

THE EMERGENCE OF UG IN THE PERIPHERY: VOWEL HARMONY IN HEBREW LOANWORDS

Introduction: In this talk, I will discuss the role of universal grammar (UG) in loanword adaptation. I will show that vowel quality in Hebrew loanwords from English is based not only on phonetic proximity or orthography, as is usually the case, but also on universal constraints requiring vowel harmony. This is rather unexpected, considering the fact that Hebrew (as spoken today) does not have a *productive* process of vowel harmony.

The argument is based on corpus and experimental data from Hebrew loanwords, with an emphasis on variations such as [keŋdeɾu] and [keŋduɾu] for Hebrew 'kangaroo'. I will argue that while the former variant reflects phonetic proximity, the latter exhibits vowel harmony. I will attribute the *optional* application of vowel harmony to the effect of a universal principle emerging at the periphery of Hebrew's lexicon. That is, while the core phonology of a language may show hardly any evidence for a particular universal principle, its effect may emerge in the periphery, such as loanwords (Paradis and Lacharité 1997, Itô and Mester 1999, Shinohara 2004, Kenstowicz and Suchato 2006).

I will present a formal model within Optimality Theory (OT; Prince and Smolensky 1993/2004), accounting for vowel harmony in Hebrew, with variation being attributed to Stochastic OT (Boersma 1998), Noisy Harmonic Grammars (Boersma and Pater 2008), or Weighted Constraints (Pater 2009).

The Problem: The phonological form of loanwords is subject to some language-specific productive grammar, with non-compliant words undergoing adaptation. Adaptation is inevitable in the vowels of Hebrew loanwords from English, since 11 or so English monophthongs must comply with Hebrew's 5-vowel system (/ieaou/). Perception and orthography are by far the most common sources of the adaptation of Hebrew vowels (Cohen 2009), accounting for ~95% of the data. However, a corpus-based study and experimental evidence reveal that in some cases the only way to account for vowel quality in adapted forms is vowel harmony.

For example, English [kæŋgəɾu] 'kangaroo' is produced in Hebrew as either [keŋdeɾu] or [keŋduɾu]. The Hebrew vowel [e] is acoustically "closest" to English [ə], which explains [keŋdeɾu]. However, the [u] in [keŋduɾu] is only attributable to vowel harmony, as orthography would produce [a], and epenthesis would give us Hebrew's standard epenthetic [e]. Similarly, [fɔːrwəɪd] 'forward' is adapted as [fɔɾwoɪd] in Hebrew. Once again, as the Hebrew vowel [e] is acoustically closest to English [ə], the second vowel in the Hebrew form must be attributed to vowel harmony (orthography=[a], epenthesis=[e]).

The Solution: I propose that vowel harmony is a reflection of universal principles, outlining the unmarked state of affairs (TETU – The Emergence of The Unmarked; McCarthy and Prince 1995, Shinohara 2004). Although there may be no evidence of these principles in the core of the Hebrew lexicon, they nevertheless surface in the periphery (in this case, loanwords).

Two kinds of constraint are relevant (Kitto and de Lacy 1999):

- (a) Constraints requiring schwa adaptations and epenthetic vowels to be unmarked; e.g. $M(V \rightarrow e)$ is the set of constraints conspiring to produce [e] as the unmarked vowel.
- (b) Constraints requiring the epenthetic vowel to correspond with some underlying vowel, i.e. to harmonise with an input vowel; e.g. $\mathcal{B}\text{-E-IDENT-F}$ is the set of constraints requiring the base vowel \mathcal{B} and the epenthetic vowel E to have the same values for the feature F .

In vowel harmony languages, $\mathcal{B}\text{-E-IDENT-F}$ outranks $M(V \rightarrow e)$, whereas in non-vowel harmony languages, $M(V \rightarrow e)$ outranks $\mathcal{B}\text{-E-IDENT-F}$. In Hebrew, we generally get the latter, but in loanwords, we witness variation resulting from fluctuation in the ranking of these constraints.

The resulting variation is attributable to Stochastic OT (Boersma 1998), Noisy Harmonic Grammars (Boersma and Pater 2008), or weighted constraints (Pater 2009), allowing fluctuations in the

constraint ranking. In the native lexicon, Hebrew is a non-vowel harmony language, and the constraint ranking is thus $M(V \rightarrow e) \gg \mathcal{B}\text{-E-IDENT-F}$. In the non-native lexicon, i.e. in loanwords, there is a certain degree of variation, suggesting that both rankings, $M(V \rightarrow e) \gg \mathcal{B}\text{-E-IDENT-F}$ (1) and $\mathcal{B}\text{-E-IDENT-F} \gg M(V \rightarrow e)$ (2), may occur.

(1)	/dɪmæɪ/ 'dimmer'	$M(V \rightarrow e)$	$\mathcal{B}\text{-E-IDENT-F}$
No harmony:	☞ a. dimeɛ		*
Harmony:	b. dimiɛ	*!	

(2)	/ɪmæd̥z/ 'image'	$\mathcal{B}\text{-E-IDENT-F}$	$M(V \rightarrow e)$
No harmony:	a. imed̥z	*!	
Harmony:	☞ b. imid̥z		*

Vowel harmony is not introduced in the core lexicon of Hebrew, given the dominance of non-harmonizing forms. For example, there is only one new masculine noun with *o* taking the feminine suffix *-ot* (*dox* → *doxot*), although Becker's (2009) experimental evidence strongly suggest the role of vowel harmony in the selection of the masculine suffix.

Conclusion: Vowel harmony is a reflection of a universal principle preferring harmonising vowels. Constraints on markedness (producing unmarked epenthetic vowels) and faithfulness (ensuring that input vowels do not change) prevent harmony in some languages. But even in these languages, the universal tendency to harmonise may surface when the effect of the markedness and faithfulness constraints is relaxed, something which happens in the periphery of the lexicon.

- Becker, Michael. 2009. *Phonological trends in the lexicon: The role of constraints*. Doctoral dissertation, University of Massachusetts Amherst.
- Boersma, Paul. 1998. *Functional phonology: Formalizing the interactions between articulatory and perceptual drives*. Doctoral dissertation, University of Amsterdam, Amsterdam.
- Boersma, P. and B. Hayes. 2001. Empirical tests of the Gradual Learning Algorithm. *Linguistic Inquiry* 32:45-86.
- Cohen, E-G. 2009. *The role of similarity in phonology: Evidence from loanword adaptation in Hebrew*. Doctoral dissertation. Tel Aviv University, Tel Aviv.
- Davidson, L. 2007. The relationship between the perception of non-native phonotactics and loanword adaptation. *Phonology* 24:261-286.
- Itô, Junko and Armin Mester. 1999. The structure of the phonological lexicon. In Tsujimura Natsuko (ed.) *The Handbook of Japanese Linguistics*. Cambridge MA: Blackwell. 62-100.
- Kenstowicz, M. and A. Suchato. 2006. Issues in loanword adaptation: A case study from Thai. *Lingua* 116:921-949.
- Kitto, C. and P. de Lacy. 1999. Correspondence and epenthetic quality. In Carolyn Smallwood and Catherin Kitto (eds.) *Proceedings of ALFA VI: The Sixth Meeting of the Austronesian Formal Linguistics Association*. Toronto: University of Toronto Press. 181-200.
- Paradis, Carole and Darlene LaCharité. 1997. Preservation and minimality in loanword adaptation. *Journal of Linguistics* 33:379-430.
- Prince, Alan and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint interaction in generative grammar*. Oxford, Basil Blackwell. [Also TR 2, Rutgers University Cognitive Science Center].
- Shinohara, S. 2004. Emergence of Universal Grammar in foreign word adaptations. In Rene Kager, Joe Pater and Wim Zonneveld (eds.) *Constraints in phonological acquisition*. Cambridge: Cambridge University Press: 292-320.