CONSONANT CLUSTER PHONOTACTICS: A PERCEPTUAL APPROACH

by

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À ma mère et à mon bébé,
qui nous ont quittés
À Marielle et Émile,
qui nous sont arrivés
À Jean-Pierre,
qui est toujours là

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ABSTRACT

This dissertation deals with deletion and epenthesis processes conditioned or constrained by the consonantal environment, essentially consonant deletion, vowel epenthesis, and vowel deletion. It is argued that the standard generative approach to these processes, which relies on the syllable and the principle of prosodic licensing, is empirically inadequate, and an alternative sequential approach based on perceptual factors is developed. It is proposed that the likelihood that a consonant deletes, triggers epenthesis, or blocks vowel deletion correlates with the quality and quantity of the auditory cues associated to it in a given context. The approach is implemented in Optimality Theory and adopts more specifically the 'Licensing by cue' framework developed by Steriade (1999a,c).

New empirical gneralizations concerning deletion and epenthesis processes are uncovered, in particular 1) the fact that stops are more likely than other consonants to delete, trigger epenthesis, or block deletion; 2) the role of syntagmatic contrast in deletion and epenthesis processes; 3) the role of the audibility of stop release bursts; 4) the existence of cumulative edge effects, whereby more and more phonotactic combinations are licensed at the edges of prosodic domains as we go up the prosodic hierarchy. These generalizations are elucidated in terms of internal and contextual cues, modulation in the acoustic signal, and cue enhancement processes at edges of prosodic domains.

The proposed perceptual approach achieves a substantial simplification and unification of the conceptual apparatus necessary to analyze deletion and epenthesis processes. It subsumes under the more general notion of perceptual salience principles of syllable well-formedness and the Obligatory Contour Principle. Furthermore, it eliminates the need for exceptional mechanisms such as extrasyllabicity at domain edges.

The analysis is based on the study of deletion and epenthesis processes in a variety of languages. Detailed investigations of schwa in Parisian French, cluster simplification in Québec French, and stop deletion and vowel epenthesis in Ondarroa Basque are provided.

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NOTES ON THE PRESENT VERSION

The present version, finished in July 2001, differs slightly from the official one, deposited in September 2000. The acknowledgments were finally added. The formatting was changed and the presentation generally improved. Several typos were corrected, and the references were updated, when papers originally cited as manuscripts were subsequently published. A couple of references were also added, as well as short conclusions to chapters 3, 4, and 5, which for the most part summarize the chapter in question.

Occasionally I have modified the text, for stylistic or clarificational reasons, without altering the original meaning. The modifications brought to the following sections deserve to be specifically mentioned:

- section 3.2.3: The discussion of Fleischhacker's analysis on pp. 171-173 was slightly modified in light of Fleischhacker (2000a).
- section 3.3.1: Explanations were provided for the tableau in (44).
- section 4.2.2: The percentage of deletion for obstruent+/t,d/ clusters was added, with corresponding revisions of the following paragraph.

I have adopted two simple terminological changes, which have no effect on the analysis, and have modified the text accordingly:

- The feature [continuant$_{ac}$] was changed to [noisy] (sections 4.3.3.1.4 and 4.3.3.2)
- The constraint MAX-C[+F_M] was changed to MAX-C(-stop) (sections 3.2.3, 3.3.2, 4.2.4, and 4.3.3.2)

I wanted to keep more significant changes to a minimum and only revised a few sections which I felt needed to be. These are:

- section 3.2.3: The constraint MAX-stop/__[+cont] was added in (29) and (35).
- section 4.1.2.2: The discussion of relative identity avoidance was revised, in particular with the addition of the Hungarian pattern.
- section 4.2.4: The analysis of Hungarian was changed.
- section 4.3.1: A few clusters were added in table 5, and its presentation was slightly modified. The discussion of previous analyses was revised, in particular in light of Nikièma (1999), which was not available when the dissertation was officially deposited.
- section 5.4.4.3: The rule for the positioning of the /-a/ morpheme was revised.
- section 5.4.6: The constraint ranking was maintained but tableaux and explanations were added, together with a discussion of likelihood and gradient well-formedness of competing forms.
- section 5.4.7: The section was generally improved.

Questions and comments are welcome.
I can be reached at <mhcote@uottawa.ca> or <mhcote@alum.mit.edu>.

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INTRODUCTION

This dissertation deals with deletion and epenthesis processes conditioned or constrained by the consonantal environment. These are essentially consonant deletion, vowel epenthesis, and vowel deletion.[1] Consonant deletion and vowel epenthesis serve to avoid consonants in certain disfavored positions; vowel deletion may be blocked when it would yield an undesirable consonantal configuration.

The standard generative approach to these processes relies on the syllable and the principle of prosodic licensing, which states that all phonological units must be prosodically licensed, that is they must belong to higher prosodic structure. In particular, segments must belong to syllables. Under this view, consonant deletion and vowel epenthesis serve to achieve exhaustive syllabification of the segmental string, when a consonant cannot be incorporated into a well-formed syllable. Likewise, vowel deletion is blocked when this would leave a consonant that cannot be properly syllabified.

I argue against the traditional syllabically-conditioned analyses of these phenomena, on empirical as well as conceptual grounds, and claim that syllable well-formedness plays no role in them. I develop an alternative sequential approach which highlights the role of perceptual factors. The basic idea is encoded in a Principle of Perceptual Salience, according to which every segment must be sufficiently salient. A consonant deletes or triggers epenthesis when the cues that permit a listener to detect its presence are diminished. Deletion removes such deficient segments, epenthesis provides them with additional salience. Likewise, vowel deletion is blocked when this would leave a consonant with diminished perceptual cues. Maintaining the vowel avoids removing cues that are crucial to that consonant. The likelihood that a certain consonant deletes, triggers epenthesis, or blocks vowel deletion correlates with the quality and quantity of the auditory cues associated to it in a given context.

[1]This is not to say that all instances of consonant deletion, vowel epenthesis, and vowel deletion are motivated by the consonantal environment. Vowel epenthesis may be driven, and vowel deletion blocked, by rhythmic constraints, for example the desire to avoid final stress, achieve a well-formed trochee (e.g. French, Fagyal 1998, 2000; Galician, Martínez-Gil 1997), or conform to minimal-word conditions (e.g. Mohawk, Hagstrom 1997; Lardil, K. Hale 1973). Consonant lenition, which may result in complete deletion, also typically applies intervocalically (Kirchner 1998; Lavoie 2000).

This approach is implemented in Optimality Theory and uses phonetically-motivated constraints projected from observable phonetic properties. This investigation pursues a more general line of research that has been developing recently and that reassesses the role of the syllable in segmental processes and explores the contribution of perceptual factors (e.g. Flemming 1995; Jun 1995; Côté 1997a, 1999; Boersma 1998, 1999; Hume 1999; Y. Kang 1999, 2000; Kochetov 1999; Steriade 1999a,c,d, to appear; Hume & Johnson, to appear). It adopts more specifically the 'Licensing by cue' approach developed by Steriade (1999a,c), according to which the likelihood that a feature or segment occurs in a given context is a function of the relative perceptibility of that feature or segment in that context.

It is argued that a perception-based sequential approach is superior to those based on syllable well-formedness because it achieves significantly greater empirical coverage as well as a substantial simplification and unification of the conceptual apparatus necessary to analyze deletion and epenthesis processes. New empirical generalizations concerning these processes are uncovered, in particular 1) the fact that stops are more likely than other consonants to delete, trigger epenthesis, or block deletion; 2) the role of syntagmatic contrast in deletion and epenthesis processes: consonants that are more similar to adjacent segments are more likely to delete or trigger vowel epenthesis than consonants that are more contrastive; 3) the role of the audibility of stop release bursts; 4) the existence of cumulative edge effects, whereby more and more phonotactic combinations are licensed at the edges of prosodic domains as we go up the prosodic hierarchy, thereby reducing the likelihood of consonant deletion and vowel epenthesis and increasing that of vowel deletion. These generalizations are elucidated in terms of internal and contextual cues, modulation in the acoustic signal, and cue enhancement processes at edges of prosodic domains.

This perceptually-motivated approach integrates principles that were thought to be independent under the more general notion of perceptual salience: on the one hand, principles of syllable well-formedness, on the other hand, the Obligatory Contour Principle. Furthermore, it eliminates the need for exceptional mechanisms such as extrasyllabicity at domain edges. The resulting theory is more coherent as it unifies phenomena that are similar but for which radically different principles had been invoked.

The irrelevance of syllable well-formedness has been argued for with respect to processes other than consonant deletion and vowel epenthesis, notably laryngeal contrasts (Steriade 1999a,c), place contrasts (Steriade 1999a), and palatalization (Kochetov 1999). These results raise the possibility that the syllable could be

dispensed with in all segmental phonology. However, this conclusion is not to be taken as implying that syllables are devoid of any phonological status. It is well beyond the scope of this dissertation to determine the exact role of the syllable in phonology, but one plausible scenario is to view the syllable as a purely rhythmic constituent, which is crucial in accounting for rhythmic processes (e.g. shortening in closed syllables, lengthening in open or stressed syllables, stress on heavy syllables) but is irrelevant for segmental ones. I leave for future research the exploration of this and other issues related to the scope of syllable structure in phonology.

The dissertation is organized as follows.

Chapter 1 introduces the syllabic approach to deletion and epenthesis and evaluates its empirical coverage. This approach is argued to be insufficient, unnecessary, and inadequate. I discuss several deletion and epenthesis processes for which a syllabic account has been proposed and show that it does not hold upon closer examination of the facts. These patterns are consonant deletion in Hungarian, Attic Greek, English, and Icelandic, and vowel epenthesis and deletion in French. Given the complexity of the French case, it is discussed in chapter 2, entirely devoted to the French schwa. While showing the inadequacy of syllable-based analyses, these patterns also reveal generalizations and tendencies in the application of deletion and epenthesis. These constitute the empirical basis of the dissertation, which the framework developed in subsequent chapters is meant to account for. These generalizations are:
1: Consonants want to be adjacent to a vowel, and preferably followed by a vowel.
2: Stops want to be adjacent to a vowel, and preferably followed by a vowel.
3: Stops that are not followed by a [+cont] segment want to be adjacent to a vowel.
4: Consonants that are relatively similar to an adjacent segment want to be adjacent to a vowel, and preferably followed by a vowel.
5: Consonants that do not surface at the edge of a prosodic domain want to be adjacent to a vowel, and preferably followed by a vowel.
6: Coronal stops want to be followed by a vowel.

Chapter 3 presents the perceptual motivations that underlie the generalizations presented in chapters 1 and 2 and develops an Optimality-theoretic constraint system that derives these generalizations and yields the desired patterns of consonant deletion, vowel epenthesis, and vowel deletion. I argue that both markedness and faithfulness constraints encode the desirability of perceptual salience. I also discuss a number of issues that this perceptually-motivated analysis raises, notably the role of phonetics and perception in synchronic grammars and the treatment of variation in Optimality Theory. I end the chapter with two simple case

studies to illustrate the functioning of the constraint system I propose: Lenakel vowel epenthesis and Sranan consonant deletion.

Chapters 4 and 5 expand on two of the factors that were shown to affect consonant deletion, vowel epenthesis, and vowel deletion in the previous chapters: syntagmatic contrast and the prosodic structure. Chapter 4 is concerned with the role of syntagmatic contrast in consonant deletion and vowel epenthesis. It elaborates on the generalization noted in chapters 1 and 2 that consonants that are more similar to adjacent segments are more likely to delete or trigger epenthesis than consonants that are more contrastive. The approach to syntagmatic contrast presented in chapter 3 is compared with previously proposed ones, in particular the OCP. It is concluded that this principle fails to account for the full range of effects of identity or similarity avoidance. Then I apply the proposed system to several case studies of consonant deletion and vowel epenthesis, in order of increasing complexity. Catalan, Black English, and French illustrate the role of agreement in place of articulation, voicing, and manner of articulation in deletion and epenthesis patterns. Hungarian shows the possible interaction of manner and place of articulation. Finally, I analyze in detail the very complex pattern of word-final cluster simplification in Québec French, which most clearly illustrates the gradient effect of similarity on consonant deletion.

In chapter 5 I investigate in more detail what I call edge effects, which refer to the fact that more complex combinations of consonants are typically allowed at edges of prosodic domains, as opposed to domain-internal positions. The greater tolerance for consonant clusters at edges explains the presence of asymmetries in the application of deletion and epenthesis processes between internal positions and edges of constituents. Edge effects have been investigated almost exclusively at the word level. This chapter expands the empirical basis of edge effects by looking at patterns of consonant deletion, vowel epenthesis, and vowel deletion that display edge effects at levels above the word, and showing the cumulativity of edge effects, whereby consonants are more and more easily tolerated as we go up the prosodic hierarchy. We will see how the perceptual approach advocated here naturally and simply accounts for edge effects and their cumulative behavior, without the need for exceptional mechanisms such as extrasyllabicity. This approach relies on the existence of cue enhancement processes at edges of prosodic domains, which increase the perceptibility of consonants in these positions. The patterns analyzed in this chapter include epenthesis and deletion in Arabic, French, Picard, and Marais-Vendéen. I develop in greater detail one case study: consonant deletion and vowel epenthesis in Basque, with special emphasis on the dialect of Ondarroa.