13 Morphological interaction between L1 and L2 in language attrition

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Introduction

Previous studies of attrition in individuals who have experienced dramatic reduction in exposure to their dominant language have shown attrition to involve regression, interference and loss of specificity in the lexicon (Berman & Olshtain, 1983; Olshtain & Barzilay, in press; Sharwood-Smith, 1983). Attrition research is in its infancy and the purpose of this chapter is to provide further insight into the field. In this chapter we will show that typological differences between L1 and L2 have an effect on attrition, and that attrition is not simply a loss of one language but an interplay between two. In particular, we will show that differences in the attrition patterns of Hebrew nouns and verbs on the part of a young native speaker of Hebrew placed in an English dominant environment are directly attributable to morphological differences between the languages. Hebrew verb morphology is very different from English verb morphology, while their nominal morphologies are not so far apart.

This chapter focuses on the structural metamorphoses of the L1 verbal and nominal systems and on the role of L2 in the changes that have occurred in L1. These are studied through instances of *code-blending*, where morphemes from one language are combined with morphemes of another language within a single word while the phonological features of the respective source languages are retained (Kaufman & Sridhar, 1986).

In previous work (Berman, 1979; Swain, 1972), code-blending has been

dismissed as an insignificant and infrequent phenomenon. In this chapter, we will show how code-blending has been very robust in the child's utterances, and has provided access to the developmental sequence of simultaneous acquisition and loss of productive morphological systems in the young child. The typological differences between the languages have resulted in data that allow firm conclusions about stages in the child's morphological productivity in each of the languages.

The study is based on daily notes and bi-weekly recordings of primarily naturalistic observations as well as occasional elicitation activities and probes designed to ascertain the child's competence in L1 and L2. The data were collected primarily in the home environment, where the use of L1 dominated.

Our subject, Michal, is a native speaker of Hebrew, who at 2;6 came to the United States, and by 2;8 was immersed in an English dominant environment at the preschool, for 7 hours a day 5 days a week. Hebrew was exclusively spoken to her by her parents and sisters (7 and 11 years old). The study began upon the child's arrival in the United States and to date has covered a period of over two years. At the outset of the study the child's language exhibits good command of the linguistic features of L1 that are typically acquired by children of her age as discussed in Berman (1985). Some examples of utterances that illustrate the child's command of the noun and verb morphology are:

(1) 2;8   *ani*   *e-efox*   *axšav*   *daf*
          I   1.FUT-turn   ·   now   page
          I will turn the page now

(2) 2;9   *ani roc-a*   *l-akri*   *sipur-im, lo i-kre-ti*
          I   want-fs   to-read(benef) story-mp, no benef-read-1s.PAST
          sipur
          story
          I want to read stories, I did not read a story

(3) 2;10 *lo*   *aav-ti*   *et*   *ha-salat*
          no   like-1s.PAST   OM   the-salad
          I didn't like the salad

This chapter focuses on the morphological disintegration and reconstruction of L1 as attested in the data at around the age of 3;4. The earlier stages of attrition are discussed at greater length in Kaufman & Aronoff (in press). In order to obtain objective appraisals of the child's growing competence in L2 (English), standardised probes were administered at age 3;4 (10 months after arrival in the United States). These included the PPVT (Peabody

Picture Vocabulary Test), selected items of the PLAI (Preschool Language Assessment Instrument), selected subtests of the ITPA (Illinois Test of Psycholinguistic Abilities) and SOLST (Stephens Oral Language Screening Test). These have indicated that after 10 months in the United States the child had reached linguistic competence equivalent to monolingual English speakers of the same age group. Our focus here is on the child's use of Hebrew within this developing English system.

The nominal and verbal systems of Hebrew and English

The hallmark of Semitic languages is their root and pattern (or template) morphology. For example, the consonantal root *k-t-v* may appear in a variety of different patterns: *katav* 'wrote', *nixtav* 'was written', *(h)ixtiv* 'dictated', *(h)itkatev* 'corresponded', *mixtav* 'letter', *maxteva* 'desk'. Modern Hebrew has seven verbal templates and any verb that is used in the language, including all borrowings, must adhere to one of these templates (Bolozky, 1978). The templates are of the forms CaCaC, niCCaC, CiCeC, CuCaC, hiCCiC, hoCCaC and hitCaCeC. Roots of three consonants are the most frequent, and may appear in any template. Roots of four or more consonants appear only in the two most productive templates, CiCeC and hitCaCeC, with the latter usually being intransitive (McCarthy, 1984). The Hebrew verb for telephone, for example, is *tilfen*. English, of course, has no such verbal system. It is affixal, mostly suffixing, and the most productive affixes have no phonological effects on their bases.

What is less known is that the nominal system of Hebrew and all Semitic languages differs from the verbal system. There are templates, but they are much more varied and less productive. There are, in addition, purely affixal noun forming patterns, where the base sometimes remains unaltered, just as in English, and finally, borrowed nouns are left intact; the Hebrew noun for telephone is *telefon*. Modern Hebrew noun morphology is thus much closer to English than is the verb morphology. The relation between the two languages is schematised in Table 1.

We will show that this relation is evidenced in attrition. With nouns, where root and pattern morphology is less pervasive, L1 nouns lose their L1 morphology and are used as if they were L2 words, that is, L2 morphological markers are affixed to L1 nouns. With verbs, however, the child does not simply lose the L1 system, but rather creates a novel template for L1 verbs in an L2 context. The resulting verbal system is thus an accommodation between L1 and L2. The rest of this chapter is organised as follows. First we discuss nouns; at an early stage, the child mixes L2 nouns

TABLE 1. *Reorganisation of L1 morphology to accommodate L2*

	Hebrew (L1)	English (L2)	Child's L1 + L2
Nouns:	C/T	C	C
Verbs:	T	C	T/C

C = concatenative; T = template
Nouns: L2 morphology replaces L1 morphology.
Verbs: L2 morphology is added to a reconstructed L1 morphology.

in an L1 context without modifying them; at a later stage, as evidenced from both plurals, noun compounds and lexical innovations, L1 morphology is lost and L1 nouns are treated morphologically in the same way as L2 nouns, although they retain L1 phonology. Second, we discuss verbs, which pattern differently: at an early stage, not only L1 verbs but even L2 verbs are found in L1 templates; at a later stage, the child uses her own idiosyncratic template to mix L1 verbs in L2. Verbs thus contrast with nouns at both ends of the attrition process.

The child's nominal system

The early stage—L2 in L1

Attrition in its early stages affected the lexicon. L2 nouns were increasingly inserted in an L1 syntactical environment from the age of 2;9, three months after initial contact with L2. An analysis of the L2 nominal insertions in the data reveals that three types of insertions prevail. First are L2 words for new concepts that had never been acquired in L1. This category includes L2 culture-loaded words such as *cereal, pumpkin, lunch-box*. Second are L2 words for school-related concepts that had been known in L1 but for which new L2 words are learned and reinforced at school, such as words for geometrical shapes and colours. Third are L2 words for common, and frequently used, concepts for which L1 words had previously been used. It is early loss of words of the third type that is most puzzling in the study of attrition. Some examples of these are:

(4) 2;9   *ima*   *t-oxl-i*   *et*   *ha*-apple   *šel-i.*
         mommy   2.FUT-eat-2fs   OM   the-apple   of-me
         Mommy, eat my apple.

(5)   3;0   *simi-i*   *et*   *ha-tik*   *al*   *ha*-back   *šel-i.*
         put.IMPER-fs   OM   the-bag   on   the-back   of-me
         Put the bag on my back.

(6)   3;0   *at*   *zoxer-et*   *et ha-yalda ba*-book   *ha-hu*?
         you   remember.PRES-fs   OM the-girl in.the-book   the-that?
         Do you remember the girl in that book?

The Hebrew words *tapuax* 'apple' (example 4) and *sefer* 'book' (example 6) were among the child's early acquisitions in L1 and it therefore seemed puzzling that when asked for the L1 equivalent of these words the child became, as time progressed, hesitant and unsure, needed prompting, and in a growing number of instances was unable to produce the L1 word. One explanation for this phenomenon may lie in the fact that early acquisition of these L2 nouns and increased exposure to them in the school setting meant that they were more readily available for production. It should be pointed out that no difficulty was demonstrated in the comprehension of these words. The nominal insertions were prefixed by the definite marker of L1, *ha*, which is a bound morpheme in Hebrew and is obligatory in these contexts.

The late stage—L1 in L2

Plural nouns

Attrition of the L1 nominal system is dramatically attested in the increasing misuse of the L1 plural markers, which undergo gradual disintegration of form and gender distinctions. Noun plurals in Hebrew are generally formed by adding *-im* and *-ot* to masculine and feminine nouns respectively. The plural morphemes are stressed and are therefore perceptually salient and are acquired early by children. Gender in animate nouns is semantically motivated, whereas in inanimate nouns it is semantically empty. Levy (1983) studied the pattern of acquisition of noun plurals in 2–3-year-olds and found initial indiscriminate use of the unmarked masculine form, followed by gradual introduction of the feminine plural morpheme based on phonological clues inherent in the singular noun. Typical feminine endings *-a*, *-et*, *-it*, *-at*, respectively, were used as clues in the gradual productive use of the feminine plural morpheme *-ot*.

Prior to the onset of attrition, the child in the present study had acquired the plural system of Hebrew to a level described in studies of 2–3-year-old native speakers of Hebrew (Berman, 1981, 1985; Levy, 1983). Thus, all the plural forms that are attested in the data at the early stage

(2;8–3;3) are in fact normatively correct, and the errors made in her subsequent speech, therefore, are of particular interest for the investigation of attrition. Analysis of these errors reveals two simultaneous factors: first, manifestations of regression to earlier developmental speech patterns found in L1 acquisition, and second, the impressive role of L2 morphology in reshaping L1 words.

Regression to earlier developmental patterns includes predominant though not exclusive use of the unmarked masculine morpheme *-im* on most nouns, including those with typical feminine endings on singular nouns, for example: *xulca/*xulca-im*, 'shirt/shirts', *calaxat/*calaxat-im*, 'plate/plates'. The semantically unmarked masculine morpheme is very productive at this stage of attrition as shown in these examples:

(7)   3;5   You have *sear-im*
         You have hair-mp

(8)   3;8   *agala-z-im*
         stroller-z(Eng pl)-mp

The word *sear*, 'hair' is usually used in the plural *sear-ot*. Hence re-analysis of the word and the choice of the masculine morpheme attests to its greater productivity. The word *agala* has the typical feminine ending *-a*, which is the first to be acquired as a phonological clue for the use of the feminine morpheme in the plural (Levy, 1983). Here it serves instead as a phonological clue for the English plural allophone /z/, which, in turn, is further supplemented by the Hebrew masculine plural morpheme.

Another regressive pattern (attested in examples 9 and 10) involves loss of sensitivity to the morphophonological rules of vowel reduction, vowel change and obligatory stress movement associated with the plural form. Plural formation in nouns of certain patterns requires penultimate stem-vowel reduction where CVCVC becomes CCVC-*ím* as in *pérax/praxím*, 'flower' (example 9). The form CéCeC (Berman, 1978) becomes CCaC-*ím* as in *séfer/sfarím*, 'book' (example 10) involving vowel reduction as well as stem-final vowel lowering. The form CiCCá becomes CCaC-*ót* involving a vowel reduction as well as a stem change as in *simlá/smalót*, 'dress/dresses'. In all these examples a stress shift to the plural morpheme occurs in normative use.

(9)   2;11   *pérax*   *prax-im*
           flower   flower-mpl
     3;8   *pérax-im*
     4;3   Look at the *pérax*-s, aren't they pretty?
                flower-z(Eng pl)

(10) 2;8   *séfer*   *sfar-ím*
            book   book-mpl
      3;7   *séfer-im*
      4;1   What *séfer-z* are there?
            book-s(Eng pl)

Developmental errors in the young language acquirer result in part from regularisation across noun patterns. Berman (1985) shows how the canonical alternation *tikra/tikrot*, 'ceiling/ceilings', leads to incorrect *ricpa/ ricpot* 'floor/floors' and *simla/simlot* 'dress/dresses'. In the case of language attrition where exposure to L1 is reduced dramatically, paradigmatic overgeneralisation is inhibited and the pattern selected in pluralisation instead reflects a strategy of opting for least change in the stem. Hence *simla* becomes *simla-ot* rather than *siml-ot* as would be predicted from paradigmatic overgeneralisation.

The strategy of opting for least change may be motivated, first by regression to earlier developmental forms that display no change in the form of the stem, and second, by the influence of L2 plural formation rules which, in the case of English, require addition of the phonologically appropriate plural allophone to a stem which is generally unchanged in vowel pattern or stress. Our data seem to suggest that in the earlier stages of attrition of the nominal system, regression played a more prominent role, whereas in the later stages, L2 morphological rules played an increasingly crucial role in shaping the child's plural forms as L2 was becoming more dominant.

Errors made between 3;5 and 3;8 attest to the increasing functional role of L2 as a plural marker. Although the L1 masculine and feminine plural markers are still present, their use is redundant and is probably formulaic and unanalysed. This is evident in examples such as (12) where the correct plural form is used (compare with the singular form *magevet* in example 11) but where the use of the L2 plural marker shows that the form *magavot* is used as a formulaic expression. In example 13 the word *garbonim* is treated as ending in [z], thus the child totally ignores the L1 plural marker, and the appropriate L2 plural allophone is added.

(11) 3;5   I need a *magevet* for my eyes

(12) 3;5   Don't forget to take *magav-ot-s*
            Don't forget to take towel-fp-s

(13) 3;9   *garbon-im-z-iz*
            tight-mp-z-iz

(14) 3;6   I like *cimuk-im-z*
            I like raisin-mp-z

Other examples seem to suggest that although the L1 plural marker is present in form, it no longer serves a function, and it is the L2 plural marker that is required for number marking (example 14). This may explain the emergence (at 3;9, 15 months after exposure to L2) of the stable plural form

TABLE 2. *Progression of attrition in pluralisation*

Singular	Plural Early Stage 2;8–3;3	Plural Intermediate Stage 3;4–3;8	Plural Late Stage 3;9–4;4	Gloss
agala	(agalot)	agalazim	—	stroller
agas	agasim	agasim/agasiz	agasiz	pear
agvaniya	agvaniyot	agvaniyot/agvaniyaz	agvaniyaz	tomato
banana	bananot	bananos/ bananim/bananaot	bananaz	banana
bul	(bulim)	—	bulz	stamp
calaxat	calaxot	calaxatim	calaxats	plate
cimuk	cimukim	cimukim/cimukimz	cimukimz	raisin
cipor	ciporim	ciporim/ciporz	—	bird
ec	ecim	—	eciz	tree
—	garbonim	garbonimz/garbonimziz	garbonimz	tights
gezer	(gzarim)	—	gezerz	carrot
kapit	kapiyot	kapiyots	kapits	spoon
kis	kisim	—	kisiz	pocket
kos	kosot	—	kosiz	glass
magevet	magavot	magavots	—	towel
mapit	mapiyot	mapiyot/mapitot	mapiyots/mapits	napkin
mazleg	mazlegot	—	mazlegz	fork
parpar	(parparim)	parparz	—	butterfly
peca	(pca'im)	—	pecaz	wound
perax	praxim	peraxim	peraxs	flower
pilpel	(pilpelim)	—	pilpelz	pepper
sakin	sakinim	—	sakinz	knife
šaon	(še'onim)	šaonz	—	watch
sefer	sfarim	seferim	seferz	book
simla	(smalot)	simlaot	—	dress
smixa	smixot	smixots	—	blanket
tapuax	tapuxim	tapuaxim	tapuaxs	apple
ugiya	ugiyot	ugiyaz	ugiyaz	cookie
xor	(xorim)	—	xorz	hole
xulca	(xulcot)	xulca'im	xulcaz	shirt
xut	(xutim)	—	xuts	thread

The parenthesised normative forms are not attested in the data.

of the L1 noun in which the L1 plural marker is systematically dropped and the L2 plural marker is code-blended with the L1 singular noun.

It is important to note that the L1 noun has retained its phonetic form and the choice of the code-blended L2 plural allophone is motivated by L2 phonological rules. Code-blending in the child's speech is not a product of input and it therefore highlights much linguistic information about acquisition and attrition. Hybrids like *perax*-s, *ec*-iz, *xor*-z (see Table 2), provide important evidence for the acquisition/attrition process. First, L2 morphological rules dominate plural formation. Second, no attempt has been made by the child to assimilate L1 phonemes which do not exist in L2, in order to approximate L2 phonemes. L1 words retain their phonetic form and the choice of L2 plural allophones to be code-blended is determined by the phonetic properties of the L1 phonemes. Third, the sounds uvular *x, r, c* are not found in English, and the correct choice of allophone is based solely on the phonetic properties of these sounds. This gives further support to Halle's proposition (1978) that native speakers of English base their choice of the plural marker on innate knowledge of the feature composition of speech sounds. In this way the English plural formation rule may apply to any foreign word retaining its phonetic form. (Halle (1978) cites the plural of 'Bach'—[baxs]—as an example.) Fourth, the code-blended hybrids which contain phonemes that are not found in English further indicate that attrition in its present state has had little effect on L1 phonetic form, although it has had a significant impact on the syntax and morpho-phonological rules of L1.

In sum, disintegration of the L1 number marking has occurred from about 3;4 (10 months after initial exposure to L2). Attrition becomes evident first, in regression to earlier developmental forms and second, in the increasing dominance of the L2 plural formation rules that are imposing new forms on the L1 words (see Intermediate Stage in Table 2). The emergence of a single code-blended form (see Late Stage in Table 2) attests to the rejection of the L1 plural marker in favour of the now dominant L2 marker.

Hybrid lexical innovations

The growing dominance of L2 morphosyntactic rules in L1 attrition is further attested in the child's use of compounding. Children's lexical innovations created to fill lexical gaps provide insight into the word formation processes they use (Clark, 1982). In English, once the structural devices of suffixation and compounding are acquired, children freely produce numerous innovations. In Hebrew, innovations are created by

combining the stem with an affixal pattern (Clark & Berman, 1984; Berman & Sagi, 1982). Compounding in Hebrew is restricted to noun–noun and adjective–noun combinations, and its productive use occurs with older children 5–6 years old, or even later, in cases where the compounds involve morphological and phonological changes in the head noun (Berman, 1985; Clark & Berman, 1987). Instances of noun compounds, however, do appear in younger children, although these are restricted to formulaic compounds like *bet sefer*, 'school', *beged yam*, 'bathing suit'.

The lexical innovations with which we are concerned here are of three types: first, hybrid noun compounds where words from L1 and L2 are juxtaposed to create an innovative noun compound (examples 15, 16); second, two L1 nouns compounded in L2 syntactical pattern (example 17); and third, code-blends involving L1 words combined with L2 suffix (examples 18, 19, 20).

(15) 3;11 it's almost *šeleg* time
                snow

(16) 4;0 I'm *ašpa* man
            garbage

(17) 4;0 another *banana af*
              banana nose

(18), 3;7 I need to wash my hand it's *sabon*-y
                                soap-y

(19) 4;3 **Child:** Mommy when can I ride my bike?
           Parent: *kše'iye*   *yoter xam*
                     when be.FUT more hot
           Child: *xam*-er?
                   hot-er

(20) 3;10 this is the *pilpel inagev*-er
                    pepper wipe-r

In the noun compounds the stress is on the first member of the compound in all instances, following the English and not the Hebrew pattern. Note that *banana* (example 17) is Hebrew, as evidenced by the use of [a] rather than [ae]. The morphosyntactic environment is that of L2 in all these examples. The child is using words retained from L1 to create a compound which is syntactically acceptable in L2. In examples 15 and 16, L1 nouns are used as modifiers to the L2 head nouns. The nouns 'time' and 'man' appear in many noun compounds used by preschool age children (Clark, 1982).

In example 17, the child is referring to the nose of the snowman (made

of a banana). In Hebrew, head nouns precede modifiers, which would generate *af banana*, although the standard form in this case would be the use of a noun phrase instead of a compound. In this example, the L1 nouns have been arranged to accommodate L2 compounding rules.

The impact of L2 morphology and syntax is further illustrated in example 18. Although the word 'soap' is known to, and has been previously used by the child, an L1 word is selected here and is transformed into an adjective by the addition of '-y' to obey L2 morphosyntactic constraints.

The comparative in Hebrew is always formed with the word *yoter*, inserted before, or less often, after the adjective. In example 19, despite the input from L1 the child is employing L2 rules which require the adjective to be marked with '-er' to indicate a comparative. The L1 input, in this case, has prompted the use of the adjective *xam* but L2 syntax dictates the appropriate morphological marking.

Example 20 uniquely combines elements of the second and third types of innovations. It involves the juxtaposition of an L1 noun as the modifier and a head noun composed of a Hebrew verb used in the child's idiosyncratic form of the verb (discussed below), combined with the L2 agentive 'er' which transforms it into a noun. It should be noted that formal categorisation into classes of nouns and verbs appears to have remained intact. Nominal and verbal insertions as well as innovative hybrids all attest to correct categorisation of L1 words, even though their use is within L2 morphological and syntactical environment. The data presented here show that organisational categories are indeed part of a child's early grammar (Maratsos, 1982), and the child is sensitive to their existence and usage. For the study of attrition it is significant that these categories are retained even after other elements of the language have been lost.

In sum, the lexical innovations have revealed how L1 words which remain in the lexicon are used within an L2 morphosyntactic environment. A growing command of and dependence on the morphosyntactic rules of L2 is evident. These rules are so powerful that they even minimise the effect of direct input, and they completely dominate the child's utterances.

The child's verbal system

The early stage—L2 in L1

Early L2 verbal insertions in the L1 context attest to the child's knowledge of the derivational and inflectional Semitic verb morphology.

The L2 verbs are treated as L1 two- and three-consonantal verbs and are set in an L1 verb template.

(21) 3;0 *im* *ze* *it-laxlex* *ani* *a*-kliyn *ot-* jam.
       if this 3s.FUT-get.dirty I 1s.FUT-clean OM-them
       If this gets dirty, I'll clean them.

(22) 3;0 *ani* *bala-ti* *et* *ze* *xazak*.
       I blow.PAST-1s OM this hard
       (English verb 'blow' inflected as a Hebrew verb)
       I blew this out (candles) hard.

In example 21 an uninflected form of the verb 'clean' is blended with the L1 bound morpheme of the first person singular future prefix *a*. In example 22 the English verb 'blow' is treated as a two-consonantal Hebrew verb CVCV like the verb *bala*, 'swallow', and is inflected accordingly. The L1 verb morphology requires the incorporation of any borrowed L2 verb within the L1 verb template system. This is a more complex process than is required for the incorporation of nouns, and indeed the data show that L1 verbal insertions appeared later and were far fewer than L1 nominal insertions.

The late stage—the idiosyncratic L1 template

Unlike L1 nominal insertions which were borrowed as whole units and inserted into L2 morphosyntactic contexts, verbal insertions displayed an interesting phenomenon. Following a period where utterances displayed a variety of verbal forms that contained traces of the L1 verbal, derivational, and inflectional morphology, a single template emerged and was over-regularised across all L1 verbs. This template, *iCaCeC*, which is similar to but not identical to an actual L1 form, becomes very productive in the child's speech and attests to her knowledge of the obligatory template system of the Semitic verbal system. (For a detailed examination of the emergence of this idiosyncratic template see Kaufman & Aronoff (in press).) Almost all the L1 verbs which are used in the child's speech about ten months after initial contact with L2 are used in this template and accommodate L2 morphosyntactic rules. L2 verbal inflections are code-blended with these reconstructed verbs to indicate person and tense. No gender distinctions are made because these are non-existent in L2. Some examples follow.

(23) 3;6 Are we gonna come back after we *isader* the things?
       'arrange'

(24)　3;7　I just need to *isaben* my legs.　　　'soap'

(25)　3;9　I need to *ixaded* my pencil. I know some that can't *ixaded*. 'sharpen'

(26)　4;0　Mom, Dad is *ixamem*-ing my bread.　　　'warm'

(27)　4;1　We get up when it *icalcel*-z.　　'ring'

(28)　4;2　Where is the coat you *ixabes*-ed?　　'wash'

Conclusion

We have shown that the attrition patterns of L1 nouns and verbs are quite different from one another in this case and we have traced this difference to the interaction between the morphological systems of L1 and L2. This finding only highlights the fact that L1 attrition does not take place in a vacuum but rather in a context of simultaneous acquisition of L2. The result is not simply a loss of L1 but also its accommodation to L2. The implications for future research are clear: attrition must not be studied in isolation but should be examined in the context of the language that is being acquired. The structural differences between the two languages will, of necessity, affect the attrition patterns.

Acknowledgement

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