0 Introduction

0.1 Setting the stage

The goals of this dissertation are twofold. First, I attempt to provide a phonological characterization of nasals, nasalized segments, and processes of nasalization. Second, I attempt to offer a theoretical interpretation of the phonological interaction between nasal and laryngeal articulations. To this end, I introduce the model of Element-based Dependency, a generative approach to segmental and prosodic structure that combines insights from the framework of Dependency Phonology (see in particular Anderson & Ewen 1987 and Smith 2000) and the framework of Element Theory (see Harris & Lindsey 1995; see also Harris 1994).

The main Element-based Dependency claims regarding nasality are, firstly, that nasal manner consists of a combination of vocalic and consonantal manner properties, and, secondly, that nasalization is expressed by an element that, depending on the structural context, is interpreted either as nasalization or as voicing. This interpretation of nasality thus departs from that of feature-based models (see e.g. Jakobson et al. 1951, Chomsky & Halle 1968), in which nasals and nasalized segment types are characterized by the feature [nasal]. The advantage of the present approach is that it recognizes a smaller number of features, or “elements”, which leads to a more restrictive model of segmental-internal structure. In addition, Element-based Dependency offers a natural and non-stipulative account of the relation between nasal manner and other manner types, between manner, phonation, and place in general, and between segmental and prosodic structure.

With regard to nasalization, I propose that nasalized segment types are characterized by the presence of a dependent element \([L]\). The interpretation of this dependent \([L]\) is context-sensitive. If \([L]\) is associated to a sonorant manner component, as in (1a), it is interpreted as nasalization. If, on the other hand, \([L]\) is associated to an obstruent manner component, as in (1b), it is interpreted as voicing.\(^1\)

\(^1\) There is a complication here, in that dependent \([L]\) is also interpreted as nasalization in case it is associated to a laryngeal manner component (which consists of a placeless obstruent manner component). I discuss this issue in §2.4.3, and in more detail in chapter 6.
An advantage of the dual interpretation of dependent \(|L|\) is that it accounts for the complementary distribution of nasalization and voice; cross-linguistic evidence suggests that there are no languages with distinctively voiced sonorants, nor do there appear to be any languages with distinctively nasalized obstruents. An additional advantage of a unified approach to nasalization and voicing is that it provides a straightforward interpretation of processes that trigger either voicing or nasalization, depending on the manner type of the affected segment. I will consider a number of such processes in chapters 3 and 4.

Proposals regarding a unified interpretation of nasality and voice can be traced back to an early suggestion regarding the feature-geometric organization of \([\text{nasal}]\) and \([\text{voice}]\). Based on a process of denasalization in Toba Batak, Hayes (1986:475) groups both features under the “Peripheral” tier, which “contains the features responsible for the velum and the larynx”. However, this proposal was not followed up in later work in Feature Geometry.\(^2\)

In some versions of Dependenc Phonology (see Humbert 1995, Smith 2000), as well as in Radical CV Phonology (see Van der Hulst 1995), it is assumed that nasalization and voice involve the presence of the vocalic “component” \([V]\). However, none of these approaches considers nasalization in any detail, nor do they provide an account of the relation between nasalization and laryngeal articulations. The same can be said about Element Theory, although Harris & Lindsey (1995:65) make an interesting suggestion with regard to the location of the element(s) specifying nasality:

\[\text{[G]}\text{iven the current state of our knowledge, it is not clear whether }\text{[nasality]}\text{ should be represented by an autonomous nasal element or is more appropriately subsumed under one of the laryngeal elements.}\]

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\(^2\) Toba Batak displays an optional process of denasalization which turns a nasal into a voiceless stop in case it precedes a following heterorganic voiceless obstruent (e.g. \(/\text{mk/} → \{\text{pk}\})\). Hayes accounts for this process in terms of spreading of the Peripheral node from the voiceless obstruent (which contains \([-\text{voice}]\) and \([-\text{nasal}]\)) to the nasal, the Peripheral node of which is delinked. A problem with this approach, as Den Dikken & Van der Hulst (1988:72) note, is that \([\pm\text{voice}]\) is not contrastive in Toba Batak nasals. Within Feature Geometry, Toba Batak denasalization can be handled by underspecification of \([\pm\text{voice}]\) in nasals, which obviates the need for a class node that subsumes both \([\text{nasal}]\) and the laryngeal features.
Working within the framework of “Revised Element Theory”, Ploch (1999) provides a unified account of nasalization and voice in terms of the element |L|. I briefly discuss Ploch’s approach in §2.4.3.

Regarding nasals, I propose that the notion of nasal manner is a derived concept, in the sense that nasal manner consists of a combination of more basic building blocks: a dominating vocalic (or “sonorant”) element |L| and a dominated consonantal (or “stop-like”) element |?|. These two elements, in this specific configuration, represent the basic structure of a segment type that I term a “sonorant stop”:

(2) \[
\begin{array}{c}
  \text{L} \\
  \text{|} \\
  \text{?}
\end{array}
\]

As I will argue in §2.2.5, sonorant stops are in most languages realized as nasals.

The essence of the Element-based Dependency approach to nasal manner is not new. The general conception is based on the representation of nasal manner in Dependency Phonology (see Anderson & Ewen 1987). Compare Anderson & Ewen’s representation of nasal manner with the present approach:

(3) a. Anderson & Ewen b. Element-based Dependency

\[
\begin{array}{c}
  \text{V} \\
  \text{|} \\
  \text{C}
\end{array}
\quad
\begin{array}{c}
  \text{L} \\
  \text{|} \\
  \text{?}
\end{array}
\]

In Anderson & Ewen, nasal manner consists of a structure in which a vocalic manner component |V| dominates a dependent consonantal manner component |C|. This is more or less equivalent to the interpretation of nasal manner here.

The Element-based Dependency representation of nasal manner captures the hybrid phonological behaviour that is displayed by nasals. The fact that nasals contain |L| as dominating element means that they behave as sonorants as regards their prosodic interpretation. Consider for instance the observation that nasals, as consonants, are relatively unmarked in vocalic positions such as nuclei and codas. The fact that nasals contain |?| as dominated element means that they behave as stops as regards place of articulation. Consider in this light the observation that, in most languages, nasals have available the same set of place contrasts as plosives. The general relation between nasal manner, place, and prosodic structure can thus be represented as in (4):
Manner, prosodic structure, and place are also interrelated in the case of other manner types. Consider for instance the Element-based Dependency representation of affricate manner:

(5) Prosodic structure
    ┌───────┐
    │       │
    │ ?     │
    │       │
    │ H     │
    │ I     │

The $[?]$-headed status of affricates expresses the fact that affricates function as plosives for the purposes of prosodic interpretation. This captures the observation that affricates generally have the same distribution as plosives. Similar to the more basic sibilants, affricates have the element $[H]$ dominating place. As such, the fact that affricates and sibilants are generally restricted to coronal place can be attributed to $[H]$ selecting $[I]$.

One consequence of representations such as those in (4) and (5) is that laryngeal modifications, which I assume are represented in terms of branching dependent elements, are directly dominated by a prosodic rather than a segmental unit. More specifically, I will follow Kehrein (2002) and assume that laryngeal contrasts such as voice, aspiration, and glottalization are directly dominated by a subsyllabic constituent, i.e. an onset (O), a nucleus (N), or a coda (C). This is illustrated by the general organization in (6), where the phonation component subsumes the various laryngeal distinctions:

(6) O, N, C
    ┌─────┐
    │     │
    │   O, N, C   │
    │       │
    │       │
    └───┬─┬─┘
         │ sector
         │     │
         │ manner phonation ┌─────┐
         │                 │     │
         │                 │     │
         │                 │ place
As Kehrein observes, the prosodic interpretation of laryngeal contrasts expresses the fact that phonological units should be assigned to the level in the prosodic hierarchy at which they are minimally contrastive. As Kehrein (2002:71) points out,

\[ \text{This is a principle widely used in phonological argumentation …;} \]
and it is (in part) responsible for the development from linear (SPE-type) to non-linear phonology. Stress, for instance, is never distinctive below the syllabic level, and thus assigned to rhymes or syllable nodes rather than segments.

In this dissertation, I will extend Kehrein’s approach to laryngeal contrasts to include nasalization, which, as was noted above, I treat on a structural par with voice. In addition, I will argue in chapter 3 that distinctive nasalization can in some languages be viewed as a property of entire syllables.

0.2 Overview of dissertation

This dissertation consists of three parts. Part I, which consists of chapters 1 and 2, provides the theoretical background. Chapter 1 outlines the basic assumptions regarding the structure and content of phonological representations. Chapter 2 introduces the main tenets of the Element-based Dependency framework in respect of the representation of manner, phonation, and place.

Part II, consisting of chapters 3, 4, and 5, forms the core of this dissertation, and offers an in-depth discussion of the phonological relation between nasality and laryngeal articulations. Chapter 3 addresses the issue of nasalization, and consider in some detail how the level of the syllable plays a role in processes of nasal harmony. Chapter 4 examines the dual interpretation of dependent |L| as voice and nasalization. Chapter 5 considers the issue of laryngeal modifications in nasals.

Part III, which consists of chapters 6 and 7, addresses some residual issues. Chapter 6 examines the status of nasalized laryngeals and considers some processes that have been argued to fall under the rubric of rhinoglottophilia, the “mysterious connection between nasality and glottality”(cf. Matisoff 1975). Finally, chapter 7 focuses on a number of phonological phenomena in which nasals do not behave as a natural class, but display asymmetric behaviour.

In each of the chapters theoretical issues are considered in combination with case studies. Some of these case studies are cursory, others offer a more detailed analysis of the matter at hand. As regards the selection of data, I have not been guided by any methodological basis. Rather, my objective has been to be as comprehensive as possible, and to include as many examples of languages and language families as I could find. Some of the languages and language families
that are examined here, such as Burmese-Loloish and Tai-Kadai, do not figure prominently in the field of generative phonology.

The subject matter of this dissertation makes certain omissions inevitable. The phonology of nasality is a vast topic, and an exhaustive investigation of each of its aspects would easily fill several volumes. Some of the omissions are rather specific. For instance, I do not discuss the issue of nasal place specification in any great detail. This is unfortunate, since nasal place, and its relation to aspects of prosodic and segmental structure, would provide a fruitful testing ground for the Element-based Dependency representations that are proposed here. Another topic that is not discussed concerns the relation between vowel nasalization and vowel place. This has been, and still is, a topic of much debate; for discussion of this issue see, among others, Bhat (1975), Entenman (1975), Hombert (1985), Beddor (1993), and Ploch (1999).

Other omissions are of a more general theoretical nature. For instance, I will have little to say about the relation between underlying and surface forms. The approach advocated here is, in principle at least, compatible with derivational and non-derivational theories, and with rule-based and constraint-based models. The reader will note that throughout this dissertation I use the term “process” and the symbol “→”. It should be stressed at the outset that I have done this for reasons of convenience, not to make any theoretical claims.