

Dynamics and Transparency in Vowel Harmony

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DEDICATION

To my wife Jana
and to my sons Matej and Samuel

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ABSTRACT

This dissertation examines the phonological patterning as well as phonetic characteristics of transparent vowels in Hungarian palatal vowel harmony. Traditionally, these vowels are assumed to be excluded from participating in harmony alternations. The experimental data presented in this dissertation run contrary to this assumption. The data show that transparent vowels in Hungarian are articulated differently depending on the harmonic domain in which they occur. Based on this observation, the central claim defended and formalized in this dissertation is that continuous phonetic details of all stem vowels including the transparent vowels are relevant for the phonological alternation in suffixes.

The dissertation proposes an integrated model that relates phonetic and phonological aspects of vowel harmony using the formal language of non-linear dynamic. The advantage of this approach is in its potential to capture both qualitative as well as quantitative aspects of the same pattern in a unified way. Crucially, a dynamic approach allows one to express both phonological and phonetic generalizations while maintaining the essential distinction between them. Hence, the dynamic approach provides a feasible research strategy in the quest for understanding one of the continuing challenges in the study of speech: the relation between

phonology – the mental or symbolic aspects of our speaking competence, and phonetics – continuous physical manifestations of this competence.

Applied to the particular case of transparency in Hungarian vowel harmony, the premise of interdependency between the phonetic properties of the stem vowels and the phonological patterns of suffix selection allows for an explanation of a broad range of data. Most importantly, it provides a motivation for the cross-linguistic generalizations related to transparent vowels in palatal vowel harmony systems. In addition, the effects of tongue body height, lip rounding, and surrounding vocalic context on the suffix selection in Hungarian receive a natural and lawful explanation.

To summarize, this dissertation presents novel experimental data from the production of transparent vowels in Hungarian. The proposed integrated model, relating phonetics and phonology using the formal language of non-linear dynamic, achieves a unified explanation of both the phonetic and phonological generalizations observed in the data and the literature.

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CHAPTER 1

1.1 Introduction

In palatal vowel harmony systems such as those of Finnish, Hungarian, or Turkish, the [±back] quality of the suffix vowel is determined by the [±back] quality of the stem-vowel. For example, the dative suffix in Hungarian appears either with a front vowel /e/ or a back vowel /a/ depending on the stem vowel: *ház-nak* ‘house-Dative’ but *kéz-nek* ‘hand-Dative’. The stem vowel is thus considered a trigger and the suffix vowel a target of the phonological harmony process. The feature [±back] is called the harmonizing feature.

Polysyllabic stems in which vowels have opposite specifications for the harmonizing feature are called disharmonic stems. A particularly interesting question is what determines the form of the suffix following disharmonic stems or, in other words, which stem vowel is the trigger of the harmony process. To answer this question, vowels in disharmonic stems have been traditionally divided into two categories. Transparent vowels are those vowels that may intervene between the trigger and the target of harmony even when they bear the opposite value for the harmonizing feature. For example, the dative suffix following disyllabic stems such as *papír* ‘paper’ takes on the [+back] value of the initial vowel despite the [–back] quality of the intervening /i/: *papír-nak* ‘paper-Dative’. Opaque vowels, in contrast, require a local agreement relationship between the trigger and the target, i.e. there can

be no intervening vowel. For example, the dative suffix following a disyllabic stem in which a back vowel precedes a front rounded vowel, such as *parfüm* ‘perfume’, must bear the [–back] quality of the immediately adjacent preceding vowel: *parfüm-nek* ‘perfume-Dative’. Hence, transparent vowels allow a non-local relationship between the trigger and the target whereas the opaque vowels ban such a relationship. In Hungarian, the transparent vowels consist of the front unrounded vowels {/i/, /í/, /é/, /e/}, and the opaque vowels include all back vowels and the front rounded vowels {/ü/, /ű/, /ö/, /ó/}.

A traditional analysis of this widespread phenomenon is that the ([±back]) form of the suffix is determined by the ([±back]) form of the rightmost non-transparent vowel of the stem. In the case of stems like *papír*, the harmonizing feature [+back] of the initial vowel triggers the [+back] value of the target vowel in the suffix while the intervening [–back] vowel /i/ is disregarded in this process.

1.2 Claims

The approach taken in this dissertation follows from a belief that we can better understand cognitive processes related to speech if we carefully study both phonetic and phonological aspects of it. Following this approach, this dissertation adds to the large body of work on vowel harmony a proposal that both phonetic and phonological

properties of vowels are relevant in determining the output of the harmony process.

Specifically, there are three major claims in this dissertation:

1. Hungarian transparent vowels are not excluded from participating in palatal vowel harmony. Rather, the $[\pm\text{back}]$ harmonizing feature is manifested on the transparent vowels by systematic phonetic differences in the horizontal position of the tongue body.
2. The phonological process of determining the discrete ($[\pm\text{back}]$) form of the suffix depends on the fine degree of articulatory backness in the vowel preceding the suffix vowel. Therefore, the form of the suffix is always determined by the backness of the rightmost stem vowel; in some cases, however, this backness is non-contrastive.
3. The relationship between continuous details of the tongue body horizontal position in stem-final vowels and the $[\pm\text{back}]$ quality of the suffix vowel(s) can be coherently modeled using the mathematics of nonlinear dynamics operating over the parameters of gestural representations.

Evidence for the first claim is drawn from the experimental investigation of the articulatory characteristics of Hungarian transparent vowels. The combination of two techniques used in this dissertation (magnetometry and ultrasound) provides a comprehensive picture of the articulatory characteristics of these vowels. The findings show that the transparent vowels in stems triggering back harmony are