

MODERN GREEK  
PHONOLOGICAL VARIATION:  
A  
GOVERNMENT PHONOLOGY  
APPROACH

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1993

Thesis submitted  
to the University of London  
for the degree of  
Doctor of Philosophy

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## ABSTRACT

This thesis explores the phonological variation that may take place in Modern Greek when nasal and oral stops occur in strictly adjacent syllabic positions in a variety of syllabic structures. This analysis, based exclusively on more than 50 hours of tape-recorded speech, is formulated within the theoretical framework of Government Phonology. Its aim is to show that the phonological behaviour of Modern Greek nasal and oral stop sequences depends on the syllabic structure in which they occur.

I first introduce the Modern Greek variation data and their phonological behaviour. I then review the best-known accounts of this phenomenon. Their shortcomings and weaknesses (mainly in terms of inadequacy of the theoretical frameworks employed) lead me to adopt the highly restrictive theory of Government Phonology. I accordingly present its main theoretical principles and stipulations.

I subsequently discuss (i) the internal structure of nasal and oral stops and (ii) the lexical distinctiveness of their compositional elements. I show that lexically Modern Greek (i) possesses only neutral oral stops and (ii) always derives its voiced oral stops from the interactions that take place between strictly adjacent nasal and oral stops. Particular interactions are either optional or categorical, depending on the syllabic structure of a word.

I also investigate the syllabic structure of *pt/kt*, *pn/kn*, *ps/ks* (two onset heads separated by an empty nucleus) and *ts* (contour segment). As their initial segment is an oral stop, these sequences also participate in Modern Greek phonological variation processes.

I then present the realisations that underlying nasal and oral stop sequences have in different environments. I explain why these realisations depend on the syllabic structure in which the nasal and oral stop sequences occur. Finally, I examine and reject the existence of prenasalisation as a phonological phenomenon in Modern Greek.

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## ACKNOWLEDGEMENTS

I would like to hereby acknowledge the debt I owe to all those who in some way or other have helped me see this thesis to its end.

The data on which this research is based were collected thanks to the generous assistance of The Hellenic Foundation. During the third year of my research I was supported by a Fellowship from The British Council for which I am most grateful.

Many warm thanks are due to my 17 informants who ungrudgingly allowed me to tape-record and use our long and often personal discussions. Their kindness, enthusiasm, and warmth of response made this the most pleasant period of my research.

I am happy to acknowledge a debt to my Linguistics lecturers of the University of Athens, especially Dr. Helen Antonopoulou, Dr. Bessie Dendrinou, Mrs. Maro Kakridi, Dr. Chryssoula Lascaridou and Dr. Sophia Marmaridou, not only for introducing me into the world of linguistics, but also for their concern and moral support throughout my research. All of them, as well as Prof. Costas Evangelides, have always been more than happy to supply me with references and to deal with administrative paperwork on my behalf. I would like to register here my particular debt and gratitude to Mrs. Maro Kakridi who unselfishly and with the greatest enthusiasm possible gave me all the data she had collected several years ago when she was researching the same subject. A special 'thanks' goes to Dr. Despina Markopoulou-Chila for bringing to my attention many an important document on Modern Greek phonology.

My sincere thanks are also due to Professor John Wells and Dr. John Harris, my two supervisors. I am grateful to Prof. John Wells not only for his helpful remarks on earlier drafts of this thesis in terms of both content and style, but, more importantly, for always being encouraging and patient, particularly during some long periods when progress seemed tardy. I am indebted to Dr. John Harris for the encouragement he gave me at the early stages of my research and for his advice throughout the writing up stage. His insight at times of resignation has been invaluable. I am also grateful for his comments on matters of content, argumentation and style and for the considerable amount of ink and time he spent on correcting misplaced commas in an earlier draft of this thesis.

My warmest thanks go to Dr. Wiebke Brockhaus for making time at what was for her a most inconvenient moment for the rigorous task of editing this thesis. Thanks to her meticulous

editing, a significant number of 'faux pas' have been avoided. I am also grateful for the interesting phonological discussions she had with me; the encouragement and intellectual stimulation I got from sharing ideas with her was inestimable.

I would also like to record my gratitude to Dr. Ianthi Tsimpli who gave me the invaluable advice of adopting the theory of Government Phonology in my analysis of Modern Greek phonological variation. In this respect, I am greatly indebted to Professor Jonathan Kaye. His lively presentations and discussions on current issues in phonology and originality of ideas and analyses revived my interest in phonology and pulled me out of the impasse I had reached with the theories I had previously attempted to implement. I would also like to thank Dr. Monik Charette for allowing me access to manuscripts on Government Phonology at a time when no publications on this theory were readily available.

My sincerest thanks go to Dr. Julia Chrysostomides not only for the invaluable moral support she has consistently and unfailingly given me, but also for her constant faith in me. A particular thanks also goes to Lea Dery who nearly forced me to learn how to use the much-dreaded computer, to Dr. Cynthia Cohen who was always ready and eager to give me advice on the stylistics and intricacies of thesis-writing and to Mr. Terry Tetlow and Mrs. Barbara Tetlow who enthusiastically edited the greatest part of the present thesis.

My special thanks go to my husband, Dr. Philip Tetlow, for editing an earlier version of this thesis, helping me in numerous practical matters, guiding me in the printing process and for being the source of much sound advice and good cheer during the last stages of this thesis. Not only did he accept my priorities, but actually encouraged me not to abandon them at many a difficult moment; for his love, affection and patience I am most grateful.

Finally, my warmest thanks are reserved for 'The Pagonis Foundation', not only for the more than generous allowance they gave me throughout my stay in the United Kingdom, but also for the enormous amount of calculating and typing (mainly of scribbles) that they undertook with the greatest of pleasure and enthusiasm. Above all, my greatest gratitude is for the love and the moral and emotional support they always gave me. Their affection, patience, depth of understanding, sensitive advice and regular but discrete guidance ensured that this thesis was brought to completion. This work is dedicated to them.

## ABBREVIATIONS AND NOTATIONAL CONVENTIONS

### Abbreviations

<i>a</i>	any audible or inaudible nuclear segment
acc.	accusative
AG	Ancient Greek
$\beta$	any audible non-nuclear segment
<i>C</i>	any neutral oral stop, unspecified for place of articulation element
<i>D</i>	a low-toned oral stop, unspecified for point of articulation element
fem.	feminine
gen.	genitive
GP	Government Phonology
ind.	indicative
KLV	Kaye, Lowenstamm & Vergnaud
LPL	Licenser Projection Level
MajSB	major syntactic boundary (plural form: MajSBs)
MG	Modern Greek
MinSB	minor syntactic boundary (plural form: MinSBs)
<i>N</i>	nucleus
<i>N</i>	a nasal segment, unspecified for point of articulation
<i>NC</i>	an underlying sequence of strictly adjacent nasal and oral stop, both unspecified for point of articulation element
<i>ND</i>	a sequence of nasal and low-toned oral stop, both unspecified for point of articulation element
nom.	nominative
<i>O</i>	onset
OCP	Obligatory Contour Principle
part.	participle
perf.	perfect
pers.	person
plur.	plural

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pres.	present
R	rime
sg.	singular
τ	any audible or inaudible nuclear or non-nuclear segment
UG	Universal Grammar
v	any audible nuclear segment
v.	verb
v <sup>0</sup>	any inaudible nuclear segment (the 'cold vowel')
*	unattested form
≈	in free variation with

### Notational conventions

Throughout this thesis, I italicise all transcriptions. I use double brackets (i.e.  $\llbracket \rrbracket$ ) when I refer to the morphological structure of a word (e.g.  $\llbracket \llbracket lámpv^0 \rrbracket si \rrbracket$ ) and single brackets (i.e.  $\llbracket \rrbracket$ ) when I refer to its attested phonetic form (e.g.  $\llbracket lámpsi \rrbracket$ ). In morphological transcriptions, the symbol '+' denotes non-analytic (i.e. formative) boundaries (e.g.  $\llbracket eN+keniázo \rrbracket$ ). When I provide the transcription of a particular syllabic structure without reference to the morphology of the word, I do not use any brackets (e.g.  $eNkeniázo$ ,  $lámpv^0si$ ). Spelling forms and glosses are not italicised. The former appear in angled brackets (i.e.  $\langle \rangle$ ) and the latter in single quotes (i.e. ' '), (e.g.  $\langle vái \rangle$  'yes').

The phonetic symbols I use throughout this thesis have their International Phonetic Association values. All transcriptions are broad and the stress of non-monosyllabic words is denoted by an accent on the vowel that bears it.

## PREFACE

This thesis explores the phonological variation that may take place in Modern Greek when nasal and oral stops occur in strictly adjacent syllabic positions in a variety of syllabic structures. The theoretical framework I employ for this analysis is that of Government Phonology, as developed by Kaye, Lowenstamm & Vergnaud (1990). The non-arbitrary explanations that this highly restrictive framework provides allow me to demonstrate that, far from being random and unprincipled, Modern Greek phonological variation is in fact wholly predictable.

To the best of my knowledge, no phonological analysis of Modern Greek has so far examined all the environments where oral stops may appear in the strict adjacency of nasals. Neither has any analysis so far examined the phonological behaviour of the sequences of nasal and oral stops that appear in different environments. The contribution, then, of the present thesis is that it offers for the first time a unified and explanatory account of the phonological behaviour that sequences of nasal and oral stops display in Modern Greek, always subject to the syllabic structure within which these sequences appear.

So far at least, purely phonological analyses of Modern Greek have been few and far between. What is more, the references these analyses contain with respect to the variation that obtains between nasal and oral stops are scarce and, with few exceptions, of a phonetic and/or historical nature. Apart, then, from aiming at remedying this situation, this thesis also aims at showing that a significant number of other phonological phenomena attested in Modern Greek can be accounted for if analyses are carried out by means of a constrained theory of syllabic structure which, *inter alia*, rejects the existence of re-write rules.



The data on which the present thesis is based come exclusively from tape-recorded interviews with native speakers of Modern Greek. To my knowledge, this is the first time that Government Phonology has been employed to account for interview and spontaneous speech data. As will be seen, the results are highly satisfying.

This thesis is structured as follows. The first chapter introduces in a pre-theoretical way the data in which nasal and oral stops occur in the strict adjacency of each other, as well as the phonological behaviour of these data. This chapter also presents an up-to-date review and brief discussion of the best-known accounts of this phenomenon. The objective of this chapter is to (i) introduce the reader to the patterns of phonological behaviour of the Modern Greek nasal and oral stops and (ii) assemble and disentangle the conflicting views that exist on the subject of Modern Greek phonological variation.

The shortcomings and weaknesses of the existing accounts (mainly in terms of inadequacy of the theoretical frameworks within which these accounts are formulated) lead me to adopt the theory of Government Phonology. I present its main theoretical principles and stipulations in the second chapter.

Having adopted Government Phonology as my working framework, I discuss in the third chapter the internal structure of nasal and oral stops, as well as questions of lexical distinctiveness of the compositional elements of these segments in Modern Greek. My purpose here is to show that (i) Modern Greek lexically possesses only neutral oral stops and (ii) voiced oral stops are always derived from nasal and oral stops which occur in strictly adjacent positions. The interactions that give rise to the Modern Greek voiced stops involve the spreading of the place and occlusion elements from the oral stop to the nasal and the spreading of the laryngeal element  $L^-$  (low tone) from the nasal onto the oral stop.

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The fourth and fifth chapters investigate a set of Modern Greek non-nuclear sequences. Specifically, Chapter 4 deals with *pt/kt* and *pn/kn*, while Chapter 5 deals with *ts* and *ps/ks*. The postulation of the correct syllabic structure of these clusters is important for the analysis of Modern Greek phonological variation. Being an oral stop, their first segment participates in the phonological variation processes of the language. This chapter aims at showing that the syllabic structure of *pt/kt*, *pn/kn* and *ps/ks* is that of two onset heads with an intervening empty nucleus; hence their identical phonological behaviour. In contrast, the syllabic structure of *ts* is that of a contour segment; hence (i) its different phonological behaviour vis-à-vis *pt/kt*, *pn/kn* and *ps/ks* and (ii) its identical phonological behaviour vis-à-vis the Modern Greek neutral oral stops.

Based on the phonological behaviour of the data presented in Chapter 1 and on the analysis presented in Chapters 3 through 5, Chapter 6 assembles the Government Phonology explanations for the different patterns of phonological behaviour that underlying sequences of nasal and oral stops display in Modern Greek. The main objective of this chapter is to show that the spreading of the different elements that compose the Modern Greek nasal and oral stops depends exclusively on the syllabic structure in which these nasal and oral stops appear. In addition, the sixth chapter examines the question of the existence of prenasalisation in Modern Greek. The conclusion drawn with respect to this controversial issue is that prenasalisation does not exist as a phonological phenomenon in Modern Greek.

## CHAPTER ONE

### MODERN GREEK PHONOLOGICAL VARIATION DATA AND AN ASSESSMENT OF SOME PREVIOUS ACCOUNTS

#### 1.0 Introduction

The purpose of this chapter is twofold. I firstly introduce the reader to the data which pertain to the phenomenon of phonological variation of Modern Greek nasal and oral stops. I secondly outline the most important treatments that have been proposed to date regarding this phenomenon.

To achieve these two aims, I have divided the chapter into two main sections. In Section 1.1, I present (i) the linguistic environments where the phenomenon of phonological variation is attested and (ii) the different phonetic variants that speakers may, subject to linguistic and social factors, use in each of these environments. This presentation is not bound to any particular theoretical framework.

In Section 1.2, I review as concisely as possible the most well-known accounts of Modern Greek phonological variation. These accounts follow either the Structuralist or an SPE-type framework. As the reader will observe, the disagreement between linguists working within even the same framework is considerable. The problems encountered in these accounts lead me to propose in the subsequent chapters an alternative analysis of Modern Greek phonological variation. This analysis is couched within the theoretical framework of Government Phonology.

### 1.1 A presentation of the linguistic data

The phenomenon I set out to investigate in the present thesis concerns the interactions that take place in Modern Greek (henceforth MG) when the oral stops of the language (i.e. *p/t/k/ts*) occur after a nasal segment (i.e. *m/n*). As my presentation will show, when nasal and oral stop sequences (hereafter *NC* sequences) occur in MG one, or a combination of two, or all three of the following interactions may take place:

- (i) the nasal may be assimilated in terms of point of articulation to the following stop,
- (ii) the oral stop may become voiced,
- (iii) the nasal may not surface before the stop.

As I will be showing in this section, each of the above-mentioned interactions seems to be obligatory in certain sets of words, optional in others and disallowed in yet other words. Also, the combination of certain interactions seems to be allowed in some but not other sets of words. Lastly, in some word sets a particular interaction seems to be allowed only if some other interaction has taken place before. The same interaction seems to be disallowed if one of the other two interactions has not taken place before. My aim in this thesis is to investigate exactly what happens in the different word sets and to explain why interactions between nasal and oral stops take the particular form that they do in MG.

This section consists of a presentation of the data pertaining to the phenomenon of MG phonological variation, as manifested in the interactions that take place between nasal and oral stops. I present below a number of data sets in which *NC* sequences are attested. Each indented data set acts as a representative example of the particular syllabic structure in which an *NC* sequence may occur. For each data set, I present (i) its syllabic structure, (ii) the different variants that it may have and (iii) those variants which are

disallowed for it<sup>1</sup>.

I have tried to keep the presentation of this section as detached from any particular theoretical framework as possible. Unfortunately, it is a well-known fact that the presentation of any data set is influenced by the framework that the researcher in question follows. The syllabic structures I present in this section all follow the theoretical framework of Government Phonology (henceforth GP). Although I neither discuss nor comment on them in this chapter<sup>2</sup>, I consider their inclusion necessary for two reasons. First, their inclusion avoids the misunderstandings and confusion that could be caused by the display of homophonous phonetic variants for what in the next chapters will be shown to be widely different syllabic structures (e.g. (11a) and (11b)). Second, their inclusion will enable the reader to comprehend the GP analysis I provide in the succeeding chapters.

In my presentation, I take all MG 'voiced' stops to be derived from underlying *NC* sequences. I argue fully for this claim in Chapter 3. I also assume that no prenasalised variants ever occur in MG. I provide a fully argued discussion of this controversial issue in Chapter 6. Lastly, the use I make of terms such as 'interaction', 'nasal reflex' and 'prenasalisation' is theoretically bound to a GP

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<sup>1</sup>The reader is referred to Appendices A, B and C for information relevant to the data on which the present analysis is based. Specifically, in Appendix A I assemble all the data sets that I will be presenting in Chapter 1 and that I will be discussing in Chapters 3 through 6. These data sets consist of all the linguistic environments where MG *NC* sequences may be phonetically or phonologically adjacent. In Appendix B, I clarify issues regarding the sampling methodology I employed and the interview techniques I used in order to collect these data. Lastly, in Appendix C I provide a transcription of the reading passages and the word lists I used during my interviews.

<sup>2</sup>Their discussion follows in Chapter 6.

framework.

My discussion of the behaviour of MG *NC* sequences is structured as follows. I first examine the *NC* sequences which occur across and next to word boundaries. I differentiate between two sets of syntactic boundaries, namely what I call 'major syntactic boundary' (hereafter MajSB) and 'minor syntactic boundary' (hereafter MinSB). I then proceed to an investigation of the behaviour of *NC* sequences which occur in word-medial positions. Lastly, I present certain generalisations that follow from the presentation provided in this sub-section.

I start my discussion of the behaviour of MG *NC* sequences with word-initial position. As the reader can see in (1a) and (1b), assimilation and voicing are obligatory for *NC* sequences which occur after a pause. Variants such as \*[*npukála*], \*[*nprávo*], \*[*mpukála*] and \*[*mprávo*] are never encountered in MG. The main variant *NC* sequences give rise to in this position is that of a 'voiced' stop (henceforth *D*) (e.g. [*brávo*] 'well-done' (1a) and [*bukála*] 'bottle' (1b) for branching and non-branching onsets respectively). A variant where the nasal reflex surfaces before the 'voiced' stop (henceforth *ND*) occurs less frequently and is socially stigmatised (i.e. [*mbrávo*] and [*mbukála*]).

(1)a. <i>Nprávo</i>	[ <i>brávo</i> ]	*[ <i>mprávo</i> ]
	[ <i>mbrávo</i> ]	*[ <i>nprávo</i> ]
b. <i>Npukála</i>	[ <i>bukála</i> ]	*[ <i>mpukála</i> ]
	[ <i>mbukála</i> ]	*[ <i>npukála</i> ]

Let me now examine the behaviour of the *NC* sequences which occur across and/or next to a MajSB. I take the term MajSB to denote all syntactic boundaries except those formed between a clitic (i.e. articles, personal pronouns, prepositions, conjunctions and particles) and either another

clitic or a noun/verb<sup>3</sup>.

I start my discussion of the behaviour of the NC sequences which occur across a MajSB with the configuration in (2), in which a vowel is the final segment of the first of two words which belong to two adjoined phrases and a 'voiced' stop (i.e. *b/d/g/dz*) is the initial segment of the second word (i.e. the second word begins with an NC sequence). In this configuration, the NC sequence of the content word behaves as if it occurs after a pause: ND variants appear only occasionally and when they do they carry social stigma (e.g. [tréxo mbas ke prolávo] 'I run just in case I can make it in time' (2)). Variants where the nasal does not surface are more frequent (e.g. [tréxo bas ke prolávo]).

(2) tréxo Npas	[tréxo bas ke]	*[tréxo mpas ke]
	[tréxo mbas ke]	*[tréxo npas ke]

When the first of two words which occur across a MajSB ends in a nasal segment (as in 3), this nasal segment can never be dropped if the second word begins with a 'voiced' stop (i.e. an NC sequence) (e.g. [tréxun bas ke prolávun], \*[tréxu bas ke prolávun] 'they run, just in case they can make it in time' (3a)). The requirement that the final nasal segment of the first word surfaces<sup>4</sup> excludes the possibility of the second word which begins with an NC sequence ever displaying a variant where its own nasal reflex surfaces (e.g. \*[tréxun mbas ke prolávun]). Recall from above that I take MG 'voiced' oral stops to be derived from underlying NC sequences. The same behaviour is attested when the final non-nuclear segment

<sup>3</sup>Later in this section I examine the behaviour of the NC sequences that occur across and next to what I call a MinSB. This latter environment consists of exactly the configurations I excluded for the MajSB, namely a clitic and either another clitic, or a noun/verb.

<sup>4</sup>As I show later in this section, certain words (proclitics) allow the optional surfacing of their final nasal reflex under specific circumstances.

of the first word is not a nasal (e.g. [tréxis bas ke prolávis], \*[tréxis mpas ke prolávis], \*[tréxis mbas ke prolávis] 'you run just in case you can make it in time' (3b)). I discuss the behaviour of these configurations in more detail in Chapter 6.

- |                      |                 |  |
|----------------------|-----------------|--|
| (3)a. tréxun Npas ke | [tréxun bas ke] | *[tréxun mpas ke]<br>*[tréxu bas ke]<br>*[tréxun mbas ke]<br>*[tréxun npas ke] |
| b. tréxis Npas ke    | [tréxis bas ke] | *[tréxis mpas ke]<br>*[tréxis mbas ke]<br>*[tréxis npas ke]                    |

Again across MajSB, when the first word ends in a nasal segment and the following word begins with an oral stop which is not voiced (i.e. *p/t/k/ts*) ((4a) and (4b)), no assimilation, voicing or optional surfacing of the nasal reflex can ever take place. Forms such as \*[ðe milúsaŋ kias ítam próta ksaðélfia], \*[ðe milúsa kias íta próta ksaðélfia], \*[ðe milúsaŋ gias ítam bróta ksaðélfia], \*[ðe milúsan gias ítan bróta ksaðélfia], or \*[ðe milúsa gias íta bróta ksaðélfia]<sup>5</sup> are ungrammatical in MG. The only possible form is [ðe milúsan kias ítan próta ksaðélfia] 'although they were first cousins, they did not speak to each other'.

- |                        |                   |  |
|------------------------|-------------------|--|
| (4)a. ðeN milúsan kias | [ðe milúsan kias] | *[ðe milúsaŋ gias]<br>*[ðe milúsa gias]<br>*[ðe milúsaŋ kias]<br>*[ðe milúsa kias] |
| b. ítan próta          | [ítan próta]      | *[ítam bróta]<br>*[ítam próta]<br>*[íta bróta]<br>*[íta próta]                     |

Speakers of MG treat boundaries between (i) adjectives and nouns and (ii) verbs and adverbs/nouns as opaque to interactions between nasal-ending segments and initial

<sup>5</sup>The form [ðe milúsa] is attested, but it refers to the first person singular, and not to the third person plural that I discuss here.



'voiceless' stops. In (5) below, we see that we may have the variants [oréon pæíón] 'pretty children (gen. plur)' (5a), [tréxun polí] 'they run a lot' (5b), [iroikón prákseon] 'heroic acts (gen.plur)' (5c) and [pérnun prosforés] 'they take bids' (5d), for non-branching ((5a) and (5b)) and branching oral-stop-initial onsets ((5c) and ((5d)) respectively. Forms where assimilation or voicing takes place, (i.e. \*[oréom pæíón], \*[oréon bæíón], \*[oréom bæíón], \*[tréxum polí], \*[tréxun bolí], \*[tréxum bolí], \*[iroikóm prákseon], \*[iroikón brákseon], \*[iroikóm brákseon], \*[pérnum prosforés], \*[pérnun brosforés], \*[pérnum brosforés]), or where the nasal reflex is suppressed (i.e. \*[oréo pæíón], \*[oréo bæíón], \*[tréxu polí], \*[tréxu bolí], \*[iroikó prákseon], \*[iroikó brákseon] or \*[pérnu prosforés], \*[pérnu brosforés]) are not attested in MG.

(5)a. <i>oréon pæíón</i>	[oréon pæíón]	*[oréom bæíón] *[oréo bæíón] *[oréom pæíón] *[oréon bæíón] *[oréo pæíón]
b. <i>tréxun polí</i>	[tréxun polí]	*[tréxum bolí] *[tréxu bolí] *[tréxum polí] *[tréxun bolí] *[tréxu polí]
c. <i>iroikónprákv<sup>6</sup>seon</i>	[iroikónprákseon]	*[iroikómbrákseon] *[iroikó brákseon] *[iroikómprákseon] *[iroikó prákseon] *[iroikón brákseon]
d. <i>pérnun prosforés</i>	[pérnun prosforés]	*[pérnum brosforés] *[pérnu brosforés] *[pérnum prosforés] *[pérnun brosforés] *[pérnu prosforés]

If in the same syntactic context (i.e. adjective + noun, or verb + adverb/noun) the second word begins with an NC sequence, two variants are attested, provided that the first

<sup>6</sup>The symbol  $v^0$  is used to denote what in Government Phonology is termed 'cold vowel'. I discuss fully this element in Chapter 2.

word ends in a nuclear segment (6). Specifically, words like [brostá] ‘ahead’ or [belás] ‘trouble’ ((6a) and (6b) respectively) show *ND* variants (e.g. [páne mbrostá] ‘they go ahead’ and [mikrí mbeláðes] ‘small trouble’) and *D* variants (e.g. [páne brostá] and [mikrí beláðes]). In this context, assimilation and voicing are obligatory (i.e. \*[nprostá], \*[mprostá] and \*[npeláðes], \*[mpeláðes]).

(6)a. páne <i>Nprostá</i>	[páne brostá]	*[páne mprostá]
	[páne mbrostá]	*[páne nprostá]
b. mikrí <i>Npeláðes</i>	[mikrí beláðes]	*[mikrí mpeláðes]
	[mikrí mbeláðes]	*[mikrí npeláðes]

The variants these *NC*-initial adverbs and nouns show after verbs and adjectives which end in a non-nuclear segment ((7a) and (7b) respectively) are those that occur after any *MajSB* (i.e. [tréxun brostá] and [mikrón beláðon]; see also (3)). If the final segment of the verb/adjective is a nasal, it must surface obligatorily (i.e. \*[tréxu brostá] and \*[mikró beláðon]). Variants where the initial nasal reflex of the second word surfaces are not attested in this context (e.g. \*[tréxun mbrostá], \*[mikrón mbeláðon]). Assimilation and voicing of the nasal reflex of the content word are obligatory: no variants like \*[tréxun mprostá], \*[tréxun nprostá], or \*[mikrón mpeláðon], \*[mikrón npeláðon] are attested in MG.

(7)a. tréxun <i>Nprostá</i>	[tréxun brostá]	*[tréxun mprostá]
		*[tréxun mbrostá]
		*[tréxu brostá]
		*[tréxun nprostá]
b. mikrón <i>Npeláðon</i>	[mikrón beláðon]	*[mikrón mpeláðon]
		*[mikrón mbeláðon]
		*[mikró beláðon]
		*[mikrón npeláðon]

Let me now examine another kind of syntactic boundary, the *MinSB*. This boundary is attested between a nasal-ending proclitic and either another clitic or a content word which begins with an oral stop. The nasal-ending proclitics consist of (i) the accusative singular of the definite masculine and

feminine articles (i.e. *toN*, *tiN*), (ii) the genitive plural of the definite article of all genders (i.e. *toN*), (iii) the negative particles *ðeN* and *miN* and (iv) the conjunction *saN*. The clitics which, together with content words, may appear after a nasal-ending proclitic in a MinSB configuration and, as a result, trigger interactions are those definite articles which begin with an oral stop (i.e. *toN*, *tiN*, *to*, *ta*, *tus*, *tis*).

Speakers have a binary choice in the way they may treat this MinSB. On the one hand, they may treat this MinSB in exactly the same way as they treat the MajSB (i.e. treatment of the MinSB as major). In this case, the interactions they allow are identical to the ones we have seen in (1) through (7), depending on the configuration within which the *NC* sequence appears. The surfacing, for instance, of the nasal reflex of the first clitic (i.e. the proclitic) is obligatory before either the second clitic or the noun/verb when speakers treat this MinSB as major.

On the other hand, speakers may treat this MinSB differently from the way they treat MajSB configurations. In this case, the interactions allowed for the nasal and oral stop are different from the ones allowed in MajSB configurations. In the paragraphs that follow immediately below, I mainly concentrate on the interactions that take place when speakers treat the boundary between a proclitic and either another clitic or a noun/verb in this second way, i.e. the way that is characteristic of MinSB configurations.

In MinSB configurations, the surfacing of the nasal reflex of the proclitic is optional<sup>1</sup>. When, before non-nuclear

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<sup>1</sup>The optional surfacing of the nasal reflex is allowed before all content words which begin with a non-nuclear segment. However, before nuclear segments, the nasal reflex of the proclitics surfaces obligatorily. We may, then, have [*ti θá/asa*] for *tiN θá/asa* 'the sea', [*ti ró/*] for *tiN ró/* 'the flow', [*ti límni*] for *tiN límni* 'the lake', but only [*tin arxí*] for *tiN arxí* 'the beginning', or [*ton uranó*] for *toN uranó* 'the sky'.

segments, the nasal reflex of the nasal-ending proclitics does not surface, the masculine article [ton] becomes homophonous to the neutral article [to] and the feminine article becomes [ti]. The negative particles become [ðe] and [mi] and the conjunction becomes [sa].

In those configurations where the nasal-ending proclitic is followed by a content word which has an initial NC sequence (i.e. a 'voiced' stop), the nasal reflex of the proclitic may surface optionally (i.e. [ðe béno] ≈ [ðem béno] for the verb *Npéno* 'enter' (8a) and [sa duvári] ≈ [san duvári] for the noun *Ntuvári* 'wall' (8b))<sup>8</sup>.

(8)a. ðeN <i>Npéno</i>	[ðem béno]	*[ðen mpéno]
	[ðe béno]	*[ðen mbéno]
	[ðe mbéno]	
	[ðen béno]	
b. saN <i>Ntuvári</i>	[san duvári]	*[san ntuvári]
	[sa duvári]	*[san nduvári]
	[sa nduvári]	

At this point, I would like to emphasise the fact that, irrespective of whether the boundary between the nasal-ending proclitic and the voiced stop of the content word is treated as major or minor, the NC sequence of the content word undergoes assimilation and voicing just like after a pause (i.e. [béno], [duvári] and [bukála]). No forms such as \*[mpéno], \*[npéno], \*[ntuvári], \*[mtuvári], \*[mpukála] or \*[npukála] are ever attested in MG.

When the nasal reflex of the proclitic is not overtly present, the nasal reflex of the content word may surface giving rise to variants such as [ðe mbéno], or [sa nduvári]. Recall that, as in (3a) and (3b), if the nasal reflex of the proclitic surfaces, the nasal reflex of the content word is

<sup>8</sup>Following our earlier discussion, in the configuration shown in (8), the nasal reflex of the proclitic surfaces obligatorily when the speaker treats this MinSB boundary as major (e.g. [tin bukála], [ðen béno] and [san duvári]).

not allowed to be overtly present (e.g. \*[ðen mbéno] and \*[san nduvári]). The difference between forms like [ðem béno] and [ðe mbéno] cannot be easily attested. I elaborate on this point in Chapter 6.

If the clitic ends in a non-nuclear segment which is, however, not nasal, the only variants that may occur for the content word which begins with a 'voiced' stop are the ones which do not allow the surfacing of its nasal reflex (e.g. [tis bukálas], \*[tis mbukálas] (9b)). The interactions between the strictly adjacent nasal and oral stop are, again, obligatory (e.g. \*[tis mpukálas], \*[tis npukálas]). By way of contrast, when the clitic ends in a nuclear segment, the NC sequence of the content word displays the same variants that appear after a pause, i.e. ND and D (e.g. [i mbukála] ≈ [i bukála] (9a)). As we know from (1b), we can never encounter forms such as \*[i mpukála], \*[i npukála].

(9)a. <i>i Npukála</i>	[i bukála]	*[i mpukála]
	[i mbukála]	*[i npukála]
b. <i>tis Npukálas</i>	[tis bukálas]	*[tis mpukálas]
		*[tis npukálas]
		*[tis mbukálas]

When the initial segment of the content word or second clitic is a 'voiceless' oral stop, interactions take place only if the proclitic is nasal-ending and the boundary is treated as minor. When speakers treat the boundary between a nasal-ending proclitic and a content word or another clitic which begins with a 'voiceless' oral stop as major, no assimilation or voicing takes place. The surfacing of the nasal reflex of the proclitic is obligatory in these cases (e.g. [ðen pernó], \*[ðe pernó] 'I do not pass' and [tin pórtá], \*[ti pórtá] 'the door', (10)). The proclitic that receives the MajSB treatment most frequently is the genitive plural (i.e. [ton pæðión] 'of the children'). Overall, however, the MajSB treatment is quite rare. In over 50 hours of the tape-recorded conversation I collected, similar variants appeared rarely

(i.e. with a frequency of less than 3%-5% of the potential tokens, depending on the speaker), unless informants were making a conscious effort to remain faithful to the spelling.

(10)a. <i>tiN pórtā</i>	<i>[tin pórtā]</i>	* <i>[ti pórtā]</i>
	<i>[tim bórtā]</i>	
	<i>[ti bórtā]</i>	
b. <i>ðeN pernó</i>	<i>[ðen pernó]</i>	* <i>[ðe pernó]</i>
	<i>[ðem bernó]</i>	
	<i>[ðe bernó]</i>	
c. <i>saN táfos</i>	<i>[san táfos]</i>	* <i>[sa táfos]</i>
	<i>[san dáfos]</i>	
	<i>[sa dáfos]</i>	

As (10) shows, when the same boundary (i.e. between a nasal-ending proclitic and a content word or another clitic which begins with a 'voiceless' oral stop) is treated as minor, the interactions that take place between these cross-boundary *NC* sequences are identical to those which take place when *NC* sequences occur within a word (as in (1a) and (1b)). Specifically, assimilation and voicing are obligatory and the nasal reflex surfaces optionally. The feminine noun *pórtā* may have the variants *[tim bórtā]*  $\approx$  *[ti bórtā]* (10a).

A branching onset structure, such as displayed in the word *tropí* 'turn' (11a) has, accordingly, the variant *[tin tropí]* when it is pronounced as if the boundary between the nasal and oral stop of the *NC* sequence were major. Following the above analysis, the word *tropí* also has the variants *[tin dropí]*  $\approx$  *[ti dropí]* when treated as occurring across a MinSB. At this point, it is interesting to note that, following the analysis of *NC* sequences which occur next to a syntactic boundary and after a non-nuclear segment, when the word *Ntropí* 'shame' (11b) receives the MinSB treatment, the nasal segment of the clitic is allowed to surface optionally (see (8a) and (8b)) yielding the variants *[tin dropí]*  $\approx$  *[ti dropí]*, i.e. identical variants with the ones we just saw for *tin tropí*.

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(11)a. <i>tiN tropí</i>	[ <i>tin tropí</i> ] [ <i>tin dropí</i> ] [ <i>ti dropí</i> ]	*[ <i>ti tropí</i> ]
b. <i>tiN Ntropí</i>	[ <i>tin dropí</i> ] [ <i>ti dropí</i> ] [ <i>ti ndropí</i> ]	*[ <i>ti ntropí</i> ] *[ <i>tin ndropí</i> ]

Although their syllabic structures are quite different, these two words display two identical variants. I presently explain how this happens. The syllabic structure of the word 'shame' is *Ntropí*. As a result, its initial segment surfaces as a voiced stop (i.e. [*dropí*], \*[*ntropí*]). The syllabic structure of the word 'turn' is *tropí*, i.e. its initial segment is a 'voiceless' stop, phonetically realised as 'voiced' when it receives the MinSB treatment following a nasal-ending proclitic. In this and only this environment, the voiceless stop may become voiced (i.e. [*ti dropí*]). Accordingly, if the nasal-ending proclitic allows its nasal reflex to surface, we have the variants [*tin dropí*] for both *tin tropí* (11a) and *tin Ntropí* (11b). If the nasal reflex of the proclitic is not overtly present, we have the variant [*ti dropí*], again for both (11a) and (11b).

However, although these two variants of the words *Ntropí* and *tropí* are homophonous (i.e. [*ti dropí*] and [*tin dropí*]), the difference of their syllabic structures results in each of them having a unique additional variant. The word *tropí* has the additional variant [*tin tropí*]. This variant results from the treatment of the cross-boundary *NC* sequence as major. The word *Ntropí* has the additional variant [*ti ndropí*]. In this variant, the nasal reflex of the proclitic is not overtly present, while the nasal reflex of the content word is allowed to surface. Recall that, as in (3a), (3b), (8a) and (8b), if the nasal reflex of the proclitic were overtly present, the nasal reflex of the content word *Ntropi* would be suppressed (i.e. \*[*tin ndropí*]).

Let me now turn to the *NC* sequences that occur in word-medial position. I begin my discussion with the data set in which the *NC* sequence occurs across a morpheme boundary which, as I show later in this thesis, is only etymological and, as such, of no interest to phonology. The first morpheme of the words of this data set consists of one of the prefixes {*eN-*}, {*siN-*}, {*paN-*}<sup>9</sup> and the second morpheme starts with one of the voiceless oral stops *p/t/k* (12). The behaviour of the *NC* sequences that may occur across these etymological boundaries is identical to the behaviour of the *NC* sequences which occur within etymological boundaries. Specifically, the *NC* sequences of both configurations obligatorily undergo assimilation and voicing. The nasal reflex is allowed to surface optionally.

(12)a. <i>eNkeniázo</i>	[ <i>en</i> geniázo]	*[ <i>eken</i> iázo]
	[ <i>egen</i> iázo]	*[ <i>en</i> keniázo]
		*[ <i>em</i> keniázo]
b. <i>siNpráto</i>	[ <i>sim</i> bráto]	*[ <i>sip</i> ráto]
	[ <i>sibr</i> áto]	*[ <i>sim</i> práto]
		*[ <i>sin</i> práto]
c. <i>páNplutos</i>	[ <i>pám</i> blutos]	*[ <i>páp</i> lutos]
	[ <i>pábl</i> utos]	*[ <i>pám</i> plutos]
		*[ <i>pán</i> plutos]

As (12) above shows, the words [[*siN+prát+o*]] ‘I co-operate’, [[*eN+ken+iáz+o*]] ‘I inaugurate’ and [[*páN+plut+os*]] ‘extremely wealthy’ give the variants [*simbráto*] ≈ [*sibráto*], [*engeníázo*] ≈ [*egeníázo*] and [*pámblutos*] ≈ [*páblutos*]. Just as in the case of the cross-minor-boundary contexts, voicing and assimilation are in evidence, although the nasal is not overtly present. One never hears variants such as \*[*enkeniázo*], or \*[*pámplutos*]. Neither does one hear variants such as \*[*sipráto*], \*[*ekeníázo*] or \*[*páplutos*].

Let me now look into the behaviour of a data set in which the nasal-ending prefixes are adjacent to sequences of *pt/kt*

<sup>9</sup>These words are traditionally referred to as ‘learned’. I review the treatment these words have received in the literature in Section 1.2.2.



and *ps/ks* (but not *ts*). As I show in Chapters 4 and 5, this data set allows the optional voicing of the oral stop (e.g. [simpsifɔ] ≈ [simbsifɔ] ‘I off-set’ (13). In these cases assimilation is obligatory (e.g. \*[sinpsifɔ]) and the surfacing of the nasal reflex is optional if voicing is in evidence (i.e. [simbsifɔ] ≈ [sibsfɔ]). If voicing is not in evidence, the surfacing of the nasal reflex is obligatory (i.e. \*[sipsifɔ])<sup>10</sup>. In Chapter 6, I provide an explanation for this apparently ‘exceptional’ behaviour of sequences of nasals + *ps/ks* or *pt/kt*.

(13)a. siNp <sup>o</sup> siɸɔ	[simpsifɔ]	*[sinpsifɔ]
	[simbsifɔ]	*[sipsifɔ]
	[sibsfɔ]	*[simbzifɔ]
		*[sibzifɔ]
		*[sinbzifɔ]
		*[sinbsifɔ]

As I mentioned earlier in this section, when an *NC* sequence occurs within a morpheme, the two segments interact obligatorily and the nasal reflex which surfaces optionally is always homorganic to the voiced oral stop. The variants we have then are [kondá] ≈ [kodá] ‘near’ (14), [kambúra] ≈ [kabúra] ‘hunch’ and [aŋgúri] ≈ [agúri] ‘cucumber’. There are no variants such as \*[kontá], \*[komtá], \*[kampúra], \*[kanpúra], or \*[aŋkúri], \*[amkúri].

(14) koNtá	[kondá]	*[kontá]
	[kodá]	*[kotá]
		*[komtá]

If the second morpheme of a compound noun which is itself composed of two free morphemes begins with an *NC* sequence (e.g. [[misó][Ntiméni]] ‘half dressed’ (15)), this *NC* sequence behaves in the same way as we saw it behaving after a pause: voicing and assimilation are obligatory. The surfacing of the

<sup>10</sup>The variants which display this optional voicing of the oral stop tend to occur not only word-medially (as in the above example) but also word-initially (i.e. the *pt/kt* and *ps/ks* sequences which occur after a nasal-ending proclitic, e.g. ðeN kséro ‘I do not know’).

[illegible]

(16) *Nparv*<sup>O</sup>*Npúni*

[ <i>barbúni</i> ]	*[ <i>mbarmbúni</i> ]
[ <i>mbarbúni</i> ]	*[ <i>mparmpúni</i> ]
	*[ <i>barmbúni</i> ]
	*[ <i>parpúni</i> ]

The second interesting word set consists of certain verbs in which the *NC* sequence appears to be phonetically adjacent to the {-sV} ending in (i) the future and certain past tense forms and (ii) their derived feminine nouns (17). The behaviour of the *NC* sequences of these words differs from any similar *NC* sequences we have seen so far. Specifically, assimilation and the surfacing of the nasal reflex are obligatory; voicing never takes place in this set of words. The word [[lámpv<sup>o</sup>]sɪ] and [[lámpv<sup>o</sup>]so] for 'shine (noun and verb, respectively)' may have the variants [lámpsi] and [lámpso] (17), but no variant such as \*[lámbzi], \*[lámbsi] (voicing), \*[lápsi], \*[lábsi] or \*[lábzi] (optional dropping of the nasal reflex). I examine the behaviour of this set of words in Chapters 5 and 6.

(17) $[[[l\acute{a}Np\upsilon^{\circ}]s\acute{i}]]$	$[l\acute{a}mpsi]$	$*[l\acute{a}mbzi]$
		$*[l\acute{a}mbsi]$
		$*[l\acute{a}psi]$
		$*[l\acute{a}bzi]$

The final word set I present here consists of words like *pémpti* 'Thursday' (18). Just like in the  $[l\acute{a}mpsi]$  word set, assimilation and the surfacing of the nasal reflex are obligatory (i.e.  $[pémpti]$ ,  $*[pénpti]$ ,  $*[pépti]$ ). In contrast to all the other word sets I mentioned, the medial oral stop of these words does not always surface (i.e.  $[pémpti] \approx [pém\acute{t}i]$ ). Voicing also takes place optionally, but only when the medial oral stop does not surface (i.e.  $[pém\acute{d}i] \approx [pém\acute{t}i]$ ,  $*[pém\acute{b}d\acute{i}]$ ). I discuss the syllabic structure of this word set in Chapter 4 and its behaviour in Chapter 6.

(18) <i>pémpti</i>	$[pémpti]$	$*[pépti]$
	$[pém\acute{t}i]$	$*[péb\acute{d}i]$
	$[pém\acute{d}i]$	$*[pén\acute{p}t\acute{i}]$
		$*[pén\acute{t}i]$

From the above presentation, I can make several generalisations. The first generalisation concerns the *NC* sequences which occur across MajSBs. No interactions ever take place here. Assimilation and voicing are not allowed. Furthermore, nasal reflexes can never be dropped.

The second generalisation concerns MinSBs. Speakers have a choice of treating a boundary between a proclitic and a content word (or second clitic) as either minor or major. If (i) the proclitic is nasal-ending, (ii) the initial oral stop of the content word (or second clitic) is voiceless and (iii) speakers treat this boundary as minor, all interactions (assimilation, voicing, optional surfacing of the nasal reflex) take place. We then have free variation between an *ND* and a *D* variant (e.g.  $[tom\ b\acute{í}ra] \approx [to\ b\acute{í}ra]$  for *toN píra* 'I took him'). When this syntactic boundary is treated as major, no interactions take place (i.e. the only variant we get for *toN píra* is  $[ton\ píra]$ ). As with the truly MajSB, the nasal reflex

must surface (i.e. \*[to píra]<sup>11</sup>).

The third generalisation concerns the NC sequences which occur next to a MinSB. When preceded by a proclitic which ends in a nuclear segment, the NC sequence of the content word behaves in the same way as if it occurred word-initially. Specifically, the nasal reflex of the content word may surface (e.g. *imbukála* 'bottle') giving rise to a socially stigmatised form. Alternatively, the nasal reflex of the content word may not surface (e.g. *ibukála*).

If preceded by a proclitic which ends in a non-nuclear segment, the nasal reflex of the content word can never surface, irrespective of the nature of the final non-nuclear segment of the proclitic (e.g. \*[tis mbukálas], \*[tim mbukála]). If the proclitic is nasal-ending, its nasal reflex may surface optionally (i.e. [tim bukála] ≈ [ti bukála]). When the nasal reflex of the proclitic is not overtly present, the nasal reflex of the content word may surface (e.g. [ti mbukála]). All other non-nuclear segments which are not nasal must surface obligatorily in the final position of a proclitic (i.e. [tis bukálas], \*[ti bukálas] for *tis Npukálas*).

The fourth generalisation concerns word-medial positions. Assimilation and voicing are obligatory and the surfacing of the nasal reflex is optional. There are three exceptions to this behaviour, namely word sets such as [simpsifizo], [lámpsi] and [pémpti]. The first two word sets have obligatory assimilation and surfacing of the nasal reflex. However, voicing is optional in the first word set and disallowed in the second. When voicing takes place in the first word set, the surfacing of the nasal reflex is optional. The third word set has obligatory assimilation and surfacing of the nasal reflex and optional presence of the medial non-nuclear

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<sup>11</sup>This form exists, but not with the meaning that I take it here (i.e. 'I took him'). This form means 'I took it'.

segment. Voicing is also optional in this word set, taking place only when the medial segment is not realised phonetically.

Finally, word-medial NC sequences which are preceded by a phonetically adjacent non-nuclear segment (e.g. [*barbúni*]) obligatorily undergo voicing. However, no nasal reflex ever occurs before these sequences (i.e. \*[*barmbúni*]).

## 1.2 MG phonological variation: a brief literature review

In this section, I present the MG phonological variation problem as outlined in the work of various linguists. In Section 1.2.1, I give an outline of the different questions that linguists have attempted to examine in their investigation of MG phonological variation. In Section 1.2.2, I review some of the accounts that have so far been offered on the subject.

### 1.2.1 An outline of the problem

All the linguists who have so far investigated the problem of MG phonological variation have, within their respective frameworks, tried to explain the multitude of variants that appear in different but at times similar-looking environments. The questions these linguists have attempted to answer can be summarised as follows:

- (i) Should what surface as MG *b/d/g/dz* be considered as autonomous phonemes? If not, should *b/d/g/dz* be derived from underlying *mp/nt/ŋk/nts*?
- (ii) As, irrespective of underlying representation, *b/d/g/dz* are in free variation with, respectively, *mb/nd/ŋg/ndz*, why is this variation widespread in certain environments (e.g. [*pénde*] ≈ [*péde*]), giving the impression of it being totally free, while in other environments both linguists and speakers

are reluctant to admit it exists (e.g. [domáta]  $\approx$  [ndomáta]<sup>12</sup>)?

(iii) Is there any justification in the postulation of prenasalised variants in MG? What is the syllabic structure of these variants, where can they appear and in what sort of relationship are they with *b/d/g/dz*, *mb/nd/ŋg/ndz* and *mp/nt/ŋk/nts*?

(iv) How, after the operations of different transformational rules, can the various underlying representations yield the attested phonetic forms? Are the *mp* of words like [sompánia], the *b* of words like [robót], the *nd*  $\approx$  *d* of words like [pénde]  $\approx$  [péde] and the *mb* of words like [kámbo] related by being derived from a similar type of underlying representation? If yes, which phonological rules can generate each phonetic form, how are these rules ordered and are they all obligatory? If not, which underlying form should we adopt for each phonetic variant and which rules will generate these phonetic forms?

In the following sub-section, I present some of the answers that have so far been proposed to these questions. The answers that can be given to all of these questions within the framework of GP appear in Chapter 6, after a discussion (in the intervening chapters) of certain crucial MG syllabic structures.

### 1.2.2 A review of the literature

Of the many authors who have looked at the phonological variation that takes place between MG nasal and oral stops,

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<sup>12</sup>As I explain later in this section, the word-initial *ND* variant, being socially stigmatised, was thought to be 'wrong'. As a result, a considerable number of linguists did not consider the variation between the *ND* variant and the *D* variant as free. For these linguists, the *ND* variant was non-existent in word-initial position. By way of contrast, as no social stigma was attached to either of the word-medial *ND* or *D* variants, this word-medial variation was, on the whole, thought to be 'correct'. As a consequence, it was considered as 'free'. This being the case, most analyses are in effect confined to an investigation of the variation that occurs in the non-stigmatised word-medial positions.

none has as yet produced a comprehensive account and/or unifying explanation of the phonological behaviour of the *NC* sequences presented in Section 1.1. The distribution of *b/d/g/dz*, their underlying representations and their variants are some of the most thorny and controversial issues of MG phonology. In this sub-section, I do not examine *dz*, as I elaborate on its derivation and distribution in Chapter 5.

Some linguists have specifically investigated MG phonological variation (e.g. Newton (1961, 1972b), Tzivaki (1985), Householder (1964), Walter (1979), Kakridi (1979) and Bailly & Schmiri (1979)). Others have merely referred to this phenomenon in their investigation of other, often unrelated, areas (e.g. Swanson (1958), Panara (1989a, 1989b), Tsopanakis (1985) and Magoulas (1979)). They all adopt one of two approaches. Mirambel (1933, 1959), Kukules (1939), Favis (1948), Swanson (1958), Walter (1979), Kakridi (1979), Bailly & Schmiri (1979), Magoulas (1979), Tsopanakis (1985) Panara (1989a, 1989b) and Mackridge (1985) follow a Structuralist framework. Newton (1961, 1972b), Householder (1964), Setatos (1969, 1974), Philippaki-Warburton (1970), Malikouti (1970), Efsthathiades (1974), Zeri (1984) and Tzivaki (1985) implement an SPE-type framework. The SPE-type accounts are the most well-known and influential.

To the best of my knowledge, there does not as yet exist a non-arbitrary explanation of MG phonological variation. None of the existing accounts explain (i) why MG phonological variation takes place in the particular context that it does and no other, (ii) why it involves the particular segments it does and no others and (iii) why it takes the particular form that it does and no other. What is more, none of the existing accounts can explain why certain similar-looking syllabic structures undergo completely different processes, while other apparently dissimilar syllabic structures display the same behaviour with respect to some process(es).

The lack of a non-arbitrary explanation of MG phonological variation is due to several factors, foremost among which are the linearity of the two frameworks employed and their use of arbitrary re-write rules and phonemes or features. In Chapter 2, I explain why these characteristics of the Structuralist and SPE-type frameworks can only lead to arbitrary accounts. I also demonstrate how GP allows us to overcome the problems of arbitrariness in phonological analyses.

Returning to the literature review, let me point out that most of the Structuralists (e.g. Swanson (1958), Panara (1989a), Favis (1948), Kukules (1939), Bailly & Schmir1 (1979) and Magoulas (1979)) and a few followers of an SPE-type approach (e.g. Setatos (1969, 1974), Malikouti (1970), Efsthathides (1974) and Newton (1972b)) trace the historical origin of MG *b/d/g*. This is an area of general consent. Greek and foreign origin words are almost invariably differentiated.

MG *b/d/g* are derived in words of Greek origin from:

- (i) a nasal segment + Ancient Greek (henceforth AG) *p, t, k* (e.g. [é(m)boros], from AG *éNporos* 'merchant') (Favis (1948), Malikouti (1970), Efsthathides (1974), Bailly & Schmir1 (1979) and Magoulas (1979)),
- (ii) a nasal segment + AG *ν, δ, γ* (e.g. [d'ino] from AG *enḗio* 'I dress') (Favis (1948), Bailly & Schmir1 (1979) and Magoulas (1979)), or
- (iii) a nasal segment + a vowel + *p, t, k* (this case is typically exemplified by the form [ká(n)de], from *kánete* 'do', through deletion of the intermediate vowel) (Kukules (1939) and Magoulas (1979)).

In foreign origin words, Swanson (1958), Bailly & Schmir1 (1979), Magoulas (1979) and Panara (1989a) derive MG *b/d/g* from: (i) nasal + *p/t/k* (e.g. French <champagne> becoming MG [sa(m)bánia]), (ii) *mb/nd/ngg* (French <jambon> becoming MG [za(m)bón]) and (iii) *b/d/g* (e.g. Italian <adio> becoming MG



[a(n)dío)].

As I show later in this sub-section, most of the existing analyses are based on dictionary-type data. Householder (1964), Kakridi (1979), Bailly & Schmir1 (1979) and Tzivaki (1985) are some of the few linguists who provide accounts based on data acquired through interviews with native speakers. Their respective data sets differ from each other in some significant respect(s). Tzivaki (1985), Householder (1964) and Bailly & Schmir1 (1979) choose to investigate only specific linguistic environments. Bailly & Schmir1 (1979), Kakridi (1979) and Householder (1964) choose informants who use standard and not dialectal pronunciation.

With the exception of Kakridi (1979), the above-mentioned data sets do not include many spontaneous style variants. The ensuing analyses are, accordingly, based on the more formal styles (Bailly & Schmir1 (1979) and Tzivaki (1985)). Householder (1964) uses both dictionary-type data and a 5-hour tape-recorded conversation. Newton (1972b) does not give much information as to the sources of his data.

A significant number of linguists, particularly those working with dictionary-type data, are influenced by the social evaluation of certain variants. They, accordingly, choose to only mention the more prestigious variants and remain silent on the stigmatised ones. This leads to numerous analyses being prescriptive to varying degrees.

In most cases where no dictionary-type data are used, interviews are often neither numerous (Householder (1964) and Kakridi (1979)) nor of sufficient length (Householder (1964) and Bailly & Schmir1 (1979)) to ensure representation of all variants. As a result, certain spontaneous style variants are not mentioned in some analyses. In this case, the lack of

presentation of certain variants is not the result of conscious choice on the part of the linguists themselves. Rather, it occurs because these variants tend to appear, on the whole, in larger data sets which include spontaneous style speech.

The existing analyses of MG phonological variation focus on the issue of the underlying representation of *b/d/g*. Some linguists claim that *b/d/g* are independent phonemes, while others derive them from underlying *NC* sequences (i.e. *mp/nt/nk*).

As I mentioned earlier in this sub-section, some linguists express their opinion on this issue, even though their research is not directly related to this area. In this case, one of two things may happen. Either the expressed opinions are not supported by arguments (Panara (1989a:21) for instance, claims that 'b, d, g are ... phonemes in their own right as their distribution seems to suggest' without, however, discussing how their distribution leads her to this conclusion). Or the arguments offered are inconsequential and phonologically irrelevant (Swanson (1958), for example, incongruously argues that *b/d/g* are independent phonemes on the basis of their variation with *mb/nd/ng*). I do not review any similar analyses in this sub-section.

Those linguists who claim that *b/d/g* are reflexes of *mp/nt/nk* also recognise that the former are in free variation with *mb/nd/ng*. Their claim is based on the observation that *b/d/g* and *mb/nd/ng* are interchangeable in all positions. These linguists also claim that the application of specific phonological rules to the underlying representations *mp/nt/nk* produces the different variants that are encountered in the various MG dialects.

The best argumentation in favour of this view is found in Newton (1961, 1972b). Newton (1972b) claims that standard

MG pronunciation has evolved as a fusion of the dialects of the Peloponese and the Ionian Islands. Word-medially, Newton (1972b) argues, both dialects have obligatory postnasal voicing (e.g. *kuNpi* → *kuNbi* 'button'). However, Peloponese assimilates the nasal in point of articulation to the following stop (e.g. *kuNbi* → *kumbi*). In the Ionian Islands, assimilation is complete (i.e. it produces geminates) and it is followed by a degemination rule (e.g. *kuNbi* → *kubbi* → *kubi*) (Newton 1972b:93ff).

Newton (1972b) claims that a speaker who belongs to the Peloponesian dialect group tends to allow the nasal reflex to surface, whereas a speaker who belongs to the Ionian Isles dialect group tends to forbid the surfacing of the nasal reflex. However, Newton (1972b:95) also points out that this should be considered more as a tendency than a rule, since 'it is often quite difficult to determine whether a given idiolect is to be treated as belonging to a [Peloponesian] . . . or a[n Ionian Isles] . . . pronunciation'.

Across MinSBs, Newton (1972b:97) accounts for the optional surfacing of the nasal reflex (e.g. [*ton díno*] ≈ [*to díno*] 'I dress him') in terms of (i) the dialectal group to which a speaker belongs and (ii) whether a speaker will treat the *NC* sequence as occurring across a morpheme or a word boundary. If the speaker treats the *NC* sequence as occurring across a morphological boundary, the nasal reflex may not surface (i.e. [*to díno*]). If the same sequence is treated as occurring across a word boundary, the nasal reflex surfaces (i.e. [*ton díno*]).

Newton's (1972b) account has many well-argued and accurate observations concerning the behaviour of MG *NC* sequences. In this respect, his analysis was a great advance on the previous accounts that existed for MG phonological variation. However, his analysis does not extend to all the relevant data (all the different data sets containing *NC*

sequences). In addition, due to framework limitations, Newton, as well as all linguists who work within an SPE-type framework are, as I mentioned earlier in this section, (i) able to generate unattested forms and (ii) unable to explain why this phenomenon takes the particular form that it does and no other.

Tzivaki (1985) adopts Newton's rules of postnasal voicing and nasal assimilation. However, instead of claiming (following Newton) that MG phonological variation is the result of a difference in the application of the nasal assimilation rule on each dialect, she claims that both the postnasal voicing and nasal assimilation rules apply in the same way in all dialects and are followed by an optional nasal deletion rule.

Tzivaki (1985) examines how each of these three rules correlates with style shifts. Her results show that style shifts are indicated only by the word-medial deletion of the nasal reflex in words which begin with a nasal-ending prefix (e.g. *[[siN+práto]]*). Another important finding is that across a MinSB the surfacing of the nasal reflex crucially depends on the speaker. Tzivaki's research suggests that the assimilation of the undeleted nasal is obligatory word-medially. Voicing is also obligatory<sup>13</sup> within words and quite widespread across MinSBs.

Tzivaki's (1985) account is also subject to the same criticism as Newton's analysis, namely that (i) her analysis does not examine all the relevant data sets and (ii), due to the shortcomings of the SPE framework she employs, her account remains arbitrary and non-explanatory.

Householder (1964) puts forward an alternative analysis,

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<sup>13</sup>The only exception she reports is that of the word *[síмптоsi]* 'coincidence'. I explain fully the behaviour of this word in Chapters 4 through 6.

claiming that *b/d/g* are derived from two sources. The first source is *mp/nt/ŋk*. Those *b/d/g* which are derived from *mp/nt/ŋk* are the product of sandhi phenomena which occur across MinSBs, as in /*ton píra*/ → [*to bíra*] 'I took him'). The surfacing voiced stop is in free variation with *mb/nd/ŋg* (i.e. [*to bíra*] ≈ [*tom bíra*]), as *mb/nd/ŋg* are also derived from underlying *mp/nt/ŋk*). There exist, however, another set of *b/d/g* which come from a different source: they are independent phonemes (i.e. they are not derived from *mp/nt/ŋk*). These independent *b/d/g* segments occur within words (i.e. they are not the product of sandhi rules) (e.g. [*bukála*], [*éboros*]).

For his examination of these independent *b/d/g* phonemes, Householder (1964) divides words into four classes. Class 1 consists of words where only *b/d/g* may occur (e.g. [*robót*]). This means that, according to Householder (1964), no variants such as \*[*rompót*] or \*[*rombót*] can ever exist in this class. Class 2 consists of words where only *mp/nt/ŋk* occur (e.g. [*sampánia*]). Again according to Householder (1964), no variants such as \*[*sapánia*], \*[*sabánia*] or \*[*sambánia*] should ever exist in this class. Class 3 and class 4 consist of the same two sets of variants, namely *b/d/g* and *mb/nd/ŋg*. The difference between them seems to lie in the frequency with which the former variants alternate with the latter. Concretely, *mb/nd/ŋg* are the 'preferred realisations' of classes 3 and 4. However, in class 3, *mb/nd/ŋg* alternate freely with *b/d/g* (e.g. [*akumbó*] ≈ [*akubó*]). In class 4, such an alternation is rare, if it exists at all (e.g. [*kámbos*] ≈ [*kábos*]).

Householder (1964) admits that his categorisation is based on the 'intervocalic occurrence of the phones and sequences in question'. This means that his categorisation is phonetic rather than phonological. However, as the behaviour of the NC sequences that I presented in 1.1 shows, the realisations Householder allows for classes 1 and 2 do not fully depict the linguistic reality. His data sets exclude forms such as [*rombót*], [*sambánia*] and [*sabánia*] which are

nevertheless attested in MG.

To his credit, Householder (1964) suggests that 'individual speakers may differ in [the assignment of] particular words [to classes]'. He furthermore mentions that class 1 and 2 words may also respectively belong to classes 3 and 4 (e.g. [*tsigúnis*] (class 1), [*tsigúnis*] ≈ [*tsingúnis*] (class 3) 'stingy'; [*dokuménto*] (class 2), [*dokuméndo*] ≈ [*dokumédo*] (class 4) 'document'). However, Householder (1964) does not mention that some words may simultaneously belong to class 1 and 2, 1 and 4, 3 and 2 and 3 and 4. Most probably, these possibilities do not appear in his data.

The fact that his classification is not based on phonological criteria is not only reflected in Householder's own admission of the phonetic categorisation of words, but also in the contents of each of his classes. The words which, according to Householder (1964), belong to the same class share not only phonetic, but also historical/etymological characteristics. Specifically, classes 1 and 2 mainly consist of foreign origin words (some of them fully assimilated into Greek). Class 4 consists mostly of words of Greek origin which begin with one of the nasal-ending prefixes<sup>14</sup>. Class 3 is the most numerous of the four classes, mainly consisting of Greek origin words; hence the terms 'regular' and 'normal' class.

Zeri (1984), Mackridge (1985), Setatos (1969, 1974) and Philippaki-Warburton (1970) adopt Householder's analysis. Setatos (1969:45) relates the lack of surfacing of the nasal reflex in classes 3 and 4 to the 'general tendency to open syllables in [MG]', as well as to factors such as the idiolect of a speaker, her social dialect and the origin of the word.

Philippaki-Warburton (1970) gives phonological basis to

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<sup>14</sup>As I also mentioned in 1.1, these are the so-called 'learned' words. I review their treatment later in this section and in Chapters 3 through 6.

Householder's analysis by proposing underlying representations for each class of words. Classes 1, 2 and 4 respectively have underlying *b/d/g*, *mp/nt/nk* and *mb/nd/ng*. Class 3 has underlying *mp/nt/nk* which undergo (i) postnasal voicing and (ii) optional nasal deletion (in that order). The latter rule applies to both classes 3 and 4. In this way, Philippaki-Warbuton (1970) succeeds in capturing the variation that exists in these two classes. Nevertheless, this optional nasal deletion rule fails to capture the fact that the difference existing between words of class 3 and class 4 is, according to Householder (1964), one of frequency of alternation of *mb/nd/ng* with *b/d/g*.

Also, neither of these two rules can apply to class 1. As a result, the attested variation between forms such as [robót] ≈ [rombót] cannot be accounted for. Finally, in her effort to differentiate and give some phonological basis to Householder's claim of the independent status and existence of classes 2 and 3, Philippaki-Warbuton rightly excludes the application of postnasal voicing in class 2. This, however, results in the attested variation between forms such as [sampánia] ≈ [sambánia] ≈ [sabánia] remaining uncaptured.

So, despite Philippaki-Warbuton's treatment, Householder's analysis remains 'phonetic' (if not historical) and his classification lacks phonological foundation. As a result, language learners still need to know (i) which words belong to each of Householder's classes, (ii) which words may belong to more than one class and (iii) which are the classes these multi-class words belong to. Besides, Householder's treatment does not reflect a most important fact, namely that speakers treat Greek and foreign origin and learned and non-learned words in exactly the same way. I will come back to this point later in this sub-section and in Chapter 6.

The controversy that exists over the underlying representations of *b/d/g* extends to the phonological relationships existing between *p/t/k*, *mp/nt/nk*, *mb/nd/ng* and

*b/d/g*, as well as their distribution in word-initial and word-medial positions and across MinSBs.

In their examination of the two latter positions, most linguists accept that *b/d/g* vary freely with *mb/nd/ng* (Mirambel (1933, 1959), Favis (1948), Kukules (1939), Newton (1961, 1972b), Tzivaki (1985), Walter (1979), Kakridi (1979), Bailly & Schmiri (1979), Householder (1964), Setatos (1969, 1974), Philippaki-Warbuton (1970) and Malikouti (1970)).

Those who derive *b/d/g* from underlying *mp/nt/nk* (e.g. Favis (1948) and Kukules (1939)) claim that both word-medially and across MinSBs *b/d/g* do not contrast phonologically with *mb/nd/ng*; hence the free variation between them. Those who follow Householder's claim that *b/d/g* are independent phonemes allow for free variation of *b/d/g* and *mb/nd/ng* across MinSBs (e.g. [ti bíra] ≈ [tim bíra]). Word-medially, however, only class 3 and 4 words are allowed to vary. The segments *b/d/g* of class 1 show no variation, unless they also belong to class 3 (e.g. the word [tsigúnis] we saw earlier).

The only environment where all linguists agree that *b/d/g* are not allowed to vary freely with *mb/nd/ng* is after a non-nuclear segment. In this environment, Householder (1964), Magoulas (1979), Newton (1972b) and Hamp (1961) point out that only *b/d/g* may appear (e.g. [barbúni], \*[barmbúni]).

Magoulas (1979) and Setatos (1969) are just two of the linguists who prescriptively claim that word-medially the nasal reflex should surface in words of foreign origin whose historical phonological shape has a nasal reflex (e.g. <jambon>). However, there is no obligation for the nasal reflex to surface. As I explain in more detail in 6.1, the surfacing of the nasal reflex in this word set is socially and stylistically motivated and, as such, it should not form the focus of an investigation of the linguistic aspect of MG phonological variation. What is important for the variation



process is the fact that speakers treat foreign words in the same way as Greek origin ones in terms of the variation pattern they allow them to display (e.g. [zambón] ≈ [zabón], just like [kondá] ≈ [kodá]). This means that what is important is the fact that the grammar of MG allows the same pattern of phonological behaviour to the *NC* sequences that occur in words of both Greek and foreign origin. I elaborate further on this issue in Chapter 6.

When linguists examined the MinSB, the possibility of its being treated as major is prescriptively silenced by all but Bailly & Schmiri (1979), Newton (1972b) and Setatos (1969). Most linguists note that the same variants which appear within a word may also appear across a MinSB. Householder (1964) gives evidence in favour of the free variation of *b/d/g* and *mb/nd/ng* across MinSBs. Furthermore, he argues that the grammatical nature of the proclitic plays a significant role in determining the variant that an *NC* sequence may generate across a MinSB. This is another point I come back to in 6.1.

Newton (1961:283-4) observes that in word-initial position *b/d/g* 'are complementary to, or in free variation with, the cluster consisting of a homorganic nasal and themselves', i.e. *mb/nd/ng*. This statement raises the issue of whether prenasalisation exists in MG. Although this is a subject I examine in detail in 6.2, let me make here some preliminary remarks regarding its treatment in the existing literature.

Prenasalisation has traditionally been a most controversial issue of MG phonology. Linguists disagree on many points. Most of the linguists who accept its existence focus on word-initial position, where, in the absence of a preceding audible vowel, the overt presence of a nasal reflex before a 'voiced' stop is felt to be different from word-medial position. In the latter position, *ND* sequences occur much more frequently than word-initially.

Many linguists feel that word-initial *ND* variants which are rather infrequent and carry social stigma assume the same type of structure as an affricate. They call these variants 'prenasalised'. Newton (1972b), Magoulas (1979), Walter (1979) and Kakridi (1979) observe the rarity of occurrence of the *ND* variants in word-initial positions, Newton (1972b) claiming that their frequency of occurrence depends on the particular speaker.

Exactly because of the infrequency of occurrence of these *ND* variants and the social stigma they carry, other linguists avoid referring to their existence word-initially. They claim that only *D* variants may appear word-initially (e.g. Mirambel (1978:43), Householder (1964:22) and Malikouti (1970:23)). Magoulas (1979:24) is the only linguist to argue in favour of the assignment of phonemic status to these 'groups of nasal and oral stops'. This, most probably, happens because Magoulas (1979) focuses on word-medial position, where the *ND* variant is quite frequent and does not carry any stigma.

With the exception, then, of Magoulas (1979), those linguists who allow prenasalisation in MG claim that  $^mb/^nd/^ng$  (rather than *mb/nd/ng*) are the segments which may appear word-initially. In this environment,  $^mb/^nd/^ng$  and *b/d/g* are allegedly in free variation. Those linguists who do not allow prenasalisation in MG postulate that only *b/d/g* occur word-initially. Word-medially, *b/d/g* are in free variation with *mb/nd/ng*, i.e. with *ND* variants which, however, do not assume an affricate structure. Yet, even though *mb/nd/ng* do not assume an affricate structure, many linguists call them 'prenasalised' just because their nasal reflex surfaces.

It becomes clear, then, that the confusion that exists on the subject of prenasalisation is mainly due to the misuse of this term. Most linguists of both frameworks have followed the practice of calling all variants in which the nasal reflex surfaces 'prenasalised'. This means that the same term is used

for two different syllabic structures. On the one hand, we have the true prenasalised variant, a complex segment which occupies one skeletal point (19). On the other hand, we have a sequence of two segments, each occupying one skeletal position (20); there is no prenasalisation here, only the surfacing of the nasal reflex of an *NC* sequence.

(19)

$$\begin{array}{c} x \\ / \quad \backslash \\ N \quad C \end{array}$$

(20)

$$\begin{array}{cc} x & x \\ | & | \\ N & C \end{array}$$

Instead of differentiating between (19) and (20) in terms of syllabic structure, most linguists refer to word position, arbitrarily allowing the surfacing of the nasal reflex in certain positions (typically word-medial ones) and forbidding it in others (typically word-initial ones). Mirambel (1933:157) (who does not use the term 'prenasalisation' in his analysis) typically represents this tendency: 'le grec commun, qui a normalement *mb*, *nd* à l'interieur, n'a au debut du mot que *b*, *d*; un group *mb*, ou *nd* doit s'appuyer sur un élément vocalique précédent . . . sinon l'implosion de la nasale se fait malaisément'.

The only remark that I would like to make at this point is that none of the linguists who have examined the issue of prenasalisation in MG seems to be concerned with the fact that, for some strange reason, this phenomenon appears to be confined to word-initial position in MG. As I show in Chapter 6, where I examine MG prenasalisation from a GP perspective, there exist no arguments in favour of the presence of this phenomenon in the language; in fact, there exist several arguments against it.

Let me return again to the issue of phonological contrast between *b/d/g*, *mb/nd/ŋg*, *mp/nt/ŋk* and *p/t/k*. Kakridi (1979) claims that *mp/nt/ŋk* contrast phonologically with both *b/d/g* (e.g. [*lámpsi*] 'shine (n.)' versus [*lámbi*] 'shine (v. 3rd pers.pres. ind.)') and *p/t/k* (e.g. [*pémpsi*] 'send' versus

[*pépsi*] 'Pepsi'). *p/t/k* are independent phonemes, while *mp/nt/nk* are clusters of phonemes.

With the exception of Newton (1972b) and Kakridi (1979), all other linguists who explore the subject of *NC* sequences report that no *mp/nt/ŋk* exist in MG. Mirambel (1978) reports that in a total of 17,239 tokens of MG phonemes he only found instances of (i) nasal + voiced stops and (ii) voiced stops (the latter being more numerous than the former). Mirambel reports that he found no nasal + voiceless stop sequences. However, he does not give any information as to the linguistic environments he examined or the way in which he established the pronunciation of these sequences. Panara (1989a:11) also claims that 'a nasal will always be followed by voiced plosive stops in Greek' and that [*mp/nt/nk*] are not permissible.

The above claims are not entirely true. The interested reader can see in Appendix C several instances of words which may possess [*mp/nt/ŋk*] variants (e.g. *kóntra*, *taNpón*). I discuss in detail similar words in Chapter 6. Also, the postulation by Householder (1964) of a whole class of words where, according to his analysis, only [*mp/nt/ŋk*] appear shows that these lexical items are anything but scant.

Moreover, the claim that no [*mp/nt/ŋk*] occur in MG may be said to be true only for the sequence *nt* which occurs before *s*. Unlike [*mp*] and [*ŋk*], [*nt*] obligatorily undergoes voicing in this specific environment (e.g. [*dzadzíki*], \*[*ntsantsíki*] for *NtsaNtsíki* 'dzadziki', but [*lámpsi*] and [*eléŋksi*], not \*[*lámbzi*] and \*[*eléŋgzi*] for *láNpv<sup>o</sup>si* and *eléNkv<sup>o</sup>si*, respectively). In Chapters 5 and 6, I explain why [*nt*] sequences cannot occur before [*s*] in MG. Also, although it is true that [*mp/nt/ŋk*] do not occur word-initially in MG (and I explain why in Chapter 6), both [*mp*] and [*ŋk*] may and do occur word-medially before a phonetically adjacent *s*, as in the words [*lámpsi*], [*eléŋksi*] (17) and in the sequence *mpt*, as in the word [*péempti*] (18).

Finally, regarding the phonological relationship between *mp/nt/ŋk* and *mb/nd/ŋg* there are, again, two views. On the one hand, those linguists who derive *mb/nd/ŋg* from underlying *mp/nt/ŋk* claim that these two sets of segments do not contrast phonologically. On the other hand, those linguists who reject *mp/nt/ŋk* as the underlying representations of intervocalic *b/d/g* claim that *mp/nt/ŋk* and *mb/nd/ŋg* contrast phonologically. For instance, Householder (1964:24) who follows the latter school of thought remarks that, even though the functional load of *mp/nt/ŋk* 'is so low' and there only exists one near-minimal pair (i.e. /andante/ 'andante' and /antant/ 'Entente'), 'still, it is foolish to pretend that the evidence is not there'.

As I mentioned earlier in this sub-section, some researchers claim that whether a nasal reflex surfaces within words or not depends upon its Greek versus foreign origin and the characterisation of a word as 'learned' or 'non-learned'. This distinction has so far been adopted, albeit tacitly at times, by practically all linguists who have investigated MG phonological variation.

The great majority of learned words seems to begin with one of the nasal-ending prefixes (e.g. {*siN-*}, {*paN-*}, as in *sínōdos* 'synod' and *panðemónio* 'pandemonium'). The findings concerning the tendency of the nasal reflex to surface in learned words are nevertheless contradictory. Walter (1979), Kakridi (1979), Setatos (1969), Newton (1972b) and Householder (1964) claim that words of the 'learned' vocabulary show a greater tendency in allowing the nasal reflex to surface. Bailly & Schmir1 (1979) find that the surfacing of the nasal reflex takes place equally frequently in allegedly learned and non-learned words.

The lack of large and stylistically varied data sets and the influence exerted by the prestige attached to the *ND* variants have, I believe, led linguists to support the former

view. The prestige involved here is so strong that Tsopanakis (1985) claims that the only correct pronunciation of a learned item is the *ND* one. The *D* pronunciation is, he asserts, ungrammatical.

Where studies have involved samples containing foreign words, linguists have, on the whole, adopted Newton's view according to which 'the practice of an individual will often depend on his knowledge of the donor language'. Newton (1972b) prescriptively points out that the correct pronunciation is the one which corresponds to the historical phonological shape of a word. Bailly & Schmir1 (1979) have used in their research foreign origin words which are assimilated into MG in varying degrees; most of them are fully integrated into MG, while some are recent loans. Their results show that an *ND* variant is used in these foreign origin words 60% of the time. This indicates that speakers treat these words in approximately the same way as Greek origin words.

Finally, many linguists claim that the rapidity of speech influences the surfacing of the nasal reflex (Setatos (1969), Newton (1972b) and Kakridi (1979)). Kakridi (1979), for instance, suggests that in the more rapid styles speakers use word-medially a greater percentage of *D* variants. However, this claim cannot achieve any statistical significance, mainly because of the difficulties involved in defining what rate of speech should be considered as slow or fast.

The rapidity of speech (if this could indeed be measured with any degree of accuracy), the 'learned' or 'non-learned' characterisation of a word and its Greek or foreign origin may exert some influence on the surfacing of the nasal reflex in those word sets in which this surfacing is optional. However, the above-mentioned factors would certainly not affect the pattern of phonological behaviour of the *NC* sequences. These patterns remain identical, irrespective of the rate of speech. This is due to the fact that the patterns of phonological

behaviour displayed by MG NC sequences are specified by the phonological system itself and cannot be influenced by extragrammatical factors. As a result, a word which displays the variation pattern  $ND \approx D$  (e.g. *koNtá*) continues to display this pattern even when the utterance containing it is delivered at a faster speed and irrespective of (i) the 'learned' or 'non-learned' characterisation of a word and (ii) its Greek or foreign origin.

As I show in Chapters 4 through 6, the distinctions between learned and non-learned words, Greek and foreign origin words and slow and fast speech are laden with social prejudice. In terms of the variation process, speakers treat all NC sequences which appear in identical syllabic structures in an identical manner. The etymological boundaries and the historical origin of words are invisible to phonology. In 6.1, I explain in more detail that whenever the grammar allows a choice between an *ND* and a *D* variant, the variant that finally gets selected by particular speakers in specific moments in time does not depend on linguistic but on social and stylistic factors<sup>15</sup>. The surfacing of the nasal reflex in these environments where it is optional has no bearing on the variation process itself. As a result, it should not be part of a phonological investigation of the variation process but of an investigation of the social and stylistic values that may attach to it.

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<sup>15</sup>Foremost among the social factors determining the choice of variants are (i) the age and sex of each speaker, (ii) the social network a speaker belongs to and (iii) the identity a speaker wants to project at particular moments in time. Foremost among the stylistic factors are (i) the amount of attention payed to speech (i.e. careful versus spontaneous speech), (ii) the characterisation of the particular word where the NC sequence appears as learned/non-learned, (iii) the Greek versus foreign origin of the word and (iv) the rapidity of speech (Pagoni ((1989) and (in preparation)a).

### 1.3 Summary

In this chapter, I have presented the MG data which are susceptible to the phenomenon of phonological variation and which consist of sequences of phonetically or phonologically adjacent nasal and oral stops. I have introduced the relevant environments where variation may be attested (i.e. a variety of major and minor cross-syntactic boundaries and within word positions), the variants which may occur in each of these environments and the variants which are disallowed in each of these contexts.

I have also reviewed the analyses that various linguists have so far proposed in an effort to account for the behaviour of at least part of these data. In addition, I have briefly exposed the best-known views on (i) prenasalisation, (ii) the underlying representation and distribution of MG *b/d/g* and (iii) the factors allegedly determining the choice of particular variants for the different word sets that have been examined. Finally, I have presented an assessment of these accounts which are couched within either the Structuralist or SPE-type frameworks and have outlined their major problems and shortcomings. In the subsequent chapters I will present an alternative account of MG phonological variation, formulated within the theoretical framework of GP, the main theoretical stipulations of which I present in Chapter 2.



## CHAPTER TWO

### THE THEORY OF PHONOLOGICAL GOVERNMENT

#### 2.0 Introduction

This chapter aims at outlining Government Phonology, the theoretical framework within which the present analysis of Modern Greek phonological variation is formulated. The account I present here does not depict all aspects of the theory in a complete and exhaustive way. Its purpose is only to acquaint the unfamiliar reader with the main theoretical stipulations of Government Phonology and with the implications some of these stipulations have for the phonological analysis of the languages of the world.

The present outline and brief discussion focus on the main points of those aspects of the theory of Government Phonology which are particularly relevant to an analysis of Modern Greek phonological variation. Most, if not all, of the notions I introduce in the following sections are taken up in the argumentation I put forth in the subsequent chapters of this thesis.

#### 2.1 Some theoretical principles of GP

GP (as developed by Kaye, Lowenstamm & Vergnaud (henceforth KLV) 1990) is, *inter alia*, a heavily restrictive theory of syllable structure<sup>1</sup>. This theory is characterised by a number

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<sup>1</sup>As I show later in this chapter, GP rejects the existence of syllables as independent constituent nodes. By saying, then, that GP is a theory of syllabic structure, phonologists working within this framework indicate the fact that GP is 'a theory about phonological strings' (Kaye 1990:306), i.e. a theory which investigates how segments are

of principles. Some of these principles are meta-theoretical, while others are principles of grammar. I discuss fully the principles of grammar later in this chapter (2.11). For the moment, I would like to focus my attention on the following five meta-theoretical principles that characterise the theory of GP (KLV 1990:194).

To begin with, universality ensures a uniform interpretation of the same physical object across phonological systems. One consequence of this principle is that markedness conventions are universal. This happens because the set of available phonological processes behaves like a function mapping initial representations onto final ones.

In the second place, non-arbitrariness refers to the existence of a direct relation between a phonological process and the context in which it occurs. As I show in 2.3, in a GP framework all phonological processes occur freely in direct response to structural and segmental conditions which are locally present in a phonological representation.

In the third and fourth place, privativeness specifies that phonological oppositions are privative, while uniformity specifies that lexical representations remain privative at all levels. Contrasts do not get converted into equipollent ones in the course of a derivation.

Lastly, interpretability designates that phonological representations should be interpretable at any level. Lexical representations do not change in kind (although they may change in detail) in the course of a derivation, as they are neither underspecified nor partially specified. Lexical representations are interpretable, just as derived ones are: no default rules are required to 'fill in' missing values.

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grouped together in given structures and what types of configurations are allowed or disallowed in the different languages of the world.

## 2.2 GP as a principles and parameters approach

Unlike other generative frameworks (e.g. SPE-type approaches), GP draws theoretical parallels between syntax and phonology. This is done in an attempt to examine if and how principles of Universal Grammar (UG) found in syntax can also apply in phonology.

In a GP framework, all human phonological systems are perceived to be defined by a set of universal principles. These are the principles of grammar I briefly outline in 2.11. However, while all languages follow these universal principles of grammar, they are also perceived to differ along well-defined lines called parameters.

A parameter may be thought of as a kind of a switch. Typically, this switch has two positions: on or off. A particular property, be it syntactic, morphological, or phonological, may be present or absent from a system, or it may take one of two possible forms. Language acquisition may . . . be defined as determining just what the particular settings are for the series of switches appropriate to what is being learned. . . . Going from English to Chinese . . . is simply a question of changing the setting of these switches (Kaye 1989:54).

## 2.3 Phonological operations in GP

In opting for the principles and parameters approach and contrary to other generative frameworks, GP rejects the notion that the appropriate way of formalising phonological processes is through the use of rules of the sort  $A \rightarrow B / C \_ D$  applied in order.

The reasoning behind this rejection is that re-write rules can only describe phonological events as a series of substitution operations, i.e. in an arbitrary way. Re-write rules can capture any process, including unattested ones. In addition, re-write rules often evaluate well-motivated and freely attested processes as equally simple, unmarked and natural as other, apparently unattested, processes. Frameworks which use re-write rules fall short of explaining why processes happen where they do and in the way they do.

The mechanism of autosegmental spreading allows non-linear frameworks to account in a non-arbitrary way for processes such as assimilation by providing a direct formal connection between an assimilating target and its conditioning trigger. Nevertheless, until recently non-linear phonology has failed to provide non-arbitrary explanations for a host of other phonological processes such as lenition or zero-vowel alternations.

GP maintains that non-arbitrary explanations should form an integral part of the analysis of the phonological behaviour of languages. The rejection of re-write rules by GP is not to be taken as a rejection of the notion of phonological processes. On the contrary, GP specifies that phonological events take place whenever the segmental and structural conditions for their occurrence are met in a phonological representation. Following the notion of phonological government to be outlined in the subsequent sections of this chapter, only two types of phonological operations are formally expressible in this extremely impoverished theory of phonological activity: (i) composition and (ii) decomposition. These two universal processes take place under specific circumstances (i.e. they are never arbitrary): they are conditioned by locality.

The relationship between a phonological event and the context in which it occurs is no longer an

arbitrary one. Phonological events are *local* (Kaye 1989:146; his emphasis).

Phonological government defines the conditions under which positions can be seen as adjacent in a phonological string. The relations of government which hold between positions in a phonological string connect phonological events and contexts in a non-arbitrary way (Harris & Kaye 1990:3). As a result, any random substitution operation of elements which are not already present in the representation of segments cannot be accommodated in this framework. GP has 'no formal means of expressing non-occurring processes of a sort that are quite easily accommodated within orthodox feature frameworks' (Harris 1990:268).

#### 2.4 GP as a theory of syllable structure

Phonologists working within autosegmental frameworks have observed that a significant number of phonetic properties (e.g. length of segments, tone, etc.) are best thought not to be tied to segments, but to span, in fact, 'domains of varying sizes (. . . feet, words, etc.)' (Durand 1990:242). In an effort to account for the interface between syllabic structure and segmental structure, phonologists have posited the existence of a tier mediating between segmental material and syllabic constituents. This tier is called the skeletal tier (or, simply, the skeleton) and consists of a series of points (or skeletal positions) which are symbolised as x's and represent units in time. As I show in more detail in 2.6, GP postulates that skeletal points are organised and associated to constituents in terms of the governing relations they contract with each other.

GP maintains that all the skeletal points (making up the skeletal tier of lexical representations) along with their segments (making up the segmental tier of lexical

representations) are projected to constituents, as illustrated in (1). Constituents, in their turn, are grouped together to form successively larger domains (e.g. foot, word, etc.). The theory of GP recognises three constituents: (i) the onset (O), (ii) the nucleus (N) and (iii) the rime (R). The syllable and the coda are both denied constituent status<sup>2</sup>.

(1) Syllabic tier:	O	N
Skeletal tier:	x	x
Segmental tier:	β	a

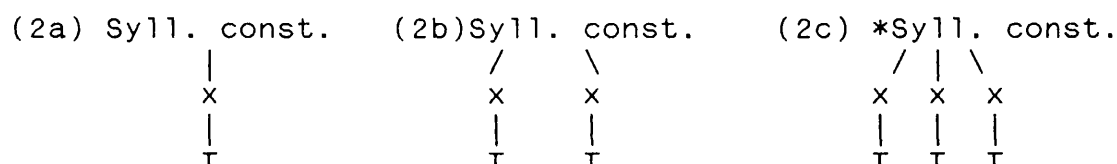
All skeletal points are related to each other in terms of binary asymmetric relations referred to as government. For a government relation to hold in a phonological string, the conditions of strict locality and strict directionality must be met. Strict locality applying to a governing domain specifies that the governor must be strictly adjacent to the governee at the so-called zero projection level ( $P_0$ )<sup>3</sup>. Strict directionality applying to a governing domain specifies that the head is initial. As I show in 2.7, directionality goes from left to right within a constituent and from right to left across constituents at the  $P_0$  level.

From these two conditions, the binarity theorem follows. It states that syllabic constituents can be maximally binary branching (2b): 'all n-ary constituents, where  $n > 2$ , are ill-formed' (KLV 1990:199), (2c). Constituents with single members are always well-formed (2a). Branching is parametrically defined in different languages, with the restriction that absence of branching rimes in a language implies absence of

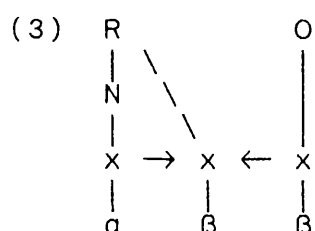
<sup>2</sup>For very thorough argumentation justifying these rejections see KLV (1990) and Charette (1988, 1989, 1991).

<sup>3</sup>This is the level of projection where all skeletal points (together with their segmental material) are present. As I show in 2.5, 2.7 and 2.9, there exist other levels of projection (e.g. licenser projection level (LPL), nuclear projection level ( $P_1$ ), etc.) where not all positions are present.

both branching onsets and branching nuclei<sup>4</sup>. Throughout this thesis,  $\tau$  stands for any segment that may occupy the syllabic position under discussion.



The left branch of a rime is always a nucleus (3). In syntactic terms, the rime is the projection of the nucleus. The right branch of a branching rime (rimal complement) has traditionally been referred to as 'coda' within those frameworks which, unlike GP, assign to it the status of a syllabic constituent. The rimal complement is, strictly speaking, 'not a complement of the rhyme, but rather its specifier' (Charette 1989:165). This position is syllabified directly under the rime. In what follows, the expression 'rimal complement position' is to be interpreted as the right branch of a rime which is always doubly governed (from within and outside the constituent). Concretely, this position is governed by both the strictly adjacent preceding nuclear head and the strictly adjacent following onset head (as shown by the arrows in (3)). Throughout this thesis,  $\alpha$  stands for any nuclear and  $\beta$  for any non-nuclear segment that may respectively occupy a nuclear and a non-nuclear position.



Within the framework of GP a nucleus is always preceded by an onset. As a result, all lexical representations at the

<sup>4</sup>MG belongs to that category of languages which forbid branching nuclei (i.e. long monophthongs and heavy diphthongs) but allow both branching onsets and branching rimes.

syllabic (constituent) level are linear sequences of pairs of onset-rimes. This means that no nucleus can stand on its own without an onset preceding it. Also vowel-initial words are analysed as being obligatorily preceded by an onset. This onset is empty.

All skeletal points that enter into a governing relation display systematic phonotactic dependencies. As a result, co-occurrence restrictions appear between segments that are in a governing relation in both intra- and inter-constituent contexts. According to Harris (1992:18), in intraconstituent contexts 'the distributional latitude of the righthand position of branching onsets and nuclei is much more tightly constrained than that afforded the head position on the left'. In the interconstituent contexts formed by an onset head and the preceding rimal complement, 'the righthand position . . . enjoys a greater degree of distributional freedom than that on the left' (Harris 1992:18).

Following the above systematic phonotactic dependencies that exist between skeletal positions which are in a governing relation, we would expect similar dependencies to be exhibited in sequences of onset-rimes<sup>5</sup>. This, however is not the case: 'onset-nucleus sequences do not display the sort of phonotactic dependencies that are evident in coda-onset clusters' (Harris 1992:19), i.e. no co-occurrence restrictions exist between onsets and rimes. This means that any well-formed onset can be followed by any well-formed rime. This property has been called the Principle of Free Co-occurrence (KLV 1990).

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<sup>5</sup>Recall from above that an onset always precedes a rime. As I show in 2.5 through 2.12, the onset is governed by the nucleus that follows it.



## 2.5 The Licensing Principle

GP is based on the notion of syllabic constituents which form governing domains. Skeletal positions are related to each other through binary, asymmetric relations referred to as government. The governing relations that exist in any well-formed phonological string (i.e. a domain) are an instance of the application of the Licensing Principle. This specifies that in any one domain every position must be licensed, apart from one, which is the head of the domain. This unlicensed head of the domain is itself licensed at some higher level of the prosodic hierarchy.

Domains can be as small as the melodic material which is attached to one skeletal position. Licensing of this domain is crucial as it determines whether the melodic material in question receives phonetic interpretation or not. According to Harris (1992:17), 'the phonetic interpretability of units within a representation depends on their being legitimised through integration into the phonological hierarchy'. This means that the phonetic interpretation of segments (i.e. the licensing of melodic material) depends on the association of segments with skeletal points (Autosegmental Licensing, Harris 1992).

The presence of skeletal positions, constituents and successively higher domains (i.e. foot, word and so on) within the different levels of projection is authorised by the mechanism of prosodic licensing (Harris 1992). This mechanism specifies that the head of a licensing domain sanctions the presence of any other unit that might occur in that domain. For example, within the domain of a branching onset, a branching nucleus or a branching rime, the lefthand position licenses its complement by virtue of the fact that it is the head of that particular domain. Once it licenses its complement, this head is projected to the next level of the prosodic hierarchy where only constituent heads are projected.

This is the so-called 'level of licenser projection' (LPL) which I discuss in 2.9.1. In that level, every onset is licensed by its following nucleus. This means that in the domain formed by an onset and a following nucleus, the nucleus is the head. These nuclei which are heads at the LPL are then projected to even higher levels of the prosodic hierarchy (i.e. foot, word, etc.) where, ultimately, all but one are licensed. The unlicensed nucleus is the head of the domain.

Every observed phonological event is tightly linked to the Licensing Principle which can rightfully be considered as the motor of phonology. Government is but an instance of licensing. In 2.12, I return to this fundamental principle of GP and I elaborate on some of its most important aspects.

## 2.6 Government and syllabification

The traditional and widely accepted view that words are sequences of syllables (where 'syllable' is treated as an independent constituent node) is rejected within the framework of GP. Instead, GP regards words as 'linear sequences of segments and of skeletal points which are syllabified into constituents determined by the governing relation they contract with each other' (Charette 1988:xii). This means that words are formed by sequences of constituents organised in terms of government. Syllabification here proceeds from the governing relations that skeletal points contract with each other.

It is important to note that the relation between syllabification and government is not bidirectional: government is not determined by the syllabification of skeletal points into constituents. As Charette (1989:165) points out, 'a relation of government is a relation between skeletal points . . . heads and complements (governors and

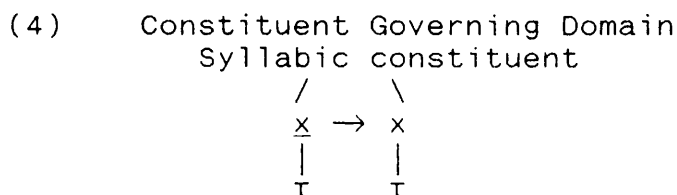
governees) are skeletal points and not constituents. Skeletal points receive their properties of governor/governee from the segments'.

## 2.7 Governing domains at the $P_0$ and $P_1$ levels

Government does not only take place at the  $P_0$  level, but also at the  $P_1$  level. In Section 2.7.1, I deal with constituent governing domains at the  $P_0$  level. In Section 2.7.2, I tackle governing domains at the  $P_1$  level.

### 2.7.1 Government at the $P_0$ level: constituent and interconstituent domains

Government within a constituent (being universally strictly directional) goes from left to right, i.e. syllabic constituents are head-initial. Government is strictly local and strictly directional at the level of zero projection and constituent governing domains<sup>6</sup> are defined by left-headedness (4)<sup>7</sup>. Throughout this thesis, heads are underlined in the illustrated representations.

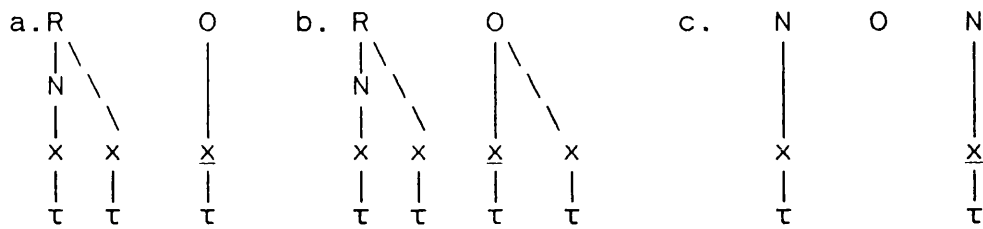


<sup>6</sup>In what follows, the expression 'constituent governing domains' does not mean 'domains which govern constituents' but 'domains in which a governing relation is contracted involving skeletal points syllabified into constituents'.

<sup>7</sup>I follow KLV (1990:211) who specify that 'locality in the strict sense is to be defined on the skeletal tier'. This means that two skeletal points are strictly local iff they are adjacent at the skeletal tier and no other skeletal point intervenes between them.

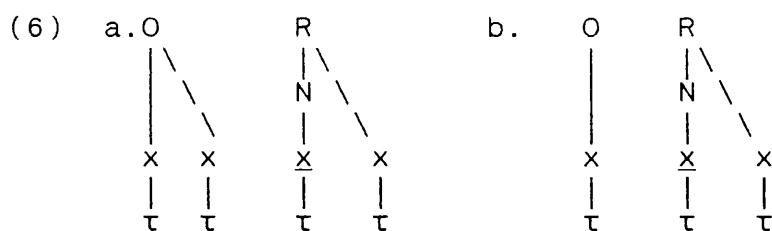
Interconstituent government holds between either (i) a potentially branching onset and the preceding rimal complement ((5a) and (5b) for non-branching and branching onsets respectively), or (ii) contiguous nuclei (5c).

(5) Interconstituent Governing Domains



Just like in constituent governing domains, strict locality is also enforced in interconstituent governing domains. However, the directionality of government is different. Interconstituent governing domains are right-headed.

A problematic point for the theory of GP concerns the interconstituent governing relationship that also holds between an optionally branching rime and its preceding onset (6). So long as the onset does not branch (as in (6b)) the conditions of strict locality and strict directionality between the nucleus (the governor) and the onset (the governee) are respected. However, when the onset is branching (as in (6a)), the only condition that is respected is that of strict directionality (government going from right to left). The condition of strict locality is not respected at the level of projection where all skeletal points are present as, at this level, the nuclear governor is strictly adjacent to the onset complement and not to the onset head which it must govern. To the best of my knowledge, GP has not as yet addressed the above problem.



The assumption of a different directionality of government prevents misidentifications of the constituent and interconstituent status of domains. If directionality of government were identical in both, always going, say, from left to right, it would be impossible to assign constituent or interconstituent status to the different sequences of segments. If such were the case, GP would be an incoherent theory.

### 2.7.2 Government at the $P_1$ level

At the  $P_0$  level of projection, all skeletal positions are present. At the so-called 'nuclear projection level' ( $P_1$ ) (one of the levels of projection I introduced in 2.4), not all positions are present. The  $P_1$  level of projection consists entirely of projections of nuclear heads. Two nuclear positions (which at  $P_0$  are separated from each other by non-nuclear points) become adjacent at the nuclear projection level and are, as a consequence, allowed to enter into governing relations. The governing relations that obtain between these nuclear heads account for phenomena such as vowel harmony, stress assignment, syncope and tone.

At the level of nuclear projection, government is local but not strictly so. As I explained in 2.7.1, this is due to the fact that strict locality is defined at the skeletal tier (KLV 1990:211). Onset heads and possibly onset and/or rimal complements which intervene between nuclei at the  $P_0$  level of projection are not projected at the  $P_1$  level. As a result, the nuclear positions which enter into governing relations at the  $P_1$  level of projection are only contiguous. The directionality

of government at the  $P_1$  projection level is evident in the prosodic phenomena of each language and is parametrically defined. In all the clear cases that we know so far, it seems that government applies from right to left at this level of nuclear projection. As I show in Chapter 6, it appears that MG also follows this right-to-left directionality of government at this level of projection.

## 2.8 Charm Theory

As I show in more detail in 2.9 below, GP denies the existence of features as the phonological units out of which segments are made. Instead, GP claims that all phonological segments are made out of elements.

All phonological segments are formed out of a pool of primitives called 'elements' . . . [which] may occur alone or in combination. Their combinatorial possibilities are defined in terms of a property called 'charm' (KLV 1990:202).

Charm has an impact on more than the combinatorial possibilities of elements. As Harris (1990:262) observes, it has 'an impact on the combinability [of elements], on their organisation into segmental systems and on the ability of segments to occupy particular positions in phonological strings'. These aspects will become obvious in the next two sub-sections, where I concentrate on the two properties that determine the governing capacity of a segment, namely charm (2.8.1) and complexity (2.8.2).

### 2.8.1 The notion of charm

As I pointed out in 2.6, a relation of government is a relation between skeletal points which receive their properties of governor or governee from the segments that

occupy them. This does not mean that governing relations are first established between skeletal positions and only then segments decide which skeletal positions they can attach themselves to: governing relations have no way of knowing between which skeletal positions they should establish themselves. Rather, depending on the segmental material that skeletal positions have, certain types of governing relations are established while other types of governing relations are not.

The directionality of government between adjacent segments is reflected in the charm values of the segments that can occupy these positions. The charm value of segments determines where a segment may occur in a particular structure. As I pointed out in 2.6, GP regards words as linear sequences of segments. The charm values of these segments determine the relation they contract with each other. In other words, segments are organised into constituents according to their charm values. A syllable position is well-formed only if it is associated with a segment which has the appropriate governing properties, mainly in terms of charm.

Charm is marked by a superscript at the right top of the element or segment it characterises. It can take one of three values: positive (<sup>+</sup>), neutral (<sup>0</sup>) or negative (<sup>-</sup>). Certain vowels are positively charmed (e.g. *a*<sup>+</sup>), sonorants are in general neutrally charmed (e.g. *l*<sup>0</sup>, *r*<sup>0</sup>), while stops and non-strident fricatives are generally negatively charmed (e.g. *t*<sup>-</sup>).

It is important to note that charm is not arbitrarily attributed to segments. Its value is determined by a calculus of the individual charm values of the elements out of which a particular segment is composed. The charm value of a segment should not be confused with that of one of its elements. It may well be that they are different, exactly because the global charm of a segment is based on a calculus of charm of

all the elements that compose the particular segment and not on the charm of only one element.

As I show in more detail in Chapter 3, the MG nasal segments  $n^0$  and  $m^0$  display neutral charm (like all sonorants) even though the  $N^+$  and the  $L^-$  elements<sup>8</sup> which figure in their representation are, respectively, positively and negatively charmed. What happens here is that the positive and negative charm of these two elements cancel each other out; thus, the resulting segment has neutral charm.

Charm also determines the way in which the compositional elements of a particular segment combine. Specifically, elements with different charm values are attracted and charmed elements with like values (both positively or both negatively charmed) are repelled. For example, both  $A^+$  and  $I^{+9}$  are positively charmed; they repel each other. Therefore, they cannot combine. In this way, GP accounts for the lack of a low ATR vowel in any language of the world.

Finally, let me present the role of charm in the distribution of segments in skeletal positions. GP stipulates that charmed segments (either positively or negatively) may govern. They can only be associated to governing positions; they cannot be governed by other segments, nor can they occur in governed positions. Neutral segments (also called 'charmless') can be governed. Neutral segments can also govern other neutrally (and only neutrally) charmed segments. The conditions under which neutral segments can occur in governing positions and perform governing duties are discussed in

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<sup>8</sup>I fully discuss the elements  $N^+$  and  $L^-$  in 2.9.

<sup>9</sup>The symbols  $A^+$  and  $I^+$  represent two of the elements that GP postulates. I deal with the element  $A^+$  in Section 2.9. The symbol  $I^+$  refers to the ATR element. This element is not present in MG. Consequently, I refrain from discussing it in any detail in this thesis. The interested reader is referred to KLV (1985) for a detailed and thorough presentation of this element.



Section 2.8.2. For the moment, my discussion focuses on the distribution of charmed segments.

Positively charmed segments can only occur in nuclear head positions. Negatively charmed segments can never occur in either these or any governed positions: they can only occur in onset head positions. This means that the right branch position of either a rime or a branching onset can never be occupied by a negatively charmed consonant.

### 2.8.2 The Complexity Condition

Charmless segments may be governed: they can be associated to governed positions. This means that charmless segments may be associated to either rimal complement or onset complement positions. If charmless segments are associated to governing positions, they must be no less complex than their governees (Complexity Condition, KLV 1990:218, Harris 1990:73-4).

Complexity, measured in terms of the number of elements a segment has in its representation, is the criterion used in order to account for the distribution and governing relations amongst neutral segments. The hierarchy of complexity for the neutral segments is: {glides, *r*} < / < nasals (KLV 1990:218).

Originally, KLV (1990:203) postulated that in branching onset configurations a 'negatively charmed segment must be associated to the head position and a charmless segment must appear to its right. Any other combination is ill-formed'. KLV (1990:207) postulate similar charm configurations for branching nuclei, although they admit that several 'apparent counterexamples come to mind'.

Regarding interconstituent government, KLV (1990:216) allow for two configurations. In the first one, a negatively charmed segment governs its preceding strictly adjacent neutral governee. In the second one, a neutral segment governs

another neutral segment 'if [the governor] has a complexity greater than its governee' (KLV 1990:218; my emphasis). KLV (1990) also mention that, if the onset position which must license the preceding rimal complement position has to also govern a complement, this onset position must be negatively charmed. An onset head position can govern a less complex rimal complement position and still be neutral only if it has no onset complement to govern.

Harris (1990:273ff) convincingly argues for a reformulation of the Complexity Condition. Specifically, he shows that, irrespective of charm value, a segment 'must satisfy certain complexity requirements before it can occupy a governing position'. Concretely, it must be no less complex than its governee<sup>10</sup>. Within a branching constituent, Harris (1990:277) claims that 'a zero complexity differential is tolerated in branching nuclei. This is not true of branching onsets in which a downward complexity slope between the governor and its governee is universally enforced'. In interconstituent domains, Harris (1990:280) claims that 'an upward complexity slope is universally required'.

Harris (1990) bases his claims for a downward complexity slope within a branching onset and an upward complexity slope in interconstituent contexts on the directionality of government in these two governing domains. For the latter governing domains, he explicitly claims that there is no necessity for the governor to be negatively charmed in order for it to carry out its governing duties. The interconstituent governor may be charmless, provided that its complexity is

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<sup>10</sup>Brockhaus (1992a:120) points out that Harris's reformulation of the Complexity Condition is too strong in the context of branching rimes, where 'a simplex segment such as [a] (consisting only of the element A<sup>†</sup>) . . . [can] govern a segment which is more complex', e.g. a lateral as in *álma* 'jump', or a nasal as in *ánthropos* 'man'. As I show in more detail in Chapter 3, MG laterals consist of two elements while MG nasals consist of a minimum of two elements.

greater than that of its charmless governee.

However, Harris (1990) avoids making an equally explicit claim for constituent governing domains (branching onsets). He believes (p.c.) that even in these contexts the onset head does not necessarily have to include a negatively charmed element in its representation. As I show in Chapter 3, MG provides ample evidence in favour of Harris's suspicion that negative charm is not necessary for onset heads which have to govern onset complements (as KLV (1990) propose).

In the analysis of MG phonological variation I present in this thesis, I do not follow KLV (1990) who are in favour of exclusively negatively charmed heads for branching onsets. Based on the evidence I provide in Chapter 3, I allow heads of branching onsets to be neutrally charmed in both constituent and interconstituent contexts, so long as the required complexity differential is respected between the neutrally charmed governor and the also neutrally charmed governee. I also allow heads of non-branching onsets to be neutrally charmed in interconstituent contexts, provided that the required complexity differential is respected between the neutrally charmed governor and its also neutrally charmed interconstituent governee.

Lastly, going back to Harris's reformulation of the Complexity Condition, let me mention that when the governed position is empty<sup>11</sup> (as in the long monophthong *i:*, or the geminate *tt*) any segment can govern it. Empty positions are always characterised by zero complexity (no segment occupies them). This implies that the slope between the governor and the empty governee will always be downward. Therefore any segment can act as the governor of these positions.

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<sup>11</sup>For a brief discussion of the issue of empty positions in GP, see 2.9.1.

## 2.9 Segmental representations

As I mentioned in 2.8, GP rejects the view that segments are composed of a set of features. In fact, GP rejects the notion of features altogether<sup>12</sup>. GP postulates the existence of elements which are characterised as univalent, individually pronounceable atoms. In this framework, then, it is elements (and not features) that make up the internal structure of segments.

In 2.10, I present the different elements. Before this presentation, however, I would like to briefly consider: (i) the issue of empty positions in GP (2.9.1), (ii) the fusion operations elements may undergo (2.9.2), (iii) the cold vowel, the only element that needs separate mention (2.9.3) and (iv) the compositional elements of the nuclear segments of MG (2.9.4).

### 2.9.1. Empty positions in phonological strings

In accordance with much recent theory (e.g. Dependency Phonology), GP accepts and makes crucial reference to the existence of empty positions. Although some phonologists consider that these empty onset and nuclear positions are truly contentless, KLV (1990) claim that only empty onsets can be truly contentless (as in vowel-initial words). Empty nuclear positions must always have content as, contrary to empty onset positions, empty nuclear positions always have governing/licensing duties to carry out (see 2.5). As I explain in 2.9.3, an empty nucleus is a position which dominates the cold vowel,  $v^0$  (Charette 1991:75).

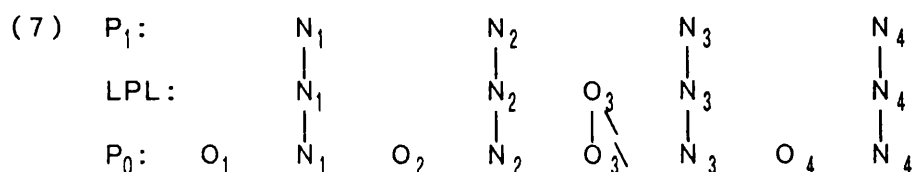
The distribution of these empty positions is determined by government relations (holding between adjacent segments)

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<sup>12</sup>For argumentation in favour of this position, see Charette (1991).

and proper government<sup>13</sup> relations (holding between contiguous nuclear positions). It was originally thought that proper government applies at the  $P_1$  level. However, Charette (1990) convincingly argues that the blocking of proper government when a governing domain intervenes between the empty nucleus and its potential governor indicates that proper government does not apply at the level of nuclear projection.

Charette (1990) shows that proper government operates at the level of representation which she calls 'licenser projection level' (LPL) and which intervenes between the  $P_0$  and  $P_1$  level, as shown in (7). At the LPL, only licensors are projected. Licensers are all the nuclei (as they have to license their preceding onset heads) and those onset heads which have to license a complement.



The way in which empty nuclear positions are licensed in a particular language depends on whether they occur domain-medially or domain-finally. As I show in more detail in 2.11, MG domain-final empty nuclei are parametrically licensed, while MG domain-medial empty nuclei are licensed through proper government relations.

For a proper government relation to hold, two conditions must be met. Firstly, the governor must itself be audible (unlicensed). Secondly, the domain of proper government in which governing relations hold should not include any other governing domains. This means that a proper government relation could not hold in (7) between  $N_2$  and  $N_3$ , if (i)  $N_2$  and  $N_3$  were

<sup>13</sup>The term 'proper government' is used to refer to this stronger form of government which obtains between contiguous nuclei.

filled by, respectively, an empty and a filled nucleus and (ii) this configuration belonged to a language which allowed right to left directionality at the  $P_1$  level. This would be due to the fact that, at the LPL, a governing domain (i.e. the onset head of the onset licenser ( $O_3$ )) intervenes between the domain of proper government involving  $N_2$  and  $N_3$ .

By way of contrast, a proper government relation would hold in (7) between  $N_1$  and  $N_2$ , if (i)  $N_1$  and  $N_2$  were filled by, respectively, an empty and a filled nucleus and (ii) this configuration belonged to a language which allowed right to left directionality at the  $P_1$  level. A proper government relation would also hold in (7) between  $N_1$  and  $N_2$ , if (i)  $N_1$  and  $N_2$  were filled by, respectively, a filled and an empty nucleus and (ii) this configuration belonged to a language which allowed left to right directionality at the  $P_1$  level. This would be due to the fact that, at the LPL, no governing domain intervenes between the domain of proper government involving  $N_1$  and  $N_2$ .

### 2.9.2 The fusion of elements

Every element consists of a number of attributes one of which is salient or marked (referred by KLV (1985) as its 'hot feature'). The other attributes an element has are unmarked. The phonetic identity of an element can only be heard when it occurs as the sole component of a segment.  $R^0$ , for instance, has the tapped articulation as one of its unmarked attributes and coronality as its salient property. Its phonetic identity is heard in the pronunciation of the segment [ɾ], in which it occurs as the sole component.

$A^+$ ,  $I^0$  and  $U^0$ , are three elements. Their properties are presented in (8). Salient properties are set out in bold.

(8)	-round	-round	<b>+round</b>
	+back	<b>-back</b>	+back
	<b>-high</b>	+high	+high
	-ATR	-ATR	-ATR
	+low	-low	-low
	A <sup>+</sup>	I <sup>0</sup>	U <sup>0</sup>

When elements combine with other elements they form compound segments. Compound segments involve at least two elements. In general, one element, defined as the operator, contributes its salient property (overriding that of the head). The other element, defined as the head, contributes its charm value and all the remaining unmarked properties to the fused expression<sup>14</sup>. In (9) and (10) below, I respectively present the compound segments  $\mathfrak{A}$  and  $\mathfrak{E}$ . My aim is to show that the reversal of the operator/head role assumed by the same element crucially influences the identity of the resulting segment (i.e.  $I^0 \cdot A^+ = \mathfrak{A}$  (9) and  $A^+ \cdot I^0 = \mathfrak{E}$  (10)).

(9)	Operator	Head	Segment
	-round	-round	-round
	<b>-back</b>	+back	<b>-back</b>
	+high	<b>-high</b>	<b>-high</b>
	-ATR	-ATR	-ATR
	-low	+low	+low
	( I <sup>0</sup> . A <sup>+</sup> )		[ $\mathfrak{A}$ ] <sup>+</sup>

(10)	Operator	Head	Segment
	-round	-round	-round
	+back	<b>-back</b>	<b>-back</b>
	<b>-high</b>	+high	<b>-high</b>
	-ATR	-ATR	-ATR
	+low	-low	-low
	( A <sup>+</sup> . I <sup>0</sup> )		[ $\mathfrak{E}$ ] <sup>0</sup>

In representational terms, each element occupies its own

<sup>14</sup>A<sup>+</sup> gives its charm to an expression iff it is the head, and N<sup>+</sup> and I<sup>+</sup> give their charm iff they are the operators of the expression. H<sup>-</sup> and L<sup>-</sup> always contribute their charm to the segment they appear in, irrespective of whether they appear in a head or operator position.

autosegmental line. Autosegmental lines can, subject to parametric variation, be fused. The result of such fusions is that certain segments are ruled out in a particular language. For instance, the fusion of the  $U^0$  and  $I^0$  lines in Greek accounts for the lack of a front labial vowel [y]. The independence of the same lines in French accounts for its presence in that language (e.g. <lune> 'moon').

### 2.9.3 The cold vowel

According to KLV (1985), the absence of an element is indicated by a maximally unmarked element. This element is called 'cold vowel' and is represented as  $v^0$  (11). The cold vowel has no salient (or 'hot') property; hence, the term 'cold'.

- (11) -round  
 +back  
 +high  
 -ATR  
 -low  
 ( $v^0$ )

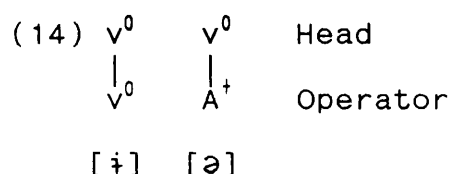
The cold vowel only manifests itself when it occupies the head position of a particular configuration, as illustrated in (12). In the operator position, the cold vowel does not contribute anything to the segmental representations it is added to. As shown in (13), it simply represents 'the absence of [any] element in a given internal representation. In that sense, the cold element may be compared with the number zero (0) in mathematics' (Charette 1991:211).

(12) Operator	Head	Segment
-round	-round	-round
+back	+back	+back
-high	+high	-high
-ATR	-ATR	-ATR
+low	-low	-low
( $A^+$ )	$v^0$	$[\emptyset]^0$

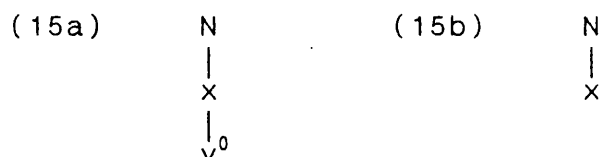


(13) Operator	Head	Segment
-round	-round	-round
+back	-back	-back
+high	-high	-high
-ATR	-ATR	-ATR
-low	+low	+low
(v <sup>0</sup> )	A <sup>+</sup>	[a] <sup>+</sup>

Following the proposal set out in KLV (1985), an 'empty nucleus' is one that contains only the cold vowel, v<sup>0</sup> (see also 2.9.1). As Charette (1991:75) points out, 'the absence of an element in a nuclear position represents the presence of the cold element in this position. The phonetic interpretation of this matrix of features is the vowel [ɨ]. The cold element is not phonetically interpretable in every language. Its phonetic realization is subject to parametric variation. In French, for example, the cold element cannot be realized phonetically. In contrast with French, the cold element is manifested in Moroccan Arabic. But in every language a nucleus dominating the cold element is different from a nucleus dominating any other segment. It is sometimes manifested phonetically and sometimes not. To be realized as zero a nucleus dominating the cold element' must satisfy certain conditions. Specifically, it must be either parametrically licensed (in those languages which parametrically license their domain-final empty nuclei), or it must be properly governed. When a nucleus 'does not satisfy the conditions for being properly governed, it must receive a phonetic interpretation. In Moroccan Arabic, given that the cold element may be expressed phonetically, a vowel [ɨ] is realized. In French, where the cold element cannot be expressed phonetically, the strategy is to add the element A<sup>+</sup> to the internal representation of the empty nucleus. . . . This results in a segment composed of the cold element as its head and the element A<sup>+</sup> as its operator. Such a representation corresponds to the vocalic segment schwa' (Charette 1991:75), as illustrated in (14).



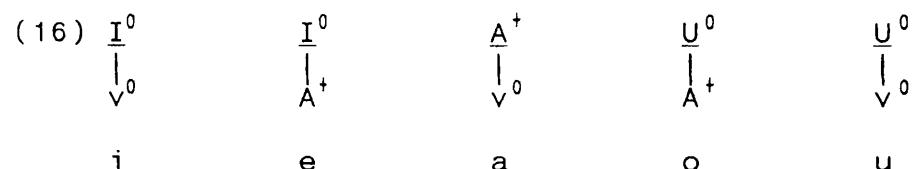
Throughout this thesis, I follow Charette (1991:75) and consider an empty nucleus as a nuclear position dominating a nuclear skeletal point to which the cold element is attached. The configuration that can be used for this empty nucleus is shown in (15a) and is simplified in (15b). Both (15a) and (15b) designate the same object.



Contrary to languages such as French and Moroccan Arabic, the cold element does not receive any phonetic exponence in MG. Nonetheless, the evidence of its presence in the syllabic structure of MG words is clear and unambiguous (see Chapters 4 and 5).

#### 2.9.4 The MG vowel system

The MG vowel system consists of five phonetically expressed vowels, namely *i*, *e*, *a*, *o* and *u*<sup>15</sup>. In (16) below, I present the elements of which the five MG nuclear segments are composed. Heads are underlined in the representations that follow.



<sup>15</sup>As I have just explained in 2.9.3, MG also possesses the cold vowel, which, however, does not have any phonetic exponence in the language. In Chapters 3 through 6, I provide ample evidence in favour of the existence of the cold vowel in MG and the influence it exerts on the phonological processes of the language.

## 2.10 The elements

Before proceeding to a presentation of the elements I use in my ensuing discussion of MG, I would like to outline the salient properties of those elements I present here for the first time. I would also like to define these elements not only in articulatory but also in acoustic terms. The definition of elements in acoustic terms is particularly important, as 'elementary phonological units map onto perceptual representations of the acoustic signal in a relatively direct manner' (Lindsey and Harris 1990:355).

The salient property of the occlusion element ( $?^0$ ) is 'a significant reduction in overall amplitude in the speech signal, such as is achieved by a radical constriction of the oral cavity' (Harris & Kaye 1990:5). The salient property of the coronal element ( $R^0$ ) is coronality. Nasality ( $N^+$ ) is defined by specifying a lowering of the velum. The narrowed element ( $h^0$ ) refers to the presence of high frequency aperiodic energy in the signal. In articulatory terms it signifies a narrowing in the vocal tract.

KLV (1990) propose two source elements:  $H^-$  and  $L^-$ . The low tone ( $L^-$ ) is specified as the laryngeal activity which is manifested as a drop in the fundamental frequency of the signal and is related to a slackness of the vocal folds. When  $L^-$  is associated with a nuclear position it is interpreted as a low tone. When it is associated with a non-nuclear position it is interpreted as full voicing. The high tone ( $H^-$ ) is specified as the active laryngeal gesture which raises the fundamental frequency; in articulatory terms it signifies the stiffening of the vocal folds. The element  $H^-$  is interpreted as a high tone when associated with a nuclear position and as voicelessness when associated with a non-nuclear position. As I pointed out in 2.9.2 (footnote 14),  $L^-$  and  $H^-$  contribute their negative charm to an expression both as heads and operators.

The elements I have so far discussed, together with their respective salient properties and phonetic realisations, are illustrated in (17).

(17) Element	Salient property	Phonetic realisation
U <sup>0</sup>	labiality	u
I <sup>0</sup>	palatality	i
υ <sup>0</sup>	none	ɨ <sup>16</sup>
R <sup>0</sup>	coronality	ɹ
ʔ <sup>0</sup>	occlusion	ʔ
h <sup>0</sup>	narrowing	h
N <sup>+</sup>	nasality	n
L <sup>-</sup>	slackness of vocal folds	L/'voice'
H <sup>-</sup>	stiffness of vocal folds	H/'voicelessness'

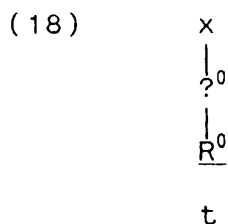
Elements can spread and be added to in the representation of a particular segment so as to strengthen it when it has governing or licensing work to perform. This process is called composition (i.e. fusion of elements from neighbouring segments).

Apart from composition, GP recognises another phonological operation: decomposition. In decomposition

<sup>16</sup>As I pointed out in 2.9, people working within a GP framework often use the symbol ɨ to designate the phonetic realisation of the cold vowel. The equivalent IPA symbol could be any of the ɤ, ʌ, ʊ, each of which represents a phonetically but not phonologically distinct segment. Phonological systems display a great variety of distinct front, low and round vowels. However, they do not seem to differentiate phonologically between segments which are characterised as being none of the front, or low, or labial. The symbol ɨ, then, is used here to denote a sound which is none of the front, or low, or labial.

processes, elements are taken away<sup>17</sup> from the representation of a particular segment, so that the weakened segment can be governed by other (charmed, or more complex) segments which occur in adjacent governing positions.

Decomposition (i.e. the loss of elements) takes place in typically weakening environments. In English, for instance, *t* can decompose into its elements in internuclear positions<sup>18</sup> (Harris & Kaye 1990). We are, then, able to observe that *t*, the coronal stop, consists of (at least) an occlusion element, which acts as the operator and a coronal element, which acts as the head (18).



<sup>17</sup>Although still encountered in the literature, the term 'taken away' might be too strong. Harris (1992) and Brockhaus ((1992a) and (1992b)) seem more inclined to support the view that in decomposition processes elements become unlicensed. This means that elements are still present in a representation, but, as they are not licensed, they receive no phonetic exponents. They, therefore, behave as if they are absent. I come back to this point in Chapter 6.

<sup>18</sup>This and the so-called 'word-final' position are the typical weakening environments. GP treats both positions identically. This happens because, according to the theory, word-final positions are also internuclear. This follows from the principle that every onset has to be followed by a nucleus so that licensing can take place (see also 2.11).

I deliberately use the term 'internuclear' here. The term 'intervocalic' is inadequate for two reasons. First, it does not have a definition in the theory. Second, it denotes an important context difference as it refers to a position between filled nuclei. In the so-called 'word-final' position, however, some languages, such as MG, have phonetically unrealised nuclei. The term 'internuclear' covers these cases as it also refers to empty nuclear positions.

## 2.11 Some principles of grammar

As I mentioned in 2.2, GP appeals to certain principles of grammar, some of them originally borrowed from syntax, in its effort to provide phonological explanations for the analyses of the languages of the world. Some of these principles are outlined below.

### 2.11.1 The well-formedness of phonological representations

Following the Licensing Principle (briefly presented in 2.5), every position in a domain must be licensed apart from one which is the head of the domain. As a result of the Licensing Principle, phonological representations are universally well-formed only if they consist of onset-rime pairs. Each onset must be licensed by a following nucleus (Onset Licensing Principle, Harris 1992:19) and each nucleus must be preceded by an onset. Phonological representations of words are, then, universally defined as onset-rime pairs<sup>19</sup>.

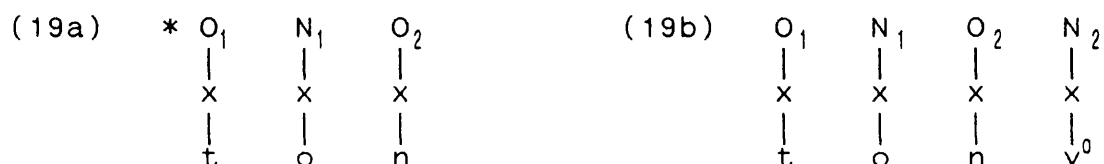
As I mentioned in 2.4 and 2.9, one corollary of this principle is that vowel-initial words are always preceded by an empty onset and all words universally end with a nucleus. Whether or not this domain-final nucleus is empty is subject to parametric variation. Some languages (e.g. Greek, English, Arabic) license their domain-final empty nuclei, allowing words to phonetically end in a consonant. Other languages (e.g. Italian, Hawaiian, Swahili) do not license their domain-final empty nuclei. In these languages, all words end in a phonetically expressed nucleus.

Structures like (19a) for the accusative case of the MG masculine definitive article [*ton*] 'the' are universally ill-formed: a non-nuclear position ( $O_2$ ) remains unlicensed. The

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<sup>19</sup>As I mentioned in 2.6, the syllable has no constituent status in GP.

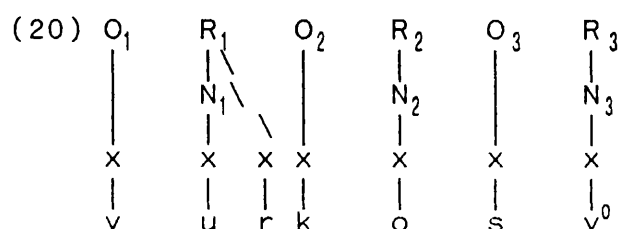
correct structure is given in (19b), where an empty domain-final nucleus ( $N_2$ ) licenses  $O_2$ .



The other alternative structure, whereby the segment  $n$  is syllabified in the rimal complement position without an empty nucleus following it, is rejected by GP, as I show in 2.11.2. In frameworks which are less constricted than GP, this word-final consonant ( $n$ ) would be syllabified in a coda position (i.e. in a rimal complement position) and licensed by a following empty nucleus. However, such a syllabification would be impossible in a GP framework, where, in accordance with the Coda Licensing Principle (see 2.11.2), internuclear consonants are universally syllabified within an onset and not in the preceding rimal complement position (i.e. ci-ty, \*cit-y).

### 2.11.2 The Coda Licensing Principle

According to Kaye (1990a:311), the Coda Licensing Principle specifies that 'post-nuclear rimal positions must be licensed by a following onset'. This means that for those languages which allow branching rimes, the segment  $r$  of a word like *vúrkosv*<sup>0</sup> 'swamp' can only be syllabified into the rimal complement position. The segment  $k$  will, then, be syllabified into the onset head position ( $O_2$ ). From the  $O_2$  head position,  $k$  may license the neutrally charmed and less complex segment  $r$  (20).



The word *vúrkosv*<sup>0</sup> shows the application at the constituent level of projection of both the Coda Licensing and the Onset Licensing Principles: *r* is licensed by *k* (according to the Coda Licensing Principle) and *s* is licensed by the following empty nucleus (according to the Onset Licensing Principle). Following 2.9.2 and 2.11.1, the empty nucleus ( $N_3$ ) is parametrically licensed in MG by virtue of the fact that it occurs in domain-final position. The first nucleus ( $N_1$ ) licenses its preceding onset ( $O_1$ ) and governs its following complement (*r*). Finally, the second nucleus ( $N_2$ ) licenses its preceding onset (*k*).

### 2.11.3 The Empty Category Principle

The Empty Category Principle (ECP) specifies that 'a licensed empty nucleus has no phonetic realisation. An empty nucleus is licensed if (a) it is properly governed or (b) it is domain-final in languages which [parametrically] license domain-final empty nuclei' (Kaye 1990a:314). Empty nuclei are licensed in MG (see also Chapters 4 through 6), either through proper government (e.g. MG *p<sup>0</sup>v<sup>0</sup>s/k<sup>0</sup>v<sup>0</sup>s/p<sup>0</sup>v<sup>0</sup>t/k<sup>0</sup>v<sup>0</sup>t*), or by virtue of occurring domain-finally (e.g. *vúrkosv*<sup>0</sup>).

### 2.11.4 The Projection Principle

The Projection Principle states that governing relations 'are defined at the level of lexical representations and remain constant throughout a phonological derivation' (KLV 1990:221).

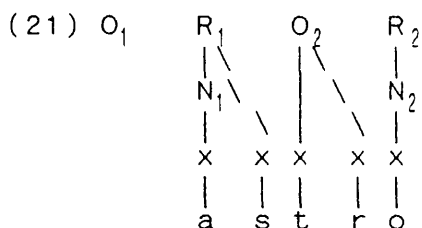
The postulation of the Projection Principle implies that the existing governing relations cannot be altered during the course of a derivation. As a result, resyllabification, which implies a restructuring of existing governing relations, is excluded as a possibility in the theory. This is a most important principle of GP.



## 2.12 The Licensing Principle revisited

In the preceding sections of this chapter, we have seen that, following Harris (1992), the phonetic interpretability of the units of a phonological representation crucially depends on their being legitimised through integration into the phonological hierarchy. As a result, the phonetic interpretability of a melody unit depends on whether this unit is associated to a skeletal position (Autosegmental Licensing). The presence of positions at the skeletal and higher levels of projection (constituent, foot, word and so on) is sanctioned by the mechanism of prosodic licensing.

The phonological licensing principle manifests itself as autosegmental licensing or prosodic licensing according to the domain in which it applies. According to the well-formedness condition of phonological representations, every onset must be followed by a nucleus. According to the Onset Licensing Principle, this nucleus is required to license its preceding onset. As Charette (1992) proposes, a non-nuclear head (i.e. an onset head position) can only govern a complement if it is government-licensed by its nucleus. This means that the nucleus ( $(N_2)$ , as in (21) for the word *ástro* 'star') can give the licensing power to its preceding onset ( $(O_2)$ , as in (21)) to either govern its complement (as in branching onsets) or license its preceding rimal complement position (as in interconstituent governing contexts).



When the nucleus that is required to government-license its preceding onset has phonetic content, there seems to be no problem: it can carry out its government-licensing duties without any problems or complications. However, when the

nucleus is empty, its strength in government-licensing depends on whether it is properly governed or parametrically licensed.

According to Charette (1992), if the parametrically licensed domain-final empty nuclei are government-licensors in a particular language, the properly governed empty nuclei of that language can either also be government-licensors (e.g. Polish) or not be government-licensors (e.g. Standard French). If in a language a properly governed empty nucleus is a government-licensor, its parametrically licensed domain-final empty nuclei must obligatorily also be government-licensors (e.g. Polish, German).

Brockhaus (1992b) takes this notion of government-licensing that Charette applies to skeletal positions and constituents even further. She proposes that, as licensing applies at all levels of representation, the segmental content of individual positions must be licensed too. Specifically, Brockhaus (1992b) argues in favour of the notion of element-licensing, i.e. the right for individual elements and combinations thereof to appear in skeletal positions. She points out that nuclei with phonetic content (i.e. unlicensed nuclei) are always strong licensors, while empty nuclei can be either strong or weak licensors, depending on whether they are parametrically licensed or properly governed.

Brockhaus's (1992a) research suggests that, in the *Hochlautung* Standard German pronunciation, only properly governed empty nuclei can be strong licensors. Her research of German final obstruent devoicing (Brockhaus 1992a, 1992b) suggests that parametrically licensed final empty nuclei are weak licensors. Specifically, when preceded by an obstruent, parametrically licensed final empty nuclei cannot license the element  $L^-$  (hence the devoicing process of final obstruents in German).

As I show in Chapter 6, the present research suggests

that parametrically licensed final empty nuclei are weak licensers in MG too. Domain-internal properly governed empty nuclear positions seem to be able to be either strong or weak licensers. In German, the choice is determined by regionally defined dialectal differences. Specifically, properly governed empty nuclei are strong element licensers in *Hochlautung* but weak element licensers in Northern Standard German (Brockhaus 1992a, 1992b). In MG, the choice is determined by social factors. As I show in more detail in Chapter 6, properly governed empty nuclei are weak element-licensors in the dialect of a socially defined group of speakers and strong element-licensors in the dialect of another social group.

### 2.13 Summary

The purpose of this chapter was to outline the main theoretical stipulations of Government Phonology. This is a theory which places particular emphasis on both syllable structure and segmental structure. GP adopts a principles and parameters approach. It is characterised by the meta-theoretical principles of privativeness, universality, non-arbitrariness, uniformity and interpretability. Locality underlies composition and decomposition, the only two phonological operations that GP recognises.

In this theory, governing relations obtain between adjacent skeletal positions. The correct syllable structure of words can be determined on the basis of the element(s) which compose the different segments, their complexity and (individual) charm and the universality of certain principles of grammar. Foremost among these principles of grammar are the Licensing Principle, the Coda Licensing Principle, the Projection Principle and the ECP.

Well-formed representations consist of onset-rime pairs. Government is an asymmetric relation holding between adjacent

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positions in a phonological string. Locality and directionality are strict at the level of  $P_0$ ; directionality is left-headed within a constituent and right-headed between adjacent constituents; at the  $P_1$  level locality is not strict and directionality is parametrically defined in the different languages of the world.

This chapter also contained a discussion of (i) the salient properties of the elements out of which MG nuclear and non-nuclear segments are composed, (ii) the cold vowel and (iii) the place of empty positions in phonology. The issues I have briefly presented in this chapter are instrumental for the discussion of MG phonological variation which follows in the subsequent chapters.

## CHAPTER THREE

### THE INTERNAL STRUCTURE OF THE MODERN GREEK NASAL AND ORAL STOPS

#### 3.0 Introduction

In this chapter, I propose an analysis of the Modern Greek nasal and oral stops within the theoretical framework of Government Phonology. A comprehensive analysis of all Modern Greek nuclear and non-nuclear segments would undoubtedly give a more thorough picture of the language and all its aspects of phonological variation. However, as the aim of the present thesis is to investigate the phonological variation obtaining between nasal and oral stops, my discussion is confined only to these two sets of segments.

This chapter is divided into two sections. In Section 3.1, I deal with the internal structure of the nasal segments. In Section 3.2, I tackle the internal structure of the oral stops. In both sections, I discuss issues of lexical distinctiveness of the elements that make up the internal representation of these segments. I also elaborate on questions relating to the charm values of the different nasal and oral stops and to the possibility of each of these segments occurring in governing positions.

Throughout this chapter I draw heavily on a number of theoretical assumptions of Government Phonology which I introduced and briefly outlined in Chapter 2. The analysis I provide here is instrumental for two reasons. First, it provides a basis for the argumentation of Chapter 4 (the syllabic structure of the sequences *pt/kt* and *pn/kn*) and Chapter 5 (the syllabic structure of *ts* and *ps/ks*). Second, it forms the basis for Chapter 6, where I elaborate on the

explanations Government Phonology provides for the behaviour of the MG NC sequences that I presented and briefly discussed in Chapter 1.

### 3.1 The nasal segments

In this section, I concentrate on the nasal segments. The segmental representations I provide below are in line with current thinking in the field and are derived from the distributional properties these segments display in MG and other languages of the world (e.g. Japanese, Yoshida (1991)).

In Section 3.1.1, I introduce the internal structure of the nasal segments. In particular, I present the compositional elements of the nasal segments and the charm value these elements attribute to the ensuing nasal segment. In Section 3.1.2, I deal with the possibility that exists for nasals to be governed by other neutral segments, an issue I come back to in 3.1.4. In 3.1.3, I explore the question of the lexical distinctiveness of the elements that make up the MG nasal segments.

#### 3.1.1 The internal structure of nasal segments

KLV propose that the elements which combine to form the nasal segments are four, namely (i)  $N^+$  (indicating nasality), (ii)  $?^0$  (indicating the presence of an occlusion in the oral cavity), (iii) place element (indicating the place of the occlusion) and (iv)  $L^-$  (indicating the slackness of the vocal folds during the production of nasal segments).

As I explained in 2.8.1, the interaction of the positive charm of the  $N^+$  element and the negative charm of the  $L^-$  element gives neutral charm value to any ensuing nasal segment. As I pointed out in 2.8.1 and 2.8.2, neutral charm is the property that allows nasal segments to occur in

governed positions such as the rimal complement position. In this position, the neutrally charmed nasal is governed not only by the nucleus that precedes it, but also by the non-nuclear onset head that follows it. The onset head position which governs the nasal can be filled by either a negatively charmed segment or by a more complex neutrally charmed non-nuclear segment. If, however, nasal segments occur in governing positions, the segments they can govern should meet two requirements. First, they should also be neutrally charmed. Second, they should be less complex than the nasals (Hierarchy of Complexity, 2.8.2).

### 3.1.2 The Complexity Condition and the internal representation of the nasal segments: a 'conflict'

According to the Complexity Condition (2.8.2), non-nuclear neutral segments which occur in governing positions can govern other neutral segments through interconstituent government, provided that the governed non-nuclear segments are less complex than their neutral non-nuclear governors. The typically governed neutral segments *r* and *l* consist of one and two elements respectively. In line with the Complexity Condition, it is stipulated that a neutral non-nuclear governor must be composed of at least one additional element.

This means that the minimum number of elements a neutral governor can consist of when it is required to govern a segment which is composed of only one element (e.g. *r*) is two. However, when required to govern a segment which consists of two elements (e.g. *l*), the minimum number of elements a neutral non-nuclear governor can be composed of is three.

As I show in 3.2.1, the minimum number of elements a neutral oral stop<sup>1</sup> has when it occurs in a governing position

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<sup>1</sup>In 3.2.2, I provide several arguments in favour of the claim that the oral stop governing/licensing the strictly adjacent nasal is neutrally rather than negatively charmed.

is three. This allows neutral oral stops to govern the less complex segments *r* and *l*. But what about nasals?

Nasals are the most complex of all neutral segments (Hierarchy of Complexity, 2.8.2). It is the four elements making up the internal representation of the nasals that render them so complex (3.1.1).

This means that GP is faced with a paradox. The contradiction is as follows. On the one hand, in interconstituent<sup>2</sup> governing domains of nasal and oral stops (as in *mp* or *nt*) the neutral governed member appears to have four elements in its representation (following 3.1.1). On the other hand, in these interconstituent governing domains the neutral governor has only three elements (following 3.2.1). The question, then, is how the nasal, which has four elements in its representation, can be governed by a neutral oral stop which has only three elements in its representation?

In order to answer this question, I first need to examine the lexical distinctiveness of the elements which make up the nasal segments. In the following sub-section, I explore this issue. My aim is to demonstrate in 3.1.4 that the 'contradiction' mentioned above is only apparent. As Harris (1990) first suggested, nasal segments are composed of only two elements whenever they occur in positions adjacent to governing oral stops.

### 3.1.3 Lexical distinctiveness of the elements composing the MG nasal segments

In this account of the internal structure of MG nasals, the reader should note that not all four of the elements presented in 3.1.1 are lexically distinctive in all environments. The

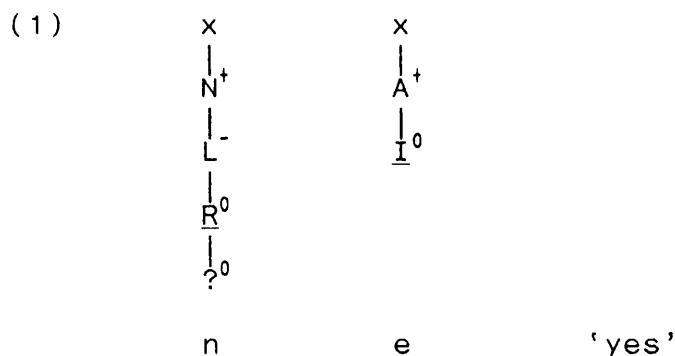
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<sup>2</sup>In 3.2.2, I explain why I assume an interconstituent rather than a constituent governing domain here.



lexical distinctiveness of certain of these elements<sup>3</sup> is determined by the internal structure of the segment that fills the strictly adjacent following position which belongs to the same governing domain. In particular, the elements that combine for the formation of the nasal segments crucially depend on the nuclear or non-nuclear nature of the following segment.

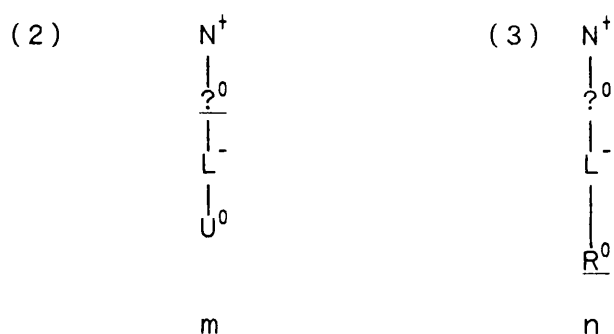
Let me first investigate pre-nuclear contexts. I would like to propose that when a nasal segment is followed by any of the five nuclear segments of MG all four elements mentioned in 3.1.1 (i.e.  $N^+$ ,  $L^-$ ,  $?^0$  and place specification elements) combine to form its internal structure. In other words, all four elements are lexically distinctive in pre-nuclear contexts (1). Recall that throughout this thesis underlined elements in illustrated representations act as heads<sup>4</sup>.



In pre-nuclear contexts two lexically distinct nasal segments may appear: *m* and *n*, as in the words *ma* 'but' and *na* 'to' respectively. The two nasal segments are differentiated by means of the place specification element. The internal structure of *m* (2) contains the labiality element ( $U^0$ ) and that of *n* (3) contains the coronal element ( $R^0$ ).

<sup>3</sup>Specifically, the occlusion and the place specification elements (see also 3.2.1).

<sup>4</sup>I follow KLV (1989) in the assignment of head/operator role to the compositional elements of nuclear and non-nuclear segments of MG.

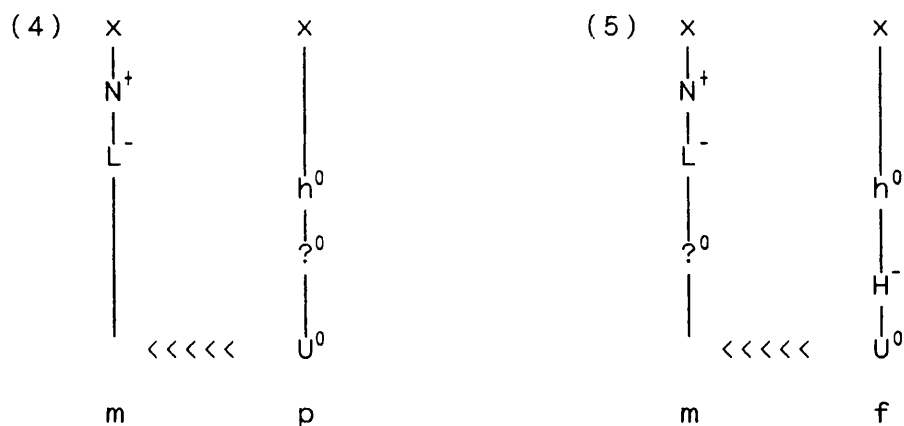


Let me now turn to non-nuclear contexts. When a nasal segment is followed by a non-nuclear segment, the situation is somewhat different from the one we saw above. The lexical distinctiveness of some of the elements of the nasal segment crucially depends on the internal structure of the following strictly adjacent non-nuclear segment. As I pointed out at the beginning of this sub-section, the elements involved in questions of lexical distinctiveness are the place specification and occlusion elements.

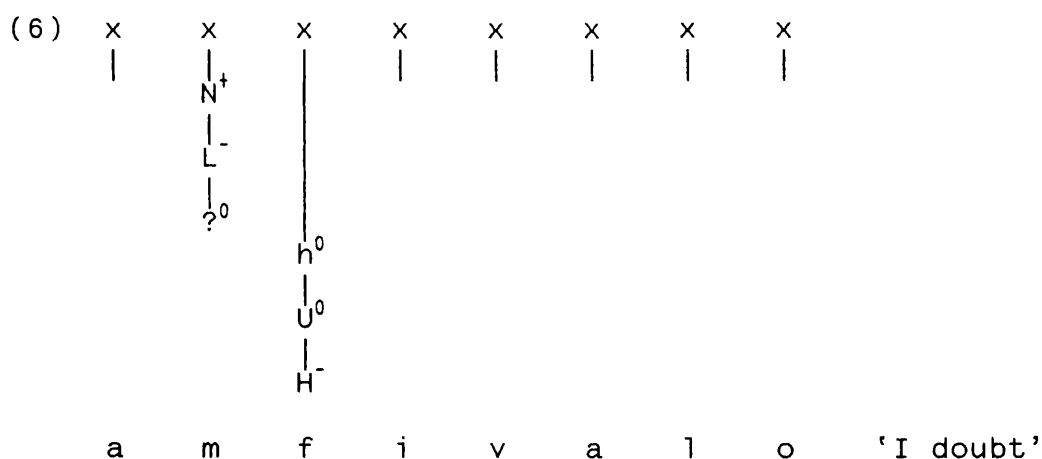
With respect to the place specification element, I would like to suggest that before non-nuclear positions this element is never lexically distinctive for the MG nasals. Words such as [emfísima] 'emphysema', [enθrónisi] 'enthroning', [enjéο] 'instil', [lámbi] 'shines', [pénde] 'five' and [ángelos] 'angel' demonstrate that the nasals always assume the place specification of the strictly adjacent non-nuclear segment that governs them<sup>5</sup>. The place element spreads from the following segment, be it an oral stop (4) or a fricative (5), onto the nasal. No \*mθ, \*mδ, \*mt<sup>6</sup>, \*md, \*nf, \*nɣ, \*mɣ, \*mk, \*mg, \*np, \*nb, \*nk, \*ng sequences exist in MG.

<sup>5</sup>For more details on the governing relations that obtain between nasals and obstruents (with particular emphasis on oral stops), see 3.2.2 and Chapters 4 through 6.

<sup>6</sup>In Chapter 6, I deal with apparent counterexamples to this claim, and specifically with the sequences *mt* and *md* as they appear in the phonetic variants [pém̥ti] ≈ [pém̥di] 'Thursday'.



With respect to the occlusion element (?<sup>0</sup>), Brockhaus (1992a:183) suggests that the ?<sup>0</sup> element is lexically distinctive for nasals when the non-nuclear segment following them is a fricative (6). I have independently come to the same conclusion, i.e. that the ?<sup>0</sup> element is included in the representation of the nasal segments when these are followed by fricatives. As no occlusion element is ever included in the representation of fricatives, the spreading of this element from a fricative onto a nasal segment is impossible.



Nevertheless, when nasal segments are followed by oral stops, the occlusion element ?<sup>0</sup> (just like the place specification element) is not lexically distinctive for the nasal. As Harris (1990:280) shows, the occlusion element (which forms part of the internal structure of oral stops) can spread from the oral stop onto the nasal. In (7) through (10) below, I demonstrate the spreading of the occlusion element

(7)  $\begin{array}{c} x \\ | \\ N^+ \\ | \\ L^- \\ | \\ <<< \\ | \\ U^0 \end{array}$   $\begin{array}{c} x \\ | \\ h^0 \\ | \\ ?^0 \end{array}$

(8)  $\begin{array}{c} x \\ | \\ N^+ \\ | \\ L^- \\ | \\ <<< \\ | \\ R^0 \end{array}$   $\begin{array}{c} x \\ | \\ h^0 \\ | \\ ?^0 \end{array}$

(9)  $\begin{array}{c} x \\ | \\ N^+ \\ | \\ L^- \\ | \\ <<< \\ | \\ v^0 \end{array}$   $\begin{array}{c} x \\ | \\ h^0 \\ | \\ ?^0 \end{array}$

(10)  $\begin{array}{c} x \\ | \\ N^+ \\ | \\ L^- \\ | \\ <<< \\ | \\ ?^0 \end{array}$   $\begin{array}{c} x \\ / \quad \backslash \\ | \quad | \\ h^0 \\ | \\ ?^0 \end{array}$

m p n t  $\eta$  k n ts

In contrast, the L<sup>-</sup> element of the nasal segments does not spread onto strictly adjacent following fricatives as it does with strictly adjacent following oral stops (e.g. [emfisima] 'emphysema' versus [emvolí] 'embolism', [enθrónisi] 'enthroning' versus [énðia] 'poverty' and [énsimo] 'stamp' versus [énzimo] 'enzyme'). This may be indicative of the presence of a negative charm in MG fricatives (6). If this is indeed the case, the impossibility of fricatives becoming low-toned in the strict adjacency of a preceding nasal segment is actually predictable. (Recall the repellent tendencies between

<sup>7</sup>In Chapter 6, I examine the specific circumstances under which the L<sup>-</sup> element spreads from the nasal onto the stop.

identically charmed elements (2.8.1).) Still, this is an issue in need of further investigation. I do not explore it in this thesis as it falls beyond the immediate concerns of the present analysis of MG phonological variation.

#### 3.1.4 Government of nasals by other neutral segments

Let me now come back to the paradox mentioned in 3.1.2, namely that nasals which have four elements in their representation are required to be governed by neutral oral stops which have only three elements in their internal structure, i.e. oral stops which are made up of fewer elements than the nasals.

In 3.1.3, I showed that before certain non-nuclear segments, namely obstruents, the nasals do not consist of all four of their elements (as they do in pre-nuclear positions). In this thesis, I am mostly concerned with the pre-stop environment. So far, we have seen that *NC* sequences are always homorganic, with the nasal segment always assuming the place specification element of the oral stop. These *NC* sequences also share the  $?\textsuperscript{0}$  element. The  $?\textsuperscript{0}$  element is lexically distinctive for the stop (3.2.4) but not for the nasal (3.1.3). This implies that the occlusion and place specification elements of the *NC* sequences spread to the nasal from the governing position which is filled by the oral stop.

This means that the complexity differential is maintained between the two neutral segments. Concretely, the internal representation of the nasal segment appearing in the governed position before an oral stop consists of only the two elements which it does not share with the following stop, i.e. the  $N^+$  and the  $L^-$  elements. At the same time, the neutral stop is composed of three elements, i.e. the  $?\textsuperscript{0}$ ,  $h^0$  and place specification elements ((7) through (10)). The Complexity Condition, requiring a neutral non-nuclear governee to be less complex than its neutral non-nuclear governor, is respected. The government of MG nasals by strictly adjacent following

oral stops is not, as it first might have appeared, problematic for the theory.

### 3.2 The oral stops

In this section, I consider four main issues. I start with a brief presentation of the three varieties of oral stops recognised by KLV (3.2.1). Then, I discuss the question of the existence of each of the three series in MG (3.2.2). I place particular emphasis on the question of the existence of a negatively charmed series in the language. My aim in 3.2.2 is to show that MG possesses only the neutral series of stops. I then proceed to suggest a way in which GP may handle the fact that the empty nucleus which precedes the MG *NC* sequences cannot be properly governed (3.2.3). I conclude this subsection by considering certain issues of lexical distinctiveness of the elements which make up the internal representation of the neutral oral stops (3.2.4).

#### 3.2.1 The three series of oral stops

KLV (1990:216) recognise three varieties of stops, depending on the elements that make up their internal structure. I introduce each of them in turn.

The elements involved in the representations of the first series of oral stops are three, namely (i)  $\text{?}^0$  (indicating the presence of an occlusion in the oral cavity), (ii) place specification (indicating the place in the oral cavity where the occlusion is formed) and (iii)  $\text{h}^0$  (indicating the noise component of the stop). In this series of stops, the neutral charm of all three elements gives neutral charm to the ensuing segment; hence the term 'neutral' (KLV 1990).

Neutral charm enables these oral stops to occur in governed positions such as the rimal complement position. The

segment *k* of the English word *akt* <act> and the segment *p* of the French word *adopté* 'adopt' exemplify this possibility, which exists for the neutral oral stops of some languages. As I show in 3.2.2, MG is not one of these languages. A governed position in which neutral oral stops can universally never occur is that of the onset complement. This 'governed position . . . is always occupied by a sonorant of some kind containing at most two elements' (Harris 1990:277). Obstruents are, accordingly, excluded from ever occurring in onset complement positions.

Following the Complexity Condition (2.8.2), neutral stops are complex enough to also occur in governing positions. When they occur in governing positions in MG, all three of their elements are lexically distinctive (see 3.2.4). As a result, neutral stops may govern in both constituent and interconstituent domains other non-nuclear neutral segments, provided that the latter are less complex than the stops.

The governed segments are typically *r* and *l* (composed of one and two elements, respectively). The segments *r/l* typically occur in rimal complement and onset complement positions (e.g. MG *arpázo* 'grab', *próta* 'first', *artiría* 'artery', *trívo* 'rub', *élko* 'attract' and *klíno* 'shut'). Moreover, in contexts of interconstituent government, the neutral oral stops can, thanks to their complexity, also govern the nasals<sup>8</sup> (Harris 1990:279-80). No negatively charmed element needs to be added to the representation of oral stops in order to enable them to govern nasal segments through interconstituent government. The neutral series of stops is complex enough (as it consists of three elements) to govern in interconstituent domains other less complex neutral segments such as the nasals. Recall that before stops MG nasals only have two elements in their representation (3.1.3 and 3.1.4).

<sup>8</sup>The neutral oral stops can also govern geminates. As standard MG does not have gemination, I refrain from providing an analysis of gemination processes.

Apart from the neutral series, KLV (1990:216) propose the existence of another two series of oral stops. In each of these series, a source element is added to the three elements of the neutral stops (i.e. the  $\varnothing^0$ ,  $h^0$  and place specification elements). In one series, this additional element is  $H^-$ , indicating a stiffening of the vocal folds. In the other series, the additional element is  $L^-$ , indicating a slackening of the vocal folds.

As we know from 2.9.2 (footnote 14),  $H^-$  always contributes its negative charm to a segment, irrespective of whether it acts as the head or the operator of an expression. The presence of the  $H^-$  element in the internal structure of an oral stop creates one of the two negatively charmed series, the high-toned oral stop series. According to charm theory (2.8), this series can never be governed. Negatively charmed segments can only occur in non-nuclear governing positions. This means that GP excludes the possibility of a high-toned stop ever occurring in a rimal (or onset) complement position.

If, instead of the  $H^-$  element, we add the  $L^-$  element to the representation of the neutral oral stops, we create the second series of negatively charmed segments<sup>9</sup>. This series, usually referred to as 'low-toned', involves slackening of the vocal folds. The low-toned series corresponds to what was traditionally called the 'voiced' series of stops. According to charm theory (2.8), low-toned stops can never be governed. Just like the high-toned stops, the low-toned ones can only occur in governing positions. This means that no low-toned stop can ever occur in a rimal (or onset) complement position.

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<sup>9</sup>Recall that the  $L^-$  element also contributes its negative charm either as head or operator (2.9.2, footnote 14).



### 3.2.2 MG and the three series of oral stops

In 3.2.1, I presented all three series of oral stops that can possibly exist in a language. Not every language obligatorily possesses all three series. Some languages have only two, or, indeed, only one series. In this sub-section, I explore the possibility of each of these three series existing in MG.

Let me begin with the neutral series of oral stops. I would like to propose that MG possesses the neutrally charmed series (i.e.  $p^0/t^0/k^0$ ) in all positions, i.e. irrespective of the governing/licensing duties of the position in which the stop occurs. As MG is one of the languages that allow both branching rimes and branching onsets, neutral oral stops may occur in three positions. In the examples below, neutral oral stops are underlined.

The first position where neutral oral stops may occur is the non-branching onset head position which does not have to license any rimal complement (e.g. ká*pu* 'somewhere', tí*mí* 'honour' and po*tá**mi* 'river'). The second position where neutral oral stops may appear is the head position of a branching onset. There, they are required to govern their onset complement (e.g. prá*to* 'make', trí*vo* 'rub' and krat*ó* 'hold'). The third position that neutral oral stops may fill is that of an (optionally branching) onset head position which has to license a rimal complement position (e.g. el*pí**ða* 'hope', artí*ría* 'artery', él*kí**θro* 'sleigh' and al*truismós* 'unselfishness').

The existence of a MG high-toned series of oral stops in the above positions can be excluded on the basis of comparative evidence coming from other languages. Specifically, there already seem to exist fairly clear indications of the presence of an H<sup>-</sup> element in the oral stop series of English (J.Kaye:p.c.) and Korean (KLV 1990:216, J.Kaye:p.c.). These languages show evidence of possession of both the neutral and high-toned series of stops. The presence

of a series of stops which possesses the  $H^-$  element is signalled in those languages by means of the pronunciation differentiation of their oral stop segments. Concretely, English differentiates between aspirated (high-toned) and unaspirated (neutral) oral stops. Korean produces its so-called 'tense' series of stops by the addition of the  $H^-$  element to its neutral series.

Unlike English and Korean, MG does not display a two-way contrast between an aspirated/tensed and a neutral  $p/t/k$  series. This indicates that only one series exists in MG. As  $p/t/k$  are never either tensed or aspirated, I postulate that the existing MG series is neutrally charmed. This postulation is not arbitrary. Further to the above-mentioned evidence, the examination of the three environments where these segments may appear in MG (i.e. onset head without governing/licensing duties, onset head with governing duties and onset head with licensing duties) provides us with ample positive evidence that  $p/t/k$  are indeed neutral and not high-toned. I present this evidence immediately below.

Let me begin with the onset head positions which are neither required to license any rimal complement, nor govern any onset complement (e.g. the segment  $p$  of the word *píra* 'experience'). The oral stop which occurs in these positions could, in principle, be either neutrally or negatively charmed.

The proof that it is neutrally charmed comes from the interactions this oral stop enters into in the strict adjacency of a nasal segment: the  $L^-$  element spreads from the nasal onto the oral stop, rendering the latter low-toned. For instance, when the word *píra* 'take' is placed in the strict adjacency of a non-analytic nasal-ending prefix such as {eN-}, it immediately and obligatorily becomes low-toned (i.e. [*e(m)biría*], \*[*enpíria*] 'experience'). This process occurs not only with  $p$ , but also with  $t$  and  $k$  (e.g. *timí* 'honour' yields

[é(n)dimi] 'honourable' and *kíklos* 'circle' yields [e(ŋ)gíkljos] 'circular letter')<sup>10</sup>.

If the oral stop which has no governing/licensing duties to perform had a lexical H<sup>-</sup> element in its internal structure (i.e. if it were lexically high-toned), the L<sup>-</sup> element spreading attested in the environment after a nasal would be impossible: both H<sup>-</sup> and L<sup>-</sup> are negatively charmed. Following 2.8.1, charmed elements with like values are repelled.

Moreover, as Brockhaus (1992a) convincingly argues, the L<sup>-</sup> and the H<sup>-</sup> autosegmental lines are universally fused. This is due to the fact that it is 'physically and logically impossible for the vocal folds to be stiff and lax at the same time' (Brockhaus 1992a:131). If, instead of being neutral, MG oral stops were high-toned, we would have to postulate that in the environment after a nasal they delink their lexical H<sup>-</sup> element and attach a L<sup>-</sup> element in a single move. This is a most arbitrary process: 'if an element is delinked, the affected segment must be in an environment where weakening has to take place. . . . It is unlikely - perhaps even impossible - for that particular environment to require strengthening . . . of the very same segment at the same time' (Brockhaus 1992a:153).

Let me now turn to branching onsets. In 3.2.1, I pointed out that oral stops can never occur in onset complement positions (Harris 1990:277). They can, however, occur in onset head positions. Following KLV (1990:218), only negatively charmed segments should fill the onset head position which has to govern a complement.

<sup>10</sup>A notable exception to this compulsory L<sup>-</sup> element spreading concerns the NC sequences which occur in domain-final position, i.e. before a parametrically licensed domain-final empty nucleus. I elaborate on this structure in Chapter 6.

However, as I mentioned in 2.8.2, I adopt a relaxation of KLV's requirement that onset head positions which have to govern their complement be negatively charmed. Provided that a downward complexity differential is maintained between the constituent governor and governee, I allow governing onset heads to be neutrally charmed. This decision is not arbitrary. It is based on the evidence of the interactions that take place when *p/t/k* occur in head positions of branching onsets and in the strict adjacency of nasal segments.

Specifically, in the strict adjacency of a nasal segment, the MG oral stops which occur in the head positions of branching onsets (e.g. *práto* 'make', *krató* 'hold' and *trívo* 'rub') also become low-toned (e.g. [é(m)brakta] 'by deeds', [e(ŋ)grátia] 'restraint' and [e(n)dríví] 'massage'). This implies that the oral stops assume in their internal structure the L<sup>-</sup> element of the strictly adjacent nasal. If these oral stops were high-toned, rather than neutral, the negatively charmed H<sup>-</sup> element of their internal structure would forbid the spreading of the also negatively charmed L<sup>-</sup> element from the strictly adjacent nasal, as elements with identical charm repel each other. The fact that the oral stops allow the spreading of the L<sup>-</sup> element from the nasal segment strongly indicates that these stops are neutral.

Again, as argued in Brockhaus (1992a), the universal fusion of the autosegmental lines of H<sup>-</sup> and L<sup>-</sup> excludes the possibility of the above oral stops being lexically high-toned. As I explained earlier in this sub-section, this is due to the fact that, in the environment after a nasal, the delinking of a lexical H<sup>-</sup> element for the addition of a L<sup>-</sup> element in a single move is arbitrary. The principle of non-arbitrariness inhibits GP from countenancing such contradictory phonological events.

Let me finally turn to interconstituent governing domains. Neutral oral stops can, in principle, occur in rimal

complement positions. There, they are governed by the strictly adjacent onset head position. Sequences like *pt/kt*, *ps/ks*, *ts*, *pn/kn* and *tn/tm* provide ample evidence for an interconstituent structure in languages such as English and French. As it happens, MG does not possess any instances of oral stops which occur in a rimal complement position. In Chapters 4 and 5, I show that the structure the above sequences assume in MG is not that of an interconstituent governing domain (as the case seems to be in English or French), but of either a sequence of two onsets separated by an empty nucleus or a contour segment.

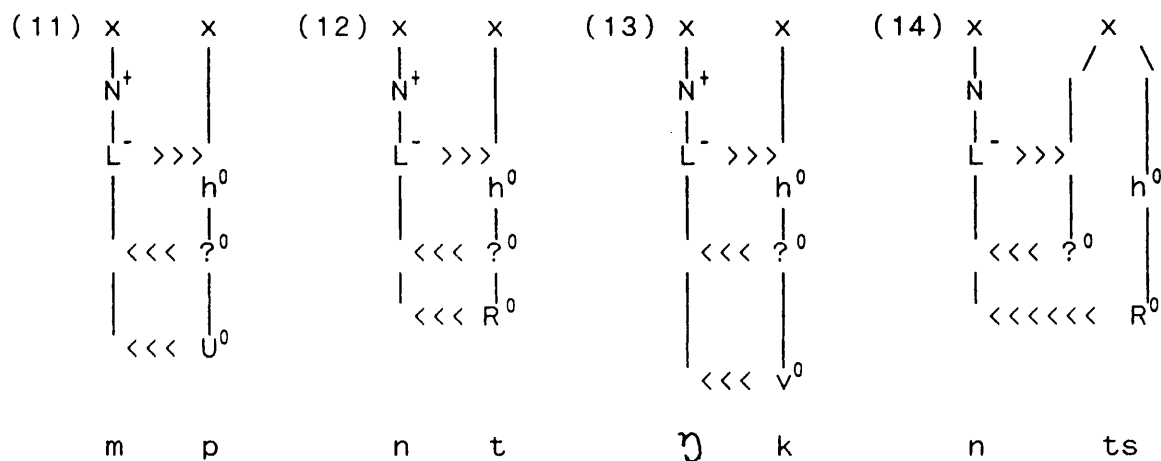
The oral stops which occur in the governing positions of genuine interconstituent structures, do not need an  $H^-$  element in their representation in order to govern their preceding rimal complement. So long as an upward complexity differential is maintained between the non-nuclear governee and governor, neutral oral stops are perfectly capable of carrying out their licensing duties.

The requirement for an upward complexity differential between the non-nuclear governee and its governor is respected in MG. Recall from earlier in this sub-section that the only segments MG neutral oral stops are required to license are all less complex than the stops. Specifically, neutral oral stops (composed of three elements) are required to license either of the following segments: (i) a nasal, (ii) a neutral fricative, (iii) / or s (all three sets of segments being composed of only two elements) or (iv) r (being composed of only one element). No negatively charmed element is needed to be added to the representation of the neutral oral stop in order to enable it to carry out its licensing duties.

The lack of contrast between neutral and high-toned oral stops indicates that only one series of stops is present in MG. When stops are strictly local to nasal segments, the interactions that take place between them always result in the

creation of low-toned stops. This fact allows me to conclude that the series of oral stops MG possesses is neutrally charmed. So far, then, I have not only excluded the possibility of a high-toned series of stops existing in MG, but I have also provided significant evidence in favour of the postulation of only a neutral series of stops in the language. I now turn my attention to the question of whether MG lexically possesses a series of low-toned stops. I present below a variety of theory-internal and theory-external arguments in favour of the claim that all MG low-toned stops are derived from underlying *NC* sequences.

Although at first sight a low-toned series of oral stops (i.e. *b/d/g/dz*<sup>11</sup>) appears to exist in MG, a closer look and more careful analysis of the language reveals that *b/d/g/dz* are all and always derived from the interactions taking place between strictly adjacent nasal and neutral oral stops. In 3.1.3 and earlier in this sub-section, I provided evidence for the non-arbitrary derivation of low-toned stops from underlying *NC* sequences. Specifically, I showed that when a nasal segment and an oral stop enter into a governing relationship, the nasal passes its  $L^-$  element onto the stop, while the stop passes its  $?^0$  and place specification elements onto the nasal (i.e. (11) through (14)).



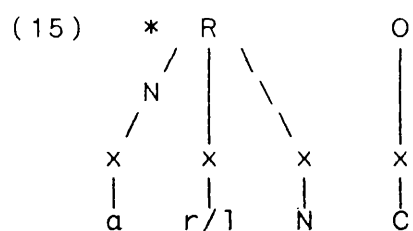
<sup>11</sup>I refer to *ts/dz* in great detail in Chapter 5.

The above multiple spreading processes are not at all unique to MG. They are, rather, quite common and widespread processes in many unrelated languages of the world, such as Japanese (Yoshida (1991)) and Zoque (Goldsmith (1990)). As a result of the spreading of the  $L^-$  element from the nasal (occurring in the rimal complement position) onto the stop (occurring in the onset head position), many languages, including MG, obtain the various low-toned stop segments. In theory-internal terms, then, the derivation of the MG low-toned stops from strictly adjacent nasal and neutral oral stops is both possible and non-arbitrary. Note that the spreading of the elements takes place between segments which are (i) strictly adjacent and (ii) in a governing relation. No spreading is postulated across intervening segments or governing domains.

In theory-external terms, MG co-occurrence restrictions lend support to the derivation of the low-toned stop series from the interactions that take place between nasal and neutral oral stops. Specifically, the co-occurrence restrictions on which segment(s) can precede what surfaces as low-toned stops are heavy. The only segments that can precede *b/d/g/dz* in a strictly adjacent position are the nasals (e.g. [ándras] 'man', [émboros] 'merchant', [anglía] 'England' and [pandzári] 'beetroot'). None of the segments *f*, *v*, *θ*, *ð*, *x*, *ɣ*, *s*, *z*, or *p*, *t*, *k* can ever precede a strictly adjacent low-toned stop (e.g. \*[afdí], \*[pakdí]).

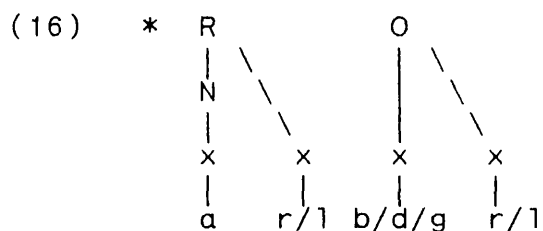
A word should be said at this point about the segments *r/l*. They both may appear to precede *b/d/g/dz*, as in the words [albánis] 'quack', [álbum] 'album' and [barbúni] 'red mullet'. The existence of such words might at first sight lend support to the view that *b/d/g/dz* can be preceded by segments other than nasals. If such were the case and *b/d/g/dz* could indeed be preceded by strictly adjacent non-nuclear segments such as *r/l*, the binarity theorem (2.4) would oblige us to analyse *b/d/g/dz* as independent segments. Any claim for the derivation

of *b/d/g/dz* from underlying *NC* sequences would have to be rejected. This is due to the fact that if an *r/l* segment preceded an *NC* sequence in a strictly adjacent position (15), we would face a violation of the binarity theorem. The rime would have to consist of three segments: the compulsory nuclear head and two non-nuclear segments (i.e. *r/l* + *N*). Following 2.4, this structure is universally excluded.



The exclusion of (15) as a possible and well-formed structure and the existence of words such as [*albánis*], [*álbum*] and [*barbúni*] appear to support the independent existence of *b/d/g*. However, there exists theory-external distributional evidence against such a conclusion.

Concretely, if *b/d/g/dz* were independent segments and formed authentic interconstituent structures with *r/l*, they should behave like other true interconstituent sequences (e.g. *st*<sup>12</sup>). Specifically, we should be able to find branching onset structures such as *rbr*, *lbr*, *rbl* or *lbl* (16), (just as we find *str*, *ltr* or *skl*).



MG shows a striking lack of any of these structures.

<sup>12</sup>The reader is referred to KLV (1990), Kaye (1992) and Charette (1988) for a thorough discussion and argumentation of the universality of the interconstituent structure of *s* + oral stop sequences for those languages which allow branching rimes.



Specifically, a branching onset whose head is filled with a low-toned oral stop and whose onset complement position is filled by either of the non-nuclear segments which appear in this position can never be preceded by *r/l*. This is true irrespective of whether the nuclear head preceding the rimal complement is empty or filled. The only non-nuclear segment that may precede a similar branching onset is a nasal. This fact lends support to the claim that *r/l* + *b/d/g/dz* sequences are not truly interconstituent.

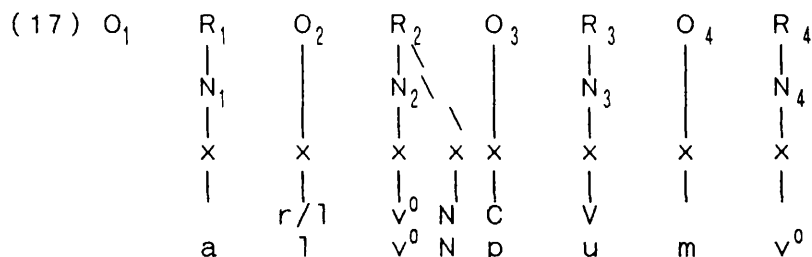
The above distributional argument leads me to conclude that sequences of *r/l* + *b/d/g/dz* are not truly adjacent. This lack of adjacency is strange as MG allows all its other non-nuclear segments to follow *r/l* (e.g. *arpázo* 'grab', *artiña* 'artery', *arketá* 'enough', *érmeo* 'prey', *arxí* 'beginning', *arní* 'lamb', *árθero* 'article', *aðelfi* 'sister', etc.). There is no reason why MG should forbid only its low-toned stops from occurring in strictly adjacent positions following *r/l*, if these low-toned stops are indeed independent segments. However, if these low-toned stops are not independent segments, but are, instead, derived from underlying *NC* sequences, we immediately have an explanation of why *r/l* cannot be strictly adjacent to what surfaces as *b/d/g/dz*: an *r/l* + *NC* structure would violate the binarity theorem (15).

The analysis whereby MG low-toned stops are derived from underlying *NC* sequences explains, then, why *r/l* + *b/d/g/dz* do not behave like true interconstituent sequences. This analysis also ensures an explanation of the strict co-occurrence restrictions I mentioned earlier in this sub-section for the segments *b/d/g/dz*, namely that only nasals are allowed to occur before *b/d/g/dz*.

If we want to avoid the violation of the binarity theorem and still retain the strict adjacency of the *r/l* segments and the *NC* sequences, we would have to analyse the *NC* sequences as assuming a branching onset structure. I exclude the

possibility of *NC* sequences ever adopting this structure on the basis of six pieces of evidence I provide later in this sub-section.

The only alternative syllabic structure for *r/l* + *NC* sequences is set out in (17). In this structure, the segments *r/l* belong to an onset head position ( $O_2$ ). This onset head is followed by a rime (Onset Licensing Principle, 2.5 and 2.11.1). An empty nucleus ( $N_2$ ) fills the head position of the second rime ( $R_2$ )<sup>13</sup> and a nasal segment fills its rimal complement position. The neutral oral stop fills the head position of the following strictly adjacent licensing onset ( $O_3$ ). In (17) below and throughout this thesis,  $v^0$  stands for an empty nucleus and *V* for a nucleus with phonetic content.



So far, then, I have shown that the only segments that can precede *b/d/g/dz* in MG are the nasals. The postulation of an underlying *NC* sequence for the MG *b/d/g/dz* segments explains not only why these strict co-occurrence restrictions exist in MG, but also why low-toned oral stops do not display a behaviour typical of interconstituent structures when they occur after the segments *r/l*. Let me now present two pieces of evidence which lend support to the derivation of all MG low-toned stops from underlying *NC* sequences.

In the first place, if, apart from the low-toned stops which are derived from underlying *NC* sequences, there existed a series of MG low-toned stops which were not derived in this

<sup>13</sup>The reader is referred to 3.2.3 for a discussion of the proper government problem that arises for  $N_2$ .

way but were, instead, independently existing (i.e. lexical), we would expect that these latter low-toned stops would behave differently from those derived from underlying *NC* sequences. For one thing, these independently existing low-toned stops should allow a rimal complement to precede them. However, as I argued earlier in this sub-section, this is never the case in MG, where the only segments allowed to precede low-toned stops are the nasals.

In the second place, if MG had indeed an independently existing series of low-toned oral stops, we would expect to see them surfacing independently and without any nasal segment preceding them. This, at first sight, may appear to be the case. Forms such as [péde] 'five', [adoxí] 'stamina', or [dulápa] 'cupboard' are not only possible, but are, in fact, quite frequent in MG. In these phonetic forms, there is no evidence to suggest the presence of a nasal segment before the stops.

However, following the data presentation of 1.1, any of the forms mentioned above can be pronounced with and/or without the nasal segment. Any speaker of MG knows that she can say [péde], [adoxí] and [dulápa] just as she can say [pénde], [andoxí] and [ndulápa]. The *ND* and *D* pronunciations of these phonetic forms are in 'free' variation. This means that the grammar of MG allows two variants for these words. Either of them is perfectly grammatical. The variant that ultimately gets selected by particular speakers at specific moments in time crucially depends on a variety of social and stylistic (i.e. extragrammatical) factors, the investigation of which falls beyond the concern of the present thesis. The interested reader is referred to Pagoni (in preparation)a.

The above evidence leads me to reject the claim that MG possesses an independently existing series of low-toned oral stops. In contrast, the above evidence leads me to support the derivation of all *b/d/g/dz* from the interactions taking place

between nasal segments and neutral oral stops.

For these interactions to take place, a governing domain must exist between the two segments. The co-occurrence restrictions I mentioned earlier in this sub-section lend support to such a postulation. If no governing domains existed, any segment would be allowed to precede what surfaces as a low-toned stop series in MG. The governing domain that exists between the nasal and neutral oral stops can, in principle, be of two kinds: constituent (i.e. branching onset) and interconstituent (i.e. rimal complement and onset head positions). As I mentioned earlier in this sub-section, I exclude the possibility of an *NC* sequence forming a constituent governing domain. I present the six arguments which support this claim immediately below.

To begin with, following a constraint derivable from the Complexity Condition, one may only expect 'the first position [of a branching onset to be] . . . always occupied by an obstruent, . . . the governed position, . . . always occupied by a sonorant of some kind' (Harris 1990:277). This constraint implies that (i) the first position can be filled by a plosive or a fricative and not by a glide, a nasal, or a liquid and that (ii) the second (governed) position cannot be filled by an obstruent such as an oral stop. As a result of the above stipulation, a sequence like *nt* or *mp* is universally excluded as a well-formed branching onset<sup>14</sup>.

In the second place, nasal segments do not have the necessary complexity to govern oral stops. Recall that before

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<sup>14</sup>The only homorganic *NC* sequence in which the nasal is allowed to occur in an onset head position must obligatorily take the form of a prenasalised structure, i.e. a contour segment occupying only one skeletal position. In this structure, both the nasal and the oral stop occur in the head position of an optionally branching onset. I examine the issue of prenasalisation in MG in Chapter 6. For the moment, my discussion is confined to those *NC* sequences in which each of the two segments occurs in a separate skeletal point.

plosives nasal segments are composed of only two lexically distinctive segments, namely  $L^-$  and  $N^+$ . The oral stops consist of three elements in these positions (i.e.  $?^0$ ,  $h^0$  and place specification elements). The nasals, then, cannot form a branching onset with the plosives as this would reverse the downward slope that is universally required to exist within a constituent between the non-nuclear governor and its non-nuclear governee (Complexity Condition, 2.8.2).

In the third place, as the  $L^-$  element spreads from the nasal segment to the neutral oral stop, this second position becomes negatively charmed. However, negatively charmed oral stops cannot occur in governed positions. Recall that following 2.8.1, charmed segments can only be associated to governing positions. Consequently, the oral stops which are now negatively charmed can neither be governed by other segments (such as the nasals) nor occur in governed positions (such as the onset complement position).

In the fourth place, there exists a stipulation according to which segments within branching onsets can be bound for at most one element (Harris 1990:278, reinterpreting in terms of element theory Rice's binding constraint on the amount of feature-geometric structure for which two positions can be bound<sup>15</sup>). In 3.1.3, I showed that an *NC* sequence shares more than one element ( $?^0$  and place specification elements). As a consequence, GP excludes such clusters as possible well-formed branching onsets.

In the fifth place, if *NC* sequences formed branching onsets, they should behave like authentic branching onsets, such as *tr*, *pl*, *kr*. These latter sequences may occur word-initially (e.g. *trívo* 'rub', *plíno* 'wash' and *krío* 'cold'), word-medially (e.g. *xítra* 'pressure cooker', *páploma* 'mattress'

<sup>15</sup>Rice, K.D. 1990. On deriving sonority: a structural account of sonority. Ms. University of Toronto.

and *ákri* 'edge') and after a rimal complement like *s* (e.g. *ástro* 'star', *splína* 'spleen' and *skliró* 'hard'). However, no *NC* sequences occur in similar syllabic structures in MG. Specifically, although *mp/nt/ŋk/nts* may occur word-medially under certain specific circumstances (on which I elaborate further in Chapter 6), not one of the above homorganic *NC* sequences may occur either word-initially or after *s* (e.g. \*[*mpukála*], \*[*ntsantsíki*], \*[*smpála*] or \*[*sntílos*]). The attested forms of the above words are, respectively, [*bukála*] 'bottle', [*dzadzíki*] 'dzadziki', [*bála*] 'ball' and [*stílos*] 'pole'.

Lastly, authentic branching onset structures like *tr*, *pl* and *kr* do not allow any non-nuclear segment to follow them. This is due to the fact that any following non-nuclear segment would cause a violation of the binarity theorem (2.4). Nonetheless, *NC* sequences allow non-nuclear segments to follow them (e.g. [*ándras*] 'man', [*emblokí*] 'fight' and [*énglima*] 'crime'). This behaviour, untypical of branching onset structures, is typical of interconstituent structures.

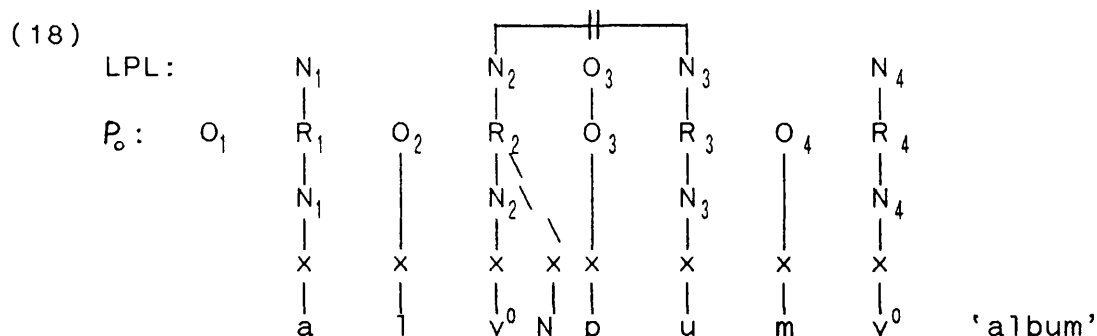
The above theory-internal and theory-external arguments exclude the possibility of an *NC* sequence forming a constituent governing domain. The only alternative, then, for homorganic *NC* sequences is to form an interconstituent governing domain. The directionality of government in these interconstituent governing domains is right (oral stop) to left (nasal) (2.7.1). The assumption of an interconstituent governing domain for the *NC* sequences is in line with the Complexity Condition which requires an upward complexity slope between interconstituent governee and governor (Harris 1990:280). The assumption of the interconstituent governing domain also explains why *NC* sequences (i) are never preceded by strictly adjacent non-nuclear segments and (ii) always allow non-nuclear segments to follow them.

The above analysis indicates that the derivation of all MG low-toned oral stops from underlying *NC* sequences is both

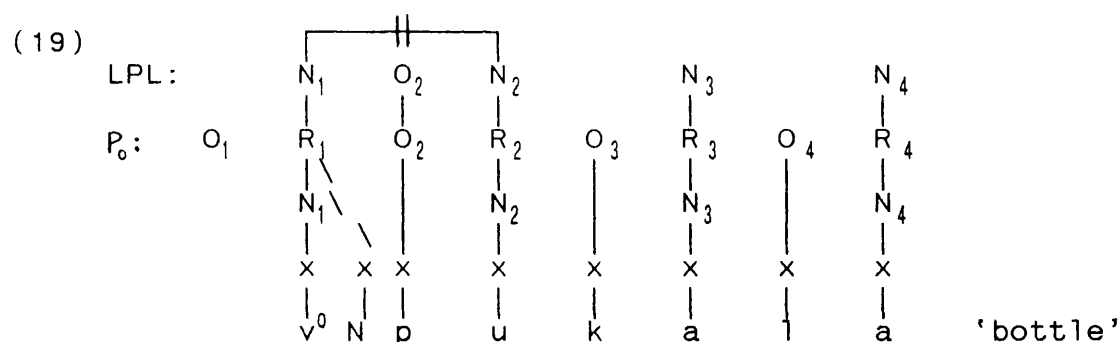
possible and non-arbitrary: the nasal and oral stop segments are able to interact as they are always strictly adjacent and in a governing relationship. The rejection of the postulation of an independent low-toned series in the language is mainly supported by distributional arguments and the heavy co-occurrence restrictions that exist for MG low-toned stops. This rejection leads to a simpler and more adequate description of the MG phonological system as it allows the construction of a simpler and more general grammar of MG. As I show in Chapter 6, such a grammar allows a non-arbitrary explanation of the phenomenon of MG phonological variation.

### 3.2.3 Proper government and MG *NC* sequences

The reader may have noticed that structure (17), reproduced below as (18) for reasons of convenience, posits a problem for GP. Specifically, in (18) the empty nucleus which governs the nasal segment of the *NC* sequence cannot be properly governed. This is due to the fact that although  $N_3$  is audible (i.e. unlicensed), it cannot properly govern  $N_2$  because an interconstituent governing domain, to wit *NC*, intervenes between  $N_2$  and  $N_3$ .



The same problem arises with the licensing of the empty nuclei that occur in word-initial position before an *NC* sequence. Specifically, in structures like (19) below, the empty nucleus  $N_1$  cannot be properly governed by  $N_2$ . Although  $N_2$  has phonetic content (i.e. is unlicensed) it cannot properly govern  $N_1$  because of the intervening interconstituent governing domain involving the *NC* sequence.



A similar problem is reported in Kaye (1992), with respect not to *NC* but to *s + C* sequences. Specifically, Kaye (1992) observes that the empty nuclei preceding word-initial and word-medial *s + C* sequences cannot be licensed by proper government.

GP must somehow account for the fact that there exist empty nuclei that cannot be licensed either through proper government or through the parameter that refers to the licensing of domain-final empty nuclei. There are two ways in which GP can accommodate the above fact. I list them immediately below.

The first way involves a relaxation of the restriction on proper government across a governing domain. One could suggest, along these lines, that the claim against the intervention of a governing domain within the domain of proper government is in fact too strong for some languages. This would imply that the restriction against the crossing of a governing domain is not, as was originally thought, a universal requirement. Instead, this restriction could be perceived in terms of a parameter, with some languages allowing and other languages forbidding the intervention of a governing domain within the domain of proper government. As this suggestion would be an unwelcome weakening of the theory of GP, Kaye strongly argues against it.

In order to avoid this relaxation of proper government, Kaye (1992) suggests that *s + C* sequences have a 'magical'



property which allows them to prosodically license (p-license) their preceding empty nuclei. The term 'magic' is used 'as a constant reminder that it is a pure stipulation in need of explanation' (Kaye 1992:306).

Kaye admits that for the moment it 'is not obvious how these . . . empty nuclei are licensed' (Kaye 1992:306). He furthermore emphasises the fact that *s + C* sequences serve as p-licensors in some languages and not in others. The fact that Magic Licensing is parameterised is reflected in the treatment of *s + C* sequences by languages such as Italian and Spanish. Italian displays magical licensing (it possesses word-initial *s + C* sequences, e.g. *strá:da* 'street'), while Spanish does not display magical licensing (a prothetic vowel occurs before word-initial *s + C* sequences, e.g. *estaθión*).

Let us now go back to our discussion of the licensing of empty nuclei which precede MG *NC* sequences. It is no more obvious to me than it is to Kaye (1992) how these empty nuclei are licensed. It is also not clear to me whether the MG evidence should serve as an indication that the restriction on proper government across a governing domain should be parameterised. As such a move would considerably weaken the theory, I would be rather unwilling to adopt it until such time as more supporting evidence from a larger number of languages has been produced.

This means that, for the moment, all I can do is observe that *NC* sequences serve as p-licensors in MG, just like *s + C* sequences serve as p-licensors in MG and Italian (as well as a host of other languages): irrespective of whether they occur word-initially or word-medially, MG *NC* sequences somehow manage to license their preceding nucleus, whenever this is empty.

In order to avoid any possible weakening of the theory at this stage, I will adopt Kaye's (1992) notion of Magic

Licensing in my analysis of MG *NC* sequences on the basis of the similarity *NC* and *s + C* sequences display in MG. I briefly outline below three pieces of evidence that lend support to this claim.

In the first place, both *s + C* and *NC* sequences display identical behaviour with respect to proper government. Both *s + C* and *NC* sequences manage to license their preceding empty nuclei in word-initial and word-medial positions. They both seem to do so not by means of proper government, but by means of a parameter that allows these empty nuclei to be realised as zero even though a governing domain intervenes between them and their potential governor (see (18) and (19) for, respectively, word-medial and word-initial *NC* sequences).

In the second place, both *s + C* and *NC* sequences assume an identical structure. Following my analysis of 3.2.2, *NC* sequences can only assume an interconstituent structure. As I already mentioned in footnote 12, KLV (1990), Kaye (1992) and Charette (1988) provide ample evidence in favour of an interconstituent structure for *s + C* sequences in all languages which allow branching rimes.

In the third place, both *s + C* and *NC* sequences display identical distribution patterns. For instance, both *s + C* and *NC* sequences allow strictly adjacent non-nuclear segments to follow them (e.g. *stratós* 'army' and *Ntropí* 'shame'). At the same time, both *s + C* and *NC* sequences forbid strictly adjacent non-nuclear segments to precede them (e.g. *\*arstóma*, *\*rNpúka*).

The above evidence lends support to a treatment of MG *NC* sequences in the same way as *s + C* sequences, i.e. to an adoption of Kaye's notion of Magic Licensing for the MG *NC* sequences. As a consequence, my ensuing analysis reflects the fact that in MG the parameter of Magic Licensing is ON, not only with respect to *s + C* but also to *NC* sequences.

It is to be hoped that further research will address the issue of licensing of empty nuclei before the interconstituent *s + C* and *NC* sequences. In this way, these sequences will lose their 'magical' nature and 'join the ranks of those phenomena that are better understood' (Kaye 1992:309).

#### 3.2.4 Lexical distinctiveness of the elements composing the MG neutral oral stops

In 3.2.2, I discussed the possibility of each of the three series of oral stops suggested by KLV (1990) existing in MG. In this sub-section, I explore some questions of lexical distinctiveness of the three elements that make up the internal structure of the neutral oral stop series. Following 3.2.2, this is the only stop series MG possesses.

The discussion of the lexical distinctiveness of the compositional elements of MG neutral oral stops is particularly important for the analysis of any phonological process in which these stops participate. The presentation of this section forms the background for the argumentation I put forward in Chapters 4 through 6.

I start my discussion with the place specification element. This element is lexically distinctive for the stops in all positions, i.e. before both nuclear and non-nuclear segments. The reader may recall that the place specification element was also distinctive for the nasal segments which occurred before nuclear segments (3.1.3). However, unlike nasals, oral stops have a lexically distinctive place specification element also in the strict adjacency of non-nuclear segments. This place specification element can even spread in certain interconstituent governing domains to the preceding adjacent segment which fills in the rimal complement position. The spreading of the place specification element of the oral stop depends on the internal structure of the segment that occurs in the rimal complement position.

Concretely, if the preceding rimal complement position is filled by, say, *r* or *l*, as in the word *élkos* 'ulcer', the place specification element of the governing oral stop will not spread to the rimal complement position. This is due to the fact that each of the non-nuclear segments has its own lexically distinctive place specification element (e.g. *erminía* 'interpretation', *arnúme* 'deny' and *almiró* 'salty').

However, if the preceding rimal complement position is filled by a nasal segment, the place specification element of the stop is not only lexically distinctive, but also spreads to the preceding governed position (3.1.3). This explains why MG nasal segments always become homorganic to their licensing oral stops (e.g. [*pénde*] 'five' and [*émboros*] 'merchant'). Recall from 3.1.3 that in this configuration (i.e. before a stop) nasals have no lexically distinctive place specification element.

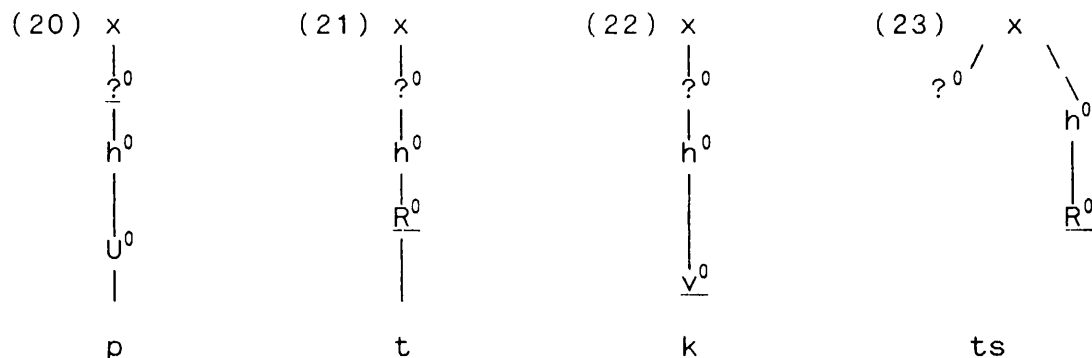
Lastly, when the oral stops occur in the head position of branching onsets, their place specification element is also lexically distinctive. Recall that both *r* and *l*, the segments that typically fill the onset complement position, have their own lexically distinctive place specification element (e.g. *apló* 'simple', *akrivó* 'expensive').

The labial element ( $U^0$ ) is involved in the internal structure of *p* (20) and the  $v^0$  element is involved in that of *k* (22). Both *t* and *ts* have the coronal element ( $R^0$ ) in their representation.<sup>16</sup> As they are composed of exactly the same elements, they are distinguished from each other only by means of their internal structure<sup>16</sup>. The organisation of the elements that compose them is different: *ts* (23) is a contour segment,

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<sup>16</sup> I refer to *ts*, the contour stop, in great detail in Chapter 5. Specifically, I justify its affricate status and show that its phonological behaviour is (i) identical to that of the remaining oral stops (i.e. *p/t/k*) and (ii) different from that of the similar-looking *ps/ks* sequences.

while *t* (21) is not.

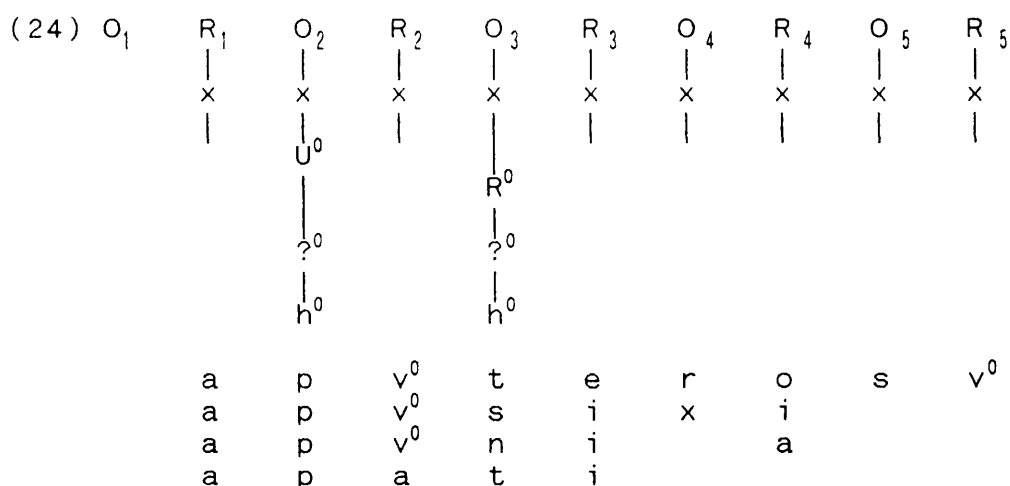


Let me now turn my attention to the noise element. The presence of the *h*<sup>0</sup> element in the representation of MG oral stops is justified by the lenition facts of MG<sup>17</sup>. Without going here into the details of similar processes, *p* and *k* can, in certain contexts, respectively become *f* and *x* (see 5.1.2). In terms of the theory, what happens in these cases is the weakening of the internal representation of the stops by the loss of the occlusion element. This means that these stops were composed of three elements before the lenition process (i.e. ?<sup>0</sup>, *h*<sup>0</sup> and place specification elements). After the lenition process, these segments are composed of only two elements: the noise and place specification elements. The two latter elements typically combine to form the fricative series. In those cases, then, where both oral stops and fricatives display identical charm values, it is only the presence of an ?<sup>0</sup> element that allows differentiation between them.

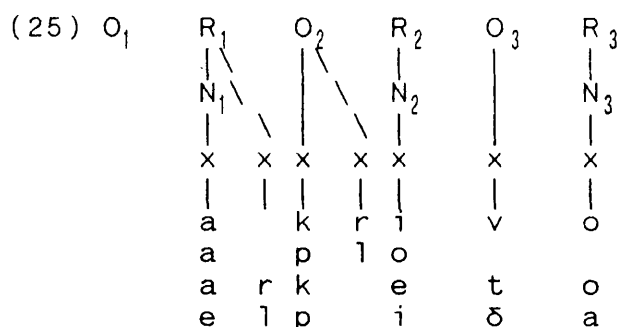
With respect to the lexical distinctiveness of the *h*<sup>0</sup> element, I would like to claim that in pre-nuclear positions the neutral stops contain a lexically distinctive *h*<sup>0</sup> element. This is so because an element which is absent from the

<sup>17</sup>The reader is referred to Harris (1990) for a thorough analysis of a wide range of phonological reduction phenomena and a detailed discussion of prime lenition sites. Harris's (1990) analysis is formulated within the theoretical framework of GP and forms the basis for my discussion of lenition in MG in this and the ensuing chapters.

internal representation of a segment cannot possibly spread to another strictly adjacent segment. Release of the oral stop is obligatory, irrespective of whether the following nucleus has audible content or not (24). This means that the  $h^0$  element is lexically distinctive when the oral stop occurs before a phonetically realised nucleus (e.g. *apáti* 'fraud'). The  $h^0$  element is also lexically distinctive when the oral stop occurs before an empty nucleus. As I argue in Chapters 4 and 5, this structure occurs when *p/k* appear before another phonetically adjacent oral stop, *s*, or nasal (e.g. *áp<sup>v</sup>teros* 'wingless', *áp<sup>v</sup>sixi* 'lifeless' and *áp<sup>v</sup>nia* 'stillness').



Before and after non-nuclear segments which are genuinely strictly adjacent to the oral stops and do not include  $h^0$  in their representation (e.g. *r* and *l*), the neutral oral stops also contain a lexically distinctive  $h^0$  element, as in the words *akrivó* 'expensive', *arketó* 'enough', *apló* 'simple' and *elpíða* 'hope' (25).



Let me finally turn to the occlusion element. The reader may recall from 3.1.3 that the  $?^0$  element was lexically distinctive for the MG nasal segments which occurred in pre-nuclear positions. I would like to suggest that in pre-nuclear positions the occlusion element is lexically distinctive also for the MG stops. This is true irrespective of whether the following nucleus has phonetic content or not. The occlusion element cannot spread from an adjacent nuclear position to the stop, as it does not form part of the segmental representation of any of the MG nuclear segments. As I mentioned earlier in this sub-section, the occlusion element ( $?^0$ ), always included in the internal structure of stops in these pre-nuclear positions, enables the differentiation between identically charmed stops and fricatives (e.g.  $p^0$  (26) versus  $f^0$  (27)).

(26)	$h^0$	(27)	$h^0$
	$?^0$		
	$U^0$		$U^0$
	p		f

The occlusion element is lexically distinctive in oral stops which occur after other non-nuclear segments. The occlusion element of the neutral oral stop which occurs in the head position of an onset which has to govern/license a preceding rimal complement is lexically distinctive in the stop, irrespective of whether the rimal complement position is filled with *r*, *l*, or a nasal. Recall that in the case of the nasals the  $?^0$  element spreads from the licensing oral stop to the nasal segment (3.1.3).

When, finally, the oral stop appears in the head position of a branching onset, its occlusion element is lexically distinctive irrespective of the nature of its onset complement. The segments which typically occur in this onset complement position are *r* and *l*. The former segment does not possess an occlusion element. The latter segment has to be lexically *l*, i.e. possess an occlusion element.

At this point, a word should be said concerning the sequence *t/*. On the face of things, *t/* looks like a branching onset structure. However, the two segments that compose this sequence share more than one element (i.e. the  $\text{?}^0$  and  $\text{R}^0$  elements). Following KLV (1990:212) 'elements may not spread within an onset'<sup>18</sup>. This implies that *t/* sequences should be universally excluded as permissible branching onsets.

However, *t/* sequences appear in many languages, including MG (e.g. *át/as* 'atlas'). As KLV (1990) argue, there seems to exist sufficient evidence for the postulation of different syllabic structures for those languages which possess *t/* sequences. The two syllabic structures usually assumed are either that of a contour segment or that of two non-nuclear segments separated by an empty nucleus. As the details of the argumentation would lead me beyond the scope of this thesis, I only point out here that MG seems to possess evidence in favour of the second structure for *t/* sequences. As a result, the  $\text{?}^0$  element of the *t* segment of the MG *t/* sequences is prenuclear. Following the analysis I provided earlier in this sub-section, in this position the  $\text{?}^0$  element is lexically distinctive for the stop.

### 3.3 Summary

The focus of this chapter was on the internal structure of the MG nasal and oral stops and the lexical distinctiveness of the elements that respectively make up their representation. The analysis I have presented here was formulated within the framework of GP, as outlined in Chapter 2. In the present chapter, I have argued (i) in favour of the existence of a series of neutrally charmed oral stops in all syllabic

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<sup>18</sup>Recall from 3.2.2 that, inspired by Rice (1990), Harris (1990:278) expresses this stipulation in terms of a binding constraint, allowing segments within a branching onset to be bound for at most one element.



positions and (ii) against the postulation of a high-toned series in any syllabic position. Furthermore, I have provided evidence against an independently existing (i.e. lexical) low-toned series of stops in MG. I have shown that the co-occurrence restrictions that exist for the MG low-toned stops indicate that these segments are derived from the interactions that take place between nasal and neutral oral stops. Specifically, the nasal segments (which occur in rimal complement positions and which consist of only the two elements  $N^+$  and  $L^-$ ) allow their  $L^-$  element to spread onto the strictly adjacent oral stop. The oral stops which occur in the onset head position and which consist of three elements ( $?^0$ ,  $h^0$  and place specification elements) allow their place specification and  $?^0$  elements to spread to the nasal segment they license.

In this chapter, I have also considered the fact that the empty nucleus that precedes the MG NC sequences cannot be licensed through proper government. I have proposed that this empty nucleus is parametrically licensed by what Kaye (1992) calls 'Magic Licensing'.

Having established the derivational source of the MG low-toned stops in this chapter, I will now turn my attention to the *pt/kt*, *pn/kn*, *ps/ks* and *ts* sequences which also participate in phonological variation processes. In the following two chapters, I will endeavour to establish the syllabic structures of these stop-initial sequences.

## CHAPTER FOUR

### THE SYLLABIC STRUCTURE OF THE MODERN GREEK *pt/kt* AND *pn/kn* SEQUENCES

#### 4.0 Introduction

The present chapter offers an analysis of the syllabic structure of the MG *pt/kt* and *pn/kn* sequences within the framework of GP. The discussion of the syllabic structure of these sequences might at first appear irrelevant to the immediate concerns of a thesis investigating MG phonological variation. However, as the reader knows from 3.2.2, phonological variation processes in MG involve the interactions that take place when oral stops are in the strict adjacency of nasal segments. Their first segment being an oral stop, both *pt/kt* and *pn/kn* potentially occur in the alternating context. Through presentation of distributional data, I argue against an interconstituent structure and in favour of an analysis in which an empty nucleus intervenes between the two stops.

This chapter consists of two main sections. In Section 4.1, I examine the *pt/kt* sequences. In Section 4.2, I discuss the *pn/kn* sequences. I explain the reasons why I reject the interconstituent syllabic structure for both sequence types, adopting in its place the structure of two contiguous onsets separated by an intervening empty nucleus.

For the argumentation purposes of this chapter, I refer to certain issues I discussed in Chapters 2 and 3. Specifically, to the theoretical stipulations of GP (Chapter 2), to the internal structure of MG oral stops (3.2.4) and to the conditions under which low-toned stops are created in MG (3.2.2). The argumentation I use in this chapter is also taken

up in Chapter 5, where I discuss, *inter alia*, the syllabic structure of the similarly analysed *ps/ks* sequences.

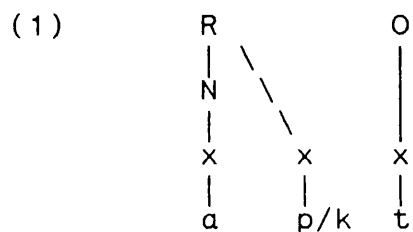
#### 4.1 The MG *pt/kt* sequences

The examination of the syllabic structure that MG attributes to its *pt/kt* sequences is important for three reasons. Firstly, this investigation allows the postulation of the correct internal representation of these segments whenever they occur in these sequences. Secondly, this examination makes possible the extraction of the correct syllabic structure of the various words which contain these sequences. Thirdly, the postulation of the correct syllabic structure for *pt/kt* allows us to explain the participation of *pt/kt* in MG phonological variation events.

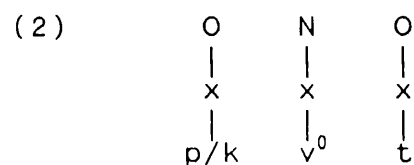
To the best of my knowledge, none of the linguists who examine issues of MG phonology has so far explored the syllabic structure of *pt/kt* in any detail. The mention of *pt/kt* in the literature is infrequent and only in relation to the 'free' variation their first segment displays in certain words. The words which allow variation in the realisation of their *pt/kt* sequences display two variants. The first variant consists of a fricative (i.e. lenited segment) + stop (i.e. *ft/xt*). The second variant consists of an oral stop (i.e. stronger segment) + stop (i.e. *pt/kt*).

KLV (1990:216) offer a brief analysis of the *pt/kt* sequences in languages such as English and French. The distributional and other evidence that exists for these languages points to the adoption of an interconstituent structure (1). KLV (1990) extend this analysis to encompass MG. Their suggestion is that MG *pt/kt* are also truly

interconstituent<sup>1</sup>.



However, the fact that the English and French *pt/kt* sequences show clear evidence of interconstituent structure does not mean that all languages which possess these sequences should adopt this structure. Some languages may display a different syllabic structure, namely two onsets separated by an empty nucleus (2).



There is no a-priori reason why MG should adopt structure (1), rather than structure (2). In the following two subsections, I examine each structure in turn. My aim is to show after the examination of distributional and other evidence that MG adopts structure (2). In Section 4.1.1, I present the reasons which led KLV to adopt an interconstituent structure for these sequences. In Section 4.1.2, I present the argumentation in favour of an empty nucleus intervening between *p/k* and *t*.

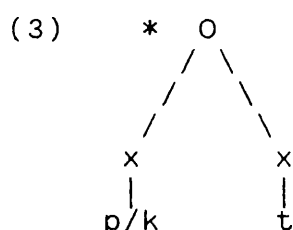
#### 4.1.1 The arguments in favour of the interconstituent analysis

The interconstituent analysis that KLV (1990:215-6) support for MG *pt/kt* is, at first glance, justified by several facts.

<sup>1</sup>KLV (1990:216) also observe that *ps/ks* have the same syllabic structure as *pt/kt* in English, French and MG. In Chapter 5, I show that this assumption too is erroneous for MG. The MG *pt/kt*, *pn/kn* and *ps/ks* sequences consist of two onsets separated by an empty nucleus.

To begin with, KLV point out that there exist co-occurrence restrictions between *p/k* and *t*. These restrictions indicate the existence of a governing relation between the two segments. Specifically, although *pt/kt* sequences obtain in MG, no *\*tp/\*tk* sequences are attested in the language. According to KLV (1990:216) the absence of *\*tp/\*tk* sequences implies that *t* is in a governing relation with *p/k*.

In 2.7.1, we saw that at the  $P_0$  level governing relations between non-nuclear segments can be of two kinds: constituent and interconstituent. Following Harris's (1990:277) stipulation that only sonorants consisting of a maximum of two elements may occur in the governed position of a branching onset, oral stops are universally excluded from ever occurring in these positions (3.2.1). *t* is apparently the most complex segment to occur there. This means that *pt/kt* can never form constituent governing domains (i.e. branching onsets) (3).



The only alternative for two segments which are in a governing relation but do not form a constituent governing domain is to form an interconstituent governing domain (1). *pt/kt* are, then, interconstituent sequences.

Apart from the above-mentioned co-occurrence restriction, KLV do not point out more arguments in favour of the adoption of an interconstituent syllabic structure for the MG *pt/kt* sequences. Nevertheless, anyone supporting their analysis would have to exclude the only competing alternative syllabic structure for *pt/kt*, i.e. that of two onsets separated by an intervening empty nucleus. On the face of things, the rejection of this structure seems possible. I present below four arguments which, at first sight, appear to exclude the

possibility of an empty nucleus intervening between *p/k* and *t*.

Firstly, there does not seem to exist any positive evidence for the postulation of a nucleus intervening between the two oral stops in MG (2). The morphological paradigm of those MG nouns and verbs where the *pt/kt* sequences occur does not show any case of an audible nucleus ever surfacing between the two oral stops<sup>2</sup>.

Secondly, following Harris's (1990) reformulation of the Complexity Condition, neutrally charmed non-nuclear segments may be licensed by also neutrally charmed non-nuclear segments. However, for government to take place in such an interconstituent governing domain, there should exist an upward complexity differential between the interconstituent non-nuclear governee and its governor. If *pt/kt* are genuine interconstituent sequences, the neutral oral stop which occurs in the rimal complement position (i.e. *p/k*) and which consists of three elements (3.2.2) should receive pressure to lenite so that the oral stop which occurs in the onset head position (i.e. *t*) and which also consists of three elements (3.2.2) may govern it.

We do see indeed some evidence of this pressure to lenite in MG. Specifically, in this configuration *p/k* may lose the ?<sup>0</sup> element from their representation and respectively become *f/x* (e.g. [*pteró*] ≈ [*fteró*] 'feather', [*ktíma*] ≈ [*x tíma*] 'land', [*eptá*] ≈ [*eftá*] 'seven', [*októ*] ≈ [*oxtó*] 'eight'). The Complexity Condition is, then, respected. This evidence points to the existence of an interconstituent governing domain between *p/k* and *t*.

Thirdly, if *pt/kt* were analysed as sequences of two onsets

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<sup>2</sup>I do not take into account here the existence of semantically related verbal and nominal forms, such as [*ptísi*] 'flight' and [*petó*] 'I fly' or [*ptinó*] 'foal' and [*petinós*] 'cock'.

separated by an empty nucleus, we would only be able to explain why lenition takes place word-medially (e.g. [eptá] ≈ [eftá], [októ] ≈ [oxtó]). Concretely, the syllabic structure of these words would be respectively  $epv^Otá$  and  $okv^Otó$ . The segments *p/k* would, then, occur in internuclear positions. As Harris & Kaye (1990) and Harris (1990) point out, the internuclear position is a prime lenition site. However, the postulation of a structure where *p/k* and *t* are separated by an empty nucleus would render impossible the explanation of why lenition takes place for *p/k* also word-initially, i.e. when *p/k* do not occur in internuclear positions (e.g. [pteró] ≈ [fteró], [ktíma] ≈ [xtíma]).

Lastly, in those words where *p/k* may lenite, *t* never does. If *pt/kt* are analysed as sequences of two onsets separated by an empty nucleus (i.e.  $pv^Ot/kv^Ot$ ) we cannot explain how the only segment which is always internuclear (i.e. *t*) never lenites (e.g. [pteró] ≈ \*[pθeró], [ktíma] ≈ \*[kθíma]). This lack of lenition indicates that the second segment of these sequences (*t*) does not occur in a typical lenition site. If, however, *pt/kt* are analysed as interconstituent sequences, *t* can never undergo lenition as it occurs in the governing position where it has to carry out interconstituent governing duties.

Overall, then, the adoption of an interconstituent syllabic structure seems to offer a plausible explanation of the phonological behaviour of the *pt/kt* sequences. The evidence which seems to indicate that both *pt/kt* are authentic interconstituent sequences is as follows. Firstly, there exist co-occurrence restrictions between *p/k* and *t* (the absence of *\*tp/\*tk* sequences implies the existence of a governing relation between *p/k* and *t*). Secondly, no nuclear reflex ever surfaces between *p/k* and *t*. Thirdly, lenition may take place for *p/k* both word-initially and word-medially. No such lenition processes are ever attested for *t*. This fact seems to indicate that *p/k* occur in typical lenition sites (i.e. rimal

complement position), while *t* occurs in typical governing sites (i.e. strictly adjacent onset head position).

Despite the above arguments, careful and more detailed analysis of MG reveals that there exists substantial evidence against the interconstituent syllabic structure and in favour of an empty nucleus intervening between two onset heads (i.e.  $p\nu^0t/k\nu^0t$ ). I present this evidence immediately below.

#### 4.1.2 The arguments in favour of an intervening empty nucleus

I begin my argumentation with KLV's observation that the co-occurrence restrictions existing between *p/k* and *t* indicate the presence of a governing relation between these segments. These co-occurrence restrictions would be significant only if the sole non-nuclear segment capable of occurring with *k/p* was *t*. This, however, is not the case in MG. Sequences like *ps/ks*, *pn/kn*, *kp/kθ/kf* are also widely attested in MG.

In the second place, *pn/kn* and *ps/ks* show clear evidence of an empty nucleus intervening between their two non-nuclear segments (see respectively 4.2.2 and 5.2.2). At the same time, *pt/kt* behave in exactly the same way as *pn/kn* and *ps/ks*, in terms of both distribution and participation in the various phonological events of MG. This similarity of behaviour leads me to suggest that they all share the same syllabic structure, i.e. that *pt/kt* also assume an empty nucleus intervening between their two non-nuclear segments.

In the third place, if *pt/kt*, *ps/ks* and *pn/kn* formed an interconstituent governing domain, *t* would be required to govern *p/k* in the *pt/kt* sequences, *s* would be required to govern *p/k* in the *ps/ks* sequences and *n* would be required to govern *p/k* in the *pn/kn* sequences. In 4.2.2 and 5.2.2, I present the arguments which lead me to reject the possibility of *p/k* being respectively governed by *n* and *s*. In the following few paragraphs, I examine and, ultimately, reject



the possibility of *p/k* being governed by *t*.

The postulation that *t* may govern *p/k* as a neutrally charmed segment runs into a major problem. Following 3.2.2, a neutrally charmed *t*, made up of three lexically distinctive elements (i.e.  $\text{?}^0$ ,  $\text{h}^0$  and place specification element), can license its immediately adjacent preceding rimal complement, provided that the latter is (i) also neutrally charmed and (ii) made up of a maximum of two elements. In this way, the upward complexity slope required to exist between a non-nuclear interconstituent governee (i.e. *p/k*) and its also non-nuclear governor (i.e. *t*) is respected.

The segments *p/k* do not meet both conditions. Although *p/k* are neutrally charmed, they consist of three, rather than two, lexically distinctive elements (i.e.  $\text{h}^0$ ,  $\text{?}^0$  and place specification element) (3.2.4). The place specification element is lexically distinctive (distinguishes *p* from *k*). The  $\text{h}^0$  element is also lexically distinctive as both *p* and *k* are always released before *t*.

The  $\text{?}^0$  element may at first appear not to be lexically distinctive, as there seems to be free variation between *pt*  $\approx$  *ft* and *kt*  $\approx$  *xt* (4.1.1). Nonetheless, closer inspection reveals that this variation is not allowed in all words. As I show later in this sub-section, only some words allow variation (e.g. [*pteró*]  $\approx$  [*fteró*]), while other words forbid it (e.g. [*ápteros*]  $\approx$  \*[*áfteros*] 'wingless'). Although, then, all *pt/kt* sequences may be pronounced as *pt/kt*, only certain words allow the lenition of *pt/kt* to *ft/xt*. This fact seems to suggest that the  $\text{?}^0$  element is also lexically distinctive for *p/k*.

The segments *p/k*, then, possess three lexically distinctive elements. The place specification element distinguishes *p* from *k*, the  $\text{h}^0$  element ensures that *p/k* are always released and the  $\text{?}^0$  element distinguishes *p* from *f* and *k* from *x*. As a result, the upward complexity slope required to

exist between the non-nuclear interconstituent governor (i.e. *t*) and its governee (i.e. *p/k*) is missing. Following Harris's stipulation (1990:280, 296), zero complexity differentials are only tolerated between nuclear segments and not between neutrally charmed non-nuclear segments. The above interconstituent configuration is, then, ill-formed. Theory-internally, at least, *pt/kt* cannot form interconstituent sequences as their allegedly strictly adjacent segments cannot enter into a governing relation.

An alternative analysis whereby *pt/kt* enter into an interconstituent governing relation is that *t* governs *p/k* not by virtue of greater complexity but by virtue of a negative charm. This implies that *t* is high-toned. However, the postulation of a high-toned *t* is not only unjustified by the phonetic facts of MG, but also seriously contradicted. The reader may recall from the analysis I presented in 3.2.2 that the postulation of a high-toned series of stops in MG fails, *inter alia*, to provide an explanation for the range of phonological phenomena oral stops give rise to in the strict adjacency of nasal segments.

As the Complexity Condition excludes the possibility of *t* governing *p/k* as a neutrally charmed segment and, at the same time, MG does not allow *t* to govern *p/k* as a negatively charmed segment, any claim for an interconstituent governing relation between the two segments must be rejected.

In the fourth place, the lack of *\*tp/\*tk* sequences that KLV point out is not a unique phenomenon of MG. This distributional gap is shared by many languages which allow branching rimes, irrespective of whether they adopt an interconstituent syllabic structure for *pt/kt*, or an intervening empty nucleus. For some reason, which, for the moment at least, is not entirely clear, *t* often displays a peculiarity of behaviour with respect to the other oral stops that exist in a language. As I mention again later in this

sub-section, KLV attribute this peculiarity of behaviour to the coronal nature of *t*. However, they cannot yet offer an explanation as to why coronality is capable of exerting such an influence on the behaviour of *t* in so many languages. Further research into this matter is clearly needed.

Going now to the discussion of the theory-external arguments I provided in 4.1.4, let me begin by reviewing the lack of positive evidence for the presence of a nucleus between *p/k* and *t*. The fact that we have no positive evidence for a nucleus ever surfacing in between *p/k* and *t* cannot exclude the possibility of an empty nucleus existing there but never surfacing. In order to exclude this possibility, we need external evidence. This can come from a variety of sources.

One of these sources could be the lack of release of *p/k* before *t*. Concretely, an oral stop which is followed by a truly adjacent non-nuclear segment is universally pronounced unreleased. In this case, the noise release element ( $h^0$ ) of the stop is not lexically distinctive. By way of contrast, an oral stop which occurs in a pre-nuclear position is orally released. In this case, its  $h^0$  element is lexically distinctive<sup>3</sup>. The existence, then, of a lexically distinctive  $h^0$  element in the representation of an oral stop suggests the presence of a nucleus following it. This nucleus can be either phonetically realised or empty. In the latter case, the two non-nuclear segments appear to be strictly adjacent and in a governing relation. The presence of the lexically distinct noise release element reveals that they are in fact separated by an empty nucleus.

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<sup>3</sup>Recall that the  $h^0$  element refers to the presence of high frequency aperiodic energy in the speech signal (2.10). This aperiodic energy, 'in the form of a noise burst, . . . characterises the release phase of genuine plosives (as opposed to unreleased stops)' (Harris 1990:263).

In languages such as English and French, *p/k* and *t* are indeed interconstituent. The segments *p/k* are, accordingly, unreleased (e.g. English <act>, <apt>; French <acteur>, <adopter>). In MG, the segments *p* and *k* are released, irrespective of whether the sequences *pt/kt* are initial or medial. Absence of oral release for *p/k* before *t* sounds strange and foreign in MG. As a matter of fact, one of the pronunciation problems Greek speakers face when they learn English is this lack of release of the first oral stop in words like <act> and <apt>. In view of the immediately preceding discussion, this fact lends support to the analysis whereby an empty nucleus intervenes between *p/k* and *t*.

In the second place, MG *pt/kt* do not behave like authentic interconstituent sequences whose segments are in a governing relation. Both *pt* and *kt* behave like sequences of segments which do not (i) display any governing relation between them and (ii) occur in the same governing domain. I provide two pieces of evidence for this claim immediately below.

Firstly, if *pt/kt* were indeed interconstituent sequences, we would have reason to expect a distribution comparable to that of other interconstituent sequences, such as *s* + oral stop (e.g. *st*, *sp*, *sk*)<sup>4</sup>, or nasal + oral stop (e.g. *mp*, *nt*, *nk*). In MG, there exist many sequences of *s* or *n* followed by a branching onset (e.g. *str*, *Ntr*). Assuming that *pt/kt* are also authentic interconstituent sequences, we should be able to find *p/k* occurring with branching onsets whose head is *t*. In other words, we should be able to find some *ktr* and *ptr* sequences.

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<sup>4</sup>As I already mentioned in 3.2.2, the reader is referred to KLV (1990), Kaye (1992), and Charette (1991) for an argumentation of the universality of the interconstituent syllabic structure for *s* + oral stop sequences in those languages which allow branching rimes.

This is indeed the case. MG has words such as [*iktró*] 'deplorable', [*kátoptro*] 'speculum' and [*ðíóptres*] 'eye-glasses' (just like *óstrako* 'shell', *ástro* 'star' and *áNtras* 'man'). This appears at first glance to be consistent with the conclusion that the distribution of *pt/kt* is that of genuine interconstituent sequences.

However, this similarity of distribution is only partial. Careful analysis shows that there exists an important gap in the distribution of *ptr/ktr* in MG words. Concretely, *ptr/ktr* can only occur after a filled nucleus, i.e. in a word-medial position. Unlike *str/Ntr*, neither *ptr* nor *ktr* can ever occur after an empty nucleus. No MG word begins with a *ktr/ptr* sequence. So, although we have words like *stratós* 'army', *stróma* 'mattress' and *Nprávo* 'bravo', we have no words such as \*[*ktrátos*], or \*[*ptráta*].

This behaviour indicates that there is something amiss in the postulation of a branching onset structure (*tr*) being preceded by a strictly adjacent rimal complement position (*p/k*). We know that there is nothing wrong with *tr*, which always behaves like a branching onset. The only alternative, then, is that there is something wrong with the postulation that the *p/k* segments which precede *t* occur in the rimal complement position.

If *p/k* do not occur in the rimal complement position, the only position they may be attached to is that of an onset head. However, in this way *p/k* cannot be strictly adjacent to *tr*. According to the Onset Licensing Principle (2.11.1), an onset head must always be licensed by a following nucleus. A nuclear position, then, must intervene between *p/k* and the branching onset *tr*. This nuclear position is filled by the cold vowel (*v*<sup>0</sup>).

Secondly, if *pt/kt* are, as I propose, sequences of two onsets separated by an empty nucleus, we should be able to

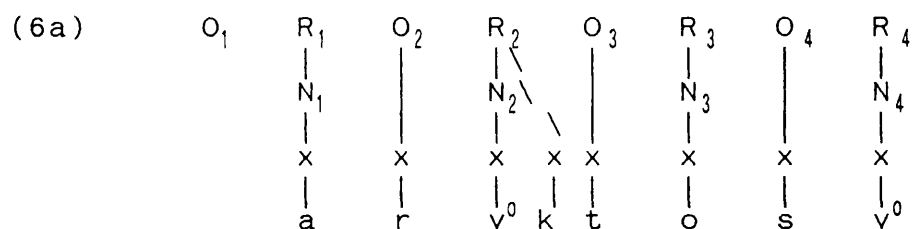
(4) \*  $\begin{array}{ccccc} & & R & & O \\ & \swarrow & | & \searrow & | \\ N & & & & \\ \swarrow & | & \searrow & & \\ x & x & x & x & \\ | & | & | & | & \\ v & r & k & t & \end{array}$

(5)

$O_1$	$R_1$	$O_2$	$R_2$	$O_3$	$R_3$	$O_4$	$R_4$
	$N_1$		$N_2$		$N_3$		$N_4$
	$x$	$x$	$x$	$x$	$x$	$x$	$x$
	$a$	$r$	$k$	$v^0$	$t$	$o$	$s$

However, an objection might be raised concerning this analysis. Concretely, one might claim that instead of a

structure which adopts a nuclear position intervening between *pt/kt* (5), we should adopt structure (6a) in which *pt/kt* occur in interconstituent governing domains<sup>5</sup> and the empty nucleus intervenes between *r* and *p/k*.



In order to reject structure (6a) and adopt structure (5) as the only well-formed structure for MG *rkt* sequences, I need to bring in some lenition and proper government evidence. I do so immediately below, starting with the lenition evidence.

As I mentioned earlier in this sub-section, MG lenition involves the loss of the  $v^0$  element from the representation of *p/k* in those words which allow variation between *pt/kt* and *ft/xt*. The lenited segment is, then, a fricative (e.g. [okt<sup>0</sup>] ≈ [ox<sup>0</sup>] 'eight'). This process gives us a good test for the syllabic structure of the sequence *rkt*. Concretely, if structure (6a) is correct and *k* fills the rimal complement position, *k* should receive pressure to lenite. This is due to the fact that, being neutrally charmed (3.2.2), both *p/k* and *t* consist of three elements. Unless, then, *k* lenites by one element, *t* cannot govern *k* through interconstituent government: the upward complexity differential required to exist between the non-nuclear interconstituent governor (i.e. *t*) and its governee (i.e. *p/k*) is missing. If *pt/kt* indeed form interconstituent sequences, we should see the form [arktíkí] being lenited to the form [arxtíkí].

If, however, structure (5) is correct and *k* occurs in an onset head position which has licensing duties to perform

<sup>5</sup>As the reader may recall from 3.2.2, this is the structure adopted by words such as álv<sup>0</sup>Npum and Nparv<sup>0</sup>Npúni.

(i.e. *k* is required to license the segment *r* which occurs in the strictly adjacent preceding rimal complement position), *k* should never be lenited to *x*.

In fact, the second behaviour is the one attested in MG. Neither of the *p/k* segments can ever lenite if the *pt/kt* sequences are preceded by *r/l*. The above-mentioned words are always pronounced [arktikí], [árktos], [irktí]. Pronunciations such as \*[arxtikí], \*[árxtos], or \*[irxtí] are all ungrammatical. This behaviour is very strange and cannot be explained unless we adopt a structure where *p/k* occur in a position where they have to carry out governing/licensing duties and cannot afford to lenite.

More evidence against the adoption of structure (6a) and in favour of the adoption of structure (5) comes from proper government<sup>6</sup>. With the exception of the empty nuclei which precede *s + C* and *NC* sequences (3.2.3), the distribution of word-medial empty positions is determined by governing relations (holding between adjacent segments) and proper governing relations (holding between contiguous positions at the LPL). We know from 2.9.1 that for a proper government relation to hold the governor must be audible and the domain of proper government in which governing relations hold should not include any other governing domains.

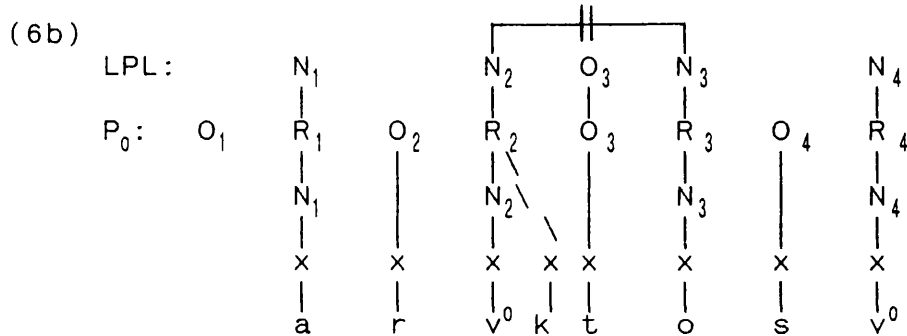
In the configuration of (6a), reproduced below as (6b) so as to include the LPL, proper government cannot apply. In (6b) the domain within which a proper government relation should hold is that formed between  $N_2$  and  $N_3$ . In this domain,  $N_3$  is the governor and  $N_2$  the governee<sup>7</sup>. The nucleus that appears in the  $N_3$  position (i.e. governor position) is audible

<sup>6</sup>This argument was brought to my attention by Dr. Wiebke Brockhaus.

<sup>7</sup>The reader may recall from 2.7.2 that MG adopts a right to left directionality of government at the  $P_1$  level.



(i.e. unlicensed). The first of the two conditions for proper government to apply is met. However, the second condition is not met: a governing domain (involving the rimal complement of  $R_2$  and the onset head of  $O_3$ ) intervenes between  $N_2$  and  $N_3$ .



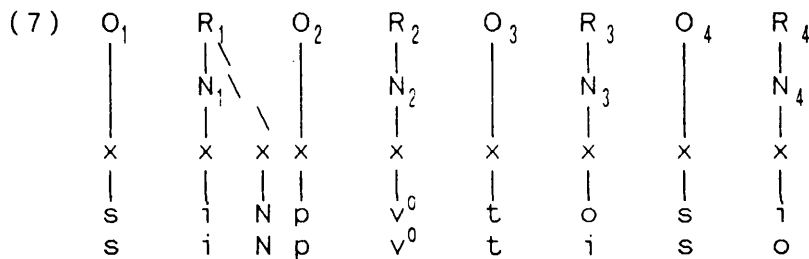
Proper government cannot take place in the above configuration. The notion of Magic Licensing that Kaye (1992) has proposed for the treatment of *s+C* sequences and that I have extended to include the MG *NC* sequences (3.2.3) cannot be further extended so as to apply in the above configuration.

This is due to the dissimilarity that *pt/kt* and *s+C/NC* sequences display in MG. My discussion earlier in this subsection suggests that *pt/kt* sequences do not display identical distribution patterns with either the *s+C* or the *NC* sequences. For example, *pt/kt* can both be preceded by a strictly adjacent non-nuclear segment, while neither *s+C* nor *NC* can (KLV (1990), Kaye (1992) and 3.2.2). There also exists a distribution gap in the occurrence of *ptr/ktr* sequences after an empty nucleus. This is not true of either the *s+C* or the *NC* sequences of MG (e.g. *stratós* 'army', *Ntropi* 'shame'). Later in this section, I provide even further evidence of the dissimilarity of distribution of *pt/kt* versus *s+C* and *NC* sequences.

As neither proper government nor Magic Licensing can apply in (6b), this structure must be rejected as ill-formed.

A third theory-external argument against the adoption of an interconstituent structure of *pt/kt* comes from the interactions that take place when *pt/kt* are in the strict

adjacency of nasal segments. We have just seen that *pt/kt* may be preceded by neutral segments such as *r/l*. These neutral segments must be analysed as occurring in the rimal complement position which is licensed by the following stop *p/k* (5). We have also seen that this licensing oral stop cannot lenite. The correctness of this analysis can be tested further by the possibility of another neutral segment such as a nasal occurring in this rimal complement position. Let me focus on words such as *siNpv<sup>0</sup>tosi* 'coincidence' and *siNpv<sup>0</sup>tiso* 'drawing tighter' (7).



Before proceeding to the closer investigation of these words, I would like to clarify that the segment *p* is not epenthetical in any of these non-analytic words which consist of the nasal-ending suffix {*siN-*} and, respectively, the stop-initial nouns *pv<sup>0</sup>tosi* and *pv<sup>0</sup>tiso*.

The segment *p/k* of the sequences *pt/kt* can never lenite when preceded by a nasal segment. As in the case of the words *arkv<sup>0</sup>tiki*, *arkv<sup>0</sup>tos* and *irkv<sup>0</sup>ti*, this fact can only lead me to analyse *p/k* as occurring in an onset head position (( $O_2$ ), as in (7)) from which it is required to license the preceding rimal complement. In this position, *p/k* cannot afford to lose any of its elements. Again, as with the words *arkv<sup>0</sup>tiki*, *arkv<sup>0</sup>tos* and *irkv<sup>0</sup>ti*, *p/k* must be separated from *t* by an empty nucleus (( $N_2$ ), as in (7)) (2.11.1). The syllabic structure of the word *siNpv<sup>0</sup>tosi*, given in (7), seems to be identical to that of *arkv<sup>0</sup>tiki*, given in (5).

However, the *siNpv<sup>0</sup>tosi* and *arkv<sup>0</sup>tiki* types of words differ in one respect. Between the segments *m* and *p* of the word

[*síptosi*] there exists an etymological morpheme boundary. Such a boundary does not exist between the segments *r* and *k* of the word [*arktikí*]. The morphology of {*siN-*}-initial words being non-analytic, the word *siNpv<sup>o</sup>tosi* can be represented as  $[[A+B]]$ , where {*A*} is the prefix {*siN-*} and {*B*} the stem {*pv<sup>o</sup>tosi*}<sup>8</sup>.

The reader knows from 1.1 and 3.2 that apart from {*siN-*} MG has another two nasal-ending non-analytic prefixes, namely {*eN-*} and {*paN-*}. Neither of these prefixes retains its original analyticity when it occurs in morphologically complex non-analytic words. All three prefixes allow syllabification across the prefix-stem boundary<sup>9</sup>. This means that in non-analytic morphology, the morphemes making up a word are not separated by any domain boundary. The last segment of morpheme {*A*} is strictly adjacent to the first segment of morpheme {*B*}. The morphological complexity of these words is invisible to the phonology.

As with the words [*arktikí*], [*árktos*] and [*irkḱí*], one of two structures can be assumed for the word *siNpv<sup>o</sup>tosi*. If one claims that *pt/kt* are not interconstituent sequences, but are separated by an empty nucleus, the structure assumed is that of (7), i.e.  $[[siN+pv<sup>o</sup>tos]]$ . As I pointed out, we have reason to believe that this structure is correct on the basis of lack of lenition of the segment *p*. However, one could claim that before we adopt the contiguous onset heads analysis for *pt/kt* we need positive, rather than lack of negative evidence. This evidence should refer to (i) the lack of strict adjacency between *p* and *k* and (ii) the existence of strict adjacency between *N* and *p*.

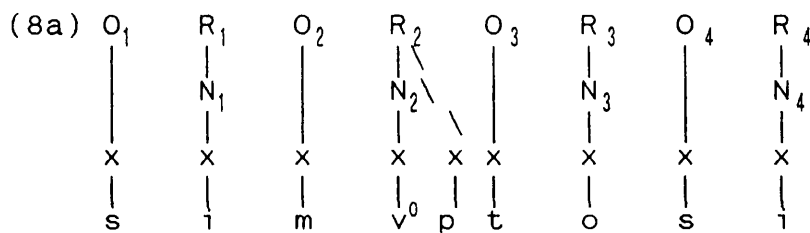
<sup>8</sup>A discussion of the morphology of the non-analytic case endings is beyond the purposes of the present thesis. I only elaborate on analytic case-endings (Chapters 5 and 6).

<sup>9</sup>As I show in detail in Chapters 5 and 6, only the words which display analytic morphology (i.e.  $[[[A]B]]$ ,  $[[A[B]]]$  or  $[[[A][B]]]$ ) show traces of morphological operations within particular cycles.

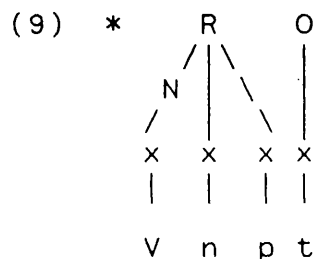
If the analysis postulating the existence of an empty nucleus before *t* is correct, the etymological morpheme {B} (i.e. *pv<sup>0</sup>tósi*) should start with a filled onset position (*p*) ((*O*<sub>2</sub>), as in (7)). This onset head should license the preceding rimal complement position, which is filled with the nasal segment *N*. If this structure is correct, we should expect to see some interaction taking place between the nasal which occurs in the rimal complement position and the oral stop which licenses it. Recall that interactions between nasal and neutral stops can take place only when the two are strictly adjacent and in a governing relation (3.2.2). These multiple interactions would give rise to forms such as [*síмптоsi*] (i.e. homorganic nasal and oral stop) and [*símbtosi*]<sup>10</sup> (i.e. both homorganicity and spreading of the *L*<sup>-</sup> element from nasal to stop).

If, however, an empty nucleus intervenes between the nasal and the oral stop, the interconstituent governing domain which would otherwise exist between these two segments is destroyed, as shown in (8a). The interconstituent governing domain will, in this case, exist only for *p/k* and *t*. This implies that the nasal segment and the oral stop are no longer in a governing relation because of the intervention of an empty nucleus ((*N*<sub>2</sub>), as in (8a)) occurring as the head of the rime in which *p/k* fill the complement position. As a consequence, the nasal segment should not interact with *p/k*. This means that the nasal segment should retain its lexically distinctive place specification element. No *L*<sup>-</sup> element should be added to the representation of the oral stop. The nasal segment would, then, be analysed as belonging to an onset head ((*O*<sub>2</sub>), as in (8a)).

<sup>10</sup>The segment *t* is neutral in the two latter forms. I elaborate on this issue in 5.2.3.



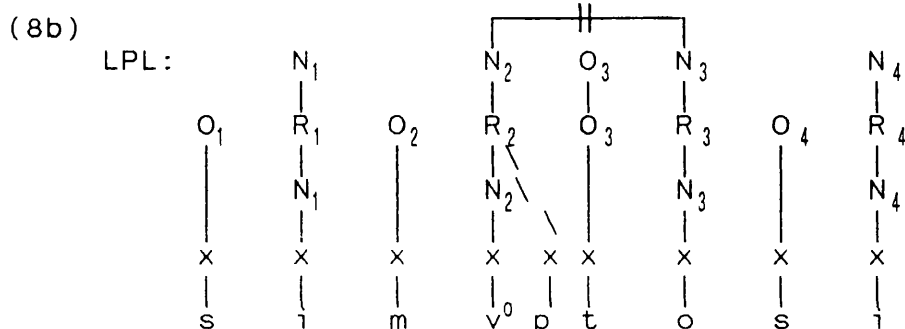
Recall that if we postulate that both the nasal segment and *p/k* belong to the rimal complement position we violate the binarity theorem. Following 2.4, a structure like (9) is universally excluded.



As a matter of fact, in MG we only have evidence for structure (7). Concretely, the place specification element spreads obligatorily for all speakers. Following 1.1, no form such as \*[*sínptosi*] or \*[*sínptiksi*] is ever attested in MG. The existing variants are [*símptosi*] ≈ [*sí(m)btosi*]. As I explain in Chapter 6, the spreading of the L<sup>-</sup> element from the nasal onto the stop is optional. The spreading of the place specification element of the stop proves not only their adjacency, but also the governing relation into which the two segments enter.

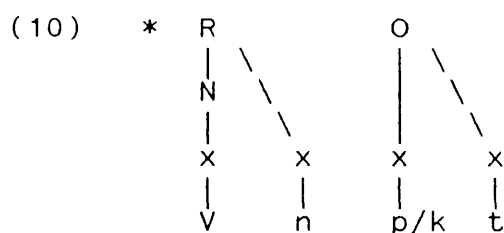
In addition, structure (8a) must be excluded on the basis of evidence coming from proper government. In (8b) below, I reproduce the configuration of (8a) to which I have added the LPL for reasons of convenience. We know from 2.9.1 and earlier in this sub-section that word-medial empty nuclear positions are licensed in MG through proper government. As government goes from right to left in MG at P<sub>1</sub>, N<sub>3</sub> is required to govern N<sub>2</sub>. This, however, is impossible. Although N<sub>3</sub> is audible (meeting the first of the two conditions required for a proper government relation to hold), it cannot properly govern N<sub>2</sub>.

This is due to the fact that a governing domain involving  $O_3$  and its preceding rimal complement intervenes between  $N_2$  and  $N_3$ . A configuration like that of (8b), where a word-medial empty nuclear position is not properly governed is ill-formed.



Just like in (6b), the notion of Magic Licensing cannot apply in (8b). Again, this is due to the dissimilarity that *pt/kt* and *s+C/NC* sequences display in MG. As I pointed out earlier in this sub-section, *pt/kt* sequences do not display identical distribution patterns with either the *s+C* or the *NC* sequences. For instance, although *pt/kt* can be preceded by a strictly adjacent non-nuclear segment neither *sC* nor *NC* can. Moreover, no *ptr/ktr* sequences can occur after an empty nucleus. This is not true of either the *sC* or the *NC* sequences of MG (e.g. *stratós* 'army', *Ntropí* 'shame'). The fact that neither proper government nor Magic Licensing can apply to (8b) lends support to the rejection of this structure.

A third alternative structure, whereby (i) the nasal belongs to the rime, (ii) the nasal and oral stop are strictly adjacent and (iii) the binarity theorem is not violated, involves the analysis of *pt/kt* as belonging to a branching onset (10).



However, a structure like (10) is also universally excluded. The sequences *pt/kt* can never form branching onsets, as oral stops cannot occur in onset complement positions (3.2.2). The only possible syllabic structure is for the nasal to be strictly adjacent to a licensing onset head (filled by *p/k*) and for an empty nucleus to intervene between the latter and *t* (7).

The final piece of evidence against the interconstituent syllabic structure of *pt/kt* and in favour of the intervening empty nucleus comes from the process of reduplication. Before I proceed to the details of this evidence, I need to clarify that in all discussions of reduplication in this thesis I exclude two kinds of sequences. First, I exclude the onomatopoeic sequences (e.g. [*titivízo*] 'twitter', [*xaxanízo*] 'laugh loudly'). Second, I exclude sequences where a whole stem is reduplicated (i.e. [*tsáka-tsáka*] 'in a jiffy', [*pítsi-pítsi*] 'bla-bla').

Let me start the discussion of reduplication processes in Greek with an outline of the basic facts. To begin with, MG has reduplicated words from both its AG and MG vocabulary. The AG reduplicated forms differ in four respects from the MG ones.

Firstly, AG reduplication forms can only be of the verbal paradigm (i.e. present and/or present, past and future perfect tenses and participles, e.g. *lé-lu-ka* 'loosen (pres.perf. first pers. sg.)' and *le-lukó:s* 'loosen (pres.perf.part. masc. nom. sg.)'). In MG, reduplicated forms are always nominal (i.e. *le-lék-i* 'very tall man'). This is why the reduplication forms that MG has retained from AG are all present perfect participles. Secondly, the AG non-reduplicate stem can stand on its own as an independent stem (e.g. *lú-o:*, *lú-so:*, *lú-omai*, *lú-somai*, etc.). In MG, it can never stand on its own (e.g. *\*lék-i*, *\*lék-ia*, *\*lék-ion*, etc.). Thirdly, the first nucleus of the reduplicated prefix ( $N_1$ ) is always filled by the segment *e* in

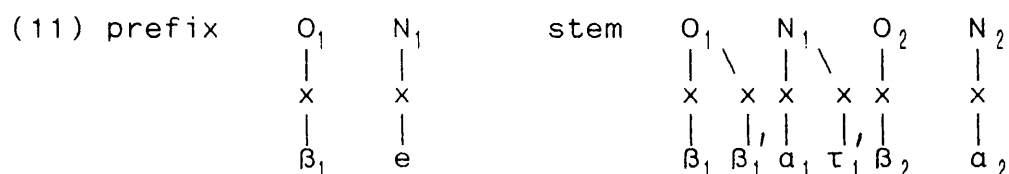
AG (e.g. *lé-luka*). In MG, it is filled by a copy of whichever vowel appears in the  $N_1$  of the base form (e.g. *ku-kúla* 'hood', *pa-pára* 'bread soaked in sauce').

The last important difference that exists between AG and MG concerns the treatment of complements that the  $O_1$  of the base has to govern/license. Concretely, with the exception of the inherited AG reduplication forms, the MG reduplication processes do not allow the  $O_1$  head of the base to ever govern or license any complement. No base forms whose  $O_1$  is branching (e.g. *\*paprára*), or whose  $O_1$  head licenses a strictly adjacent rimal complement (e.g. *\*paspára*) can ever reduplicate in MG. This implies that only base forms whose  $O_1$  position is non-branching can participate in reduplication processes in MG (e.g. *papára*).

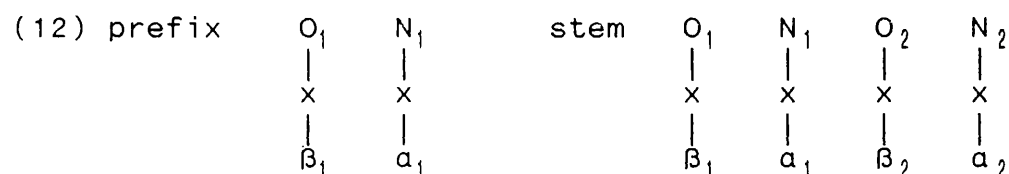
By way of contrast, the AG reduplication process can take place irrespective of the governing/licensing duties of the  $O_1$  of the stem. The  $O_1$  head of the stem (underlined in the examples that follow) may be required to govern a complement (e.g. [*dédraka*] 'I have acted'), license a rimal complement position (e.g. [*estráteumai*] 'I have served in the army') or may be non-branching (e.g. [*pépeismai*] 'I have been convinced').

All reduplicated prefixes of both AG and MG consist of an onset-nucleus pair. In AG only the head of the first onset ( $O_1$ ) is reduplicated. The  $N_1$  is filled with the nuclear segment *e*. No governed members are ever copied from the stem onto the prefix. This means that any rimal complement or any onset complement that may exist in the first onset-nucleus pair of the base is excluded from the reduplication process, as shown in (11). In the examples that follow, the subscripted numbers indicate the specific onset-rime pair to which each indexed segment belongs. The accented segments ( $\tau_1'$ ,  $\beta_1'$ ) indicate the segmental material that occurs in the governed positions of the first onset-rime pair. This material is never reduplicated.

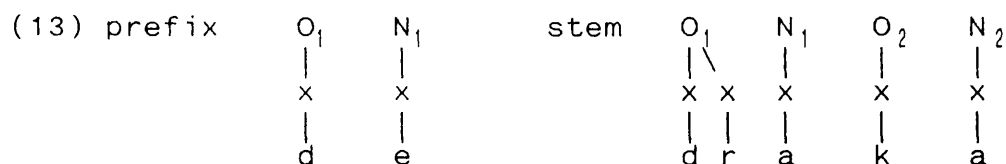




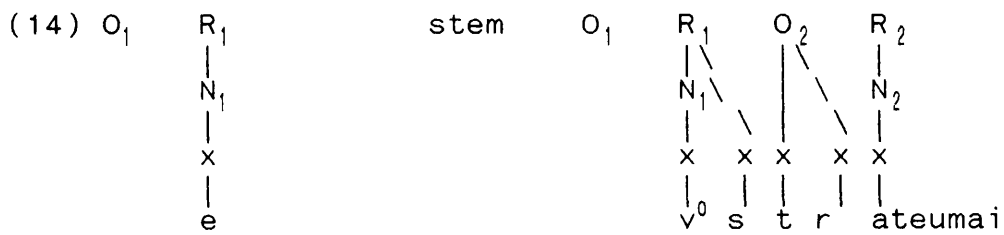
The lack of reduplication of governed members is not a problem for MG. As I explained above, MG reduplicates only words whose  $O_1$  of the base is both (i) non-branching and (ii) not preceded by a rimal complement, as illustrated in (12).



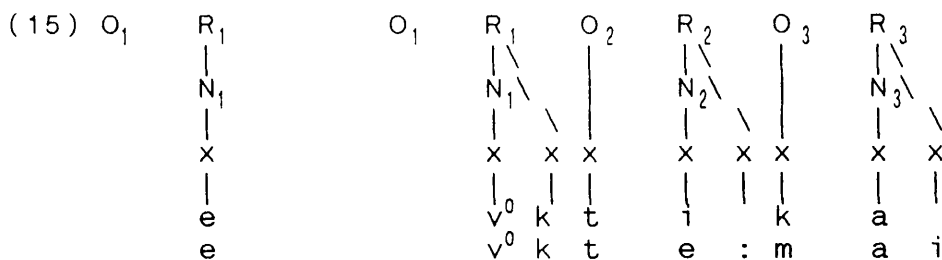
A crucial point for the present discussion is that the AG reduplication process treats the two kinds of non-nuclear governed members in a different way. I first tackle those verbs which have an initial branching onset. The reduplication prefix of these verbs consists of a copy of the  $O_1$  head of the base and the nuclear segment *e* (13). Accordingly, the reduplicated prefix of the verb *drá-o:* (*dró:*) is *dé-draka*, as shown in (13).



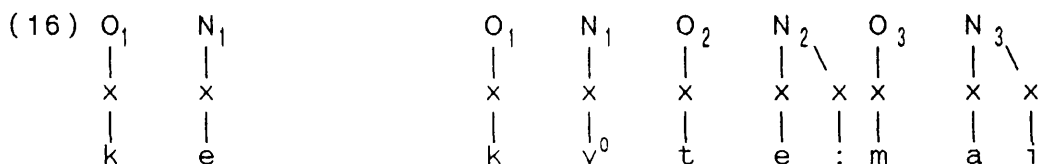
Let me now deal with words like *stratéuomai* 'to serve in the army', whose first filled onset head is preceded by a rimal complement. In these words, the filled onset head of the base is not reduplicated and only the  $N_1$  of the prefix appears, i.e. [*e-stráteuomai*], as in (14). This leads me to analyse the empty onset of the base as  $O_1$  and the first filled onset of the base as  $O_2$ . As the nuclear head of the stem ( $N_1$ ) is empty, the  $N_1$  of the prefix is filled by *e*, the default nuclear segment of AG reduplicated forms (14).



Based on this differential treatment of governed segments, we have a test whereby we may check whether AG treats *pt/kt* as interconstituent sequences or as sequences of two onsets separated by an empty nucleus. If *pt/kt* are interconstituent, we should expect them to behave like the interconstituent sequences of (14). In other words, a verb like *ktízo*: 'I build' would become [é-*ktika*] and a verb like *ktáomai* 'I procure for myself' would become [é-*kte:mai*], as shown in (15).



If, on the other hand, *pt/kt* belong to two different onset heads separated by an empty nucleus, we should expect the reduplicated form of the verb *ktáomai* to be [ké-*kte:mai*] (16) and not [é-*kte:mai*]. The reduplicated form of the verb *ktízo*: would, in this case, be [ké-*ktika*] and not [é-*ktika*].



In fact, AG has both structures. Certain verbs choose the interconstituent structure and other verbs choose the structure with the intervening empty nucleus. So, alongside forms like [ké-*kte:ménos*] and [ké-*kte:mai*] 'I have procured for myself' (i.e. empty nucleus structure), we have forms like [é-

*ktika*] 'I have built' and [*ektisména*] 'built (pres.perf.part.)' (i.e. interconstituent structure). This means that AG has both  $kv^0t$  and  $v^0kt$  structures. The *kt* sequence of the verb *kṭízo:* is truly interconstituent (i.e.  $v^0kt$ ) and the *kt* sequence of the verb  $kv^0táomai$  shows evidence of an intervening empty nucleus (i.e.  $kv^0t$ ). The form [*kékte:mai*] is one of the very few which reduplicate in this way in AG. Most *kt*-initial forms reduplicate in the way of the verb *kṭízo:*, i.e. as truly interconstituent sequences.

MG has retained in its vocabulary very few AG reduplicated forms. These do not only come from verbs which have a non-branching  $O_1$  in the stem. They also come from (i) verbs which have a branching onset ( $O_1$ ) in the stem and (ii) verbs whose  $O_1$  head is empty and which have the segmental material which occurs in the word-initial rimal complement position (the latter position follows the empty  $O_1$ ) licensed by a filled  $O_2$ . Forms like [*peproméno*] 'destiny', [*tetriména*] 'cliché' and [*keklistménon*] 'shut' prove that MG retains reduplicated forms of verbs whose  $O_1$  is branching. In addition, forms like [*espevzména*] 'hurried', [*estavroménos*] 'crucified' and [*eskeména*] 'deliberately' show that MG retains reduplicated forms of verbs whose  $O_1$  of the stem is empty and the segmental material which fills the rimal complement position is licensed by the  $O_2$  head.

It would, then, be interesting to see whether MG has retained any reduplicated forms of *pt/kt*-initial verbs. If it did, it would be extremely revealing to see which of the two structures it retained. It is reasonable to assume that if MG allows interconstituent *pt/kt* structures (i.e.  $v^0pt/v^0kt$ ), it should allow the retention of reduplicated forms like [*ektizménos*]. If, however, it only allows a structure where an empty nucleus intervenes between *p/k* and *t* (i.e.  $pv^0t/kv^0t$ ), it should forbid reduplication forms like [*ektizménos*] and only allow forms like [*kektiménos*].

In fact, MG retains only the latter (i.e. [*kektiménos*]). MG, then, has reduplication forms from the AG vocabulary whose stems uncontestedly begin with (i) non-branching structures (e.g. [*pepizméni*] 'convinced', [*tetaméni*] 'tense', [*kekorezméni*] 'saturated'), (ii) branching structures (e.g. [*peproméno*] 'destiny', [*tetriména*] 'cliché' and [*keklizménon*] 'shut') and (iii) rimal complement structures (e.g. [*esteménos*] 'crowned'). Forms like [*kektiménos*] only fit in the first category. The reduplication prefix shows the typical form of a non-branching onset in the stem. This structure can be allowed for the *kt* sequence only if an empty nucleus intervenes between the two oral stops.

Quite significantly, the only *pt/kt*-initial forms retained by MG are the ones in which the AG *kt* reduplicates like a non-branching structure. As I mentioned above, this structure is, in AG, the least numerous of the two syllabic structures that the *pt/kt* sequences may assume. I consider this behaviour of MG as indicative of the syllabic structure it assumes for *pt/kt*.

Before rounding up this sub-section, let me point out that there exists a set of words in which *p/k* are not separated from *t* by an empty nucleus. The set I refer to is that of words like *pémpiti* 'Thursday'. Following my discussion of 1.1, in these words, the oral stop which intervenes between the nasal segment and *t* (i.e. *p*) is epenthetic and not lexical. The *pt/kt* sequences in which *p/k* are epenthetic rather than lexical are different from the *pt/kt* sequences of the words I examined above. I do not elaborate on the epenthetic structure here. In Chapter 6, however, I provide proof for the epenthetic nature of *p* in these sequences, I illustrate the syllabic structure these *pt/kt* sequences assume and I discuss in detail their totally different phonological behaviour.

Let me now review the ten pieces of evidence in favour of the existence of an empty nucleus intervening between *p/k*

and *t*. First, *pt/kt* fail to show strict co-occurrence restrictions. Second, the lack of *\*tp/tk* sequences is not a language-specific trait. Third, in sequences of what looks like strictly adjacent *pt/kt*, the first of the two oral stops is released. Fourth, unlike the behaviour of other true interconstituent sequences, there exists a distribution gap in the occurrence of *ptr/ktr* sequences after an empty nucleus ([*stratós*], but *\*[ktrátos]*). Fifth, both *pt/kt* can be preceded by a *r/l* segment or by a nasal filling the strictly adjacent rimal complement position (*arkv<sup>o</sup>tiki*). Sixth, no lenition ever takes place when *p/k* have to license a rimal complement position ([*arktiki*]  $\approx$  *\*[arxtiki]*). Seventh, no lenition takes place in the first consonant of some of the *pt/kt* sequences ([*ptósi*]  $\approx$  *\*[ftosi]*). Eighth, if a nasal segment precedes the *pt/kt* sequences it must be homorganic to the first of the two stops ([*sí(m)ptosi*], *\*[sínptosi]*). Ninth, subject to social variation, the *L* element of the nasal spreads onto the first stop of the *pt/kt* sequences ([*sí(m)btosi*]  $\approx$  [*sí(m)ptosi*]). Tenth, where MG has a choice of retaining from AG *kt*-initial structures which reduplicate either like interconstituent structures or as sequences of two onsets separated by an empty nucleus, it only retains the latter.

The above evidence leads me to reject the interconstituent syllabic status of *pt/kt* and adopt the structure where an empty nucleus intervenes between the two oral stops (i.e. *p<sup>v</sup><sub>t</sub>/k<sup>v</sup><sub>t</sub>*).

#### 4.2 The MG *pn/kn* sequences

The *pn/kn* sequences are not as frequent as the *pt/kt* or the *ps/ks* ones. To the best of my knowledge, they receive virtually no mention in the MG phonological literature. This is probably due to two reasons. Firstly, in contrast to *pt/kt*, *pn/kn* do not directly participate in any variation process. Secondly, their identical behaviour regarding the various MG

phonological processes excludes the possibility of their each adopting a different syllabic structure. In this respect, they contrast with *ts* and *ps/ks* which, although similar-looking (i.e. stop + s), adopt two different syllabic structures (see 5.2.2).

The sequences *pn/kn* show signs of similar distribution and behaviour to *pt/kt* and, as I show in Chapter 5, to *ps/ks*. Their first segment being an oral stop, they participate in the phonological variation processes I investigate. In the next two sub-sections, I give some general information as to the treatment of the *pn/kn* sequences by KLV (4.2.1). I also provide some evidence against the assumption of an interconstituent syllabic structure for them and in favour of an intervening empty nucleus (4.2.2).

#### 4.2.1 *pn/kn*: the analysis offered by KLV (1990)

KLV (1990:212) universally exclude homorganic stop-nasal clusters as well-formed onsets on the grounds that such sequences violate the constraint against spreading of elements within an onset. They also note that universally sequences of stop plus nasals are typically heterorganic.

In their examples which come from various languages, KLV also cite MG. They remark that in MG, as in other languages, *pn/kn* 'mirror the stop clusters' *pt/kt* (1990:229). They also point out that English stress placement treats the English *pn/kn* sequences as heterosyllabic, as in the example <arachnoid>, where stress is placed on the second rather than on the first nucleus of the word.

From these two remarks, I assume that KLV would treat the MG *pn/kn* sequences just as they treat the English ones, i.e. as interconstituent sequences. However, as with *pt/kt*, there is no a-priori reason why MG *pn/kn* should assume the syllabic structure they display in English. In the following sub-

section, I discuss the evidence that leads me to reject the analysis offered by KLV (1990) and adopt, in its place, an analysis whereby *pn/kn* consist of two onsets separated by an empty nucleus (i.e.  $pv^0n/kv^0n$ ).

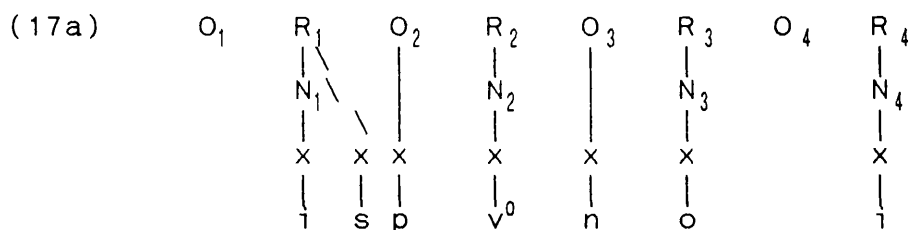
#### 4.2.2 The arguments in favour of an intervening empty nucleus

The potential absence of any *tn/tm/pm* sequences in MG might suggest that co-occurrence restrictions exist between *p/k* and *n*. Such a fact would provide evidence in favour of the existence of a governing domain between *p/k* and *n*, and, hence, their interconstituent status. However, words like [*fátni*] 'manger' and [*atmós*] 'steam', demonstrate the existence of *tn* and *tm* sequences. In MG, the gap exists only for *\*pm*. This gap is not language-specific but attested in many of the world's languages. Furthermore, this gap does not necessarily imply the strict adjacency of *p/k* and *n*. The existence of *pt/kt* and *ps/ks* sequences indicates that apart from *n*, the segments *p/k* may occur with other non-nuclear segments. These facts shed serious doubts on the postulation of a governing relation between *p/k* and *n*.

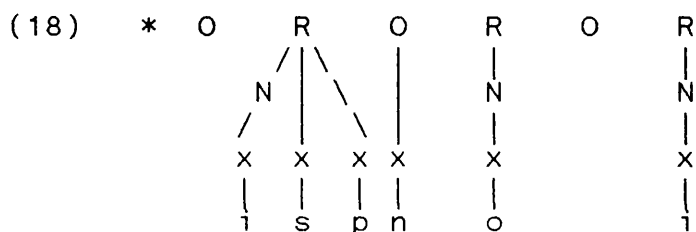
In MG, there exists abundant distributional evidence against the strict adjacency of *p/k* and *n*. To begin with, if *p/k* and *n* were truly adjacent, both *p* and *k* should be nasally released in pre-nasal positions, i.e. their  $h^0$  element should not be lexically distinctive. Recall from 3.2.4 that the existence of a lexically distinctive  $h^0$  element in the representation of *p/k* before *n* would suggest the presence of an intervening nucleus (the  $h^0$  element being lexically distinctive for the stops only in pre-nuclear positions). If, however, an empty nucleus intervenes between them, *p/k* should be orally released. In fact, MG chooses the second option: *pn/kn* are always pronounced with an orally released oral stop, i.e. their  $h^0$  element is lexically distinctive. Nasal release for *p/k* before *n* sounds foreign and strange.

In the second place, if *pn/kn* are true interconstituent sequences, we should never be able to see them preceded by a rimal complement position: such a structure would violate the binarity theorem. Consequently, structures such as *spn*, *skn*, *mpn*, *nkn* should not exist in MG. Recall that *sp* and *mp* (see 4.1.2 and 3.2.2, respectively) are genuine interconstituent sequences.

This assumption is wrong. Although, just like in English, examples are hard to come by, words such as [*ispnoí*] 'inhalation' (17a), [*ðíspnia*] 'difficulty in breathing' and [*e(m)bnéo*] 'I inspire' are widely used in MG. Also the example [*sknípa*] 'gnat', shows that there is no distributional gap for word-initial positions, as there was for the *spt* and *skt* sequences. The sequences *spn/skn* can occur after both filled and empty nuclei. Having excluded the possibility of *pn/kn* forming branching onsets (4.2.1), the adoption of an intervening nucleus is necessary if we are to explain the strict adjacency of *s/n* and *p/k* (17a).

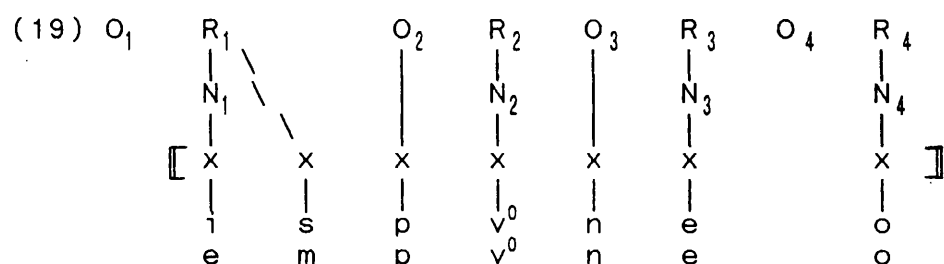


If we assign an interconstituent status to *pn/kn*, the strict adjacency of *s/n* and *p/k* would mean that the rime consists of one nuclear head and two non-nuclear positions, contra the binarity theorem (2.4) (18). This structure is universally excluded.





In the third place, words such as [e(m)bnéo] provide additional proof of the intervening nucleus. These words consist of a non-analytic nasal-ending prefix (e.g. {eN-}) and a stem which has an initial oral stop (i.e. {pv<sup>0</sup>néo}). Again, the morphological complexity of these words is not visible to the phonology. Their syllabic structure is given in (19) below.



The interactions that take place between strictly adjacent nasal and oral stops (3.2.2) provide a most reliable test for the correctness of the assumption that the oral stop is not adjacent to its following nasal segment. Specifically, if there exists some interaction between the nasal segment of the prefix {eN-} and the oral stop of the stem, we should assume a structure where these two are strictly adjacent, i.e. they form an interconstituent governing domain. This implies that the oral stop of the *pn/kn* sequences (i.e. *p/k*) and the nasal following it must conform to the general condition on the well-formedness of phonological strings (2.11.1) and allow an empty nucleus to intervene between them, as shown in (19). In such a configuration, the oral stop must be strictly adjacent to the preceding nasal segment and separated from the following, phonetically adjacent, nasal segment by an intervening empty nucleus. Recall that the branching onset structure has been excluded for *pn/kn*, as nasals cannot occur in onset complement positions (4.2.1).

If, on the other hand, *pn/kn* are interconstituent sequences, the oral stop should occur in the rimal complement position, as illustrated in (20a). This oral stop would, then, be governed by the following nasal. This governing nasal

(20a)

$O_1$	$R_1$	$O_2$	$R_2$	$O_3$	$R_3$	$O_4$	$R_4$
	$N_1$		$N_2$		$N_3$		$N_4$
	x	x	x	x	x		x
	$e$	$N$	$v^0$	$p$	$n$		$o$

(21) \* O R O R O R

          / \ / \ / \ / \

          N | | |

          / | \ / \

          x x x x

          | | | |

          e N p n e o

Besides, proper government evidence allows us to reject structure (20a) as ill-formed. The word-medial empty nucleus which appears in the  $N_2$  position cannot be licensed through

(20b)

LPL:

Diagram (20b) shows four vertical chains of nodes labeled  $O_1$ ,  $O_2$ ,  $O_3$ , and  $O_4$ . The nodes are connected as follows:

- $O_1$ :  $N_1 - R_1 - N_1 - x - e$
- $O_2$ :  $N_2 - R_2 - N_2 - x - N$
- $O_3$ :  $N_2 - O_3 - N_3 - R_3 - N_3 - x - p - n$
- $O_4$ :  $N_4 - R_4 - N_4 - x - o$

A horizontal line connects the top of  $O_2$ ,  $O_3$ , and  $O_4$ . A diagonal line connects the second node of  $O_2$  ( $R_2$ ) to the second node of  $O_3$  ( $O_3$ ).

Let me now sum up the six arguments in favour of a structure for *pn/kn* where each segment belongs to an onset head with an empty nucleus separating them. First, the lack of co-occurrence restrictions between *p/k* and *n* (there also exist *pt/kt*, *ps/ks*, *tn*, and *tm* sequences) indicates the lack of a governing relation between *p/k* and *n*. Second, the lack of only *\*pm* sequences is not a language-specific trait but is

shared by many of the world's languages. Third, *p/k* are always orally and never nasally released before the nasal segments. Fourth, both *pn* and *kn* allow strictly adjacent non-nuclear rimal complements to precede them. This distribution shows no gaps as it may take place both word-medially ([*ispnoí*]) and word-initially ([*sknípa*]). Fifth, when a nasal segment occurs in a strictly adjacent position preceding *pn/kn*, it becomes homorganic to its licensing stop ([*embnéo*], \*[*enbnéo*]). Sixth, in these environments, the oral stop of the *pn/kn* sequences also becomes low-toned (*embnéo*).

#### 4.3 Summary

In the present chapter, I discussed the syllabic structure of the MG *pt/kt* and *pn/kn* sequences. The assumption of the correct syllabic structure for these sequences is important to an analysis of MG phonological variation as the first segment of these sequences is an oral stop. For all four sequences I argued against the adoption of the interconstituent syllabic structure assumed by KLV (1990) and in favour of an intervening nucleus between *p/k* and *t/n*. My arguments were chiefly theory-external and referred to the distribution and phonological behaviour of these sequences.

I have shown that (i) *pt/kt* and *pn/kn* fail to show strict co-occurrence restrictions and that (ii) the lack of *\*tp/tk* and *\*pm* sequences is not a language-specific trait. I have also argued that *p/k* is always orally released before either *t* or *n*. I have demonstrated that there exists a distribution gap in the occurrence of *ptr/ktr* sequences after an empty nucleus and that *pt/kt* and *pn/kn* can be preceded by strictly adjacent non-nuclear segments. In addition, I have shown that no lenition ever takes place when *p/k* have to license the segmental material of their preceding rimal complement position. Furthermore, I have demonstrated that if a nasal segment precedes the *pt/kt* or *pn/kn* sequences it must be

homorganic to the initial stop of these sequences. Finally, I have produced evidence supporting the fact that where MG has a choice of retaining from AG *kt*-initial structures which reduplicate either like interconstituent structures or as sequences of two onsets separated by an empty nucleus, it only retains the latter.

## CHAPTER FIVE

### THE SYLLABIC STRUCTURE OF MODERN GREEK *ts* AND *ps/ks*

#### 5.0 Introduction

Having established in the previous chapter the syllabic structure of the MG *pt/kt* and *pn/kn* sequences, I turn, in this chapter, to an analysis of *ts*, *ps* and *ks*, three of the most problematic and widely discussed Modern Greek clusters. The analysis I propose is also couched within the framework of Government Phonology. Just as with *pt/kt* and *pn/kn*, the discussion of the syllabic structure of *ts* and *ps/ks* might at first appear irrelevant to the purposes of this thesis. Nevertheless, *ts* and *ps/ks* are also involved in MG phonological variation processes, their first sound unit being an oral stop. At the same time, however, the phonological behaviour of *ts* differs in some important respects from that of *ps* and *ks*. As I argue in this chapter, this difference is due to their dissimilar syllabic structure: *ts* is a contour segment, while *ps/ks* are, like *pt/kt* and *pn/kn*, sequences of two onsets separated by an intervening empty nucleus.

The analysis I provide of the syllabic structure of *ts* and *ps/ks* is organised as follows. In Section 5.1, I briefly present the most prominent accounts that exist of the syllabic structure and phonological behaviour primarily of *ts*, but occasionally also of *ps* and *ks*. In Section 5.2, I propose an analysis of *ts* and *ps/ks* within the framework of GP. I first discuss the analysis offered by KLV for *ts* and *ps/ks*. Then, I explain the reasons why I adopt their contour analysis for *ts*, but reject their interconstituent syllabic analysis for *ps/ks*.

In this chapter, I often refer to (i) the theoretical

stipulations of Government Phonology (Chapter 2), (ii) the interactions taking place between strictly adjacent nasal and oral stops (3.2.2) and (iii) some of the arguments I used in order to prove that the syllabic structure of *pt/kt* and *pn/kn* is that of two onsets separated by an intervening empty nucleus (Chapter 4). Most of the claims I make in this chapter also come up in Chapter 6, where they undergo further elaboration so that they provide additional supporting evidence for the analysis I present of the phenomenon of MG phonological variation.

### 5.1 Presentation of the problem and of some existing analyses

This section is divided in two sub-sections. In 5.1.1, I outline the questions different linguists have attempted to answer in their examination of the syllabic structure of *ts* and *ps/ks* in MG. In 5.1.2, I present the most well-known and recent analyses. The majority of these analyses are formulated within an SPE-type framework. It is mainly the older analyses that follow the Structuralist approach.

Throughout 5.1.2, I use the SPE terms the linguists themselves use in their accounts. For instance, I use terms like 'consonant', 'vowel' and 'affricate' (rather than, respectively, 'non-nuclear', 'nuclear' and 'contour' segments). I also use terms which have no standing in a GP framework (e.g. 'phoneme'). Lastly, for the sake of convenience and clarity of presentation, I use two sets of symbols:  $t^S/d^Z$  (referring to the unit-phonemic analysis) and *ts/dz* (referring to the cluster analysis). This conventional notation is in force only for this section. From 5.2 onwards, I use the symbols *ts/dz*.

#### 5.1.1 An outline of the problem

Three questions recur in the literature on MG *ts*, *ps* and *ks*:

- (i) Do all three sound sequences possess an identical syllabic structure or not?
- (ii) If their syllabic structure is different, which structure should we assume for each sequence?
- (iii) Is *dz* an independent cluster? If so, what is its syllabic structure and how does it relate to that of *ts*, *ps* and *ks*?

The attempts to answer these questions have, over the years, brought to light numerous and often quite diverse analyses. Most linguists deal only with *ts*. Some maintain that *ts* is a cluster, while others maintain that it is 'an affricate'. Moreover, the comparisons of *ts* with *ps/ks* are scant and, most of the time, haphazard. Finally, in very few analyses is *dz* systematically compared to *ts*, *ps* and *ks*. In the next sub-section, I review some of the existing accounts in an effort to show how different linguists have tackled the above issues.

#### 5.1.2 A review of the literature on MG *ts* and *ps/ks*

Let me begin this review with *ts*. Most linguists seem to focus on the possibility of assigning phonemic status to *ts*. These linguists can be divided into two groups. On the one hand there are those who treat *ts* as a sequence of two segments (Mirambel (1946a, 1950, 1959), Newton (1961:284), Setatos (1969:46-51), Koutsoudas (1962), Swanson (1979), Magoulas (1979:22) and Philippaki-Warburton (1970:18)). On the other hand, there are those who treat *ts* as a unit phoneme (Triandaphyllides (1939), Mirambel (1946a, 1950, 1959), Householder (1964:17-9), Zeri (1984), Malikouti (1970:24-5) and Joseph (1986)).

A handful of linguists from both groups use the Structuralist approach (e.g. Mirambel, Triandaphyllides, Swanson and Magoulas). In their analyses, special emphasis is placed on the historical origins of *ts*. The remaining



linguists use an SPE-type framework (e.g. Newton, Householder, Zeri, Malikouti, Setatos, Koutsoudas and Philippaki-Warburton). In their analyses, less emphasis is placed on the historical origins of *ts* and more on its distribution in different syllabic positions.

Newton (1961), Magoulas (1979), Setatos (1969) and Philippaki-Warburton (1970) support the view that *ts* forms a cluster. In his attempt to reduce the phonemic inventory of MG and do without a series of sounds which most linguists consider as phonemes, Newton (1961) observes that *ts* can never be followed by another consonant: it can only be followed by a vowel. This, he claims, clearly indicates that *ts* behaves like a cluster and not like an affricate.

In addition, Newton (1961) claims that there does not exist any contrast between two kinds of *ts*, namely a *ts* which behaves like an affricate and a *ts* which behaves like a cluster (i.e.  $t^S$  versus  $t + s$ )<sup>1</sup>. Newton considers that the above fact proves that there only exists one syllabic structure for *ts*. He opts for the cluster structure in view of the simplicity this solution introduces in the description of the MG phonological system.

The last argument in favour of an analysis of *ts* as a cluster appears in Magoulas (1979). He argues that, although most linguists consider *ts* as an affricate, Martinet's criteria for the monophonemic status of sounds lead him to postulate that *ts* can only assume the structure of a cluster of two independent phonemes, namely *t* and *s*<sup>2</sup>. Martinet's criteria specify that when each of the two sounds (here, *t* and *s*) can occur on its own replacing the original cluster in an

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<sup>1</sup>cf. Mirambel's (1946a, 1950) account later in this section.

<sup>2</sup>The reference Magoulas (1979:36) gives for these criteria is Martinet, A. 1956. *La description phonologique avec application au parler francoprovençal d'Hauteville (Savoie)*. Genève.

intelligible minimal pair, the original cluster can no longer be considered as a unit phoneme, but as two phonemes. Minimal pairs such as *patsás* 'a soup', *patás* 'you step on' and *pasás* 'pasha' can only point, Magoulas argues, to the adoption of the cluster solution.

Setatos (1969) presents impressive lists of words containing the sounds *ts/dz*. He creates these lists on the basis of the pronunciation of *ts/dz*, their origin, the variants they have, their distribution in the different positions in a word and the sandhi phenomena they participate in. Setatos (1969) does not propose any new arguments for his position. Nor does he oppose any of the ones favouring the affricate option. He simply sums up those already existing in the literature and stresses the more recent introduction of *ts* (as well as *dz*) into MG (see later in this sub-section). He finally claims that a more economical analysis of MG can be attained by avoiding the phonemicization of *ts/dz*; hence his adoption of the cluster option.

Finally, following Koutsoudas (1962), Philippaki-Warburton (1970) supports the cluster solution, albeit tentatively: 'On the basis of simplicity only we will follow the solution which treats the affricates /*ts/* and /*dz/* as clusters of a stop + the strident fricative' (Philippaki-Warburton 1970:18; my emphasis). However, Philippaki-Warburton (1970:18) recognises the need for further research in this area and refrains from expressing a categorical opinion on the issue: 'we cannot offer a responsible solution at present . . . this proposal is only tentative'.

The linguists who support the unit-phonemic option are more numerous. The most convincing argumentation can be found in Householder (1964). Householder considers Newton's (1961) attempt to rephonemicize MG as a 'dream' and, accordingly, attacks it. Householder (1964) points out that *t<sup>s</sup>* can only occur as a morpheme-initial or morpheme-medial sequence (e.g.

respectively  $[[t^S \acute{e}p+i]]$  'pocket' and  $[[kót^S+i]]$  'ankle bone'), but never occur across what he calls 'morph-boundaries' (rather than 'morpheme boundaries')<sup>3</sup>, i.e.  $*[[kót+s\acute{i}]]$ . This, Householder claims, proves that  $t^S$  is one unit and cannot be broken down to further component parts (see also 5.2.2).

Furthermore, Householder (1964) observes that  $t^S$  can occur in reduplicative environments, i.e. as the initial consonant of the first and second syllables of a word followed by the same vowel (e.g.  $t^S i t^S i \delta i$  'stark naked'). In this reduplicative environment, no clusters ever occur.

Malikouti (1970) also follows Householder (1964) in treating  $t^S$  as a unit-phoneme. Malikouti (1970) stresses the impossibility of  $t^S$  occurring across a morpheme boundary and points out that the voiced cognate of  $t^S$  has a different distribution than the voiced cognates of *ps/ks*<sup>4</sup>. This indicates that there exists a difference in the syllabic structure of *ts* versus *ps/ks*.

Let me now turn to the analyses that contrast *ts* with *ps/ks*. These are not numerous, mainly because most linguists do not enter into an examination of the syllabic structure(s) of *ps/ks*. If they mention *ps/ks* at all, it is simply because they want to draw some parallel to, or distinction from, the syllabic structure of *ts*. No one has so far ever argued that *ps* and/or *ks* are contour segments. This is one of the very few areas of MG phonology where linguists of all approaches seem to have a general consensus.

Those linguists who claim that *ts* is a cluster of two segments assume an identical syllabic structure for all three

<sup>3</sup>His analysis is particularly confusing, as Householder (1964) does not differentiate between analytic and non-analytic 'morph'-boundaries.

<sup>4</sup>For more details on this point, see 5.2.3.

*ts/ps/ks*. Magoulas (1979), Newton (1961) and Setatos (1969) belong to this group. Magoulas does not explicitly draw any comparison between *ts* and *ps/ks*. Newton and Setatos, however, make short reference to *ps/ks*. Newton only mentions *ps/ks* in order to strengthen his argument that *ts* is not an affricate. Specifically, he says that if *ts* is to be treated as an affricate 'why not make the sequences [ps] and [ks] unit phonemes?' (1961:284). Setatos (1969) simply mentions the different distribution of *ps/ks* (as compared with that of *ts*) in the review he offers of the work of other linguists.

To my knowledge, it is only the linguists who assume an affricate structure for  $t^S$  who enter into a comparison of  $t^S$  and *ps/ks*. Their comparison aims at showing the difference in the phonological behaviour (and, hence, status) of  $t^S$  vis-à-vis the similar-looking sequences *ps/ks*. Mirambel (1959), Householder (1964), Malikouti (1970) and Joseph (1982)<sup>5</sup> are amongst this latter group. With the exception of Mirambel (1946a, 1950, 1959) who follows the Structuralist framework, the other two linguists use an SPE-type approach in their analyses. In their attempt to prove the different syllabic structure of  $t^S$  as compared with *ps/ks*, Mirambel (1946a, 1950, 1959), Householder (1964) and Malikouti (1970) use phonological criteria, while Joseph (1982, 1986) uses semantic criteria.

Householder (1964) observes that the clusters *ps/ks* occur in much the same positions as  $t^S$ . However, their distribution across morph-boundaries is different.  $t^S$  can never occur across a 'morph'-boundary (e.g.  $[[pat^S + ás]]$ ,  $*[[pat + sás]]$ ), while both *ps* and *ks* can (e.g.  $[[p\acute{e}k]s\acute{í}]$ ,  $*[[p\acute{é}ks + \acute{í}]]$  'knitting';  $[[\theta rép]s\acute{í}]$ ,  $*[[\theta réps + \acute{í}]]$  'nourish' (see also 5.2.2).

Householder (1964) also observes an unmatched

<sup>5</sup>As I show later in this section, Joseph's (1982, 1986) examination of the status of  $t^S/d^Z$  differs from the ones I mention here, mainly because of its semantic orientation.

distribution for  $d^Z$ , *bz* and *gz*. Specifically, Householder claims that *bz/gz* can only occur word-initially when *ps/ks* follow a nasal-ending proclitic (e.g. *ton psíno* → [*tom bzíno*] 'I bake him', *ton kséro* → [*toj gzéro*] 'I know him'). *dz* can likewise occur as the result of a similar process (*ton tsákosa* → [*ton dzákosa*] 'I caught him'), but it can also exist independently. Specifically, Householder claims that *dz* can occur word-initially and word-medially without any nasal segment preceding it (e.g. [*to dzáki*] 'the fireplace' and [*ton adzamí*] 'the maladroït man'). This means that contrary to *bz* and *gz*, *dz* can occur as an independent phoneme. Recall that, following 1.2.2, Householder (1964) also adopts the existence of MG independent voiced stop phonemes (i.e. *b/d/g*): *dz* is, then, one of them.

Finally, Householder points out that unlike *ps/ks*,  $t^S$  can occur in MG as the initial consonant of the first and second syllables of a word followed by the same vowel (e.g.  $t^S/t^S\acute{o}i$ ,  $*p^Sip^S\acute{o}i$ ,  $*k^Sik^S\acute{o}i$ ). In 5.1.2, I provide a fully detailed account of the behaviour of *ts* and *ps/ks* in reduplication environments.

Malikouti (1970) also stresses the occurrence of *ps/ks* across morph-boundaries and the impossibility of  $t^S$  occurring in similar positions. This, she claims, is a clear indication of their different status and especially of the behaviour of  $t^S$  as one unbreakable unit.

Finally, in his semantically-oriented analysis, Joseph (1982, 1986) argues convincingly that *ts/dz* are unparalleled by all other MG sequences of oral stop + *s*. Without making an explicit claim as to the phonemic status of *ts/dz*, Joseph points out that, unlike *ps/ks*, *ts/dz* occupy a special place in the MG phonological system.

Let me now outline the analyses so far proposed for *dz*. These are not numerous. They mostly refer to the historical

origin of *dz*. Setatos (1969:46), for instance, stresses the more recent introduction of *dz* into the language: *dz* is 'an offspring of the evolution the Greek language underwent during the great span of time from postclassic to modern times (10th century) and of the foreign influences that came to act upon it'. He also points out (1969:46) the slower adaptation of *dz* (as compared with that of *ts*) into the MG phonological system: 'There is no doubt that their phonological adaptation (especially concerning [dz]) has not yet been concluded'.

Those linguists who support the cluster option for *ts* assume the same status for *dz*. Newton (1961:284), for example, considers that *dz* is made up of *t* + *z* (an underlying *t* being voiced in the adjacency of voiced segments). He points out that there are no minimal pairs of *dz* versus *d* + *z*, just as there are no minimal pairs of *ts* versus *t* + *s*. This fact, he believes, supports a cluster analysis for both *ts* and *dz*.

Those linguists who treat *ts* as an affricate (i.e.  $t^S$ ) assume the same syllabic structure for  $d^Z$  (Mirambel (1959), Householder (1964), Setatos (1969) and Joseph (1982)). None of these linguists derives  $d^Z$  from a nasal segment + *ts*. They all recognise an independently existing voiced affricate ( $d^Z$ ), just as they recognise an independently existing MG voiced plosive series (i.e. *b/d/g*).

Malikouti (1970) is the only linguist who both adopts the affricate solution and derives  $d^Z$  from the strict adjacency of a nasal segment to the affricate  $t^S$  (i.e.  $N + t^S$ ). The reader may recall that Malikouti also derives the MG voiced plosives in exactly the same way, i.e. from underlying *NC* sequences (1.2.2).

Let me finally conclude this sub-section with Mirambel's (1946a, 1950) analysis of *ts/dz* and *ps/ks*. I outline his views separately because the account he provides is rather complicated and differs in most respects from the accounts I

have presented so far.

The emphasis Mirambel (1946a, 1950) places on the historical origin of *ts*, *ps* and *ks* and the spelling conventions of MG lead him to distinguish two kinds of *ts* sequences in 'grec commun' (as opposed to 'grec dialectal'). The first kind is a cluster (i.e. *ts*). The second kind is an affricate (i.e. *t<sup>s</sup>*). His distinction is based solely on the historical processes which operated in MG. In order to decide on the syllabic status of *ts*, Mirambel takes into consideration the historical origin of the particular word in which *ts* appears. Specifically, if *ts* came about by a process whereby two consonants coalesced, the emerging *ts* is a cluster (e.g. *ks* > *ts*, as in [eksalapató] > [tsalapató] 'to tread over'). Alternatively, if *ts* came about by a process whereby one consonant turned into *ts*, this emerging *t<sup>s</sup>* is an affricate (e.g. *k* > *t<sup>s</sup>*, as in [kíx/a] > [t<sup>s</sup>íx/a] 'thrush'). Both *ts* and *t<sup>s</sup>* are spelt identically, i.e. as <τσ>.

Mirambel (1950) also discusses the existence of a voiced cognate to *ts*, i.e. *dz*. He says that there should be two kinds of *dz*: a 'groupe' *dz* and an affricate *d<sup>z</sup>*, just as there is a cluster *ts* and an affricate *t<sup>s</sup>*. The 'groupe' *dz* should be the result of the coalescence of two consonants into *dz* (this *dz* being the voiced cognate of the cluster *ts*). The affricate *d<sup>z</sup>* should come about through the change of one consonant into *d<sup>z</sup>* (this *d<sup>z</sup>* being the voiced cognate of the affricate *t<sup>s</sup>*).

However, as Mirambel (1950) remarks, this is not exactly how MG works with respect to *dz*. MG does not possess a *dz* cluster: 'l'ancien δ (*d*) ne s'est maintenu qu'après nasale (vδ>vτ), et le *d* (noté vτ), en dehors de ce cas, est venu postérieurement (et par emprunt), de sorte que les conditions qui, historiquement, ont permis la constitution d'un groupe *ts* ne jouent pas pour le groupe *dz*' (1950:61). The affricate *d<sup>z</sup>* exists as predicted. Mirambel obtains *d<sup>z</sup>* from a historical change of one consonant into *d<sup>z</sup>* (e.g. *z* > *d<sup>z</sup>*, as in [zízifos] >

[ $d^Zid^Zifos$ ] 'jujube'). This  $d^Z$ , Mirambel claims, is not the product of the adjacency of *ts* to a nasal segment.

This last point is particularly important as it forms the basis for Mirambel (1946a) to carry out his contrast of *ts* versus *ps/ks*. Specifically, Mirambel claims that all three *ts/ps/ks* become voiced if a nasal segment precedes them. We can derive *dz* from *N+ts* (e.g. *toN tsalapató*, being pronounced as [*ton dzalapató*] 'I tread over him'), *bz* from *N+ps* (e.g. *toN psomá*, being pronounced as [*tom bzomá*] 'the baker') and *gz* from *N+ks* (e.g. *toN kséno*, being pronounced as [*ton gzéno*] 'the foreigner'). It is in this respect that *dz* and *bz/gz* are similar. These *dz*, *bz* and *gz* are all sequences of two phonemes and they are the product of cross-morpheme phonological phenomena.

However, Mirambel claims that '*à la différence de ks et de ps, ts admet un corrélatif sonore dz en dehors des conditions de sonorisation*' (1950:63; his italics). By 'conditions de sonorisation' Mirambel denotes the nasal-adjacent environment. It is in this respect that *bz/gz* differ from *dz*: 'on ne rencontre jamais de groupes *gz* et *bz* en une position quelconque, autonomes et distincts de *ks* et *ps*' (1950:63). Following Mirambel, then, only *ts* may have a cognate which is not the product of the adjacency of *ts* to a nasal-ending morpheme. As we saw earlier, this  $d^Z$  results from the historical change of one consonant into  $d^Z$ . This  $d^Z$  is an independent phoneme: it has nothing to do with the  $d^Z$  which results from Mirambel's 'conditions de sonorisation'.

## 5.2 The GP approach

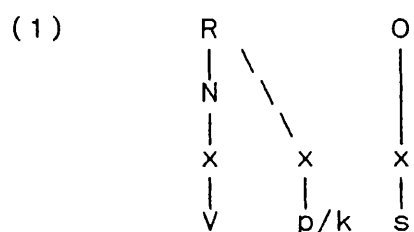
In this section, I present an analysis of the syllabic structure of MG *ts* and *ps/ks* based on the framework of GP. In 5.2.1, I review the analysis that KLV (1990) offer for the syllabic structure of *ts* and *ps/ks*. In 5.2.2, I consider the



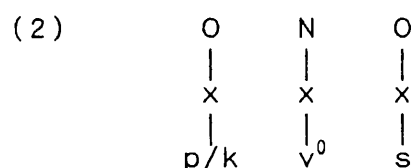
different syllabic structure possibilities that an oral stop + *s* may have. Following a GP approach and using mainly distributional arguments, I show that the syllabic structure of *ts* is that of a contour segment, while the syllabic structure of *ps/ks* is that of a sequence of two onsets separated by an empty nucleus. In 5.2.3, I argue that, like the low-toned oral stops discussed in 3.2.2, *dz* is derived from the spreading of the  $L^-$  element from a strictly adjacent nasal segment to *ts*. I also argue that the different syllabic structures of *ts* and *ps/ks* are reflected in their respective low-toned cognates and the distribution thereof.

### 5.2.1 The analysis offered by KLV (1990)

KLV (1990:216) suggest an analysis of the *ps/ks* sequences in languages such as English, French and Greek. According to this analysis, the syllabic structure of *ps/ks* is different from that of *ts* and similar to that of the *pt/kt* sequences. As I mentioned in Chapter 4, KLV mainly concentrate on evidence coming from the distribution of *ps/ks* (as well as *pt/kt*) in English and French. In these languages, clear evidence seems to exist that *ps/ks* are genuine interconstituent sequences (1). KLV (1990) assume that this structure is also shared by the MG *ps/ks* sequences.



Nevertheless, the fact that *ps/ks* show evidence for an interconstituent structure in English and French does not mean that all languages which possess these sequences necessarily adopt the same structure. Some languages may adopt a syllabic structure in which *ps/ks* are sequences of two onsets separated by an empty nucleus (2). MG is free to choose either (1) or (2).



KLV's (1990) analysis also shows that *ts* and *ps/ks* behave in a phonologically different manner. This dissimilarity of behaviour leads KLV to conclude that *ts* is not an interconstituent structure, but rather a contour segment. They cite various pieces of evidence from English, French, Gascon and MG in favour of the contour segment structure for *ts*.

In English, for instance, the nucleus obligatorily shortens before all interconstituent structures (including *ps/ks*, a fact strengthening the assumption that *ps/ks* are interconstituent sequences) but is allowed to remain long before *ts* (e.g. <pizza>, versus <vixen> and <lapse>). In Quebec French, the nucleus may be lax in closed syllables (e.g. <fixer> 'fix'; this is impossible before *ts*, where the nucleus is always tense, e.g. <Mitsou> 'female's name', <pidza> 'pizza'). In Gascon, stem-final *p* and *k* become *t* in the plural forms (e.g. <sak> - <sats>). Finally, in MG only stem-final *t* changes before the suffix {-si} (e.g. [[plék+o]] becomes [pléksi], but [[plít+o]] becomes [plíksi] (see 5.2.2)).

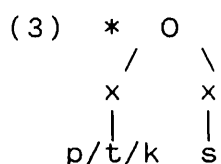
### 5.2.2 Possible syllabic structures for MG oral stops + s

The syllabic structures we can assume for *ts* and *ps/ks* are, at least in principle, four. First, they may form a branching onset. Second, they may constitute a sequence of two onsets separated by an intervening empty nucleus. Third, they may form an interconstituent sequence of a rimal complement and an onset head. Fourth, they may constitute contour segments.

In this sub-section, I examine the fit between each of the above-mentioned syllabic structures and each of the *ts* and *ps/ks* sequences. Specifically, I first explore and exclude the possibility of *ts/ps/ks* forming a branching onset. I then deal

with the remaining three possibilities. I argue that on the basis of distributional and other evidence *ps/ks* can never be contour segments or interconstituent sequences; they can only be sequences of two onsets separated by an empty nucleus. I conclude this sub-section by showing that the structures of interconstituent sequences and intervening empty nucleus should be rejected for *ts* which shows clear evidence of a contour segment structure.

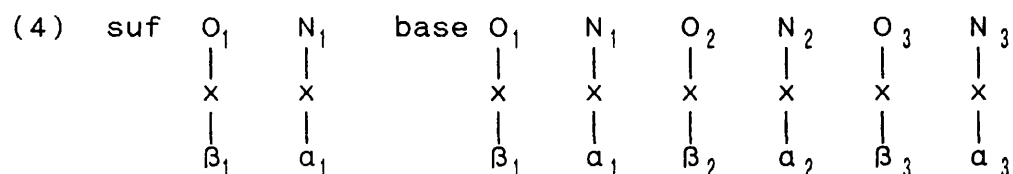
Let me begin with the branching onset structure. If any of the MG *ts/ps/ks* formed a branching onset, it would assume structure (3).



A structure like (3) is universally excluded for languages allowing branching onsets. According to Harris (1990:277), 'the governed position [within an onset] is always occupied by a sonorant of some kind'. This stipulation, which hopefully will soon be derivable from some more primitive theoretical notion, clearly excludes sibilants from ever occurring in an onset complement position: 'supposed onset clusters, in which the right-hand slot is filled by a stop or fricative (*kt*, *pn*, *kn*, *ps* and the like) . . . can be shown to be heterosyllabic; either the first member appears in a 'coda' position, or the two consonants occur in separate onsets with an intervening empty nucleus' (Harris 1990:297).

Let me proceed to examine whether *ps/ks* can ever form contour segments. The evidence I use refers to the MG reduplication process. As I already mentioned in Chapter 4, reduplication is not as productive in MG as it was in AG. However, it still exists for a limited number of words which share one characteristic, namely that their base forms have non-branching  $O_1$  (4) (e.g. *le-léki* 'very tall man' and *ku-kúla*

'hood').



Words whose  $O_1$  head of the stem is either required to govern an onset complement or license a rimal complement are all fossilised forms retained from the AG vocabulary (e.g. [tetriména] 'cliché' and [eskeména] 'on purpose') (4.1.2).

For *ps/ks* or *ts* to participate in MG reduplication processes, they must form non-branching onsets. This means that they can only occupy one skeletal position, i.e. they must be contour segments. If, however, they do not reduplicate as *ts/ps/ks* they assume one of the following three syllabic structures: (i) interconstituent, (ii) intervening empty nucleus or (iii) branching onset.

In MG, we do not find any reduplication forms such as *psVpsV*<sup>6</sup> or *ksVksV*, although there exist some *tsVtsV* words. I refer to the latter later in this sub-section. The lack, however, of *psVpsV* and *ksVksV* reduplication forms indicates that (i) the status of *ps/ks* is different from that of *ts* and (ii) unlike *ts*, neither *ps* nor *ks* are contour segments.

Having, then, also excluded the contour segment option for *ps/ks*, I now turn my attention to the two alternative structures that remain for them, i.e. (i) two onsets separated by an empty nucleus and (ii) interconstituent sequences. Once I establish the syllabic structure of *ps/ks*, I will then turn to *ts*.

The syllabic structure assumed when a nucleus intervenes

<sup>6</sup>The only exception that exists is that of the onomatopoeic word [psipsína] 'kitten'. Following 4.1.2, onomatopoeic words fall beyond the domain of my investigation.

between two onset heads is that of (2). On the face of things, this structure can be rejected for both *ps* and *ks* because of the lack of positive evidence for its existence. Specifically, nowhere in the morphological paradigm of MG nouns or verbs where the *ps/ks* sequences occur does a vowel ever intervene between either of *p/k* and *s* (e.g. \*[*pisomí*] for [*psomí*] 'bread', \*[*apesifó*] for [*apsifó*] 'defy' and \*[*kisílo*] for [*ksílo*] 'wood').

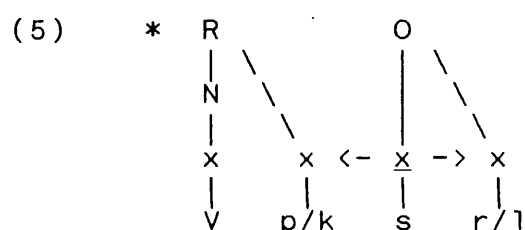
However, I cannot exclude the possibility of a nucleus existing there merely on the basis of a lack of positive evidence for its presence. Just as with *pt/kt* and *pn/kn*, there may well exist an empty nucleus between *p/k* and *s*. Careful analysis reveals that MG provides significant evidence in favour of this option. I present this evidence below.

To begin with, the existence of sequences such as *pt/kt* and *pn/kn* (Chapter 4) implies that there are no co-occurrence restrictions between *p/k* and *s/t/n* (as there were for the *NC* sequences of 3.2.2). The segments *p/k* and *s* show no signs of being in a governing relation: the segment *s* of these sequences can easily be replaced by *t* or *n*.

Secondly, as I show in this chapter, *ps* and *ks* behave identically to *pt/kt* and *pn/kn*. This similarity of behaviour can only indicate that *ps/ks*, *pt/kt* and *pn/kn* share an identical syllabic structure. Knowing that *pt/kt* and *pn/kn* form sequences of two onsets separated by an empty nucleus (4.1.2 and 4.2.2), I can only assume that *ps/ks* also share this structure.

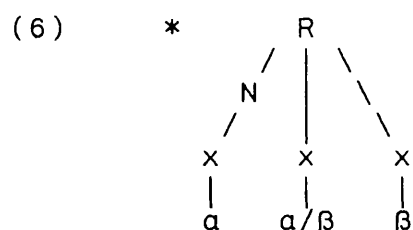
Thirdly, if *ps/ks* were true interconstituent sequences, we would expect them to behave like other interconstituent sequences. For one thing, they should (i) allow onset complements and (ii) forbid rimal complements. Let me explore each possibility in turn.

Regarding onset complements, if *ps/ks* were genuine interconstituent sequences, they should allow *r* and/or *l* to follow them. Recall from Chapters 2 through 4 that *r/l* are the neutral segments which typically occur in governed positions. If, then, *ps/ks* were interconstituent structures, sequences like \**psr* or \**ksl* (where the oral stop occurs in a rimal complement position and *sr* or *sl* occur in the branching onset position (5)), should be attested in MG in both word-initial and word-medial positions. This is never the case: neither word-medially nor word-initially can *ps/ks* ever be followed by *r/l*<sup>1</sup>.



Regarding rimal complements, we know that if *ps/ks* were genuine interconstituent sequences, they should never allow another non-nuclear segment to precede them. This restriction results from the fact that the first member of any interconstituent sequence occurs in the rimal complement position. If another segment were to precede *p/k*, the rime would end up with three skeletal positions. Recall that the head of the rime is always a nucleus (2.4). As a result, for those languages which allow branching rimes, a maximum of only one second member can occur in the rime. This second member can be either a nuclear or a non-nuclear segment. Should two non-nuclear segments occur in the rimal complement position, the binarity theorem (2.4) is violated (6).

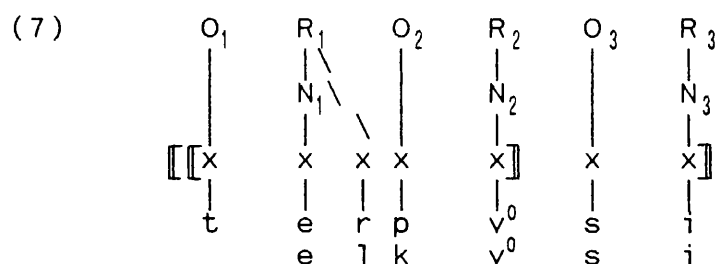
<sup>1</sup>This argument is weakened by the fact that maybe *sr* and/or *sl* are not branching onsets anyway. It is indeed true that there seems to be evidence in favour of the exclusion of *s* from an onset head position in many languages of the world (J. Kaye:p.c.). However, as this issue is far from closed, I will maintain this argument, albeit tentatively, until such time as phonologists have reached a definite conclusion upon this issue.



If, then, any of the *ps/ks* sequences are genuinely interconstituent, we would expect them to occur only after a vowel. However, there exist MG words of both analytic and non-analytic morphology which allow a non-nuclear segment to precede the *ps/ks* sequences. I first review the analytic words which provide two pieces of evidence against the assumption of the interconstituent structure. Then, I examine the non-analytic words.

The first piece of evidence against the interconstituent structure of *ps/ks* comes from the existence of words like [é/ksi] 'attraction' and [té/psi] 'enjoyment'. In these words, *ps/ks* are preceded by a strictly adjacent non-nuclear segment. The existence of such words not only excludes the interconstituent structure for *ps/ks*, but also lends support to the structure of two onsets separated by an intervening empty nucleus (i.e.  $pv^0s/kv^0s$ ).

The second piece of evidence against the interconstituent structure of *ps/ks* comes from the fact that these words display analytic morphology. Concretely, the segments *p/k* and the segment *s* of the words [é/ksi] and [té/psi] do not belong to the same governing domain. The morphological structure of all the analytic *-lksi* and *-rpsi* words is [[A]B] (7).



The proof that the boundary falls between *p/k* and *s* comes from the existence of words of two kinds. The first set of words consists of the stems {*élkv<sup>o</sup>*-} and {*térpv<sup>o</sup>*-} and the non-analytic suffixes (e.g. [*élk+o*] 'I attract', [*elk+istik+ós*] 'attractive', [*élk+iθr+o*] 'sleigh'). The second set of words consists of words which accept the analytic suffix {-*si*} (e.g. [[*lámpv<sup>o</sup>*]*si*] 'shine' and [[*kámpv<sup>o</sup>*]*si*] 'flexion'). These words show that two syllabification domains (i.e. {*élkv<sup>o</sup>*-}/{*térpv<sup>o</sup>*-} and {-*si*}) occur in the words *élkv<sup>o</sup>si* and *térpv<sup>o</sup>si*.

In (7), the oral stop (i.e. *p/k*) occurs in the last onset position (*O<sub>2</sub>*) of morpheme {*A*} and is strictly adjacent to the rimal complement position which is filled with the segment *r/*. This oral stop (*O<sub>2</sub>*) is licensed by the empty nucleus which follows it (*N<sub>2</sub>*). This nucleus (*N<sub>2</sub>*) happens to be final in this governing domain (of morpheme {*A*}). The reader may recall that final empty nuclei are licensed in MG (2.11.1). As a result, the final empty nucleus of the stem (*N<sub>2</sub>*) is phonetically inaudible. The segment *s* occurs in the *O<sub>3</sub>* position (morpheme {*B*}) and is independent of the preceding morpheme ({*A*}), as the brackets show. The oral stops *p/k* and *s* are phonetically adjacent, their intervening nucleus being phonetically unrealised.

In (8), I present the stems {*térp-*} and {*élk-*} with a present tense non-analytic suffix and the analytic suffix {-*sV*} forming (i) other tenses of the verbal paradigm (pres.subj./future) and (ii) the feminine gender nouns (nominal paradigm).

(8)	Present	[ <i>térp+o</i> ]	[ <i>élk+o</i> ]
	Pres.subj/future	[[ <i>térpv<sup>o</sup></i> ] <i>so</i> ]	[[ <i>élkv<sup>o</sup></i> ] <i>so</i> ]
	Noun	[[ <i>térpv<sup>o</sup></i> ] <i>sí</i> ]	[[ <i>élkv<sup>o</sup></i> ] <i>sí</i> ]

This evidence shows that *ps/ks* can occur across analytic morpheme boundaries. This implies that at least in these cases *ps/ks* are not genuinely interconstituent, an empty nucleus intervening between *p/k* and *s* (2). In Chapter 6, I provide



additional evidence in favour of the existence of an empty nucleus in the final nuclear position of morpheme {A} of the analytic {-si}-ending words. Concretely, I show how the presence of this empty nucleus forbids the spreading of the  $L^-$  element from a nasal segment to its licensing oral stop.

Let me now turn to some non-analytic words which also allow *ps/ks* to be preceded by strictly adjacent non-nuclear segments (e.g. [marksistís] 'Marxist', [afksiméno] 'increased', [éfksinos] 'Euxine (geographical name)' and [éfpsixos] 'courageous'). As far as phonology is concerned, these words constitute one analytic domain and both *p/k* and *s* belong to this morphological domain. In these words, *ps/ks* do not occur across morpheme boundaries (i.e. \*[[[mark] sistís], \*[[[afk] siméno], \*[[[éf] ksinos] and \*[[[éf] psixos]). Any existing morphological boundary is only etymological (non-analytic) (i.e. [marks+ist+ís], [afks+imén+o], [éf+psix+os] and [éf+ksin+os]).

Again, the existence of words such as (i) [sað+ist+ís] 'sadist' and [vasan+ist+ís] 'torturer', [parapit+imén+o] 'falsified' and [parat+imén+o] 'abandoned', [kal+ós] 'good' and [kak+ós] 'bad' and (ii) [markv<sup>o</sup>s+ism+ós] 'Marxism' and [markv<sup>o</sup>s+istik+ós] 'Marxist', [afkv<sup>o</sup>s+án+o] 'increase (verb)', [áfkv<sup>o</sup>s+is+í] 'increase (noun)' and [afkv<sup>o</sup>s+omí+os] 'alternate increase and decrease', [én+pv<sup>o</sup>six+os] 'animate' and [pv<sup>o</sup>six+í] 'soul' proves that two syllabification domains (i.e. {-istís}, {-iméno}, {-os} and {markv<sup>o</sup>s-}, {afkv<sup>o</sup>s-}, {pv<sup>o</sup>six-}) are present in the words markv<sup>o</sup>sistís, afkv<sup>o</sup>siméno and éfksinos.

Given (i) the non-analytic morphological structure of the above-mentioned words, (ii) the possibility of a strictly adjacent non-nuclear segment preceding *ps/ks*, (iii) the binarity theorem (2.4) and (iv) the well-formedness condition of phonological strings (2.11.1), the only possible structure these words can assume is that of (9), where an empty nucleus

(9)

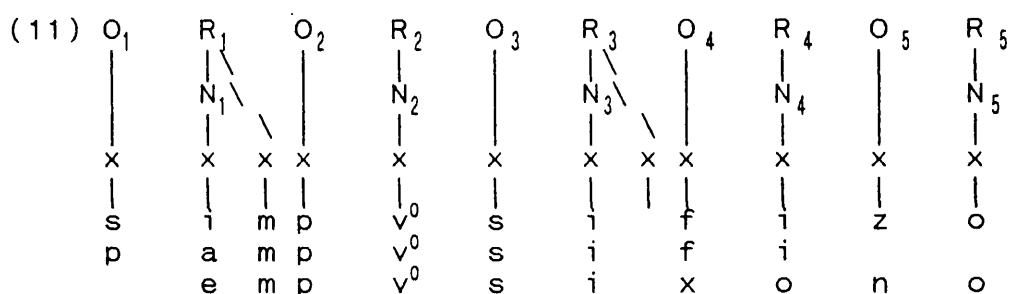
$O_1$	$R_1$	$O_2$	$R_2$	$O_3$	$R_3$	$O_4$	$R_4$	$O_5$	$R_5$		
$\downarrow$	$\downarrow$ $N_1$	$\downarrow$	$\downarrow$ $N_2$	$\downarrow$	$\downarrow$ $N_3$	$\downarrow$	$\downarrow$ $N_4$	$\downarrow$	$\downarrow$ $N_5$		
$x$	$x$	$x$	$x$	$x$	$x$	$x$	$x$	$x$	$x$		
$m$	$a$	$r$	$k$	$v^0$	$s$	$i$	$s$	$t$	$i$	$s$	$v^0$
	$a$	$f$	$k$	$v^0$	$s$	$i$	$m$	$e$	$n$	$o$	$v^0$
	$e$	$f$	$k$	$v^0$	$s$	$i$	$n$	$o$	$s$	$v^0$	$v^0$
	$e$	$f$	$p$	$v^0$	$s$	$i$	$x$	$o$	$s$	$v^0$	$v^0$

(10) \*  $O_1$   $R_1$   $O_2$   $R_2$   $O_3$   $R_3$   $O_4$   $R_4$   $O_5$   $R_5$

$\begin{array}{cccccccccccc} | & | & | & | & | & | & | & | & | & | \\ | & N_1 & | & N_2 & | & N_3 & | & N_4 & | & N_5 \\ | & | & | & | & | & | & | & | & | & | \\ x & x & x & x & x & x & x & x & x & x \\ | & | & | & | & | & | & | & | & | & | \\ m & a & r & v^0 & s & l & t & l & s & v^0 \\ & a & f & v^0 & k & i & m & e & n & o \\ & e & f & v^0 & k & i & n & o & s & v^0 \\ & & f & v^0 & p & s & i & o & s & v^0 \end{array}$

<sup>8</sup>The reader may have noticed that structure (9) is identical to that of the words *arkv<sup>o</sup>tiki* and *irkv<sup>o</sup>ti* (4.1.2) and *siNpv<sup>o</sup>tosi* and *éNpv<sup>o</sup>nefsi* (4.2.2).

{-*psix*-}). The forms we should obtain when the nasal-ending prefixes are used are [*empsixóno*] ≈ [*e(m)bsixóno*] 'encourage', [*pampsifi*] ≈ [*pa(m)bsifi*] 'unanimously' and [*simpsifizo*] ≈ [*si(m)bsifizo*] 'balance or compensate'. In all of these forms, the nasal is homorganic to the following stop. Moreover, the  $L^-$  element is allowed to spread from the nasal onto the following stop rendering the latter low-toned. Following 3.2.2, these interactions can only take place when the nasal segment is strictly adjacent to an oral stop. Consequently, a structure like (10) should be excluded. The correct structure is given in (11).

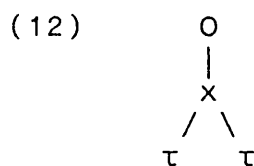


The above-mentioned shortcomings lead me to reject the interconstituent structure for *ps/ks* and adopt the structure of two onset heads separated by an empty nucleus. Let me, then, sum up the arguments in favour of the latter structure. First, *ps/ks* fail to show systematic co-occurrence restrictions (*t* and *n* may also occur with *p* and *k*). Second, *ps/ks* display identical phonological behaviour with *pt/kt* and *pn/kn*, which allow an empty nucleus to intervene between them. Third, *ps/ks* can occur across analytic morpheme boundaries (*élkv<sup>0</sup>-si*). Fourth, *ps/ks* both allow rimal complements to precede them in both analytic and non-analytic words ([*élkv<sup>0</sup>si*] and [*markv<sup>0</sup>+sistís*], respectively). Fifth, if a nasal segment precedes the *ps/ks* sequences, it is homorganic to the oral stop ([*empsixos*]). Sixth, when preceded by nasal-ending non-analytic prefixes, the oral stops become voiced ([*embsixóno*]). These two interactions imply the strict adjacency of the nasal and oral stop. Seventh, the lack of participation of both *ps/ks* in reduplication processes

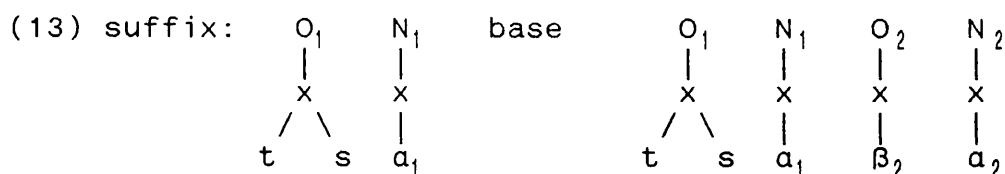
excludes the possibility of their forming contour segments. Eighth, the theory-internal impossibility of *s* occurring in onset complement positions allows the rejection of the branching onset status for *ps/ks*.

I conclude this sub-section by examining the syllabic structure that should be assigned to *ts*. The reader may recall that earlier in this sub-section I have excluded the possibility of *ts* forming a branching onset on Harris's (1990) stipulation that *s* cannot occur in onset complement positions. I now present some distributional evidence from the MG reduplication process which not only excludes the branching onset, interconstituent and intervening empty nucleus options, but also provides evidence in favour of the contour segment structure.

Given that reduplication processes are only witnessed in words whose  $O_1$  of the base is non-branching, the existence of *tsVtsV* reduplication forms would imply that its two segments (*t* and *s*) occupy only one skeletal point, i.e. one timing unit. In other words, if we find MG reduplication forms whose base  $O_1$  position is filled with *ts*, this *ts* must be a complex segment, as illustrated in (12).

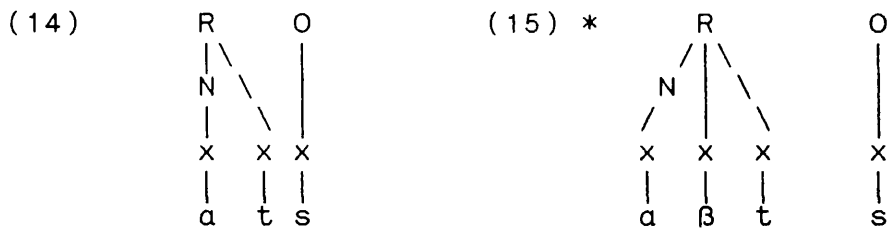


This is indeed the case. In MG we have reduplication forms such as [*tsitsíði*] 'stark naked', [*tsatsára*] 'comb', [*tsutsúni*] 'dick' and [*tsetsé*] 'tsetse' (13).

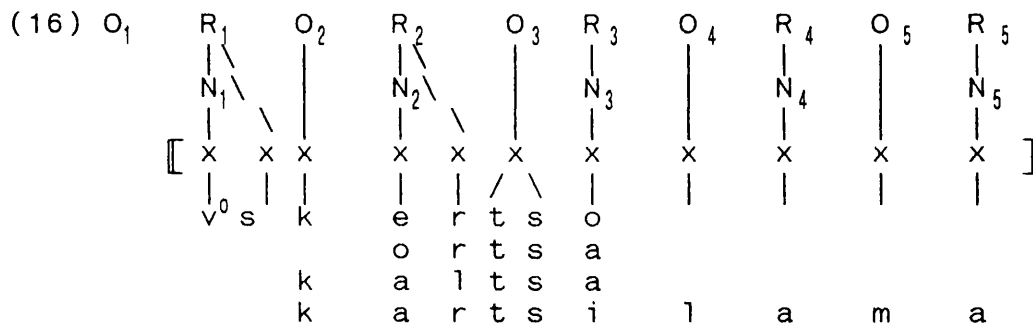


The above evidence that *ts* forms a contour segment rather

than an interconstituent sequence or a sequence of two onsets can be tested further. If *ts* were a genuine interconstituent sequence (14), it should never allow a strictly adjacent non-nuclear segment to precede it (15).



If *ts* allows non-nuclear segments to precede it, the interconstituent syllabic structure should be rejected. In fact, *ts* allows other strictly adjacent non-nuclear segments to precede it, as in the words [skértso] 'jest', [órtsa] 'luffing', [káltsa] 'sock' and [kartsilámás] 'a dance' (16).



Furthermore, if *ts* consisted of two onsets separated by an empty nucleus, it should behave in a similar way to *ps/ks*. It should, for instance, occur across analytic morpheme boundaries. This, however, is not the case in MG. All the words where *ts* is preceded by a non-nuclear segment display non-analytic morphology, i.e. [[A+B]]. Unlike *ps/ks*, the oral stop of *ts* can never belong to the first morpheme and *s* to the second morpheme of even non-analytic words (e.g. [[tsíx/ta]] 'thrush' (morpheme-initially), [[órtsa/ro]] 'luff' (morpheme-finally), [[kótsif/as]] 'blackbird' (morpheme-medially in etymological stem) and [[míkr/útsik/os]] 'smallish' (morpheme-medially in etymological suffix)).

Just as we would expect from a contour segment, *ts* never occurs across analytic boundaries. It always occurs as an unbreakable unit. One may, then, ask how verb stems which end with *t* form those verb/noun forms which require the addition of the analytic suffix {-sV}? In these cases *t* and *s* should surely occur across a morphological boundary. A similar fact would imply that, just like *ps/ks*, *ts* also consists of two onsets separated by an empty nucleus.

However, these {-sV}-ending verbal and nominal forms show that MG treats *ts* differently from *ps/ks*. Concretely, unlike *p/k*-ending stems, those verb and noun stems which end in *t* do not form either of their present subjunctive and future tenses or their nouns with *ts*. They construct these forms in one of three different ways. In two, the segment *t* is dropped so that it does not occur across an analytic morphological boundary whose second morpheme starts with *s*. Let me examine each type in turn.

In the first type, the *t*-ending forms drop the oral stop completely and only retain *s*. For instance, [θét+o] yields [[θé]so] and [[θé]s] 'place'. The potential \**tv*<sup>o</sup>*s* sequence which would occur across the analytic boundary is avoided. In the second type, the potential \**tv*<sup>o</sup>*s* sequence is turned into a *kv*<sup>o</sup>*s* sequence, since the latter can occur across an analytic morpheme boundary, while the former cannot (e.g. [prát+o] 'make' yields [[prákv<sup>o</sup>]so] and [[prákv<sup>o</sup>]s] for the verbal and nominal forms respectively). Again, the existence of a \**tv*<sup>o</sup>*s* sequence is avoided. In the third type, *t* is retained, but the added suffix is no longer {-sV}, but {-isV} (e.g. [rot+ó] 'ask' yields [[rot]íso] and [[erót]is]; [zit+ó] 'demand' yields [[zít]íso] and [[zít]is]). The potential \**tv*<sup>o</sup>*s* sequence is, once more, avoided (17).

(17)

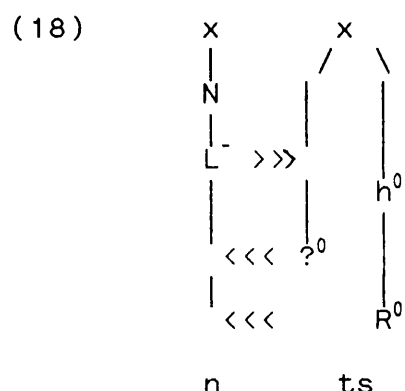
	O <sub>1</sub>	N <sub>1</sub>	O <sub>2</sub>	N <sub>2</sub>	O <sub>3</sub>	N <sub>3</sub>	
	x	x	x	x	x	x	
	z	ɿ	t	ɿ	s	ɿ	

Let me now sum up the arguments I have presented in this sub-section in favour of a contour segment structure for *ts*. First, *ts* participates in MG reduplication processes ([*tsitsíði*]). Second, *ts* allows non-nuclear segments to precede it ([*ká/tsa*]). Third, it never occurs across morpheme boundaries, even though the latter may only be non-analytic ([*tsíx/a*], [*orts-áro*], [*kótsif-as*] and [*míkr-útsikos*]). Fourth, whenever *ts* might be expected to occur across an analytic boundary (i.e. in those *t*-ending verb stems to which the analytic suffix {-*si*} is added) *t* is either dropped or the morpheme that is added to it is {-*isi*}.

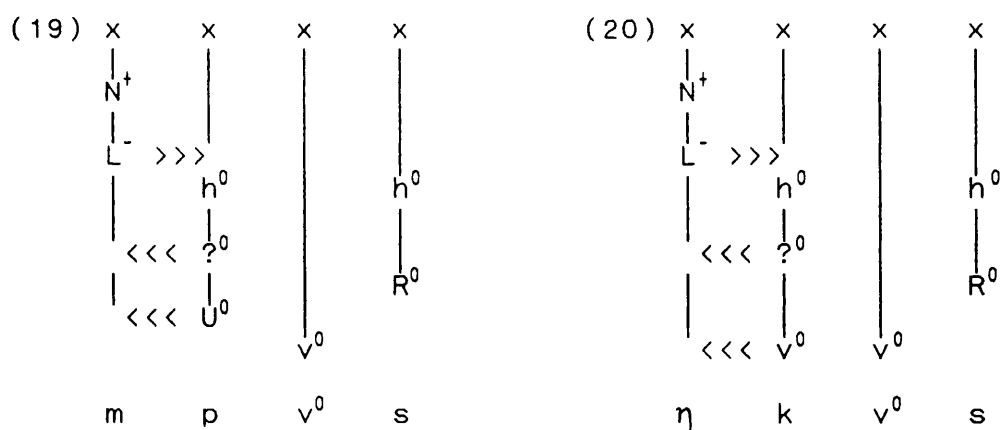
### 5.2.3 The distribution of low-toned *dz* and *bs/gs*

Following the analysis of oral stops I presented in Chapter 3, *ts* and *ps/ks* may become low-toned only in the strict adjacency of a nasal segment which fills the immediately preceding rimal complement position. The multiple interactions that take place in this environment involve the spreading of the  $L^-$  element from the nasal onto the stop and that of the  $?^0$  and place specification elements from the oral stop to the nasal (3.2.2).

When these interactions take place, the  $L^-$  element of the nasal segment spreads to the following skeletal position, rendering the segmental material that is attached to this position low-toned. When this position is occupied by the contour segment *ts*, all the segmental material attached to it is affected by the  $L^-$  element spreading. The derived segment is *dz* (18).



By way of contrast, when the L<sup>-</sup> element spreads to the *ps/ks* sequences, only the segmental material attached to the immediately following position is affected. This means that the only segment that is rendered low-toned after the spreading of the L<sup>-</sup> element of the nasal is the oral stop (i.e. *p/k*) (19), (20).



As *p/k* and *s* are separated by an intervening empty nucleus (5.2.2), the L<sup>-</sup> element cannot spread to the fricative across this nuclear position (19). As a result and contrary to the oral stop which becomes low-toned, the segment *s* of the sequences *ps/ks* remains neutral. By way of contrast, the segment *s* of the contour segment *ts* is not neutral, as it belongs to the same skeletal position as the oral stop (*t*) and is, thus, affected by the L<sup>-</sup> element spreading (18).

The same process takes place with the *pt/kt* sequences. In the strict adjacency of a nasal segment (as in the word *síNp<sup>0</sup>tosí* 'coincidence'), the first of the two oral stops



(21)

m      p       $v^0$       t

(22)

$\eta$       k       $v^0$       t

<sup>9</sup>In fact, there seem to exist some phonetic indications that the segments *s/t* are not fully voiced in these environments. Specifically, during 1990, I have carried out laryngographic and spectrographic analyses of a number of MG nuclear and non-nuclear sequences. These included a number of *Nts* sequences, one *Nps* and one *Npt* sequences. Some of the findings of this analysis appear in Pagoni (1990). The analysis of these *Nts/Nps/Npt* sequences revealed the presence of considerable laryngeal activity during the pronunciation of *dz/b*. By way of contrast, during the pronunciation of the segments *s/t* of both the *Nps/Npt* sequences, the laryngeal activity was considerably diminished. Admittedly, all words were pronounced by only one speaker. More importantly, however, these experiments were severely limited in number. I accordingly refrain for the moment from considering the above as conclusive phonetic evidence in favour of the voiceless state of the segment *s/t* in the *Nps/Npt* sequences. More experiments are clearly needed before such phonetic evidence can be cited here as conclusive.

thesis, I use the symbols *s* and *t* (i.e. *bs/g<sub>s</sub>* and *bt/g<sub>t</sub>*) when the *ps/ks* and *pt/kt* sequences have been rendered low-toned in the strict adjacency of a nasal segment (e.g. [*si(m)bsif<sub>z</sub>o*] for *siNp<sub>v</sub><sup>o</sup>sif<sub>z</sub>o* and [*pá(m)btoxos*] for *páNp<sub>v</sub><sup>o</sup>toxos* 'very poor'). By way of contrast, I use the symbol *dz* when *ts* has been rendered low-toned in the strict adjacency of a nasal segment. This notation signals that the totality of the segmental material attached to the skeletal position which *ts* fills has been rendered low-toned (e.g. [*dzáki*] for *Ntsáki*, \*[*dsáki*] 'fireplace').

Let me now turn to the environments which give rise to strict adjacency between a nasal segment and *ps/ks*. The first environment where *ps/ks* may occur in the strict adjacency of a nasal segment and, as a result, become low-toned is after one of the nasal-ending non-analytic prefixes (e.g. {*eN-*}, {*siN-*} and {*paN-*} as in the words *emp<sub>v</sub><sup>o</sup>sixóno*, *simp<sub>v</sub><sup>o</sup>sif<sub>z</sub>o* and *pamp<sub>v</sub><sup>o</sup>sif<sub>i</sub>* I introduced in 5.2.2). The second environment where *ps/ks* may become low-toned because of their strict adjacency with a nasal segment is after a nasal-ending proclitic (e.g. *toN*, *tiN*, as in *toN p<sub>v</sub><sup>o</sup>sará* 'the fisherman' and *tiN kv<sup>o</sup>silia* 'the timber'). The latter *NC* sequences occur across a MinSB (1.1).

In both cases, the *L̃* element spreads from the nasal segment of the prefix or proclitic onto the strictly adjacent licensing oral stop (and not, as I explained, to the fricative). As the reader knows from 1.2, this *L̃* element spreading is not obligatory for *ps/ks* when prefixes are involved and when the *NC* sequences occur across a MinSB. I explain why this is so in Chapter 6.

These are the only environments which give rise to *Nps/Nks* in MG. In other words, there are no cases of lexical *bs/g<sub>s</sub>* in MG, just as there are no cases of lexical *b/d/g* in the language. In the same way, no cases of lexical *bt/g<sub>t</sub>* and *bn/g<sub>n</sub>* can be found in MG. The only way we may come across sequences like *bt/g<sub>t</sub>* and *bn/g<sub>n</sub>* is when the first oral stop of,

respectively, the *pt/kt* and *pn/kn* sequences (i.e. *p/k*) occurs after a nasal-ending prefix (e.g. *siNpv<sup>o</sup>tosi* and *eNpv<sup>o</sup>néo*) or a nasal-ending proclitic (e.g. *tiNpv<sup>o</sup>tósi* 'the fall' and *tiNpv<sup>o</sup>noí* 'the breath'). Just as with *ps/ks*, the interactions between the  $L^-$  element of the nasal segment of either the nasal-ending etymological prefix or the proclitic and the first oral stop of the *pt/kt* and *pn/kn* sequences are also not obligatory. I explain why this is so in Chapter 6.

Let me now turn to *ts*. Just as with *ps/ks*, there exist two environments where *ts* can be preceded by a nasal. However, only one of these environments is identical to that of *ps/ks*. This is the environment across a MinSB. Just like the remaining non-complex oral stops (i.e. *p/t/k*) and the stop-initial sequences we have seen (i.e. *ps/ks*, *pt/kt* and *pn/kn*), *ts* becomes low-toned after a nasal-ending clitic, always provided that speakers treat this syntactic boundary as minor (e.g. [*to(n) dza(ŋ)gári*] for *toN tsaNkári* 'the cobbler').

The segment *ts* does not appear after a nasal-ending prefix in MG. This happens because *ts* was introduced in the language when the construction of forms consisting of nasal-ending prefixes and stems which have an initial oral stop was no longer productive (i.e. *\*ents-*, *\*pants-*, *\*sints-*).

The second environment where we may come across *Nts* sequences involves the cases of lexical *Nts*. Just like the MG oral stops (i.e. *p/t/k*) and unlike the instances of the stop-initial onset sequences *ps/ks*, *pt/kt* and *pn/kn*, there exist some lexical *Nts* sequences. The nasal segment which passes its  $L^-$  element onto the strictly adjacent *ts* does not belong to any prefix/suffix (e.g. [*Ntsák+i*] 'fireplace', [*aNtsam+ís*] 'maladroit', [*NtsuNts+és*] 'very short man' and [*suvla+Ntsíðik+o*] 'kebab house', respectively yielding [(*n*)dzáki], [*a(n)dzamís*], [(*n*)dzu(n)dzés] and [*suvla(n)dziðiko*]). These lexical *Nts* sequences which yield [dz] are unparalleled by *Nps* [*bs*] (*\*[bz]*) and *Nks* [*gs*] (*\*[gz]*).

The environments, then, where we may encounter *Nts* are different from those of *Npv<sup>0</sup>s* and *Nkv<sup>0</sup>s* and similar to those of *Np*, *Nt* and *Nk*. This fact serves as an additional indication in favour of (i) the adoption of a structure for *ts* where the two segments occupy one skeletal position (just like *p/t/k*) and (ii) the adoption of a structure for *ps/ks* where each of their segments occupies one skeletal position.

### 5.3 Summary

In this chapter, I have reviewed the literature regarding the syllabic structure of *ts*, *ps*, *ks* and their voiced cognates. I have also offered a GP analysis of these sequences which participate in MG phonological variation processes (their first segment is an oral stop). In my discussion, I have argued against KLV's (1990) view that *ps/ks* are interconstituent sequences in MG. I have produced evidence in favour of the lack of co-occurrence restrictions between *p/k* and *s/t/n*. I have also showed that *ps/ks* (i) can occur across analytic morpheme boundaries and (ii) can allow rimal complements to precede them in both analytic and non-analytic words. In addition, I have demonstrated that when *ps/ks* are preceded by any of the nasal-ending non-analytic prefixes, their oral stop becomes low-toned, while the nasal is rendered homorganic to the oral stop. These two facts indicate the strict adjacency of these two segments and exclude the possibility of *p/k* and *s* being strictly adjacent. Lastly, the lack of participation of both *ps/ks* in MG reduplication processes and the fact that *s* cannot occur in onset complement positions have led me to propose that *ps/ks* form sequences of two onsets separated by an empty nucleus.

In this chapter, I have also argued (alongside KLV (1990)) that *ts* should assume a different syllabic structure from *ps/ks*. I have provided evidence in favour of a contour segment structure. Specifically, I have argued that *ts* (i)

participates in MG reduplication processes, (ii) allows non-nuclear segments to precede it and (iii) never occurs across morpheme boundaries, even though the latter may only be non-analytic. Lastly, whenever *ts* might occur across an analytic boundary (i.e. in those *t*-ending verb stems to which the analytic suffix {-*si*} is added) *t* is either dropped or the morpheme {-*isi*} is added to it.

Finally, I have shown in this chapter that the different syllabic structure of *ts* and *ps/ks* is reflected in the formation and distribution of their voiced cognates.

## CHAPTER SIX

### A GOVERNMENT PHONOLOGY ANALYSIS OF MODERN GREEK PHONOLOGICAL VARIATION

#### 6.0 Introduction

In this chapter I assemble and further develop the GP explanations I have so far provided (Chapters 3 through 5) for the behaviour of MG *NC* sequences which occur within a variety of syllabic structures. My aim is twofold. I first want to show that it is the syllabic structure assigned to MG words by a GP-defined grammar that determines the phonological behaviour of their *NC* sequences. The analysis I provide examines the particular patterns of phonological behaviour that each syllabic structure generates. My second goal is to demonstrate how the grammar defined for MG by a restrictive theory of syllabic structure such as GP is capable of generating (i) all and only the grammatical contexts within which *NC* sequences may occur and (ii) all and only the attested variants that each context possesses.

In order to achieve these goals, I present in 6.1 an explanatory account of the linguistic aspect of MG phonological variation. I discuss each of the four contexts that a GP-defined grammar of MG assigns to words which contain *NC* sequences. I also examine the phonologically conditioned variant(s) that each syllabic structure may have. Lastly, I explain why the *NC* sequences of particular syllabic structures behave the way they do in MG. An analysis of MG phonological variation would be incomplete without a discussion of the central but highly controversial prenasalisation issue. In 6.2, I explore the question of its existence in MG and, ultimately, argue against it.

## 6.1 GP and the phonological behaviour of the MG *NC* sequences

This section is divided into two sub-sections. In 6.1.1, I present the four syllabic contexts potentially involved in phonological variation processes. I show that two of these contexts are categorical, i.e. the grammar allows only one realisation for their *NC* sequence. I also show that the other two contexts allow optionality, i.e. the grammar allows each of these two contexts to have a minimum of two realisations for its *NC* sequence. I draw attention to the fact that the variants the grammar defines for each of the four syllabic structures are all phonologically conditioned. Lastly, I show that in those syllabic structures which allow optionality (i.e. more than one realisation for their *NC* sequence) it is purely social and stylistic (i.e. extragrammatical) factors that determine which particular variant (out of all the possible variants for the syllabic structure in question) gets selected in speech.

In 6.1.2, I provide the GP explanations for the phonological behaviour of the *NC* sequences that occur in each of the syllabic contexts defined by the MG grammar. My aim is to show that syllabic structure can explain why certain contexts exclude, while others allow, optionality.

### 6.1.1 *NC* sequences in context

In Chapters 3 through 5, I have presented four different syllabic contexts within which *NC* sequences may occur. All of these contexts are expressed in terms of syllabic structure and are defined by the grammar of MG that the theoretical framework of GP has generated.

Each of the four syllabic structures within which MG grammar allows *NC* sequences to occur exhibits a different phonological behaviour, i.e. gives rise to different variants. This means that each of the contexts within which an *NC*

sequence may occur is not only different with respect to syllabic structure, but also behaves differently with respect to variation.

In (1) below, I assemble the 4 syllabic structures within which *NC* sequences may occur in MG. I also present their respective realisation(s). A detailed discussion of each syllabic context and its realisation(s) follows in 6.1.2.

(1) Syllabic structure	Realisation
(a) ...βv <sup>o</sup> NCV...	<i>D</i>
(b) [[...VNCv <sup>o</sup> ] CV...]	<i>NC</i>
(c) #v <sup>o</sup> NCV... <sup>1</sup>	
...(β)VNCV...	<i>ND</i> ≈ <i>D</i>
(d) (β)VNCv <sup>o</sup> βV...	<i>NC</i> ≈ <i>ND</i> ≈ <i>D</i>

As (1) shows, the first two syllabic structures that the MG grammar defines (i.e. (1a) and (1b)) do not allow for the possibility of variability. They are categorical, i.e. they allow only one realisation for their *NC* sequence. By way of contrast, the remaining two syllabic contexts that the grammar defines (i.e. (1c) and (1d)) allow for variability, with (1c) allowing two and (1d) allowing three variants for their *NC* sequences.

At this point, it is important to note two facts. In the first place, the syllabic contexts within which particular variants occur are defined by the MG phonological system itself, and not by any extragrammatical factors (e.g. social and/or stylistic factors). Likewise, the particular variants that exist for each syllabic context are defined by the MG grammar itself and not by any extragrammatical factor. This

<sup>1</sup>The symbol #, used to mark word boundaries, is employed here and throughout this thesis to indicate the fact the v<sup>o</sup> is word-initial. In this syllabic structure, the onset preceding this v<sup>o</sup> is empty.



means that the particular variant(s) that exist for each syllabic structure are entirely phonologically conditioned. Non-phonological factors, such as the ones posited by previous accounts of the phenomenon (i.e. the Greek or foreign origin of a word, its characterisation as learned/non-learned, the speed with which the utterance is delivered, the word-medial or word-initial position in which the *NC* sequence occurs (1.2)), cannot explain why certain contexts allow, while other contexts exclude, optionality. These non-phonological factors can also not condition the variant(s) attested for each *NC* sequence.

Let me illustrate the above point by an example. The only variant that the phonological system defines as grammatical, i.e. well-formed, for a word to which the same phonological system assigns the syllabic structure ... $\beta v^{\circ}NCV$ ... (e.g.  $\acute{a}lv^{\circ}Npum$  'album') is *D* (i.e. [ $\acute{a}lbum$ ]). All other realisations of this *NC* sequence (e.g. *NC*, *ND*) are ungrammatical (i.e. ill-formed), irrespective of the social and/or stylistic circumstances under which this word is uttered (i.e.  $*[\acute{á}lmpum]$ ,  $*[\acute{á}lmbum]$ ). In the same way, the only variants that the MG phonological system defines as grammatical for a word which assumes the structure ... $(\beta)VNCV$ ... (e.g. *koNtá* 'near') are either of the *ND* or *D* variants (i.e. [*kondá*]  $\approx$  [*kodá*]). An *NC* variant for this context will always be ungrammatical (i.e.  $*[kontá]$ ), no matter what social and/or stylistic factors are prevalent during its utterance. As I pointed out, this happens because the variants of particular syllabic structures are phonologically and not socially or stylistically conditioned.

In the second place, in those environments where the phonological system allows for optionality in the realisation of the *NC* sequences (i.e. (1c) and (1d)), the selection by a speaker of a particular variant (out of the total of possible variants) does not depend on the phonological system itself. Rather, the selection of the particular variant that is used in speech (out of all the possible variants allowed for the

NC sequence in question) depends on purely social and stylistic factors, i.e. it is socio-stylistically, rather than phonologically, conditioned.

This means that in those syllabic structures in which the phonological system allows optionality, the selection of one particular variant rather than the other possible one(s) crucially depends on the social and stylistic factors that prevail at the particular moment when a specific speaker utters a word which is potentially involved in phonological variation processes<sup>2</sup>. The grammar cannot (and should not be able to) tell us what social connotations each variant has. This evaluation falls within the domains of the social matrix which is completely independent of the grammar<sup>3</sup>.

In short, then, the GP-defined grammar of MG allows NC sequences to be realised in different ways, depending on the syllabic structure within which they occur. For each syllabic structure defined by the grammar as allowing optionality (i.e. contexts (1c) and (1d)), speakers can only choose from amongst a particular set of variants that are defined (yet again by the phonological system itself) as grammatical and no other set of variants. For those syllabic contexts where the grammar forbids optionality (i.e. the categorical contexts (1a) and (1b)), speakers can only use the unique realisation that the phonological system defines as grammatical.

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<sup>2</sup>As I pointed out in Chapter 1, foremost among the social factors that influence the selection of a variant (out of the total of all the variants that the system defines as grammatical for the particular context) is the age and sex of the speakers as well as the social network they belong to. Foremost among the stylistic factors is the amount of attention a speaker pays to speech, the characterisation of a word as learned/non-learned and its Greek or foreign origin.

<sup>3</sup>The investigation of the social evaluation of particular variants falls beyond the concern of this thesis. For an examination of the social factors and their correlation with particular linguistic variants the interested reader is referred to Pagoni (in preparation)a.

### 6.1.2 How GP can explain the phonological behaviour of the MG NC sequences

As I showed in the immediately preceding sub-section, the grammar that GP defines for MG (Chapters 3 through 5) assigns four different syllabic structures to its various NC sequences. In this section, I argue that the syllabic structure within which an NC sequence occurs is the only factor determining the attested variants specific NC sequences give rise to. Concretely, my aim is to show that the NC sequences which occur in identical syllabic structures (both within and across words) also display identical phonological behaviour<sup>4</sup>. My aim is to also explain why each syllabic structure adopts the particular variation pattern it displays and no other.

In order to achieve these aims, I will examine in turn each of the 4 syllabic structures I presented in (1). I will first deal with one of the two syllabic structures that allow optionality, namely the syllabic structure that gives rise to the  $ND \approx D$  variation pattern. I will subsequently proceed to an investigation of the two categorical contexts. I will first examine the syllabic structure which gives rise to the  $D$  variant. I will then discuss the syllabic context which gives rise to the NC variant. Lastly, I will turn my attention to the second syllabic structure that allows variability, i.e. the context which generates the  $NC \approx ND \approx D$  variation pattern.

Let me begin my discussion with the syllabic structures that give rise to the  $ND \approx D$  variation pattern. These take either the form  $...( \beta )VNCV...$  or the form  $\#^{\circ}VNCV...$  (1c). In the first syllabic context, the nucleus which governs the nasal of the NC sequence is filled (i.e. has phonetic content). In

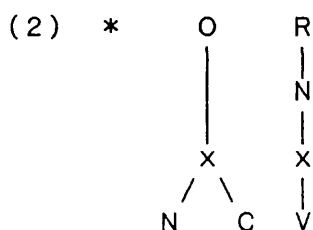
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<sup>4</sup>Recall that following Chapters 3 through 5, identical syllabic structures display identical phonological behaviour (e.g. *ps/ks*, *pt/kt* and *pn/kn* behave identically; *ts* behaves differently from *ps/ks/pt/kt/pn/kn*).

the second syllabic structure, the nucleus which precedes the NC sequence is empty and has no licensing duties to perform (its preceding onset is empty).

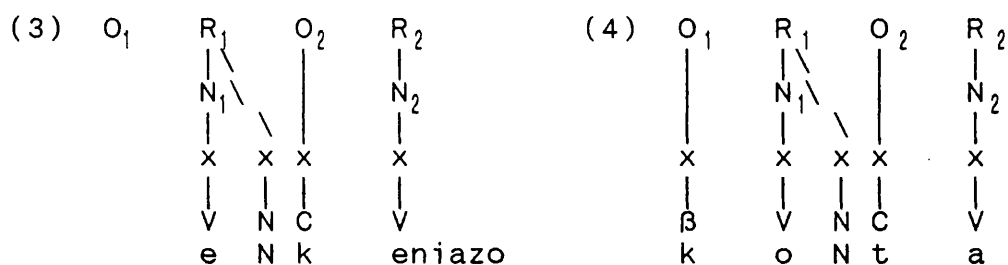
The  $ND \approx D$  variation pattern is attested within non-analytic words and across MinSBs. This pattern is also attested next to both MinSBs and MajSBs. In this variation pattern, the first variant allows the surfacing of the nasal reflex (e.g. [mbukála], [enjeniázo], [kondá] and [tim bórtá] for, respectively, the words *Npukála* 'bottle', *eNkeniázo* 'I inaugurate', *koNtá* 'near' and *tiN pórtá* 'the door'). The second variant suppresses the surfacing of the nasal reflex (e.g. [bukála], [egeniázo], [kodá] and [ti bórtá]). No variants such as \*[enkeniázo] or \*[emkeniázo], \*[mpukála] or \*[nbukála], \*[kontá] or \*[komtá] and \*[tin bórtá]<sup>5</sup>) can ever occur in MG for these NC sequences.

In GP terms, the  $L^-$  element of the nasal reflex spreads obligatorily onto the oral stop. The place specification element of the oral stop spreads to the nasal segment also obligatorily. Only the surfacing of the nasal reflex is optional (and socially motivated). As I argue in 6.2, when the nasal reflex surfaces, it does so in the rimal complement position and not as a prenasalised contour segment (2).

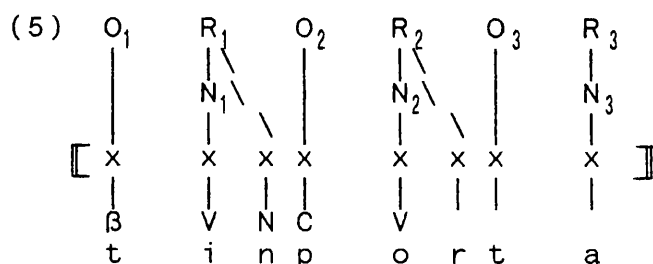


<sup>5</sup>The variant [tin pórtá] may also occur in MG but only when the MinSB involving the clitic *tiN* and the noun *pórtá* is treated as major. The syllabic structure assumed then is different from that assumed for the MinSB. I come back to this point later in this sub-section, when I examine the behaviour of NC sequences which occur across MajSBs.

Let me now present in turn each of the syllabic structures which give rise to the  $ND \approx D$  variation pattern. I will start my discussion with those cases where the nucleus which governs the nasal of the  $NC$  sequence is filled. Two configurations are possible for this structure. Firstly, the filled nucleus which governs the nasal segment may be preceded by an empty onset, as in (3). Secondly, this filled nucleus may be preceded by a filled onset, as in (4).

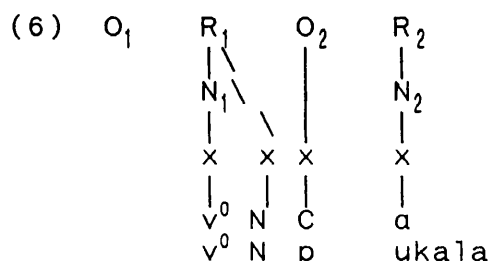


$NC$  sequences may also occur across a MinSB. In this case, the spreading of (i) the occlusion and place specification element from the oral stop to the nasal and (ii) the  $L^-$  element from the nasal onto the stop render the oral stop low-toned. The above interactions do not lend support to an analysis whereby the nasal-ending proclitic and the oral-stop-initial content word belong to different analytic domains. Instead, these interactions lend support to an analysis in which the proclitic and the content word form one analytic domain. The nasal reflex of the proclitic should be analysed as occurring in the rimal complement position and the oral stop of the content word or second clitic should be analysed as occurring in the onset head position ( $(O_2)$ , as in (5)).



The syllabic structure displayed in (5) is, then, identical to that displayed in (4). Both syllabic structures

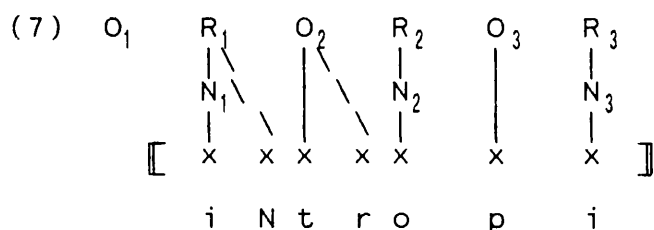
Let me now present the configuration of (6). Here, the nucleus which governs the nasal of the *NC* sequence is empty but has no licensing duties to perform (i.e. it is not preceded by a filled onset). In configurations such as those of (6), *NC* sequences also display the variation pattern  $ND \approx D$ .



In (3) through (6), we have only seen *NC* sequences which occur within etymological boundaries. In contrast, some *NC* sequences occur across etymological morpheme boundaries (e.g.  $[[eN+keniázo]]$  'I inaugurate',  $[[siN+práto]]$  'I co-operate' and  $[[páN+plutos]]$  'extremely wealthy'). However, as etymological boundaries are invisible to the phonology, the variation pattern these *NC* sequences display is also  $ND \approx D$

(i.e. [e<sup>h</sup>geniázo] ≈ [egeniázo], [simbráto] ≈ [sibráto] 'collaborate' and [pámblutos] ≈ [páblutos] 'very rich'). The syllabic structure assumed by {eN-}-initial words is identical to that of (3). The syllabic structure assumed by {siN-}/{paN-}-initial words is identical to that of (4). In all of the above-mentioned syllabic structures, a filled nucleus precedes the NC sequence. Identical syllabic structures display identical phonological behaviour.

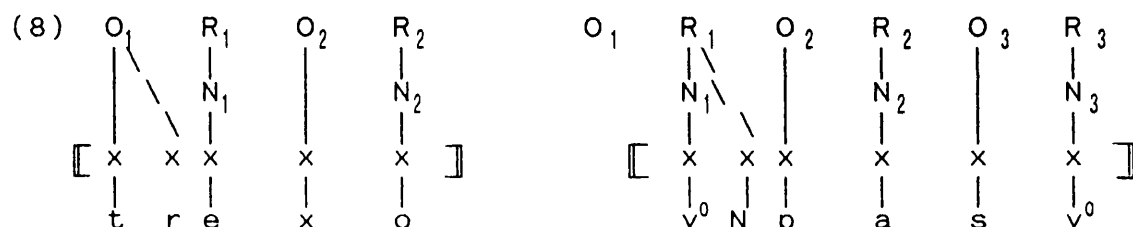
The ND ≈ D variation pattern is also attested when NC sequences which appear within the syllabic structure ... (β)NCV... occur next to either a MinSB or a MajSB. I will first look into those cases where the word preceding these NC sequences ends in a nuclear segment: next to a MinSB, the NC sequence which occurs after a nuclear segment (e.g. *i Ntropí*) allows its nasal reflex to optionally surface (e.g. [i ndropí] ≈ [i dropí]) (7).



In the above configuration, the two words form one analytic domain. The nuclear segment of the proclitic fills the N<sub>1</sub> position of the content word. The nucleus which follows the NC sequence also has phonetic content (N<sub>2</sub>). The syllabic structure assumed for *i Ntropí* is identical to that of *eNkeniázo* (...VNCV..., as in (3)), i.e. an audible nucleus governs the nasal reflex. Once again, we see that identical syllabic structures display identical phonological behaviour.

Next to a MajSB, the NC sequence which occurs after a nuclear segment (e.g. *tréxo Npas* (8)) allows its nasal reflex to optionally surface (e.g. [tréxo mbas] ≈ [tréxo bas]), i.e. this configuration also adopts the ND ≈ D pattern. However, unlike (7) above, the boundary preceding this NC sequence is

major. Consequently, I cannot analyse the two words as forming one analytic domain.





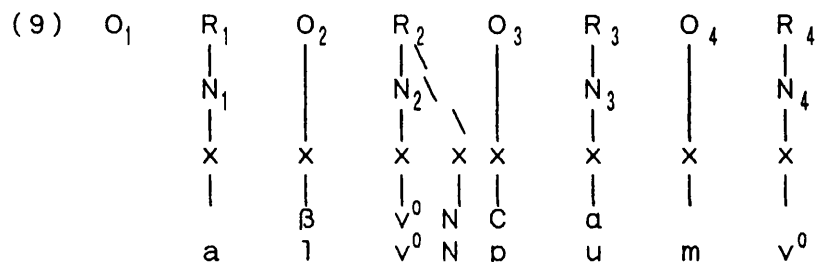
or {B}, behaves in exactly the same way as the *NC* sequences which occur in non-compound words of identical syllabic structures. Concretely, the *NC* sequences which appear in either of the two morphemes of a compound word independently undergo the various phonological operations dictated by their syllabic structure. As a result, the variation pattern they display is identical to that of a non-compound word of the same syllabic structure.

Following the above analysis, the variation pattern the morpheme  $v^ONtiméni$  of the compound word  $[[[miso]] [v^ONtiméni]]$  'half-dressed' displays is identical to the variation pattern of the non-compound word  $v^ONtiméni$  'dressed'. The two morphemes display the same syllabic structure as  $v^ONpukála$  (6). Following the analysis I provided earlier in this sub-section, this syllabic structure gives rise to the variants  $[ndiméni] \approx [diméni]$  (just like  $[mbukála] \approx [bukála]$ ). As a result, the variants that may surface for the compound word  $[[[misó]] [v^ONtiméni]]$  are  $[misondiméni] \approx [misodiméni]$ , i.e. with and without the surfacing of the nasal reflex. Once again, we see that identical syllabic structures give rise to identical variation patterns.

Let me now turn to the two categorical contexts (i.e. those environments which do not allow any variation in the realisation of their *NC* sequences). In the first of the two contexts, the only realisation allowed for the *NC* sequence is *D*. The syllabic structure which gives rise to this unique variant is that of (1a), i.e.  $... \beta v^ONCV ...$ . This syllabic structure can be attested within words and next to either MinSBs (e.g. *tis v^ONtropis* 'the shame (gen.sg.fem.)' or MajSBs (e.g. *tréxis v^ONpas* 'you run just in case').

In this syllabic configuration, the onset head position preceding the nucleus which governs the nasal reflex is filled. This filled onset is licensed by an empty nucleus which is itself licensed, following 3.2.3, by Magic Licensing.

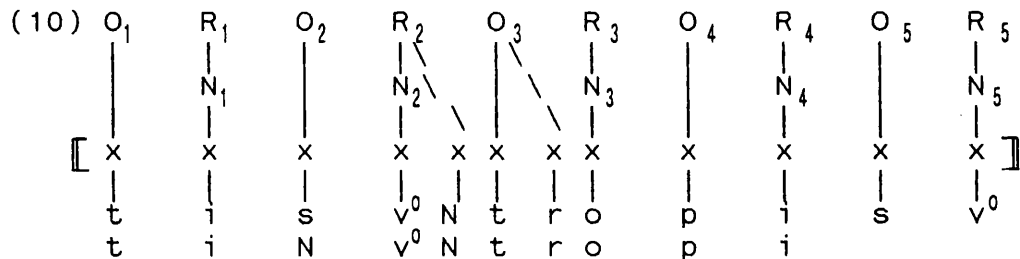
In the word *álv<sup>O</sup>Npum* 'album' (9), for example, the N<sub>2</sub> position is filled by an empty nucleus. This empty nucleus which is licensed by Magic Licensing must both govern the following nasal and license its preceding onset (O<sub>2</sub>).



At present, it is not entirely clear to me why a filled onset position preceding the empty nucleus which governs the nasal segment of the NC sequence should have this effect on the surfacing of the nasal reflex. I strongly suspect that the surfacing of this reflex may be disallowed because the governing and licensing power of the empty nucleus governing the nasal reflex is diminished. Specifically, the configuration here is that of an empty nucleus which is required to perform both governing and licensing work (to respectively its following nasal reflex and preceding filled onset), while it is not licensed through proper government or the parameter licensing domain-final empty nuclei, but by Magic Licensing. It appears that the governing power of an empty nucleus is diminished when it has to also license its preceding onset while it is itself licensed by Magic Licensing (rather than proper government). Further research is clearly needed in order to clarify this issue.

Apart from within-word positions, this categorical pattern of phonological behaviour is displayed when NC sequences occur next to either a MinSB or a MajSB following a non-nuclear segment. Let me first examine the MinSB configuration. Next to a MinSB, we may have a proclitic which ends in an audible non-nuclear segment. If this proclitic is followed by a content word which starts with an NC sequence (e.g. *tis v<sup>O</sup>Ntropis* (10)), the only attested variant is [*tis*

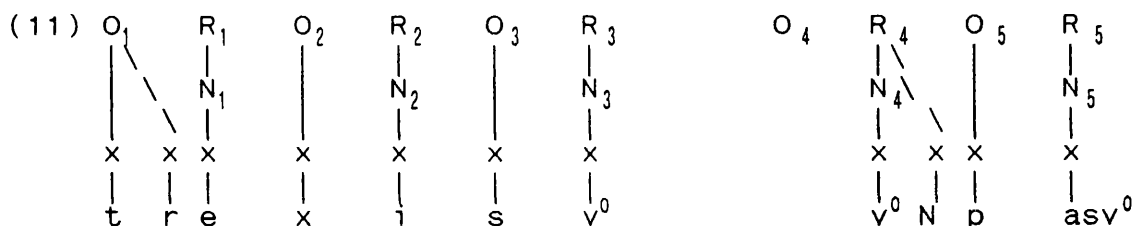
*dropís*]. No variant such as \*[*tis ndropís*] may ever occur in MG.



This leads me to analyse the proclitic and content word as forming one analytic domain (10). In this case, the empty nucleus of the content word would have to be analysed as occurring in the N<sub>2</sub> position. The syllabic structure of (10) is, then, identical to that of (9). The empty nucleus (N<sub>2</sub>) cannot be properly governed by N<sub>3</sub>, as a governing domain consisting of an NC sequence intervenes between the two nuclei. Following my discussion in 3.2.3 and earlier in this sub-section, the empty nucleus preceding the NC sequence must be licensed by Magic Licensing. It seems that when an empty nucleus has to license a preceding onset while it is itself licensed by Magic Licensing, its power of governing its following nasal segment is diminished. As a result, the surfacing of the nasal reflex is disallowed in this configuration. The identity of syllabic structures in (9) and (10) explains in a non-arbitrary way the identity of phonological behaviour of the NC sequences whose empty nucleus is required to carry out both governing and licensing duties.

So far, then, we saw that the NC sequences which occur next to a syntactic boundary and are preceded by a nuclear segment adopt the *ND* ≈ *D* variation pattern, irrespective of the nature of the syntactic boundary (e.g. MinSB: [*i dropí*] ≈ [*i dropí*], as in (7); MajSB: [*tréxo mbas*] ≈ [*tréxo bas*], as in (8)). We also saw that the NC sequences which occur next to MinSBs but are preceded by an audible non-nuclear segment can only be realised as *D* (e.g. [*tin dropí*], \*[*tin dropí*], as in (10)). This leads me to conclude that the differential treatment of NC sequences which occur next to MinSBs (i.e. the *ND* ≈ *D*

Let me now turn to the *NC* sequences which occur next to a MajSB, following a non-nuclear segment (e.g. *tréxis Npas* (11)). In this configuration, each word forms one analytic domain. We would expect then the *NC* sequence to display the  $ND \approx D$  variation pattern we saw in (6). However, this is not the case. These structures allow only one variant, *D* (i.e. [*tréxis bas*], \*[*tréxis mbas*]).



The surfacing of the nasal reflex of the *NC* sequences which occur next to MajSBs (e.g. *tréxis Npas*) crucially depends on the nuclear or non-nuclear nature of the segment preceding the empty nucleus which licenses the nasal reflex. Earlier in this sub-section, we saw that the surfacing of the nasal reflex of the *NC* sequences which occur next to MinSBs (e.g. *tis Ntropis*, *tiN Ntropí*) also depends on the nuclear or non-nuclear nature of the segment preceding the empty nucleus which licenses the nasal reflex.

The above two facts lead me to suggest that the nature of the syntactic boundary is not the factor that determines

the variation pattern of the *NC* sequences which occur next to syntactic boundaries. Instead, the nature of the segment preceding the *NC* sequence is the factor that determines the variation pattern of these sequences.

Let me conclude the discussion of this categorical context by focusing on structure (6), exemplified with the word  $v^ONplukála$ , and structure (9), exemplified with the word  $álv^ONpum$ . In these two structures, an empty nucleus ( $N_1$ ) governs the nasal reflex. Structure (6) shows that the surfacing of the nasal reflex is optional when the onset preceding this nasal reflex ( $(O_1)$ , as in (6)) is empty (i.e. when the *NC* sequence occurs word-initially). For example, the word *Npukála* allows the variation pattern  $ND \approx D$ , i.e.  $[mbukála] \approx [bukála]$ . Structure (9) shows that the surfacing of this nasal reflex is disallowed when the same onset ( $(O_2)$ , as in (9)) is filled (i.e. when the *NC* sequence occurs word-medially). For instance,  $álv^ONpum$  only allows the variant *D*, i.e.  $[álbum]$ ,  $*[álmbum]$ . On the basis, then, of this evidence, one might support a claim against syllable structure and in favour of word position as the factor determining the variation pattern of *NC* sequences. After all, the nasal reflex surfaces optionally after an empty nucleus only word-initially (6); word-medially, it never surfaces (9).

However, it is only on the face of things that word position appears to determine the variation pattern that specific *NC* sequences generate. As I showed earlier in this sub-section, the behaviour of word-initial *NC* sequences which allow an empty nucleus to precede them and which allow a filled onset to precede this empty nucleus ((10) and (11)) is identical to that of word-medial *NC* sequences which display the same syllabic structures (filled onset followed by an empty nucleus), (9). Both positions disallow the surfacing of the nasal reflex, giving rise to the same variant, *D*. This indicates that only syllable structure and not word position determines the variation pattern (and, hence, the phonetic

variants) of *NC* sequences.

Speakers treat *NC* sequences which occur next to MinSBs as if they belong to one and the same analytic domain with the proclitic (i.e. as if there exists no morphological boundary between them ((7) and (10))). The interactions that take place in this analytic domain are identical to the interactions that take place when this domain is filled not with two distinct words which are treated as one (as in (7) and (10)), but with only one word (as in (6) and (9)).

Let me test further the influence that syllabic structure exerts on the phonological behaviour of *NC* sequences. If word position were the factor determining the surfacing of the nasal reflex, we would expect the word-initial nasal reflex of the content word *Ntropí* to surface freely next to a MinSB, irrespective of whether the preceding clitic ends in a nuclear or a non-nuclear segment (e.g. *i* versus *tin*). This, however, is not the case in MG, where the nasal reflex surfaces optionally after a nuclear segment (as illustrated in (7)) but is suppressed after a non-nuclear segment (as shown in (10)).

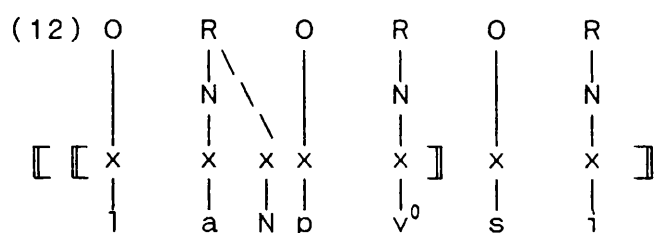
Lastly, let us not forget that the nasal reflex is suppressed only when a filled onset precedes the empty nucleus which governs the nasal segment of the *NC* sequence ((9), (10) and (11)). The only grammatical variant for the configurations displayed in (9), (10) and (11) is the *D* variant. When, however, both the onset and the nucleus which precede the nasal segment of the *NC* sequence are empty as in (6), the variation pattern this *NC* sequence displays is  $ND \approx D$ . As I showed earlier in this sub-section, the  $ND \approx D$  variation pattern is adopted also when the nucleus governing the nasal reflex is filled by an audible segment ((3) and (4)).

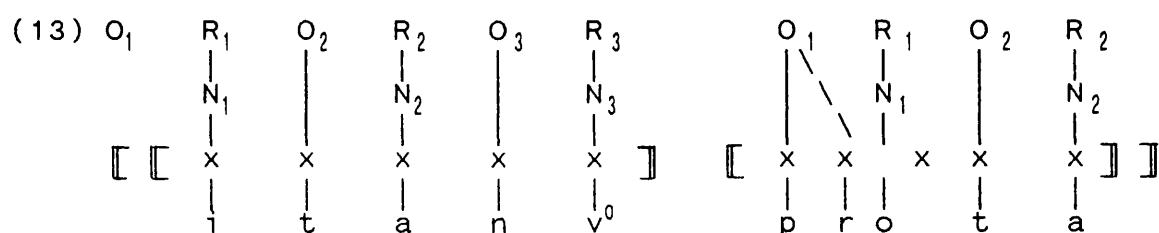
The above three pieces of evidence demonstrate that different syllable structures display different variation patterns. A configuration of a filled onset position preceding

the empty nucleus which governs the nasal reflex of an *NC* sequence (e.g.  $\acute{a}lv^ONpum$  and *tis Ntropís*) is treated differently from a configuration of an empty onset position preceding the empty or filled nucleus which governs the nasal reflex of an *NC* sequence (e.g. *Ntropí* and *i Ntropí*). The former configuration displays the *D* variant, while the latter displays the  $ND \approx D$  variation pattern. The phonological behaviour of *NC* sequences depends on the syllabic structure in which these sequences occur, and not on whether the *NC* sequence occurs word-initially or word-medially.

Identical syllabic structures display identical variation patterns. A configuration of a filled onset position preceding the empty nucleus which governs the nasal reflex of an *NC* sequence is treated identically, irrespective of whether it occurs word-initially (e.g. *tis v^ONtropís* (10)) or word-medially (e.g.  $\acute{a}lv^ONpum$  (7)). The variant these identical configurations display is *D*. Also, a configuration of an empty onset position preceding the empty or filled nucleus which governs the nasal reflex of an *NC* sequence is treated identically irrespective of whether it occurs word-initially (e.g. *Npukála* (6), *tréxo Npas* (8)) or word-medially (e.g. *eNkeniázo* (3)). The variation pattern these identical configurations display is  $ND \approx D$ .

Let me now turn to the examination of the syllabic context which gives rise to the unique variant *NC*. This variant is attested in domain-final position of words of analytic morphology (e.g.  $[[l\acute{a}mpv^O]s]]$  (12)) and across MajSBs (e.g.  $[[\acute{t}an] [pr\acute{o}ta]]$  (13)).





Let me examine each structure in turn, starting with (12). As I pointed out in Chapter 5, the spreading of the  $L^-$  element from the nasal segment to the stop is blocked when the  $NC$  sequence occurs in domain-final position. This gives rise to the  $NC$  variant (e.g. [*lámpsi*], \*[*lámbzi*], \*[*lámbsi*]). The nasal reflex surfaces obligatorily in these words (e.g. [*lámpsi*], \*[*lápsi*]).

The obligatory blocking of the spreading of the L<sup>-</sup> element from the nasal to the stop in words of analytic morphology might at first seem arbitrary. It is, however, explained within a GP framework. Specifically, this blocking is effected by licensed domain-final empty nuclei. Recall that final empty nuclei are parametrically licensed in MG (2.11.1). The blocking of the spreading of the L<sup>-</sup> element from a nasal segment to a strictly adjacent oral stop in MG by these parametrically licensed domain-final empty nuclei, could be interpreted as a signal of the presence of a domain boundary<sup>6</sup>.

This behaviour of domain-final empty nuclei is not unique to MG. Brockhaus (1990, 1991, 1992a) convincingly argues that

<sup>6</sup>Brockhaus (1992b) handles the blocking of the spreading of the L<sup>-</sup> element from the nasal segment to the oral stop by means of element licensing. The reader may recall from 2.13, that Brockhaus (1992b) suggests that parametrically licensed domain-final empty nuclei are weak licensors. The nucleus following the NC sequence in the syllabic context I presently examine is a parametrically licensed domain-final empty nucleus. As a result, Brockhaus (1992b:5) suggests that although the L<sup>-</sup> element still spreads from the nasal to the oral stop, 'being unlicensed, it has no effect, as it were; its presence doesn't manifest itself'. For a detailed discussion of the government-licensing and element-licensing properties of MG empty nuclei the reader is referred to Pagoni (in preparation)b.



final obstruent devoicing in German (interpreted as the presence of an unlicensed laryngeal element  $L^-$  in the segmental representation of obstruents) is always triggered by a following parametrically licensed domain-final empty nucleus. In the *Hochlautung* standard German pronunciation, then, the presence of an unlicensed laryngeal element ( $L^-$ ) could be interpreted as signalling the presence of a domain boundary.

The lack of manifestation of the spreading of the  $L^-$  element in MG words, signals analyticity. This explains why  $*[mp]$ ,  $*[nt]$   $*[ŋk]$  and  $*[nts]$  sequences cannot occur word-initially: the spreading of the  $L^-$  element is blocked only in domain-final position where the *NC* sequence is licensed by a parametrically licensed domain-final empty nucleus. All other positions display obligatory spreading of the  $L^-$  element.

This analysis also explains why  $*[nt]$  sequences can never occur in the language. An  $[nt]$  sequence would be attested in MG only if  $[nt]$  were allowed to occur in domain-final position of analytic words. In such a case, *nt* would be followed by an empty nucleus. This nucleus would in turn be followed by the analytic suffix  $\{-sV\}$ . This would give rise to a  $NtV^0s$  sequence. However, as we know from 5.2.2, such a structure never occurs in MG. Following Chapter 5, MG provides ample evidence for a contour segment structure for *ts*. As a result and contrary to  $[mp]$  and  $[ŋk]$  which occur in the language because they allow an empty nucleus to follow them (i.e.  $pV^0t/kV^0t/pV^0n/kV^0n/pV^0s/kV^0s$ ; see Chapters 4 and 5), no  $ntV^0s$  sequences can ever occur in MG.

Returning again to the lack of manifestation of  $L^-$  element spreading in MG, let me point out that, in cross-boundary *NC* sequences such as illustrated in (13), it signals the presence of a MajSB between the nasal and oral stop segments. Words which display this structure (i.e. an *NC* sequence which occurs across a MajSB) retain their

phonological shape. This means that each word forms its own analytic domain.

Specifically, the last audible non-nuclear segment of the first analytic domain (in the cases I investigate, a nasal segment) is pre-nuclear ((O<sub>3</sub>), as in (13)). As a result, it is licensed by a following empty nucleus ((N<sub>3</sub>), as in (13)). Following 3.2.4, pre-nuclear stops have their own lexically distinctive place specification element. As word-final non-nuclear segments are invariably coronal in MG, the nasal segment that may occur in this position can only be *n*. This nasal segment never allows its L<sup>-</sup> element to spread onto another non-nuclear segment (e.g. \*[ðe milúsan kias], \*[ítam próta], \*[oréom peðíon], \*[tréxum polí], \*[iroikóm prákseon], \*[pérnum prosforés], \*[ðe milúsan gias], \*[ítam bróta], \*[oréom beðíon], \*[tréxum bolí], \*[iroikóm brákseon] and \*[pérnum brosfórés]).

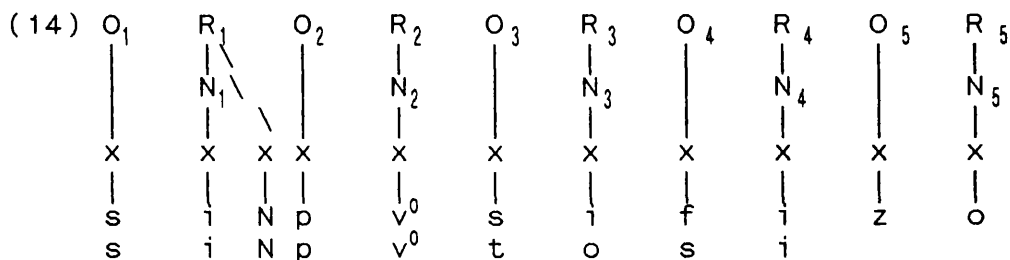
This happens for two reasons. Firstly, the nasal segment of the above sequences is followed by a nuclear position ((N<sub>3</sub>), as in (13)) across which elements cannot spread. Secondly, even if this domain-final empty nucleus did not intervene between the nasal segment and the oral stop of the second word, the only segment to which the L<sup>-</sup> element could spread in MG is the phonetically adjacent oral stop. However, this stop belongs to a different analytic domain. Interactions can only take place within and not across analytic domains.

As a result, words retain their phonological shape across MajSBs. The only variant NC sequences can display when they occur across MajSBs is NC (e.g. [ðe milúsan kias] and [ítam próta]; [oréon peðíon] and [tréxum polí] and [iroikón prákseon] and [pérnum prosforés]). The nasal reflex surfaces obligatorily across MajSBs (e.g. \*[ðe milúsa kias]<sup>7</sup>, \*[íta próta], \*[oréo peðíon], \*[tréxu

<sup>7</sup>This structure occurs in MG. However, it refers to the first person singular, and not to the third person plural that I discuss here.

*polí*], \*[*iroikó prákseon*] and \*[*pérnu prosforés*]) as the L<sup>-</sup> element spreading is blocked.

Let me now turn to the  $NC \approx ND \approx D$  variation pattern. This pattern is displayed by words in which the nasal segment precedes a *ps/ks* or a *pt/kt* sequence (14) (e.g. *siNpv<sup>O</sup>sifízo*, *siNpv<sup>O</sup>tosi*, respectively yielding the variants [*simpsifízo*]  $\approx$  [*simbsifízo*]  $\approx$  [*sibsifízo*] and [*simptosi*]  $\approx$  [*simbtosi*]  $\approx$  [*síbtosi*]). The  $NC \approx ND \approx D$  variation pattern is a hybrid of the realisations attested in two different patterns of phonological behaviour, namely the variation pattern  $ND \approx D$  and the variant *NC*. Again, GP can explain why we get this pattern when a nasal segment precedes a *ps/ks* or a *pt/kt* sequence.



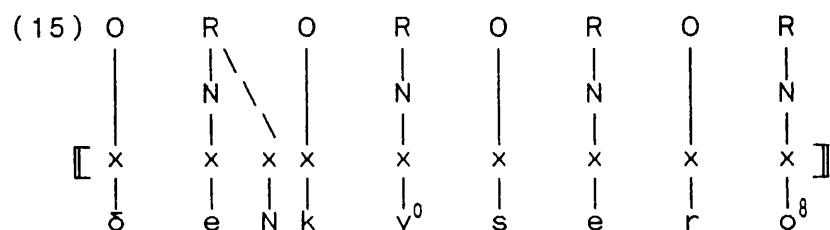
On the one hand, all words which display the  $NC \approx ND \approx D$  variation pattern are non-analytic and their *NC* sequences are preceded by a filled nucleus (i.e. *siNpv<sup>O</sup>sifízo* and *siNpv<sup>O</sup>tosi*). In (3) and (4), we saw that all non-analytic words whose *NC* sequences are preceded by a filled nucleus give rise to the  $ND \approx D$  variation pattern, irrespective of whether the onset position which is licensed by this nucleus is empty (e.g. [*en̥geniázo*]  $\approx$  [*egeniázo*]) or filled (e.g. [*kondá*]  $\approx$  [*kodá*]). As a result, the words *siNpv<sup>O</sup>sifízo* and *siNpv<sup>O</sup>tosi* signal their non-analyticity and their preceding audible nucleus by allowing the same variation pattern,  $ND \approx D$  (i.e. [*simbsifízo*]  $\approx$  [*sibsifízo*] and [*simbtosi*]  $\approx$  [*síbtosi*], in the same way as *eNkeniázo* allows the variants [*en̥geniázo*]  $\approx$  [*egeniázo*] and *koNtá* allows the variants [*kondá*]  $\approx$  [*kodá*]).

On the other hand, all analytic words in which the *NC*

sequence occurs before the domain-final empty nucleus give rise to the variant *NC* (e.g. [lámpsi], \*[lámbpsi], \*[lápsi] (12)). The words *siNpv<sup>0</sup>siffo* and *siNpv<sup>0</sup>tosí* are not analytic and their *NC* sequence does not occur in domain-final position. However, their *NC* sequence is followed by an empty nucleus, in the same way as the *NC* sequences of the above-mentioned analytic words. As a result, the *siNpv<sup>0</sup>siffo* and *siNpv<sup>0</sup>tosí* type of words signal their following empty nucleus by allowing the variant *NC* (i.e. [símpsi] and [símptosi]). The combination of the *ND*  $\approx$  *D* variation pattern and the *NC* variant generates the pattern *NC*  $\approx$  *ND*  $\approx$  *D*, for those words where the nasal reflex occurs before a *pt/kt* or a *ps/ks* sequence.

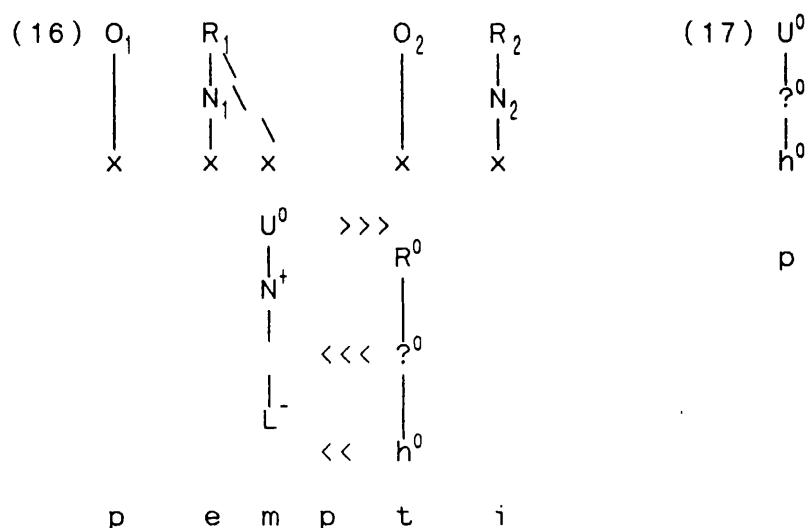
Within words, this variation pattern is generated when any of the {eN-}/{siN-}/{pan-} prefixes precede a {pv<sup>0</sup>s-}/{kv<sup>0</sup>s-} or a {pv<sup>0</sup>t-}/{kv<sup>0</sup>t-} initial morpheme. As I mentioned earlier in this sub-section, the boundary between these prefixes and the stop-initial stem is only etymological. As a result, the place specification element obligatorily spreads from the oral stop to the nasal segment (e.g. \*[sinpsi] and \*[sinptosi]). The spreading of the L<sup>-</sup> element from the nasal to the stop is optional. Lastly, the surfacing of the nasal reflex is obligatory when the L<sup>-</sup> element spreading is not in evidence (e.g. \*[sipsi] and \*[síptosi]).

The *NC*  $\approx$  *ND*  $\approx$  *D* variation pattern is also attested when *Npv<sup>0</sup>s/Nkv<sup>0</sup>s* or *Npv<sup>0</sup>t/Nkv<sup>0</sup>t* occur across MinSBs (15). Specifically, a structure such as *ðeN kv<sup>0</sup>séro* 'I do not know' has the variants [ðe kéro]  $\approx$  [ðen géro]  $\approx$  [ðe géro]. This is the case because the two words are treated as if they formed one analytic domain. The syllabic structure assumed by *Npv<sup>0</sup>s/Nkv<sup>0</sup>s/Npv<sup>0</sup>t/Nkv<sup>0</sup>t* sequences which occur across MinSBs is identical to that adopted when these sequences occur within words: a filled nucleus precedes the nasal segment and an empty nucleus follows the oral stop. Following the above analysis, the variation pattern similar configurations give rise to can only be *NC*  $\approx$  *ND*  $\approx$  *D*.



<sup>8</sup>Brockhaus (1992b) handles the spreading of the L<sup>-</sup> element from the nasal segment to the oral stop in the configurations of (16) and (17) by means of element-licensing. Specifically, Brockhaus (1992b) suggests that properly governed empty nuclei can be either strong or weak element-licensors. In the dialect of a particular social group of MG speakers, properly governed empty nuclei are weak element-licensors. This means that in this particular socially-defined dialect, the oral stop of the NC sequences which display the syllabic structure ... (β) VNCV... surfaces as neutral (NC variant). In the dialect of a different social group of MG speakers, properly governed empty nuclei are strong element-licensors. This means that in this second socially-defined dialect, the oral stop of the NC sequences which display the syllabic structure ... (β) VNCV... surfaces as low-toned ((N)D variant). The interested reader is, again, referred to Brockhaus (1992b) and Pagoni (in preparation)<sup>b</sup> for a more detailed analysis.

<sup>9</sup>It is not entirely clear to me at this stage how GP can accommodate the creation of this contour segment structure. At first sight, the creation of this epenthetic stop appears to involve the insertion of a skeletal position between the rimal complement of  $R_1$  and its licensing onset head ( $O_2$ ). However, such a move would amount to a violation of the Projection Principle. Further research into this matter is clearly needed.



Following Clements (1987), the sequence *mpt* of the word *pémpti* displays all the typical characteristics of what he calls 'type A' intrusive stops. Specifically, Clements (1987) notes that 'type A' intrusive stops (i) cannot appear before consonants which are in a stressed syllable, (ii) can be synchronically intrusive for some speakers but not for others, (iii) show dialectal variation in their incidence and their optional or obligatory character and (iv) are felt by speakers to be different to obligatory lexically-present stops<sup>10</sup>.

In accordance with the above characteristics, the fact that this *p* is epenthetic and not lexical is evidenced by the existence of the variants [*pémpti*] ≈ [*pémti*]. When this *p* is not epenthesised, the labial nasal *m* allows its *L*-element to spread onto the coronal stop, hence the variant [*pémdi*]. When the *p* is epenthesised, the spreading of the *L*-element from the nasal onto the stop is blocked (i.e. \*[*pémbdi*]). The nasal reflex surfaces obligatorily, irrespective of whether the

<sup>10</sup>Clements (1987) reports that experimental research on the last characteristic has shown, inter alia, that in order to highlight the difference between intrusive and lexically-present stops, speakers eliminate the intrusive stop of clusters which contain them and lengthen the underlying stop of clusters which contain lexically-present oral stops. To my knowledge, no similar research has been carried out for MG intrusive stops: this is clearly an area in need of further investigation.

spreading of the  $L^-$  element is blocked (e.g. \*[pépti], \*[péti]) or not (e.g. \*[pébtí], \*[pédi]).

Again, in conformity with the above characteristics, this  $p$  appears before a non-nuclear segment which is in an unstressed syllable. It also appears to be intrusive for only some speakers. The majority of my informants (12 out of 17) allowed the epenthetic stop to surface in less than 30% of the potential tokens. Lastly, 3 informants commented on the different character of  $p$  in words such as *pémpti* and *símtosi*.

The four patterns of phonological behaviour I presented above account for all the configurations in which *NC* sequences may appear in MG. I sum them up immediately below.

The words that display the  $ND \approx D$  variation pattern assume either of the following syllabic structures: (i) ... $(B)VNCV$ ... (i.e. *NC* sequences which are preceded by a filled nucleus), or (ii)  $\#v^ONCV$ ... (i.e. *NC* sequences which are preceded by an empty nucleus which has no licensing duties to perform, as the onset head that this nucleus licenses is also empty). These syllabic structures can be encountered (i) across MinSBs (*tiN pórtá*), (ii) within and across etymological boundaries of non-analytic words (*eNkeniázo*, *koNtá*), (iii) next to either MinSBs or MajSBs, provided that the segment preceding the *NC* sequence is nuclear (*i Ntropí*, *páne Nprostá*) and (iv) in compound words (*[[miso]] [[Ntiméni]]*).

The words that display the *D* variant assume syllabic structure ... $\beta v^ONCV$ ... (i.e. the empty nucleus which precedes the nasal reflex of the *NC* sequence is required to govern a filled onset). This syllabic structure can be encountered in non-analytic words (*álv^ONpum*) and next to both MinSBs and MajSBs provided that the segment preceding the empty nucleus which governs the nasal of the *NC* sequence is non-nuclear (*tis Ntropís*, *tréxis Npas*).

The words which display the *NC* variant assume syllabic structure  $[[[...VNCv^O]CV...]]$  (i.e. the empty nucleus which follows the oral stop of the *NC* sequence is domain-final and parametrically licensed). This syllabic structure is only encountered in *NC* sequences which occur across MajSBs (*iroikón prákv<sup>O</sup>seon*) and in domain-final position of analytic words (*lámpv<sup>O</sup>si*).

Finally, the words which display the  $NC \approx ND \approx D$  variation pattern assume the syllabic structure  $...(B)VNCv^OBV...$  (i.e. the nasal segment of the *NC* sequence occurs before a  $pv^Ot/kv^Ot$  or a  $pv^Os/kv^Os$  sequence). This syllabic structure is encountered both word-medially (*siNpv<sup>O</sup>sifizo*, *siNpv<sup>O</sup>tosí*) and word-initially (*ðeN kséro*).

In this sub-section, we also saw that the pattern of phonological behaviour displayed by *NC* sequences which occur next to a syntactic boundary depends on the nature of the audible segment preceding the *NC* sequence and not on the nature of the syntactic boundary. Specifically, we saw that in both MinSB and MajSB contexts, when word-initial *NC* sequences are preceded by an audible nuclear segment, the variation pattern is  $ND \approx D$  (*i Npukála*, *tréxo Npas* for, respectively, MinSB and MajSB). When these *NC* sequences are preceded by a non-nuclear segment, the only attested variant is *D* (*tis Npukálas*, *tréxis Npas* for, respectively, MinSB and MajSB). The nature of the syntactic boundary does not determine the behaviour of the *NC* sequences which occur next to a syntactic boundary: their behaviour depends solely on syllabic structure.

In contrast, the pattern of phonological behaviour displayed by *NC* sequences which occur across a syntactic boundary depends on the nature of this boundary. This is due to the fact that since, in the latter case, syllabic structures are identical (i.e. filled nuclei preceding and following the *NC* sequences), the only thing that



differentiates them is the nature of the syntactic boundary. The MinSB gives rise to the  $ND \approx D$  variation pattern (*tiN pórtá*), while the MajSB gives rise to the NC variant (*ítan próta*).

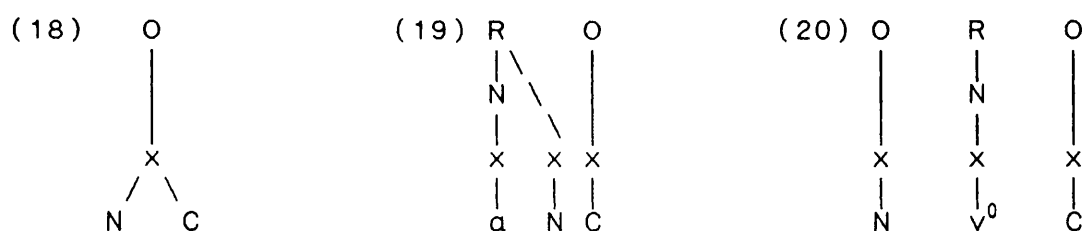
## 6.2 The MG 'prenasalisation' issue

Before embarking on an investigation of the alleged existence of prenasalisation in MG, I would like to remind the reader of certain facts I raised and briefly discussed in Chapter 1. To begin with, the term 'prenasalisation' has no pre-theoretical status. As a result, different linguists have, over the years, adopted different syllabic structures and distribution patterns for what they call 'prenasalised' segments.

As we saw in 1.2, Magoulas (1979) claims that MG low-toned oral stops which are preceded by a surfacing nasal reflex are instances of prenasalised segments and they assume an affricate structure. Again following 1.2, Magoulas (1979) is the only linguist to claim that these segments should be assigned phonemic status. However, any claim for the phonemic status of these 'prenasalised' segments has to be rejected for MG, even in a framework as unconstrained and powerful as SPE, as the replacement of a 'prenasalised' with a 'non-prenasalised' oral stop does not bring about a change of meaning in MG (e.g. [á<sup>n</sup>dras] 'man', [ádras] 'man').

The remaining linguists invariably call  $ND$  variants 'prenasalised', but assign to them allophonic rather than phonemic status. The majority of these linguists do not clarify which syllabic structure they assign to these variants. In the following paragraphs, I examine each of the three possible structures that an  $ND$  variant can assume. My aim is to show that only one of them exists in MG.

In the first structure, the nasal and oral stop occur under the same skeletal position, as illustrated in (18). This means that the nasal and oral stop occupy one timing unit. They accordingly assume the structure of a contour segment. In the second and third structures, the nasal and oral stop occur under different skeletal positions ((19) and (20) respectively). This means that each segment occupies one timing unit. However, in the second structure, the nasal segment occupies the rimal complement position and is licensed by the strictly adjacent onset head position which is filled in by the oral stop, as shown in (19). In this second structure, the nasal and oral stop form an interconstituent governing domain. In the third structure, the nasal and oral stop each occupies an onset head position, as in (20). This means that although the two non-nuclear segments look as if they are strictly adjacent, they are not: an intervening empty nucleus separates them (i.e.  $Nv^0C$ ). This syllabic structure is identical to that adopted by *pt/kt*, *pn/kn* (Chapter 4) and *ps/ks* (Chapter 5).



I would like to suggest that only structure (19) exists in MG. Structures (18) and (20) must be rejected. To provide support for this claim, I examine each structure in turn. I first show that we can exclude structure (20). I then demonstrate that structure (18) also has to be rejected as MG provides ample positive evidence in favour of the existence of only structure (19).

To the best of my knowledge, none of the linguists who claim that MG possesses 'prenasalised' segments has ever argued that these variants assume structure (20). I present below the evidence against the postulation of an empty nucleus

intervening between *N* and *C*.

In Chapters 3 through 5, we have seen that nasals interact with neutral oral stops in MG. These interactions (involving the spreading of the  $\text{?}^0$  and place specification elements from the oral stop to the nasal and the spreading of the  $\text{L}^-$  element from the nasal onto the stop) give rise to the low-toned series of stops in the language. A structure like (20) would render impossible any interaction between *N* and *C*. It must, therefore, be excluded as ill-formed.

At this point, one might raise an objection and claim that, for instance, the lack of spreading of the  $\text{L}^-$  element from the nasal segment onto the oral stop in domain-final position of analytic words can be taken as a sign that, at least in this environment, an empty nucleus intervenes between the two segments. However, such a claim can be disproved on three grounds. I list them in turn immediately below.

Firstly, the place specification element spreads obligatorily from the oral stop to the nasal in all *NC* sequences. This fact strongly indicates that the two positions are strictly adjacent and that no segments intervene between them.

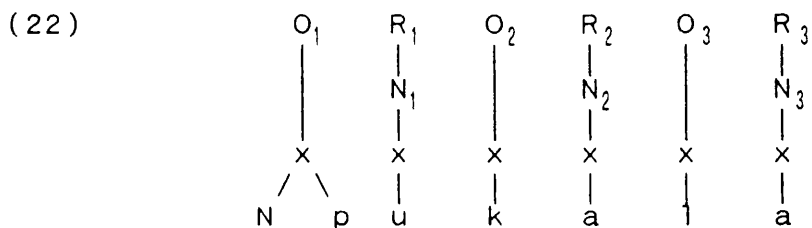
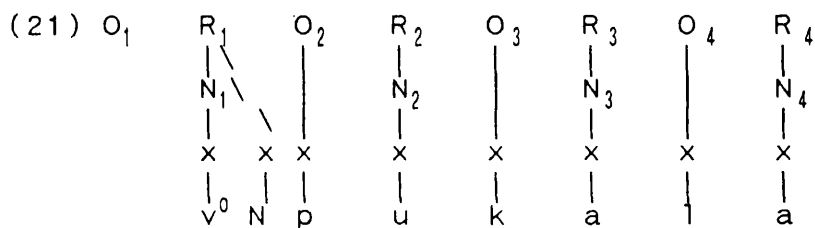
Secondly, let us for the sake of argument assume that in these instances where the  $\text{L}^-$  element does not spread onto the stop the correct structure is that of (20). If this hypothesis were correct, we should be able to find similar configurations in both word-medial and word-initial positions. This implies that we should be able to find *NC* variants in both word-medial and word-initial positions. However, this is not the case in MG. Although *NC* variants are attested word-medially (e.g. *lámpsi*), they are never attested word-initially (e.g. \*[*mpukála*]). This distributional gap indicates that the nasal and oral stop do not assume structure (20).

Thirdly, these domain-final *NC* variants do not behave like true sequences of onsets separated by an empty nucleus: they can never be preceded by another non-nuclear segment. If the nasal segment of the *NC* variant occurred in an onset position, there would be no reason why another non-nuclear segment could not precede it. However, this is never the case in MG: *NC* variants are never preceded by non-nuclear segments (e.g. [lámpsi], \*[lármpsi]). Following the binarity theorem (2.4), this can only serve as an indication that the nasal reflex of *NC* variants does not occur in an onset position. What is more, the same behaviour is attested when *ND* variants are involved: no non-nuclear segment can precede them (e.g. \*[esɲgeniázo] and \*[kolndá] for eNkeniázo and koNtá, respectively).

The above evidence leads me to reject (20) as a possible structure for MG 'prenasalised' segments. I now turn my attention to an examination of structures (18) and (19). Following 1.2, these are the two different structures most linguists adopt, albeit often indirectly and implicitly, for the MG *ND* variants. I provide three arguments in favour of structure (19) and against structure (18).

The first argument against the adoption of structure (18) for MG *ND* variants is purely theory-internal and refers to the derivation of the *ND* variants. Following Chapters 3 through 5, low-toned oral stops are derived from interactions between nasal reflexes which occur in rimal complement positions and oral stops which license the nasal reflexes from strictly adjacent onset head positions. In the  $ND \approx D$  and  $NC \approx ND \approx D$  variation patterns, the surfacing of the nasal reflex is optional. The two variants then (i.e. the variant which allows the surfacing of the nasal reflex (i.e. *ND*) and the variant which disallows this surfacing (i.e. *D*)) can only be derived from the same source, i.e. the interactions between the strictly adjacent nasal and oral stop of the *NC* sequence (3.2.2).

This means that, following 3.2.2, any claim in favour of the existence of a contour segment structure for the *ND* variant (18) implies the derivation of this *ND* variant from an underlying *NC* sequence whose segments adopt structure (19). The derivation of this *ND* variant from an *NC* sequence which assumes structure (19) should be non-arbitrary. This means that we should be able to turn in a non-arbitrary way the interconstituent syllabic structure of (19) (from which both the *ND* and *D* variants are derived) into the contour segment structure of (18) (for the derivation of the contour *ND* variants). This process is displayed in (21) and (22) below.



In order to derive a contour structure for the *ND* variants from an underlying *NC* sequence, we must allow the delinking of the nasal segment from the rimal complement position ( $(R_1)$ , as in (21)) and its attachment to the adjacent onset head position ( $(O_2)$ , as in (21)). Such a deleting and re-attachment operation will result in a structure like (22). Such an operation can only take place in a relatively unconstrained framework which allows lexical representations to undergo restructuring during derivation.

GP is an extremely restrictive theory. It adopts non-arbitrariness as one of its major meta-theoretical principles (2.1). In terms of principles of grammar, GP adopts, *inter alia*, the Projection Principle (2.11.4). In a framework which

is set up with these requirements, an operation whereby a particular syllabic structure (e.g. (18)) is derived from a different syllabic structure (e.g. (19)) is impossible. Following the Projection Principle, no restructuring of existing governing relations is possible. The governing relations that are established at the level of lexical representation remain constant throughout a derivation. As a result, GP categorically excludes an operation like that displayed in (21) and (22). A structure which at the level of lexical representation takes the form of (19) cannot change into a structure which ultimately takes the form of (18). The delinking and re-attachment processes I described above are rejected in a GP framework.

Let me now turn to some theory-external arguments against the existence of a contour segment structure for the *ND* variants and in favour of their interconstituent structure. The evidence I cite below comes from the MG reduplication process. The reader may recall from Chapters 4 and 5 that all non-nuclear segments may reduplicate in MG so long as they occur in head positions of non-branching onsets which also have no licensing duties to perform (e.g. *luúði* 'flower', *papára* 'bread soaked in sauce', *kokoviósv<sup>0</sup>* 'goby').

The segments *b/d/g/dz* may also undergo reduplication processes (e.g. *bubúki* 'bud', *dudúka* 'megaphone', *gágarosv<sup>0</sup>* 'popular expression for native Athenian', *dzidzifióngosv<sup>0</sup>* 'popular expression for dandy'). This may at first sight appear to indicate that instead of being derived from strictly adjacent *NC* sequences, MG low-toned stops are independently existing segments in MG. This, however, is not true. In 3.2.2, I argued in favour of the exceptionless derivation of all MG low-toned stops from underlying *NC* sequences. Besides, in line with current thinking in the field (e.g. Shaw 1985), reduplication processes actually take place only after the *NC* sequences (from which *b/d/g/dz* are derived) have undergone the necessary interactions that will allow them to surface as low-

toned stops. Recall that reduplication of non-nuclear segments which occur in head positions of (i) branching onsets (e.g. *tetriména* 'cliché') and (ii) onsets which have to license a rimal complement (e.g. *estavroménosv<sup>O</sup>* 'crucified') is no longer productive in MG (4.1.2). All words of this type are inherited from AG.

On the basis of participation of *b/d/g/dz* in MG reduplication processes, we would expect to also witness participation of the *ND* variants in reduplication processes if these *ND* variants assumed a contour segment structure (i.e. if the nasal reflex and the low-toned oral stop occupied one skeletal position). If the above claim were correct, the reduplicative words *v<sup>O</sup>NpuNpúki* and *v<sup>O</sup>NgáNgarosv<sup>O</sup>* should respectively possess the variants [<sup>m</sup>*bu*<sup>m</sup>*búki*] and [<sup>n</sup>*gá*<sup>n</sup>*garos*]. The variants [<sup>m</sup>*ba*<sup>m</sup>*bás*], [<sup>n</sup>*dzi*<sup>n</sup>*dzifíngos*] and [<sup>n</sup>*du*<sup>n</sup>*dúka*] should also be possible. If, on the other hand, the *ND* variant assumed an interconstituent (rather than a contour segment) structure, we would expect variants such as \*[*mbumbúki*] and \*[*ngángaros*] to be disallowed in MG. Recall that following 4.1.2, this is the case because interconstituent sequences of rimal complements and onset heads cannot participate in MG reduplication processes.

In fact, the second hypothesis is correct. In over 50 hours of tape-recorded conversation I have collected, I do not have a single instance of an *ND* reduplicated token. My repeated questions to all my 17 informants, as well as to a host of other native speakers of MG concerning the grammaticality of reduplication of *ND* variants, were all answered in a categorically negative way.

At this point, one might raise the objection that reduplication is productive only for MG non-nuclear segments which do not assume a contour segment structure. However, such a claim can easily be disproved by the examination of the phonological behaviour of *ts*, the MG contour segment I

discussed in Chapter 5. Recall that following 5.2.2, *ts* fully participates in MG reduplication processes (e.g. *tsitsíði* 'stark naked', *tsatsára* 'comb'). The only reason, then, that all *ND* variants are excluded from reduplication processes in MG is that they do not assume a contour segment structure.

The second and final empirical argument against the existence of a contour segment structure for the *ND* variants comes from their distribution. Concretely, their distribution is different from that of *ts*, the true contour segment of MG and identical to that of interconstituent sequences of non-nuclear segments such as *sp*, *st* and *sk*.

In Chapter 5, we saw that *ts*, like all non-nuclear segments which occupy one skeletal position, can be preceded by a strictly adjacent non-nuclear segment (e.g. *ká/tsa* 'sock' and *órtsa* 'luff'). By way of contrast, interconstituent sequences of non-nuclear segments cannot be preceded by non-nuclear segments (e.g. *\*[árstra]*, *\*[ká/ska]* and *\*[lárspi]*). This follows from the binarity theorem which specifies that all constituents have a maximally binary structure (2.4). As the head of all rimes is always occupied by a nuclear segment, a maximum of only one non-nuclear segment may fill the governed position of the rimal constituent. The fact, then, that so-called 'prenasalised' oral stops can never be preceded by a non-nuclear segment (e.g. *\*[tsár<sup>n</sup>da]* and *\*[el<sup>n</sup>driví]*) indicates their interconstituent rather than contour segment status.

What is more, words such as *fílv<sup>O</sup>Ntisi* and *álv<sup>O</sup>Npum* have an empty nucleus separating the segment / from the nasal reflex. This empty nucleus occurs in the head position of the rimal complement (see 3.2.2 and 3.2.3 for an analysis of this structure). As I pointed out in 6.1, similar syllabic structures do not allow the nasal reflex to surface (e.g. *[álbum]*, *\*[álmbum]*, just as *[tis bukálas]*, *\*[tis mbukálas]*). As a result, *ND* variants cannot occur in either of these word-medial or word-initial syllabic structures. Note that these



syllabic structures are the only ones to allow a non-nuclear segment to phonetically precede a low-toned oral stop.

Altogether, then, *ND* variants may only assume an interconstituent structure in MG. The arguments in favour of this claim are as follows. Firstly, the interactions that take place between the nasal and oral stop segments of the *NC* sequences renders their strict adjacency obligatory. Secondly, the non-arbitrariness and Projection principles oblige us to allow for the *ND* variant only the interconstituent structure. This is due to the fact that the underlying *NC* sequence from which the *ND* variants are derived assumes an interconstituent (and not a contour segment) structure (3.2.2). Third, the impossibility of participation of the *ND* variants in MG reduplication processes is a clear indication that these segments do not occupy only one skeletal position. Fourth, the fact that non-nuclear segments are not allowed to precede *ND* variants indicates that the MG *ND* variants cannot adopt a contour segment structure. Following the exclusion of (20) and (18) as possible structures for MG *ND* variants (and the impossibility of any *ND* variant forming a branching onset (Harris 1990:277)), the only possible structure an *ND* variant may assume is that of an interconstituent governing domain.

### 6.3 Summary

The arguments of this chapter aimed at demonstrating that the only factor that determines the phonological behaviour of *NC* sequences is syllabic structure. Factors such as word position or the origin of a word were shown to be irrelevant to the phonological behaviour of MG *NC* sequences.

The patterns of phonological behaviour of *NC* sequences are four in total. The *ND*  $\approx$  *D* variation pattern is displayed by *NC* sequences which are either preceded by a filled nucleus or, if they are preceded by an empty nucleus, the onset head

that this nucleus licenses is also empty. The *D* variant is displayed by *NC* sequences which are preceded by an empty nucleus. This empty nucleus is required to govern its complement and license a filled onset. The *NC* variant is displayed by *NC* sequences which occur in domain-final positions. These *NC* sequences are licensed by a parametrically licensed domain-final empty nucleus. The  $NC \approx ND \approx D$  variation pattern occurs when the nasal segment of the *NC* sequence occurs before a  $pV^0t/kV^0t/pV^0s/kV^0s$  sequence.

In this chapter, I have also demonstrated that the behaviour of the *NC* sequences which occur next to a syntactic boundary depends solely on syllabic structure. When preceded by an audible nuclear segment, *NC* sequences display the  $ND \approx D$  variation pattern in both MinSBs and MajSBs. When these *NC* sequences are preceded by a non-nuclear segment, the only attested variant is *D*, again for both MinSBs and MajSBs. In contrast, the pattern of phonological behaviour displayed by *NC* sequences which occur across a syntactic boundary depends on the nature of this boundary. The MinSB gives rise to the  $ND \approx D$  variation pattern, while the MajSB gives rise to the *NC* variant.

In this chapter, I have also shown that the *ND* variants which have over the years been called 'prenasalised' assume an interconstituent structure. This is demonstrated by several facts. Firstly, the obligatory interaction of the nasal and oral stop indicate that these segments are strictly adjacent and in a governing relationship. Secondly, the impossibility of derivation of a contour segment structure from an underlying interconstituent structure excludes the assignment of a contour segment structure to *ND* variants. Third, the impossibility of participation of prenasalised variants in MG reduplication processes indicates that *ND* variants do not occupy only one skeletal position. Fourth, the impossibility of non-nuclear segments preceding *ND* variants lends support to the postulation of an interconstituent structure for them.

## CONCLUSION AND SUGGESTIONS FOR FURTHER WORK

In this thesis I have endeavoured to demonstrate two things. In the first place, I have attempted to show that the phonological behaviour of MG *NC* sequences crucially depends on the syllabic structure in which they appear. In the second place, I have aimed at demonstrating that an impressive number of problems that have, over the years, been repeatedly reported in the existing literature on MG phonology can be resolved by use of a constrained theory such as GP.

The framework of GP has been shown to be up to the task of accounting for interview and spontaneous speech data. In fact, GP has managed to provide explanations for the existence and phonological behaviour of all and only the attested forms of MG that were subjected to examination in the present thesis.

The four areas where the adoption of the theoretical framework of GP has advanced our knowledge of the phonological events that take place in MG are as follows.

Firstly, with respect to the question of the existence of a low-toned series of oral stops in MG, I have shown in Chapter 3 that lexically MG only possesses a neutral series of stops (i.e. *p/t/k/ts*) and that it derives its low-toned series (i.e. *b/d/g/dz*) from the interactions that take place when neutral oral stops occur in the strict adjacency of nasal segments. The interactions that take place between these segments involve the spreading of the occlusion and place specification elements from the oral stop to the nasal and, depending on the syllabic structure of the word(s) involved, the spreading of the  $L^-$  element from the nasal onto the stop.

Secondly, regarding the syllabic structure of *pt/kt*, *pn/kn* and *ps/ks*, I have demonstrated in Chapters 4 and 5 that all

six sequences assume an identical syllabic structure in MG, namely that of two onset heads separated by an intervening empty nucleus. The *pt/kt*, *pn/kn* and *ps/ks* sequences behave identically with respect to a number of MG phonological phenomena, foremost amongst which are the interactions they enter into when their initial oral stop occurs in the strict adjacency of a nasal segment. Having contrasted the phonological behaviour of the above-mentioned sequences with that of the MG sequence *ts*, I have also demonstrated that *ts* is a contour segment. Because of its syllabic structure, the phonological behaviour that *ts* displays is identical to that of the MG neutral oral stops.

Thirdly, with reference to the question of the existence of prenasalisation in MG, I have concluded in Chapter 6 that prenasalisation does not exist as a phonological phenomenon in the language. The surfacing of the nasal reflex before a stop in those structures where this is optional takes place in the rimal complement position. The surfacing of the oral stop takes place in the onset head position.

Fourthly, with regard to the phonological behaviour of MG *NC* sequences, I have shown that (i) different syllabic structures (syllabic contexts) give rise to different patterns of phonological behaviour and that (ii) the assumption of the correct syllabic structure for a word where an *NC* sequence appears allows one to actually predict the phonological behaviour of the *NC* sequence in question. For those syllabic structures which allow variability, the particular variant that a speaker will actually use at specific moments in time depends entirely on social (i.e. extragrammatical) factors. As such, the examination of which variants specific speakers use in particular moments in time (in those contexts where the phonological system allows for variability) has not formed part of the immediate concern of this thesis.

Finally, regarding the phonological behaviour of MG *NC*

sequences, the results of the analysis presented in this thesis lead me to the following conclusion. MG NC sequences display four different patterns of phonological behaviour depending on the syllabic structure in which they occur. Two of these patterns display categorical behaviour, as they allow only one realisation for the NC sequence. The remaining two patterns allow for variability. In the one of the two patterns which allow for variability there exist two realisations of the NC sequence, while in the other pattern there exist three realisations for the NC sequence.

The specific patterns of phonological behaviour that NC sequences display in MG, together with the syllabic contexts in which each pattern occurs are as follows.

In the first place, the *D* realisation is attested when the nucleus which precedes the nasal reflex of the NC sequence is empty and is also required to govern a filled onset. This realisation of the NC sequence is attested in non-analytic words and next to MinSBs and MajSBs.

In the second place, the NC realisation is attested when the nucleus following the NC sequence is empty and occurs either across MajSBs or in domain-final position of analytic words.

In the third place, the  $ND \approx D$  variation pattern is attested when the NC sequences are either preceded by a filled nucleus or, if they are preceded by an empty nucleus, the onset head that this empty nucleus licenses is also empty. This realisation is attested when the NC sequences occur across MinSBs, within and across etymological boundaries of non-analytic words, next to either MinSBs or MajSBs (provided that the preceding segment is nuclear) and in compound words.

In the fourth place, the  $NC \approx ND \approx D$  variation pattern is attested when the nasal segment of the NC sequence occurs

before either a word-medial or a word-initial  $p\nu^0t/k\nu^0t/p\nu^0s/k\nu^0s$  sequence.

Also, the pattern of phonological behaviour displayed by *NC* sequences which occur next to a syntactic boundary depends on the nature of the preceding audible segment (i.e. on the syllabic structure) and not on the nature of the syntactic boundary. When these *NC* sequences are preceded by a nuclear segment, the variation pattern is  $ND \approx D$ . When these *NC* sequences are preceded by a non-nuclear segment, the only variant is *D*. In contrast, the variation pattern of the *NC* sequences which occur across a syntactic boundary depends on the nature of this boundary. This is due to the fact that since their syllabic structures are identical (i.e. filled nuclei preceding and following the *NC* sequences), the only thing that differentiates them is the nature of the syntactic boundary. The MinSB gives rise to the  $ND \approx D$  variation pattern, while the MajSB gives rise to the *NC* variant.

The issues I have discussed in this thesis do not come anywhere near exhausting the subject of MG phonological variation. Since part of this phenomenon (specifically the surfacing of the nasal reflex in those variation patterns where this surfacing is optional) seems to depend on social rather than linguistic factors, it is to be hoped that the extragrammatical influencing factors will be investigated in depth in future work.

Another area that needs serious study is that of the MG fricatives. Our understanding of the workings of the MG phonological system can be substantially advanced if future research addresses the following issues:

(i) charm values and lexical distinctiveness of the compositional elements of MG fricatives, (ii) the phonological behaviour of MG fricatives in a variety of syllabic positions and (iii) the syllabic structure that should be assumed by non-nuclear sequences where a fricative is the initial segment

(e.g. *fx*, *sθ*, *θn*, *fn*, *mn*, *ɣn*, *xm*, etc.).

Furthermore, a totally neglected area which is nevertheless fraught with interesting questions is that of the syllabic structures that different MG dialects assume for their non-nuclear sequences (e.g. *pt/kt*, *pn/kn*, *ps/ks*, *ts*, *θn*, *mn*, *tl*, etc). Much more light can be shed not only on the workings of MG phonological variation but also on the workings of the whole MG phonological system once data from other MG dialects and other languages of the world are examined.

Finally, future work will hopefully soon address a number of questions that I have already raised in my analysis of MG phonological variation. Foremost among these questions are those concerning (i) the way 'Magic Licensing' operates in MG (and other languages of the world) with respect to *s+C* and *NC* sequences, (ii) the influence of coronality on the behaviour of *t* (versus the other non-coronal stops) and (iii) the creation, representation and distribution of epenthetic stops in the various languages of the world.

Although the present thesis has not been able to address all these and many more intriguing issues, it has explained at least a substantial set of important phonological phenomena in standard MG. It is to be hoped that further research in this area will soon see the light of day.

## APPENDIX A

In this Appendix I assemble the data sets I have presented in Chapter 1 and discussed in Chapters 2 through 6. These data sets consist of all the linguistic environments where MG NC sequences may be phonetically or phonologically adjacent. This table comprises (i) representative examples of the different syllabic structures in which NC sequences may occur in MG (individual data sets), (ii) the different variants that each data set may have and (iii) those variants which are disallowed for each data set.

Syll. Str.	Variants	Disal. Variants
1. <i>Nprávo</i>	[ <i>brávo</i> ] [ <i>mbrávo</i> ]	*[ <i>mprávo</i> ] *[ <i>nprávo</i> ]
2. <i>Npukála</i>	[ <i>bukála</i> ] [ <i>mbukála</i> ]	*[ <i>mpukála</i> ] *[ <i>npukála</i> ]
3. <i>tréxo Npas</i>	[ <i>tréxo bas ke</i> ] [ <i>tréxo mbas ke</i> ]	*[ <i>tréxo mpas ke</i> ] *[ <i>tréxo npas ke</i> ]
4. <i>tréxun Npas ke</i>	[ <i>tréxun bas ke</i> ]	*[ <i>tréxun mpas ke</i> ] *[ <i>tréxu bas ke</i> ] *[ <i>tréxun mbas ke</i> ] *[ <i>tréxun npas ke</i> ]
5. <i>tréxis Npas ke</i>	[ <i>tréxis bas ke</i> ]	*[ <i>tréxis mpas ke</i> ] *[ <i>tréxis mbas ke</i> ] *[ <i>tréxis npas ke</i> ]
6. <i>ðen milúsan kias</i>	[ <i>ðe milúsan kias</i> ]	*[ <i>ðe milúsan gias</i> ] *[ <i>ðe milúsa gias</i> ] *[ <i>ðe milúsan kias</i> ] *[ <i>ðe milúsa kias</i> ]
7. <i>ítan próta</i>	[ <i>ítan próta</i> ]	*[ <i>ítam bróta</i> ] *[ <i>ítam próta</i> ] *[ <i>íta bróta</i> ] *[ <i>íta próta</i> ]
8. <i>oréon peðión</i>	[ <i>oréon peðión</i> ]	*[ <i>oréom beðión</i> ] *[ <i>oréo beðión</i> ] *[ <i>oréom peðión</i> ] *[ <i>oréon beðión</i> ] *[ <i>oréo peðión</i> ]



9. <i>tréxun polí</i>	[ <i>tréxun polí</i> ]	*[ <i>tréxum bolí</i> ] *[ <i>tréxu bolí</i> ] *[ <i>tréxum polí</i> ] *[ <i>tréxun bolí</i> ] *[ <i>tréxu polí</i> ]
10. <i>iroikónprákv<sup>o</sup>seon</i>	[ <i>iroikónprákseon</i> ]	*[ <i>iroikómbbrákseon</i> ] *[ <i>iroikó brákseon</i> ] *[ <i>iroikómpbrákseon</i> ] *[ <i>iroikó prákseon</i> ] *[ <i>iroikón brákseon</i> ]
11. <i>pérnun prosforés</i>	[ <i>pérnun prosforés</i> ]	*[ <i>pérnum brsforés</i> ] *[ <i>pérnu brsforés</i> ] *[ <i>pérnum prosforés</i> ] *[ <i>pérnun brsforés</i> ] *[ <i>pérnu prosforés</i> ]
12. <i>páne Nprostá</i>	[ <i>páne brostá</i> ] [ <i>páne mbrostá</i> ]	*[ <i>páne mprostá</i> ] *[ <i>páne nprostá</i> ]
13. <i>mikrí Npeláðes</i>	[ <i>mikrí beláðes</i> ] [ <i>mikrí mbeláðes</i> ]	*[ <i>mikrí mpeláðes</i> ] *[ <i>mikrí npeláðes</i> ]
14. <i>tréxun Nprostá</i>	[ <i>tréxun brostá</i> ]	*[ <i>tréxun mprostá</i> ] *[ <i>tréxun mbrostá</i> ] *[ <i>tréxu brostá</i> ] *[ <i>tréxun nprostá</i> ]
15. <i>mikrón Npeláðon</i>	[ <i>mikrón beláðon</i> ]	*[ <i>mikrón mpeláðon</i> ] *[ <i>mikrón mbeláðon</i> ] *[ <i>mikró beláðon</i> ] *[ <i>mikrón npelaðón</i> ]
16. <i>i Npukála</i>	[ <i>i bukála</i> ] [ <i>i mbukála</i> ]	*[ <i>i mpukála</i> ] *[ <i>i npukála</i> ]
17. <i>tis Npukálas</i>	[ <i>tis bukálas</i> ]	*[ <i>tis mpukálas</i> ] *[ <i>tis npukálas</i> ] *[ <i>tis mbukálas</i> ]
18. <i>tiN pórtá</i>	[ <i>tin pórtá</i> ] [ <i>tím bórta</i> ] [ <i>ti bórta</i> ]	*[ <i>ti pórtá</i> ]
19. <i>ðeN pernó</i>	[ <i>ðen pernó</i> ] [ <i>ðem bernó</i> ] [ <i>ðe bernó</i> ]	*[ <i>ðe pernó</i> ]
20. <i>saN táfos</i>	[ <i>san táfos</i> ] [ <i>san dáfos</i> ] [ <i>sa dáfos</i> ]	*[ <i>sa táfos</i> ]
21. <i>tiN tropí</i>	[ <i>tin tropí</i> ] [ <i>tin dropí</i> ] [ <i>ti dropí</i> ]	*[ <i>ti tropí</i> ]

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22. <i>tiN Ntropí</i>	[ <i>tin dropí</i> ] [ <i>ti dropí</i> ] [ <i>ti ndropí</i> ]	*[ <i>ti ntropí</i> ] *[ <i>tin ndropí</i> ]
23. <i>ðeN Npéno</i>	[ <i>ðem béno</i> ] [ <i>ðe béno</i> ] [ <i>ðe mbéno</i> ] [ <i>ðen béno</i> ]	*[ <i>ðen mpéno</i> ] *[ <i>ðen mbéno</i> ]
24. <i>saN Ntuvári</i>	[ <i>san duvári</i> ] [ <i>sa duvári</i> ] [ <i>sa nduvári</i> ]	*[ <i>san ntuvarí</i> ] *[ <i>san nduvári</i> ]
25. <i>eNkeniázo</i>	[ <i>engeniázo</i> ] [ <i>egeniázo</i> ]	*[ <i>ekeniázo</i> ] *[ <i>enkeniázo</i> ] *[ <i>emkeniázo</i> ]
26. <i>siNpráto</i>	[ <i>simbráto</i> ] [ <i>sibráto</i> ]	*[ <i>sipráto</i> ] *[ <i>simpráto</i> ] *[ <i>sinpráto</i> ]
27. <i>páNplutos</i>	[ <i>pámblutos</i> ] [ <i>páblutos</i> ]	*[ <i>páplutos</i> ] *[ <i>pámplutos</i> ] *[ <i>pánplutos</i> ]
28. <i>koNtá</i>	[ <i>kondá</i> ] [ <i>kodá</i> ]	*[ <i>kontá</i> ] *[ <i>kotá</i> ] *[ <i>komtá</i> ]
29. [[ <i>misó</i> ] [ <i>Ntiméni</i> ]]	[ <i>misodiméni</i> ] [ <i>misondiméni</i> ]	*[ <i>misontiméni</i> ] *[ <i>misotiméni</i> ] *[ <i>misomtiméni</i> ]
30. <i>Nparv<sup>O</sup>Npúni</i>	[ <i>barbúni</i> ] [ <i>mbarbúni</i> ]	*[ <i>mparmpúni</i> ] *[ <i>mbarmbúni</i> ] *[ <i>barmbúni</i> ] *[ <i>parpúni</i> ]
31. [[ <i>láNpv<sup>O</sup></i> ] <i>si</i> ]	[ <i>lámpsi</i> ]	*[ <i>lámbzi</i> ] *[ <i>lámbsi</i> ] *[ <i>lápsi</i> ] *[ <i>lábzi</i> ]
32. <i>siNpv<sup>O</sup>sifízo</i>	[ <i>simpsifízo</i> ] [ <i>simbsifízo</i> ] [ <i>sibsifízo</i> ]	*[ <i>sinpsifízo</i> ] *[ <i>sipsifízo</i> ] *[ <i>simbzifízo</i> ] *[ <i>sibzifízo</i> ] *[ <i>sinbzifízo</i> ] *[ <i>sinbsifízo</i> ]
33. <i>pémp<i>ti</i></i>	[ <i>pémp<i>ti</i></i> ] [ <i>pémt<i>i</i></i> ] [ <i>pém<i>di</i></i> ]	*[ <i>pépt<i>i</i></i> ] *[ <i>pébd<i>i</i></i> ] *[ <i>pénpt<i>i</i></i> ] *[ <i>pént<i>i</i></i> ]

## APPENDIX B

The purpose of this Appendix is twofold. I firstly provide some information pertaining to the process I employed for the collection of the data on which this research is based. I secondly outline the criteria I used in the selection of the sample I interviewed.

Following Pagoni (1989), there exist strong indications of social differentiation in the surfacing of the nasal reflex in the two contexts where variability is allowed by the MG grammar. The results of the above pilot study of MG phonological variation show a clear correlation of particular phonetic variants and the degree of participation of individuals and group(s) of informants in specific networks.

In accordance with these findings, I decided not to employ a random sampling procedure for the present investigation. Instead, I focused on only one social group, characterised as middle class. The sample I interviewed was selected on the basis of primarily the participation of individual informants and groups thereof in sets of network relationships. The members of each selected network are reasonably balanced by age and sex.

The resulting sample consists of 17 informants, 9 women and 8 men, all native speakers of MG. Each sex is represented by two age groups, (i) 20-35 (age group A) and (ii) 50-70 (age group B). In (1) below, I give two initials for each informant. Initials are followed by each informant's details of sex and age group membership at the time of the interview.

(1)	INITIALS	SEX	AGE GROUP
1.	NP	Male	B
2.	FB	Female	B
3.	IB	Male	B
4.	DA	Male	A
5.	EB	Female	A

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6.	KA	Male	A
7.	MD	Female	B
8.	OD	Female	A
9.	AG	Female	A
10.	VM	Male	B
11.	SM	Female	B
12.	MM	Male	A
13.	MV	Male	B
14.	ZV	Female	B
15.	JV	Male	A
16.	MB	Female	A
17.	RB	Female	B

The fieldwork for this research was carried out according to the principles outlined in Milroy (1987). All the above-mentioned informants belong to four different but interrelated social networks. Specifically, FB, IB, EB, KA and DA form one network; MD, OD, and AG form another network; VM, SM, and MM form the third network; MV, ZV, JV, MB and RB from the fourth network. NP is a peripheral/marginal, rather than core, member of each of these networks.

The younger informants link these four networks: they are all close friends, colleagues or relatives. They all know each member of their respective networks intimately and are well acquainted with the older members of the other three networks. The older members who belong to the same network know each other intimately. Their acquaintance with the older members of the other networks is, more often than not, remote.

The data collection process took place in Athens, Greece, in 1988-1989. Each informant was interviewed for 3-6 hours. All interviews were conducted by myself. At the time of the interview, and with the exception of NP, whom I had known intimately for almost 24 years, I had been closely associated with all younger informants for at least 6 years and had been well acquainted with the older ones for a period of 3-6 years.

Interviews took place in the social setting that was familiar to each speaker (usually their home). The familiarity

of the surroundings, combined with the fact that informants considered me as a member of their network, rather than as an 'outsider', enabled them to use more casual styles of speech. Following Labov (1972a, 1972b) these styles are not easily observed when informants are in the presence of 'outsiders' to their networks, still less when these outsiders aim at observing these very linguistic habits of their interviewees.

Interviews were designed to elicit two speech styles. The first style, hereafter RS (Reading Style), was formal and careful, involving three different reading activities. The second style, hereafter SS (Spontaneous Style), was casual and relaxed, ranging from minimally controlled to totally spontaneous conversation.

The RS involved the reading aloud of the four reading passages, the extended word list and the minimal pair list I provide in Appendix C (hereafter RP, EWL and MPL respectively). All activities include a significant number of different syllabic structures where *NC* sequences appear. Each syllabic structure is represented by words of (i) both Greek and foreign origin and (ii) the learned and popular vocabulary.

This choice of words stems from the objective of examining, *inter alia*, whether the phonological behaviour of *MG NC* sequences can be influenced by factors other than syllabic structure. The results I obtained from this investigation show that extragrammatical factors such as the origin and/or the membership of a word in the learned/non-learned vocabulary can only influence the particular variants that speakers select in the two contexts where the grammar of *MG* allows variability (*i.e.* contexts (1c) and (1d) in Chapter 6). These results form the basis for the argumentation I provided in 6.1.1, namely that the phonological behaviour of *NC* sequences is determined by the syllabic structure in which

these sequences appear.

Let me come back to the presentation of the interview material. The four RPs, each of which was rated differently on a formality scale, contained 299 instances of *NC* sequences. The first two RPs were informal. The first RP mainly described the interior of a gipsy hut. The second RP was a dialogue between a couple concerning an invitation to a wedding. The other two RP's were formal, written in the form of newspaper articles. One reported on the political situation in South Africa before the release from prison of Nelson Mandela. The other article reported on an imaginary financial scandal in Greece and the legal action taken as a result of it. The EWL consisted of 555 *NC* sequences. The *NC* sequences of both the four RPs and the EWL appeared not only in word-initial and word-medial position but also across and next to MinSbs and MajSbs. The MPL contained 71 minimal pairs and was the most formal of all reading activities. With one exception, all the *NC* sequences of the MPL were either word-initial or word-medial.

At the end of these three reading activities, I gave my informants a series of photographs from advertisements which, at the time of the interviews, were quite well-known. These photographs generated conversations on topics related to the products themselves, advertising techniques and the media. Often informants would start by discussing topics related to the above-mentioned subjects and then quickly digress to subjects of greater interest to them and remotely related to the photographs.

As I was well-acquainted with all 17 informants, I was aware of the subjects each one was most keen on discussing. The older informants enjoyed talking about their life experiences and current hobbies which ranged from cooking, gardening and embroidery, to literature, finance and politics.

The younger informants enjoyed discussing university-life experiences, as well as emotional and job-hunting problems. The interest in politics was shared by practically all informants.

By the time the discussion started, most informants assumed that the interview was over. Attention was turned away from the tape-recorder and the microphone, both purposefully placed slightly to the side of the informants<sup>1</sup>. The conversation became fairly relaxed, following the patterns of a routine visit. The usual socialising, the occasional interruptions by other members of the family and/or telephone calls and the joining in the discussion of other members of the household ensured an atmosphere atypical of interviews.

At the end of these conversations, I asked some brief questions on accent and the MG language. As practically all informants held strong laymen's views on these subjects, long and heated conversations were sometimes generated. Interviews were concluded with each informant filling a questionnaire on personal information such as age, education and profession. The questionnaire and the questions on accent and the MG language also appear in Appendix C.

Depending on the speaker and the duration of the interview, the tokens of NC sequences I obtained in the SS ranged from 1060 to 1543. Adding to these the 925 RS tokens, the sum total of RS and SS tokens ranged for each speaker from 1985 to 2468.

The quantitative material gathered in this way was subjected to detailed analysis. For the purposes of this analysis I grouped together relevant tokens of the different

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<sup>1</sup>This position not only avoids numerous sound distortion effects, but also ensures that the tape-recording apparatus is not always in full view of the informants.

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phonetic variants that *NC* sequences display in the different contexts which allow variability. The index scores calculated for individuals and groups of individuals who belonged to the same cell were correlated with stylistic factors (e.g. reading versus spontaneous style) and social factors (e.g. age, sex and network membership). The details and results of these correlations are to be found in Pagoni (in preparation)a.



## APPENDIX C

In this appendix I provide a transcription of the reading passages, the minimal pair list and the extended word list I used for my interviews. Although this transcription fails to give a detailed picture of the syllabic structure of all the words I used, it at least depicts quite accurately and in line with the GP analysis I presented in this thesis the syllabic structure of those sequences of segments that are of special interest to an investigation of MG phonological variation (i.e. NC sequences, *pt/kt*, *pn/kn*, *ps/ks* and *ts*). The transcription of the above-mentioned reading material is followed by the questionnaire each informant filled in and the questions on the basis of which the discussion on accent and the MG language was conducted.

### Reading passage 1

*katiforízoNtas tiN plajiá tu vunú pros tin amfiloxía vréthike Nprós stiN paráNka tu jíftu. ítan skepasméni me miá NtsíNkini skepí pu jíálize ston ílio. NpénoNtas aNtíkrise tiN paliá sóNpa me to skuriasméno Npurí, ena saravaliasméno Ntulápi, kena γánNtso apópu krémoNtaN péNte NprúNtsini mastrapáðes. sto váthos diékrine mia fotoγrafiá me ti jenovéfa na kratái ena Ntéfi ke na kitá ton pánθira ke ti zéNpra pu vrískoNtan sta póðia tis. o jíftos itan kv<sup>o</sup>saploménos xámo. forúse ena triméno paNtelóni. ton kítakv<sup>o</sup>se kalá. i melanxolía itan zoγrafisméni sto prósopó tu. ðen Nporúse na pistépv<sup>o</sup>si oti ítan móno triáNta xronón. i théa ton syurón kátasproN malión tu ton sokárise. ton akúNpise ke ekínos pérnoNtás ton xaNpári kv<sup>o</sup>σίpv<sup>o</sup>nise ke teNtóthike xtipóNtas ton aNkóna tu stoN tíxo. ton tárakv<sup>o</sup>se o pónos apo to éNkavma ke múNkrise sa θerió.*

### Reading passage 2

*o Nkíkas vv<sup>o</sup>γíke apo to Npakáliko tu xaNtsianōréa kratóNtas tin Npaloméni tsáNta tu jemáti me kÁNposa tsaNpiá stafíliá, peNtékv<sup>o</sup>si Ntenekeðákia*

Ntolmádes jiala<sup>o</sup>Ntsí, misí Ntuzína Npíres, θrúNpess ke káti a<sup>o</sup>Ntsúyes na tis liNpízese! Npéno<sup>o</sup>Ntas ston kípo apo tiN píso me<sup>o</sup>riá tis misoNkremisménis máNtras a<sup>o</sup>Ntámose stiN pórtá tis kuzínas tis tiN patrúla, ti zoNtoxíra, ti siNtrófisá tu.

- ðe vríka jiaúrti stra<sup>o</sup>Nkisméno jia Ntsa<sup>o</sup>Ntsíki.

- ðeN pirázi. pinás?

- sa líkos, ke ða<sup>o</sup>Nkóni ena suNtsukáki.

- vré Ntsana<sup>o</sup>Npéti miN tsiNpás. θa se píasi lókv<sup>o</sup>siNkas! áNte, ke súxo símera Nprízola, a<sup>o</sup>Ntíðia ke a<sup>o</sup>NkuroNtomatosaláta. tóra ettimázo Npurekákia jia tin eNkóna mu tin oliNpía. píje me ti siNpe<sup>o</sup>théra sti θálasa jia Npánio. miN kv<sup>o</sup>sexásis, Nkíka, tiN kiriakí paNtrévete i tria<sup>o</sup>Ntafiiliá i Npírv<sup>o</sup>Npilomáta. metá to γámo θa páme sti veráNta to Npuzukv<sup>o</sup>síðiko. pézi i reNpétiki koNpanía me toN Npajia<sup>o</sup>Ntéra. θaxi Npuzúki, Npaylamá, akorv<sup>o</sup>Nteón, Ntéfi ke ton χleNtsé ton Ntsími sti líra. o ðé Nparv<sup>o</sup>Npa Ntsavós θa xorepv<sup>o</sup>si zeinPékiko. ti péNpti íðame ta prikiá. ti keNtímata, NtaNtéles, staNpotá trapezomáNtila, Ntsevréðes, NkoNplén! ke épipla! rotóNta, Npu<sup>o</sup>fédess, seNtúkia ke tsuNpelékia! aN pís kiapó xrisafiká! NpriláNtia, ruNpínia, ðiamáNtia, ena soró!!!

- piús kalésane?

- tiN katerína tin xoNtroNpalú, toN kósta, ton láNpiro, toN paNtelí, ton jiáNko, toN táki, tiN trelokaNpéro tiN tasía, ke tiN kikí ke tiN kúla tu karaNkúni. jia ðóro θa tus páro to Nkrízo aNpazúr apó toN teNp<sup>o</sup>ési ton éNpora. ðen vríka to Nplé pu íθela!

-eNtákv<sup>o</sup>si, ðeN pirázi!

### Reading passage 3

jioxánesv<sup>o</sup>Npurv<sup>o</sup>Nk, tu a<sup>o</sup>Ntapokrití mas láNpi NtsiNtsilóni.

nées siNkrúsis se apókeNtres sinikíes tu jioxánesv<sup>o</sup>Npurv<sup>o</sup>Nk, opu páno apo éNteka xiliáðes énxromi néi íxan siNkeNtro<sup>o</sup>thí fonázoNtas sinθímata ðiamartiíras jia tis apánθropes sinθíkes ðiavíosiss sta Nkéto. siNkekriména sinelíθisan ekatoNtáðes Ntóp<sup>o</sup>ii, kaθós ke siNparaistátes apo tin ziNpáNpue, namíNpia ke aNkóla. se sinéNtefkv<sup>o</sup>si me a<sup>o</sup>Ntapokkrités tu asosiéiteNt prés, i kiría maNtéla katíNkile ti xrisi NklónNpv<sup>o</sup>s ke ti rípv<sup>o</sup>si ðakriχónon vomvón enaNthíON ton siNkeNtro<sup>o</sup>théNton ðiaðilotón. metá apo parémvasi tu episkópu ke noNpelísta NtésmoNt tútu, i kivérnisi Npóθα simfómise na elefθerósi ðiakosíus peníNta apo tus siliθéNtes.

pirá aNtiláχisan epísis koNtá se aðamaNtorixía tu stélenNpos ta opía

ekmetalévoNte i eteríes NtáimoNt estáNplisment límiteNt ke i Nkólv<sup>o</sup>NteNperv<sup>o</sup>Nk máins kónpani me apotélesma to álote anθiró eNpório δiamaNtiÓN kaθós ke proiÓNton opos xavliódoNtes ke elefaNtostún, ala ke Npanánes, mánko, avokáNto ke Nkréip frút na stamatísi lóγo tu epivliθéntos eNpárv<sup>o</sup>Nko apo perisóteres apo triaNtapéNte xóres, me sinéπia tin ipotímisi tu θnikú nomísmatos, ráNt, kiríos énaNti tu ðolaríu ke tu elvetikú fráNku.

éNkiri kíkli anaferun oti ta ésoða tis sinavlías pu ðóθike sto uéNplei tis aNklías jia ti siNplírosi ton evðomíNta xρόnoN tu nélsoua maNtela, ke i opía γnórise meγáli aNtapókrisi, θa ðiateθún jia tin kalitérefsi ton sinθikón ðiavíosis sta Nkéto. Análoγi sinavlíia sto Ntitróit ton ípa anaménete na pra matopiθí stis arxés tu xília eniakósia oγðNtaená.

#### Reading passage 4

ta éNtona provlímata pu parusiázoNte sti ðiaxírisi tu éNporoviomixaniku kéntru aNpelokípoN ke paNkraτίu déon opos aNtimetopisθún siNtómos ipo tu eNtetalménu simvúlu ke jenikú ðiefθiNtú toN keNtrikón γraφioN tis oú Nkúra, kiríu alfa kaNkelári. i ekprosópi ton sinðikalistikón somatíon katíNkilan os asimfórus tas ipoγraφisas simvásis me viomixaniká siNkroτίmata is floreNtía, riáNt, islamaNpáNt, xoNk-KóNk, NpaNkóNk, kaθós ke is tin jiuNkoslavía, tsáNt, uNkáNta, uNkaría ke aNklía. katópiN tis kataNkelías εðóθi eNtolí ipo tu isaNkeléos kiríu Npí ðia tin parapoNpín is toN takv<sup>o</sup>tikón anakritín kírioN pétroN konstaNtiníðin, tu proanaferθéntos kiríu aðamaNtíu kaNkelári, os ke toN melóN tu ðiikitikú simvulíu kírioN kírioN evaNkélu NpaNtuvá, aNtóni NkuNtsíu, aNkélu NpóNpoli, xaraláNpus maraNkopúlu, lavreNtíu NtsamNtsí, mánθu paNkálu ke kirías aNðromáxis Ntsórv<sup>o</sup>Ntsi. eNtometakv<sup>o</sup>σί, afixísan ek Nporv<sup>o</sup>Ntós γalías, i éNpiri pramatoxnómones kirii kirii roNpér NkuNtrón, ke Nkí eNtriNkó ke ek NtuNpái i kiría aNkáθa NpreNpí ina provún is eNperistatoménou élenxoN páNtoN ton stixíon ke apofanθún epi tu vasímu toN kataNkelíon.

#### Minimal pair list

Ntínos	finos	tropí	Ntropí	θési	Npési
ti vúla	tiN kúla	ðáNtis	máNtis	ðíno	Ntíno
Npuḑés	kufés	kuzína	Ntuzína	sála	Npála

<i>ráma</i>	<i>Ntáma</i>	<i>γάντι</i>	<i>NkáNti</i>	<i>kéfi</i>	<i>Ntéfi</i>
<i>óra</i>	<i>Npóra</i>	<i>lezáNta</i>	<i>leváNta</i>	<i>líma</i>	<i>líNpa</i>
<i>rátsa</i>	<i>ráNtsa</i>	<i>Npóχos</i>	<i>lóχos</i>	<i>láso</i>	<i>Npáso</i>
<i>rayízo</i>	<i>raNtízo</i>	<i>kuNpí</i>	<i>kulí</i>	<i>δóri</i>	<i>δóNti</i>
<i>siNpaθó</i>	<i>sixaθó</i>	<i>póθos</i>	<i>póNtos</i>	<i>δέno</i>	<i>Npéno</i>
<i>áNkira</i>	<i>ápira</i>	<i>aNkío</i>	<i>aNtío</i>	<i>róka</i>	<i>róNpa</i>
<i>kálos</i>	<i>káNpos</i>	<i>stála</i>	<i>stáNpa</i>	<i>vázi</i>	<i>Nkázi</i>
<i>δrómena</i>	<i>Nkómena</i>	<i>araká</i>	<i>araNpá</i>	<i>sópa</i>	<i>sóNpa</i>
<i>θália</i>	<i>Ntália</i>	<i>éforos</i>	<i>éNporos</i>	<i>sóla</i>	<i>sóNpa</i>
<i>apalayí</i>	<i>aNtalayí</i>	<i>zaNpón</i>	<i>taNpón</i>	<i>γála</i>	<i>γáNpa</i>
<i>éNtera</i>	<i>éterá</i>	<i>éNtimo</i>	<i>énsimo</i>	<i>píno</i>	<i>Ntíno</i>
<i>tsáNta</i>	<i>tsóNta</i>	<i>kóNtra</i>	<i>kóNpra</i>	<i>xól</i>	<i>Npól</i>
<i>Nkarízi</i>	<i>xarízi</i>	<i>Ntsámi</i>	<i>Ntsáki</i>	<i>mésa</i>	<i>méNta</i>
<i>polikós</i>	<i>poNtikós</i>	<i>NtsáNpa</i>	<i>sáNpa</i>	<i>láki</i>	<i>láNpi</i>
<i>élefsi</i>	<i>éNpv<sup>o</sup>nefsi</i>	<i>suzúki</i>	<i>NpuNpúki</i>	<i>vázo</i>	<i>Npázo</i>
<i>NtsaNtsíki</i>	<i>NtsiNtsíki</i>	<i>tsakízo</i>	<i>tsaNtízo</i>		

## Extended word list

## (a) word-initial and word-medial NC sequences

*Npez, muNtiál, óNpoe, violoNtsélo, sáNpa, lezáNta, konstaNtinúpoli, Npar, xúNta, Npuréki, Npásket, troNpéta, sálpiNka, taNkó, máNpo, peNtéli, siNkrú, Ntsamáika, xóNpi, aNtiprósopos, NpríNts, raNtevú, tíNpano, oliNpiakós, Nkális, maraNtóna, Ntráms, éNkios, póNtos, NtsuNtsúkos, tsérnoNpil, koNkó, akorv<sup>o</sup>Nteón, variNpópi, NpíNko, arχeNtiní, aNtíNtas, NtsiriNtsáNtsules, leváNta, fraNkolevaNtínos, parapoNpí, Npuxátsa, aNtitorpilikó, éiNts, fuNtúki, luNpáNko, NkráNpa, NpaNtsanákis, síriNka, zoNklér, γáNkrena, ralaNtí, NtsanaNpétis, aNtí, NpaNpás, Nperv<sup>o</sup>NpáNtis, neráNtsi, Nparv<sup>o</sup>Npúni, faNtáros, NpaχapóNtis, snóNp, líNpra, tse Nkuevára, repuNplikános, eNpistosíni, tsaNtízo, maNtsurána, siNpérasma, Ntropí, pareNpoðízo, taNpón, sáNtuits, áNtras, tsaNkáris, eNpézo, NkáNkv<sup>o</sup>ster, tsóNta, síntakv<sup>o</sup>si, oNpréla, siNkraféas, iNtriNkes, moNtelíst, apoðiopoNpéos, Nkéto, siNtelíte, Nkómena, xítra séNp, zaNpón, méNtium, siNpósio, NkuvernáNta, Ntumáni, máNkas, síNpv<sup>o</sup>tikv<sup>o</sup>si, káNpiNk, liNtsáro, koNplekv<sup>o</sup>síkos, zoNtanévo, NpaNpáki, Npórv<sup>o</sup>Nk, léNtel, Npréznief, Nkorv<sup>o</sup>Npatsóf, éNplastros, siNkiríes, patsaNtsíðiko, éNtakv<sup>o</sup>si, erkoNtíision, láNtsa, siNkinoníes, suvlaNtsís,*

*víNteo, NtsíNtsikas, veráNta, éNtera, teNpélis, páNtote, mijiáNkixtos, aNpéli, kaNparé, maNkanopíxao, kuNparás, málv<sup>o</sup>Nporo, Nkastróno, lókv<sup>o</sup>siNkas, zoNtóvolo, Nporó, éNtona, δáNtis, Nkríza, zéNpra, aNtapókrisi, síNkrusi, Ntulápi, réNkes, kéNtima, Ntomáta, siNkeNtróthikan, aNpazúr, isaNkeléas, katíNkile, éNpiros, aNkóna, Nkáfa, Nkremízo, paNtrévete, paNkráti, triaNtáfilo, aNpelókipi, aNklía, NtaNtéles, NpónNpiras, NtokuménTo, Nplokárisma, NtaNtá, Nkálop, Ntrépome, Nkrínia, Ntérti, Npukóno, Npuxátsa, Nkémia, Nterlikóno, Npóta, Ntailíki, NpuNtrúmi, Nkól, Npúrōa, Ntamári, Npléko, NtónNpros, Npuxáda, Npúfos, Ntáma, NpojiaNtsís.*

(b) NC sequences next to msb's

*ton Npuzukión, ton Nprostinó, tin NtaNtá, ton Nkazión, tin Npóra, ton Ntefión, ton Nperv<sup>o</sup>Npánti, ton NpaxapóNti, tin NkuvernáNta, ton NpaNpá, den Nporó, an Nporéso, ótan Nporési, min Npórese?, ótan Nporésis, san Nporési, prin Nporéso, den Npóresa, an Npórese, ótan Npórese, san Npóresa, den Ntíno, an Ntíso, ótan Ntísis, min Ntísese, san Ntísise, prin Ntísune, min Ntísese, den Ntiθíkane, an Ntiθúne, ótan Ntiθíkame, min Ntiθíte, san Ntiθúne, prin Ntiθíte, ton NpónNpira, ton NtsíNtsika, ton NpaNpakión, tin Ntropí, ti NkráNpa, tin Npuxátsa, ton NtsíNko, NtokuménTon, ton Nkálop, ton Nplokárisma, ton Ntrépome, tin Nkrínia, ta Nkémia, ti Npóta, ti Npúrōa, tin Nkáfa, ton Npléko, ton NtónNpron, tin Npuxáda, ton NpojiaNtsí, ton Nkól, tin Ntáma, ton Npúfo, ton Ntíno, tin Ntíno.*

(c) NC sequences across msb's

*ton kavalári, tin káva, tin próthesi, ton kúrasa, ton kakuxión, ton katáfera, ton tixōiokv<sup>o</sup>ton, tin prothesmía, ston katanalotón, tin trofi, an plínis, tin tsápa, ton parixorión, ston kaθárise, tin panúkla, den kéréise, ton tilikv<sup>o</sup>se, ton tsarlatáno, tin páli, den ponó, ton tileoráseon, ton tsámiko, min kóvis, tin portokaliá, ton tsaxpíni, ton píre, den kv<sup>o</sup>séro, ton koθikón, stin prímni, tin katáplikv<sup>o</sup>si, an paravlépv<sup>o</sup>sis, tin tsíxla, ton pritáneon, stin téxni, tin kipv<sup>o</sup>séli, ton texníti, stin tsépi, tin pápia, min kopanás, ton kávura, ton polaplasíase, den plákose, ton trokv<sup>o</sup>tikón, tin kerōoskopía, ótan kiníxise, stin plóri, den pónese, tin púlise, den kontaraxtipiéme, ton trémi, ton kervero, tin tsákise, ton tsákose, tin tsántise, tin pátise, ton tríxo, den pernó, ton paNtoθínamo, den paravlépo, min plénis, tin triáda, ton planíti, ótan troxízo,*

toN kaθeró, tiN piramída.

aN plínis, ðeN plínis, miN plínis, priN plínis, ótaN plíneste, saN plínis, aN pliθís, ðeN pliθíkame, miN pliθís, priN pliθís, saN pliθíkame, ótaN pliθó, aN pérases, ðeN pérase, miN perásane?, ótaN pérase, saN pérasa, aN perásis, ðeN pernás, miN pernás, priN perásis, ótaN perásete, saN perásis, aN krátises, ðeN krátisa, miN krátise?, ótaN krátisan, saN krátises, aN kratísis, ðeN kratás, miN kratísis, priN kratísis, ótaN kratísete, saN kratíθúme, aN pátises, ðeN pátises, miN pátises?, ótaN pátises, saN pátisa, aN patísis, ðeN patás, miN patísis, priN patísis, ótaN patísete, saN patísis, aN krínis, ðeN kríθikes, miN krínis, priN kríno, ótaN krínis, saN kríθike, aN kriθís, ðeN kriθíkame, miN kriθís, priN kriθíte, ótaN kriθíkame, saN kriθís, aN kéNtises, ðeN kéNtise, miN kéNtise?, priN kéNtise, ótaN kéNtises, saN kéNtise, aN kéNtiso, ðeN keNtó, miN keNtísis, priN keNtísis, ótaN keNtísune, saN keNtísis, aN tériakv<sup>o</sup>se, ðeN tériakv<sup>o</sup>ses, miN tériakv<sup>o</sup>se?, priN tériakv<sup>o</sup>san, ótaN tériakv<sup>o</sup>san, saN tériakv<sup>o</sup>san, aN teriákv<sup>o</sup>sis, ðeN teriákv<sup>o</sup>sane, miN teriákv<sup>o</sup>sis, priN teriákv<sup>o</sup>sune, ótaN teriákv<sup>o</sup>sete, saN teriákv<sup>o</sup>sune, ðeN tsákises, ðeN tsákise, miN tsákise, ótaN tsákisan, saN tsákise, aN tsakízis, ðeN tsakízi, miN tsakísis, priN tsakísete, ótaN tsakísune, saN tsakísete, aN tírises, ðeN tírisa, miN tírise?, priN tírisa, ótaN tírises, saN tírise, aN tirísate, ðeN tirísame, miN tirísate, priN tirísis, ótaN tirísate, saN tirísune, aN tsínPisa, ðeN tsínPises, miN tsínPise?, priN tsínPise, ótaN tsínPise, saN tsínPise, aN tsínPísate, ðeN tsínPíθikan, miN tsínPáte, ótaN tsínPísane, priN tsínPísate, saN tsínPísune.

(c) NC sequences across and next to msb's and masb's

ton oréon trapezión, ólon ton spuðéon koritsión, ton xiðéon peðión tu, ton koménon paraγráfon tis, ton koménon pantelonión pu, ton periorisménon periθoríon, ólon ton kaθarisméno Ntsakión, ólon ton kaloγraménon paramiθión tu, ton spuðéon katorθomáton tis, ton xiðéon texnasmáton tu, ton skisménon pukamíson pu forá, ton xtisménon Ntsakión, ólon ton oréon tsaNtón, ton periorisménon króton pu, ton Npaloménon tíxon tu, ton jialisménon patomáton tis, ton anθisménon kákv<sup>o</sup>ton, ton kakón peðión, ton polón trapezión pu strónun, ólon ton katastreπv<sup>o</sup>tikón paγídon, ton kakón koritsión tis, ton koNtón pantelonión, ton mikrón paraγráfon tu, ólon ton mikrón periθoríon, ólon ton foverón katorθomáton tu, ólon ton mikrón tsaNtón tu, ton tromerón katorθomáton tu, ton ponirón texnasmáton tis, ton plekv<sup>o</sup>tón pukamíson pu

forá, ton kalón paramithión, ólon ton kaθarón patomáton tis, ólon ton lepv<sup>o</sup>tón tixon, ton ðinatón króton, ton kaθarón Ntsakión tu, ton kaθarón Ntsamión, ton kátaspron malión tu, ton ómorfon Ntsakión, ólon ton kaθarón Ntsamión, ton kv<sup>o</sup>sílinon trapezión pu, ton ómorfon koritsión tis, ton prásinon kákv<sup>o</sup>ton tu, ólon ton átakv<sup>o</sup>ton peðión tu, ton áγrafon parayráfon, ton árafton paNtelonión pu próvare, ton ápiroN periθoríon, ólon ton vrómikon Ntsakión, ólon ton áγrafon paramithión tu, ton asílipv<sup>o</sup>ton katorθomatón tis, ólon ton ilíθion texnasmatón tis, ton katámavron pukamíson pu forá, ólon ton ómorfon Ntsakión pu éxi, ton vrómikon tsaNtón, ólon ton prásinon tixon, ton kítrinoN kákv<sup>o</sup>ton tis, ton vrómikon patomáton tu spitiú, ton tromerón krotón, ton foverón peðión, ton polón kákv<sup>o</sup>ton, ton lepv<sup>o</sup>tón tixon, ton kaθarón xóron, ítan trís, γράpv<sup>o</sup>san polá, diávasan perilípv<sup>o</sup>sis, perpátisan pros ta, aravoniástikaN kopéles, aγápisan kopéles, paNtréftikaN poli, píraN Npros, píxan péra, ítan káto, írθaN píso, éxun páli, ítan pénte, rávuN paNtelónia, aravoniástikaN téseris, iðaN polá, píxan páso, miláN trelí, esθánθikaN tremúla, píraN prín, íxan Npésa, píxan páno, ákusaN polá, iðaN ke xirótera, ítan téseris, ítan Ntaís, aravoniástikaN trís, foviθikaN polí, tilefónisaN polí.

### Questionnaire

1. Name: .....
2. Age: 20-28 ( ) 29-35 ( )  
45-55 ( ) 56-66 ( )
3. Sex: Male ( ) Female ( )
4. Do you have children? Yes ( ) No ( )  
How many? ( ) Of what age is each? ( ) ( )
- Which foreign language(s) do they speak? .....
- To which school do/did they go? .....
- Are they studying? .....
- What and where do they study? .....
- Have they finished their studies? .....
5. What is your profession/occupation? .....
6. What are your hobbies? .....
7. Are you a member in any organisation/society/club? ...
8. How regularly do you buy: a) newspapers

b) magazines

c) books

9. How active is your social life? .....
10. What is your relationship with each of the remaining 16 informants?

#### Language questions

1. Do you speak with an accent? Do other people consider you have an accent?
2. How broad do you think your accent is?
3. Do you think you speak "well", "correctly"?  
Who do you think speaks "correctly", "well"?  
Is it good to speak "correctly", "well"? Why?  
Do you make an effort to speak "correctly"?
4. On which factor do you think "correct"/"good" speech depends:  
a) vocabulary   b) accent   c) syntax  
d) education   f) other
5. Did you find any common pronunciation characteristic in the words you read? Do you know if there exists any pronunciation rule for *b/d/g/dz*? Where do we learn this rule?
6. How do you pronounce *b/d/g/dz*? How do other people pronounce *b/d/g/dz*?
7. Are distinctions such as the following important for the manner that you pronounce *b/d/g/dz*?
  - a) the katharevousa versus demotiki characterisation of a word
  - b) casual versus formal speech
  - c) rapidity of speech
  - d) the particular word in question (e.g. whether the word is rarely/often used, popular/archaic, etc.)
9. Have you ever thought about the pronunciation 'problem' of *b/d/g/dz*? Have you ever thought of any other pronunciation 'problem' of Modern Greek?



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