Salience in American Sign Language Loanwords

By

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Acknowledgements

My sincerest thanks go to the members of my committee, Christina Bethin, Robert Hoberman, and Yoonjung Kang for the time and energy they devoted to assisting me with this project. The committee demonstrated a familiarity with my work which showed a high level of integrity. In addition each member contributed information that was uniquely useful, providing direction and organization. This research would also not have been possible without the help of my deaf colleagues from Suffolk County Community College. I want to thank in particular, Steve Bruno, Joshua Banilover, and Liz Wallace for their native-signer intuitions and for tolerating my endless questions. Lastly I wish to thank colleagues from QPW and Phonology II, audience members of LSA 2002, and the many students from Comparative Linguistics at SCCC for their questions and comments, all of which helped develop this work.

1. Introduction

The adaptation of borrowings into spoken languages is well documented (Haugen 1950; Hyman 1970; Broselow 1983; Silverman 1992; Itô & Mester 1995; Meade 1998; Davidson & Noyer 1996; Itô & Mester 1999) and when foreign words contain phonetic constructions not typically found in the native lexicon, alterations are often made to *nativize* the borrowed form. For example, segments may be deleted or epenthesized to satisfy native language coda conditions. In Boumaa Fijian, for example, a vowel is epenthesized to address illicit coda consonants: 'kaloko' (clock) and 'aapolo' (apple) (Dixon 1998). In Mandarin Chinese, the coda consonant is deleted in borrowed English words: ‘qiao-ke-li’ (chocola**t**e) and ‘hao-lai-wu’ (Hollywoo**d**) (Miao 2002). If we recognize signed languages as legitimate, functioning natural languages, much like spoken languages, we would expect them to consist of both native and foreign vocabulary and to parallel spoken languages in their manner of handling loanwords. American Sign Language (ASL) is such a language and it does impose restrictions on how borrowed words are incorporated into the language.

This paper focuses on a specific class of borrowings called *initialized signs.* Unlike other types of ASL loans, this particular class is formed from a combination of a semantic root and a manual representation of English spelling, called *fingerspelling*. This unique hybrid of semantics and phonetics, similar to Egyptian hieroglyphics and Chinese loanword[1] formation, provides a good medium to explore the mechanisms available in ASL for adapting borrowed forms, and specifically, to explore the nature of the interaction between ASL root faithfulness and English word faithfulness. The semantic root component of these initialized loans has a movement (M) and place-of-articulation (POA) feature. Place-of-articulation (POA) refers to where the sign is

[1] Some examples of phonemic English loans in which Chinese morphemes are chosen which have semantic associations to source word: **h**a**ck**er→ **h**ei-**k**e (black guest); **J**ohn**s**on & Johnson→ **q**ing-**sh**eng. (Miao 2002)

articulated in the signing space, such as the head, torso, or lower trunk area. Movement (M) refers to the manner in which a change occurs within a sign: some are produced with a 'single', 'repeated', 'multiple' or 'trilled' movement. The English spelling component has a handshape (HS) feature which refers to which digits are utilized and how they are positioned in relation to each other. I take the position that the semantic roots are native, namely, they are generally monosyllabic, originate from polymorphemic[2] *classifier*[3] predicates and contain less complex handshapes than loanwords.[4] Analyses of loanword phonology in spoken languages traditionally have categorized borrowings according to degrees of assimilation (Itô & Mester 1995*;* Meade 1998; Davidson & Noyer 1996). Initialized loans are fairly well assimilated because they are monosyllabic. Less nativized forms generally are polysyllabic, contain all the letters of the original English word, and do not exhibit inflectional or derivational morphology as initialized loans can.

One goal of the paper is to account for the preservation of initial letter handshapes. Using an Optimality Theory framework (Prince & Smolensky 1993; McCarthy & Prince 1993) I demonstrate that the preservation of initial letter handshapes is a case of position-sensitive faithfulness. In spoken languages, there is a need to preserve initial phonetic material for reasons of perceptual salience and successful processing of speech (Marslen-Wilson 1987; Steriade 1995; Casali 1997). I claim that although position-sensitive faithfulness is not normally active in ASL native vocabulary, the need for it arises at the sign-phonetic juncture of borrowings. I propose that in combinations of a root sign + phonetic borrowing, the struggle to preserve both root and borrowed material is resolved by a positional faithfulness over

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[2] *polymorphemic:* indicating they are made from combining bound root HSs and various affixes (i.e. movement and orientation affixes) to form classifier predicates (Supalla 1982) (e.g. 2-stooped-upright beings-side by side-facing forward-move forward-carefully-from 'a'-to 'b', 'dock in space') (Brentari 1998; p.294)

[3] A classifier is a type of handshape which represents a whole object or just its height, width, depth, perimeter, or surface.

[4] Brentari (1998) claims the native lexicon is not uniform and has overlapping areas, including fingerspelling.

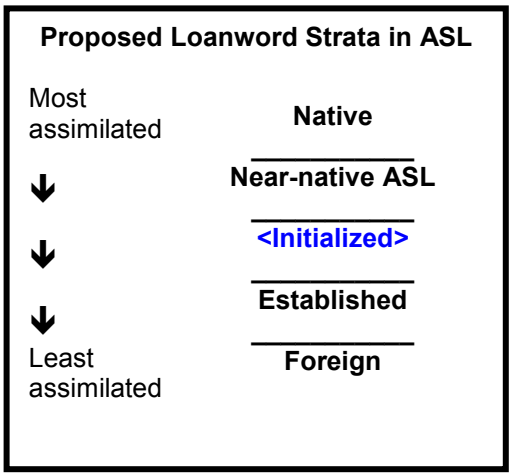
markedness ranking which in turn dominates faithfulness, thus sacrificing root handshape features for the sake of preserving initial English letters. Markedness constraints limit how much of the input is actually articulated.

Another goal of this paper is to introduce the notion of a salient signing domain and to show how it interacts with markedness. Both marked and unmarked handshapes are used in adapting loanwords. A handshape is considered *marked* if it has a low frequency of occurrence in the lexicon, is restricted to certain areas of the body[5] and involves manipulation of non-adjacent digits (Stokoe 1965; Battison 1978; Boyes-Braem 1990). In some initialized loans the occurrence of a marked handshape triggers a place-of-articulation (POA) violation: the signer is forced to relocate the sign itself to a higher area of the body. This adjustment is made, I suggest, to enhance perceptibility of the handshape's internal complexity in the case of marked structures.

Throughout this study, comparisons will be drawn between spoken languages and ASL in an effort to demonstrate the applicability of phonological theory to signed languages. A brief overview of ASL loanwords types will be provided to establish a framework in which to analyze the degree of assimilation of initialized loans . The focus of this study will be the HS, M, and POA features of root signs and how these features are affected when English vocabulary is borrowed through fingerspelling.

[5] Handshapes which are less marked can appear in any area of the body (e.g. SPREAD [5] HS: touching the hips in the old sign for RUSSIA; touching the chin and forehead as in PARENTS; touching the chest as in FINE.

2. *Overview of loanwords*[6]



ASL speakers have two different strategies for adopting English vocabulary. If the native ASL lexicon provides a semantically equivalent native root sign, speakers of ASL will combine this semantic root with the borrowed English letters represented through fingerspelling. This output can be viewed as quasiphonetic-semantic in the sense that fingerspelling is normally accompanied by mouth movements corresponding to English sounds, and is therefore very close to a phonetic representation. This type of borrowing is observed in initialized loans. They can be divided into two types: (a) those which have only a foreign word in the input[7,8] and (b) those which have a native root plus a foreign word.

Near-native ASL loans take the form of nouns, pronouns, verbs, adjectives, and interjections. An example is #BREAD, which is signed using two hands, the middle fingers and thumbs touching repeatedly. This unmarked handshape, commonly referred to as '8', somewhat resembles the letters 'B' and 'D' which would have appeared earlier in the assimilation process, at the B-R-D stage.

An example of an established loan is #BACK, which was originally fingerspelled as

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[6]There is a category of loans called sign + fingerspelled compounds, such as LIFE + S-T-Y-L-E, BLIND + D-A-T-E, M-I-C-R-O + SOFT and F-I-E-L-D + TRIP which will not be addressed in this study. When fingerspelling occurs in a compound sign, it is due to the need to preserve semantic integrity; for example, a signer cannot utilize the ASL root OUT for 'outline' since OUT refers to a means of exit, but *outline* does not share that meaning (Padden 1998). These types of borrowings would be considered 'foreign' loans.

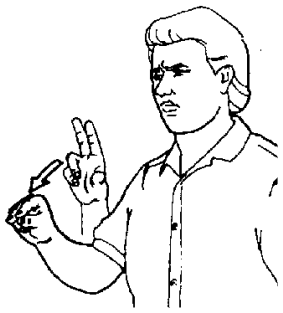
[7] Type (a) will not be addressed in this study. There appear to be only four items of type (a): the color signs PURPLE, GREEN, YELLOW, and BLUE. These do not appear to have a semantic root, however, it would be difficult to categorize them as another type of loan, such as 'established', since they preserve the initial English letter and 'established loans' generally preserve two letters.

[8] In terms of (a) and (b), ASL parallels spoken languages such as Chinese which has more than one strategy for dealing with foreign vocabulary. Chinese speakers can combine a semantically equivalent native root with an English morpheme; for example, *yin-te-**wang*** (‘net’) for *internet* or ***jiu**-bar* (‘liquor’) for *bar* (where *yin-te* and *jiu* represent the Chinese pronunciation of the English morphemes) or by forcing the foreign word to conform to native phonological constraints, *sha-fa* ('sofa') or *lei-da* ('radar') (Miao, 2001)

B-A-C-K, yet after numerous productions within native discourse, became B-K, the form found in contemporary usage.

If a semantic native root sign does not exist, speakers will adopt the English word in its entirety via fingerspelling. This visual representation of English is normally articulated in the torso area, on the ipsilateral side of the body, in line with the dominant shoulder. Fingerspelling each letter of the English word is usually abandoned after the third production within a discourse because signers naturally begin to delete some handshapes and alter other parameters as well (Brentari & Padden, in press). In most cases, the edges of the English word are preserved while medial segments are deleted, for example, B-K for BACK.

Initialized loans fall somewhere between fully assimilated loans such as #BREAD[9], #WHAT, and #SAY-NO which I will term 'near-native ASL', and 'established' loans like #BACK, #SALE, #OK, #DO-DO, #VICE-PRESIDENT, #MEGABYTE, and #BULLSHIT. Near-native ASL loans are considered assimilated to the degree that traces of English letters are barely discernible. In fact native signers usually do not recognize the word as a borrowing. This degree of assimilation is not peculiar to sign language, as Korean speakers utilize the word /namp^{h}o/, 'lamp,' borrowed from English, yet do not recognize the word as a borrowing (Y. Kang, p.c.). Near-native #BREAD and established loan #BACK can inflect for person or number (Padden 1998; Valli 1992): the palm orientation of the signer's hand will be directed towards the object as in 'I give you feedback' or 'I give the book back to her.'



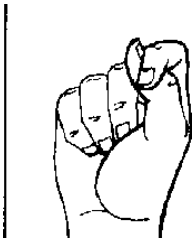
#SAY-NO Near-native

#EARLY 'foreign'

[9] The symbol # will be used throughout this paper to denote all ASL loanwords other than initialized signs; capital letters indicate a gloss of an ASL sign.

Initialized loans exhibit derivational and inflectional morphology. On the other hand, 'foreign' loans do not exhibit inflectional morphology. These are still in the assimilation process like #EARLY, #BUSY and #MORPHOLOGY and often contain most of the letters from the original English word and have predominantly marked handshapes. The foreign loan #MORPHOLOGY would initially be signed with all its letters, M-O-R-P-H-O-L-O-G-Y, and after the second or third production reduce to M-P-H-L-Y. Both established and foreign loans tend to preserve the edges of the borrowed English morphemes[10] but do not utilize a semantic root.

Initialized loans are formed by combining a semantic equivalent root sign with the left edges of the English morphemes. For example, the verb TRAIN consists of the root sign PRACTICE plus the initial letter 'T'. Similarly, the noun VIDEOTAPE is constructed from the root TO-FILM plus English 'V' and 'T'.



T-handshape

Semantic root: PRACTICE

We observe a similar outcome in Chinese, where an English word 'democracy' is initially adopted as 'de-mo-ke-la-xi,' but later becomes more nativized as 'min-zhu' (people-government); similarly 'wei-ta-ming' (vitamin) becomes 'wei-sheng-su' (protect-life-element) (Miao 2001). A semantic ASL root is often selected to serve a variety of borrowings; for example, TEAM and DEPARTMENT both utilize the root GROUP; STAFF and FACULTY share the root MEMBER; RESIDENT and CLIENT share PERSON (Padden & Brentari in press).[11] I think that FEEDBACK[12], once a less nativized form, shares a common root, DIALOGUE, with signs like NEGOTIATE and COMMUNICATE.

[10] Exceptions are #SEX ('X'), #TRANSSEXUAL ('X'), & #COMMONLAW ('M-W'). The preservation of 'X' may be due to native signer's exposure to printed or visual formats depicting 'x-rated'. The preservation of 'M' and 'W' might be attributed to the notion of **m**an and **w**oman. Thanks to C. Bethin & L. Marusic for this observation.
[11] Padden & Brentari (in press) claim that some signs referring to *status, *trait, and *color have no native counterpart.
[12] #FEEDBACK ('F-B' + DIALOGUE) has been analyzed as an abbreviated nonnative form (Padden & Brentari in press); however I have observed in the Long Island area a more assimilated form - an unmarked 'F and no trace of 'B', hence 'F' + DIALOGUE. I have categorized this sign as 'initialized'.

Initialized loans NEGOTIATE (N + DIALOGUE) or PORTFOLIO (P + FOLDER) differ from an established loan like #BACK in that the former consists of a semantic root plus an English word in the input, while the latter has only the English word in the input.

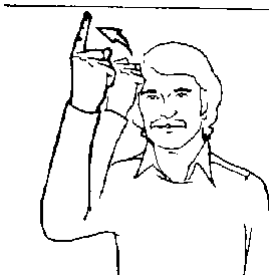
What causes #BACK, #BREAD, or TRAIN to be considered more assimilated than #MORPHOLOGY is that they have fewer letter handshapes and, in the case of #BREAD, these handshapes are unmarked.

To explain why English letter handshapes are deleted in the borrowing process, it is necessary to examine the concept of a syllable in native ASL signs and the prosodic word constraint on loanwords.

3. *Syllable structure of ASL*

One important constraint on borrowing foreign words is that they conform to the native language's syllable template. It is widely accepted that complex onsets are universally more marked than simple onsets and complex codas are more marked than simple codas (Kager 1999). In Boumaa Fijian, codas are disallowed, so we see evidence of syllable repair through vowel epenthesis: 'kaloko' (clock) and 'aapolo' (apple) (Dixon 1998). Languages can also avoid complex onsets, as observed in Japanese speakers treatment of loanwords *furendo* (‘friend’), *sutoro*:*ku* (‘stroke’), and *gurasu* (‘glass’) (M. Volpe, p.c.); also in Egyptian Arabic *tiransilet* (‘translate’) and *bilastik* (‘plastic’) (Broselow 1982).

SPECIAL = 1 syllable



UNDERSTAND=1 syllable

Since ASL is a visual - manual language, the traditional way of thinking of syllable structure in terms of a nucleus, onset, and coda must be modified. Secondly, syllable structure in spoken language is normally analyzed in a linear manner, (e.g. CV, CCVC), yet signs are often composed of handshapes that are produced simultaneously. In short, although the correlation is not perfect[13], studies such as Sandler (1989), Mandel (1981), Perlmutter (1993) and Brentari (1998) have shown that the concept of a syllable can be applied to ASL.

Following this, an ASL syllable is determined by sequential phonological movements and native signs cannot be more than one movement, or one syllable[14]. I define a *native sign* as a manual utterance employing one or both hands, in which the digits form a non-complex HS and move in a single path. This single path movement is equal to one morpheme. However, a sign can be polymorphemic - the HSs, palm orientation, and POA of the hands each function as affixes to contribute meaning - yet monosyllabic due to the single path movement (Padden 1998). An example of a monomorphemic, monosyllabic sign is UNDERSTAND; a polymorphemic monosyllabic sign is I-GIVE-YOU. No signs currently exist in the language which lack movement, therefore we can generalize that a well-formed sign is one that has movement.

The motivation for a one syllable maximum for all ASL signs is based on the fact that there is a greater percentage of signs containing simple movements (monosyllabic signs) than any other type (Padden 1998; Stokoe et al. 1965)[15].

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[13] It should be noted that the following asymmetries need to be resolved in order to having a unifying account of signed and spoken languages: (1) sonority sequencing constraints: it has been theorized that sonority rises in the first half of the syllable and falls during the second and that the syllable peak has the greatest sonority (Selkirk 1982; Clements 1990; Zec 1988); it is still unclear how this can be applied to sign languages since no phonetic *clusters* occur; (2) syllable hierarchical internal structure: there is no way to speak of a *signed* onset or rime in terms of phonological contrast (Hayes 1989; Hyman 1985; Perlmutter 1992); (3) heavy versus light syllables: heavy syllables in spoken languages are believed to have two or more moras while light syllables contain one mora (Kager 1999); arguments for a heavy-light contrast in ASL have been made by correlating complex-simple movements to unimoraic-bimoraic structure in spoken languages (Brentari 1998).

[14] Many thanks to Mark Aronoff for his valuable contributions to my one syllable/one movement argument.

[15] In Stokoe's *Dictionary of American Sign Language on Linguistic Principles* (DASL) 82% of the sign corpus contained simple movements compared to only 18% which had complex movements. A *complex* movement involves more than one co-occurring path movement; a *simple* movement has a single path movement.

Brentari (1998) has claimed that there is two-syllable maximum, providing examples such as CURRICULUM and PROJECT. However, these signs are loans, and syllable violations in loanwords are not unusual. Bisyllabic signs can result from derivational processes, where a monosyllabic root verb is given an added movement morpheme to create a noun, such as AIRPLANE (2 movements) derived from TO-FLY (one movement). A sign like PAPER, which has two movements, can be explained by examining its verbal root TO-CRUSH (pulp). Secondly, plain root verbs containing one movement can receive added movement as inflection, for example, LOOK-FOR (one, sequential circular movement) to LOOK-FOR-REPEATEDLY (circular, repeated movement with trilled fingers). In sum, the only apparent violators of the one syllable maximum are loans and morphologically derived signs; native roots all appear to be monosyllabic[16]. UNDERSTAND and SPECIAL are monosyllabic native roots involving one movement.

In the less assimilated example of #MORPHOLOGY, the transition from one letter to the next counts as one syllable, or movement, for a total of four as compared to an established loan like #BACK, which only has one movement:

M → P → H → L → Y B → K
1 1 1 1 = 4 σ 1σ

The driving force behind the reduction of English letter HSs then is the prosodic word constraint on ASL signs. For example, the word 'phonology' was initially signed P-H-O-N-O-L-O-G-Y with all the English letters represented, entailing six phonological movements, (i.e. six syllables), then was reduced, at its current stage of assimilation, to three, #P-H-L-Y[17] .

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[16]exceptions include SCHOOL, and DESTROY. However, the etymology of SCHOOL reveals a meaning of "to clap hands to call the class to attention." (S. Bruno, p.c.) The double clap, or movement, therefore is an artifact. Deaf signers in the New York metropolitan area are observed using both the traditional bisyllabic citation form of DESTROY, noted by Brentari (1998), as well as a monosyllabic version.

[17]For #PHONOLOGY, Brentari (1998) observes P-HG-Y and analyzes H-G as one handshape, probably due to the similarity in their handshape features (both utilize the thumb and index finger, and the same palm orientation) thereby claiming this loanword has 2 syllables: P → [HG] → Y=2. However, I have observed the following form P-H-L-Y on Long Island, and disagree with this grouping of H and G. Each handshape should be analyzed separately. Therefore, P→H→G→Y would violate ASL's prosodic word constraint because it has three syllables.

Similarly, #EVEN (E-V-N), originally three syllables, E➔ V ➔ E➔ N = 3, now has two syllables: E➔ V➔ N = 2. An initialized sign TRIGONOMETRY (/'trigonometry' + CALCULATE/), formed from a semantic root + English fingerspelling, loses eleven handshapes: R-I-G-O-N-O-M-E-T-R-Y, leaving only 'T' +CALCULATE. This loan conforms to the native prosodic word constraint.

The reasons for the elimination of HSs in initialized signs can be best expressed by a markedness constraint on the prosodic word:

(1) **PWD=1σ:** An ASL sign can be at most one syllable (1 movement)

To illustrate this constraint, consider the initialized sign SOCIETY which is comprised of the initial unmarked letter HS 'S' plus the semantic root GROUP. The input for this sign is the English word 's-o-c-i-e-t-y' + GROUP. We never see a form which has all the English letters plus the semantic root. This form would violate PWD=1σ since the total movement between HSs would constitute a six syllable sign:

S➔ O ➔ C➔ I➔ E➔ T➔ Y
1 1 1 1 1 1 = 6σ

4.0 Root faithfulness constraints & positional faithfulness

In the initialized loan SOCIETY, the surface form, S + GROUP~[18], preserves the initial letter of the English word, an unmarked 'S' HS and does not violate the constraint on prosodic word structure. But letters 'O', 'C', 'I', 'E', 'T', and 'Y' are sacrificed indicating that preserving all the HSs of the English input is not as critical. Likewise we do not find a loan of the form S-O-C,

[18] The symbol ~ following a sign root as in GROUP~ indicates a root sign minus its original HS. In S + GROUP the 'S' has replaced the original 'C' HS of the root.

since the movement between letters exceeds one. In addition, a form such as 'S' is not possible since it violates root faithfulness, suggesting that in initialized signs, root features must be preserved over English letters, as shown in tableau 1 (T1) below.

(2) **IDENT ROOT (M):** the specification for the movement of a root sign in the input must be preserved in its output correspondent.
(3) **IDENT ROOT (POA)**: the specification for the place of articulation of a root sign in the input must be preserved in its output correspondent.

T1

/'s-o-c-i-e-t-y' [1]+ GROUP[2] /	Pwd=1σ	IDENT ROOT (M)	IDENT ROOT (POA)	MAX
a. S-O-C-I-E-T-Y + GROUP	*!			
b. S-O-C	*!	*	*	*****
c. S-O-C + GROUP~	*!			****
d. S		*!	*	*******
⇨e. S + GROUP~				******

[2]GROUP: [H_1] [H_2] [dir:circle]

[1]S: [flexed] [all] [thumb]
O: [all] [flexed] [stacked] [nail] [supination]
C: [selected: flexed] [all]
I: [ulnar] [nonselected: flexed] [supination]
E: [nonselected:flexed] [stacked]
T: [selected: -flexed] [thumb] [supination]
Y: [ulnar] [thumb] [selected: -flexed] [supination]

Refer to Appendix A for *key* explaining features of each handshape

Clearly, there is a need to preserve the initial segments of the borrowed English word. Such a faithfulness constraint on the borrowed segment would explain why other letters of the English word are not preserved, such as forms like 'C' + GROUP, 'O' + GROUP, or 'Y' + GROUP.

The preservation of the word-initial letter is due to a special positional faithfulness constraint:

> (4) **MAX WI**: Every word-initial segment in the input must have a corresponding segment in the output (Casali 1997).

In spoken languages, the strong tendency to preserve segments in word-initial position is based on empirical evidence that the first part of a word is often given the greatest degree of length and amplitude (Casali 1997; Steriade 1995; Jun 1995). In language processing, according to Marslen-Wilson (1989), a speaker creates a *cohort group* of all the known words that match the first one or two phonemes audibly perceived; as more segments fail to correspond or are found to be semantically nonequivalent, they are eliminated as potential matches until one remains.

In T2 the loanword PARTY, composed of English P-A-R-T-Y + the semantic root in ASL meaning 'party'[19] candidates (a), (b), (c), and (d) fatally violate MAXWI because they do not preserve the initial English letter. Candidate (e) P-A-R violates PWD=1σ because the movement between letters exceeds the maximum of one. Candidate (f) 'P' violates root faithfulness. Candidate (g), 'P' + PARTY, sacrifices the original HS of the root sign PARTY, which is an unmarked 'Y'. If IDENT ROOT (HS) were to outrank MAX WI we would predict candidate (d) 'Y' + PARTY to emerge. This means that the following ranking obtains: MAX WI >> IDENT ROOT (HS). Generally the HS of the semantic root is sacrificed to preserve the English letter. The winning candidate (g) therefore violates IDENT ROOT (HS) as shown in T2:

> (5) **IDENT ROOT (HS):** the specification for handshape of a root sign in the input must be preserved in its output correspondent.

[19] It should be noted that candidate (d) does not violate IDENT ROOT (HS) because it happens to be identical in every way to the root sign, PARTY (i.e. same 'Y' HS, M, and POA).

T2

/'p-a-r-t-y'[1] + PARTY[2] /	Pwd=1σ	IDENT ROOT (M)	IDENT ROOT (POA)	MAX WI	IDENT ROOT (HS)	MAX
a. A + PARTY~				*!	*	*****
b. R + PARTY~				*!	*	*****
c. T + PARTY~				*!	*	*****
d. Y + PARTY~				*!		*****
e. P-A-R	*!		*		*	***
f. P		*!	*		*	*****
⇨g. P + PARTY~					*	*****

[2] ROOT:- [H_1] [H_2] [dir:strght] [repeat: 180] [ulnar] [thumb] POA: [waist]

[1] P-A-R-T-Y:
P: [ind] [mid] [thumb] [nonselected: flexed] [stacked] [selected: spread] [pronation]
A: [nonselected: flexed] [supination]
R: [selected: -flexed] [cross] [ind] [mid] [supination]
T: [selected: -flexed] [thumb] [supination]
Y: [ulnar] [thumb] [selected: -flexed] [supination]

P+ root 'party'

Utilizing MAX WI, we can now examine several cases of position-sensitive faithfulness, as illustrated in T3, T4, and T5.

T3

/'s-o-c-i-e-t-y' [1]+ GROUP[2] /	Pwd=1σ	IDENT ROOT (M)	IDENT ROOT (POA)	MAX WI	IDENT ROOT (HS)	MAX
a. s-o-c-I-e-t-y + GROUP	*!					
b. T + GROUP~				*!	*	*******
c. E + GROUP~				*!	*	*******
d. I + GROUP~				*!	*	*******
e. Y + GROUP~				*!	*	*******
f. O + GROUP~				*!	*	*******
g. C + GROUP~				*!		*******
h. S-O-C	*!	*	*			*****
⇨ i. S + GROUP~					*	*******

[2]GROUP: [H_1] [H_2] [dir:circle]

[1]S: [flexed] [all] [thumb]
O: [all] [flexed] [stacked] [nail] [supination]
C: [selected: flexed] [all]
I: [ulnar] [nonselected: flexed] [supination]
E: [nonselected:flexed] [stacked]
T: [selected: -flexed] [thumb] [supination]
Y: [ulnar] [thumb] [selected: -flexed] [supination]

In T3 above, the input is semantic root GROUP + English word S-O-C-I-E-T-Y. Candidate (a) violates PWD=1σ because the total number of movements between letters exceeds the maximum of one (S ➔O➔ C➔ I ➔E ➔ T ➔Y=6 σ + ROOT =1 σ). Candidates (b) through (g) violate MAXWI since they do not manifest the word initial letter. All candidates, except (g) and (h), sacrifice the original HS of the root, which was a 'C' HS. Candidate (h), S-O-C, violates the permitted number of sequential movements between letters and also does not remain faithful to the M and POA of the root GROUP.

T4

/'w-a-t-e-r'[1]+DRINK-FROM-RECEPTACLE[2]	Pwd=1σ	IDENT ROOT (M)	IDENT ROOT (POA)	MAX WI	IDENT ROOT (HS)	MAX
a. 'w-a-t-e-r' + DRINK-FROM-RECEPTACLE	*!					
b. DRINK-FROM-RECEPTACLE				*!		*****
c. A + DRINK-FROM-RECEPTACLE~				*!	*	*****
d. W-A-T	*!	*	*		*	***
⇨e. W + DRINK-FROM-RECEPTACLE~					*	****

[1]W: [ind] [mid] [ring] [nonselected: flexed] [selected: spread] [supination]
A: [nonselected: flexed] [supination]
T: [selected: -flexed] [thumb] [supination]
E: [nonselected:flexed] [stacked] [supination]
R: [ind] [mid] [crossed] [nonselected: -flexed] [supination]

[2] DRINK-FROM-RECEPTACLE (ROOT): [H_1] [tracing: arc] [RAFI] POA: [x-plane; chin] [repeat]

In T4 above, WATER is composed of the semantic root meaning TO DRINK FROM A RECEPTACLE[20] + the English fingerspelled word W-A-T-E-R. Candidate (a), having all the English letters 'w-a-t-e-r' and plus the features of the original semantic root would contain five syllables, exceeding the maximum of one: (W ➔A➔ T➔ E ➔R = 4 σ + DRINK-FROM-RECEPTACLE =1 σ). Candidate (b) is the root sign without any English letters, hence it fatally violates, MAX WI. Candidate (c) preserves letter 'A' and the semantic root, but still fatally violates MAX WI since it does not keep the 'W'. Candidate (d) violates IDENT (M) and IDENT

[20] Historical documentation of ASL is scarce, and this sign is so deeply embedded in the lexicon that it is very difficult to determine how the sign was articulated before borrowing occurred. However, speakers of ASL are observed articulating *to drink nonalcoholic liquids* by utilizing an unmarked 'C' HS, a classifier, moving towards the lips. This particular root sign would be utilized if a signer wished to express the concept of *drinking water from a receptacle.* Classifiers are commonly linked with a fingerspelled word in natural discourse: a signer would employ the unmarked 'C' HS after manually spelling the word 'w-a-t-e-r', or the name of any beverage, such as 'coke.' These observations support an input of 'w-a-t-e-r' + DRINK FROM RECEPTACLE.

(POA) since it does not preserve M and POA features of the root sign, DRINK-FROM-RECEPTACLE. Candidate (e) is the winner despite its violation of IDENT ROOT (HS).

In T5 below, the input is the English word P-O-R-T-F-O-L-I-O + semantic root meaning FOLDER. Candidates (a) exceeds the maximum number of syllables and therefore violates Pwd=1σ. Candidates (b) and (c) do not preserve the initial position of the English word. Candidate (d), P-O-R, while satisfying MAX WI does not preserve the M and POA of root FOLDER and also violates PWD=1σ because it has two sequential movements. Candidate (e) 'P' + FOLDER, while satisfying MAX WI, violates the original HS of the semantic root. The ranking of MAX WI over IDENT ROOT (HS) explains why candidate (e) emerges despite its faithfulness violation.

T5

/ 'p-o-r-t-f-o-l-I-o' + FOLDER /	Pwd=1σ	IDENT ROOT (M)	IDENT ROOT (POA)	MAX WI	IDENT ROOT (HS)	MAX
a. 'p-o-r-t-f-o-l-i-o' + FOLDER	*!					
b. F + FOLDER~				*!	*	*********
c. L + FOLDER~				*!	*	*********
d. P-O-R	*!	*	*		*	*******
e. ⇨P + FOLDER~					*	*********

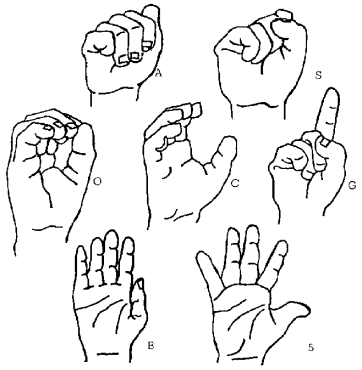
[1]P: [ind] [mid] [thumb] [nonselected: flexed] [stacked] [selected: spread] [pronation]
R: [ind] [mid] [crossed] [nonselected: -flexed]
T: [selected: -flexed] [thumb] [supination]
F: [mid][ind] [ulnar] [-flexed] [supination]
O: [all] [flexed] [stacked] [nail] [supination]
L: [ind] [thumb] [nonselected: flexed]
I: [ulnar] [nonselected: flexed] [supination]
[2] FOLDER: H2 [all] [-flexed] POA: [waist] H1 [all] [-flexed] [strght][repeat]

5.0 Markedness & salience

In the process of loanword formation, the preservation of the initial letter position by MAX WI often introduces a marked HS that is normally not seen in a native root sign, and since initialized loans preserve the M and POA of the root, the signer is forced to articulate this marked HS in an area of the signing space that is not salient. The need to make the loan as easily perceptible as possible will cause a faithfulness violation in the POA of the root: the signer will change the POA to one which is more salient to facilitate perception of the marked HS. In ASL the most salient domain is the head area, hereafter [head]. Therefore we see that remaining faithful to English input (MAX WI) can lead to the use of a marked HS. The requirement to use a marked HS requires a more salient domain, and this in turn entails a faithfulness violation. However, before embarking on a discussion of POA violations, it is necessary to establish a definition of *markedness* and to explain the features that make a HS either marked or unmarked. Below, I provide a criteria for determining the degree of markedness of ASL HSs.

5.1 Handshape markedness

In ASL, HSs are considered either marked or unmarked. Battison (1978) was the first to propose that the most basic (unmarked) HSs of the language were the following: A, S, O, C, G[21], B, 5[22]. His argument is supported by the fact that (1) they are the most widely distributed in the language; (2) they



Basic unmarked handshapes

[21]Commonly referred to as 'INDEX'; this is the form I will use throughout this paper
[22] Commonly referred to as 'SPREAD'.

have a greater number of points where they can contact the body or hand; (3) they form the shape of the passive hand in two-handed signs; (4) they are the first HSs learned by deaf children; and (5) it has been shown that deaf children's substitution errors involve less marked HSs. (McIntire 1977; Boyes-Braem 1990, Cheek et al. 1999, Marentette & Mayberry 2000).

I propose that there is a HS markedness hierarchy: signs increase on a continuum from least complex, A, S, O, C, 'INDEX', B, and 'SPREAD' to more complex, W, P, K, E, M, N, R, T. The former constitute the majority of native signs (i.e. 'classifiers'), while the latter appear as a result of representing English through fingerspelling (i.e. 'loanwords'). No one single factor determines the degree of markedness of a HS, but rather a combination of factors leads to its placement on the continuum. There are four criteria for determining HS markedness, provided in the figure above. If a HS satisfies a particular criterion, then it is assigned a numeric value of 0. A HS which does not satisfy a given criteria, would be assigned a value of 1. For criterion (b), *early acquisition*[23]*,* a stage I HS would have a 0 value; stage II, a 1; stage III, a 2; stage IV, a 3, and finally all other HS outside these sets would be given a 4. HS which have the lowest numeric value are considered 'unmarked'.

Criteria	Handshape			
	'C'	**'R'**	**'A'**	**'Y'**
(a) wide distribution	**0**	**0**	**0**	**0**
(b) early acquisition*	**0**	**3**	**0**	**2**
(c) permitted on passive hand	**0**	**1**	**0**	**1**
(d) no POA restrictions	**0**	**1**	**0**	**1**
1=no 0=yes Total=	0	5	0	4

*early acquisition: stage I = 0, stage II= 1, stage III= 2, stage IV= 3, all others= 4

For example, a HS like 'C' which is (a) widely distributed in the language (i.e. used as a classifier), (b) is found in the earliest stages of deaf children's HS acquisition (Boyes-Braem 1990), (c) forms the shape of the passive hand in two-handed signs, and (d) is not restricted to

[23] Boyes-Braem (1990) proposed four stages of HS acquisition: S1=A, S, L, baby O, INDEX, 5, and C; S2= B, F, O; S3= Y, I, D, K, 3, V, U, W; S4= 8, X, R, E.

any certain area of the body would be given a 0 value and therefore placed at the far end of the continuum. It would be equal in markedness to any other HS which achieved the same value, 'A' or 'INDEX'. In contrast, a HS like 'R' which appears in only a small percentage of signs and is not used as a classifier, is acquired by deaf children much later (i.e. 'stage III', Boyes-Braem 1990), can never appear in the passive hand of two-handed signs, and is restricted to a salient domain of the signing space would fall on the other end of the continuum, and be equal in markedness to a HS matching the same criteria, such as 'X' or 'E'. A HS such as 'Y' would be considered less marked than 'R', yet more marked than 'A' or 'C', since it appears as a classifier, is found in stage III of children's acquisition, does not appear to have restrictions, but is not permitted on passive hand in two-handed signs. It would have the same numeric value as the HSs 'I' or 'W' and therefore similar markedness. HS markedness plays a role in the errors of signing children. Studies have shown that of the three major sign parameters: HS, M, and POA, deaf children produce the most errors in HS, followed by M and finally POA, which has the lowest frequency of error (Marentette & Mayberry 2000; Siedlecki & Bonvillian 1993; Cheek et al.1999). The errors depend on the total number of possibilities in each of these three sign parameters. A signer has fewer POA choices compared to the choices available for HSs and therefore there is less chance of error in POA. When presented with an adult form containing a marked 'Y' HS, COW, a deaf child will substitute a less marked INDEX HS in the early stages of language acquisition. According to the HS markedness hierarchy, 'Y' is avoided: *Y >> *INDEX.

T6

/COW/ ('Y' @ temple)	***Y**	***INDEX**
a. COW ('Y' @ temple)	*!	
⇨b. COW (INDEX @ head) [24]		*

[24] Marentette & Mayberry (2000). Please note that the child also substituted the [temple] POA for [head], however, this will not be addressed here.

When the MAX WI constraint forces a marked HS to appear an adjustment may take place. This adjustment may be classified as a *repair* to enhance perception. If an English borrowing, for example, has a marked HS, and its potential semantic root does not provide a salient POA, modifications must be made to it to ensure visual acuity (Siple 1978). The borrowing will be moved to the most salient domain, [head].

most salient domain
(Battison 1978)

5.2 ***Changes in place of articulation as a way of enhancing salience***

When a marked word-initial HS in an initialized loan is accompanied by a change in the POA, the change is always in the direction of a more salient POA. For example, if a marked HS such as 'T', which is articulated in the lower trunk area in an initialized loan like TWIN, has to be word-initial by virtue of MAX WI, its POA changes, and it moves to a more visible or salient domain, the [head]. The claim that marked HSs cannot appear in a non-salient domain is supported by data collected by Stokoe et al. (1965) in which it was shown that the percentage of marked HSs in the head area (i.e. eyes, chin, nose, temple, etc.) was higher (33.1%) than the percentage of marked HSs in the trunk area (24.1%) ($x^2 = 4.10$; d.f. = 1; $p<.05$). Although this study was conducted many years ago, a simple inventory of modern ASL signs still reveals the proportions to be accurate. Marked HSs never appear in the waist area, or in the extremities of the signing area, for example, below the waist, above the head, or beyond the shoulders. Marked HSs must appear as near to the head area as possible. As HSs move away from the head toward the extremities, their need to be unmarked increases.

Deaf children also find the [head] area to be more salient and the POA errors they make tend to involve shifts to areas of the head. In a longitudinal study of three deaf children, Conlin et al. (2000) reported that POA errors only constituted 18.6% of 372 tokens, compared to HS and M which were much higher. The most frequently used POA was the face or head area (37.5% of the corpus) or neutral space[25] (47.8% of the corpus). Rarely were the signs articulated in some other region (7.8%) such as the torso. Adult signs that require contact with the contralateral side of the torso, were often substituted with an ipsilateral POA. This could be attributed to difficulty in reaching across the midline (Bonvillian & Siedlecki 1996).

The need for perceptual acuity is not limited to signed languages. In spoken languages, it is widely accepted that there is universal sonority sequencing. *In any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values…'* (Selkirk 1984: 116). The more open the vocal tract is, the more sonorous the segment; vowels are the most sonorous followed by glides, liquids, nasals, voiced obstruents, and voiceless obstruents (Kenstowicz 1994). Manner and POA in speech can be equated to M and POA of signs in ASL, respectively, some being more marked than others for articulatory reasons. For example, the equivalent of the sonority scale in signed languages is: shoulder >> elbow >> wrist >> base joints >> nonbase joints (e.g knuckles) (Brentari 1998). Signs, such as DAY that are produced using the elbow would be perceived at a greater distance than a sign such as PERPLEXED which involves only the nonbase joints (Brentari 1998, p.217). As predicted, PERPLEXED is produced on the head, increasing the likelihood of perception.

The initialized sign TWIN is an example of a loan that has undergone a change in POA in order to ensure that its marked HS is perceived. It is produced using a marked HS 'T' moving horizontally from the ipsilateral side of the chin to the contralateral side, with a M of [single].

---

[25] *neutral space* refers to the area just in front of a signer at the chest level, but not in contact with the body.

The input for this loan is the root sign meaning TO-BE-BORN[26] + the English letters T-W-I-N. The HS markedness hierarchy for TWIN is *T, *N >> *W, *I. This constraint predicts the loan to emerge with either 'W' + TO-BE-BORN or 'I' + TO-BE-BORN, 'W' and 'I' being the most unmarked. However, MAX WI is ranked higher than any of the markedness constraints on HS, and therefore only candidate (d) remains faithful (T7).

LSF: JUMEAUX

T7

/'t-w-I-n'[1]+ TO-BE-BORN[2]	MAX WI	*T	*N	*W	*I
a. N + TO-BE-BORN~	*!		*		
b. W + TO-BE-BORN~	*!			*	
c. I + TO-BE-BORN~	*!				*
⇨d. T + TO-BE-BORN~		*			

[1] T-W-I-N:
T: [selected: -flexed] [thumb] [supination]
W: [ind] [mid] [ring] [nonselected: flexed] [selected: spread] [supination]
I: [ulnar] [nonselected: flexed] [supination]
N: [ind] [mid] [thumb] [nonselected: flexed] [supination]
[2] ROOT: [H1]: [all] [-flexed][dir:strght] [pronation] [H2]: [all] [-flexed]
POA: [waist]

ASL: TWIN

[26] I base the input on the historical link between ASL and French Sign Language (LSF). The sign for 'jumeaux' (twin) as well as 'être né' (to be born) is produced in the lower trunk area, symbolic of the womb, and identical in POA to modern TO-BE-BORN in ASL. In FSL, JUMEAUX is articulated with two unmarked 'S' handshapes as shown in the pictorial, while ASL changes the POA to the head. In ASL, the sign TRIPLET is produced by signing TO-BE-BORN plus THREE; TO-BE-BORN is a native sign containing an unmarked handshape. The appearance of BORN in a related native form as well as the similarity between ASL and LSF lead me to hypothesize that TWIN originated as 'twin' + the semantic root TO-BE-BORN. Other researchers have suggested that TWIN is a 'status' sign having no semantic root (Padden 1998; Bentari & Padden, in press).

What remains puzzling is the fact that the surface form, 'T' + TO-BE-BORN, has a completely different POA from the root. TO-BE-BORN is produced at the waist area, a non-salient domain, whereas the surface form, 'T' + TO-BE-BORN, is articulated at the mouth, a salient area. Recall that in general, initialized loans tend to preserve the POA and the M of the root sign, therefore, the root POA is violated. The surface form TWIN has a [head] POA while the root TO-BE-BORN has a [waist] POA. Normally, a 'T' + TO-BE-BORN [head] would be ruled out by IDENT ROOT (POA) since [waist] and [head] are not identical in nature, as illustrated in T8.

T8

/ 't-w-I-n'[1] + TO-BE-BORN[2] [waist]/	IDENT ROOT (POA)	MAX WI	*T
a. TO-BE-BORN [waist]		*!	
b. 'T' + TO-BE-BORN~ [head]	*!		*
c. ➔ 'T' + TO-BE-BORN~ [waist]			*

[1]T-W-I-N:
T: [selected: -flexed] [thumb] [supination]
W: [ind] [mid] [ring] [nonselected: flexed] [selected: spread] [supination]
I: [ulnar] [nonselected: flexed] [supination]
N: [ind] [mid] [thumb] [nonselected: flexed] [supination]
[2] BORN: H1 [all] [-flexed][dir:strght] [pronation] H2 [all] [-flexed]
POA: [waist]

Faithfulness to initial-word position (MAX WI) results in 'T' + BORN [waist] bearing a marked HS. It would be difficult for a signer to perceive the 'T' features if the sign were articulated so low in the field of vision, so the sign is moved to the [head] area. The initialized loan respects MAXWI by preserving 'T' but violates IDENT ROOT (POA) since the sign has been moved to the mouth[27].

[27] The appearance of 'T' + TO-BE-BORN [mouth] in the lexicon, indicates that IDENT ROOT (POA) must be ranked lower than a markedness constraint preventing marked HSs from appearing in a nonsalient position. I leave this question to future research.

Another example of MAX WI entailing violations of IDENT (POA) is found in the loanword BACHELOR. BACHELOR is formed from the semantic root sign meaning 'single' and the English word B-A-C-H-E-L-O-R. MAX WI rules out candidates having letters other than 'B', (*A + SINGLE, *R + SINGLE, etc.). The HS markedness hierarchy for BACHELOR is *H, *B >> *E, *R >> *O >> *A, *C, *L[28] so this means that a marked HS must be made. Like TWIN, there is a violation of POA faithfulness. The root sign has an unmarked 1 HS and has a [chest] POA. However, the surface form has a [head] POA. The signer moves the 'B' HS in a [single] movement from the ipsilateral side to the contralateral side of the chin. Faithfulness to MAX WI leads to a faithfulness violation of IDENT POA.

Other loans which pattern after BACHELOR and TWIN, violating POA to avoid having a marked handshape in a non-salient region, include PARK (EARTH + 'P'), CAKE[29] (TO-BAKE + 'K'), POISON (TO-BECOME-BONES + 'P'), VANILLA (TO-GRIND + 'V'), and VITAMIN (TO-TAKE-PILL + 'V').

8. Conclusion

In this paper I focused on a specific class of loanwords in American Sign Language created from the convergence of a signed root and a borrowed English word. One premise of the discussion of their formation is that material from English is conveyed visually by a process called fingerspelling. Fingerspelling is a manual representation of the letters of an English word using various HSs. Since deaf signers have phonemic awareness, these HSs are always accompanied by mouth movements corresponding to sounds (Padden 2001). A second assumption, well documented from the literature on spoken language, is that the first sound of a

[28] While I have ranked *A and *C here equally, it is also possible to posit ***C >> *A** since fully open or fully closed HSs are though to be more perceptually salient than handshapes having partially extended fingers (Brentari 1990).
[29] The loan word CAKE appears to be another exception, like TRANSSEXUAL and COMMON-LAW, in that it does not preserve the letter 'C' but rather 'K'.

word is often given the greatest degree of length and amplitude, and that there is a need to preserve initial material for processing. The ability to actually hear these initial phonemes depends on the degree of hearing loss of a deaf individual; however, what remains constant is that deaf signers need to perceive the initial sound, regardless of modality, for the same reasons that non-deaf speakers do: language processing. Against this backdrop, I demonstrated that the initial position of a borrowed English word is always preserved by the faithfulness constraint MAX WI. Its effects on English letters were illustrated with the loans SOCIETY, WATER, PARTY, and PORTFOLIO. These surface forms all appear without the original HS feature of the root, therefore I concluded that MAX WI outranks IDENT ROOT (HS). Faithfulness to root HS ranks lower than faithfulness to the first English letter. However, in this particular class of loans only, faithfulness to English does not appear to extend beyond initial position. To account for the absence of initialized loans which preserve more than one English letter (examples such as S-O-C-I-E-T-Y + GROUP or S-O-C, W-A-T-E-R + DRINK-FROM-RECEPTACLE or W-A-T, P-A-R-T-Y + PARTY or P-A-R, and T-W-I-N + TO-BE-BORN), the following ranking was proposed: PWD=1σ, IDENT ROOT (M), IDENT ROOT (POA)>>MAX. The ranking of PWD=1σ, IDENT ROOT (M), IDENT ROOT (POA) >> MAX predicts that forms missing root M and POA features, such as S and S-O-C, should not exist since faithfulness to root M and POA is more crucial than the preservation of all the English letters.

Adopting the definition of a sign language syllable as sequential phonological movement, I took the received point of view that in fingerspelling, the transition from one letter HS to another is equal to one syllable. Prior literature in the field of ASL has suggested that ASL signs can have a maximum of two syllables. Contrary to this, I proposed that signs can have at most one movement. Forms that appear to violate this prosodic word constraint are inflectional and derivational forms or other classes of loanwords at various stages of assimilation.

An outcome of faithfulness to initial word position and faithfulness to the POA and M of the root, is that marked HSs are then produced in what I termed a *non-salient domain*. I provided criterion for determining the degree of HS markedness. When borrowings contain marked HSs in a non-salient domain, a reparation is needed to make them as perceptually salient as possible. This is achieved through a change in POA to the [head] region at the expense of violating root faithfulness. In sum, a faithfulness constraint, MAX WI, entails a markedness violation, which in turn forces a faithfulness violation, IDENT ROOT (POA). This was illustrated by the signs TWIN and BACHELOR. A likely assumption would be that in all cases where a marked HS appears in a perceptually incongruent region, signers would have to violate POA. However, in loans such as, PORTFOLIO, faithfulness to root movement, IDENT ROOT (M), provides adequate perceptibility, and therefore a POA violation never occurs. The longer a marked HS appears in the field of vision, the greater the chances of perception. Many other loans pattern after PORTFOLIO.

Until this point, the use of Optimality Theory in ASL phonology has been limited to work by Brentari (1998). She has attempted an optimality-theoretic account of a phenomenon in native signs called *weak-drop.* Weak-drop refers to the removal of one of the signer's hands in a non-alternating type 1 sign[30]. Brentari proposes constraints on two-handed signs in terms of contact, HS, orientation, M, and POA features and demonstrates how these determine well-formed weak-drop outputs. She also suggests both faithfulness and markedness constraints on native ASL signs, for example Prosodic Word=1$\leq$2σ ("core lexemes consist of at least one syllable and not more than two") and Align (L) ("Align initial handshape of stem with left edge of stem"). In this paper, I took the position that PWD1$\leq$2σ is more accurately PWD=1σ, which eliminated forms such as S-O-C and 'S-O-C-I-E-T-Y + GROUP'. Brentari (1998) uses Align (L) and Align (R) to account for ASL loanwords which preserve both the initial and final English

[30] a *type 1 sign* is one that has synchronous (non-alternating) movement

letter positions (#JOB→ J-B, #EASY→ E-S-Y, #STOCK→ S-K). I take issue with the use of alignment constraints because although they work successfully in spoken languages, it is not clear how a restriction which refers to 'edges' can be applied to signed languages since borrowed segments are articulated simultaneously with roots, or more accurately, meshed with the semantic root in a form of coalescence. The loanwords used in her analysis, such as #JOB and #STOCK, do not have a root sign in the input and therefore do not preserve the root M and POA features. Her work does not address the class of loans which are a combination of English fingerspelling and root signs. However, the present study proposes a grammar which can handle the class of initialized loans as well as account for the preservation of initial English letters in types like #JOB and #STOCK[31].

The present work not only suggests refinements to what is a very limited number of constraint-based analyses of ASL, but also introduces new constraints that will contribute to the breadth and depth of research in ASL loanword phonology.

An important step for this study is to collect samples of newly created initialized loanwords and to establish an ASL loanword database from which to draw forms for further analysis. One prediction of my analysis is that new forms of initialized loans should adhere to the constraint ranking of PWD=1σ, IDENT ROOT (M), IDENT ROOT (POA), MAX WI >> IDENT ROOT (HS). Locally we find the following new initialized loans in use in the deaf community: FOXY (as in 'a *foxy* lady'), a combination of root sign TO-PUT-ON-LIPSTICK + 'F'; HOULIHANS, formed from RESTAURANT + 'H', and STONYBROOK-HOSPITAL, created from root sign HOSPITAL + 'S-B'. All of these conform to the grammar proposed in this study. The events of September 11, 2001 have lead to the creation of the following new loans: WORLD-TRADE-CENTER and BIN-LADEN, the former created from a combination of the semantic root

[31] I do recognize the fact that a faithfulness constraint is needed in addition to MAX WI to account for the final letter preservation in loans which have no semantic root input, #JOB (J-B) and #STOCK (S-K). This question I leave to future research.

BUILDING-COLLAPSE + 'W-T-C', the latter, a combination of the root LONG-BEARD + 'B-L'. WORLD-TRADE-CENTER, appears to violate the PWD constraint since it has two syllables, indicating MAX WI>> PWD=1σ. This suggests that future work in this area should include an examination of loans from other strata: those which preserve two or three letter HSs, and how the current theory handles these forms. At this point, it appears that ASL may have a core grammar and a periphery grammar, similar to that proposed by Itô & Mester (1995) for Japanese. The prediction is that MAX WI would not be active in native signs. This constraint only becomes active when root signs are joined with English spelling. PWD=1 would rank high since well-formed native signs are those which contain no more than one movement. IDENT ROOT (M), IDENT ROOT (POA) and IDENT ROOT (HS) will rank equally unless further analyses of native signs reveal that faithfulness to root POA and HS is more critical than faithfulness to root M. The existence of morphologically derived signs with complex movements alludes to the ranking of IDENT ROOT (M) below than IDENT ROOT (HS) or (POA).

A loanword found in the stratum closest to the core, such as FOXY ('F' + PUT-ON-LIPSTICK), would adhere to the ranking initially proposed in this paper: PWD=1σ, IDENT ROOT (M), IDENT ROOT (POA), MAX WI >> IDENT ROOT (HS).

In the periphery stratum, where WORLD-TRADE-CENTER (W-T-C + BUILDING-COLLAPSE) is found, the following grammar is predicted: MAX WI >> PWD=1σ, IDENT ROOT (M), IDENT ROOT (POA) >> IDENT ROOT (HS). For this stratum of loanwords, MAX WI >> PWD=1σ indicates that remaining faithful to the English word entails a violation of prosodic word structure. In sum, the farther removed a sign is from the core (native), the more faithful it is to the borrowed input and hence the more likely it is to violate PWD=1σ.

APPENDIX A

Key* for specific
handshape, movement, & place of articulation
features used in tableaux

Hands:

[H_1] = dominant hand of signer
[H_2] = nondominant hand of signer

Handshape:

[all] = the index, middle, ring, and pinky all selected
[contra] = contralateral
[crossed] = fingers crossed (i.e. R)
[flexed] = fingers flexed (i.e. 'bent')
[-flexed] = fingers not bent
[ind] - index finger
[ipsi] = ipsilateral
[nonselected] = any finger not performing an action or engaged
[pronation] = palm downward
[RAFI] = radial side of fingers
[stacked] = fingers supporting each other (i.e. P, K E,)
[supination] = palm upward or forward
[thumb] = thumb
[ulnar] = pinky
[mid] = middle finger
[ring] = ring finger

Movement:

[180^0] = movement comes 180 degrees
[repeat] = movement is repeated (i.e. 2 movements)
[single] = one movement
[trill] = movement is trilled (i.e. indiscernible number of movements)
[mult] = multiple movements ($n \geq 3$
[strght] = movement is straight
[tracing] = forming an imaginary line with a finger
[arc] = forming an arc either in the air or contacting another hand or part of the signer's body
[circle] = tracing a circle
MF = movement feature
M = movement

Place of Articulation

POA = place of articulation (i.e., torso, waist, lower torso, head…)
[waist] = sign produced in/at the waist area (i.e. lower torso)
[mouth] = sign produced in/at the mouth area (i.e. including chin)

*Some terms may reflect those used by Brentari (1998); others are uniquely of my own creation.

APPENDIX B

Initialized loans examined for this study*

ADULT
ASSOCIATION
ATTITUDE
AUNT
BACHELOR
BAPTISM
BASEMENT
BIN LADEN
BIOLOGY
BLUE
BOARD
BROWN
CAFETERIA
CAKE
CALCULATE
CHEMISTRY
CLIENT
COACH
COMMUNICATE
COMPUTER
COUSIN
CRITERIA
CHAIR PERSON
DEPARTMENT
DIVORCE
ENERGY
EVALUATE
EXAM
EXAMINE
FACULTY
FAMILY
FEEDBACK
FOXY
GAY
GENERATION
GEOGRAPHY
GREEN
HOULIHANS
HICKSVILLE
INTERNSHIP
INDUSTRY
JEHOVAH-WITNESS
LESBIAN
LIBERTY
MATURE
METS
NEPHEW
NEGOTIATE
NIECE
ORGANIZATION
PARENTS
PARTY
PARK
PEOPLE
PERSONAL
PERSONALITY
PLANET
POISON
PORTFOLIO
PORTFOLIO^{2}
PURPLE
RABBI
RECTANGLE
REGISTRAR
RELIGION
RESIDENT
RESPECT
RETARDED
RIVERHEAD
RISK
ROAD
ROME
SOCIOLOGY
SENATE
SOCIETY
SQUARE
STAFF
STAGE
STATISTICS
STONY BROOK HOSPITAL
SUPERMAN
TAN
TEAM
TEENAGER
TRAIN
TRAIT
TRIGONOMETRY
TRY
TWIN
UNCLE

UNIVERSE
UNIVERSITY
VANILLA
VEGETABLE
VIDEOTAPE
VITAMIN
VOCATION
WATER
WEATHER
WINTER
WORLD
WORLD-TRADE-CENTER
YANKEES
YELLOW

*(Bold-faced signs indicate loans which violate POA for salience)

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