is to say that the first rote items acquired by a child involve a minimum of either phonological or semantic analysis. The child associates an intonationally prominent and coherent piece of the speech stream with a salient and coherent subset of the semantics of the ongoing situational framework. One consequence of this principle is as follows:

CONSEQUENCE PHONOLOGY 11A: Affixes are present in a morphophonological correct form before being used productively.

In English, Brown (1973) found that grammatical morphemes are used in a semantically accurate fashion several weeks or months before their use becomes fully productive. I report (MacWhinney, 1974) a similar pattern of acquisition for affixes in Hungarian. Thus, at age 2;2, my subject Zoli used a large number

of correct past tense verbs without showing evidence of productive use of the past tense. This kind of usage can be attributed to rote learning of words which are later analyzed as stem-plus-affix combinations. Within the dialectic mode, such combinations are called AMALGAMS. Newport and Meier (1986) have presented a convincing analysis of an entirely similar phenomena that they call FROZEN FORMS in the acquisition of sign language. The important role amalgams seem to play in sign language is significant evidence for the universal importance of Operating Principles 1, 11, and 12.

A second consequence of Operating Principle 11 (part b) is that early amalgams are defined as intonational units.

CONSEQUENCE PHONOLOGY 11B: Affixes enter before adposiiions.

This is clearly true for Hungarian. Virtually all of the major suffixes are learned by age 3;0. At the same time, most of the postpositions are acquired after that time. However, it should be noted that the postpositions are used far less frequently than the suffixes in the adult language and that their meanings seem to be more complex.

A further consequence of the intonational definition of early words is noted in part (a) of Operating Principle 11 where it is claimed that strings which occur by themselves as uninflected citation forms arc likely to be picked up as intonational units.

CONSEQUENCE PHONOLOGY 11C: The first productive uses of stems and the first morphophonological ovcrgcneralizations of stems usually make use of the uninflected citation allomorph, if the language has such forms.

In the Hungarian diary literature, we find that overgeneralizations of citation allomorphs exceed overgeneralizations of oblique allomorphs by about 4 to 1. Thus, errors like *ló-k 'horse-PL' for lov-ak which use the citation form ló are very common, whereas errors like *lova-nak 'horse + DAT' for ló-nak which use the oblique allomorph lova are quite rare. Consequence phonology lie has also received support from other languages. In German (Mills, 1985), children use the citation form of the adjective to form the comparative, as in hocher for höher. This is comparable to the English error gooder. Newport and Meier 1985) cite similar errors for ASL. In Hebrew, Berman and Levy (Berman, 1985) report early extensions of the singular citation form for nouns. Verbs, which do not have uninflected citation forms, show no such pattern. In Estonian, Marilyn Vihman, personal communication) the first form of the verb is often the second person singular imperative which is also the citation form. In Polish, loczyriska (1985) reports forms such as chlepa and koteka which show overgeneralization of citation allomorphs of stems. She also cites Wojtowicz as

claiming that overgeneralization of citation allomorphs are "much more frequent than overgeneralizations of oblique allomorphs." In Mandarin, the tone sandhi patterns of dipping tone words change in accordance with the tone of the following word (see MacWhinney, 1978 for a more detailed description). Li and Thompson (1976) have found that such dipping tone words first enter with the full dipping tone that is used when the word appears alone. This seems to be good evidence for the salience of citation forms. When the language does not provide the child with a frequent uninflected citation form, the child may attempt to use some other form as basic. Thus, in Japanese (Clancy, 1985) children may use the adjective with its present sense suffix as basic. In Romance IPS and 3PS forms are often overgeneralized (Clark, 1985; Bybee & Brewer, 1980).

The exact shape of the phonological packaging mentioned in Operating Principle 11 (part b) can be defined somewhat more precisely. Operating Principle 11 holds that children record the speech stream in terms of packages demarcated by intensity/pitch contours and pause junctures (Brown, Cazden, & Bellugi, 1968, p. 51). One consequence of this principle is:

> CONSEQUENCE PHONOLOGY 11D: Early imitations preserve accented syllables and, as much as possible, those unaccented syllables which are not separated from the accented syllable by pauses or junctures.

In Hungarian, the first syllable of the words receives the main stress. In imitations, children tend to preserve the first syllable of a word or word string (Viktor, 1917). In Hebrew, where most words have final stress, initial syllables are often omitted in imitation (Berman, 1985). In Mohawk, Feurer (1980) found that, in long strings of affixes with penultimate stress, often only the accented syllable is preserved.

However, as Slobin (1973, p. 191) has noted in his Operating Principle A ("pay attention to the ends of words"), recency is also an important factor in syllable retention. In view of this, Operating Principle 11 (part b) is worded in a way that allows for a role for all three factors: stress, juncture, and recency. Thus, in addition to Consequence spellout lid, the following consequence is allowed:

> CONSEQUENCE PHONOLOGY HE: Final segments tend to be preserved more than earlier segments.

Thus, Viktor (1917) found that, in three-syllable words, children would delete the middle syllable. Evidently, they preserve the first syllable for its stress and the third for its recency. However, if only one syllable is preserved, it is more likely to be the first. In general, it appears that early acquisition of the suffixa-

tional morphology of Hungarian seems to be facilitated by the aspect of Operating Principle 11. Consequence spellout l i e is also supported by data from several other languages. In Hebrew, the verbal prefixes, the definite prefix, and the prepositions are all omitted in early speech (Berman, 1985). On the other hand, the verbal suffixes of Japanese which are both word-final and often utterance-final are learned quite early (Clancy, 1985), as are the various pragmatic particles which appear in sentence-final position.

Although most Hungarian amalgams are characterized intonationally as a syllable with main stress and the set of syllables that occur between it and the next main stress, there are a few cases in which pretonic syllables are joined to the word without any juncture. In particular, the definite article *(a, az)* functions intonationally like an unstressed prefix. For example, children may pick up phrases such as *az ebéd* 'the meal' as rote items. Thus, along with stress and recency, juncture seems to be a factor in amalgam segmentation.

## 6.6. Amalgam Analysis (Operating Principle 12)

Once the child has acquired a set of amalgams, s/he faces the task of analyzing those amalgams into their pieces. As Slobin (1973) has noted in his Operating Principle B ("the phonological forms of words can be systematically modified"), the very act of analysis indicates that the child is not bound to viewing the word as the final unit of meaning. In performing this analysis the child relies on Operating Principle 12. This principle, like Slobin's Operating Principle D ("avoid interruption or rearrangement of linguistic units"), holds that the child first attempts to analyze words by breaking them up into perceptually clear continuous morphemes. This principle has at least six consequences. The first two are as follows:

CONSEQUENCE PHONOLOGY 12A: The child is relatively slow in acquiring metathesis patterns.

CONSEQUENCE PHONOLOGY 12B: The child is relatively slow in acquiring infixes.

Hungarian provides no real test of these two consequences because it has so few productive cases of infixation or metathesis. However, one can point to the fact that most Hungarian affixes are learned by age 3;0 as evidence for the general case of acquiring affixes and stems that are easily segmented. In Hebrew (Bernian, 1985), productive control of the metathesis in *simla—smalot* is fairly late. The third consequence of Operating Principle 12 is as follows:

CONSEQUENCE PHONOLOGY 12c: Occasionally, the child uses oblique stem allomorphs without affixes.

There are a number of errors in the diary literature supporting this consequence For example, children may use *köv for kő 'stone'[1]. The form *köv may be derived from an analysis of, say, követ ('stone+ACC') into köv and et.[4] The fourth consequence of Operating Principle 12 is as follows:

> CONSEQUENCE PHONOLOGY 12D: The acquisition of new bound lexical items by the analysis of amalgams relies on extraction of the high frequency allomorph and treatment of the residue as a new lexical item.

This consequence is supported by the Hungarian diary literature. Stems are often extracted by removal of the most frequent allomorph of an affix. For example, the most frequent allomorph of the accusative is -t. When presented with the amalgam narancsot 'orange+ACC, children recognize -t as the accusative and treat *narancso as the stem. In this case, however, the actual citation stem is narancs 'orange'. For further discussion of errors resulting from the use of frequent affix allomorphs in amalgam analysis see MacWhinney (1976) and Smoczynska's data (1985) on the analysis of poszlísmy. Berman (1985) cites the error kadimanit 'forward' in Hebrew which can only be based on the extraction of a suffix *-anit from the word axoranit 'backwards' by the analogy axor 'behind' : axoranit 'backwards' :: kadima 'forward' : *kadimanit 'forward'. This example shows how the extraction of a new morpheme can rely on a single exemplar.

Another consequence of Operating Principle 12 is that the child may occasionally attempt to analyze new itesm which are morphologically indivisible.

> CONSEQUENCE PHONOLOGY 12E: Occasionally the child analyzes a unitary lexical item.

Overanalysis usually occurs when a child tries to analyze a new unknown word. An English example of overanalysis would be analyzing carburetor as: car + buretor, A child making such an analysis might ask whether a truck has a buretor too. The majority of the reported Hungarian overanalyses (MacWhinney, 1974, pp. 398-399) divide the amalgam into a meaningful stem {car) and a meaningless residue {buretor). Sometimes the child is more successful and finds two meaningful stems as in the analysis of millió 'million' into mily 'how' and jó 'good'. Other common errors of analysis in Hungarian involve attempts to decompose portmanteau morphemes like maguk 'us' (MacWhinney, 1974, p. 353) and tied 'yours' (MacWhinney, 1974, pp. 394-397). In maguk, children recog-

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[4]Note that *köve + -t is a less reasonable analysis of követ, since final e would change to é before the allomorph -I. The absence of undersegmented allomorphs ending in e or a can be taken as evidence that the child monitors his segmentations by sending them back through his system of productive combinalions. In this case the rules would yield *kövéi which would not match követ and thus analysis of követ into köv plus -et would be blocked.

nize the 3PL ending -*uk* and in *tied* they recognize the 2SG ending -*ed*. Although such analyses are incorrect, they seem superficially plausible. There are very few examples of overanalysis of affixes, although in Polish, Smoczynska reports that children sometimes analyze the first person plural -*smy* into -*s* and -*my*. This is because the first person singular -*my* is a fairly common unit.

A final consequence of both Operating Principle 12 and Operating Principle 11 is as follows:

> CONSEQUENCE PHONOLOGY 12F: Children will overgeneralize non-zero allomorphs even when zero allomorphs are of much greater applicability.

This child does this because the zero allomorph is not actually a lexical item. Rather, it indicates the absence of a device for marking a function. Thus, when the non-zero allomorph enters, it is the first full allomorph for the function and is overgeneralized according to Consequence spellout 1ib. The case of the third person singular indefinite in Hungarian illustrates this consequence. Nearly all verbs in the language take a zero-marking in the third person singular indefinite. However, a group of perhaps ten common verbs and other less common verbs end in -*ik* in this person. Despite the vastly greater applicability of the zero allomorphs, a large number of overgeneralizations of -*ik* are reported in the literature. Similarly, in the Polish genitive plural, -*ow* replaces the more frequent zero allomorph (Smoczynska, 1985).

## 6.7. Merger (Operating Principle 14)

In some cases amalgam analysis yields a new form which is synonymous but not homonymous with an old form. This may also occur in amalgam acquisition, particularly in bilingual environments. When this situation arises, Operating Principle 14 holds that there are two ways of resolving the synonymy. The first solution involves generalization rather than discrimination. It adds the new form to the old forms by simply changing the weights in a cluster concept or prototype. For example, in Hungarian, the plural allomorphs are -*ak, -ek, -ok, -ök,* and -*k*. This cluster of allomorphs may be represented by a vowel archisegment plus a /k/, as in -*Vk*. We will call such a situation weak allomorphy, since the allomorphs are not distinct morphemes.

The second solution to the problem involves the introduction of a discrimination by adding a new morpheme. Strong allomorphy occurs when allomorphs are simply listed and not merged. Operating Principle 14 holds that weak allomorphy is preferred to strong allomorphy. As a consequence, we have:

> CONSEQUENCE PHONOLOGY 14A: When allomorphs have a large set of common eatures and when the roles governing allomorphy are opaque, the first productive allomorph is a phonologically central form.

Thus, Mills (1985) reports that some German children use *de* as their first definite article. This form is phonologically central to the set of article allomorphs *(der, die, dem, des, den, das)* although it is not a real allomorph itself. If a child uses expressive criticism (Operating Principle 6) and receptive criticism (Operating Principle 9) with a loose phonological filter, an item such as *de* is likely to be judged as acceptable more often than any alternative form. This possibility is also supported by data from Kunene (1979) on the acquisition of Si-Swati. In the case of Hungarian, applicability and phonological centrality are often confounded, i have shown (MacWhinney, 1975b, 1978) that the very first morphophonological errors in Hungarian involve attachment of a monoconsonantal suffix to the stem without a linking vowel. For example, in *\*pingvink,* the child attaches the *-k* allomorph of the plural directly to the stem. As noted in Consequence phonology 1 lb, this allomorph is the most applicable of the five plural allomorphs. At the same time, it is also the common denominator of the five allomorphs of the plural *(-ok, -ak, -ek, -ök,* and *-k).*

When allomorphs share little common phonological material, Operating Principle 14 holds that they should be acquired as separate morphemes. This leads to the following consequence:

> CONSEQUENCE PHONOLOGY 14B: When allomorphs share little common phonological material, they should be acquired and activated as separate morphemes and the alternation they represent should not be generalized to any other forms.

Strong allomorphy is widespread in compound bilingualism, since one set of meanings often has two forms (morphemes)—-one in one language and one in the other. In the monolingual case, a new morpheme is established whenever two synonymous forms have different positional patterns. For example, the Hungarian nominal instrumental suffix *-val* must be a different morpheme from the pronominal instrumental prefix *vel-*. In certain cases, weak allomorphy and strong allomorphy may combine. For example, the Hungarian second person singular present indefinite has two sets of allomorphs: *-ol, -el, -Öl* and *-asz, -esz, -sz*. It appears that these sets of allomorphs are best represented as two separate morphemes. There are no reported child overgeneralizations of the 1/sz alternation to any other forms.

## 7. APPLICATIONS OF THE MODEL TO THE ACQUISITION OF SYNTAX

The dialectic model can also be used to account for the child's learning of syntax. In the lexicalist model being used in this paper (MacWhinney & Sokolov, in press), syntax is defined quite narrowly as the system of rules governing the ordering of morphemes into the strings of surface structure. Here, we will con-

sider the impact of Operating Principles 1, 2, 3, 4, 5, 10, 11, 12, and 13 of the dialectic model on the acquisition of Hungarian ordering.

## *7.1* Rote, Analogy, and Combination (Operating Principles 1, 2, and 3}

### *7.1.1. Rote (Operating Principle 1)*

According to Operating Principle 1, there are three ways the child can control the ordering of morphemes. First, s/he can learn a string of morphemes by rote. In terms of ordering, rote is revealed only by the occasional morpheme order errors it engenders. Such errors involve attachment of an affix to an unanalyzed amalgam.

> CONSEQUENCE SYNTAX 1A: When the child produces affix order errors, they will most often involve failure to separate an affix from a stem with which it frequently co-occurs.

English illustrations of this type of error include / *picked up my socks up* and *you pickup it* (Menyük, 1969). Smoczyriska (1985) cites a case of this type in Polish where children fail to separate the person suffix *-m* from the verb when attaching the suffix *-by.* In Hungarian, errors of this type usually involve the ordering of affixes in a word. *Thus, föl-kel-ök* 'up-get-lSG' often appears as *\*kel-j-föl-ök* 'get-IMP-up-lSG' with the *affix föl* placed in the wrong position. Here the common sequence *kel-j föl* 'get-IMP up[1] is an unanalyzed amalgam to which the first person singular suffix *-ok* is attached. Similarly, in the form *\*kalap-om-ka* 'hat-my-DIM' for the correct *kalap-ocská-m* 'hat-DIM-my' the diminutive *-ka* (also *-ocska)* is incorrectly ordered after the first person possessive *-om.* Here, *kalap-om* 'hat-my' seems to function as an amalgam to which the diminutive is then added.

I have argued (MacWhinney, 1982) on the basis of English data that children may also learn strings of words by rote, although there seem to be limits on the size and number of such strings. The following consequence derives from that analysis:

> CONSEQUENCE SYNTAX 1B: Some words are used by some speakers in only a limited number of combinations, and are not subject at first to incorrect placements.

Por example, Bever (1970) and Richards (1979) report that 3-year-olds' ordering > adjectives before the noun in English is usually correct, that it worsens around ge 5, and then improves again in grade school. It may be that 3-year-olds are Using adjective strings like *great big* or *nice little* which are learned by rote. For a variety of further evidence along this line consult MacWhinney (1982). Evidence

of this type of U-shaped learning function has not been reported for Hungarian probably because in Hungarian the existence of a multiplicity of word-order alteratives makes ordering errors less likely.

### 7.1.2. *Analogy (Operating Principle 2)*

The second way in which the child can order a string of morphs is by analogy to some other string. This other string can be in either long-term memory or short-term memory. As I have noted (MacWhinney, 1982), there is very little evidence in favor of the idea that children can retrieve long strings of words from their long-term memories, instead, the kinds of long strings that children tend to learn by rote arc songs and poems rather than standard sentence templates. On the other hand, it is clear from the research on sentence imitation that children can store long strings of words in short-term memory. Moreover, it appears that they can rely on Operating Principle 1 to use these strings as ways of producing new strings.

CONSEQUENCE SYNTAX 2A: Children occasionally produce sentences or parts of sentences on analogy with preceding sentences spoken by themselves or by others.

For example, Clark (1977) reports the following sequence:

Adult: We're all very mucky. Child: 1
all very mucky too.

Here, one could argue that the first sentence serves as the basis for an analogy which takes part of the previous sentence and varies the rest. In Hungarian, this type of discourse analogy can often be detected by errors in verb inflection (MacWhinney, 1974, pp. 526, 527, 564, 584, 585). For example, if an adult says *kérsz teát* 'Do you want tea?'[1], the child may answer *kérsz* 'you want[1] rather than *kérek* 'I want'. Such sequences are extremely common (see also Mills, 1985). Note that, in discourse analogy, the phrase that is borrowed from the previous sentence is not necessarily an item that the child has stored by rote in long-term memory. Rather, the sentence is built around an item in short-term memory. Moreover, the analogy involves not just ordering, but also semantics, since use of the earlier item in the current sentence is based on an analogy between aspects of the earlier intention and aspects of the current situation.

### 7.1.3. *Combination (Operating Principle 3)*

MacWhinney (1982) notes that, by combining the mechanisms of rote and analogy one can construct plausible accounts for the generation of virtually any phrase in a language. All that is required is that the system store a large number

of templates for phrases and that it have a way of extracting similarities across templates which can be applied to new instances. Although it seems reasonable to imagine that small phrasal units may be stored as templates, it is much harder to believe that we store whole clauses and complex sentences as rote units. To the degree that rote and analogy fail to provide a sufficient account of sentence production, they must be supplemented by some mechanism that permits the combination of units. Operating Principle 3 holds that one way in which expressive forms may be produced is by combination. One obvious consequence of this principle is that not all forms are produced by rote. When forms are produced by combination, errors in the process of combination will lead to errors in the order of the morphemes. This means that the following consequences should hold:

> CONSEQUENCE SYNTAX 3A: Children and adults should make some errors in the ordering of morphemes in words.

The Hungarian literature reports only a few incorrect orderings of both affixes and words. In the next section, we will see why incorrect ordering is so quickly controlled.

## 7.2. Patterns (Operating Principle 4)

Operating Principle 4 holds that combinations are shaped by the use of three types of patterns: predispositions, free rules, and bound rules. Let us consider the consequences of the use of each of these three ways of ordering lexical items.

### 7.2.1. *Predispositions*

In the area of word order, predispositions operate to favor the placement of certain items before others. These predispositions can be viewed as universal preferences for the lexicalization of some items before others. There are at least three such predispositions that are relevant to early word combinations in Hungarian: informativeness, agency, and relatedness. Each of these three predispositions has received widespread attention in the international literature. However, as I have concluded from a review of this research (MacWhinney, 1982), the nignly anecdotal, non-experimental nature of this literature has led to a certain confusion regarding the exact shape and relative importance of these predispositions.

The first predisposition to be considered is the hypothesized tendency of the child to order the most informative (newest, least given, least predictable,etc.) element first. This predisposition should lead to the following consequence:

CONSEQUENCE SYNTAX 4A: In early combinations, children will tend to order the newest or most informative element first.

In fact, Dezső (1970), MacWhinney (1975a), and Meggyes (1971) all report that there is a short period, early in Hungarian acquisition, when children tend to initialize and stress the verb, despite the fact that the most common word orders in Hungarian are SOV and SVO, and despite the fact that Hungarian sentences often begin with an unstressed element that is given or topical. Dezső (1970) argues that in such sentences the verb is expressing new or highly informative information. Presumably, in the situations confronting children, the objects are often highly given things like familiar playthings, common foods, or close family members. What is new and exciting are the activities in which these well-known objects engage. Verb initialization in early sentences has also been observed for French (Lightbrown, 1977), Italian (Bates, 1976; Fava & Tirondola, 1977), German (Park, 1974), and English (Braine, 1963b), none of which are verb-initial languages. This same predisposition may also be associated with the observation that in other SÜV languages like Japanese (Clancy, 1985) and Turkish (Slobin & Aksu-Koc, 1985) children are so quick to pick up the use of right-dislocations of highly given material.

The second predisposition we will consider is the hypothesized tendency for the child to order agents before non-agents. Thus, in a string of nouns, the first noun would normally be the agent.

CONSEQUENCE SYNTAX 4b: In early combinations, children tend to order the agent before the patient.

The Hungarian literature suggests that such a predisposition is, at best, quite weak, since early sentences include Patient-Agent order as well as Agent-Patient orders. The same is true of Turkish (Slobin, personal communication).

The third predisposition to be considered is the hypothesized tendency, also known as Behaghel's Law, to place together words that are semantically related.

CONSEQUENCE SYNTAX 4C: Children have no problem placing together items that are related in semantic structure, However, when semantic relations are not clear or when items are related to whole clauses, errors are more frequent.

There are almost no reported errors in the placement of items according to consistent rules when there is a simple semantic relation between single items. However, items such as the negative *nem,* the interrogative *-e,* and the conditional *volna,* which modify the whole clause, are often placed in incorrect positions. Similarly, conjunctions such as *mielőtt* 'before' may be placed on the wrong clause (MacWhinney, 1974, p. 502), but errors of this latter type may be conceptual (Clark, 1971).

Altogether, the impact of predispositions on syntax seems to be confined to the earliest stages and weakly learned patterns. The main determinants of rule strength and competition are not predispositions, but the factors of reliability and applicability discussed earlier. In any case, it is crucial to remember, that, in the competition model, predispositions compete on an equal footing with rote, analogy, and combinatorial rules. Thus, the main empirical question relates to the relative strength of predispositions in this competition.

### 7.2.2. *Free rules*

The second major type of ordering pattern is the free rule. Free ordering rules order morphemes on the basis of their role in the clause, rather than their specific lexical identity. Because they are not lexically bound, we call these rules lexically-free rules, or simply free rules. For example, morphemes connected by the modifier-modified relation are ordered by a ordering pattern which places the modifier before the modified. This rule orders *big* before *dog* in *big dog* and *red* before *balloon* in *red balloon*. The possible scope of such rules is discussed in detail in MacWhinney (1982). Free rules can be used to describe, for example, the dominance of SVO ordering in Indo-European (Clark, 1985; Mills, 1985) and SOV order in Japanese (Clancy, 1985). Many word order patterns in Hungarian could be viewed as either free or bound. For example, the MODIFIER + MODIFIED pattern could be viewed as actually a set of patterns such as BIG + x and RED + x bound to words like BIG and RED. Since either the free or the bound solution could work and since there are few errors to demonstrate the presence of one pattern or the other, it is hard to exclude either interpretation. Moreover, if one allows bound rules to be activated by analogy, it may be possible to account for morpheme ordering without relying on free rules at all.

Perhaps the best evidence for the reality of free rules in child grammars is the presence of strong developmental shifts in the ordering of the major constituents. If word order were governed simply by a set of lexically-bound rules, across-the-board developmental changes in word order would not be expected. At the same time, free rules should show their presence by applying automatically to new operators, as soon as they are required.

> CONSEQUENCE SYNTAX 4D: Children seem to demonstrate control of free rules by (1) making across-the-board changes in word order and (2) applying the pattern automatically to new operators.

The Hungarian research is relevant to only the first part of this consequence. Meggyes (1971) reports that, from 1;9 to 2;0, her daughter used mostly VS ordering. During the period from 2;0 to 2;2 this ordering gave way to the SV ordering that is more common in the adult language. I observed (MacWhinney, 1974) a period during which an early predisposition for fronting of informative material gave way to the free pattern of ACTOR + ACTION.

Hungarian has another set of word order patterns that cannot be controlled by bound rules, unless these are accompanied by some strong analogical mechanism. The two most important of these are the rules that are used to order the topic and the focus. The first of these is the TOPIC + COMMENT PATTERN. This pattern orders the topical element at the beginning of the utterance and then follows it, after a slight pause, with the comment. Each sentence may have only one such topic. Often the topic is the actor (there is no need in Hungarian to distinguish between the "actor" and the "subject"). However, any noun phrase may be topicalized. This free pattern is quite consistent and children make few errors in its application. The second major pragmatic pattern is the FOCUS + ACTION/PROCESS pattern. This pattern orders the item of highest focus directly before the verb stem. Because of the complexity of this pattern, we will postpone its discussion until we also consider Operating Principle 5.

### 7.2.3. *Bound rules*

The third major type of ordering pattern is the bound rule. These rules are bound to a particular lexical item or set of lexical items. 1 have referred (MacWhinney, 1982) to these rules as ITEM-BASED PATTERNS. Such patterns order a specific morpheme (the operator) either before or after some other morpheme or phrase (the nucleus) with which the operator is related semantically. For example, the English morpheme *big* always occurs before the morpheme which it modifies. Therefore, the item-based positional pattern for *big* is: *big + X,* where X is the nucleus and the plus indicates that the item on the left precedes the item on the right.

The psychological reality of an item-based pattern may be demonstrated in at least two ways. First, its productivity may be demonstrated by application to a new item. Thus, if a child learns the new word *zebra* and says *there's a big zebra,* we can argue that *big* has been ordered by use of an item-based pattern. Second, the productivity of a pattern may be demonstrated by consistent placement of the operator. Thus, if a child places *this* in front of the noun to which it is related 9 times out of 10, we can argue that there is statistically significant evidence for a positional pattern (Braine, 1976). Third, if we find a development in the intonational integration between items, we can take this as some evidence for the presence of an item-based pattern with an associated intonational contour. These three types of evidence may be summarized in this way:

> CONSEQUENCE SYNTAX 4E: Soon after learning a new operator, children demonstrate control of an item-based pattern for that operator by (1) productive positioning of that operator with new nuclei, (2) consistent correct positioning of the operator, and (3) intonational integration of the operator with its nuclei.

A study of over 11,000 early utterances from two Hungarian children (MacWhinney, 1975a) provided strong support for the second part of this consequence. There was only one clear cut case of a failure to use a relevant item-

based pattern (MacWhinney, 1974, p. 474). Moreover, between 85 and 100 percent of the utterances produced by these two children could be analyzed in terms of a set of a few dozen item-based patterns, such as *ott + X* 'there + X' as in *ott kutyus* 'there doggie'. In the case of affix ordering, the support for consequence ordering 4e is equally emphatic. Errors in affix ordering almost never occur and most of those that do occur can be attributed to amalgam usage (see consequence ordering la above). The third part of consequence ordering 4e is supported by Fónagy's (1972) study of intonation in early word combinations. In that study, Fónagy found that combinations begin as successive single word utterances, but that over time, the final contour on the first word and the pause between the items tends to disappear until a single smooth intonational contour emerges.

One common type of bound rule is the governance rule. In both Indo-European and Finno-Ugric, verbs govern the cases of their object in a fairly idiosyncratic fashion. For example, we can say *fight with John, fight John,* and *hit John,* but not *\*hit with John*. It may be possible to formulate some of these patterns as free rules. However, many instances of governance seem to be lexically bound. As in the case of agreement, the verb and the case marker may often be noncontiguous in surface structure. Because the units first acquired by the child are amalgams (Operating Principle 11), the child will be slow to pick up longer-range dependencies.

> CONSEQUENCE SYNTAX 4F: Children will make errors in governance even when the rules are consistent.

Mills (1985), Smoczynska (1985), and Clancy (1985) report a variety of governance errors for German, Polish, and Japanese. Table 4 lists the governance errors that have been reported for Hungarian (MacWhinney, 1974, pp. 545-548, 575-580). These errors are basically of two types. The first type involves confusion within the set of locative cases. Thus, the child says 'into the leg' instead of 'onto the leg' or 'from the chair' instead of 'into the chair'. These errors either use the wrong direction for the movement or treat the reference point as the wrong topological type (enclosure for point, surface for enclosure, point for surface, etc.). The other type of error involves confusions between the three principle non-locative cases: the accusative, the dative, and the instrumental. These errors indicate that children are working on two very general goals. One is to lexicalize a locative suffix and the other is to lexicalize a suffix for the basic case relations. It might be the case that the fact that all of these devices are marked by suffixes increases their confusability. For example, it might be that, if the language marks the accusative with a suffix and the instrumental with a prefix, fewer confusions would arise.

Governance errors in Hungarian are at least as prevalent as Table 14.4 suggests. They are certainly a characteristic aspect of the speech of preschoolers and they continue into the early grade-school years. It seems that, when children are

TABLE 14,4
Governance Errors

| Adult | | Gloss | Child | | Gloss |
|-------|-------|-------|-------|-------|-------|
| *ül* | *-be* | sit into | *üt* | *-ból* | sit from |
| *tüsszent* | *-re* | sneeze onto | *tüsszent* | *-ról* | sneeze from |
| *köt* | *-ra* | tie onto | *köt* | *-ba* | tie into |
| *bánt* | *-t* | hurt someone | *bánt* | *-nak* | hurt to someone |
| *fölvesz* | *-l* | pick up someone | *fölvesz* | *-nak* | pick up to someone |
| *tesz* | *-t,* -ra | put someone onto something | *tesz* | *-ra* | put onto someone |
| *húz* | *-t,* -ra | pull someone onto something | *húz* | *-t* | pull someone |
| *tréfál* | *-val* | joke with someone | *tréfál* | *-nak* | joke to someone |
| *éhes* | *-re* | hungry for something | *éhes* | *-val* | hungry with something |
| *utca* | *-ra* | onto the street | *utca* | *-ba* | into the street |
| *Losonc* | *-ra* | onto Losonc | *Losonc* | *-ba* | into Losonc |
| *láb* | *-on* | onto the leg | *láb* | *-ba* | into the leg |
| *fej* | *-en* | onto the head | *fej* | *-ban* | into the head |
| *kivü!* | *-en* | outside on | *kivül* | *-nél* | outside by |
| *fogva* | *-tói* | starting from | *fogva* | *-ig* | starting to |
| *verekszik* | *-val* | fight with someone | *verekszik* | *-t* | fight someone |
| *átmegy* | *-ra* | go over on someone | *átmegy* | *-t* | go over someone |
| *veszekszi* | *-val* | squabble with someone | *veszekszik* | *-t* | squabble someone |
| *mesél* | *-ról* | tell from on something | *mesél* | *-re* | tell onto something |
| *olvas* | *-ból* | read from in something | *olvas* | *-be* | tell into something |
| *iszik* | *-bál* | drink from in something | *iszik* | *-ba* | drink into something |
| *gondol* | *-ról* | think from on something | *gondol* | *-ra* | think onto something |
| *játszik* | *-val* | play with something | *játszik* | *-t* | play something |
| *csinál* | *-val* | do with someone | *csinál* | *-t* | do someone |
| *mos* | *-val* | wash with something | *mos* | *-t* | wash something |
| *ad* | *-nak* | give to someone | *ad* | *-t* | give someone |
| *fér* | *-ban* | fit into something | *fér* | *-nek* | fit to something |

not sure of the specific case governed by a specific verb, they attempt to generate a case by general semantic strategies such as "select a reasonable locative for directional movement." However, the idiosyncrasies of the language make such strategies less than optimal and children must eventually learn governance verb by verb.

## 7.3. Competition (Operating Principle 5)

The ordering of several operators about a single nucleus must be governed by a series of precedence constraints between patterns, as noted in Operating Principle 5. In effect, the child must learn which patterns will win out when two or more patterns come into competition (sec MacWhinney, 1982, for details). The basic principle governing the resolution of competition is that the system attempts to maximize the overall fulfillment of patterns. Rules vary in strength and

the satisfaction of strong rules is more important than the satisfaction of weak rules. However, in a fully developed, well-organized system, some highly specific rules are set up to "buy off" or "suppress" their more analytic counterparts. Until this system is learned, we expect the following consequence to hold:

> CONSEQUENCE SYNTAX 5A: When two or more morphs have positional patterns that compete for a given position, at first the child makes frequent errors in their ordering. In these errors, the most strongly activated morpheme is placed closer to the stem.

An example of this consequence in Hungarian is the competition between patterns for preverbal positioning. We have already noted in the discussion of consequence ordering 4d above that the focal element has the primary claim on this position. Focus itself is determined by a complex series of factors including contrastivity, negation, indefinitcness, and informativeness. Moreover, and to make matters even more complicated, when there is no focused item, the separable verbal prefix is placed before the verb stem. Otherwise, it is postposcd. However, in the imperative, the separable prefix is obligatorily postposed and with certain modals it precedes both the modal and the stem in the order SEPARABLE PREFIX + MODAL + STEM. Because the vectors on the category of focus are so complex, and because there is so much competition for preverbal position, children make many errors in selection of the correct preverbal element. These errors (MacWhinney, 1974, pp. 466-471) include: (1) failure to prepose the perfective separable prefix when no other item qualifies for focus *(*Eva fürdik meg?* 'Éva bathes up?' for *Éva megfürdik* 'Éva up+bathes'); (2) failure to postpose the separable prefix in the imperative *{megnézzük* 'up-+ sec+we' for *nézzük meg* 'see+we up'); and (3)failure to postpose the separable prefix when there is a focused pre-verbal element *(*nem megeszem* 'not up+eat+I' for *nem eszem meg* 'not eat+I up'). The child must learn to integrate the various free rules here with the bound rules for each of the separable prefixes. The large number of errors that have been reported for this system testifies to the difficulty facing the child in achieving this integration. I should perhaps add that rt is my impression that these errors do not reflect the tendency of some children to prepose the separable prefix and for other children to postpose it. Rather, the children I have observed all make errors of each of the three types. However, the exact distribution of these errors warrants closer scrutiny.

An example from French cited by Clark (1985) indicates how a conflict between affix positions may arise devclopmentally. The object clitic occurs very requcntly in the position before the verb, as in *je le mange* 'I it eat'. When indirect object clitics are added to this structure, they are appended in front of the direct object clitic. This results from the greater strength of the DIRECT OBJECT + verb pattern. For first and second person indirect object pronouns, this leads to no error. For third person indirect object clitics, however, the correct order is

DIRECT OBJECT + INDIRECT OBJECT, but children use the opposite pattern and make errors. In Polish, the conditional *-by* competes with the person suffixes for postverbal positioning. Because the person suffixes occur more frequently, they are often incorrectly allowed to win out in this competition. This leads to errors like *\*pisaf-em~by (~* 'write-I-would') or *\* by pisai-em* (= 'would write-I') for the correct form *pisai-by-m* (= 'write-would-I') (Smoczynska, 1985). In both the Polish and French examples, the child first solves these competitions by placing the frequently occurring morpheme closer to the stem. Operating Principle 10 holds that this is due to the greater strength of the positional pattern for the more common morpheme. Note, however, that many of these same phenomena are also predicted by Consequence syntax la which states that "when the child produces affix order errors, they will most often involve failure to separate an affix from a stem with which it frequently co-occurs."

The system of competition also has to deal with the competition between positions for a morpheme. Thus, the counterpart of syntax 5a is syntax 5b which holds that:

> CONSEQUENCE SYNTAX 5B: When two positions compete for a given morpheme, the child produces incorrect orders and overmarkings using that morph in both positions.

Smoczynska (1985) cites three errors of this type:

1. Incorrect and redundant placement of -m on both the verb and the conditional marker *-by* as in *Nie pojezdzif-em by-m* 'not ridc-I would-I' (- 'Í wouldn't ride') for the correct *Nie pojezdzit-by-m* 'not ride-would-I'.
2. Use of *by* as both a suffix and an enclitic. Thus we have errors like *A moja mamusia tez BY miaia-BY iadne wioski* 'and my mommy also have-would pretty hair' (- "and my mommy would also have pretty hair").
3. Redundant marking of the first person plural of the past by *~smy* on the verb when the pronoun *my* 'we' is available. Thus, children may say *my-smy poszli-smy* 'we-first/plural went-first/plural' (= 'we went') for correct *my-smy poszli* 'we-first/plural went' (= 'we went').

In English, comparable overmarkings such as / *picked up my socks up* are quite common (MacWhinney, 1982). A particularly difficult system of this type is the system of adjective declension in German (Mills, 1985). Overmarkings of endings such as *-er* 'DEF.AR^MASC.SG.NOM' lead to forms like *\*meiner guter Papa* 'my-DEF.ART:MASC.SG.NOM good-DBF.ART:MASC.SG.NOM Papa' for *mein guter Papa* 'my good-DHF.ART:MASC.SG.NOM Papa'. Clark (1985) also cites French errors in which postverbal positioning of direct object clitics in affirmative imperatives competes with preverbal positioning in negative imperatives.

## 7 4. Rule Acquisition (Operating Principles 10 and 15Í

The tenth Operating Principle of the dialectic model holds that every time a rule applies successfully, it gains in strength. Conversely, whenever a rule applies unsuccessfully, it loses strength. There are a series of consequences of this principle of survival of the fittest for ordering. The first consequence relates to the role of predispositions.

> CONSEQUENCE SYNTAX 10A: It takes time for children to learn to block the application of predispositions toward certain incorrect word orders.

Some of the earliest sentences produced by the Hungarian child provide support for this consequence. As we noted earlier, in their first sentences, children lend to place the most informative element first. This often leads to the placement of the verb in initial position even when the adult language would use another order. However, as Meggyes (1971) has noted, because of the pressure of the highly productive TOPIC + COMMENT pattern, children soon overcome this predisposition.

The second consequence of Operating Principle 10 relates to the order of acquisition of ordering rules:

> CONSEQUENCE SYNTAX 10B: The first ordering patterns that are acquired are those which apply correctly to the largest number of combinations produced by the child

This consequence is supported by two types of data. The first type of data is that there arc virtually no errors at all in the use of bound rules for affixes. As in Turkish (Aksu-Koc, & Slobin, 1985), the order of affixes after the stem in Hungarian can be stated in terms of rules that have no exceptions. Also as in Turkish, such rules are acquired very early with virtually no errors. The second type of evidence for syntax 10b is that order of applicability also determines the order of acquisition for alternative placements of certain words. For example, the first productive rule for verbal separable prefix placement is the one which places the verbal separable prefix before the verb. Then the rule for verbal separable prefix postposing is learned and finally the rule for pre-modal placement emerges. This developmental order reflects the relative applicability of these three rule types. Similarly, in German (Mills, 1985), the rule placing *nicht* 'not' after the tensed verb is the first negative placement rule acquired and is also the lost applicable. In Indo-European, the prevcrbal placement of the actor is a highly applicable rule which is learned early on. In Hungarian, the placement of the topic before the comment and the focus before the verb are similarly high in applicability. They are also learned quite early.

The third major consequence of Operating Principle 10 is that children will attempt to formulate rules in the most general form possible. Operating Principle 15 holds that error monitoring leads to the formation of both free and bound rules. However, free rules are higher in applicability and will grow faster in strength, if they do not lead to errors. A consequence of this tendency of free rules to grow quickly in strength is as follows:

> CONSEQUENCE SYNTAX 10c: When the language makes use of bound rules that apply quite generally, the child ovcrgeneralizes these rules.

For example, the rule of separable prefix preposing is often overgeneralized on the basis of the semantic feature of [+ modality] to include the preposing of the conditional postposition *volna* (MacWhinney, 1974, pp. 475, 478). Consequence ordering 10c is also widely supported for other languages. Í review (MacWhinney, 1982) the literature showing how children attempt to interpret the complements of verbs like *ask, promise,* and *tell* in terms of a free rule. Doing so leads to errors in interpreting sentences *with promise.* Thus, in *G rover promised Oscar to go* children say that it is Oscar who will go. Clark (1985) reviews similar results for these verbs in French and Spanish.

## 7.5. Item Acquisition (Operating Principle 11)

Although ordering involves the acquisition of rules rather than items, there are still some interesting consequences of Operating Principles 11, 12, and 13 for the development of ordering. Operating Principle 11, which holds that early lexical items may be amalgams, leads to this consequence (compare with Consequence phonology lla):

> CONSEQUENCE SYNTAX 11A: Bound morphemes are ordered correctly even before they arc used productively. However, free morphemes may be used productively before they are ordered correctly.

Thus, at age 2;2, my subject Zoli used a large number of correctly placed past tense suffixes without showing any evidence of productive use of the past tense. He showed a similar pattern of correct placement preceding productivity across a whole array of affixes. In each case, Zoli appeared to be acquiring affixes initially as parts of amalgams. On the other hand, we find errors such as *labda Jancsi* 'ball Johnnie' for *Jancsi labda(ja)* 'Johnnie ball(POS)' in which there is clearly a mistake in the order of free morphemes (MacWhinney, 1975a). Another consequence of Operating Principle 11 is closely related to the first:

> CONSEQUENCE SYNTAX 11B: The first ordering rules that the child will learn are those that govern the ordering of items in intonational units.

As was noted above, the Hungarian data support this consequence in that the rules controlling affix ordering are acquired very early and are almost never violated.

## 7.6. Amalgam Analysis (Operating Principle 12)

The twelfth Operating Principle holds that the child will first attempt to analyze amalgams by breaking them up into continuous morphemes. Thus, the child should acquire continuous morphemes before discontinuous morphs (Consequence phonology 12a). A further result of this strategy is that:

> CONSEQUENCE SYNTAX 12A: Patterns that place the component pieces of discontinuous morphemes into linear order arc acquired late.

The Hungarian data provide no clear data relating to this consequence, partly because there are so few items in Hungarian that are clearly discontinous morphemes rather than agreement markers.

## 8. APPLICATIONS OF THE MODEL TO THE ACQUISITION OF LEXICAL SEMANTICS

The dialectic model can also be applied to the study of the acquisition of the patterns that use semantics to achieve activation of lexical items in retrieval. During retrieval, the speaker uses the mappings from semantic features and clusters onto morphemes to decide how to apply inflections and derivations in ways that are sanctioned by the semantic principles of the language:

## 8.1. Rote, Analogy, and Combination (Operating Principles 1, 2, and 3)

There are three ways in which a speaker may take a meaning and convert itinto a set of morphemes. These ways are rote, analogy, and combination.

### 8.1.1. *Rote (Operating Principle 7)*

It a meaning can be directly mapped onto a single morpheme, then lexical retrieval has occurred by rote. Such rote forms often consist of several morphemes as in the case of idioms and other phrases. They also include inflected 'ords for which the following holds.

> CONSEQUENCE SEMANTICS 1A: Meanings associated with affixes appear in amalgams before they are used combinatorially.

This is to say that the child uses a few plural forms before he develops a general plural. Errors like *rices* (for rice grains) do not appear at this time. This consequence is the semantic flip-side of consequence spellout lb which was discussed earlier. Please refer to that discussion for evidence on Consequence retrieval la.

### 8.1.2. *Analogy (Operating Principle 2)*

Analogy in retrieval would lead to the production of an item in which the product would have a polysemic structure like the basis. If analogy is being used to produce lexical structures, the following consequence should hold:

> CONSEQUENCE SEMANTICS 2A: Occasionally, speakers produce forms for which there could be only one possible semantic analog.

This consequence is supported by a handful of examples from many adult languages. For example, in English the first form of the *sit-in, be-in, teach-in* class was *sit-in.* When *teach-in* was introduced as the second form, only *sit-in* was available as an analog. Further examples of this type of common in the literature on language change (Stern, 1931). In child language, if one looks at words in their discourse context, one finds occasional good support for Consequence retrieval 2a. Thus, Trencsény (MacWhinney, 1974, p. 381) reports a conversation in which he told his daughter Piroska to eat the little pieces of meat on her plate *egy-enként* 'one-DISTRIBUTIVE' ('one at a time'). Piroska replies that one can also eat them *sok-enként* 'many-DISTRIBUTIVE' ('many at a time'). The only plausible basis for *sokenként* seems to be *egyenként.* Note also that the analogy is not fully rule governed since the stems to which *-nként* can be attached are always (+ delimited) in meaning and the use of *-nként* with *sok* 'many' violates this restriction.

Certain other examples of Consequence semantics 2a are somewhat less convincing. For example, Vértes (MacWhinney, 1974, p. 384) reports that, at age 5;0, László used *rabkulcs (rab* 'prisoner' + *kulcs* 'key') for the correct form *tolvajkulcs (tolvaj* 'thief 4- *kulcs* 'key') to express what corresponds to the English term *skeleton key.* The choice of *rab* in *rabkulcs* seems to be a result of an analogy with some weakly stored form of *tolvajkulcs.* Essentially, the idea is that if a key can be a thief, it might also be in some analogous sense a prisoner. Parallel examples that appear to be analogies are * *borjúfelhő* 'sheep cloud' for *bárányfelhő* 'lamb cloud[1] (MacWhinney, 1974, p. 383) and *körmös néni* 'nailish lady' for *manikürös kisasszony* 'manicurey girl' (MacWhinney, 1974, p-182).

Lexical analogy plays a clear and important role in language change. In the child language literature it is often assumed that neologisms are produced by a

process of proportional analogy. For example, given a neologism like *cutter* for "scissors," one might argue that *cutter* is being produced on analogy with *mower* where the formative *-er* is taken to indicate for cutting just what it indicates for mowing. Unfortunately, few studies have directly investigated the operation of analogy as a psychological process rather than as a general descriptive mechanism. In principle, it would be possible to conduct such studies within the context of the nonce-probe task developed by Berko (1958) and modified by MacWhinney (1978).

If analogy is understood to include not just proportional analogy using single exemplars, but also extended analogy, then its descriptive and generative power is vastly increased. Lacking the necessary data on the frequency of the error types, many if not all of the examples of combinatorial derivations that will be discussed below could also be viewed as forms produced by extended analogy in retrieval.

### 8.1.3. *Combination (Operating Principle 3)*

Operating Principle 3 holds that one way a child can express a meaning is by combining morphemes. Parallel to Consequence phonology 3a above we then have this consequence:

CONSEQUENCE SEMANTICS 3A: Children form words and phrases from any semantically feasible combination of morphemes.

The notion of semantic feasibility is the same as the one discussed under consequence spellout 3a above. This consequence is supported by the large array of neologisms that have been reported in the Hungarian child language literature. The clearest support for consequence semantics 3a comes from the nearly 300 reported neologisms by Hungarian children which violate no rule of any part of the grammar. These neologisms demonstrate productive uses of the 25 formative suffixes listed in Table 14.5. Of course, there are also a few "formatives" like the infinitive *-ni* that are so productive in adult Hungarian that their use is almost never erroneous. In terms of the polysemy they illustrate, such formatives might be better classified as inflections.

There are at least four reasons why these more than 300 derivational neologisms and others like them are not fully acceptable:

1. they may use a stem which is either nonproductive or idiosyncratic;
2. they may use an affix which is in arbitrary competition with another affix;
3. they may produce a result which is already present as a non-analyzed stem, or
4. they may fill a lexical gap which is of little importance to the adult world.

TABLE 14.5

Productive Formative Suffixes

| Suffix | Derivational function | English approximation | Earliest Use |
|---|---|---|---|
| Suffixes making verbs from verbs: | | | |
| 1. *-an, -en* | momentaneous | suddenly | 2;3 |
| 2. *-ad, -ed* | inchoative | become | 4;9 |
| 3. *-kod, -köd* | iterative | frequently | |
| 4. *-ká\, -két* | frcqucnlalivc | keep | |
| 5. *-sat, -get* | frequentative (highly productive) | keep | 2;6 |
| 6. *-dogéi, -dogál* | frequentative | keep | 3;6 |
| 7. *-ódik, -ődik* | middle voice | — | 3;1 |
| 8. *-ít* | causative | make | 2;0 |
| 9. *-tat, -let* | causative (highly productive) | make | — |
| 10.  *-aszt, észt* | causative | make | 3;6 |
| suffixes making verbs from nouns or adjectives | | | |
| 11.  *-oz, -ez, -öz* | general denominative | -ize | 2;1 |
| 12. *-ít* | general denominative | -ize | 2;2 |
| 13. *-ol, -el, -öl, -l* | general denominative | -ize | 1;6 |
| 14. *-kodik, -kedik, -* | agential denominative | -ize | 3;0 |
| 15. *-ul*, *-ül* | deadjectival | become | 3;0 |
| 16. *-odik, -edik, -ödik* | deadjectival | become | 2;5 |
| Suffixes making nouns from verbs | | | |
| 17.  *-ó, -ó* | general ad verbal ive | -cr | 1;8 |
| 18. *-oda, -ede, -ode* | locative devcrbative | -ery | — |
| 19. *-at, -et* | resultative (English -ant) | -ant | 6;0 |
| 20. *-sag, -ség* | abstract deverbative | -ness | 4;8 |
| 21. *-es, -as* | resultative | -ing | 5;6 |
| SUFFIXES MAKING NOUNS FROM NOUNS | | | |
| 22. *-os, -es, -ös, -as,* | profession | -ist | *5,0* |
| **SUFFIXES** MAKING ADJECTIVES | | | |
| 23. *-as, -es, -s* | denominative | -y | 6;0 |
| 24.  *-so, -so* | deadverbial | -y | 5;0 |
| 25. *-os, -ös* | deverbative | -y | 1;ll |

These four reasons for neologism unacceptability are cases of what Clark and Clark (1979) call pre-emption. In each case the child is forming words by combination in a semantically plausible way. However, lexical facts override semantic plausibility just as they override morphophonological plausibility. Just as the existence of *went* overrides the plausibility of *goed,* so the existence *of scissors* overrides the plausibility of *cutters.* For each of the four types of preempted neologisms there arc different reasons why a lexical item already exists that precludes the combinatorial form. Let us consider each of the four types and examples of these reasons in greater detail.

1. There arc only three reported errors in which children use a non-productive or idiosyncratic stem in an otherwise correct neologism. In the form *kancsalii* 'to make act like a pitcher' (MacWhinncy, 1974, p. 364), the stem *kancsal* 'act like a pitcher' is itself a neologism. Here an adult would simply say *leant* 'pour out'. The neologism *összecsicered* 'stick together[1] (MacWhinney, 1974, p. 363) uses a stem *csicer* which is the child^s own onomatopoeic creation symbolizing sticking. Finally, the neologism *vakarás* 'scratchy' (MacWhinney, 1974, p. 379) is based on a misuse of *vakar* 'scratch', since the child really wanted to say *viszketős* 'itchy'.

2. Neologisms can also arise when two affixes mean (he same thing or neariy the same thing. English examples (from Stemberger, 1982) include the use of *decidal* for *decision, philosophist* for *philosopher,* and *disparence* for *disparity.* In such cases the various stem and affix combi nations will have to be learned by rote. Hungarian seems to be particularly rich in such errors. Table 14.6 lists the neologisms of this type that have been reported. In each case, the standard form and the neologism are so close that one suspects that the child may have been familiar with the standard form but encountered some difficulty in retrieving it. However, having retrieved the stem of the standard form, another affix then

TABLE 14.6 Neologisms
Stemming from Wrong Suffix Choice

| Ciliid *Form* | *Gloss* | Adult Form | *Gloss* |
|---|---|---|---|
| *öltöztetés* | dress-eause-ing | *öltözet* | dress |
| *törös* | breaky | *törékeny* | breakable |
| *lefolytat* | drain out | *lefolyat* | drain out |
| *mozdít* | make move | *mozgít* | make move |
| *röpdögél* | fly about | *repked* | fly about |
| *szállkál* | land about | *szálldogál* | land about |
| *peregd* | dim | *perdít* | turn |
| *ebédez* | dine | *ebédel* | dine |
| *kövekel* | stone | *kövez* | cobble |
| *besoroz* | line up | *besorol* | line up |
| *megsintál* | smoothen | *megsimít* | smoothen |
| *rámnehezekedik* | gel hard for me | *rám nehezedik* | get hard for me |
| *bekormít* | get dirty | *bekormoz* | get dirty |
| *elkormít* | get dirty | *elkormoz* | get dirty |
| *megkarcit* | sralch | *megkarcol* | scratch |
| *aranyit* | make golden | *aranyoz* | make golden |
| *tovagoz* | ride horse | *lovagol* | ride horse |
| *maradás* | remains | *maradék* | *remains* |
| *ugrat* | jump | *ugrás* | jump |
| *rakat* | stack | *rakás* | stack |
| *bukat* | jump | *bukás* | jump |
| *kocsmás* | innkeeper | *kocsmáros* | inn-keeper |

moved into the slot vacated by the standard affix. This interpretation seems plausible and interesting, but would have to be tested against new data.

3. The third and most common reason why child neologisms may not be accept able is the existence of some alternative form that expresses in one morpheme the same meaning as the child tries to express by the combination of mor phemes. For example, in English one of the alternative meanings or polysemes of the word *youth* is equivalent to the compound *\*youngness,* Thus, *youth* preempts *\*youngness.* In the Hungarian literature there arc many neologisms of this type; they arc presented in Table *[4.1.* In the majority of the cases, Hun garian pre-empts the productive derivation in ways that are quite parallel to English. In some other cases, given at the end of the Table, there is no English parallel to the Hungarian pre-emption.

4. The fourth reason why child neologisms arc not accepted is perhaps the weakest reason of all. In a number of cases children make up perfectly good words that simply do not correspond to anything that needs to be permanently coded in the lexicon. Of course, adults do this too (Clark & Clark, 1979) when they talk about *jet coaching* and *Americanness,* In particular, Hungarian encourages neologistic use of the two demonstrative vcrbalizers *-oz* and *-ol* and the suffix *-kodik* 'act like'. Thus, we find forms like *malacozik {malac-* 'pig' + *-ozik* 'act like') and *ridegenkedik (ridegen* 'stern' + *-kedik* 'act like'). Some of these forms that were reported as neologisms earlier in this century are now established in the language. These include *montíroz* (MacWhinney, 1974, p. 366) 'to blacksmith', *homokoz* (MacWhinney, 1974, p. 367) 'play in the sand', *szemezik* (MacWhinney, 1974, p. 367) 'play with eyes', and the compound *pénztartó* 'money holder' (Mac Whinney, 1974, p. 382).s

An area in which Hungarian displays particular neologistic richness is the area of compound formation. The five most productive compounding patterns in Hungarian each lead to several reported child neologisms. In the descriptions below, the numbers in parentheses indicate the pages in MacWhinney (1974) where the errors are reported in full.

1. ENTITY x + ACTION Y + NOMINALIZKR: an entity Z which Y's (a, the)X, as in the English compound *pothokler* 'a thing which holds pots'. Hungarian child neo logisms of this type include *fájgyógyítö* 'pain-curcr', cf. correct *gyógyszer* 'medicine', (MacWhinney, 1974, p. 381),*pénztartó,* 'money-holder' cf. correct *ridikiil* 'purse', *villanyégető* 'electricity-burner', cf. correct *lámpa* 'lamp', *falterítő* 'wall-eoverer', cf. correct *falvédó* 'wall protector', *libahúzó* 'goose-

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<sup>5</sup>Other essentially error-free neologisms include: *bibizget* 'go ouchy', *találgat* 'find about", and *kihuppan* 'go whoops out' (MacWhinney, 1974, p. 363), *lehoppáztat* 'go whoops down' (MacWhin ney, 1974, p. 365), 52 forms in *-ez* (MacWhinney, 1974, pp. 366-370), *vizsláikodik* 'act like a vizsla', *jókálkotlik* 'act good', *elvilágoskodik* 'lighten', *lilut* 'get lilac' (MacWhinney, 1974, p. 372), 18 forms in *-ol* (MacWhinney, 1974, pp. 373-375), *koptalan* 'unworn' (MacWhinney, 1974, p. 510), *enyvelő* 'gluer' (MacWhinney, 1974, p. 377), and *vásárság* 'fairness' (MacWhinney, 1974, p. 378.)

TABLE 14.7
Neologisms Stemming from Existence of Non-
inflected Form

| Child Form | Gloss | Adult Form | Gloss |
|---|---|---|---|
| *pillogó* | blinker | *szempilla* | eyelash |
| *haragudó* | angry-cr | *szemöldök* | eyebrow |
| *füstölők* | smoker | *kémény* | chimney |
| *író* | writer | *ceruza* | pencil |
| *kötő* | **binder** | *zsinór* | cord |
| *pucó* | cleaner | *rongy* | rag |
| *kukucsoló* | peek-a-boo-er | *sztereoszkóp* | stereoscope |
| *bekenő* | in-spreader | *orrkenőcs* | nose salve |
| *dolgozó* | worker | *kalapács* | hammer |
| *vágó* | cutter | *olló* | scissors |
| *kapáló* | hocr | *kapa* | hoe |
| *rajzoló* | sketcher | *ceruza* | pencil |
| *nyomó* | presser | *festék* | paint |
| *ülő* | sitter | *szék* | chair |
| *körüljáró* | around walker | *palló* | boardwalk |
| *hattat* | heard | *hang* | sound |
| *parancsolatom* | orderer | *katona* | soldier |
| *fogas* | toother | *fogorvos* | dentist |
| *élvágyas* | hungery | *éhes* | hungry |
| *iszos* | drinky | *szomjas* | thirsty |
| *tökös* | pushy | *biliárd* | billiard ball |
| *csurizós* | slinger | *csúzli* | slingshot |
| *villanyégetö* | lightburiier | *lámpa* | lamp |
| *röpülőlabdu* | flying ball | *léggömb* | balloon |
| *kargyürü* | wrist ring | *karkötő* | bracelet |
| *zeneskatulya* | music box | *verkli* | organ |
| *utcanéző* | street looker | *erkély* | balcony |
| *levizesül* | water down | *megázik* | soak |
| *kirongyosít* | raggen | *kirojtoz* | wrinkle |
| *rámagasít* | highen | *ráemel* | raise |
| *hidegít* | col den | *lehiit* | cool |
| *lehéjázik* | off rindize | *meghámoz* | peel |
| *tanultat* | cause to learn | *tanít* | teach |
| *megdögleszt* | cause to die | *megöl* | kill |
| *sebzik* | woundizc | *vérzik* | bleed |
| *elromlít* | breakale | *elront* | break |
| *leszálltat* | cause to come down | *leemel* | lower |
| *festékez* | paintize | *fest* | paint |
| *ekéz* | plough izc | *szánt* | plough |

puller', cf. correct *játék,* and *utcanézó,* 'street-looker', cf. correct *erkély* 'balcony' (MacWhinney, 1974, p. 382). In these compounds the Hungarian suffix -ó which is equivalent to English -*er* imposes a transitive reading on the verb and codes the noun as an object.

2. ENTITY x + ENTITY Y: a Y of the type such that X possesses it. Child neologisms here include *cipőliszt* 'shoe flour', cf. correct *hintőpor* 'talc' (MacWhinney, 1974, p. 381), *kargyűrű* 'arm ring', cf. correct *karkötő* 'bracelet' (MacWhinney, 1974, p. 383), *utazóház* 'traveler house', cf. correct *pályaudvar* 'railway station', *rabkulcs* 'prisoner key', cf. correct *tolvajkulcs* 'thief key', *szemtükör* 'eye mirror', cf. correct *szemüveg* 'eyeglasses' (MacWhinney, 1974, p. 384), and *kotlatér* 'note ground', cf. correct *zenepavilon* 'music pavilion' (MacWhinney, 1974, p. 473).

3. ENTITY x + ENTITY Y: a Y that typically deals with X. Child neologisms here include *jegybácsi* 'ticket man', cf. correct *kalauz* 'conductor', *motorbácsi* 'motor man', cf. correct *motorkerékpáros* 'motorcyclist', and *szemszerész* 'eye repairman', cf. correct *iátszerész* 'optician' (MacWhinney, 1974, p. 382).

4. ENTITY x + ENTITY Y: a Y that can be characterized as an X. Child neologisms here include *csontember* 'bone man', cf. correct *csontváz* 'skeleton', *bárány felhő* 'sheep cloud', cf. correct *borjú felhő* 'lamb cloud' (— 'cloud that resembles a lamb'), *virágcsalán* 'flower nettle', (- 'nettle that looks like a flower') (MacWhinney, 1974, p. 383), *vonalkép* 'train picture' (— 'picture of a train'), and *zeneskatulya* 'music box', cf. correct *verkli* 'music box' (MacWhinney, 1974, p. 384).

5. MODIFIER x + ENTITY YI an entity Y that has the characteristic X. Child neologisms include ***pírosebéd*** 'red meal' (— 'tomato dish'), *szárazhíd* 'dry bridge' (= 'bridge over railway tracks'), and *repülőlabda* 'flying ball', cf. correct *léggömb* 'balloon' (MacWhinney, 1974, p. 382).

Apart from these neologisms, errors in the use of compounding patterns are of two basic types. Some compounds are produced in violation of these feature-based patterns. Thus, * *lentágy* 'down bed' (= 'downstairs bed') *&nd fentágy* 'up bed' (- 'upstairs bed') (MacWhinney, 1974, p. 382) use adverbs rather than the adjectives required by pattern 5. The forms *\*tejívó* 'milk drinker' (= 'pitcher for milk') and *\*tejiszó* 'milk drinker' (= 'udder') (MacWhinney, 1974, p. 473) use pattern 1 incorrectly to form nominalizations expressing instrumentality. The error *\*mosófog* 'washer tooth', cf. correct *fogmosó* 'tooth washer', which incorrectly places the verb before the object (MacWhinney, 1974, p. 472). *Füstö'lhaz* 'smokes house' (= 'chimneyed house') follows pattern 5, but should have the derivational suffix -o on füstöl to *produce füstölőház* 'smoking house'.

The second type of error is produced by very young children who try to separate nominals from almost any descriptive combination of words (see consequence retrieval la). Thus, we find *szél-fúj* 'wind-blows' (= 'a gust of wind )> *fúj-a-szél* 'blows-the-wind' (= 'a gust of wind'), *kézbefog táska* 'hand-in-grab satchel', cf. correct *ridikiil* 'handbag', *nem béka* 'not frog' (= 'the part of the violin without the frog'), *semmi szél* 'no wind', and *mindig be* 'always in' (= spiral) (pp. 472-473).

The comparison between the large number of compound neologisms and errors reported for Hungarian and the paucity of similar reports for Romance (Clark, 1985) indicates that compounds are not being produced haphazardly in Hungarian. Nor are they being formed in alliance with some universal pre-disposition. Rather, they are being generated combinatorially by the application of systematic patterns.

## 8.2. Patterns (Operating Principle 4)

Operating Principle 4 holds that the units juxtaposed by combination may be subjected to activation from three types of patterns: predispositions, free rules, and bound rules.

### 8.2.1. *Predispositions*

Many polysemic patterns are probably common across language. For example, children have little trouble learning that the word for any object can also be construed to refer to the corresponding toy (see Kooij, 1971). On a higher level, the word for a literary work like *Hamlet* may be interpreted as referring to a book or to the literary creation found in the book. If patterns such as these are truly universal, it might be reasonable to view them as predispositions. Such pre-dispositions would alter the interpretation of a sememe in a standard context. For example, when playing with toys, all words can be understood to refer to the corresponding toy replicas.

### 8.2.2. *Free Rules*

Patterns that alter meanings in an across-the-board fashion are free rules. If such rules exist in expressive retrieval, the following consequence should hold:

> CONSEQUENCE SEMANTICS 4A: At least some learned rules apply obligatorily in a given phonological context without regard to lexical or allomorphie facts.

The neologisms discussed in the previous section can be viewed as involving the application of free rules. For example, in a compound like *money-holder* for 'purse', the noun *money* is treated as the object of the verb *holding*. Rather than marking this fact by use of the accusative, the lexicalization of the nominalizer *-6* along with a verb allows one of the polysemes of *money* to assume the object role. Or in the neologism *malacozik* 'to act like a pig' the use of the *-ozik* verbalizer allows *malac* [4]pig' to assume an agentive role.

The neologisms we have discussed can be divided into two types. In the first [tv]pe, there is some resemblance between the child's neologism and the corre-sponding adult form. In non-compound derivations, the child preserves the adult stem and uses the wrong affix. In the compound derivations, half of the com-pound is right and half is wrong. In such cases, it is extremely hard to exclude the Possibility that the correct form was at least partially available to the child.

Neologisms of this type seem to result from either analogy or competition between affixes in retrieval.

In the second type of neologism, there is no morphemic correspondence between the child's neologism and the adult form which pre-empts it. For example, the neologism *utcanéző* 'street-looker', cf. correct *erkély* 'balcony' has no match to the adult form. In such cases, it seems far less likely that analogy was operative. Rather, the form appears to have been produced by combining *utca* 'street' with *néz* 'see' and *ő* 'nominalizer'.

The other major type of free rule is the agreement rule. These rules may either activate semantic properties of one cluster onto another cluster or they may inhibit marking on one cluster on the basis of aspects of other clusters. Agreement of the noun with the number of the modifier requires that a quantity modifier takes a singular noun:

(Quantity (Entity)) - -> (Quantity) (Singular (Entity)))

In other words, the presence of a quantity term must suppress activation of the plural sememe. There are 14 failures to apply this rule, leading to errors like *\*sok fák* 'many trees' for the correct *sok fa* 'many tree' (MacWhinney, 1974, p. 523). A similar suppression involves agreement of the verb with the number of the actor such that a quantity modifier takes a singular verb. (The term "actor" is being used here to represent not only actors but also subjects of stative verbs and copulas.):

((Actor (Quantity (Entity))) (Action)) - -> ((Actor
(Quantity (Entity))) (Singular (Action)))

Errors such as *\*mért vannak ennyi lyuk* 'why are so+many hole' for the correct *mért van ennyi lyuk* 'why is so+many hole' and *sok fák van* 'many trees is' for the correct *sok fa van* 'many tree is' show that rule 2 can be applied separately from rule 4 (agent—verb number agreement). Four errors of this type have been reported (MacWhinney, 1974, p. 524).

The other side of this coin is that the child must also learn to activate agreement marking when needed. Learning of plural activation leads to a roughly equal number of errors as learning of plural suppression. Activation of plural agreement occurs to mark subject-verb agreement, so that a plurally marked noun takes a plural verb:

((Actor (Number (Entity))) (Action)) - -> ((Actor
(Number (Entity))) (Number (Action)))

There are 11 reported errors due to failure to apply this rule (MacWhinney, 1974, p. 525-527). An example is *\*megy a tehenek* 'go+SG the cattle' for the correct form *mennek a tehenek* 'go+ + the cattle'. There is also a parallel rule for agreement in person. However, since pronominal subjects are usually deleted,

errors in the use of this rule may often go unnoticed. The plural must also be activated to mark agreement of the deictic topic with the number of the comment:

((Topic (Deixis (Entity))) (Comment (Number (Entity))))- -> ((Topic (Deixis (Number (Entity)))) (Comment (Number (Entity))))

There are six errors in which the child fails to pluralize the topic to agree with the comment (MacWhinney, 1974, P. 528). An example is *az galambok* 'that doves' for the correct *azok galombok* 'those doves'.

The types of agreement in Hungarian we have discussed so far operate solely on number. Hungarian also has a pattern of agreement of the verb with the definiteness of the object.

((Object (Definite (Entity))) (Action))- ->
((Object (Definite (Entity))) (Def (Action)))

There are 53 reported errors in the use of this rule (MacWhinney, 1974, p.' 529-535). However, this number is certainly an underestimate of the true relative trequency of this error. Judging from the fuller samples presented by Meixner (1971) and MacWhinney (1974), this rule probably causes children more difficulty than any other single rule in Hungarian grammar. One should remember that every transitive sentence in Hungarian requires a decision regarding verb-object agreement and that the acquisition of definiteness as a category seems to confront the child with basic conceptual problems (Karmiloff-Smith, 1979; Maratsos, 1976). Given this, the high level of errors is not too surprising. Furthermore, note that in sentences with SVO word order, the verb may be produced before the object is fully lexicalized or before its definiteness is determined. No such problem occurs for agent-action (i.e., subject-verb) agreement since the agent is usually lexicalized before the verb is produced.

### 8.2.3. *Bound rules*

In retrieval, bound rules serve to promote the candidacy of a given morphemt by activating one of the features that activates it or by inhibiting one of the features it does not contain. Unlike free rules, these rules are bound not to general features of semantics but to specific morphemes. This means that they cannot operate for a morpheme until its polysemic alternatives have been acquired:

CONSEQUENCE SEMANTICS 4b: Bound retrieval rules will apply to new morphemes as soon as the relevant polysemes arc acquired.

*I* clearest support for this consequence comes from the scores of semantically Ppropriate neologisms using the verbal formatives *-oz* and *-oL* These formatives

place the noun stem in one of the five polysemic roles: (1) actor, (2) instrument (3) result, (4) location, or (5) object transferred. The neologisms reported in MacWhinney (1974, pp. 366-371) indicate that children soon learn to use *-oz* and *-ol* appropriately in each of these alternative ways. For example, children can produce neologisms meaning things like 'to act like a blacksmith', 'to use soap bubbles', 'to make a spot', 'to act like at school', and 'to make into a bride'.

Although bound rules are highly limited in their applicability, they are quite reliable in their application. Therefore, the errors in the use of bound polysemic rules should be quite limited:

> CONSHQUENCE SEMANTICS 4c: Errors in the shape of the context of bound poly- semic rules (as distinguished from reformulations as modifications) are quite rare.

In fact, the only reported error in the shape of a bound polysemic rule is the neologism *szépekedik* 'pretty + inchoative' in which a non-process adjective is used as the basis for the selection of the inchoative polyseme of *-kedik* (Mac- Whinney, 1974, p. 372). However, this is probably a deeper semantic error rather than a polysemic error. That is, the child seems to be viewing 'pretty' as a process rather than a state.

## 8.3. Competition (Operating Principle 5)

When we were discussing competition in phonology, we noted that children often end up using two allomorphs of a given morpheme. When discussing syntax, we found that the competition between morphemes for slots could lead to misorderings. In semantics, sememes compete for the opportunity to express underlying semantic intentions. Here, competition may lead to a couple of possi- ble consequences. One is the child may choose some analytic lexicalization because he has not learned how to make the weaker rote lexicalization suppress the analytic lexicalization.

> CONSEQUENCE SEMANTICS 5A: When a given meaning could conceivably map- onto two different lexicalizations, at first the child makes errors in selecting the correct alternative.

There are at least four competitions of this type reported in the Hungarian literature. Each has several reported errors.

1. The suffix *-ai* expresses third person singular possession of plural objects. This suffix competes scmantically with the combination of the plural suffix *-ek* and the third person singular possessive *-je*. Thus, errors like *\*tete-jé-k* 'roof-POSS-PL (MacWhinney, 1974, p. 353) compete with correct forms like *tetei*. Similarly, *- aim* '1SG.POSS-PL' can be viewed as an alternative to *-ak* 'PL' and *-am*

'1SG.POSS'. The error *többi-ek-em 'others-PL-lSG.POSS' (MacWhinncy, 1974, p. 517)7 cf- correct több-eim 'others-PL: 1SG.POSS' is the result. Also-e/ 'plural possession of singular possessor' competes with -e 'sign of possessor' and -k 'PL' and we find kiék 'whose-POSS-PL' for kiéi 'whose-POSS.PL' (Mac-Whinney, 1974, p. 517).

2 The portmanteau negatives nincs(eri), sem, sincs(en), and sincsenek express the same semantic content as the expressive analytic forms nem van 'not is', *nem is 'not also', *nem is van 'not also is' and *nem is vannak 'not also are'. Errors involve use of the analytic forms instead of the portmanteau form or use of both at the same time. Clancy (1985) reports similar errors for negative portmanteaus in Japanese. In Romance, portmanteaus such as du and au are analyzed into *de le and *á le. Clark (1985) notes that French and Romanian children use analytic forms such as de moi and á die rather than single forms like mon and lui in the early school years. However, unlike the Hungarian analytic forms, these forms are often acceptable in adult French and Romanian.

3. The dative pronoun stem nek- takes the ending -ik in the third person singular rather than the usual -ük. However, children often produce *nekük 'DAT+3PL' for nekik 'DAT+3PL' (MacWhinney, 1974, p. 398).

4. The normal second person singular suffix is -d. In the imperative this -d sup presses use of imperative marker -j in the second person singular. However, in some child errors both are present. Thus, *ad-j-ad 'give-IMP-2SG' appears instead of ad-d 'give-2SG.IMP' (MacWhinney, 1974, p. 398).

A second consequence of Operating Principle 5 is that, when a meaning could be expressed in two different ways, the child activates the morphemes for each alternative and ends up with semantic redundancy.

CONSEQUENCE RETRIEVAL 5B: When a meaning could be expressed in two different ways, the child may produce redundancies.

I have reported (MacWhinney, 1974, pp. 354, 538-544) 22 errors in which there is some type of semantic redundancy. For example, the word holnap 'tomorrow' codes location in time. In Hungarian, as in English, one says 'on Thursday', but not 'on tomorrow'. Thus, *holnapon 'tomorrow+SUPER' is a case of suffix redundancy. Similarly, vagy 'you are' is the 2PS copular verb. Addition of the S suffix to produce *vagyol is a redundancy which indicates that the semantic analysis of vagy is incomplete. Redundancy may also occur between two stems as in*sem nem nincsen 'or not it+isn't'. Hungarian permits multiple negation, but each negative must attach to its own constituent. The form *sem nem nincsen is a triple redundancy.

These Hungarian redundancies are similar to a type of error in retrieval that is fairly widely reported in French (Clark, 1985, Karmiloff-Smith,  1979). For sample, Clark notes that, in French, possession may be marked by the possesive adjective (mon) by a possessive nominal (le mien), or by a propositional phrase (á moi). Until the child learns to assign different functions to these

devices, errors such as *mon mien de chapeau á moi* may occur. In such errors the forms the child is retrieving are redundantly expressing the same semantic content in slightly different ways. The child must learn that retrieval of one of these forms should inhibit retrieval of the others.

## 8.4. Rule Acquisition (Operating Principles 10 and 15)

When a morpheme has more than one polyscme, the most frequently used alternative should be the strongest.

> CONSEQUENCE SEMANTICS 10A: The first productive uses and the first semantic overgeneralizations of an affix make use of the most frequent polyseme.

Thus, the neologisms based on the nominalizer *-6* are chiefly extensions of the instrumental and agentivc polysemcs, rather than the locative polyseme. Similarly, most of the neologisms using *-02* and *-ol* are agentive and instrumental.

Consequence semantics 10a also applies to the polysemes of case markers. For example, in Japanese, the strongest polyseme of the postposition *o* is that of the direct object. However, for verbs of nonintentional perception, *ga* marks the object. Children err in such cases by using *o* to mark the object (Clancy, 1985). Similarly, the strongest polyseme of *ga* is its use as an agent marker; its uses as a marker of the recipient or a marker of the object of perception verbs are acquired somewhat later. If some of the polysemes of a sememe are not known to the child, he may use circumlocutions to express the same meaning that can be found in a simple term. For some errors of this type in French, see Clark (1985).

Although we do not have enough data to state the order of acquisition of polysemic rules in Hungarian in detail, there is enough evidence to support the following consequence, parallel to Consequence semantics 10a above:

> CONSEQUENCE SEMANTICS 10B: Bound polysemic rules that apply fairly generally will be acquired initially as free rules.

In support of this, we note that the selection between the polysemic meanings of the denominative vcrbalizcrs *-oz* and *-ol* is occasionally ovcrgencralized to the verbalizer *it*. The errors are *vödörít* 'to use a bucket' and *elmáskárít* 'to use a mask' (MacWhinney, 1974, p. 372). Since *it* does not have an instrumental polyseme, these forms are errors. Children have assumed that, since two verbalizers have instrumental readings, all verbalizers might have such readings-The selection between a neutral and an affirmative response reading of the verbal separable prefix is also occasionally generalized as a free rule. Thus, the answer to the question *should we not gather them together?* should be *but yes, together*. However, the child responded with *but yes, gather* (MacWhinney,

1974 p. 481)- Here, the child seems to have assumed that since verbal prefixes can be used in this way to answer questions, verbs can be used this way too. Bowerman (1975) and Lord (1979) have investigated in great depth the over-extension of the English pattern of zero-derivation of causative transitives from intransitives as in transitive *open* from intransitive *open*. In the present model, this pattern can be seen as a rule which activates one of the semantic features of which a morpheme is composed. At first, the pattern overgeneralizes to suppress rote causatives like *drop* and *bring*. Eventually, the pattern must be acquired as a bound rule. Bowerman (1982) notes that her daughter Christy had eight verbs which might have served as the basis for this rule. She also notes that, even once the pattern is reined in, it continues to show some productivity (Bowerman, 1982). Moreover, adult errors of this type are far from uncommon (Stemberger, 1982). In Hungarian, transitives may not be formed by zero-derivation from intransitives. Nevertheless, early in the third year, there are seven reported errors in which intransitives are used for the corresponding lexical transitives *{elbúj* 'hide', *gurul* 'roll', *alszik* 'sleep', and *nőtt* 'grew', (MacWhinney, 1974, p. 546); *ül* 'sit*' *kel* 'rise', *feküd* 'lie', MacWhinney, 1974, p. 547). There are also two errors in which intransitives arc conflated into transitives ('reach it out', MacWhinney, 1974, p. 546; 'telegraph someone', MacWhinney, 1974, p. 547). Although Hungarian does not form transitives from intransitives by zero-derivation, it does use transitives without direct objects. Just as in English, Hungarians can say 'John eats' without specifying what he is eating. This use of some verbs both with and without objects may induce children to form a polyscmic rule that allows any verb to be used with an object. In Hungarian, such a rule would be more short-lived than in English.

In the competition model, many cases of semantic extension can be explained in terms of the formulation of overly general polysemic rules. However, most cases simply involve errors during competition between morphemes for activation. If two morphemes share 14 features in common and differ on only one, any error in the activation of this one feature can lead to the activation of the wrong morpheme. The competition model offers a very powerful account for the detailed patterns of overgeneralization and undergeneralization found in semantic development. When a child takes a form to be more plurifunctional than it really is this should be because he has not yet acquired the necessary competitors or because the competitors are still weak. For example, the child could use the singular for both plural and singular reference (see Bowerman, this volume). his is not because singulars are coded as plurals, but because no strong com-'titors to the single have yet been learned. Similarly, the child will use "syndic forms that code too much material simply because these forms have no yet been analyzed and no competitors are higher in specificity and accuracy. Unfortunately, a full discussion of the issue of semantic extension lies outside the scope of this chapter. In particular, this chapter passes over data on the overex-

tensions of stems in Hungarian. For the most part, such overextensions are parallel to those so thoroughly documented for Indo-European by Clark (1973)

## 8.5. Item Acquisition (Operating Principle 11)

Operating Principle 11 holds that "children cluster concepts in terms of their semantic relatedness." The most likely cluster, in most cases, is the one corresponding to a simple object or action. Thus, in many cases, children think they are learning simple nouns or verbs even though additional material is attached. Failing to detect the presence of this additional material, children may then use stems with inflections when only bare stems are required. Alternatively, children may actually add new material that contradicts material present in the unanalyzed rote form.

> CONSEQUENCE SEMANTICS I 1A: Errors in the association of a set of semantic features with a phonological string in early lexical items arc revealed by contradictions and superfluities.

I have cited five errors (MacWhinney, 1974, pp. 353, 548) in which the child takes an item with insufficient semantic detail and adds on a suffix which contradicts an affix already in the word. Thus, *szá-d-am-ba* 'mouth-yours-my-in' is used for *szá-m-ba* 'mouth-my-in'. Evidently the child assumed that *szá-d* 'mouth-my' actually referred to just 'mouth'.

In 36 other errors (MacWhinney, 1974, pp. 346-348, 476-478, 592-593), Hungarian children use stems with superfluous suffixes attached. The reports from Kenyeres and Balassa indicate that, for a period, children produce the relevant errors with some consistency. Each stem is used with the suffix it "deserves." Tools have superfluous instrumentals attached ('saw-INSTR' is used for 'saw'); body parts and clothes have possessives ('eye-3SG.POSS' is used for 'eye'); foods have accusatives ('bread-ACC is used for 'bread'); and locations have locatives ('park-INESS' is used for 'park')- Even verb phrases may be picked up as under-analyzed amalgams. Thus, Balassa's son used 'open the door' and 'close the door' as if they meant 'open' and 'close'.

In addition, we should note that the redundancies and reduplications discussed under Consequence phonology 5c could also be viewed as resulting from improper attachment of sound to meaning in amalgam acquisition. However, it seems to me that we make fewer tenuous assumptions by viewing reduplications and redundancies as products of allomorph competition. On the other hand, competition does not seem to be a reasonable account for superfluities and contradictions, since these errors point to some defect in the semantic encoding of lexical items.

According to Operating Principle 11, clarity of phonological and semantic segmentation is the chief determinant of the initial acquisition of free mor-

hemes. Although clarity of semantic segmentation is extremely hard to define, intuitively, there seem to be at least some words that involve complex, hard-to-seement relations between abstract concepts. Items expressing such meanings should be acquired fairly late.

CONSEQUENCE SEMANTICS 11B: Items expressing meanings that extend across stretches of cognitive material will be acquired late.

Kenyeres (1928) made detailed observations regarding his daughter Eva's lexical development up to age 8;6. Table 14.8 lists 34 lexical items that were learned between 3;6 and 8;6. These late acquisitions come from two semantic fields. The first involves the representation of complex temporal relations. These include terms such as 'tomorrow', 'afternoon'[7], and 'in the evening'. As Cromer (1976) has noted, the lateness of the acquisition of such terms is not a result of their low frequency, but their cognitive complexity. While clearly complex cognitivcly (Cromer, 1976), these terms do not present the child with segmentation problems. However, segmentation problems do seem to arise in the learning of the other words in Table 14.8. For example, in order to learn the use of 'nonetheless,' the child needs to be able to relate one event to another potentially disenabling event. Use of 'anyway' is similar but also suggests that the limitation is being specifically or purposefully ignored. In order to use 'either . . . or', the child must be able to see two events as alternatives. Temporals such as 'during' and 'while' require that one full action be used as background to another. Words like Ho be sure' and 'indeed' require certain acknowledgments of views of the listener and the ways they fit in with the claims of the speaker.

## 8.6. Amalgam Analysis and Morpheme Acquisition (Operating Principle 12)

The issue of the order of emergence of inflections has been a central question in recent child language research. Table 14.9 from MacWhinney (1976) summarizes the order of emergence of the 29 earliest inflections in Hungarian. Suffixes of the first group generally emerge before those of the second group, and so on. However, within a group, the order of emergence is indeterminate. Table 14.10 summarizes the order of acquisition of the first inflections from my subject Zoli between 1;5.6 and 2;2.3, using the scoring system of Cazden (1968). The six samples involved contain 4 to 8 hours of free-speech data apiece.

There is a reasonably close correspondence between Tables 14.9 and 14.10. nc first group of suffixes emerges in periods III and IV. The second group is distributed across periods II to V, with a concentration in IV and V. The third group is evenly distributed across periods IV, V, and VI. Most of the fourth group and one suffix in the third group have not yet emerged at period VI. The Wferences between Tables 14.9 and 14.10 could reflect peculiarities in Zoli's

TABLE 14.8
Late Acquisitions of Eva Kenyeres

| Word | Translation | Age |
|---|---|---|
| ugyanolyan | just like | 3;6 |
| nappal | in the day | 3;6 |
| éjjel | in the **night** | 3;6 |
| helyett | instead of | 4;0 |
| felé | toward | 4;0 |
| délelőtt | forenoon | 4?3 |
| délután | afternoon | 4;1 |
| tegnap | yesterday | 4;1 |
| ma | today | 4;1 |
| holnap | tomorrow | 4;1 |
| holnap után | day after tomorrow | 4;6 |
| tegnap elölt | day before yesterday | 4;8 |
| addig ... amig | as long as | 4;11 |
| mihelyt | as soon as | 5;0 |
| óta | since | 5;0 |
| régóta | since a long time ago | 5;0 |
| meddig? | until when? | 5;1 |
| mire | by that time that | 5;1 |
| amint | as soon as | 5;2 |
| aközben | during | 5;4 |
| múlva | past | 5;7 |
| túl | beyond | 6;0 |
| kivül | besides | 6;0 |
| ugyan | anyway | 6;4 |
| söt | indeed | 6;5 |
| azonban | however | 6;5 |
| ellen | against | 6;6 |
| miatt | because of | 6;6 |
| iránt | toward | 6;6 |
| Iáján | in the vicinity of | 6;6 |
| hosszait | long (time) | 6;6 |
| mind ... mind | both ... and | 6;7 |
| hát | to be sure | 6;8 |
| mivel | inasmuch as | 6;8 |
| -hoz képest | in comparison with | **7;10** |
| mióta | since | 8;1 |
| miközben | while | 8;3 |
| mialatt | while | S;6 |
| miután | after | 8;6 |
| ellenben | on the contrary | 8;6 |
| akár... akár | either ... or | 8;6 |

TABLE 14.9

Generalized Order of Emergence of Early Inflections

| First group | Accusative | | Plural | Diminutive |
|---|---|---|---|---|
| | Allative 'to'[1] | | Illative (Incssive) 'to' | |
| Second | Dative | | Illative 'to' | Instrumental |
| Group | Past Tense | | IPS Indefinite | Infinitive |
| Third group | Sublative 'onto' | | Superessivc 'on' | ÍPS Possessive |
| | 3PS Possessive | | Sign of Possession | 1PP Indefinite |
| | 3PP Indefinite | | IPS Definite | 1PP Definite |
| Fourth group | Illative 'from in' | | Adessive 'toward' | Causal-Factitive |
| | Ablative 'from' | | Conditional | 3PP Definite |
| | 3PS Definite | | | |

individual development. They could also reflect differences between Cazden's criterion and the criteria of the diary studies. For example, it is not clear how to define obligatory contexts for the diminutive. Nor are the contexts of the 3PS possessive always clear. Even more problematic is the occurrence of acquisition without productivity. Zoli acquired the past tense in period II, but there was no evidence of productivity until period VI. However, the accusative was acquired in period III and demonstrated productivity in that same sample.

Assuming that Tables 14.9 and 14.10 can be taken as the basic pattern of Hungarian development, we are led to ask several further questions. First, why do the first locatives express 'motion towards'? Both MacWhinney (1974) and Meggyes (1971) found that 'position at' was coded by locative deictics and that 'movement from' was seldom mentioned before 2;2. A second question is why do *indefinite* suffixes tend to enter before definite suffixes? It should be noted that the indefinite is used for all intransitives, whereas transitives may be definite or indefinite. What is the role of this division? Thirdly, role suffixes like the

TABLE 14.10

Emergence of Inflections in Zoli from 1:5.2 to 2;2.3

| Period | Number of utterances | New acquisitions |
|---|---|---|
| I 1;5,3-1;5,5 | 5l | — |
| II 1;6,29-1;6,30 | 228 | Past Tense |
| III L;8,6-l;8,8 | 2675 | Instrumental, Diminutive, Allative |
| IV 1;IO,O-1;1O,6 | 1911 | Sign of Possession, Plural, Accusative 1PS Poss., Illative, 2PS Def. Imper., 1PP Indef., 3PP Def.,   Imper., Infinitive |
| V 2;0,0-2;0,5 | 835 | Dative, 2PS Poss., 3PS Poss., IPS Def., IPS Indef., Def. Article |
| VI 2;2,0~2;2,3 | 1826 | 2PS Indef., 3PS Def., IPP Def., 3PP Def., 3PP Indef., Sublative |

dative, accusative, and instrumental appear quite early. Is this due to their pragmatic importance or are they somehow functionally basic?

Taken by itself, the principle of relative ease of analysis started in Operating Principle 12 cannot fully account for the order of acquisition of grammatical morphemes. On the one hand, Operating Principle 11 holds that markers will only be acquired if they are picked up as parts of amalgams. Thus, using both Brown's data for English and new data for Quiche Mayan, Pye (1979, 1980 p. 57) has found that perceptual saliency is a better predictor of marker acquisition than either frequency or semantic complexity. In Hungarian, nearly all of the relevant markers are monosyllabic suffixes. Therefore, perceptual salience is similar across markers. It may be that, in Hungarian, the order of acquisition of grammatical markers is determined by the factors of reliability and applicability (Operating Principle 10).

## 8.7. Inference (Operating Principle 13)

Operating Principle 13 holds that, during parsing, the child can infer aspects of the semantics of new items on the basis of the words with which they are concatenated by ordering patterns. For example, given the phrase *myfungo,* we know that*fungo* should refer to an object. Alternatively, if we wish to use formal rather than functional terms, we may say *that fungo* is a noun. However, many frames are ambiguous in regard to the semantic/formal class of the items they allow. For such frames, we expect children to produce erroneous assignments to semantic class.

> CONSEQUENCE SEMANTICS 13A: Wherever the language has ambiguous cooccurrence frames, children make errors in assigning words to semantic class.

For example, English-speaking children often analyze the word *behave* into *be + have.* Since *be* has a frame that takes a following stative adjective, children assume that *have* is a stative adjective and produce errors like *I'm being have* (Peters, 1980, 1985).

In Hungarian, I have reported (MacWhinney, 1974, pp. 549-552) 36 errors in assignment of items to a part of speech. The nature of these errors is particularly interesting. Let us take as an example the child's use of *savanyú* 'sour' to refer to *szőlő* 'grape'. One possible source of this error could be the positional pattern EZ + ENTITY 'this + entity' which at an early period is often used in the "naming game." From this positional pattern, the child infers that *savanyú* is an entity. Later, when s/he has learned the form EZ + MODIFIER, he will avoid such erroneous inferences. However, in the meantime, he may use *savanyú* for a short period as a noun. Similarly, possessive pronouns, numerals, and modifiers all occur in comment position. However, only modifiers occur prenominally- If [a] possessive pronoun or numeral is learned from a sentence in which it is the

comment, the child may conclude that it is a modifier. As a result, s/he may erroneously place it in prenominal position. There are several errors of this type (MacWhinney, 1974, pp. 553-553). Examples include *enyém virág* 'mine flowers[1], cf. correct *virág-om* 'flower-my', *kettő bárány,* cf. correct *két bárány)* 'two sheep', and *Mártikáé almája* 'Mártika's apple+POSS', cf. correct *Mártika almája* 'Mártika apple+POSS'.

Other errors that may be due to ambiguity in acquisitional frames include *leül* 'down+y' (= 'down') (MacWhinney, 1974, p. 520), *egy homokot* 'a sand- + ACC (MacWhinney, 1974, p. 518), *leig* 'down+until' (MacWhinney, 1974, p. 521), *belülje* 'insidey+its' (MacWhinney, 1974, p. 521), *and piszokok* 'dirt- +PL' (MacWhinney, 1974, p. 544). There are four errors which resulted from failure to code certain adjectives as non-comparable: *csepebb* 'weer', *túlabb* 'beyonder', *elegebb* 'enougher' (MacWhinney, 1974, p. 511), and *csomóbb* 'buncher' (MacWhinney, 1974, p. 519). There are also two errors which arise from treating *hamar* 'soon' as an adjective (MacWhinney, 1974, p. 520). The use of the reflexive with inanimates as in * 'the package opened itself or * 'the stone threw itself (MacWhinney, 1974, p. 364) may derive from analogy with acceptable structures like 'the door closed itself. Similarly, the error *sokenként* 'many at a time' that was discussed above (MacWhinney, 1974, p. 512) can be based on analogy with *egyenként* 'one at a time'.

Errors using the nominal form of case suffixes with pronouns are extremely common. Thus, in adult Hungarian, 'with Imre' is *Imrével* 'Imre+COM' but 'with you' is *veled* 'COM+2SG'. However, children take a pronominal base of the possessive such as *ti* and then add a nominal suffix, producing *tivel* '2SG+COM'. The feature [+ pronominal] or [+deictic] fails to make the correct separation between the contexts of *-vel* and *vel-,* since the pronouns *az* and *ez* 'this' and 'that' take the nominal suffix as in *avval* and *evvel.* Moreover, the third person pronouns *maga* and *maguk* also act like nouns in *magával* and *magukkal.* It is clear then that the distinction between pronouns that take the prefix and ones that take the suffix is semantically opaque. Moreover, the availability of both personal stems (like *ti-)* and personal suffixes (like *-d)* forces the child to specify the context of these forms by bound rules.

Inference of semantic markers from positional patterns can also work to control arbitrary formal classes such as conjugation and declension. In Hungarian, the only productive morphological marking for an arbitrary formal class [if> for the group of verbs that take *-ik* in the third person singular present indefinite indicative. These *-ikes* verbs also show five further irregularities in their indefinite conjugation.

1.   *-am, -em* instead of *-ek* in the first person singular conditional.
2.   *-m* instead of *-k* in the first person singular present.
3.   *-m* instead of *-k* in the first person singular imperative.
4.   *-al* instead of zero in the second person singular imperative, and
5.   *ek* instead of *on* in the third person singular imperative.

Because of these correlated properties, this group of verb stems can be reasonably viewed as a conjugational paradigmatic class (Maratsos & Chalklcy, 1980) Inference allows the child to construct feature markers which can be entered into the lexical encoding for the verbs of the *-ikes* paradigm. There seem to be a variety of semantic and phonological features which may also give support to assignment of a verb to the *-ikes* conjugation, but this has not yet been adequately examined in Hungarian. However, there is evidence in German (MacWhinney, 1978; Köpcke and Zubin, 1982) that gender selection, a similar paradigmatic phenomenon, is far from arbitrary and that phonological and semantic cues summate activation to select the feature of gender which is then attached to the noun. However, these predicators are not fully determinate and there are exceptions. Therefore control is best when gender is computed for each item separately. Given this, we expect the following consequence:

> CONSEQUENCE SEMANTICS 13B: Children will make many errors when morphological marking is governed by formal class membership.

In fact, errors in the use of the *-ikes* verbs continue into adolescence. However, because some dialects fail to utilize the *-ikes* conjugation, this late acquisition may be viewed, at least in part, as a result of sociolinguistic variation.


## 9. SUGGESTIONS FOR FURTHER STUDY

If one compares our knowledge of the acquisition of Hungarian with our knowledge of the acquisition of English, it becomes clear that there are at lest two major gaps in the Hungarian research. First, there exists almost no literature on the development of comprehension strategies in Hungarian children. Work by MacWhinney, Pléh, and Bates (in press) on the development of sentence comprehension strategies begins to close this gap. However, it is clear that work on the resolution of polysemy in noun phrases, prepositional phrases, adverbial phrases, and derivational formations will also be needed.

A second major gap in the Hungarian literature is in the area of the acquisition of conversational functioning. There are very few studies in Hungarian of the development of responses to questions, elaborations of narrative structures, modes of argumentation, control of politeness, attempts to elicit information, monitoring of communication error and success, mother-child interaction, or verbal play. This is not to say that there is no literature on these topics. However it is very difficult to find much in this literature that reflects the distinctly Hungarian nature of the ways that Hungarian children come to control these abilities. At the same time it is intuitively clear that conversational functioning in Hungarian uses forms and rules that are quite different from those of English.

In addition to these two major gaps, the Hungarian language provides us with structures that deserve further intensive research. In particular, further research

the child's acquisition of the definite-indefinite contrast in the conjugation of the verb could prove quite interesting. In the area of morphophonology, there is a need for experimental studies using techniques like those of MacWhinney (1978) in which the nonce form is, however, not a stem but an affix. This would provide a useful way of assessing the true productivity and scope of a number of phonological rules whose description is presently incomplete. Finally, there is a need for studies of the productivity and semantic form of derivational affixes in school age children. Here there are a number of developments that may not be completed until late childhood.

## 10. THEORETICAL IMPLICATIONS

This review has summarized the basic facts that can be found in literature on Hungarian language acquistion. The two important exclusions have been data on phonological development and studies of the acquisition of sociolinguistic competence. For the three basic areas of the grammar, the competition model has provided a useful framework for both describing and explaining the central facts about Hungarian development. Moreover, many of the data we have gathered from other languages can also be satisfactorily explained by the model. Of course, it is clear that the model is far from complete. Nevertheless, it seems to me that real progress can be made within a framework of this type toward the important goal of understanding the acquisition of the world's languages by the world's children.

## ACKNOWLEDGMENT

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