

**Classifying Hungarian palatal obstruents:**  
Phonetic control as a diagnostic for segmental complexity

Hannah Morrison

Advisor: Jason Shaw  
May 2023



**Yale University**  
Department of Linguistics

*Submitted to the faculty of the Department of Linguistics in partial fulfillment of  
the requirements for the degree of Bachelor of Arts*

# Acknowledgements

A great deal of gratitude is due to the people who have supported me such that I'm in a place to successfully conclude my undergraduate career and produce this work as a capstone of it.

To Jason Shaw, my advisor: thank you for being patient, flexible, and inspiring throughout the many stages of this project, and for teaching me about phonetics from my first days at Yale to my last. Raffaella Zanuttini, thank you for supporting me in and outside of the classroom with your nurturing spirit and sincere guidance. Claire Bower, thank you for being such an accessible and ingenious Director of Undergraduate Studies and for helping me sort through everything it means to be a senior. To my phonetics and phonology professors along the way — Roslyn Burns, Natalie Weber, and Chris Geissler — thank you for believing in me intellectually and otherwise. Thank you to Patrick Hall, for encouraging creativity at the crux of linguistics and archival work. Linguistics grad students (especially Dani, Coralie, and Sunny): you remind me why linguistics is fun. To the senior class of undergraduate linguistics majors, thank you for being kind and relatable, and I'm glad we could lean on each other in the process of making this thing.

Outside of linguistics, I am fueled by a loving community of friends and family whose contributions to my student experience and personhood are scarcely quantifiable. To my Saybrook Family, thank you for being my home away from home. To my actual family — Mom, Dad, Sima, Balázs, Jack, and extended family on both sides — thank you for loving me and guiding me through childhood, all of the late nights doing homework and extracurricular activities, and now through college and beyond. Thank you to Sean and Shuree and the rest of the Celli-Gath-Wood family for cheering me on; thank you to Tess, for always letting me share myself with you. And I am proud to thank my love, Joshua Celli, without whom I would be neither the linguist nor the person I am today (I love you).

Finally, I'm grateful for my mom, our family in Hungary, and the Hungarian community in America for providing an environment where I could learn to speak and to love Hungarian as a young child; this is an irreplaceable gift and I feel so lucky to have both the language and culture in my life. I am where I am today because of it.

# Table of Contents

<b>Abstract</b>	<b>4</b>
<b>1 Introduction: The Palatal Question</b>	<b>5</b>
1.1 Hungarian Language Overview	5
1.2 Consonant Inventory of Hungarian	5
1.3 The Palatal Series	7
1.4 The Palatal Production Factor	8
1.5 Roadmap: Toward an Answer to the Palatal Question	10
<b>2 Affricates as Complex Segments</b>	<b>11</b>
2.1 Phonological Representations of Affricates	11
2.2 Phonetic Representations of Affricates	12
2.3 Implications of Control for Segmental Complexity	13
<b>3 The Hungarian Palatal Obstruent: Competing Theories</b>	<b>14</b>
3.1 Affricate Arguments	14
3.1.1 Szende (1974; 1992; 1994)	14
3.1.2 Gombocz & Meyer (1909) and Hegedűs (1958)	15
3.1.3 Evidence from Attested Affricates in Hungarian	19
3.2 Stop Arguments	21
3.2.1 Siptár & Törkenczy (2000) and Siptár (2013)	21
3.2.2 Evidence from Other Phonetic Studies	23
3.2.3 Evidence from Phonological Behavior	24
<b>4 Conclusion and Discussion</b>	<b>25</b>
4.1 Classifying the Hungarian Palatal Obstruents	25
4.2 Broader Implications for Sound Description	25
4.3 Further Research	26
<b>References</b>	<b>28</b>

# Abstract

Hungarian linguistics literature fails to reach a consensus on the phonemic category of its palatal obstruents /c(ç), ʃ(j)/. In this study, I compare arguments for stop and affricate classifications, analyzing evidence for proof of phonetic control of frication and taking this as a requirement for classification as a complex (affricate) segment. Researchers such as Szende (1992), Gombocz & Meyer (1909), and Hegedűs (1958) argue that the Hungarian palatal obstruents should be considered affricates on the basis of having two distinct acoustic events, silence and frication. However, I argue that the evidence for an affricate classification does not confirm that frication is attached to the mental representation of a complex segment, and that this frication is better described as a passive phonetic consequence of the unique mechanics of articulation for the palatal obstruent. This view is supported by studies from Siptár & Törkenczy (2000), Siptár (2013), and Geng et al. (2005), who present evidence that this frication is variable and its presence on the surface is conditioned by predictable physiological patterns in speech production. In further support of the stop hypothesis, Siptár & Törkenczy (2000) and Siptár (2013) find that the Hungarian palatal obstruents pattern with stops in phonological processes. Ultimately, I conclude that the sounds are palatal stops, rejecting a superficial view of sound description and arguing that it is necessary to look beyond the presence of frication on the surface in order to determine affricate status.

# 1 Introduction: *The Palatal Question*

## 1.1 Hungarian Language Overview

Hungarian is a Uralic language spoken by about 10 million people in the Central European country of Hungary (Eberhard, Simons & Fennig 2023). There are 12.5 million Hungarian speakers globally, with significant speaker communities in Slovakia, Serbia, and, most notably, Romania, particularly in the region of Transylvania (Eberhard, Simons & Fennig 2023).

There are multiple dialects of Hungarian, as recognized by Ethnologue (Eberhard, Simons & Fennig 2023) and Siptár & Törkenczy (2000), among other sources. Many dialects, though not all, are spoken in Hungary, where the language holds national status and where nearly 80% of Hungarian speakers reside (Eberhard, Simons & Fennig 2023). Siptár & Törkenczy (2000) define “Educated Colloquial Hungarian” to be the standard dialect of Hungary and “the spoken language of ‘educated’ people living in Budapest,” the capital city (Siptár & Törkenczy 2000: 13). This contrasts with “Standard Literary Hungarian,” which the authors attribute to “speech-conscious” or “conservative” language users (Siptár & Törkenczy 2000: 13). This essay concentrates on data from a non-specific standard variety of Hungarian.

## 1.2 Consonant Inventory of Hungarian

Sample Hungarian phonemic consonant inventories are given below (Figures 1-2) from two foundational texts, Szende (1994) and Siptár & Törkenczy (2000). The former is from the *JIPA*<sup>1</sup> sketch for Hungarian, while the latter is from the widely referenced grammar *The Phonology of Hungarian*.

Figure 1: Hungarian consonant inventory as reported in Szende (1994: 91)

	Bilabial	Labio-dental	Dental	Post-alveolar	Palatal	Velar	Glottal
Plosive	p b		t d			k g	
Affricate			ts dz	tʃ dʒ	cç ʃʃ		
Nasal	m		n		ɲ		
Fricative		f v	s z	ʃ ʒ			h

<sup>1</sup> *Journal of the International Phonetic Association*.

Trill			r				
Approximant					j		
Lateral Approximant			l				

Figure 2: Hungarian consonant inventory as reported in Siptár & Törkenczy (2000: 75)<sup>2</sup>

	Labial	Dental	Palatal	Velar
Stops	p b	t d	c ɟ	k g
Fricatives	f v	s z	ʃ ʒ	x
Affricates		ts	tʃ dʒ	
Nasals	m	n	ɲ	
Liquids		l r	j	

Szende describes the dental consonant series to be laminal dental, with “laminal denti-alveolar” sibilants (Szende 1994: 93). Siptár & Törkenczy (2000) also identify a dental consonant series but otherwise afford some recategorizations compared to Szende (1994); the fricatives /ʃ, ʒ/ and their affricate counterparts /tʃ, dʒ/ are notated as palatal rather than post-alveolar or palato-alveolar.

One debated aspect of the Hungarian consonant inventory is the inclusion of the voiced affricates /dz/ and /dʒ/. The consonants /dz/ and /dʒ/ have a sparse distribution throughout the language, remaining unattested in some word positions, and their lack of true singleton-geminate contrast contributes to their marked status (Béke, Gósy & Horváth 2012: 262). Tarnóczy (1987) makes the claim that /dʒ/ is associated with words of Turkish and Persian origin and that both sounds are “always pronounced long” between vowels (Tarnóczy 1987: 256). Siptár & Törkenczy (2000) and Tarnóczy (1987) both question whether these affricates should belong in the phonemic consonant inventory, with the former excluding /dz/, as seen in Figure 2.<sup>3</sup>

Each consonant in the consonant inventory has a geminate counterpart, which is, for most pairs, contrastive (“in at least a limited number of word forms”) (Szende 1994: 91); non-contrastive exceptions are the geminate forms of /dz, dʒ/, which, as discussed above, have a

<sup>2</sup> The axes for place and manner in Figure 2 are reversed with respect to the original figure in Siptár & Törkenczy (2000) for ease of comparison with Figure 1.

<sup>3</sup> The distribution of voiced affricates in Hungarian ultimately does not bear directly on the analysis of palatal obstruents in this study; however, it is worth noting that they are sometimes excluded from discussions of Hungarian affricates in the literature for the reasons stated above.

marked distribution like their singletons and thus have fewer potential for contrast. Szende (1994) says that long consonants in Hungarian are “often analyzed as clusters of identical consonants,” which is his reason for excluding geminates from his phonemic inventory (Figure 1) (Szende 1994: 92). Siptár & Törkenczy (2000) cite degemination processes and their argument that most geminates are derived as evidence for their similar exclusion of geminates (Figure 2) (Siptár & Törkenczy 2000: 19–20). Despite this, there are one or more minimal pairs for most singleton-geminate consonant pairs, e.g., *hal* [hɒl] ‘(s)he/it is dying,’ *hall* [hɒl:] ‘(s)he/it hears’ (Szende 1994: 91).<sup>4</sup>

### 1.3 The Palatal Series

A typologically unique feature of Hungarian is its palatal consonant inventory. This includes a palatal nasal, <ny> /ɲ/, the palatal glide <j> /j/,<sup>5</sup> and the sounds, a voiced and voiceless pair, which are notated in the orthography as <ty> and <gy>, but whose phonetic and phonological classification is up for debate. There is a lack of consensus in Hungarian linguistics literature as to whether these consonants should be considered stops or affricates; Tarnóczy (1987) refers to the debate as “the so-called ‘affricate problem’” (Tarnóczy 1987: 255). Both historic (e.g., Gombocz & Meyer 1909) and modern (e.g., Geng et al. 2005; Siptár 2013) phonetic and phonological studies on Hungarian frequently make reference to this debate, and the uncertainty surrounding the sounds’ classification can interfere with homogeneous discussions of the stops or affricates as classes in Hungarian. Tarnóczy (1987) cites the controversy as a reason to exclude palatal obstruents from a study on Hungarian affricates, and Geng et al. (2005) treat the palatal obstruents differently in comparison with bilabial, alveolar, and velar stops in a study on Hungarian stop perception (Geng et al. 2005). In the sample consonant inventories (Figures 1-2) given from Szende (1994) and Siptár & Törkenczy (2000), the palatal obstruents are classified in the former table as affricates and in the latter table as stops.

In this paper I use the term “palatal obstruents” to describe the sounds notated as /c, ɟ/ or /cç, ɟj/; I avoid using the terms “palatal stops” or “palatal affricates” as to not prematurely bias my argument in one direction or the other. I specify that these are “palatal obstruents” and not merely “palatals” to avoid confusion with the rest of the palatal inventory in Hungarian, which includes the sonorant palatal nasal /ɲ/ and palatal glide /j/.<sup>6</sup>

---

<sup>4</sup> Hungarian’s vowel inventory will not be discussed at length, as this paper focuses exclusively on consonant-related matters; readers can note that Hungarian has seven distinct vowels, each of which having a long counterpart (with two pairs that differ in quality as well as length) to yield a total of fourteen phonemic vowels.

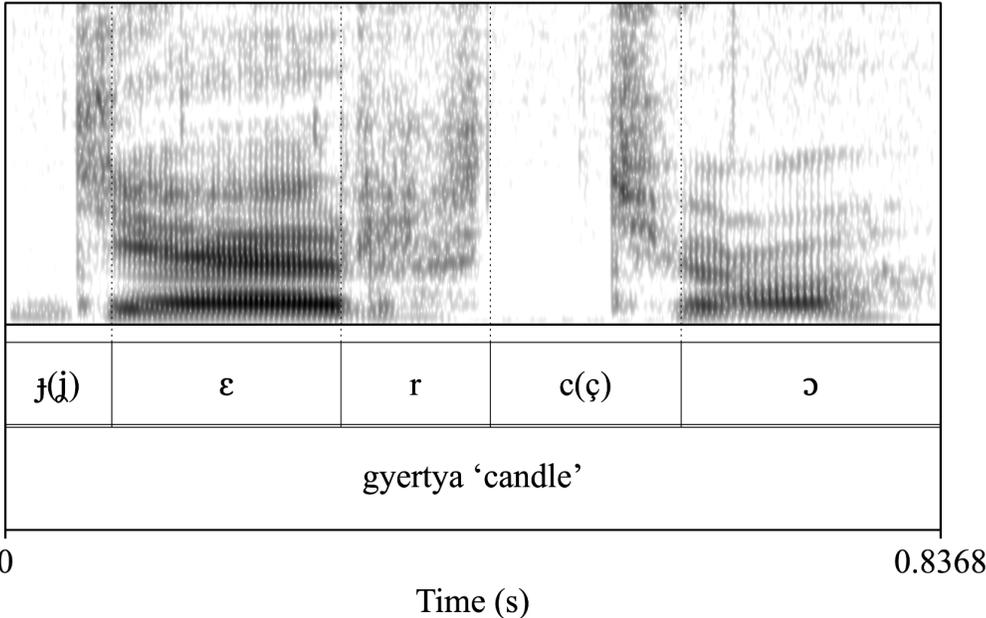
<sup>5</sup> Hungarian also has a letter <ly> which historically represented the palatal lateral /ɬ/, but this is now merged with the palatal glide /j/; the historical difference is maintained only in orthography.

<sup>6</sup> If I do refer to the palatal obstruents using the terminology “palatal stops” or “palatal affricates,” it is either in direct quotation or paraphrase of another author when they use these terms in their arguments.

### 1.4 The Palatal Production Factor

To understand the controversy surrounding the Hungarian palatal obstruent, it is important to examine the acoustic and articulatory qualities of the sound as it occurs in Hungarian. The following spectrogram (Figure 3) displays the amplitudes and frequencies in the acoustic signal for voiced and voiceless palatal obstruents in Hungarian, notated, respectively, by /ɟ(j)/ in the word-initial position of *gyertya* and /ç(ç)/ in the initial consonant of the final syllable.<sup>7</sup>

Figure 3: Spectrogram showing voiced and voiceless Hungarian palatal obstruents, /ɟ(j), ç(ç)/

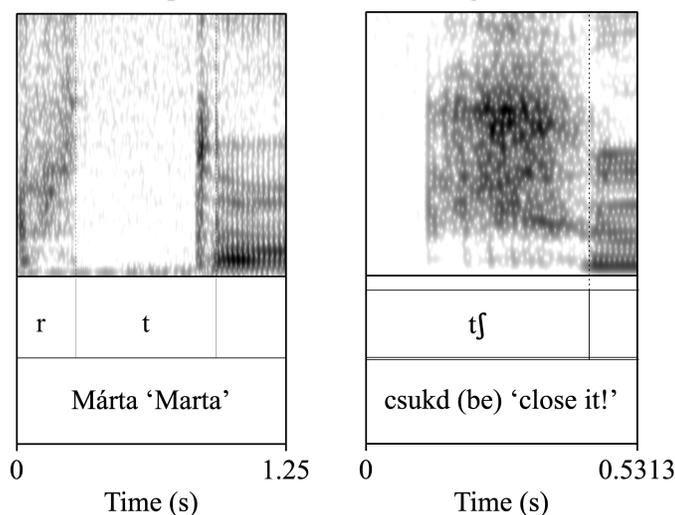


In Figure 3, a notable period of noise, or frication, is visible in the signal for both the voiced and voiceless palatal obstruents, following a comparatively longer period of silence (with voicing in the case of /ɟ(j)/) associated with the closure portion of the sound. When one compares the amount of frication here with the amount of frication found in acoustic samples of Hungarian plosives and *attested* affricates, the frication duration of the Hungarian palatal obstruent falls somewhere in between the duration of the plosive release and the duration of the fricative portion of the affricate.<sup>8</sup> Figures 4-5 show samples of the frication duration relative to closure found in the Hungarian dental stop /t/ and post-alveolar affricate /tʃ/. In Figure 4 (left), a long period of silence is followed by a short burst, while in Figure 5 (right), frication dominates the acoustic signal.

<sup>7</sup> The data analyzed in the spectrograms shown (Figures 3-5) is from a prior non-published study on Hungarian phonetics conducted by the author. The speech was produced by a female heritage speaker of Hungarian in her 60s.

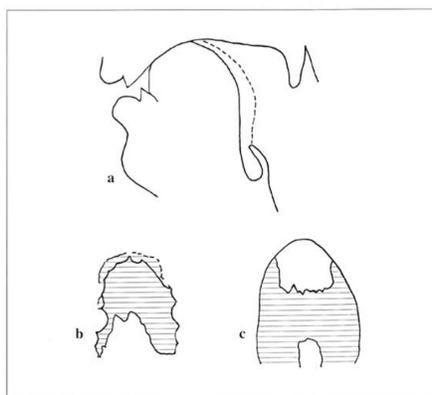
<sup>8</sup> These observations are not strictly quantitative, and the sample of data discussed in this paper is highly limited, because this study does not truly rely on this or any other specific dataset as evidence for its arguments. The data presented here is intended as a sample for readers to visualize the acoustics of the Hungarian palatal obstruents.

Figures 4-5: Spectrograms showing frication in Hungarian dental stop /t/;  
post-alveolar affricate /tʃ/



While there is a short period of frication shown in the spectrogram for the dental stop (Figure 4), this is usually considered to be part of the burst or release of the stop, and spectrogram of the palatal obstruent (Figure 3) shows a longer period of frication (relative to silence) compared to that found in the stop. However, the palatal obstruent frication is proportionally considerably shorter than that of the sample affricate /tʃ/ (Figure 5). These acoustic findings contribute to the uncertainty surrounding whether the palatal obstruent is a stop or affricate. Furthermore, there are crosslinguistic factors related to the mechanics of articulation and the palatal place of articulation for palatal obstruents that distinguish the sounds from other stops (and affricates).

Figure 6: Palatal consonant articulation (Keating & Lahiri 1993: 82; after Bolla 1980: 81–84)



Original caption from Keating & Lahiri (1993: 82):

“Articulatory data on palatal stops in Hungarian [after Bolla, 1980]. **a** Tracing of sagittal X-ray. **b** Tracing of palatogram, contacted area shaded. **c** Tracing of linguogram, contacted area shaded.”

Unlike coronal stops (articulated with the tongue tip or blade) or velar stops (articulated with the tongue dorsum), palatal obstruents are articulated with the tongue body, a relatively slow-moving articulator. The contact for a palatal stop or affricate is made at the palate, as shown in Part (a) of Figure 6. As this constriction is formed and maintained, the tongue body (the primary articulator) takes on a wide shape. Upon pulling away from the target, a narrow constriction is formed between the tongue and the palate. This configuration is similar to that created for the high vowel /i/ (Geng & Mooshammer 2004: 237). Since the tongue body moves more slowly in motion away from this wide constriction at the palate compared to the primary articulators in comparable plosives (tongue tip or tongue dorsum), this increases the length of time spent in this narrow constriction phase, allowing more time for air to flow through this narrow channel and generate aperiodic noise. This extended time spent in the release position as well as the wide, narrow nature of the constriction results in a higher level of frication compared to alveolar, velar, or other stops. Furthermore, Tabain, Beare & Butcher (2013) identify that “the presence of the palatal incline behind the alveolar ridge serves as an important obstacle to airflow at the moment of both velar and palatal release, in many cases resulting in affrication” (Tabain, Beare & Butcher 2013: 291).

The increased frication found in association with the palatal obstruent in Hungarian is at least partially due to the natural phonetic consequences of the palatal place and the mechanics of the tongue body during the achievement of and movement away from the target for a palatal sound. Whether the Hungarian palatal obstruents are to be classified as stops or affricates, the frication shown in the acoustics (Figures 3-5) and discussed with respect to palatal articulation is undeniably present in the palatal obstruent. In the coming sections, I explore how to interpret this frication and the implications of its presence as part of the sound.

## 1.5 Roadmap: Toward an Answer to the Palatal Question

The question of whether the Hungarian palatal obstruents are stops or affricates is confounded by notable frication observed in acoustic representations of the sound (Section 1.4). There is an undeniable level of frication that sets the palatal obstruents apart from Hungarian’s attested stops, but the sounds may not be easily grouped with Hungarian’s attested affricates, /ts, tʃ/. Over the course of this paper, I compare the evidence presented in stop and affricate proposals found in the literature and provide phonetic analysis of this evidence with an understanding of the following as criteria for affricate status: 1. presence of frication; 2. phonetic *control* of frication (explained in Section 2.3); and 3. appropriate phonological patterning. If these criteria for affricate status are not met, then a stop classification is appropriate.

I lay groundwork for understanding what constitutes an affricate, both from a phonological perspective (explaining the underlying representation) and in terms of expectations for the phonetic form (surface realization) (Sections 2.1 and 2.2). I analyze these descriptions in terms of phonetic control (Section 2.3) in preparation for evaluating evidence presented in the

literature against this criterion (Section 3). This evidence takes the form of plain language claims about phonemic classification (Sections 3.1.1; 3.1.2; 3.2.1); quantitative representations of frication (Section 3.1.2); analyses of the relationship between acoustics and articulation (Sections 3.1.2; 3.2.1; 3.2.2); comparisons to attested affricates, stops, and fricatives in Hungarian (Sections 3.1.2; 3.1.3); and qualitative analysis of frication with respect to phonetic environment and phonetic variation factors (e.g., speech rate, register) (Section 3.2.1). I also consider how the Hungarian palatal obstruents are reported to behave with respect to phonological processes (Section 3.2.3). I then make a proposal for a classification of the Hungarian palatal obstruent (Section 4.1) and discuss the implications of using phonetic control to analyze the given evidence (Section 4.2). Finally, I outline opportunities for further research in the form of quantitative contributions to this analysis (Section 4.3).

## 2 Affricates as Complex Segments

### 2.1 Phonological Representations of Affricates

Affricates, crosslinguistically, can be understood as one phonological segment realized as two phonetic segments. How the phonological segment is defined is a matter up for theoretical debate. Lombardi's (1990) analysis follows the theory that affricates are *contour* or *complex* segments, which are defined by Clements (1999) as a segment that phonologically behaves as one segment, but which has two parts, the first of which having features of a stop and the second those of a fricative ("a plosive interval released into a fricative interval") (Clements 1999: 2). However, Lombardi (1990) argues against the sequential element of the featural description, proposing that the [ $\pm$ continuant] segments (the stop being [-continuant] and the fricative being [+continuant]) within the affricate's underlying representation need not be ordered to preserve contrast (Lombardi 1990).

Lombardi (1990) proposes evidence that the affricate is a complex segment and differs from a consonant cluster, such evidence including: cases of contrastivity between affricates and consonant clusters with the same segments in, among other languages, Polish and Czech; affricates patterning with single segments in processes such as syllabification in Chipewyan; affricates being treated as single segments in Ewe reduplication; and inseparability of affricates in conditions such as epenthesis and metathesis in Hebrew (Lombardi 1990).

Some authors, such as Clements (1999), refute analyses of affricates as either complex or contour segments<sup>9</sup> and propose that affricates are phonologically simple single segments which do not contain separate tiers of features such as [stop] and [continuant]. To evidence this point, Clements follows a similar argument structure to Lombardi (1990) as she argues for non-ordered [ $\pm$ continuant] segments; both propose that such analyses (for a simple segment, in the case of Clements, and for ordered [ $\pm$ continuant] segments, in the case of Lombardi) "overgenerate" contrasts (Clements 1999: 3). These theories aside, the key element of the phonological representation of an affricate is the requirement that both a stop and fricative portion are constituents of the mental representation, and (according to some) correspond to [ $\pm$ continuant] segments within the underlying representation.

### 2.2 Phonetic Representations of Affricates

While the phonological perspective on affricates centers around underlying representations of the sound, Repp et al. (1978) discuss how stop, fricative, and affricate consonants are characterized on the surface with respect to perception and investigate the

---

<sup>9</sup> The difference between a *complex segment* (as in the bipartite model of Lombardi and others) and a *contour segment* (more similar to what is proposed by Clements) is not discussed here at length, but it can be generally understood as such: in the former, the [continuant] and [stop] features of the affricate are said to be on different tiers, whereas in the latter, they're treated as one.

auditory cues listeners use to discriminate between them. Temporal cues of closure duration and fricative noise duration are key distinguishing characteristics for perceiving these obstruent sounds; the perceptual significance of these cues is connected to the articulatory gestures that produce them (Repp et al. 1978). Stops are characterized by a closure gesture on the part of the primary articulator, which yields an interval of silence in the acoustic signal. Fricatives are marked by the passage of air through a critical constriction, producing aperiodic energy (noise) in the acoustic signal; this noise can be referred to as frication. Repp et al. (1978) write that for the affricate, this silence and fricative noise are “integrated” with each other (Repp et al. 1978: 623). An affricate can be analyzed according to these two parts, silence and frication, which characterize the acoustic signal and are motivated by closure and critical constriction, respectively, in articulation.

Some linguists, such as Pycha (2007; 2010), pose comparisons of the stop and fricative portions of affricates with respect to the temporal ratio of silence to frication. This ratio can provide a potentially useful metric when comparing between different types of affricates or between affricates under different conditions, such as phonetic or phonological lengthening.<sup>10</sup> Repp et al. (1978) found a connection between the silence-frication ratio and the phonetic variation factor of speech rate; they report that at the perceptual boundary between fricative and affricate, in order to trigger the switch in the listener’s classification from fricative to affricate, “more silence was needed in the fast sentence frame than in the slow sentence frame” (Repp et al. 1978: 625). That is, as speaking rate increased, not only a change in the durations of silence and frication were needed (for successful perception), but also a change in the ratio between them.

To further discuss frication in the acoustic signal as an important (perceptual) cue for affricates, Howell & Rosen (1983) found that *rise time*, the temporal measure between the onset of frication and the maximum amplitude of frication, of the fricative noise was a factor in distinguishing between voiceless fricatives and affricates. They found that the frication portion of affricates saw a shorter rise time than the frication in fricatives, an effect that was consistent across conditions of running speech and isolated words (Howell & Rosen 1983). The studies discussed in this section are useful for understanding the listener’s perception of obstruent consonants generally (not specifically to Hungarian) as well as what distinguishes a stop or a fricative from an affricate in terms of perception (which relates to the acoustic surface form) and articulation. Quantitative metrics such as silence-frication ratio, fricative rise time, and length of a phonetic cue with respect to speaking rate or other phonetic variation factors can shape language users’ categories for stops and affricates, including those for the Hungarian palatal obstruents.

---

<sup>10</sup> Pycha’s research is elaborated upon in Section 3.1.3.

## 2.3 Implications of Control for Segmental Complexity

The stop and frication portions of the affricate surface form discussed in Section 2.2 map onto the underlying representation of the complex segment described in Section 2.1. The stop (or silence, closure) portion corresponds to the [-continuant] part of the affricate, while the fricative noise portion corresponds to the [+continuant] member (Lombardi 1990). Because of this relationship between the surface and underlying forms, determining whether a sound is an affricate or not depends not only on the presence of both silence and frication on the surface, but also on whether the silence and frication are surface forms of these phonological [ $\pm$ continuant] features. If either the silence or frication is not attached to the underlying form, it is a passive phonetic consequence of articulation, and not a phonemic part of a complex segment. An example of this alternative phonetic consequence case exists in plosives (obstruent stops), which typically have a short period of fricative noise associated with the sound. This frication is a passive consequence of releasing the constriction and the pressure built up behind it. However, it is not driven by a [+continuant] portion of the underlying representation, and therefore is *not under control*. In this case, the presence of frication is not sufficient grounds for classifying the plosives as affricates, and this could be true for the Hungarian palatal obstruents as well.

In the Hungarian palatal obstruent, there is both silence and frication on the surface, so to determine its classification we must investigate whether this frication portion is under control. The stop-affricate dichotomy presented in Hungarian linguistics literature informs the assumption that control of the *frication* will be the deciding factor in the sound's classification, rather than control of the silence; following this, if the frication is not under control, then the sound will be classified as a stop. If the frication portion of the palatal obstruent is under control and the sound is classified as an affricate, then the palatal obstruent would necessarily be operated by both a [-continuant] and [+continuant] part, as outlined in Section 2.1. This phonology makes the prediction for the phonetics that the frication is a consistent constituent of the phoneme not only in its presence but in its resistance to significant variability. The frication should behave like the frication portion of an affricate, rather than the passive frication of a stop release, in order to motivate its inclusion in the underlying representation.

## 3 The Hungarian Palatal Obstruent: Competing Theories

### 3.1 Affricate Arguments

#### 3.1.1 Szende (1974; 1992; 1994)

Szende (1974; 1992; 1994) consistently discusses the Hungarian palatal obstruents as affricates, though his notation throughout his works varies between one symbol and two symbols. In Szende (1974), he notates the sounds as /c/ and /j/, with single symbols, but names them (as well as their geminate forms /cː, jː/) as affricates, listing them alongside /ts/, /dz/, /tʃ/, etc. Adding onto his description of affricates, including the palatals, Szende states that all Hungarian affricates “have monophonemic status in Hungarian sound pattern” (Szende 1974: 129).

In Szende (1992), he specifically states that /c/ and /j/ “were originally classified as stops” until “the affricate debate” (citing Kázmér (1961) as a historical overview of this), after which they were “generally taken to be affricates” (Szende 1992: 119). He states that /c/ and /j/ “at the level of phonetic contrasts, belong to the class of affricates,” and addresses their notation in writing, identifying /c̥ç/ and /j̥j/<sup>11</sup> as a more correct and “narrow” transcription compared to /c/ and /j/ (Szende 1992: 124). The notion of “narrow transcription” here perhaps alludes to an implicit argument that these sounds are already understood to have frication, so this frication is optionally expressed by a narrow digraphic transcription, but the intrinsic evidence for its phonemic status as an affricate lies elsewhere.

Throughout Szende’s arguments, there is no clear tie to empirical evidence of the affricate classifications of these palatal obstruents, neither through data collected by the author for these studies nor through references to other corpora or experimental data. He merely reports on the sounds as part of the affricate class, including them as such in his phonological inventory in the *JIPA* sketch for Hungarian, a widely referenced linguistics source (Szende 1994). In this brief text, he notates and describes them as digraphic affricates /cç, jj/. He also makes a note about register that addresses the alternative theory that the sounds are stops: “In formal style /cç, jj/ are realized mostly as palatal stops, i.e., [c] and [j]” (Szende 1994: 93). Szende’s observations and his ultimate classification of the Hungarian palatal obstruents as affricates could be rooted in an analysis of the sounds based on the presence or absence of frication on the surface, which might motivate him to suggest that the palatal affricates surface as stops in a formal style, if there is less frication occurring in this context. Judgements about distribution and classification of palatal obstruents based on the surface acoustics alone pose a potentially problematic approach

---

<sup>11</sup> One might expect to see the voiced palatal fricative /j/ as the second part of the voiced affricate notation here, yielding /jj/ to match /c̥ç/; however, Szende writes /j̥j/ with the second symbol appearing to represent the palatal glide /j/. This may have been a matter of typescript, as the paper (Szende 1992) was composed on a typewriter, with symbols such as <j> and the affricate tie bar written in by hand. It seems likely that the intended phonetic interpretation of this second part would be /j/.

(see Section 4.2), due to the requirement for evidence of phonetic control (outlined in Section 2.3) in order to assign a sound affricate status.

### 3.1.2 Gombocz & Meyer (1909) and Hegedűs (1958)

In their 1909 paper, Gombocz & Meyer refute Balassa's (1893) hypothesis that the Hungarian palatal obstruents are "einfache Verschlusslaute," or 'plain plosives,' discussing them instead as "mouillirte Verschlusslaute," or 'palatalized plosives' (Gombocz & Meyer 1909: 156). They propose a classification of the palatal obstruent as an affricate, with the sound containing two parts, the plosive and the palatalization. Whether due to conventions of the era in which the paper was written or due to a unique analysis of what we now call the palatal obstruent, Gombocz & Meyer (1909) notate the sounds in question as <t'> and <d'>, which attaches the sound to an idea of the alveolar or dental /t/ and /d/ and more strongly represents the notion of a *palatalized* sound rather than the *palatal* sound suggested by the modern IPA notation of a palatal stop /c/ or affricate /çç/. When discussing the fricative portion specifically or notating it in acoustic figures, Gombocz & Meyer refer to it as <'>. They do treat this as a second sound that is part of this palatal unit, which is the center of their affricate hypothesis. It is unclear whether the first portion of the sound is seen as an alveolar/dental stop or a palatal stop. When drawing comparisons between the palatal sound and a plain stop, they are given with respect to this non-palatal /t, d/. Using the term palatalized and the given digraphs <t', d'> also reinforces this comparison. In any case, Balassa (1893), despite his claim that these sounds are plain plosives, does recognize the palatal place of the sounds, and both he and Gombocz & Meyer (1909) discuss the sound's broad contact at the palate, which suggests an overall analysis that the plosive portion should be considered palatal despite the alveolar-suggestive notation.

Gombocz & Meyer (1909) challenge Balassa (1893) by stating that his claims lead to the false conclusion that "the closure is the essence of the overall sound and the fricative-like offglide is simply an offglide, that is, a necessary consequence of the preceding articulation" (Gombocz & Meyer 1909: 156).<sup>12</sup> Gombocz & Meyer's (1909) counterevidence to this closure-forward hypothesis is that in their measurements of at least the voiceless palatal, the duration of the fricative portion, in fact, "far surpasses"<sup>13</sup> the duration of the plosive portion (Gombocz & Meyer 1909: 156). Further evidence that distinguishes the palatal obstruent from plain plosives includes the authors' measurements of the "oral volume curve"<sup>14</sup> of the release of the palatal compared to the release of the plain alveolar/dental stop (compare Figures 7a and 7b); they found that the offglides differed in character, having recorded the amplitude curve of the stop release into the following vowel to be quick and steep for /d/ (Figure 7a), compared to a longer and more gradual rise for the palatal <d'> (Figure 7b).

---

<sup>12</sup> "...dass...der Verschluss das Wesentliche des Gesamtlauts und der engenlautartige Abglitt eben nur ein Abglitt, d. h. eine notwendige Folgeerscheinung der vorhergehenden Artikulation ist" (Gombocz & Meyer 1909: 156).

<sup>13</sup> "bei weitem die Dauer des Verschlusses übertrifft" (Gombocz & Meyer 1909: 156).

<sup>14</sup> "Lautstromkurve" (Gombocz & Meyer 1909: 158); it is unclear exactly what this term means or what the proper translation into English would be, but it may refer to a measurement related to rise time amplitude.

Figure 7a: Oral volume curve for the release of the plosive /d/, as reported in Gombocz & Meyer (1909: 158)

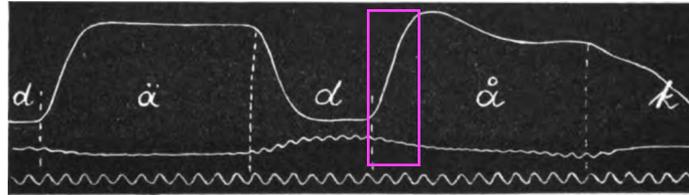
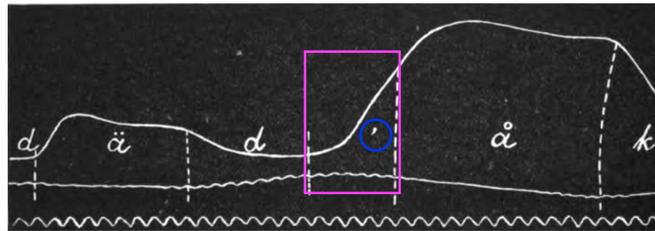


Figure 7b: Oral volume curve for the fricative portion of the proposed affricate <d'>, as reported in Gombocz & Meyer (1909: 158)



However, Gombocz & Meyer (1909) ultimately point out the same facts as Balassa (1893) (and Hegedűs 1958): that the palatal obstruent sound is still *characterized* by its closure more so than its frication, and that the frication is related to the phonetic or physiological circumstances of the sound, that is, a broad contact at the palate with an obstructed release that creates a narrow channel (see Section 1.4). These remarks on the palatal place and articulation mechanics explain the differences in the measurements between the release offglide for /d/ and the frication offglide for <d'>; there is no paradigm in Hungarian of both a palatal plosive and a palatal affricate where you could ascertain that the offglide in a palatal affricate is distinct from that of a *palatal* plosive (in place of the alveolar/dental plosive /d/). If there were both an oral palatal stop and an oral palatal affricate in the Hungarian consonant inventory, we could compare the release of the stop with the fricative portion of the affricate and make a claim about stop or affricate status based on the release that is not affected by differences in place of articulation. But this is not the case, and the condition of place cannot be controlled for within Hungarian, so a difference between the offglide of the palatal obstruent and the offglide of an alveolar/dental stop does not exclude an explanation for this that relates to the exaggerated release of a palatal stop due to its the place and mechanics of articulation (detailed in Section 1.4).

Gombocz & Meyer (1909) also point out the relationship between the closure and fricative portion of the sound in a way that implies causation, stating that the broad contact between the tongue body and palate results in a “hindered” constriction in the airstream for a “relatively longer” period of time, resulting in an offglide with a “fricative character” (Gombocz

& Meyer 1909: 156).<sup>15</sup> This is, indeed, an argument for both the closure and frication being part of the same sound unit, but a claim for affricate status might be misleading, because the frication depends upon the closure to exist and is thus likely not under control. They further describe the atypical relationship between the fricative portion and attested fricatives, saying, similar to what Hegedűs (1958) found, that for the voiceless sound <tʰ>, the closure (stop) portion is not fully closed, producing some of this frication in this “Überenge” ‘super-closeness’ state (Gombocz & Meyer 1909: 156); however, it is still so much more narrow than a fricative constriction that “the ear moreso gains the impression of a stop than that of a fricative” (Gombocz & Meyer 1909: 157).<sup>16</sup> These differences in the acoustics of both the closure and frication portion of the palatal obstruent compared to attested affricates and fricatives in Hungarian separate the palatal obstruent from these classes, and, despite the potential intentions of the authors to prove that the sounds are affricates, in fact provide further evidence that the palatal obstruents might not be part of this class. Ultimately, according to Gombocz & Meyer’s (1909) own definition of an affricate, which is the linkage of a stop and fricative sound, the palatal obstruent may be considered an affricate for their study. But when one analyzes their observations and data for this frication and the dependent relationship it has with the stop portion of the sound, the study can be considered false evidence for the affricate hypothesis, as the researchers fail to prove that the frication associated with this palatal sound is an in-control phonological affricate constituent and not merely a passive phonetic consequence of the palatal articulation.

In Hegedűs (1958), the author argues that the Hungarian palatal obstruents are affricates, though he discusses them separately from other affricates in Hungarian, namely /ts, tʃ/ and the controversial /dz, dʒ/. His study presents empirical data in oscillograms, and he cites these as evidence for the affricate status of the palatal obstruents, defining affricates, similar to Gombocz & Meyer (1909), by the framework of two sequential elements in time, where the first element is a plosive and the second element a fricative (Hegedűs 1958). Hegedűs compares the surface form of the palatal affricate with the patterning of other affricates, stating that this stop and homorganic fricative sequence is akin to the composition of the “other affricate types.” However, he identifies a different sound structure in the palatal affricates than in other affricates with respect to the ratio of closure to frication; while in other Hungarian affricates, the fricative element dominates and the closure portion is reduced, for the palatal affricates, “the stop portion is emphasized while the narrow portion is reduced” (Hegedűs 1958: 170).<sup>17</sup> Hegedűs (1958) also records that in palatal affricates, the duration of the stop portion exceeds that of the fricative portion in both singletons and geminates. He does, however, state that the ratio of silence to

---

<sup>15</sup> “Die breite Berührung zwischen Zungenrücken und Hartgaumen hat zur Folge, dass der Atemstrom nach Aufhebung des Verschlusses während verhältnismässig langer Zeit in seiner freien Entfaltung behindert bleibt...sodass der Abglitt...Engenlautcharakter erhält” (Gombocz & Meyer 1909: 156).

<sup>16</sup> “...das O[h]r me[h]r den Eindruck eines Verschlusslauts als den eines Engenlauts erhält” (Gombocz & Meyer 1909: 157).

<sup>17</sup> “...das Verschlusselement [ist] das ausgeprägtere und das Engeelement das reduziertere” (Hegedűs 1958: 170).

closure is different in geminates than in singletons, with a 3:1 ratio for geminates and 1:1 or 1:¾ for singletons (Hegedűs 1958: 163).<sup>18</sup>

Hegedűs (1958) follows a definition of affricates that coincides with that of Hála (1952), who states that an affricate is formed by “two successive articulatory elements,”<sup>19</sup> one plosive and one fricative (Hála 1952: 83; as cited in Hegedűs 1958: 164). Hála (1952) also wrote that the closure in an affricate generally<sup>20</sup> is weaker than the closure in plosives proper, and that the fricative portion is less defined than it is in true fricatives (Hegedűs 1958: 164). This corroborates Gombocz & Meyer’s (1909) conclusion that there is frication during the stop portion of the palatal and not a complete closure (Gombocz & Meyer 1909: 157), as well as a weaker period of frication compared to simple fricatives. These observations on frication during the closure of a palatal obstruent also coincides with the findings of a much more modern study, Geng & Mooshammer (2004). Geng & Mooshammer (2004) observed that for the Hungarian palatal obstruent, “during the stop interval no full silence was achieved but the whole interval was accompanied by frication” (Geng & Mooshammer 2004: 230). This continuous frication was not observed for the dorsal velar stops, by comparison. Hegedűs (1958) also cites Forchhammer (1953), who states that affricates could be considered “reduced clusters”<sup>21</sup> (Forchhammer 1953: 405; as cited in Hegedűs 1958: 164). However, Hegedűs adds on to his definition for affricates a notion that “the stop and fricative periods can be distinguished from each other...they thus cannot be formed at the same time” (Hegedűs 1958: 170–171).<sup>22</sup> This statement and the requirement for sequential sounds (Hála 1952; Hegedűs 1958) imply that the Hungarian palatal obstruent, like the other affricates, should not see frication happening during the closure period, as this violates the principle of discrete closure and frication which characterizes true affricates.

Hegedűs (1958), like Gombocz & Meyer (1909), comments on the palatal place of the stop, describing “closure formation occurring on a large surface, from whose release frication inevitably arises” (Hegedűs 1958: 163).<sup>23</sup> This statement refers to a causal relationship between frication and closure, suggesting a lack of phonological control; Hegedűs’s explanations align closer with an analysis of frication as a passive phonetic consequence. Here, he associates the frication explicitly with the *release* of the wide palatal stop constriction, and states that it “inevitably” arises from the place of articulation. When one compares this statement with how we would expect to discuss attested affricates (see Section 2), it becomes clear that an “inevitable consequence” is not an ideal explanation for the frication portion of an affricate. For example, the affricate /ts/ is not deemed an affricate because there is enough frication due to the release of the /t/ such that something similar to /s/ is formed; otherwise, we would not have both /t/ and /ts/

---

<sup>18</sup> This difference coordinates with the findings on Hungarian geminate affricates /ts/ and /tʃ/ recorded in Pycha (2010).

<sup>19</sup> “deux éléments articulatoires successifs” (Hála 1952: 83; as cited in Hegedűs 1958: 164).

<sup>20</sup> The author makes non-Hungarian specific observations.

<sup>21</sup> “reduzierte Lalemverbindungen” (Forchhammer 1953: 405; as cited in Hegedűs 1958: 164).

<sup>22</sup> “Verschluß- und Engemomente können voneinander abgegrenzt werden...sie werden also nicht gleichzeitig gebildet” (Hegedűs 1958: 170–171).

<sup>23</sup> “...auf großer Fläche erfolgende *Verschlußbildung*, mit deren Auflösung zwangsläufig Reibegeräusche entstehen” (Hegedűs 1958: 163).

in the Hungarian phonemic inventory. The fricative portion [s] is under phonological control as part of the underlying affricate /ts/; it is not passive frication following a stop /t/. Though Hegedűs (1958) writes that the palatal affricates should be considered affricates that surface differently compared to other affricates in Hungarian, there is still, as discussed in Section 2.3, a requirement for clear control of frication in order for this sound to be considered an affricate in its own right. As further evidence that a control analysis may not apply to Hegedűs's (1958) palatal affricate, the author writes about the sound that "the second element is, as stated, an inevitable accompanying sound phenomenon, whose duration cannot be lengthened as arbitrarily as that of the stop" (Hegedűs 1958: 163).<sup>24</sup> The statement about "arbitrarily lengthen[ing]," which could also be translated as "voluntarily lengthen[ing]," being less possible for the fricative portion than the stop portion invites an interpretation that the fricative portion is less under control than the stop portion and operates differently than stop portion (resisting lengthening), which is not an acceptable description for the two parts of an affricate. In Section 2, it is explained that both stop and fricative portions of an affricate must be comparable constituents of the underlying affricate phoneme, and one should neither be dependent on the other to exist nor pattern differently from the other in order to constitute a valid complex segment.

It seems that these researchers who claim that the Hungarian palatal obstruent is an affricate are in fact presenting evidence that points to affrication of a stop which is present for palatals but not for other plosives. The palatal obstruent, as they describe it, in some ways does not mimic the mechanics of an affricate; it would be a valid argument to state that the palatal obstruent behaves differently or perhaps has more or less frication than affricates formed in other places. However, it is first necessary to prove that the palatal obstruent has affricate status, which requires, according to the control hypothesis, that the frication be under control as part of the underlying representation of an affricate. Gombocz & Meyer (1909) and Hegedűs (1958) describe the palatal obstruent as having two distinct parts, but at the same time discuss frication as a passive phonetic consequence of palatal articulation, which provides more evidence for a *lack* of control than for the presence of it.

### 3.1.3 Evidence from Attested Affricates in Hungarian

The research of Pycha (2010; 2007) provides a potential point of comparison between the palatal obstruents and attested affricates in Hungarian, offering insights into attested variation in affricate frication. The studies in question report on the phonological and phonetic behavior of Hungarian affricates /ts/ and /tʃ/. Pycha investigates effects on the internal structure and timing of the complex affricate segment in the context of lengthening, of the variety of both a phonological process (gemination) and a phonetic process (phrase-final lengthening). She observed, in addition to the overall duration of the affricate segments, the "internal duration structure" (Pycha 2010: 134), or the length of the stop portion relative to the fricative portion, measured using the

---

<sup>24</sup> "Das zweite Element ist, wie gesagt, eine zwangsläufige begleitende Geräuscherscheinung, deren Dauer vom Sprechenden nicht so willkürlich verlängert werden kann wie die des Verschlusses" (Hegedűs 1958: 163).

proportion of closure to the total length of the segment.

Pycha (2010) found that the relative duration of closure to segment length is asymmetrical between singleton and geminate forms in Hungarian; that is, the closure proportion was greater in geminate forms than in singleton forms for the same segment, in addition to the segment being longer overall in a lengthened surface form. This result contrasted with the measurements from the phrase-final lengthening condition, where the closure proportion decreased, rather than increased, as a sound was lengthened. Furthermore, when comparing between the two types of affricates measured, post-alveolar and alveolar, relative duration structure was not uniform; the underlying proportions of closure and frication varied by place of the affricate. This difference was true under both singleton and geminate conditions. These findings show that attested affricates are not uniform in their duration structures across various conditions such as phonemic length and place of articulation, and thus suggest that internal duration structure may not be a stable metric for comparing the possible palatal affricates with attested affricates in Hungarian.

Pycha (2007) found that phonetic (phrase-final lengthening) and phonological (gemination) lengthening do not result in a uniform lengthening for affricates in Hungarian. Instead, the two lengthening types affect the stop and fricative portions differently. She observed that phonetic phrase-final lengthening targets the fricative portion, while phonological gemination lengthening targets the stop portion. These results differ from her results in testing plain consonants /t, s, ʃ/; for non-complex segments, the overall duration of the sound under the different lengthening conditions was different, but for the affricates, the overall duration remained approximately the same across the condition of lengthening. She attributes this result possibly to the contrast principle, where different duration structures for the affricates help to preserve some kind of contrast between phonologically and phonetically long segments (Pycha 2007).

Pycha's (2010; 2007) findings are valuable because they describe the patterning of attested affricates as a class in response to phonological and phonetic processes. They also further support a classification of an affricate as a complex segment that behaves as a unit (such that the duration ratio may fluctuate), rather than a pair of individual segments coordinated to each other, as previously discussed in Section 2. Pycha's results show that phonological and phonetic processes such as lengthening do not result in merely surface-level duration changes, but also affect the internal timing structure of affricates. However, there were varied results amongst groups of affricates that one might expect to pattern similarly (e.g., singletons and their geminate counterparts; alveolar and post-alveolar affricates). This suggests that if, in further research, the palatal obstruents were found to surface with different duration structures compared to other Hungarian affricates, this may be evidence neither for nor against an affricate classification, as the attested affricates also do not pattern uniformly. While a fluctuating silence-frication ratio may be characteristic of affricates, according to these results, the variable nature of the metric may render this particular comparison unhelpful in determining the classification of the Hungarian palatal obstruent.

## 3.2 Stop Arguments

### 3.2.1 Siptár & Törkenczy (2000) and Siptár (2013)

Siptár & Törkenczy (2000) and Siptár (2013) argue that the Hungarian palatal obstruents are stops, phonemically the sounds /c, ʃ/, which surface as “affricate-like,” [c̥ç, ʃ̥j], in certain phonetic contexts (Siptár & Törkenczy 2000: 82; Siptár 2013: 398). The researchers recognize the fricative noise that is regularly present in association with the palatal obstruent, but find that the degree of frication (strong, absent, or light) follows predictable patterns based on the phonetic environment of the obstruent. I analyze these environments where stronger frication is found and argue that the physical articulation mechanics of these environments can be found to generally condition frication, suggesting that such frication is a crosslinguistic physiological phenomenon not specific to an underlying fricative portion of the Hungarian palatal obstruent. In other words, the frication is not a part of the phoneme, but rather a passive phonetic consequence that is conditioned or enhanced by the phonetic environment of the sound. Siptár & Törkenczy’s (2000) language overall supports an analysis that this affrication is not a phonemic constituent of the palatal obstruent (a requirement discussed in Section 2.3), as they describe the sounds as “affricate-like to a *variable* extent” and discuss the affrication as part of a “surface realization” (Siptár & Törkenczy 2000: 82).

The authors do not give quantitative measurements for the degrees of affrication, instead describing them in terms such as “quite strongly affricated” and “slight affrication” (Siptár & Törkenczy 2000: 82). Nevertheless, one can consider “strong” affrication to be a generic high level of frication, while “less” or “no” affrication can refer to a low or absent level of frication. Siptár & Törkenczy write that the sounds are “strongly affricated” before stressed vowels and word-finally (e.g., *tyúk* /cu:k/<sup>25</sup> ‘hen’, *gyár* /ʃa:r/ ‘factory’; *fütty* /fyc:/ ‘whistle’, *vágy* /va:ʃ/ ‘desire’) (Siptár & Törkenczy 2000: 82). In both of these prosodic conditions, stressed syllable and word-final position, sounds are generally prone to lengthening of gestures, which can result in a more significant duration of fricative noise and an increased perception of affrication. De Jong (1995) discusses these effects as “localized hyperarticulation,” finding that movements in stressed syllables, compared to in unstressed syllables, are larger, longer, and less overlapped (de Jong 1995), resulting in overall more perceptible transitions, such as an affricated release of a palatal obstruent. As the tongue stays for a longer time in each state of articulation for the sound, more time will be spent in, for example, the narrow constriction phase between the release from constriction and the offset of controlled movement, resulting in a greater duration of aperiodic noise. Conversely, in unstressed vowels, which are articulated faster, there is less time for “hyperarticulation” and less time for frication to be perceived; Xu & Prom-on (2019) write that movements are faster (having a higher stiffness) in unstressed syllables (Xu & Prom-on 2019).

---

<sup>25</sup> Siptár & Törkenczy (2000) do not explicitly provide IPA transcriptions for most of the forms in this section; these were done by myself in accordance with the authors’ typical conversion of orthography to IPA in order to provide transparency in interpreting the orthography. These transcriptions should therefore not be expected to account for “strong” or “less” affrication in the surface forms, as Siptár & Törkenczy (2000) did not explicitly notate this.

This coordinates with Siptár & Törkenczy's (2000) findings on frication of the palatal obstruent in unstressed syllables; they write that before an unstressed vowel the sound is "much less" affricated (e.g., *ketyeg* /kɛtɛg/ 'tick', *magyar* /mɔjɔr/ 'Hungarian') (Siptár & Törkenczy 2000: 82).

Siptár & Törkenczy (2000) report that palatal obstruents are "not at all" affricated before a plosive (e.g., *hagyta* [hɔctɔ]<sup>26</sup> 'he left it', *ágyba* /a:jbɔ/ 'to bed') (Siptár & Törkenczy 2000: 82). Frication is "variably present" before /r/ (e.g., *bugyrok* /buɣrok/ 'bundles') and appears before /l/ only in cases of emphasis (e.g., *fátylak* /fa:clɔk/ 'veils') (Siptár & Törkenczy 2000: 82). The nasals /n, ɲ/ condition a lack of frication like oral stops (e.g., *hagyna* /hɔjɲɔ/ 'he would leave some'; *hegynyi* /hejɲi/ 'as large as a hill'), though "slight affrication" may precede /m/ (e.g., *hagyma* /hɔjmɔ/ 'onion') (Siptár & Törkenczy 2000: 82). To explain these patterns phonetically, it is possible that affrication is not perceived before a plosive because as the tongue makes a seal and blocks airflow in order to articulate the following stop, it renders the release of the preceding palatal obstruent inaudible. This explanation can apply to the palatal obstruent appearing without frication before /r/, as well, as the contact made to articulate the trill blocks the audible release of a preceding sound (such as the palatal obstruent). Following this logic, it makes sense that before the lateral approximant /l/, the audible release of a preceding stop would appear only in cases of emphasis, where there is less overlap between gestures. The mechanics of inaudible release before plosives would apply to nasal stops as well, although before /m/, "slight affrication" being variably present is difficult to explain, as this leaves a somewhat unsealed paradigm between the nasal stops (all but the bilabial blocking frication) and bilabial stops (the oral stops blocking frication but the nasal not). One possible explanation of this asymmetry is that there is some kind of compensation against *gestural hiding* going on with the bilabial nasal; this effect is discussed with respect to Georgian in Chitoran, Goldstein & Byrd (2002). The researchers state that there is increased gestural overlap in stop-stop sequences where there is a "back-to-front" order of place of articulation (Chitoran, Goldstein & Byrd 2002: 2). With the bilabial constriction for /m/ being more anterior than a preceding palatal (creating a back-to-front sequence), perhaps the bilabial sound poses a risk for gestural hiding, "threaten[ing] their perceptual recoverability," and thus triggers a reverse effect (of an exaggerated release gesture) to compensate (Chitoran, Goldstein & Byrd 2002: 2). However, this still does not sufficiently isolate the cause of Siptár & Törkenczy (2000) reporting more affrication for /m/ than for the other bilabial stops.

Siptár & Törkenczy (2000) also relate the distribution of palatal obstruent frication to phonetic variation factors such as speech style and rate of speech, writing that affrication is "much stronger" in "slow, deliberate speech" compared to "fast or casual styles" (Siptár & Törkenczy 2000: 84). This comment could prove to be an additional piece of evidence for slow rate of speech and careful speech causing increased frication due to lengthened gestures and less gestural overlap. It also identifies the patterning of the Hungarian palatal obstruent with respect

---

<sup>26</sup> This form is given in square brackets [] to indicate a narrow transcription, as the palatal obstruent in /hɔjtɔ/ undergoes regressive voicing assimilation to surface as voiceless, [hɔctɔ]. This was flagged in the original text by Siptár & Törkenczy (2000: 82).

to register as a potentially viable addition to the discussion on frication distribution; this is a compelling topic for further investigation or testing (see Section 4.3).

Overall, Siptár & Törkenczy's (2000) findings point to an underlying *stop* with a variable degree of frication based on phonetic factors; they even state that “true *affricates* fail to exhibit such extensive variability” (Siptár & Törkenczy 2000: 82). This is a judgment not on the presence of variability, but rather on the extent of the variability shown for palatal obstruent frication. If the frication portion of a sound (here the Hungarian palatal obstruent) were to be controlled, Siptár & Törkenczy (2000) have an expectation for greater consistency. For example, Siptár (2013) cites comparable crosslinguistic evidence, Buizza & Plug (2012), as a parallel case where British English Received Pronunciation /t/ surfaces variably as affricated [ts] in some phonetic environments, but the researchers find that this does not constitute a change to the phonemic status of /t/ (Buizza & Plug 2012). Siptár & Törkenczy (2000) ultimately conclude that the Hungarian palatal obstruents are palatal stops which sometimes surface with affrication: “In the appropriate phonetic contexts, under appropriate conditions in terms of stress, speech rate, and speech style, they become affricated, as is to be expected for physiological reasons. However, this does not warrant their classification as affricates” (Siptár & Törkenczy 2000: 84).

### 3.2.2 Evidence from Other Phonetic Studies

Olsson (1993) is cited by Siptár & Törkenczy (2000) as having generally unique proposals for classification of Hungarian consonants. Among these, he proposes an affricate analysis for the Hungarian palatal obstruents, citing his principle that “one should take the variant in the strongest position as basic (where ‘strongest’ is understood as ‘most resistant to lenition’)” (Olsson 1993; as cited in Siptár & Törkenczy 2000: 81–84). Since the palatal obstruents are realized with frication (“as affricates”) before stressed vowels (a strong position) but realized as a stop in “various weaker positions,” they are, according to Olsson (1993), affricates (Siptár & Törkenczy 2000: 84). However, Siptár & Törkenczy (2000) refute this claim by pointing out that the principle he calls upon for his reasoning may be inconsistent with his treatment of another segment, /h/, and, more importantly, that his findings “disregard[] the fact that genuine affricates are never realized as stops [in Hungarian], no matter how weak the position;” thus, the palatal obstruent could not be considered an affricate as long as it had non-affricated (stop) surface forms (Siptár & Törkenczy 2000: 84).

Geng et al. (2005) performed a study on the perception of palatal obstruents (which they refer to as palatal stops) compared to other stop categories such as alveolar and bilabial, using Hungarian as a case study. Their findings add information to the stop-affricate debate on idiolectal variation with respect to the frication portion (or release, if it is considered a palatal stop) which supports the stop hypothesis. They report that the “burst” for the palatal was “heterogeneous” between speakers, where some “exhibited clear bursts” but others did not (Geng

et al. 2005: 220).<sup>27</sup> They conclude from this that “the burst information is an unstable cue for perception of palatal place” (Geng et al. 2005: 220), which relates more specifically to their perceptual study comparing palatal stops to other stops such as alveolar and velar, but adds to our discussion on classifying palatal obstruents based on consistent control of the frication . Although Geng et al. (2005) are not using their data to make a classification of the Hungarian palatal obstruents, their conclusion about idiolectal variation between speakers and judgment of frication as an “an unstable cue” aligns with the theory that this frication is an unreliable phonemic quality of the sound due to variation, and therefore not under control.

### 3.2.3 Evidence from Phonological Behavior

Phonological evidence further motivates an interpretation of the palatal obstruents as stops, as explained in Siptár & Törkenczy (2000) and Siptár (2013). The palatal obstruent patterns with stops in the case of a phonological process where stops are sometimes realized as unreleased before other stops (e.g., *kapta* [kɒp̚ˈtɒ]<sup>28</sup> ‘he got it’; *rakta* [rɒk̚ˈtɒ] ‘he put it’) (Siptár & Törkenczy 2000: 83). Affricates, however, do not surface with an unreleased component in this case (e.g., *bocskor* [bɒʃ̥kɒr], \*[bɒʃ̥ˈkɒr] ‘moccasin’; *barack* [bɒrɒʃ̥k], \*[bɒrɒʃ̥ˈk] ‘peach’) (Siptár & Törkenczy 2000: 83). Palatal obstruents, like the stops, surface as unreleased in this position, and do not surface as an affricate like the affricates do: *hegytől* [hɛçˈtøːl], \*[hɛç̥tøːl] ‘from (a) hill’; *hagyd* [hɒj̥ˈd], \*[hɒj̥ˈd] ‘leave’ (imp.) (Siptár & Törkenczy 2000: 83).<sup>29</sup>

The palatal obstruents also pattern with stops in sequences of identical sounds across a word boundary, where stops obligatorily merge into geminates (*szép pár* [se:p:a:r] ‘nice couple’; *sok kör* [ʃok:ør] ‘many circles’); affricates, however, in most registers resist gemination (Siptár & Törkenczy 2000: 83). These affricates “remain unmerged in careful speech” (e.g., *rác cég* [ra:ʃ̥s̥-ʃ̥e:g] ‘Serbian firm’; *bölcs csere* [bølt̥ʃ̥-ʃ̥ɛɾe] ‘wise change’), only merging occasionally in casual speech, where they are then sometimes subject to degemination ([ra:ʃ̥s̥e:g]; [bølt̥ʃ̥ɛɾe] ~ [bølt̥ʃ̥ɛɾe]) (Siptár & Törkenczy 2000: 83). In testing the palatal obstruents against these two behaviors (the stops merging while the affricates mostly do not), the authors report that the palatal obstruents pattern with stops, not affricates, as “the merger applies automatically and obligatorily” to palatal obstruents in this word-boundary position (Siptár & Törkenczy 2000: 83). Another phonological phenomenon to note is that affricate pairs across a word boundary may also undergo lenition of the first affricate (e.g., [ra:ʃ̥s̥e:g]; [bølt̥ʃ̥ɛɾe]) in colloquial speech; however, this is “totally unacceptable” for palatal obstruents (*ramaty tyúk* [rɒmɒç:u:k], \*[rɒmɒç̥u:k] ‘decrepit wench’; *nagy gyár* [nɒj̥:a:r], \*[nɒj̥j̥a:r] ‘big factory’) (Siptár & Törkenczy

<sup>27</sup> It is worth noting that Geng et al. (2005) would not be noticing the variation by phonetic environment that was found in Siptár & Törkenczy (2000) (Section 3.2.1), as each speaker repeated the same set of tokens, so the release yielded variable surface forms in the same word-internal context.

<sup>28</sup> In contrast to the IPA examples presented in Section 3.2.1, these narrow transcriptions are provided directly in the text by Siptár & Törkenczy (2000).

<sup>29</sup> Siptár & Törkenczy (2000) do report that there may be some variation in pre-stop surface form, perhaps in the pre-velar environment, at least in the example of *hetyke* [hɛçˈkɛ] ~ [hɛç̥kɛ] ‘pert’ (Siptár & Törkenczy 2000: 83).

2000: 83). In the three phonological processes outlined in this section, the palatal obstruents patterned with stops and/or against affricates in every case; this suggests a phonology-motivated classification of the Hungarian palatal obstruents as stops and corroborates the phonetic evidence in Section 3.2 that these sounds behave as simple, rather than complex, segments.

## 4 Conclusion and Discussion

### 4.1 Classifying the Hungarian Palatal Obstruents

Following the results of my phonetic analysis of evidence for both stop and affricate arguments in the literature, I conclude that the Hungarian palatal obstruents should be classified as palatal stops, /c, ʃ/. The frication in the surface form of the sound does not meet requirements for phonetic control which would motivate affricate status. As examined in Section 3, the presence of this frication is conditioned by language non-specific phonetic and physiological factors and is subject to significant variation. There is a lack of proof that the frication is attached to a [+continuant] portion of the underlying form and it can therefore not be considered to be under control; the palatal obstruents also pattern with stops phonologically, which further supports a phonemic classification as such. The frication that occurs on the surface in a Hungarian palatal obstruent is better understood as a passive phonetic consequence of the palatal place and mechanics of articulation (Section 1.4) of the sound.

### 4.2 Broader Implications for Sound Description

The approach taken in this paper to classify Hungarian palatal obstruents is one that makes claims not only about the phonemic category of these sounds, but about the way that we translate phonetic information into classifications of sounds. The pro-affricate hypotheses discussed in Section 3.1 rely on a superficial view of what makes a sound to answer *the palatal question*. According to this view, if affricates are characterized by silence followed by frication, and there is silence followed by frication in the Hungarian palatal obstruent, then the palatal obstruent is an affricate. What appears on the surface (in the acoustic signal) determines a sound's classification. However, by this definition, many sounds, such as /t/ placed in a phonetic environment that conditions affrication (as discussed by Buizza & Plug 2012), would *alternate* with affricate forms in those environments, granted that their phonemic status is entirely dependent of what appears on the surface. The palatal obstruent, as well, following Siptár & Törkenczy's (2000) evidence that frication is present or absent in different phonetic environments, would necessarily be classified as both a stop and affricate, depending on word position.

If we take a control-based approach to describing sounds, this problem is mitigated, as sounds such as the palatal obstruent are understood not only by their surface acoustics but also by their underlying representation, which aligns with the dual phonological-phonetic understanding of affricates explained in Section 2. Following the control-based view, an affricate is silence and frication that is attached to the mental representation of a complex segment. This definition calls into question what speakers of Hungarian control when producing palatal obstruents and generally treats the classification of sounds according to the tacit knowledge a

speech community has about their language. These principles motivate this acceptance of the stop analyses proposed by Siptár & Törkenczy (2000), Siptár (2013), and Geng et al. (2005), as they recognize that the Hungarian palatal obstruents produced by speakers behave like stops that surface with frication sometimes, with such variation following patterns of predictable physiological phenomena related to the sound's palatal place and phonotactic matters of word position and speech rate. Overall, this understanding builds upon evidence that adds up to a more holistic and generalizable explanation of how the Hungarian palatal stop operates, in concordance with general patterns within language such as frication as it relates to articulation and influence from predictable phonetic factors.

This conclusion is strengthened by the palatal obstruent's patterning with stops in phonological processes. If the palatal obstruent were analyzed as an affricate, in order to answer to the evidence in Section 3.2.3, one would need to understand the sounds as palatal affricates that behave like stops phonologically, which is a more challenging pattern to fit into the structure of a language. Overall, an affricate classification of the palatal obstruent requires linguists to find systems to explain the *lack* of frication in certain environments (see Siptár & Törkenczy's (2000) rebuttal of Olsson (1993), Section 3.2.2) when it is more straightforward to explain the *presence* of frication by examining factors that motivate its presence physiologically, such as word position and phonetic variation (Section 3.2.1). In any case, despite the presence of surface-level frication, Hungarian speakers do acquire and produce a sound that phonetically and phonologically behaves like a stop. This is proof in itself that speakers reject a superficial understanding of the palatal obstruent based on the presence of frication alone, and linguists should likewise be dissatisfied with a surface-based description.

### 4.3 Further Research

Adding quantitative data to the phonetic analysis of palatal stops is a priority for further research within this topic. It would be useful to support these discussions of frication duration in the Hungarian palatals and comparable sounds with quantitative measurements from a controlled dataset. Siptár & Törkenczy (2000) map out the environments in which there is greater, less, or no frication for Hungarian palatal stops (Section 3.2.1), but they do not reference specific measurements or data in which these observations are grounded. There is potential here to measure Hungarian palatal stops in each of the word environments outlined by their study (e.g., word-final, stressed syllable, before plosives, before /m/) and create a true quantitative analysis of palatal stop frication in different phonetic environments. It would also be insightful to collect measurement data for frication duration under different phonetic variation factors such as speech rate and speech style/register, a topic alluded to in Siptár & Törkenczy (2000) and Szende (1994) but not discussed at length or supported by quantitative evidence.

Such data would also help linguists to better understand the phonetic environments and phonetic variation factors that generate frication generally, and provide opportunities to expand this research crosslinguistically to other cases (such as Pitjantjatjara (Tabain & Beare 2011),

Arrernte (Tabain 2023: 82), and other Australian languages) where there is ambiguity as to the phonemic status of affrication in palatal stops. Quantitative measurements of frication duration and ratio of silence to frication in Hungarian palatal obstruents would invite comparison with the silence-frication ratios of attested affricates /ts, tʃ/ in Hungarian as explored in Pycha (2007; 2010), although in Section 3.1.3 it was proposed that this metric may be more ideal for answering research questions other than the classification of the palatal obstruent, especially if we are to understand the sound as a palatal stop and not an affricate.

The research in this paper is a starting point for a control-based classification of Hungarian palatal obstruents and complex segments in general. Further investigation involving quantitative description of the factors discussed above holds the potential to contribute more evidence to a control-motivated approach to Hungarian palatals as well as potentially yield crosslinguistic evidence of frication patterns in support of a Hungarian palatal stop analysis. In any case, this paper's classification of Hungarian palatal obstruents as stops stands as a contribution to the century-long debate of the palatal question and takes a step towards completing the picture of the palatal inventory in Hungarian.

## References

- Balassa, József. 1893. Kurze Darstellung des ungarischen Lautsystems [Brief depiction of the Hungarian sound system]. *Phonetische Studien [Phonetic Studies]* 6. 167–180, 302–321.
- Béke András, Gósy Mária & Horváth Viktória. 2012. Gyakorisági vizsgálatok spontán beszédben [Frequency statistics in spontaneous speech]. *Beszédkutató [Speech Research]*.
- Bolla, Kálmán. 1980. Magyar hangalbum [A phonetic conspectus of Hungarian]. *Magyar Fonetikai Füzetek [Hungarian Papers in Phonetics]* 6.
- Buizza, Emanuela & Leendert Plug. 2012. Lenition, fortition and the status of plosive affrication: the case of spontaneous RP English /t/. *Phonology* 29(1). 1–38.  
<https://doi.org/10.1017/S0952675712000024>.
- Chitoran, Ioana, Louis Goldstein & Dani Byrd. 2002. Gestural overlap and recoverability: Articulatory evidence from Georgian. *Laboratory phonology* 7(4–1). 419–447.
- Clements, G. N. 1999. Affricates as noncontoured stops. In *Item, order in language and speech. Prague*. Charles University Press.
- Eberhard, David M., Gary F. Simons & Charles D. Fennig. 2023. *Ethnologue: Languages of the World*. 26th edn. Dallas, Texas: SIL International. <http://www.ethnologue.com>.
- Forchhammer, Jörgen. 1953. Zum Affrikatenproblem [On the affricate problem]. *Zeitschrift für Phonetik und Allgemeine Sprachwissenschaft [Journal for Phonetics and General Linguistics]* 7(5). 403–408.
- Geng, Christian, Katalin Mády, Caroline Bogliotti, Souhila Messaoud-Galusi, Vicky Medina & Willy Serniclaes. 2005. Do palatal consonants correspond to the fourth category in the perceptual F2-F3 space? In *ISCA Workshop on Plasticity in Speech Perception*.  
[https://www.isca-speech.org/archive\\_open/archive\\_papers/psp\\_2005/psp5\\_219.pdf](https://www.isca-speech.org/archive_open/archive_papers/psp_2005/psp5_219.pdf).
- Geng, Christian & Christine Mooshammer. 2004. Hungarian palatal stop: phonological considerations and phonetic data. *ZAS Papers in Linguistics* 37. 221–246.  
<https://doi.org/10.21248/zaspil.37.2004.250>.
- Gombocz, Zoltán & Ernst A. Meyer. 1909. Zur Phonetik der ungarischen Sprache [On the phonetics of the Hungarian language]. *Le monde oriental [The Eastern World]* 122–187.
- Hála, Bohuslav. 1952. Une contribution à l'éclaircissement de la nature phonétique des affriquées [A contribution to the elucidation of the phonetic nature of affricates]. *Zeitschrift für Phonetik und Allgemeine Sprachwissenschaft [Journal for Phonetics and General Linguistics]* 6(1). 77–93.
- Hegedűs, Lajos. 1958. Neuere Untersuchungen über die ungarischen Affrikaten [Novel investigations on Hungarian affricates]. *Phonetica* 2. 155–183.
- Howell, Peter & Stuart Rosen. 1983. Production and perception of rise time in the voiceless affricate/fricative distinction. *The Journal of the Acoustical Society of America* 73(3). 976–984. <https://doi.org/10.1121/1.389023>.
- Jong, Kenneth J. de. 1995. The supraglottal articulation of prominence in English: Linguistic stress as localized hyperarticulation. *The Journal of the Acoustical Society of America* 97(1). 491–504. <https://doi.org/10.1121/1.412275>.
- Kázmér, Miklós. 1961. A magyar affrikátságzemplélet [The Hungarian affricate approach]. *Nyelvtudományi értekezések [Dissertations in Linguistics]* 27.
- Keating, Patricia & Aditi Lahiri. 1993. Fronted Velars, Palatalized Velars, and Palatals. *Phonetica* 50(2). 73–101. <https://doi.org/10.1159/000261928>.

- Lombardi, Linda. 1990. On the representation of the affricate. *University of Massachusetts Occasional Papers in Linguistics* 16(2). 7.
- Olsson, Magnus. 1993. The basic Hungarian allophone system: Structure and rules. *Working papers/Lund University, Department of Linguistics and Phonetics* 40. 157–184.
- Pycha, Anne. 2007. Phonetic vs. Phonological Lengthening in Affricates. *UC Berkeley Phonology Lab Annual Reports* 3. <https://doi.org/10.5070/P72HS4V5WT>.
- Pycha, Anne. 2010. A test case for the phonetics–phonology interface: gemination restrictions in Hungarian. *Phonology* 27(1). 119–152. <https://doi.org/10.1017/S0952675710000059>.
- Repp, Bruno H., Alvin M. Liberman, Thomas Eccardt & David Pesetsky. 1978. Perceptual integration of acoustic cues for stop, fricative, and affricate manner. *Journal of Experimental Psychology: Human Perception and Performance* 4(4). 621–637. <https://doi.org/10.1037/0096-1523.4.4.621>.
- Siptár, Péter. 2013. Palatal controversies. In *VLLXX: Papers Presented to László Varga on his 70th Birthday*, 395–408. Budapest: ELTE. <http://real.mtak.hu/13547/1/siptar.pdf>.
- Siptár, Péter & Miklós Törkenczy. 2000. *The Phonology of Hungarian* (The Phonology of the World's Languages). OUP Oxford. <https://books.google.com/books?id=owdREAAQBAJ>.
- Szende, Tamás. 1974. Intervocalic Affricates in Present-Day Hungarian. *Annual Report of the Institute of Phonetics of the University of Copenhagen* 8. 129–131.
- Szende, Tamás. 1992. *Phonological Representation and Lenition Processes*. Budapest: Research Institute for Linguistics of the Hungarian Academy of Sciences.
- Szende, Tamás. 1994. Hungarian. *Journal of the International Phonetic Association* 24(2). 91–94. <https://doi.org/10.1017/S0025100300005090>.
- Tabain, Marija. 2023. Articulatory and acoustic phonetics. In Claire Bowerman (ed.), *The Oxford Guide to Australian Languages [In Press]*. Oxford University Press.
- Tabain, Marija & Richard Beare. 2011. A Spectral Analysis of Stop Bursts in Pitjantjatjara. In *ICPhS, 1934–1937*.
- Tabain, Marija, Richard Beare & Andrew Butcher. 2013. A preliminary spectral analysis of palatal and velar stop bursts in Pitjantjatjara. In *INTERSPEECH*, 291–295.
- Tarnóczy, T. 1987. The Formation, Analysis and Perception of Hungarian Affricates. In Robert Channon & Linda Shockey (eds.), *In honor of Ilse Lehiste*, 255–270. De Gruyter Mouton. <https://doi.org/10.1515/9783110886078.255>.
- Xu, Yi & Santitham Prom-on. 2019. Economy of Effort or Maximum Rate of Information? Exploring Basic Principles of Articulatory Dynamics. *Frontiers in Psychology* 10. 2469. <https://doi.org/10.3389/fpsyg.2019.02469>.