AN EXPERIMENTAL COMPARISON
OF THE PHONOLOGY
OF ENGLISH AND MODERN GREEK

by

E. EFSTATHIADIS

Thesis submitted for the Degree of Ph.D.

in the

DEPARTMENT OF LINGUISTICS

UNIVERSITY OF EDINBURGH

September, 1973

Supervisors: Dr Gillian Brown
Mrs Elisabeth Ingram

To

my wife,

Mary

ACKNOWLEDGMENTS

I wish to record my debt to all those who have helped in the preparation of this thesis: to the students of the Department of English, The University of Thessaloniki, who volunteered to participate in the experiment; to my colleague Miss M. Pilidou for typing the Greek in this work and for proofreading the stencils; to Professor I.E. Jago, Mrs Y. Jago, and Mr. M. Murrell, the three Judges, for giving much of their valuable time to assessing subject vocal production in Part Two of this investigation. I am particularly indebted to my two supervisors: to Mrs E. Ingram for her help in the construction of the experimental materials and her guidance in the statistical evaluation of the test results; and to Dr G. Brown for her numerous and most insightful comments and suggestions in matters of phonological theory.

Finally, I am grateful to the British Council for financing my studies in the Department of Linguistics in Edinburgh.

CONTENTS

ABSTRACT OF THESIS

The aim of the present thesis is to investigate the manner in which Greeks process the sound continuum when performing in English. The scope of this study is restricted to certain comparable (and problematic) areas of the phonological systems of Modern Greek and English. Only phenomena involving consonantal sequences are considered, specifically those relating to the following processes:

- Regressive voice-assimilation of obstruents.
- Regressive voice-assimilation of pre-consonantal sibilants.
- Regressive point-assimilation of pre-consonantal nasals.
- Progressive voice-assimilation of post-nasal stops.
- Identical-consonant cluster simplification.
- Pre-obstruent nasal deletion.
- Epenthesis.

Environmentally, such phenomena are examined and accounted for within the domain of the phonological word.

The selected fragment of the Greek phonology is analysed and described in transformational, generative terms, and, where this is pertinent, the sets of Redundancy and Phonological rules developed for Greek are compared with their English counterparts. When the same or similar inputs to rules yield non-identical outputs in the two systems, the explanation is sought in the, at least partially, different processes that the relevant data undergo.

The experimental part of the thesis seeks to provide some independent, empirical support for the conclusions (concerning primarily transfer and misapplication of Greek rules to English phonological structures) arrived at on the basis of the comparison of the phonological processes involved in each language.

P A R T   O N E

DESCRIPTIVE

CHAPTER 1

INTRODUCTION

1. Aim

The primary concern of this thesis is to provide a theoretical basis for comparing some matching areas in the phonological systems of Greek and English, and, this done, to account for certain pronunciation errors, observed in the performance of Greek learners of English, by showing that they can be attributed to the manner in which native speakers of Greek process the English sound continuum in terms of rules of the Greek, rather than of the English, phonology.

This investigation does not pretend to have exhausted the subject, nor even does it claim to offer any final answers to the specific questions it has dealt with. It can only claim originality in two respects: first, in contrast to normal practice,(1) Greek phonology is treated here in generative terms - as expounded, mainly, in Chomsky & Halle (1968), and in Brown (1969, 1972); and second, the comparison of the two languages involved is also made in terms of generative processes, which, to this writer's knowledge, has not been attempted on a comparative basis of this kind so far.

2. Problems

Pronunciation errors made in a foreign language learning setting can be variously categorized. They may be termed 'Major' (or 'Phonemic', or 'Distinctive') when they refer to a change in the composition of a segment; ambiguity or even incomprehensibility may result then, as, for instance, when cap in, "Your cap is here." is misheard or mispronounced with 'voice' in the final segment.[2] Or they may be classed 'Minor' (or 'non-Phonemic', or 'non-Distinctive') when they reflect 'foreignness' of accent rather than any real break in communication, as, for example, when <u>bomber</u> is mispronounced with a medial [b].

Whatever the evaluative merits of the terms 'major' and 'minor', the fact remains that although errors observed may be grouped in the ways suggested above, one can never hope to categorize in the same way the <u>people</u> who make such mistakes: all learners, of all foreign languages make <u>both</u> (and many other) kinds of errors. The language teacher may feel that priority must be given to the former type of mistakes, but the language investigator need not be bound by similar considerations as to the area he chooses to examine. Nevertheless, some selection of scope of research is necessary.

2.1 The coverage of this thesis has been restricted to a relatively small number of phonological phenomena that occur intra- and inter-morphemically within the domain of the phonological word.[3] Specifically, interest in this partial study lies in investigating how certain consonants and, mainly, consonantal sequences are processed, separately in each of the two languages, and, additionally, how a Greek handles such English segments and segment sequences as are compared here.

The particular pedagogical problems examined in this thesis all relate to the tendency of a Greek learner of English to impose the rules of Greek phonology on the English system. A brief, informal account of such problems is given below:

(a) Application of the Greek rule that assigns the feature 'voiced' to stops post-nasally (cf. p. 77) to English

phonological inputs which satisfy this sequential condition. That is, a Greek frequently mishears and mispronounces English words such as <u>bumper</u> like this: *[bʌ́mbə].(4)
A serious pedagogical problem is involved here.

(b) Application to the relevant English sequences of the Greek rule that may delete a nasal segment before a 'voiced stop' (cf. pp.89-94); the stop segment may have been originally 'voiced', or it may have assumed voicing through application of the previous Greek rule; for example, both <u>tend</u> and <u>tent</u> may be erroneously perceived or rendered as *[téd], as in <u>Ted</u>.
A pronunciation problem arises here also.

(c) Application to English of the Greek rule that assigns the feature 'voiced' to the archi-segment /S/ (5) before any voiced consonant; for example, <u>small</u> is generally misheard or mispronounced as *[zmól] by a Greek.
This case of rule-misapplication constitutes a very serious learning and teaching problem.(6)

As we shall see in greater detail later (chapters 3 and 4), all of these problems originate in the fact that English consonantal sequences are processed by the learner according to the rules of his mother tongue - Greek.

Another pronunciation difficulty considered in this work arises from epenthesization of the segment [ᵊ] after a consonant at the end of English words; this process also may result in ambiguity, as when <u>send</u> is, frequently, misperceived or misproduced as *[séndᵊ].

Naturally, when all or a number of these Greek rules are misapplied to English structures, the problem becomes more acute. As an illustration, consider the various phonetic shapes that an English word like <u>sink</u> may assume when processed in accordance with the rules of Greek phonology:

- after application of the 'Progressive voice-assimilation of post-nasal stops' rule (cf. rule (11), p. 77) : *[sɨ́ŋg]
- after subsequent epenthesization of [^{ə}] : *[sɨ́ŋg^{ə}]

and more rarely

- after application of the 'Progressive voice-assimilation of post-nasal stops' rule, and after subsequent application of the 'Pre-obstruent nasal deletion' rule (cf. rule (4), p. 94), but before epenthesization of [^{ə}] (cf. rule (5), p. 96) : *[sɨ́g]
- after subsequent epenthesization of [^{ə}] : *[sɨ́g^{ə}]

2.2 There are numerous other phonological areas which, though quite problematic, are not dealt with in this thesis at all. For instance, all vowels are excluded from this treatment, and so are certain consonants (e.g. /ʦ/ and /ʣ/) and the glides (/y/, /w/, /h/) as not directly related to the subject-matter of this study; stress is ignored (except that it is marked in phonetic transcriptions, purely for the reader's convenience) as are all suprasegmental elements. Finally, 'syllables' are not treated here as underlying elements, but rather as the distributional unit of the phonetic realization.(7)

The language being analysed and described is, for Greek, strictly Thessalonikian Greek, in particular the variety of Greek which the present writer speaks; no onomatopoeic words or foreign loan-words are accounted for.(8) On the English side, the R.P. variety (as described in the works of D. Jones) is considered.

2.3 All of the problems considered on a comparative basis in Part One of the present thesis have been tested in an experiment which is described and discussed in detail in Part Two, chapters 5 and 6.

3. Organization

The general organization of this thesis is as follows:

Part One is concerned with the phonological description of the problems under examination. Part Two is devoted to the experiment.

Chapter 1, the Introduction, is a brief, informal sketch of the nature of the problems considered; it also states what assumptions have been made and what conventions have been observed in the course of this investigation; finally, it outlines the theoretical model used for analysis and description.

Chapter 2 presents in some detail the descriptive model as well as the 'distinctive features' framework utilized in the formulation of rules and in the explication of certain phonological and phonetic processes in later chapters.

Chapter 3 deals with the relevance of the Redundancy Rules to the pedagogical problems examined in this thesis. Only Sequence Structure Rules[9] are considered, the form and function of a set of Segment Structure Rules being simply demonstrated but otherwise taken for granted. The important question of 'voicing' in Greek, related to a number of processes discussed in this work, is also argued in some detail.

Chapter 4 shows the relevance of Phonological Rules to the problems under discussion.

In all presentation in Part One (and where relevant in Part Two), the general rules which we eventually land up with will be referred to by name. Other rules which are instances of these general rules will be developed during the discussion; these will always be referred to the maximally general form of the rules.

Chapter 5 analyses in considerable detail both the materials used in the experiment and the conditions (administrative and physical) under which the experiment was conducted.

Chapter 6 is a fairly comprehensive discussion of the statistical evaluation of the experimental results.

Finally, the Tables in the Appendices to this thesis contain all the experimental materials in the form in which they were administered to the participants, and give a complete picture of the assessment of the subjects' behaviour in all the phases of the experiment. The Tables also include statistical information that is useful for the interpretation of the experimental results.

4. Assumptions - Conventions

4.1 Assumptions

In the course of the investigation into the fragment of Greek and English phonologies presented here, the following assumptions have been made:

(a) It is taken for granted that a formal syntactic and semantic analysis of both languages under examination has preceded this study, and that information derived from such an analysis forms part of the specification of all lexical items as well as of the syntactic surface structure representation.[10]

(b) It is further assumed that, from a phonological point of view, all entries appear in the lexicon with a minimal specification - typically, in the form of sequences of Archi-segments - although, in this work, only the segments and segment sequences immediately under discussion are represented in non-redundant form, the rest of the segmental environment being given in full phonemic shape.

(c) As conceived in this thesis, the 'phonological word' has the following properties in Greek[11] - mostly informally expressed here:

(i) It is immediately dominated by one of the major categories;[12] this implies that it normally contains only one lexical stem - except in cases of compounding, which are not examined here.

(ii) It defines the phonological domain of stress assignment.

(iii) It controls the phonological domain of the processes of:
- Regressive voice-assimilation of obstruents.[13]
- Regressive point-assimilation of pre-consonantal nasals.
- Progressive voice-assimilation of post-nasal stops.
- Identical-consonant cluster simplification.
- Pre-obstruent nasal deletion.
- Epenthesis.

(iv) It includes in its domain all types of enclitics.[14]

(v) It controls affixation.

(vi) It defines the phonological domain of derivational operations.

4.2 Conventions

The following conventions have been observed throughout this study.

4.2.1 General

(a) As mentioned in section 2.2 above, and unless otherwise specifically stated, 'Greek' is to be understood as that variety of Modern Greek which is spoken in Thessaloniki and area. Strictly words of Greek origin are considered. 'English', on the other hand, is meant as a shorthand for 'R.P. English' as expounded in D. Jones's works - notably in his 'English Pronouncing Dictionary'.

(b) Where relevant, examples illustrating the various processes discussed in this thesis are generally drawn from the materials used in the experiment.

(c) Unless otherwise stated, all Greek examples that involve inflexion are given in the active, present tense, first person singular (in verbs), or in the nominative, singular (in nouns, pronouns, and adjectives).

(d) Stress is indicated by ´ which is placed above the vowel of the syllable that is accented; only primary stress is given here and it appears only in phonetic representations.

4.2.2 Notational(15)

(a) In all representations where phonemic or phonetic symbols are used, these are to be understood as informal abbreviatory devices, each standing for a complex of feature specifications; it is important that no theoretical significance should be attached to such transcriptional conventions. This statement also holds true for the convenient symbols V and C, standing for 'vowel' and 'consonant', respectively; the convention is extended to cover the symbolization of archi-segments: for example, /N/ = [+nasal].

(b) Whenever representations are not given in terms of features, the symbols used are the most economical typographically(16) and, with regard to English, must be given the phonetic value they have in Jones, 1967a, from which they were derived. (See also (f) below.) Finer phonetic distinctions, such as length and aspiration, are not included in such representations, not even in inter-language comparisons.(17)

(c) (i) An asterisk * indicates:

- 'ungrammaticalness', when placed before a lexical or a surface structure representation, e.g. *+/sxn.../

- 'unacceptability', in R.P., when placed before a phonetic representation, e.g. *[bʌ́mbə], 'bumper' (Cf. note 4 above).

(ii) Obliques / / enclose any non-phonetic representation;(18) that is:
- lexical entries: /eN/, 'in, with'; /nomos/, 'law'(19)
- (syntactic) surface structure representations: /eN+nomos/, 'legal'
- outputs from R-rules: /en+nomos/, 'legal'
- outputs from P-rules: /enomos/, 'legal'.

(iii) Square brackets [ ] enclose:
- outputs from the Phonetic Realization Rules: [to(m)bétro], 'Peter' (art.+ acc.)
- distinctive features: [+stop], [-obstruent], etc.

(iv) Parentheses ( ) round segments in phonetic transcriptions indicate the optional presence of these segments: [to(m)bétro] stands for either [tombétro] or [tobétro].

(v) Braces { } enclose, in rules, two or more alternatives from which only one must be selected:

$$[+nasa] \dashrightarrow \left\{ \begin{array}{l} \emptyset \ / \ {+}{+} \ \_\_\_ \\ \sim\emptyset \ / \ \_\_\_ \end{array} \right\} [+obst] \qquad \begin{array}{l} (a) \\ (b) \end{array}$$

of which case (b), in fact, explains the optional deletion of the nasal segment before the stop in (iii) and (iv) above.(20)

(vi) A single oblique / means 'in the environment of ...'.

(vii) The environment bar ——— (whether or not occurring within square brackets) shows the place occupied by the part of the rule preceding the arrow -----> in the part of the rule that follows it.

(viii) The arrow -----> in rules is an instruction to rewrite what immediately precedes it as what immediately follows it.

(ix) When inside square brackets, the signs + and - indicate the positive or negative value of the distinctive feature to which they are assigned. Outside square brackets (and also in surface structure representations), one plus-sign, + , symbolizes a morpheme boundary, and two plus-signs, ++ , symbolize a word boundary. (Where irrelevant to the discussion, morpheme boundaries are omitted from surface structure representations; for instance, no morpheme boundaries appear between <u>bases</u> and <u>suffixes</u>.)

(x) '<u>alpha</u>-variables' stand for either a + or a - in the specification of features in a rule.

(d) The distinctive features utilized in this thesis are abbreviated to the first four letters when they occur in rules, as follows:

- vocalic	= [voca]	- stop	= [stop]
- consonantal	= [cons]	- nasal	= [nasa]
- obstruent	= [obst]	- voiced	= [voic]
- peripheral	= [peri]	- strident	= [stri]
- anterior	= [ante]		

Note that 'null', symbolized ∅, stands for the complex of features $\begin{bmatrix}\text{-segment}\\ \text{-boundary}\end{bmatrix}$.

(e) The following abbreviations of certain syntactic/semantic features are occasionally used:

- masculine = m.	- noun = n.	- nominative = nom.
- feminine = f.	- singular = s.	- genitive = gen.
- neuter = nr.	- plural = p.	- accusative = acc.

(f) Finally, in the phonemic or (broad) phonetic transcription of English examples in this study, the symbols

p, b, f, v, t, d, θ, ð, s, z, k, g, l, r, m, n, h, w

as well as

i, e, æ, ɒ, o, u, ʌ, ə

stand for the phonemes they customarily represent in this language.

In addition, the underlined letter(s) in the following key-words illustrate the phonemes represented by the symbols given on the left:

Consonants		Vowels		Diphthongs	
š	she	ɨ	sit	eɨ	say
ž	measure	a	far	aʉ	brown
č	char	ʉ	good	ɨə	year
ǰ	judge				
y	you				

Similarly, in the Greek examples, the correspondence of symbol to phoneme is as follows:

Consonants(21)

p	πάλι	páli	'again'
b	μπαίνω	béno	'I enter'
f	φίλος	fílos	'friend'
v	βάρος	város	'weight'
t	τότε	tóte	'then'
d	ντύνω	díno	'I dress'
θ	θεῖος	θíos	'uncle'
ð	δύο	ðío	'two'
s	σάλος	sálos	'commotion'
z	ζῆλος	zílos	'zeal'
k	κόρη	kóri	'daughter'
g	γκρεμός	gremós	'precipice'
x	χαρά	xará	'joy'
γ	γόνος	γónos	'offspring'
l	λόγος	lóγos	'word'
r	ρέω	réo	'I flow'
m	μητέρα	mitéra	'mother'
n	νόθος	nóθos	'bastard'

Vowels

i	εἶμαι	íme	'I am'
e	μπαίνω	béno	'I enter'
a	πάλι	páli	'again'
o	φῶς	fós	'light'
u	οὐρά	urá	'tail'

5. Outline of the Descriptive Model

We shall attempt to account for the interference sketched on pp. 3-5 in terms of a generative model as conceived by Chomsky & Halle (1968), and by Brown (1969, 1972). This model of phonological description consists essentially of two components: (a) a Lexicon, and (b) two sets of rules.(22)

The lexicon contains entries which are composed of Bases and Affixes.(23) On the basis of their syntactic, semantic, and phonological minimal possible specification, certain entries are selected from the lexicon so as to fit correspondingly specified structures generated by the syntactic component of the grammar; such entries are inserted into the appropriate labelled bracketing and are associated with each other in these surface structures. After application of a special set of Readjustment Rules to such structures, only those boundaries remain in them which enclose entries specifically marked [+P-rule P]; all other boundaries are erased.(24) These partially specified representations are subsequently submitted to the Redundancy Rules of both the Segment and the Sequence Structure type (cf. chapters 2 and 3); when matrices emerge from these rules, they are fully specified regardless of whether or not they still contain morpheme boundaries. Those matrices which are not marked [+P-rule P] in the lexicon are fed directly into the set of Phonetic Realization Rules (cf. notes 22 and 24 above), while other matrices marked [+P-rule P] have to pass through the relevant rule(s) in the set of P-rules (cf. chapter 4) for some change in their feature composition. If, because of the operation of one or more P-rules on a matrix, the feature specification of that matrix has to be further completed, the matrix is recycled through all the R-rules before being directed to the Phonetic Realization Rules; otherwise, the matrix is submitted directly to the Phonetic Realization Rules.

Let us take an example from Greek to illustrate the way in which the phonological word may be processed at the various stages we have just summarized. Consider the lexical entries /siN/ and /nefo/.[25] The first of these will have assigned to it the features $\begin{bmatrix}+\text{prefix}\\ \text{X}\\ +\text{P-rule P}\end{bmatrix}$ and the second $\begin{bmatrix}+\text{noun-base}\\ \text{Y}\end{bmatrix}$, where [prefix] and [noun-base] are syntactic features, [X] and [Y] are complexes of features necessary for the unique but non-redundant syntactic, semantic, and phonological characterization of the prefix /siN/ and of the noun-base /nefo/, respectively, and [+P-rule P] indicates that the output of this syntactic surface structure will eventually be submitted to some P-rule P. Now, if the syntactic component of the grammar generates a surface structure marked $\begin{bmatrix}+\text{prefix}\\ \text{X}\\ +\text{P-rule P}\end{bmatrix} + \begin{bmatrix}+\text{noun-base}\\ \text{Y}\end{bmatrix}$ (where the sign + outside the brackets indicates the presence of a morpheme boundary, and where [X] and [Y] stand for feature complexes as above), it is possible for the surface structure just given to have inserted in it the lexical entries /siN/ and /nefo/, each of which satisfies the conditions required for insertion into this surface structure, which will then have the form

$$\text{(a)}\quad \Big[_{\text{noun}}\Big[_{\text{prefix}}\ \text{siN}\Big]_{\text{prefix}} + \Big[_{\text{noun-base}}\ \text{nefo}\Big]_{\text{noun-base}}\Big]_{\text{noun}}$$

The Readjustment Rules will now apply to (a) to erase the brackets but <u>not</u> the morpheme boundary + since, as we have noted, "one of the functions of the readjustment rules ... [is] to delete all morpheme boundaries occurring between items NOT MARKED FOR ENTRY TO THE PHONOLOGICAL RULES."[26] and /siN/ <u>is</u> so marked. So the representation /siN+nefo/, with the morpheme boundary, will pass through all relevant R-rules where its specification will be completed in the normal way and will emerge from these rules as in (b) below

(b) /sin+nefo/

This output from the R-rules will then serve as input to the P-rules (specifically, to the 'Identical-consonant cluster simplification' rule) which will delete the first of the two identical nasals and also the morpheme boundary, leaving

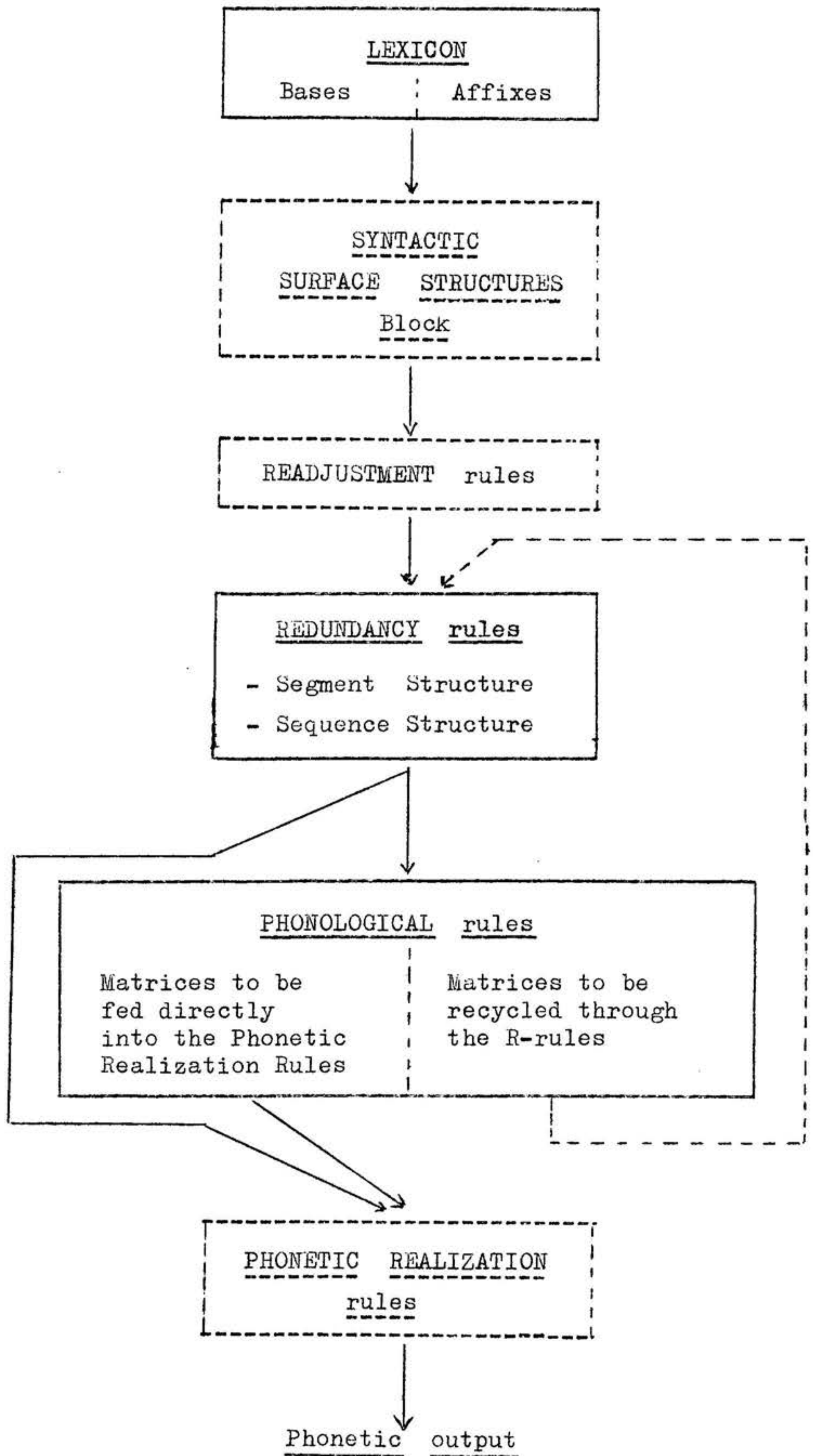
(c) /sinefo/

Now, the change effected on /sin+nefo/ by the relevant P-rule is not such that recycling through the R-rules is made necessary; therefore, /sinefo/ is fed directly into the Phonetic Realization Rules, which will convert the binary phonological features in (c) into the multi-valued phonetic features assumed to be represented in (d) (cf. chapter 2, pp. 27-9)

(d) [sínefo] , 'cloud'.

The figure on the next page helps to show diagrammatically how the model we have just sketched works.

5.1 Diagrammatic representation of the present descriptive model



NOTES TO CHAPTER 1

(1) Except for Warburton (1970), Malikouti (1970), Newton (1972).

(2) The linguistic or extra-linguistic context will normally resolve the ambiguity.

(3) For an informal definition of the concept of the Greek 'phonological word', see p. 8 of this chapter; also note 11 below.

(4) More precisely, a Greek will tend to pronounce *bumper* as *[bʌ́mber]; this point will not be pressed, however, as it is irrelevant to the present discussion.

Notice at this point that although [mb] is a perfectly possible R.P. pronunciation, it is *unacceptable in this particular context*, i.e. as the phonetic realization of *this* item.

(5) For some discussion of archi-segments and the role they play in phonology, see chapters 2 and 3.

(6) It is of interest to notice that the relevant Greek rule may apply not only within but also across phonological words, occasionally even after a pause, as in

Μπῆκες, βγῆκες, δέ μᾶς ἄφησες νά ἡσυχάσουμε.

[bíkez γvíkez δé mas áfisez na isixásume]

'You've come in and out and didn't let us rest.'

However, misapplication of this rule across English phonological words is not as common as it is within words.

(7) For an interesting treatment of syllables, see Anderson & Jones.

(8) It seems very probable, nevertheless, that if such items were included in this study, no radically different handling of processes would be called for.

(9) For a detailed discussion of such rules, see chapter 3.

(10) See note 22 below, and diagram on p. 16; also chapter 2.

(11) Concerning the Greek phonological word, see Warburton, 1970 b.

For a detailed treatment of the concept 'phonological word' and other related matters (on the English side), see Chomsky & Halle, 1968: 366-70.

(12) For a definition of 'Major Categories', see Lyons, 1967: 273 f.

(13) As we shall see in chapter 3, this phenomenon is observed strictly inside the boundaries of the phonological word when obstruent sequences other than $[+\text{stri}]\begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$ are involved; with regard to these latter sequences, the 'voicing' operation in question can be extended to cover across-word cases as well.

See note 6 above; also chapter 3, section 3, and note 14.

(14) In a more exhaustive analysis, this assumption might have to be somewhat modified, and the morpheme and prefix boundaries involved in the respective representations might need to be separately introduced and handled in the phonology.

For questions pertaining to boundaries, see Chomsky & Halle, 1968: 364-72, and elsewhere. See also note 14 to chapter 3 in this study.

(15) Abbreviatory devices are fully discussed in Chomsky & Halle, 1968 (see their 'Subject Index'); also, a particularly illuminating treatment is given to such conventions in Harms, 1968: 57-83.

(16) See Abercrombie, 1964: 16-22.

(17) In this connection, the general remark may be made that aspiration is practically non-existent in Greek stop segments, and that length is not distinctive in Greek - though stress and segmental environment do influence the phonetic realization of vowels in this language; for example, stressed vowels tend on the whole to be longer than their unstressed counterparts.

(18) By 'non-phonetic representations' we mean those matrices which have not yet been submitted to the Phonetic Realization Rules. Occasionally, when phonemic transcription is used, outputs from the P-rules will look very much like outputs from the set of the Phonetic Realization Rules. However, the former outputs are assumed to be represented with <u>phonological</u>, <u>binary</u> features, whereas the latter are understood as being specified with <u>phonetic</u> features the values of which range along a scale of values.

See relevant discussion in chapter 2, 2.1, pp. 27-9.

(19) See bottom of page.

(20) For a detailed treatment of cases of optional pre-obstruent nasal deletion, see chapter 4, pp. 89-94.

(21) See note 17 above concerning aspiration in Greek stop segments.

(22) But note that, in fact, (a) a 'Syntactic Surface Structure' block intervenes between the Lexicon and the Rules (for a somewhat more detailed discussion of the function of such a 'block', see chapter 2, pp. 32-3); and (b) there are two more sets of rules, the <u>Readjustment Rules</u> (whose function is to process the output from the syntactic component in such a way as to make it suitable for entry to the rules of the phonological component), and the <u>Phonetic Realization Rules</u> (which convert binary phonological features into multi-valued phonetic features).

Readjustment Rules and Phonetic Realization Rules are assumed but not discussed in this thesis.

(23) Strictly speaking, it is not right to assume that all words can be shown to be derivable from affixes and bases; uninflected forms, for instance, are not so derived.

See also chapter 2, p. 30-1.

19) Actually, there is no real sense in which to gloss a form enclosed in obliques, i.e. any non-phonetic representation such as /eN/ or /nomos/ or /eN+nomos/ or /en+nomos/ or /enomos/; where such representations are glossed in this work, this is done purely for the convenience of the reader.

(24) Cf. Chomsky & Halle, 1968: 9 f, and elsewhere; also note 22 above.

(25) /nefo/ is not, strictly, a 'pure' base: the final /o/ is itself an affix, the suffix that marks neuter gender and singular number. As this has no bearing on the point being made, however, no morpheme boundary appears in the lexical representation of the item.

(26) See Brown, 1969: 9-10.

See also Chomsky & Halle, 1968: 9-11, and chapter 8, section 6.5. Notice that Chomsky & Halle do not allow Readjustment Rules to delete boundaries. Nevertheless, as we shall have occasion to suggest as we proceed, our phonology will be simpler if we permit Readjustment Rules to erase both brackets and <u>certain</u> boundaries.

CHAPTER 2

THE 'DISTINCTIVE FEATURE' FRAMEWORK AND THE DESCRIPTIVE MODEL

1. In a generative framework, the grammar of a language can be thought of as a device consisting of a lexicon and of a system of rules which ultimately generate all and only the sentences of that language and which assign a structural description to each sentence so generated. In particular, each such grammar (as conceived by Chomsky in his 'Aspects of the Theory of Syntax', 1965) contains a central syntactic component and two 'interpretive' components, one semantic, the other phonological. The syntactic component of the grammar provides for each sentence that it generates (i.e. that it accounts for structurally) a 'deep structure' on which the semantic component operates and to which it gives a 'meaning'; it also provides for each such sentence a 'surface structure' which is converted by the rules of the phonological component into the phonetic shape of that sentence. All this is done at various levels of differing degrees of abstraction and complexity.

In this thesis, we shall not be concerned with the relation holding between the syntactic and the semantic components of grammar. And we shall consider the syntactic component somewhat indirectly,(1) that is, to the extent to which it is relevant for the (ultimately) phonetic interpretation of surface structures, the derivation of which will be assumed to have been previously formally established.

In brief, we shall be examining here some aspects of the phonological component of the grammar of Greek which takes as input a structurally analysed string of morphemes (some lexical, others grammatical) in their surface structure representation and processes it through a set of phonological rules in such a way as to provide as its output the phonetic realization of this string. In doing so, we shall also have occasion to indicate the other main function of the phonological component, that is, how it can express valid generalizations concerning the phonological structure of a language.

1.1 The descriptive model employed in this work was very briefly outlined in chapter 1. There, mention was also made of the set of 'Distinctive Features' which are used in the specification of the various types of representation (cf. p. 9f.) and also in the formulation of the rules that take such representations as inputs for processing.

However, both the model as well as the distinctive feature framework and the representations (matrices) and rules in which such features appear deserve more detailed consideration than the sketchy treatment they received in chapter 1. So this chapter is given primarily to: (a) a discussion of the distinctive features proposed for the description of the phonological areas selected from Greek and English for comparison; and (b) an analysis of the various parts of the descriptive model, with particular emphasis on the function of the Redundancy Rules in phonology.[2]

2. <u>The Distinctive Features proposed</u>

Let us begin by first presenting the distinctive features selected for the description of the fragments of Greek and English phonologies that we shall concern ourselves with in this thesis. As Greek and English exhibit some similarity of distribution with regard to the segments which are involved in this partial comparative investigation, the same set of features may be used to specify (fully) these segments, as in Tables I and II below: this would not have been possible (without seriously complicating the grammar of at least one of the languages under consideration) in a fuller account of the two phonologies. Such distinctive features are assumed to be (a) universal, (b) binary, and (c) acoustically-articulatorily defined.

At this juncture, notice that, in Table I, stops appear in the form of archi-segments and are left unspecified for the value of the feature 'voiced'. As will be shown later in this chapter and also in chapter 3, /f/ and /v/, /s/ and /z/, and /n/ and /m/ also can be reduced to archi-segments but <u>only in certain environments</u>, unlike the stop archi-segments which appear in lexical representations in the form in which they are given in Table I <u>in all environments</u>.

The Tables appear in the form of matrices, with columns standing for a segment each and rows representing features which are characterized as 'plus' or 'minus' for a given segment. It should be strongly emphasized at this point, however, that our concern in this thesis is <u>not</u> with whole segments but rather with the feature specifications that are needed to uniquely characterize these segments. It should also be noted that the relative <u>order</u> of the features in each column is immaterial, although in the choice and definition of the features themselves some hierarchy must apparently be observed.(3)

Notice that Tables I and II present only one of a number of possible categorizations with respect to both (i) the choice of the features, and (ii) the grouping of the segments relative to each other. In the case of (i) the main criterion in determining <u>how many</u> and <u>which</u> features are necessary is pertinency of the features to the

Table I Distinctive Feature Composition of Greek Segments.

Features	P	f	v	T	ϑ	δ	s	z	K	x	γ	m	n	l	r
vocalic	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
obstruent	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−
peripheral	+	+	+	−	−	−	−	−	+	+	+	+	−	−	−
anterior	+	+	+	+	+	+	−	−	−	−	−	+	+	+	−
stop	+	−	−	+	−	−	−	−	+	−	−	+	+	−	−
nasal	−	−	−	−	−	−	−	−	−	−	−	+	+	−	−
voiced		−	+		−	+	−	+		−	+	+	+	+	+
strident	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−

Table II Distinctive Feature Composition of English Segments.

Features	p	b	f	v	t	d	θ	δ	s	z	š	ž	k	g	m	n	l	r
vocalic	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
obstruent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−
peripheral	+	+	+	+	−	−	−	−	−	−	−	−	+	+	+	−	−	−
anterior	+	+	+	+	+	+	+	+	+	+	−	−	−	−	+	+	+	−
stop	+	+	−	−	+	+	−	−	−	−	−	−	+	+	+	+	−	−
nasal	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	−	−
voiced	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	+	+
strident	−	−	+	+	−	−	−	−	+	+	+	+	−	−	−	−	−	−

discussion of the processes involved in the subject-matter of this thesis; in (ii), on the other hand, establishment of the most general 'natural classes' into which segments fall is the over-riding consideration.

The features employed in these tables have been selected from and have essentially the same articulatory (and acoustic) correlates as those set up in Chomsky & Halle, 1968: 298-329. The few deviations from that framework are briefly explained below.

'vocalic', 'consonantal', 'obstruent', 'nasal', 'voiced', and 'strident' coincide exactly with the Chomsky & Halle description. 'stop' is used here instead of 'continuant', in Chomsky & Halle, but this is an arbitrary terminological decision not affecting the content of the definition in the least: in the rules of Greek phonology that will be discussed later, the more familiar term 'stop' appears more frequently and is for this reason preferred to 'continuant'.

'peripheral' has replaced 'coronal', used by Chomsky & Halle, in the belief that it immediately suggests one of the two dimensions that determine point of articulation: segments articulated with a primary stricture at the periphery of the mouth cavity (i.e. the lips or the velum) are termed [+peripheral]; all other segments are marked [-peripheral].(4)

'obstruent' is introduced so that [-obstruent] may characterize the general class of 'resonants' (i.e. 'nasals' and 'liquids') and, in combination with 'vocalic', also make the distinction between 'nasals' and 'liquids' <u>within</u> the class of 'resonant' segments.

Chomsky & Halle define the feature 'anterior' in these terms: "Anterior sounds are produced with an obstruction that is located in front of the palato-alveolar region of the mouth; nonanterior sounds are produced without such an obstruction." Their definition of 'anteriority' has been modified here as follows: "Anterior sounds are produced with an obstruction that is located in front of the palato-alveolar region of the mouth and, additionally, with the sides of the tongue not raised from neutral position to form a groove; non-anterior sounds are produced without such an obstruction and/or with the sides of the tongue raised so that a groove is formed." 'Anteriority', then, is not determined in this thesis by tongue-tip position alone, but also by the shape of the sides of the tongue. Thus, the Greek segments /s, z, r/ with their retracted and 'grooved' articulation are [-anterior], and in this respect the first two are different from the corresponding English segments.(5)

A look at the two tables will confirm the point made that no radical change is initiated by this work either in nomenclature or in content of the features used (although, in Table I, the oral stop segments have been reduced from six to three); the only material departure from the Chomsky & Halle framework concerns the modification in the definition of 'anterior'. Otherwise, the features are used in precisely the same way in which they are employed by Chomsky & Halle to differentiate major segment-classes ('vocalic', 'consonantal', 'obstruent'), to indicate point ('peripheral', 'anterior') and manner ('stop') of articulation, and so on, and, indirectly, to determine which segments belong together, that is, which segments can be grouped in the same 'natural' class or sub-class, the outstanding consideration in such groupings being that they should enable us to state distributional restrictions and phonological processes systematically and economically.

Some of the features we have just presented have a more restricted phonological function in one language than in the other. For example, 'strident' could be dispensed with in Greek if one decided to base one's phonological classification solely on phonetic criteria: /s/ and /z/ would then be specified $\begin{bmatrix}+\text{obst}\\-\text{peri}\\-\text{ante}\end{bmatrix}$ and would thus be distinguished from every other consonantal segment of Greek. The feature 'nasal' also may be considered technically redundant for Greek: it can always be replaced by the set of features $\begin{bmatrix}-\text{voca}\\+\text{cons}\\-\text{obst}\end{bmatrix}$, which are needed in the system anyway; 'nasal' is, nevertheless, a convenient feature for heuristic purposes and a very pertinent one in the comparisons that are made in this work; it is, therefore, used as a shorthand standing for the set of features just mentioned.[6] Finally, though we need a distinctive feature 'voiced' to make the distinction between Greek /θ/ and /ð/, and /x/ and /γ/ in all positions, and between /f/ and /v/, and /s/ and /z/ in any pre-vocalic position, this feature has a much more limited function in Greek than it has in English; in the latter language the feature 'voiced' is used, for example, to keep apart all voiced from all voiceless obstruents in all positions.

This brief discussion tentatively suggests that in a differently motivated treatment it might prove to be simpler to eliminate the features 'nasal' and 'strident' from the distinctive feature framework in so far as the characterization of the particular segments involved in this investigation is concerned: these two features are always predictable by the remaining seven features.

2.1 Phonological and Phonetic function of distinctive features

The term 'distinctive feature' is sometimes used indiscriminately in the literature in both phonetic and phonological contexts. This practice often results in ambiguity as to the kind of specification meant.

To clarify this point, suppose we had a feature [aspirated] associated with voiceless stops in both English and Greek; we could then account for the observation concerning the difference in the degree of intensity of aspiration in voiceless stops in various positions in the two languages by assigning to it an integer taken from a scale of integers, each representing a different degree of intensity of the feature in question; thus, if four degrees of aspiration were recognized, 1 showing lowest and 4 highest intensity, the English words in (a) might receive the following <u>phonetic</u> specification with regard to this feature:(7)

(a) [pǽn] , 'pan', where [p] might be [4aspirated]
[nǽp] , 'nap', where [p] might be [1aspirated].

Similarly, in comparing English and Greek at the phonetic level, we would probably wish to specify this feature differentially to show different degree of intensity with which the said feature is realized; for example,

(b) English [pǽn] , 'pan', where [p] might be [4aspirated]
Greek [páno] , 'on' , where [p] might be [2aspirated].

Feature specification of this kind is in fact assumed to be present in the phonetic representation of most segments.

However, unlike phonetic features, whose values are, in principle, measurable along a scale of values, phonological features are used to state that a certain segment in a phonological representation has or does not have a particular property; that is to say, in their phonological function, segments are assigned to, for example, either the category 'stop' or the category 'non-stop', as in the case of the initial segment in /kano/, 'I do, make', and /xano/, 'I lose', respectively. Thus, phonological distinctive features, which are abstract classificatory devices, can have only binary values; then membership of phonological segments in such categories as 'voiced', 'stop', etc., is simply indicated with a + or a - ; for example, /k/ in /kano/ would be marked [+stop], and /x/ in /xano/ would be [-stop], [-stop] meaning that /x/ is assigned to the category 'non-stop'.

To summarize the discussion in this section, we have seen that 'features' have two functions:

(i) a phonetic function, in which they are specified with a particular value taken from a scale of values (this value being decided by context); in this capacity, features specify the phonetic shape of an utterance, i.e. how an utterance is supposed to be actually heard[8] or pronounced; and

(ii) a phonological (categorial) function, in which they are specified with one out of two possible values; in this capacity, they determine partial or full specification of non-phonetic representations and also group segments into 'natural classes'.

In this thesis, for convenience of exposition[9] and except for purposes of demonstration in this chapter, the representation of matrices at the phonetic level will not be in terms of phonetic-feature specifications. Instead, such matrices (enclosed in square brackets) will be given in the, typographically, most economical notation which resembles a broad phonemic transcription.

3. The structure of the Descriptive Model

As was mentioned in chapter 1, p. 13, the model adopted for the phonological description in this thesis consists of two parts: (i) a Lexicon, and (ii) two sets of rules.[10] In the remaining sections of this chapter, these two components of our model will be presented in some detail.

3.1 The lexical entry

The Lexicon is composed of BASES and of AFFIXES. These entries appear in the lexicon with a maximally non-redundant syntactic, semantic, and phonological specification, that specification only which is necessary for their unique characterization. Such minimally specified bases and affixes are referred to here as 'lexical representations' (or 'lexical entries') and are separately enclosed within obliques, / /, as can be seen in the examples below. It is in this form that specific bases and specific affixes are selected by (and associated with each other within) the syntactic surface structures according to the relevant information contained in these structures. The representation of such affix-base combinations, with the appropriate boundaries introduced by the syntactic component, is also given within obliques, / /, but is referred to as 'surface structure representation' to distinguish it from the corresponding 'lexical representation' where no associative boundaries appear. This output from the syntactic surface structures is normally the most abstract form in which 'phonological words' appear in this thesis.

For example, in Greek, we see both that the same base /Poros/[11], 'source', is capable of attachment to different prefixes (e.g. to /eF/, 'well', and /eN/, 'in, with') to form words, as shown in (a) on the next page; and that the same prefix /eF/, 'well', is capable of attachment to different bases (e.g. /Poros/, 'source', and /θimos/, 'disposition') to form words, as shown in (b) below:

	Lexical Representation		Surface Structure Representation (Phonolog. words)	Phonetic Representation	Gloss
(a)	/eF/	/Poros/	/eF+Poros/	[éfporos]	well-to-do
	/eN/	/Poros/	/eN+Poros/	[émboros]	merchant
(b)	/eF/	/Poros/	/eF+Poros/	[éfporos]	well-to-do
	/eF/	/θimos/	/eF+θimos/	[éfθimos]	gay

As can be seen from the examples (c-d) below, the situation is not different in English; that is, in English we may have both

(c)	/dɨs/	/poʉz/	/dɨs+poʉz/	[dɨspóʉz]	dispose
	/ɨN/	/poʉz/	/ɨN+poʉz/	[ɨmpóʉz]	impose

and

(d)	/dɨs/	/poʉz/	/dɨs+poʉz/	[dɨspóʉz]	dispose
	/dɨs/	/bɨliv/	/dɨs+bɨliv/	[dɨsbɨlív]	disbelieve

In this way, both the affixes and the bases are specified only once in the lexicon, a more economical and revealing procedure than if each affix-base combination was entered in the lexicon as a separate word requiring individual specification each time.[12]

Strictly speaking, it is wrong to assume that all Greek words can be shown to be derivable from affixes and bases. In fact, only items that have a 'lexical' meaning (cf. Lyons, 1968: 273), like the bases in the examples above (i.e. mainly nouns, verbs, adjectives, but also some adverbs and numerals) may be subject to this 'affixational' derivation; items with 'grammatical' meaning, like /ke/,[13] 'and', /eδo/, 'here', etc., would have to be differently marked in the lexicon and treated in the grammar.[14] To a large extent, the situation in English is similar to that just outlined for Greek.

3.2 The Rules

The second component of the model used in this investigation comprises two sets of rules, the Redundancy Rules (R-rules) and the Phonological Rules (P-rules), each of which performs a different function in phonology.

3.2.1 Redundancy Rules

The primary function of the R-rules is to complete the specification of segments or segment sequences in lexical entries and to express phonotactic constraints. Indirectly, R-rules also serve to provide lexical entries with their most economical representation.[15]

Following Brown (1969, 1972), we shall allow R-rules to operate anywhere within the domain of the Greek phonological word - that is, both within and across morpheme boundaries. So morpheme boundaries will appear in the syntactic surface structure representations but will normally be absent from the formulation of the R-rules.

3.2.1.1 Segment Structure Rules

In section 1 of this chapter we said that a generative grammar contains a phonological component which is a system of rules whose function is to map the structurally analysed strings generated by the syntactic component of the grammar (i.e. surface structures) onto their corresponding phonetic representations.[16] These surface structures consist, as we have just seen, of strings of morphemes each of which contains (in addition to the syntactic and semantic) all phonological information necessary for the operation of the rules of phonology, in the manner suggested in chapter 1, pp.13-5. More specifically, each lexical morpheme (or 'entry')[17] in a string can be seen as a matrix which consists of the right number of columns, one for each of the successive segments of the item in question, and of a number of rows, each of which stands for a distinctive feature of the language under analysis; the point where these two co-ordinates meet is accordingly marked 'plus' or 'minus', as explained in section 2.1 above.

For example, assuming the characterization, in terms of features, of the two vowels to be given in the entry /ena/ , 'one', the consonantal segment /n/ could receive the following full feature-specification:

Table III

Features	/ e n a /
vocalic	-
consonantal	+
obstruent	-
peripheral	-
anterior	+
stop	+
nasal	+
voiced	+
strident	-

This representation for /ena/ would then be so processed by the rules of Greek phonology as to yield, ultimately, the phonetic form [éna].

Notice, however, that much of the information contained in the specification of /n/ in Table III is not necessary to completely identify this segment and differentiate it from every other segment of Greek, that is to say, it is not 'significant' or 'distinctive' information in the technical sense. Such 'redundant' specification can be eliminated from the lexicon (and also from all surface structure representations) in the interests of economy provided that it can be supplied by rules of general applicability. For example, given rule (1) below

(1) All non-peripheral nasal segments are predictably non-vocalic, consonantal, non-obstruent, voiced, non-strident, stop, and anterior.

we can effect great savings in all entries in the lexicon that contain a /n/.

Rules such as (1) belong to the Redundancy Rules of the phonological component of the grammar; they are called Segment Structure Rules because of their function, which is to fill in predictable feature values in segments independently of the rest of the segmental environment in which the segment operated upon by such rules occurs. Segment Structure Rules are given in the form of 're-write rules', as follows:(18)

$$[\ X\ ] \dashrightarrow [\ Y\ ]\ /\ \begin{bmatrix} \underline{\qquad} \\ Z \end{bmatrix}$$

where X, Y, and Z represent sets of n number of features specified for + or - values.

Rule (1) above would normally be expressed like (1a) below:

(1a)

$$[-\text{peri}] \dashrightarrow \begin{bmatrix} -\text{voca} \\ +\text{cons} \\ -\text{obst} \\ +\text{ante} \\ +\text{stop} \\ +\text{voic} \\ -\text{stri} \end{bmatrix}\ /\ \begin{bmatrix} \underline{\qquad} \\ +\text{nasa} \end{bmatrix}$$

Rules such as (1a) show how the feature specification of a segment (considered in isolation) is completed.

To return to the specification of /ena/ : we have seen that rule (1a) makes it possible for the two features [+nasal] and [-peripheral] to characterize uniquely the segment /n/ in lexical entries like /ena/ (and also in their surface structure representations). Following this procedure of non-redundantly specifying lexical items, we can now restate the representation in Table III as it appears in Table IV, where only the non-redundant feature values are specified.

Table IV

Features	/ e	n	a /
vocalic			
consonantal			
obstruent			
peripheral		-	
anterior			
stop			
nasal		+	
voiced			
strident			

Notice that by leaving blank all feature values which are predictable by general rule, and thus redundant, we conform to the obvious condition imposed by the principle of simplicity,(19) a condition that states that we can "omit features in all dictionary representations, whenever these can be introduced by a rule that is less costly than the saving it effects."(20)

Notice further that many of the rules of phonology that are used for filling in blank entries in lexical representations are motivated on independent grounds as they are needed in the system of rules anyway.

3.2.1.1.1 In the light of the discussion in sections 2.1 and 3.2.1.1, we can now juxtapose for comparison the matrices that represent the nasal segment in /ena/ and in [éna], that is, one in the form in which the entry appears in the lexicon and in which it is fed as input to the rules of phonology (in particular, to the Redundancy Rules), the other in the form it might receive after it has been processed by all relevant phonological and phonetic rules.

Table V

	(a) Lexical Representation	(b) Phonetic Representation (21)
Features	/ e n a /	[é n a]
vocalic		-
consonantal		+
obstruent		-
peripheral	-	-
anterior		3
stop		4
nasal	+	4
voiced		4
strident		-

A comparison of matrices (a) and (b) in Table V shows clearly that lexical entries appear typically in the form of matrices partially (i.e. non-redundantly) specified with binary feature values, and that their phonetic actualization is represented by matrices fully specified with features whose value ranges - according to feature[22] - sometimes between two extremes in opposition (i.e. 'plus' or 'minus') and sometimes along a scale of values showing degree of intensity the feature in question exhibits.

This is only one of a number of differences between phonological and phonetic matrices. Some other distinctions will be made apparent as we proceed.[23]

3.2.1.2 Segment Structure Rules will not be discussed any further in this thesis; rather, the existence of a set of such rules will be presupposed. It would be helpful, however, to present at this juncture some of the most general and pertinent ones which will be assumed in the formulation of the rules in the chapters that follow. As can be readily seen, even the few rules that will be given presently are capable of simplifying considerably the phonological representation of the Greek and English segments in Tables I and II.

Here are now, in summary form, some selected Segment Structure Rules which apply to both Greek and English.

(2) $$[+\text{segm}] \dashrightarrow \begin{bmatrix}-\text{voca}\\+\text{cons}\\-\text{nasa}\end{bmatrix} / \begin{bmatrix}\rule{2em}{0.4pt}\\+\text{obst}\end{bmatrix}$$

i.e. all obstruent segments are also non-vocalic, consonantal, and non-nasal.

(3) $$[+\text{segm}] \dashrightarrow \begin{bmatrix}+\text{voic}\\-\text{stri}\end{bmatrix} / \begin{bmatrix}\rule{2em}{0.4pt}\\-\text{obst}\end{bmatrix}$$

i.e. all non-obstruent segments are also voiced and non-strident.

(4) $$[+\text{segm}] \dashrightarrow \begin{bmatrix}-\text{voca}\\+\text{cons}\\-\text{obst}\\+\text{ante}\\+\text{stop}\end{bmatrix} / \begin{bmatrix}\rule{2em}{0.4pt}\\+\text{nasa}\end{bmatrix}$$

i.e. all nasal segments are also non-vocalic, consonantal, non-obstruent, anterior, and stop.

(5) $$[+\text{segm}] \dashrightarrow \begin{bmatrix}-\text{obst}\\-\text{nasa}\\-\text{peri}\\-\text{stop}\end{bmatrix} / \begin{bmatrix}\rule{2em}{0.4pt}\\+\text{voca}\\+\text{cons}\end{bmatrix}$$

i.e. all segments marked vocalic and consonantal (i.e. the 'liquids') are also predictably specified non-obstruent, non-nasal, non-peripheral, and non-stop.

Notice that the features 'voiced' and 'strident' need not be specified in nasals (rule (4)) and in liquids (rule (5)); as nasals and liquids are predictably non-obstruent, rule (3)becomes applicable and will automatically supply the redundant features $\begin{bmatrix}+\text{voic}\\-\text{stri}\end{bmatrix}$ to all such segments.

3.2.2 Sequence Structure Rules

The obvious economy effected in the non-redundant matrix (a) in Table V above is attributed to simultaneous feature co-occurrence in the same segment and is explained by rules such as those presented in the previous section. However, certain feature values can be termed redundant in certain environments owing to the existence of general contextual(24) constraints imposed by the structure of the language. Such constraints, which also belong to the R-rules, are called Sequence Structure Rules and are treated in considerable detail in chapter 3. Only those Sequence Structure Rules are discussed there which are directly relevant to the subject-matter of this thesis - that is, to certain consonantal sequences. At this stage, we shall only demonstrate briefly the form and function of such rules.

All Sequence Structure Rules will be given in the form of 're-write rules' as shown below

$$[\ X\ ] \dashrightarrow [\ Z\ ]\ /\ [\ Y\ ]$$

where each of X, Y, and Z represents a set of n features speccified for + or - values.

A rule of this form says characteristically that X is assigned the feature specification(s) Z when in the environment (to the left or to the right[25]) of Y.

Let us illustrate the function of Sequence Structure Rules with examples from Greek.

The point-of-articulation features of the nasal preceding the stop in the surface structure representations below

(a) /eN+Pirikos/ ----> [embirikós] , 'empirical' (26)

/eN+Tasi/ ----> [éndasi] , 'tension'

/eN+Keros/ ----> [éŋgeros] , 'timely'

are completely determined (as can be seen from the corresponding phonetic realizations) by those of the following stop segment by a rule (the 'Regressive point-assimilation of pre-consonantal nasals' rule; see p. 73) of the form of (6)

(6)
$$[+\text{nasa}] \dashrightarrow \begin{bmatrix} \alpha\ \text{peri} \\ \beta\ \text{ante} \end{bmatrix} \ / \ \rule{1.5em}{0.4pt} \begin{bmatrix} +\text{cons} \\ \alpha\ \text{peri} \\ \beta\ \text{ante} \end{bmatrix}$$

which states that anywhere within the phonological word a nasal is assigned the features of point of articulation of a following consonant (here, of a following stop), that is, a nasal must agree with a following consonant (stop) in 'peripherality' and 'anteriority'.[27]

Such predictable phenomena make it desirable to appeal to the notion of ARCHI-SEGMENTS, which are unspecified for some features (in certain environments).

To take another example: given the predictability (and thus redundancy) of the value of the feature 'voiced' in the specification of the prefix-final segments in the words on the next page (cf. 'Regressive voice-assimilation of obstruents' in chapter 3), the feature 'voiced' can be omitted from the lexical (and also from the surface structure) representation of such prefixes, and, consequently, such entries can be more economically represented in the lexicon in the form of partially specified archi-segments:

(b)	/eF+Poros/	----->	[éfporos] ,	'well-to-do'
	/eF+γenis/	----->	[evγenís] ,	'noble, polite'
(c)	/proS+fora/	----->	[prosforá] ,	'offer'
	/proS+voli/	----->	[prozvolí] ,	'offense, insult'
(d)	/eK+θesi/	----->	[ékθesi] ,	'display'
	/eK+ðosi/	----->	[égðosi] ,	'edition'

However, it must be emphasized at this juncture that apart from certain consonantal archi-segments occurring in certain critical sequences, lexical entries are generally represented at a low level of abstraction in this thesis in the sense that they resemble a phonemic transcription rather than an underlying representation. For instance, no attempt is made to simplify either the lexical or the surface structure representation of English by proposing /Ir/ and /ar/ (as in Chomsky & Halle, 1968) to account for R.P. [ɨə] and [α], respectively; rather, [ɨə] and [α] are regarded here as manifestations of the phonemes /ɨə/ and /α/.

The only treatment in both lexical and surface structure representations which may be considered to involve a striking departure from a phonemic one is the handling of the Greek 'voiced stops' [b], [d], and [g], which are here conceived as phonetic realizations of sequences of a nasal archi-segment /N/ (unspecified for all point-of-articulation features) and one of the stop archi-segments /P/, /T/, and /K/ (unspecified for the feature 'voiced'). In addition to this, the archi-segment convention is also adopted (though to a limited extent) in the case of the segments /F/ and /S/ in prefix-final position.(28)

As explained in chapter 1, pp. 13-5, all the matrices, which are partially specified in the lexicon (that is, appear typically as sequences of archi-segments), pass through this unordered set of Redundancy Rules of both the Segment and the Sequence Structure type and are processed there until their feature specification is completed. After that, they are chanelled either directly to the Phonetic Realization Rules, if unmarked in the lexicon for passage through the P-rules, or to the P-rules, if marked in the lexicon for further processing in the set of P-rules.

None of the matrices informally represented in (a-d) above has to be operated on by any P-rules; so the route followed by such items is: from Surface Structures to Redundancy Rules to Phonetic Realization Rules.

3.3 Phonological Rules

Consider, however, the following examples:

Surface Structure Representation	Output from R-rules	Output from P-rules	Output from Phonetic Real. Rules	G l o s s
/eF+foros/	/ef+foros/	/eforos/	[éforos]	fertile
(/ðiS+sevis/	/ðis+sevis/	/ðisevis/	[ðisevís]	impious)
/eK+kremis/	/ek+kremis/	/ekremis/	[ekremís]	pendant
/eN+moni/	/em+moni/	/emoni/	[emoní]	persistence

The fully specified output from the R-rules /ef+foros/ cannot be fed directly into the Phonetic Realization Rules - there is [éforos], but no *[éfforos] in Greek, and neither the R-rules nor the Phonetic Realization Rules are permitted to change the feature composition of matrices in any way (in the case at hand, to delete feature complexes, i.e. whole segments): this is precisely the function of the Phonological Rules (P-rules): in contrast to R-rules, which simply *fill in* blank entries with predictable feature values in lexical and surface-structure representations, P-rules *change* the feature composition of segments and of segment sequences *in those matrices only which are specifically marked in the lexicon* for entry into the set of P-rules.[29] So after they leave the R-rules, matrices such as those just cited, specified in the lexicon for passage through the P-rules, will have to be submitted to a P-rule (in the case at hand, to the 'Identical-consonant cluster simplification' rule; cf. pp. 88) that will reduce the two identical consonants in the output from the R-rules to one.

None of the cases examined in this work involves a change caused by the P-rules such that recycling through the R-rules (where the feature specification of the segment or segments affected by the operation of P-rules is completed) becomes necessary; such would be the case in Greek, for example, in the process of 'Dissimilation'. For the purposes of this thesis, then, the route followed by items like those presented on the previous page is: from *Surface Structures* to *Redundancy Rules* to *Phonological Rules* to *Phonetic Realization Rules*.

NOTES TO CHAPTER 2

(1) The relation between the syntactic and the phonological components of the grammar is, of course, a direct one as the operation of the rules of phonology depends partly on information provided by the output of the syntactic component, i.e. on the surface structures with their associated labelled bracketing.

(2) Most of the accounts of Greek phonology (but cf. chapter 1, note 1) have been given in terms of traditional phonemic theory, which does not provide for Redundancy Rules. Even in the most recent description of Greek (dialects) in generative terms (Newton, 1972) no *explicit* mention of the importance of R-rules is made. As we shall have occasion to show later, in chapter 3, this leads to unnecessarily complicating the grammar.

(3) Thus, it would seem natural to place 'Major-Class Features' higher up in such a hierarchy than, say, the feature 'strident'. Cf. Stanley, 408.

(4) Newton (1972) recognizes four point-of-articulation features for the characterization of all "'true consonants' (consonantal, nonvocalic)", namely 'labial', 'dental', 'palatal', 'velar'. He admits (p. 10) that "It would be possible to describe the four points of articulation in terms of combinations of plus and minus values of two features, according to a common practice (i.e. by treating 'dental' and 'palatal' as central versus peripheral and 'labial' and 'dental' as front versus back)" and he proceeds to claim that "there seems to be no clear advantage in departing from the familiar four-term system in a description of modern Greek dialects."

Newton does not justify his preference for four instead of for two point-of-articulation features, but surely it *would* be a 'clear advantage' to have two fewer distinctive features in the phonology, provided that this would not affect the explicitness and simplicity of descriptive statements in any way.

Now, presumably, one of the reasons why Newton proposes these four features is that they enable him to account for such secondary articulations as 'palatalization' of consonants and 'labialization' and 'velarization' of vowels. But these processes can be handled very neatly in the grammar by making use of *derived* features, which have been proposed by Brown (1969: 12, footnote) and which can be supplied by quite general Sequence Structure Rules. Thus, 'palatalization' could be explained through assignment to a consonant of the feature [+front] (which Newton gives on p. 11) from a following vowel marked with this particular feature value. Similarly, 'labialization' and also 'velarization' of vowels could be accounted for in terms of a feature [+peripheral] derived from a preceding consonant. (See Stockwell, 1966; also Jakobson & Halle, 1962: 486.)

(5) The case of the Greek /r/ is a little peculiar: phonetically it can be regarded as a $\begin{bmatrix}-\text{ante}\\+\text{stop}\end{bmatrix}$ segment (cf. Chomsky & Halle, 1968, 318), but phonologically it behaves like a $\begin{bmatrix}-\text{ante}\\-\text{stop}\end{bmatrix}$ liquid.

As the concern of this thesis is mainly with phonological processes rather than with detailed phonetic realization rules, the latter representation for Greek /r/ will be favoured throughout.

As regards the phonetic realization of /s, z/, it would be pedagogically relevant to note that Greek [s] and English [s], for example, will differ considerably from each other in the degree of intensity that the feature 'anterior' will receive. And each of these segments will be different from English [š] in the same respect, Greek [s] coming approximately midway between English [s] and [š].

This difference in the formation of the segments in question is quite clearly shown in a number of spectrograms made at the Phonetics laboratory in Edinburgh. At this point, I must acknowledge my debt to J.P.B. Allen, who volunteered to act as the 'informant' for the English section, and to R. Motherwell for seeing this little, informal 'operation' through its technicalities.

(6) Intuitively, the features 'strident' and 'nasal' seem to be very important in Greek phonology. For instance, the only possible consonants word-finally are characterized as either [+nasal] or [+strident]; 'nasality' also appears to be crucial in accounting for pre-nasalization of voiced stops; etc.

However, the explanation itself of these and of a number of other phonological and morpho-phonological phenomena does not necessitate the recognition of the features 'nasal' and 'strident' as such. For instance, one way of handling pre-nasalization of voiced stops would be through use of 'derived features' as indicated in note 4 above.

In any case, the question of whether or not the resulting grammar would be simpler (and thus more highly valued) if 'nasal' and 'strident' were included in the inventory of the features used for the characterization of Greek segments is a theoretical one with no direct bearing on the points at issue here: the orientation of this thesis is not essentially evaluative.

(7) Phonetic specification of this sort has not been nearly adequately investigated and is far from being a settled matter. (Cf. note 21 below.)

Notice, incidentally, that such detailed phonetic specification is also indispensable in the characterization of idiosyncrasies in the speech of individuals. But this point, being irrelevant to the present discussion, will not be pursued any further.

(8) The way an utterance is heard (by a phonetician, who normally knows the structure of the language he is investigating) is not necessarily identical with the way this utterance is physically realized. For some discussion on this point, see Chomsky & Halle, 1968: chapter 2, section 2, and chapter 2, note 33; also Jakobson & Halle, 1962: 488.

(9) See notes 7 and 21 to this chapter; also discussion of the Readjustment Rules in chapter 1; also 'Notational Conventions' in chapter 1, pp. 9-12.

(10) See chapter 1, note 22.

(11) In fact, the final /os/ in the examples is itself an affix, the suffix that shows masculine gender and singular number; so the relevant bases would actually be /Por/ and /θim/, respectively; but as this is irrelevant to the point being made here, no boundaries appear between the bases and the suffixes in the lexical representations.

Concerning the glossing of lexical and other non-phonetic representations, see chapter 1, note 19.

(12) Which affixes are associated with which bases is determined by the specification in the Syntactic Surface Structures.

(13) All 'velar' consonants are 'automatically' palatalized before front vowels in Greek.

(14) See Brown, 1969: 9-12.

(15) Cf. Stanley, 435.

(16) For some differences between phonological and phonetic matrices, see discussion in this and the next section (pp. 32-36), and also in chapters 3 and 4; also Chomsky & Halle, 1968: 296, 334; Stanley, 434-35; Halle, 1969.

(17) For a proposal concerning specification of grammatical morphemes, see Brown, 1969: 9-12.

(18) Like Segment (and also Sequence) Structure Rules, P-rules are formally expressed in terms of the 're-write' convention. However, this should not lead to misunderstanding as to the different function R-rules and P-rules perform.

(19) The term is used here in the technical sense in which it is employed by Chomsky & Halle, 1968: 296, 334; Stanley, 434-35; Halle, 1969.

(20) See Halle, 1962: 340; also Chomsky & Halle, 1968: 168.

(21) It must be stressed that in the case of integer co-efficients, both the upper limit, 4, of the physical scale and the specific numerical values provided in the squares in representation (b) in Table V are used only to illustrate the point being made; they are not meant to reflect any exact or systematic gradations in the physical intensity of the features they specify.

(22) See Chomsky & Halle, 1968: 164 f.

(23) For a detailed discussion, see Chomsky & Halle, 1968: 164 ff; Stanley, 400-401; Halle, 1962.

(24) See Chomsky & Halle, 1968: chapter 4; Halle, 1958: 330; Stanley, 401.

(25) "The deletion of the environment bar '——' has been suggested as a meaningful abbreviation in situations where an 'either after or before' relationship exists." (Harms, 1968) Thus, the part that follows the oblique / in the rule we have just given is an abbreviation of the two environments [Y]—— and ——[Y].

(26) For the postulation of the stop archi-segments /P, T, K/ as well as for an extensive argumentation of the view adopted in this thesis regarding Greek 'voiced stops', see ch. 3, pp. 65-75.

(27) Notice, in passing, that the examples in (a) above also demonstrate the application of another rule, namely the rule that governs 'Progressive voice-assimilation of post-nasal stops'. See chapter 3, pp. 77.

(28) For a detailed argumentation of these positions, see chapter 3, pp. 65-75 and 48-55, respectively.

(29) However, it must be noted that certain matrices acquire such marking after they have been processed by the R-rules. Thus, there is no a priori reason why the prefix-final consonant in /eF/, for instance, should be marked in the lexicon for passage through the set of P-rules: it is only after the prefix /eF/ gets associated with a base like /foros/ that such marking becomes necessary.

The handling of such cases has not been adequately investigated in this partial grammar of Greek; therefore, no solution to the problem is offered in this study.

CHAPTER 3

REDUNDANCY RULES AND THEIR RELEVANCE TO THE PEDAGOGICAL PROBLEMS

1. As has been implicit in the discussion so far, a statement of the redundancies in the phonology of a language contributes considably towards simplifying the grammar of that language. So in this chapter we shall be concerned exclusively with certain Redundancy Rules of the Sequence Structure type, that is, with the kind of rules that make structural predictions and state sequential constraints in the phonology of Greek. In particular, we shall consider the following four processes, all of which are directly connected with the subject-matter of this investigation:

(a) Regressive voice-assimilation of obstruents. (Rule (1))

(b) Regressive voice-assimilation of pre-consonantal sibilants. (Rule (3))[1]

(c) Regressive point-assimilation of pre-consonantal nasals. (Rule (9))

(d) Progressive voice-assimilation of post-nasal stops. (Rule (11))

Crucially related to all of these problems is the question of voicing in Greek phonology. Specifically, related to the processes (a - b) above is the postulation of the archi-segments /F/ and /S/ especially in prefix- (and morpheme-)final position; and the important question of 'voiced stops' in Greek is raised in connection with the rules in (c - d). The processes that these four rules reflect will, therefore, be discussed in some detail, and a number of sub-rules will be developed out of these maximally general formulations to account for specific problems.

This chapter will also attempt to explain briefly why it is desirable to treat the processes under examination within the set of the Redundancy rather than of the Phonological Rules.

As we proceed with the discussion of each of these general processes, we shall also have occasion to show that misapplication of any of these Greek rules to the English phonological system causes pronunciation problems to Greek learners of English.

2. Regressive voice-assimilation of obstruents

2.1 The best argument for considering voice-assimilation in obstruent sequences a regressive operation can be derived from instances of such sequences across morpheme boundaries. If, for example, we postulated the following prefix-final archi-segments, unspecified for the value of the feature 'voiced',

/S/	in	/δiS/ ,	/iS/ ,	/proS/ ,
/F/	in	/eF/ ,	and	
/K/	in	/eK/ (2)		

we would be able, as we shall show presently, to (i) predict the voice value of each of these archi-segments in any obstruent environment on their right, and (ii) to do so in the (technically) simplest way in the set of R-rules.

Let us consider the following examples:

	Surface Structure Representation	Phonetic Representation	Gloss
(a)	/δiS+pistos/(3)	[δíspistos]	incredulous
	/iS+fora/	[isforá]	contribution
	/proS+voli/	[prozvolí]	offence

(a) (cont'd)	/δiS+tixis/	[δistixís]	unhappy
	/proS+θesi/	[prósθesi]	addition
	/iS+δoxi/	[izδoxí]	admission
	/δiS+kolos/	[δískolos]	difficult
	/δiS+xeris/	[δisxerís]	difficult
	/proS+γiono/	[prozγióno]	I land (a plane)
(b)	/eF+paθia/	[efpáθia]	sensitiveness
	/eF+foria/	[eforía](4)	fertility
	/eF+via/	[évia](4)	Euboea (island)
	/eF+tixia/	[eftixía]	happiness
	/eF+θimos/	[éfθimos]	gay
	/eF+δiaθetos/	[evδiáθetos]	in good mood
	/eF+sevia/	[efsévia]	piety
	/eF+zonos/	[évzonos]	Euzone
	/eF+kolos/	[éfkolos]	easy
	/eF+xeria/	[efxéria]	ease
	/eF+γenis/	[evγenís]	noble
(c)	/eK+peδevo/	[ekpeδévo]	I train
	/eK+fovizo/	[ekfovízo]	I intimidate
	/eK+viazo/	[egviázo]	I blackmail
	/eK+telesi/	[ektélesi]	execution
	/eK+θesi/	[ékθesi]	display
	/eK+δosi/	[égδosi]	edition
	(/eK+sio/	[eksío]	I (re)move(5)(6) violently)
	/eK+zema/	[égzema]	eczema

(c) (cont'd)	/eK+kinisi/	[ekínisi][7]	departure
	/eK+xilizma/[8]	[ekxílizma]	(liquid) extract
	/eK+γimnazo/	[egγimnázo]	I train

Observe that there is no way of predicting the value of the feature 'voiced' in any of the pre-vocalic non-stop base-initial segments, i.e. in /f/ or /v/, /θ/ or /ð/, and /x/ or /γ/ : these will have to be specified for this feature in their lexical representation; and once the value of the feature 'voiced' in the pre-vocalic base-initial consonant is fixed in the lexicon, the value of the same feature of the prefix-final consonant catenated with it becomes automatically predictable: it agrees with that of the base-initial consonant. It is reasonable, therefore, and also in accordance with the phonetic facts of Greek, to propose that the prefix-final consonant be left unspecified for voice in such lexical entries, as this specification is always predictable and can thus be supplied by an R-rule. The direction of this process of contextually determined voice-assignment (voice-assimilation) is, then, from right to left - i.e. <u>regressive</u> - in all of the above cases.

Now, there appears to be no good reason why we could not generalize the 'regressiveness' of the process demonstrated above to cover cases like the following:[9]

(d)	[spíti]	home	[aspíða]	shield
	[sféra]	bullet	[osfialγía]	lumbago
	[zvíno]	I erase	[lézvos]	Lesbos
	[stóma]	mouth	[astíos]	funny
	[sθénos]	vigour	[ésθisi]	sense
	[skála]	ladder	[askós]	flask
	[sxára]	grate	[pásxo]	I suffer
	[zγurós]	curly		

(e)	[ptinó]	bird	[aptós]	tangible
	[ftíno][10]	I spit	[aftós]	this (m., s.)
	[fθinóporo]	autumn	[áfθa]	ulcer
	[vðéla]	leech	[psévði]	lies (nom., p.)
(f)	[ktínos]	beast	[aktí]	coast
	[xtízo]	I buid	[axtíða]	beam
	[xθónios]	infernal	[óxθi]	(river) bank
	[γðínome]	I undress	[líγða]	grease

We could then give one of the major rules of Greek phonology, namely the 'Regressive voice-assimilation of obstruents' rule, in its simplest possible form

$$(1) \qquad [+\text{obst}] \dashrightarrow [\alpha\ \text{voic}] \ / \ \underline{\qquad} \begin{bmatrix} +\text{obst} \\ \alpha\ \text{voic} \end{bmatrix}$$

which states that anywhere within the phonological word, an obstruent must agree in voice state with a following obstruent. This rule explains voice agreement in all sequences of obstruents, i.e. the rule is, as we have seen, applicable both within and across morphemes inside the phonological word.

Now, it is true that even if we did not introduce the archisegment convention, we would still be able to account for the regressive nature of this type of assimilation: for example, /f/ would change to /v/ before a voiced obstruent, as in

/ef+γenis/ ----> [evγenís] , 'noble' .

But this would prove to be a costly operation, as a P-rule would be required to effect the change.

On the other hand, the gain from the present treatment is threefold: first, the 'regressiveness' of the process symbolized in rule (1) is now explained in a more natural and better motivated way; second, lexical entries are now considerably simplified; third, and most important, the process of assimilation is now accounted for in the set of the R-rules rather than in that of the P-rules - and P-rules have a cost, in contrast to R-rules which are costless.(11)

2.2 Before we move on to the examination of the corresponding case in English, let us consider briefly an argument that has been put forward against the adoption of the archi-segment convention in morpheme-final (here, prefix-final) positions.

It has been suggested that although the convention of having /S/ and /F/ prefix- (and morpheme-)finally will give the desired results when these prefixes combine with bases that begin with an obstruent segment (as in the examples on pp. 48-9), there will still be no way of predicting the value of the feature 'voiced' in the prefix-final archi-segments when these prefixes combine with bases with an initial vowel such as /aγo/, 'I bring', and /ilios/, 'sun', respectively. Therefore, it is maintained that derivations like

(i)	/is+fora/	----->	[isforá]	contribution
	/is+δio/	----->	[izδío]	I creep in
	/is+aγo/	----->	[isáγo]	I import
(ii)	/ev+paθia/	----->	[efpáθia]	sensitiveness
	/ev+γenis/	----->	[evγenís]	noble
	/ev+ilios/	----->	[evílios]	sunny

with prefix-final /s/ and /v/, respectively, are better motivated than the corresponding derivations with prefix-final archi-segments /S/ and /F/.

In addition to being rather uneconomical (it takes a P-rule to convert /is+δio/ to [izδío] and /ev+paθia/ to [efpáθia]), this argument seems to ovelook some of the phonetic facts of Greek: the prefix-final sibilant is always voiceless when such prefixes combine with bases beginning with a vowel; and the prefix-final labial fricative is always voiced when this prefix occurs before bases with an initial vowel.

In fact, the situation in Greek appears to be as follows:

A. Pre-vocalically inside a morpheme:

As has already been noted, the voice feature of the underlined segments in

/soni/	[sóni]	(he) saves	
/zoni/	[zóni]	belt	and in
/foras/	[forás]	you are wearing	
/voras/	[vorás]	North	

is not predictable and will thus have to be specified in the lexicon.

B. Pre-vocalically across morphemes (prefix-finally):

(a) The voice feature of /S/ in

/iS+aγo/	[isáγo]	I bring in
/iS+oδos/	[ísoδos]	entrance

and the like, can be predicted by a rule such as (a) below

(a) $[+\text{stri}] \dashrightarrow [-\text{voic}] \;/\; \underline{\quad\quad} + \begin{bmatrix}+\text{voca}\\-\text{cons}\end{bmatrix}$

i.e. a prefix- (and morpheme-)final strident segment is assigned the feature [-voiced] when followed by any base-initial vowel: there are no *[δizV...] or *[izV...] or *[prozV...] pronunciations in Greek, where V stands for some base-initial vowel.

(b) The voice feature of /F/ in

/eF+ilios/	[evílios]	sunny
/eF+alotos/	[eválotos]	easily captured

and the like, <u>can</u> be predicted by a rule like (b) below

$$\text{(b)}\quad \begin{bmatrix}\text{+peri}\\ \text{+ante}\\ \text{-stop}\end{bmatrix} \dashrightarrow [\text{+voic}] \;/\; \underline{\qquad} + \begin{bmatrix}\text{+voca}\\ \text{-cons}\end{bmatrix}$$

i.e. a prefix- (and morpheme-)final peripheral anterior non-stop segment is predictably [+voiced] when followed by any base-initial vowel: there are no *[efV...] pronunciations in Greek, where V represents some base-initial vowel and where [ef] is the phonetic realization of the classical Greek prefix <u>ευ</u>.(12)

As will have been noticed, underlying the whole question of whether to use /s/ or /S/, or /v/ or /F/ prefix-finally in the lexical representation of the relevant prefixes is the assumption that R-rules are permitted to function strictly at the morpheme level and that any processes crossing morphemes must be dealt with by the P-rules.(13) The advisability of having such a strong constraint in generative phonology has been questioned recently by Brown (1969, 1972) on the grounds that such a restriction causes loss of significant generalizations and that it renders phonological description unwarrantly complicated.

Let us illustrate briefly the validity of Brown's proposal with reference to Greek. Consider the phonological words:

(c)	/oliNPos/	[ólimbos]	Olympus
(d)	/eN+Poros/	[émboros]	merchant

If a rule was allowed to assign the feature [+voiced] to the /P/ (assumed not to be specified for this feature in the lexicon;

cf. discussion in sections 4 and 5, pp. 65 - 79 below) in /oliNPos/, i.e. intra-morphemically, but not to the /P/ in the surface structure /eN+Poros/, i.e. inter-morphemically, then the same rule would have to be repeated in the set of P-rules to take care of the process of post-nasal voicing of the stop demonstrated in (d), a process which is obviously identical with that observed in (c). But this means that our grammar would not be very highly valued because we would be (i) missing a valid generalization, and (ii) ignoring the simplicity criterion.

On the other hand, if we let R-rules operate both inside and across morphemes within the phonological word, our grammar would be simpler and more general.(14)

2.3 Voice-agreement in obstruent sequences in English

The rule that governs voicing in obstruent sequences in English is very general and straightforward; it states that:

> Obstruent segments in sequence within the same syllable in English must share the same value of the feature 'voiced'; that is, both obstruents must be either voiced or voiceless.

The following examples will demonstrate the rule:

(a)

spit	gasp
sphere	
stop	mast
skip	ask

(b)

(i)	(ii)	(iii)
apse	caps	cabs
(Ritz)	mats	adds
axe	packs	bags

(b) (cont'd)	apt	mapped	grabbed
	lift	sniffed	lived
	act	racked	ragged
	mist	missed	eased

(c) absent
adhesive
obtain

Observe that in (a - b) above the rule applies regardless of whether there is (cases (b ii-iii)) or not (cases (a) and (b i)) a morpheme boundary within the relevant phonological words. In case (c), however, the rule is inapplicable because the obstruents under consideration here cross the boundaries of the syllable.

Rule (2) expresses formally these facts.

(2) $[+\text{obst}] \dashrightarrow [\alpha\ \text{voic}] \ / \ \begin{bmatrix}+\text{obst}\\ \alpha\ \text{voic}\end{bmatrix}$ ——

where both obstruents must fall within the same syllable.

The fact that English has words such as those in (d) below

(d) abdicate
advantage
obvious

where voice agreement in obstruents is observed even across syllable boundaries is not predictable: both obstruents in the sequences in question must be originally marked [+voiced] in the lexicon.

Now, it is interesting to notice two things when comparing the Greek rule (1), the 'Regressive voice-assimilation of obstruents' rule, and the English rule (2), the 'Voice-agreement in obstruents' rule. First, in the case of rule (1) we have a <u>regressive</u> assimilatory process, the second of two obstruents conditioning the voice state of the first; whereas in the case of the English rule, items like those under (b ii-iii) indicate that the process of assimilation is of the progressive type, the first of two successive obstruents determining the value of the feature 'voiced' in the second. And second, the Greek rule is permitted to apply to sequences of obstruents anywhere within the domain of the phonological word - that is to say, it can cross morpheme as well as syllable boundaries; the English rule, on the other hand, is operative within the same syllable irrespective of whether this syllable is co-extensive with one morpheme or extends over two successive morphemes. Notice that cases like those listed in (d) suggest that the converse of this statement is not necessarily true.

This difference concerning the domain of application of rule (1) and that of rule (2) has important pedagogical implications. When a Greek learner of English is confronted with words like blackboard, football, and absent, he processes them according to the 'Regressive voice-assimilation of obstruents' rule, and, quite naturally, produces the phonetic forms *[blǽgbod], *[fúdbol], and *[ǽpsənt], in all of which the first obstruent is made to agree in voice state with the second.(15)

3. Regressive voice-assimilation of pre-consonantal sibilants

Let us now turn our attention to the case of [+stri][+cons] sequences in Greek.

Having already argued in section 2.1 above that the archisegment /S/ may be left unspecified for voice in prefix-final position, we can extend the convention of incompletely specifying sibilants in the lexicon to cover any intra-phonological-word position as the following list of examples indicates.[16]

(a)	/SPanios/	[spánios]	rare
	/Sfera/	[sféra]	bullet
	/Svino/	[zvíno]	I erase
	/STino/	[stíno]	I stand (tr.)
	/Sθenos/	[sθénos]	vigour
	/SKala/	[skála]	ladder
	/Sxara/	[sxára]	grate
	/Sγuros/	[zγurós]	curly
	/Sminos/	[zmínos]	squadron
(b)	/aSpiδa/	[aspíδa]	shield
	/leSvos/	[lézvos]	Lesbos
	/koSmos/	[kózmos]	world
(c) (i)	/aS+Pi/	[aspí]	let (him) say
	/aS+NPi/[17]	[azbí]	let (him) enter
	/tiS+Tazi/	[tistázi]	(he) promises her
	/tuS+NTini/	[tuzdíni]	(he) dresses them
	/tuS+Kremasan/	[tuskrémasan]	they hanged them
	/tuS+NKremisan/	[tuzgrémisan]	they tore them down
(ii)	/tiS+filias/	[tisfilías]	of the friendship
	/tiS+varkas/	[tizvárkas]	of the boat
	/aS+θavun/	[asθávun]	let them bury
	/aS+δosun/	[azδósun]	let them give
	/aS+xorevun/	[asxorévun]	let them dance
	/aS+γemisun/	[azγemísun]	let them fill

(c) (ii) (cont'd)	/proS+meno/	[prozméno]	I expect
	/tiS+manas/	[tizmánas]	mother's
	/ðiS+noitos/	[ðiznóitos]	difficult to understand
	/tuS+nomus/	[tuznómus]	the laws (acc., p.)
	/proS+lipsi/	[prózlipsi]	hiring
	/aS+lene/	[azléne]	let them talk
	/iS+roi/	[izroí]	inflow
	/tuS+raftes/	[tuzráftes]	the tailors (acc., p.)

These data indicate that the value of the feature 'voiced' of strident segments is <u>always</u> conditioned by the value of the corresponding feature of the consonant that follows the strident segment regardless of whether or not the sequence [+stri][+cons] contains a morpheme boundary; and in case there <u>is</u> a morpheme boundary inside the sequence, it is immaterial whether this boundary occurs between a prefix and a base or between some enclitic and a base.

Rule (3) makes this generalization formally.

(3) $$[+\text{stri}] \dashrightarrow [\alpha\ \text{voic}]\ /\ \rule{1.5em}{0.4pt} \begin{bmatrix}+\text{cons}\\ \alpha\ \text{voic}\end{bmatrix}$$

This is a rule of very wide applicability in Greek phonology as it predicts the voice state of sibilants in any pre-consonantal context.

Notice the following points in connection with the data in (a - c) and with rule (3) above:

(i) The data just presented lend further support to the regressive nature of the process of 'voice-assimilation of pre-consonantal sibilants'.

(ii) Rule (3) can be regarded as an extension of rule (1) as it accounts for (regressive) voice-assimilation in

[+stri][+obst] sequences, and, in addition, in

$[+stri]\begin{bmatrix}+cons\\ -obst\end{bmatrix}$ sequences.

(iii) When the rightmost consonant in the rule is further specified [+stri], there will be a /S+s/ or a /S+z/ sequence in the corresponding surface structure; such sequences will ultimately be simplified through application of the 'Identical-consonant cluster simplification' rule (to be given in chapter 4) as is shown in the examples below:

Output from Surface Structures	Output from R-rules	Output from P-rules	Output from Phonetic Real. rules	Gloss
/tuS+serni/	/tus+serni/	/tuserni/	[tusérni]	(he) talks ill of them
/tuS+zalisan/	/tuz+zalisan/	/tuzalisan/	[tuzálisan]	they confused them

With regard to examples like the above, it is interesting to observe how phonetic forms can be ambiguous. Thus, [tuzálisan], for instance, may have a second meaning, 'they confused his (head)'. In the underlying structure, however, no ambiguity could ever occur; there, the proclitics in /tuS+zalisan/ and in /tu+zalisan/ (with the second interpretation) would be differently syntactically and semantically specified, while in the surface such specification can be obscured owing to identical phonetic realization of the two forms. Notice that conventional orthography would also leave no room for ambiguity in such cases; a comparison of the three types of representation will confirm this:

Orthographical Representation	Surface Structure Representation	Phonetic Representation
τούς ζάλισαν	/tuS+zalisan/	[tuzálisan]
τοῦ ζάλισαν	/tu+zalisan/	[tuzálisan]

Similarly with /tuS+serni/ and /tu+serni/.

At this juncture, it would not be irrelevant to point out the fact that in all the critical places in the examples cited in this section conventional spelling systematically has a <u>σ</u> (sigma) within morphemes, and a <u>s</u> ('final sigma') across morphemes, <u>never</u> a <u>ζ</u> (zeta); this observation may be interpreted as an indication that it is the voiceless one which is the unmarked member of the opposition /s/ vs. /z/.

(iv) For the purposes of this investigation, the most interesting instance of rule (3) is that which assigns the feature [+voiced] to a /S/ in the environment to the left of any voiced consonant, as follows:

$$(4) \qquad [+\text{stri}] \dashrightarrow [+\text{voic}] \;/\; \rule{2em}{0.4pt} \begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$$

As we shall see presently, this restricted case of the general 'Regressive voice-assimilation of pre-consonantal sibilants' rule is of great pedagogical importance, although theoretically its separate formulation is unmotivated.

3.1 Turning now to English <u>sibilant</u> + <u>consonant</u> sequences, we observe that there is no general rule that governs the voice state of the sibilant in such sequences. Specifically, the situation in English appears to be as follows:

(a) <u>The sibilant is predictably voiceless</u>:

(i) <u>Inside morphemes before a voiceless consonant</u>; for example,

spit	aspect	gasp
sphere	asphalt	
stop	asterisk	mist
	aesthetic	
skip	Eskimo	ask

(ii) Word-initially before a nasal or a liquid; for example,

small sleep

snob

(iii) Across morphemes before any consonant when the sibilant is the last segment of the prefixes dis- and mis- , or of the demonstrative this; for example,

dispose	misbehave	dismiss
misfortune	this voice	this name
mistake	misdirect	mislead
this thesis		misread
misconduct	misguided	

(b) The sibilant is predictably voiced:

(i) In the (Greek) suffixes -ism and -asm; for example,

organism orgasm

pessimism spasm

(ii) Inside a number of loanwords; for example,

cosmic Israeli

asbestos Ezra

(c) The voice state of the sibilant is unpredictable:

For example, along with

(i) nozzle, drizzling, Thursday, business, etc.

where the sibilant is voiced, there are also

(ii) thistle, castle, fasten, listen, artsmen, etc.

where the sibilant is voiceless - though in the same environment on the right as in (i).

The voice state of the sibilant in case (c) does not seem to be easily (if at all) generalizable. In case (b), such a generalization could be made; for reasons that will become apparent presently, however, it is pedagogically uninteresting to do so. This leaves examples like those examined under (a). For such items (notably, for those in (ii) and in the second and third column in (iii)) we could formulate, tentatively, rule (5), which, though of obviously limited applicability, is very useful for explaining certain pronunciation difficulties the Greek learner has with English $/s/\begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$ sequences.

$$(5) \quad \begin{bmatrix}-\text{peri}\\+\text{ante}\\+\text{stri}\end{bmatrix} \dashrightarrow [-\text{voic}] \;/\; (++) \;\text{———}\; (+) \begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$$

where two 'pluses' indicate a word boundary and one 'plus' stands for a morpheme boundary <u>after a prefix</u>, and where either ++ or + <u>must</u> be selected. Rule (5) says that word-initially, or prefix-finally, a non-peripheral anterior strident segment is voiceless before a voiced consonant.

It must be noted that this rule is deliberately made overspecific in order to account for the pedagogically interesting case of a sibilant in English, which, unlike a sibilant in Greek, stays voiceless <u>even before</u> some voiced consonant word-initially and prefix-finally. In a more general form the rule would be given with just [+segment] in its rightmost position; it would then take care of both voiced and voiceless consonants (as well as of vowels) in the positions in question.

Now, from a language learning or teaching point of view, the difference between the Greek rule (4) and the English rule (5) is of extreme importance; the enormous amount of mispronunciations observed, both experimentally[18] and in the classroom situation, in this particular environment can be ascribed to transfer of the relevant Greek rule (4), that the learner has internalized, and to its misapplication to the English phonological system. Thus, pupils will persistently say,[19] for example, *[zmóʊk] and *[mɨzbɨhéɨv], and so on. And although [zm] and [zb] are perfectly possible realizations <u>in other contexts</u> in English, they are non-occurrent sequences word-initially and across <u>prefix-base</u> combinations. Presumably, such errors occur because learners process the relevant English data in accordance with the Greek, not the English rule; that is, they misapply rule (4) to the English surface structure representation (which cannot be done in English, as the conditions for entry to the relevant R-rules are different in the two languages) and naturally derive from it the wrong (Greek-like) phonetic output; for example:

Surface Structure Representation	Processed by	Phonetic Output	Gloss
/smol/	R-rule (4)	[zmól]	small
/mɨs+bɨheɨv/	R-rule (4)	[mɨzbɨhéɨv]	misbehave

As is shown experimentally,[20] the pedagogical problem involved in a Greek learner's rendering of English $\begin{bmatrix}\text{-peri}\\ \text{+ante}\\ \text{+stri}\end{bmatrix}\begin{bmatrix}\text{+cons}\\ \text{+voic}\end{bmatrix}$ sequences is more acute when the strident segment occurs prefix-finally than it is when it occurs word-initially.

To return briefly to words like <u>organism</u> and <u>cosmic</u>: when the learner is faced with such items, he most probably still applies to them rule (4), but this no longer results in non-English phonetic outputs; these particular English imputs seem to undergo the same processing as any Greek $[\text{+stri}]\begin{bmatrix}\text{+cons}\\ \text{+voic}\end{bmatrix}$ sequence in any position undergoes.

4. Regressive point-assimilation of pre-consonantal nasals

4.1 As was suggested at the beginning of this chapter, related to the discussion in this and the next section, (5), is the question of Greek 'voiced stops'. It is important, then, that this problem of Greek phonology be cleared up before we proceed any further.

In 1961 Newton proposed a 'rephonemicization of Modern Greek' whereby he claimed that the so-called 'voiced stops' in Greek could be dispensed with in the interests of economy and replaced by sequences of /mp/, /nt/, and /ŋk/, realized phonetically as [b], [d], and [g], respectively.

This position was attacked later by Householder (1964) essentially on the grounds that a treatment like Newton's will consistently produce [(m)b], [(n)d], and [(ŋ)g] even in cases where exclusively or primarily [mp] or [b], [nt] or [d], and [ŋk] or [g], respectively, are attested. Based chiefly on frequency counts of the occurrence of variants in his informants' performance, Householder sets up "four classes of words as regards the intervocalic occurrence of the phones and sequences in question."

1. Words where only [b], [d], [g] occur, e.g.
   [bébis], 'baby' (m.); [adío], 'good-bye'; [strígla],(21) 'shrew'

2. Words where only [mp], [nt], [ŋk] occur, e.g.
   [témpo], 'tempo'; [kóntes], 'count' (n.); [iŋkóγnito], 'incognito'

3. Words where there is a tendency to prefer [mb], [nd], [ŋg], but [b], [d], [g] also occur; this is the "normal" use.
   (No examples are given for this class.)

4. Words in which [mb], [nd], [ŋg] are normal, and [b], [d], [g] rare or non-occurrent, e.g.
   [kámbos], 'plain' (n.); [paténda], 'patent'; [γoŋgíli], 'bulb(ous root)'.

He then proceeds to set up "a four-way [phonemic] contrast at all stop positions: /p/, /mp/, /mb/, /b/; /t/, /nt/, /nd/, /d/; /k/, /nk/, /ng/, /g/. (p. 24) Householder admits (p. 24) that "the functional load [of such segments and sequences] is ... low" and that although "There are probably no minimal pairs ... it is foolish to pretend that the evidence is not there;" Therefore he regards a solution such as Newton's "clearly indifensible, unless the rules are altered." (p. 27)

Setatos (1969: 36-45) holds a similar view to that of Householder's. Setatos remarks that the distribution of voiced stops in the various positions is uneven, and that the bulk of voiced stops occurs word-medially (either as [b], [d], [g], or as [mb], [nd], [ŋg]) while the rest of the cases are derived from classical Greek nasal + voiceless stop clusters, e.g. /em+poros/ -----> [é(m)boros][22] and also that voiced stops at the beginning of inherited words have resulted from nasal + voiceless stop clusters through loss of a classical Greek initial vowel and subsequent deletion of the pre-stop nasal, as in [béno] < /em+baino/.[23] He goes on to argue that this fairly clear picture has been blurred by the influence on the Modern Greek KOINE phonological system of: (a) Katharévousa (puristic language), which has brought in new clusters; (b) loanwords, which have introduced new sound distributions; (c) Sandhi rules, which, in combination with the clear tendency of Greek for open syllables, have caused the evolution of new nasal + voiced stop clusters (subsequently optionally simplified) even initially, for example, [tin dáksi] -----> [ti ^{n}dáksi] -----> [ti dáksi], 'the order/classroom' (acc.); and, finally, (d) change due to rapid pronunciation. On the basis of data very similar to those presented by Householder, Setatos gives phonemic status to /b, d, g/ and concludes that

"The phonemic system of MGK includes the phonemes /p, b, t, d, k, g/, which form with the nasal phonemes /m, n/ the clusters /mp, mb, nt, nd, nk, ng/. There is medially a great deal of variation between voiced stops and the corresponding nasal clusters, which is either free or put to uses more or less fixed as to their informational load."

4.1.1 Two important observations can be made on Householder's and Setatos's treatments:

First, Setatos's corpus includes substandard, dialectal, and a great number of foreign words; and Householder's arguments rest exclusively on loanwords.

Second, Householder (1964: 17) establishes at the very beginning of his article that he is "talking about phonemicization of the traditional kind (not about distinctive feature analysis or phonematic-prosodic analysis both of which offer certain advantages for the solution of these three[24] problems);" And Setatos shares this view completely.[25] Their point is evidently not that Greek 'voiced stops' cannot be derived from some underlying <u>nasal</u> + <u>stop</u> sequence, but rather that this is not possible or not best done within the framework of traditional phonemic theory - as Newton (1961), Hamp (1962), and others seem to imply.

Householder's and Setatos's arguments, then, do not affect the validity of the present treatment, which utilizes the archi-segment convention to account for 'voiced stops' in Greek, as (i) loanwords are excluded from this thesis, and (ii) the descriptive model employed is a generative one that makes full and explicit use of distinctive features.

Before we present and substantiate our own position, however, let us see briefly how Newton handles this question in his latest publication (1972), which, to this writer's knowledge, is the most recent account of Greek phonology - though chiefly concerned with dialectal variations.

In his book, Newton comes back to his earlier claim. He says (p. 12): "We shall find in the course of our investigation that some of the ..... consonants which occur in modern dialects can be accounted for by sypposing them to represent clusters of underlying segments. Thus [b], [d], and [g] can be shown to derive from /mp/, /nt/, /nk/;" Though valid objections could be raised concerning Newton's symbolization of these "underlying segments" (cf. also Newton, 1972: 13) even at this preliminary stage, one would probably accept it as a first approximation to the archi-segment convention to which he switches - without much discussion - later on in his work (p. 111).

The basic objection even to the latest of Newton's treatments is that although he succeeds in substantiating most of his claims, he does so in a rather uneconomical manner: he presents most of his 'Morpheme Structure Rules' as if they were P-rules rather than R-rules. This fact has important theoretical implications, as it complicates his account unnecessarily. Another, minor, criticism of his presentation is that his rules are not always unambiguously formulated (cf. p. 94 concerning the expression of Nasal assimilation I).

4.2 We shall begin our treatment of the process of 'Regressive point-assimilation of pre-consonantal nasals' with the following assumption:(26)

In lexical entries, each 'voiced stop' is represented by a sequence of a nasal archi-segment (informally symbolized /N/), which is unspecified, at this level, for the point-of-articulation features, and of a stop archi-segment (symbolized /P/, /T/, /K/, accordingly), which is unspecified for the value of the feature 'voiced'.

Thus, [b] is assumed to be derived from lexical /NP/, [d] from /NT/, and [g] from /NK/. We shall assume this convention to hold good anywhere within the phonological word.(27)

The motivation behind this assumption is mainly <u>simplicity</u> and <u>adequacy</u>: the grammar of the language (Greek) will be simpler if its inventory of 'phonemes' can be reduced (without loss) by three, and if lexical representations are given in a maximally non-redundant specification; moreover, as we shall have occasion to demonstrate presently, the archi-segment convention makes it possible for very general phonological processes to be accounted for more explicitly, and also in the set of the R-rules, this in itself being a simplification of the grammar.

Notice, incidentally, that this treatment reflects directly the principles of conventional orthography, which, as Chomsky & Halle remark (1968: 49), "is a near optimal system for the lexical representation of English words. The fundamental principle of orthography is that phonetic variation is not indicated where it is predictable by general rule."(28) Although their comment is specific to English phonology, it can be maintained equally well for Greek.(29)

4.2.1 Let us now turn our attention to the examples from Greek on the next page:

	Surface Structure Representation[30]	Phonetic Representation	Gloss
(a)	/aNPeli/	[ambéli][31]	vineyard
	/aNTi/	[andí]	instead
	/aNKonas/	[aŋgónas]	elbow
(b)	/siN+Paθia/	[simbáθia]	liking
	/siN+Tomos/	[síndomos]	brief
	/siN+Kinisi/	[siŋgínisi]	emotion

On the basis of the data just presented, and ignoring for the time being what happens to the stop segment in the phonetic representation ofeach of these sequences, we can make the following very general observation concerning the realization of any /N/ in a /N/[+stop] sequence in Greek phonology:[32] in the unrestricted phonological-word environment, the values of the point-of-articulation features of a nasal are conditioned by the feature values of a following stop with which the nasal forms a sequence; that is, /N/ is realized as: [m] before a labial, [n] before a dental, and [ŋ] before a velar stop segment. Rule (6) below explains this assimilatory process:

(6) $$[+\text{nasa}] \dashrightarrow \begin{bmatrix}\alpha\,\text{peri}\\ \beta\,\text{ante}\end{bmatrix} \;/\; \rule{2em}{0.4pt} \begin{bmatrix}+\text{stop}\\ \alpha\,\text{peri}\\ \beta\,\text{ante}\end{bmatrix}$$

i.e. a nasal must agree with a following stop in 'peripherality' and 'anteriority'.

Rule (6), an instance of the general 'Regressive point-assimilation of pre-consonantal nasals' rule, is obviously a collapsing of three similar (regressive) assimilatory rules. It permits us to simplify the lexical representation of all nasal segments in the environment to the left of a segment specified [+stop].[33]

4.2.2 As the reader will no doubt have noticed, obstruents in Greek, whether marked [+stop] or [-stop], behave phonologically in strikingly similar ways. The following examples provide one more illustration of this fact:

	Surface Structure Representation	Phonetic Representation	Gloss
(a)	/aNfivolia/	[amfivolía][34]	doubt
	/aNvonas/	[ámvonas][34]	pulpit
	/aNθos/	[ánθos]	flower
	/iNδalma/	[ínδalma]	ideal (n.)
(b)	/tiN+filise/	[timfílise][35]	(he) kissed her
	/tiN+varka/	[timvárka][35]	the boat (acc., s.)
	/tiN+θia/	[tinθía]	the aunt (acc.)
	/tiN+δiran/	[tinδíran]	they beat her (past)
	/toN+sosan/	[tonsósan]	they saved him
	/toN+zosan/	[tonzósan]	they surrounded him
	/tiN+xara/	[tiŋxará]	the joy (acc.)
	/tiN+ɣata/	[tiŋɣáta]	the cat (acc.)

Here, as in the case of pre-stop nasals, the point-of-articulation features of a nasal anywhere within the phonological word are conditioned by those of the following non-stop obstruent segment. This fact is stated formally by rule (7).

(7) $$[+\text{nasa}] \dashrightarrow \begin{bmatrix}\alpha\ \text{peri}\\ \beta\ \text{ante}\end{bmatrix} \ / \ \underline{\qquad} \begin{bmatrix}-\text{stop}\\ \alpha\,\text{peri}\\ \beta\,\text{ante}\end{bmatrix}$$

i.e. a nasal must agree with a following non-stop (obstruent) consonant in 'peripherality' and 'anteriority'.

4.2.3 Finally, consider the following examples:

Surface Structure Representation	Output from R-rules	Phonetic Representation	Gloss
/siN+moria/	/sim+moria/	[simoría]	gang
/eN+nomos/	/en+nomos/	[énomos]	lawful
/siN+loγi/	/sil+loγi/	[siloγí]	collection
/siN+riza/	/sir+riza/	[síriza]	by the root

The assimilatory process demonstrated by items like those just listed is formally captured by a rule of the form of (8)

(8)
$$[+\text{nasa}] \dashrightarrow \begin{bmatrix}\alpha\ \text{peri}\\ \beta\ \text{ante}\end{bmatrix} \ / \ \underline{\quad\quad} \begin{bmatrix}+\text{cons}\\ -\text{obst}\\ \alpha\ \text{peri}\\ \beta\ \text{ante}\end{bmatrix}$$

which states that a nasal receives its point-of-articulation features from a following nasal or liquid.

The only exception to rule (8) is the case of /mn/ sequences <u>within</u> <u>morphemes</u>, as, for example, in

/mnimi/	[mními]	'memory' ,	and
/limni/	[límni]	'lake' .	

However, it must be noted that the point-of-articulation features are always predictable in a <u>nasal</u> + <u>nasal</u> sequence which is not interrupted by the presence of a morpheme boundary: the first nasal is [+peri], the second is [-peri], and both are (redundantly) [+ante], thus: $\begin{bmatrix}+\text{nasa}\\ +\text{peri}\\ +\text{ante}\end{bmatrix}\begin{bmatrix}+\text{nasa}\\ -\text{peri}\\ +\text{ante}\end{bmatrix}$.

Now, as can be readily seen, rules (6 - 8) are instances of the same rule (9), a rule of very general applicability in Greek phonology.

(9)
$$[+\text{nasa}] \dashrightarrow \begin{bmatrix} \alpha\ \text{peri} \\ \beta\ \text{ante} \end{bmatrix} \Big/ \;\underline{\quad\quad}\; \begin{bmatrix} +\text{cons} \\ \alpha\ \text{peri} \\ \beta\ \text{ante} \end{bmatrix}$$

Rule (9) states that anywhere within the phonological word, a nasal must agree with any following consonant in 'peripherality' and in 'anteriority'.

Note that R-rule (8) will account for /sim+moria/ and /en+nomos/, but not, directly, for /sil+loγi/ and /sir+riza/; rather, it will generate /sin+loγi/ and /sin+riza/. There seem to be two ways of handling this problem. First, we can re-cast rule (8) in the form of R-rule (10)

(10)
$$\begin{bmatrix} +\text{cons} \\ -\text{obst} \end{bmatrix} \dashrightarrow \begin{bmatrix} \alpha\ \text{voca} \\ \beta\ \text{peri} \\ \gamma\ \text{ante} \end{bmatrix} \Big/ \;\underline{\quad\quad}\; \begin{bmatrix} \alpha\ \text{voca} \\ +\text{cons} \\ -\text{obst} \\ \beta\ \text{peri} \\ \gamma\ \text{ante} \end{bmatrix}$$

which states that a non-obstruent consonant agrees with a following non-obstruent consonant in point of articulation and also in vocalicness - i.e. assimilation of the first to the second segment in the sequence is complete. Now, considering that in Greek the only possible non-obstruent consonant prefix-finally is additionally specified [-vocalic], i.e. that it can only be a nasal segment (as in the case at hand), and also remembering that [+nasal] is used in this thesis as a shorthand in place of the complex $\begin{bmatrix} -\text{voca} \\ +\text{cons} \\ -\text{obst} \end{bmatrix}$ (cf.p. 27) we can allow rule (8) in the specific form in which it is given above. Alternatively, we can accept rule (8), but relax the strict 'identity condition' imposed by Chomsky & Halle(36) on consonantal sequences to be simplified; this would make it possible for a nasal to be deleted before a liquid. In other words, the reduction of /siN+loγi/ or even of /sin+loγi/ to /siloγi/ would be a permissible operation in this view.

For reasons of overall generality, the former solution to the problem is adopted in this study.

4.2.4 Before we move on to consider the corresponding English case, let us argue briefly the postulation of the archi-segment /N/ in all positions in lexical items except pre-vocalically inside morphemes.(37)

(a) Pre-vocalically within a morpheme:

The point-of-articulation features (in particular, the value of the feature 'peripheral') cannot be predicted in such nasals and has to be specified in the lexicon; for example,

/mina/	[mína]	month (acc.)
/nina/	[nína]	Nina
/nima/	[níma]	thread (n.)

(b) Pre-vocalically across morphemes (prefix-finally):

The value of the feature 'peripheral', which is at issue here, is predictable - always [-peri] - in words like

/siN+olo/	[sínolo]	total
/eN+orkos/	[énorkos]	juror

by a rule such as the one immediately below

$$[+\text{nasa}] \dashrightarrow [-\text{peri}] \;/\; \underline{\qquad} + \begin{bmatrix}+\text{voca}\\-\text{cons}\end{bmatrix}$$

which says that a prefix- (and morpheme-)final nasal is assigned the feature [-peripheral] when followed by any base-initial vowel: there are no *[simV...] or *[emV...] pronunciations in Greek, where V stands for some base-initial vowel.

4.3 Point-assimilation in nasals in English

Consider now the following examples from English:

(a)	/pɒNpəs/	[pɒ́mpəs]	pompous
	/æNfɨbəlɨ/	[æmfɨ́bəlɨ]	amphiboly
	/pɒNtɨf/	[pɒ́ntɨf]	pontiff
	/æNθəm/	[ǽnθəm]	anthem
	/dɒNkɨ/	[dɒ́ŋkɨ]	donkey
(b)	/ɨN+pɒsəbl/	[ɨmpɒ́səbl]	impossible
	/eN+fəsɨs/	[émfəsɨs]	emphasis
	/ɨN+tend/	[ɨnténd]	intend
	/ɨN+θroʉn/	[ɨnθróʉn]	enthrone
	/ɨN+kəm/	[ɨ́ŋkəm]	income

Clearly, rule (7) that we gave for Greek applies to English as well without any modification: here also the point-of-articulation features of a nasal in sequence with a non-stop obstruent are determined by those of the latter segment.[38] As for rule (6), this is also applicable to English on the condition that the $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ sequence occurs within a morpheme, as in examples under (a) above, or that the nasal segment in sequence with an oral stop <u>is the final segment of a prefix</u>, as in the examples in (b). This restriction concerning the domain of application of rule (6) becomes necessary[39] because of the existence of words like [kláɨmd], 'climbed', and [hǽŋd], 'hanged', in which the point-of-articulation features of the nasal before the past tense suffix realized as [d] do not agree with the corresponding features of this following [d].

A comparison of the manner in which nasal + obstruent sequences are processed in Greek and English reveals some asymmetry. Thus, for example, there are a few (rare or idiosyncratic) alternative realizations of $[+\text{nasa}]\begin{bmatrix}+\text{peri}\\+\text{stop}\end{bmatrix}$ sequences, as in [ɨ́mpʉt] or [ɨ́npʉt], 'input', and [kóŋkod] or [kóŋkod], 'concord'. Nevertheless, this asymmetry does not really constitute a pedagogical problem: whether the learners **hear** or say [ɨ́npʉt], for instance, instead of [ɨ́mpʉt] does not impede comprehension.

5. Progressive voice-assimilation of post-nasal stops

In section 4.2, p. 69, we began discussion of the process of 'Regressive point-assimilation of pre-consonantal nasals' with the assumption that "in the lexicon in Greek, each 'voiced stop' is represented by a sequence of a nasal archi-segment unspecified for the point-of-articulation features and a stop archi-segment unspecified for the feature 'voiced'". This assumption was subsequently shown to hold anywhere within the phonological word.

The postulation of underlying nasal + stop sequences of archi-segments that represent realizations of 'voiced stops' in the surface is even more pertinent to the discussion of the process of 'Progressive voice-assimilation of post-nasal stops' examined in this section.

Let us consider the following items:

(a)	/NPeno/	[béno]	I enter
	/NTino/	[dɨ́no]	I dress (tr.)
	/NKremos/	[gremós]	precipice

(b)	/aNPeli/	[ambéli][40]	vineyard
	/aNTi/	[andí]	instead
	/aNKonas/	[aŋgónas]	elbow
(c)	/siN+Paθia/	[simbáθia][40]	liking
	/siN+Tomos/	[síndomos]	brief
	/siN+Kinisi/	[siŋgínisi]	emotion

On the basis of the data just presented, two important observations can be made:

(i) Regardless of the position of the sequence [+nasa][+stop] within the phonological word, the value of the feature 'voiced' of the stop is determined by the value of the respective feature of the preceding nasal - always [+voiced]; that is to say, the direction of the process is from left to right.

(ii) Word-initially, nasality is obligatorily subsequently dropped in the phonetic realization of lexical [+nasa][+stop] sequences. This deletion operation is discussed in chapter 4; as we shall see there, the nasal in cases like those under (b - c) is also optionally deleted.

The facts in (a - c) are formally expressed by rule (11), the rule that governs 'Progressive voice-assimilation of post-nasal stops'.

(11)
$$\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix} \longrightarrow \left\{\begin{array}{l}[+\text{voic}] \;/\; [+\text{nasa}] \_\_\_\_ \\ \\ [-\text{voic}]\end{array}\right\}$$

which states that in the unrestricted phonological-word environment, any oral stop following a nasal segment is assigned the (redundant) feature [+voiced], i.e. is predictably voiced.

Thus, rule (11) permits the simplification of all lexical representations that contain a segment marked $\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$: post-nasally such segments are always voiced; in all other contexts, they are voiceless.

Notice, in passing, that this treatment is in accord with the orthographical conventions of Greek: there is no way of representing voiced stops in Greek other than <u>μπ</u> = [b], <u>ντ</u> = [d], and <u>γκ</u> (or <u>γγ</u>) = [g].(41)

5.1 Let us now look at the following English words:

(a)	/æNpeə/	[ǽmpeə]	ampere
	/teNt/	[tént]	tent
	/æNkə/	[ǽŋkə]	anchor
(b)	/ɨN+pɒsəbl/	[ɨmpɒ́səbl]	impossible
	/ɨN+tend/	[ɨnténd]	intend
	/ɨN+kəm/	[ɨ́ŋkəm]	income

As becomes clear from the examination of these examples, there is no conditioning of the value of the feature 'voiced' in a stop segment by that of the respective feature of the nasal preceding the stop in a sequence which is confined to one morpheme or extends over two successive morphemes within the phonological word. This suggests that at no point in the process of derivation of words containing a [+nasa][+stop] sequence is there an English rule that assigns the feature [+voiced] to the stop by force of the presence of this feature value in the nasal segment before the stop.

From a pedagogical point of view, this is a very significant difference between the phonological systems of Greek and English, a difference which must be responsible for a great number of pronunciation errors that Greeks make in the course of their learning English.

Presumably, error in this area results from the automatic transfer of the pupil's intuitive knowledge of the Greek 'Progressive voice-assimilation of post-nasal stops' rule to the English system and from erroneous application of this rule to the relevant English inputs. In other words, when confronted with the sequence underlying mp in simple, for instance, the Greek learner most probably identifies it with the corresponding underlying sequence in a Greek lexical item, enters it in 'his English lexicon' as /NP/, and from that point on he submits it to the appropriate Greek rule, rule (11), which he would have applied in his own language, thus ending up with [mb] and [sɨ́mbəl].[42] And he does this consistently with all voiceless stops preceded by a nasal in the foreign language.[43] At this juncture, it is of interest to note that the problem appears to be more acute when the sequence in question occurs within rather than across morphemes.[44]

NOTES TO CHAPTER 3

(1) This is really an extension of the 'Regressive voice-assimilation of obstruents' process.

(2) Note that the archi-segment /K/ is separately postulated (along with the other two stop archi-segments /P/ and /T/) for all positions on independent grounds.

See also discussion in sections 4 and 5 of this chapter.

(3) In fact, in all the surface structure representations below where there is a base-initial oral stop, this stop should appear in archi-segment form, /P, T, K/, unspecified for voice state. (Cf. sections 4 and 5 of this chapter.) However, for uniformity of representation and for the reader's convenience, these segments are given, at this stage, in full phonemic shape.

(4) For a discussion concerning the reduction of two identically or similarly specified segments (here, of two labials) to one, see 'Identical-consonant cluster simplification' in chapter 4.

(5) An infrequent word. Hereafter, such items will be enclosed in parentheses ( ).

(6) Note that if CV sequences were also included in the scope of this study, a P-rule would be required that would convert, ultimately, the prefix /eK/ to [eks], before a base-initial vowel, as in the examples below:

/eK+orizo/	[eksorízo]	I banish
/eK+erevno/	[ekserevnó]	I explore

(7) See note 4 above.

(8) Unlike /K+k/ sequences, which are obligatorily reduced to phonetic [k], /K+x/ and /K+γ/ sequences are not subject to this simplification operation.

(9) A sibilant archi-segment /S/ will be postulated later (see section 2.2, pp. 52-55, below) for all intra-phonological-word environments except pre-vocalically.

(10) Notice the systematic free variation between the underlined clusters in [<u>fθ</u>inós] and [<u>ft</u>inós], and in [<u>xθ</u>és] and [<u>xt</u>és], expecially word-initially. However, this phenomenon cannot be generalized to cover all words beginning with or containing a sequence [fθ] or [xθ]. In fact, the examples given in (e) have been so chosen as to exclude the possibility of free variation in the relevant sequences. In any case, it would be immaterial to the discussion of the process under examination here whether sequences such as those just cited varied freely or not: the process of the 'Regressive voice-assimilation of obstruents would not be affected anyway.

(11) See Chomsky & Halle, 1968: their 'Subject Index' under: 'Evaluation Procedure', Lexical Redundancy', '(Plausible) Rules of Phonology'.

(12) From this presentation it becomes clear that rules (a) and (b) we have just given are special morpho-tactic R-rules applying to specific morphological classes of prefixes, rather than phonotactic R-rules without exception (see note 14 below). Thus, for example, the lexical entry-prefix /iS/ could have, among many others, the morphological feature [+class A], and rule (a) would be similarly specified in its leftmost part so as to apply only to prefixes that satisfy this entry condition. In the same way, prefix /eF/ would be marked, say, [+class B] and so would be the leftmost part of rule (b). Then rule (a) would, in fact, say:

> "Class A prefixes, /ðiS/, /iS/, and /proS/, are realized with [-voiced] assigned to their final segment before vowels; before consonants, this prefix-final /S/ is assigned the voice feature of the following consonant." (Cf. rule (3), p. 59.)

Similarly, rule (b) would state:

> "Class B prefix /eF/ is realized with [+voiced] assigned to its final segment before vowels; before consonants, this prefix-final /F/ is assigned the voice feature of the following consonant." (Cf. rule (1), p. 51.)

Thus, the phenomena would still be dealt with by R-rules that <u>fill in</u> feature values. Admittedly such rules are of very restricted application, but this limitation would also be true of the P-rules that would be required to <u>change</u> /s/ to [z] and /v/ to [f], as in (i-ii), p. 52: the respective P-rules would need exactly the same amount of morphological-class information about their inputs as the proposed R-rules; in addition, the P-rules would be more costly than the R-rules in that the former are feature-changing, not feature-filling-in operations as are the latter: of the two solutions, the cheaper one is favoured here.

(13) The chief exponents of this dogma are Chomsky & Halle, 1968; also Stanley.

(14) Cases like [tóferez mazísu], 'you brought it with you', where the sequence $[+\text{stri}]\begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$ crosses the phonological-word boundaries, may be interpreted as an indication that it might be possible, indeed desirable, to extend the domain of application of <u>certain</u> R-rules so that they may be permitted to operate in inter-word contexts also. Thus, it seems likely that we need to recognize the following types of R-rules - given below in a decreasing order of generality:

(a) <u>Phonotactic rules without exception</u>

Domain of application: (possibly) the tone group.

R-rule (3), p. 59, the 'Regressive voice-assimilation of pre-consonantal sibilants' rule, would belong to this category of R-rules and would be allowed to assign the feature [+voiced] to the initially unspecified (for this feature) sibilant in the first word in [tóferez mazísu].

(b) Word-structure rules

Domain of application: the phonological word.

R-rule (1), p. 51, the 'Regressive voice-assimilation of obstruents' rule, is an example of this type of R-rules.

(c) Morpheme-structure rules

Domain of application: the morpheme.

A rule (applicable to both English and Greek) stating that "If a morpheme begins with a sequence of two consonants, the third segment in the sequence is vocalic." (See Halle, 1958: 331, Rule 2) would be an example of this kind of R-rules.
None of the (Greek) R-rules discussed in this work is exclusively a Morpheme-structure rule.

(d) Syllable-structure rules

Domain of application: the syllable.

Such is the English rule (2), given on p. 56.

The point should be stressed, in this connection, that although it is possible for all four types of R-rules to deal with the same phonological phenomena as such, the rules are differentiated from each other on the basis of the restrictions concerning the domain of their application.
However, as the question of distinguishing between various kinds of R-rules lies outside the scope of the present study, and as it has not been properly investigated, we shall not press the point beyond the tentative suggestions just made.

(15) See relevant discussion in chapter 4, note 8, pp. 101-102.

(16) For more, pertinent, examples, see section 2.1 (a) above.

(17) For the postulation of sequences of nasal and stop archi-segments to account for the phonetic realizations [b], [d], and [g], see discussion in sections 4 and 5 below.

(18) See discussion on the perception (pp. 164-69) and the production (186-89) of English underlying $\begin{bmatrix}-\text{peri}\\+\text{ante}\\+\text{stri}\end{bmatrix}\begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$ sequences; Also Tables 6 and 13, pp. 262 and 282, respectively.

(19) The manner in which the pupil 'decodes' a stretch of speech that he hears in class can only be conjectured to be analogous to how he processes the relevant data when he speaks. But see chapter 4, note 8, pp. 101-102.

(20) See note 18 above.

(21) [stríŋgla] is not only a possible but also a very common pronunciation.

(22) Setatos regards the distinction between /m/ and /n/ as neutralized before labials.

(23) Other processes that do not concern us here are also involved in such derivations.

(24) The other two 'dreams' in Householder's article relate to the important questions of palatalization and of affrication, neither of which is dealt with here.

(25) Personal communication.

(26) See Chomsky & Halle, 1968: chapter 9.

(27) As a matter of fact, this convention can be maintained even across words.

(28) Chomsky & Halle go on to say (p. 221 and elsewhere) that if forms are entered in the lexicon in the manner suggested by conventional orthography, the required output will eventually be generated by the rules of phonology.

(29) The present treatment of voiced stops in Greek is only one of numerous cases that demonstrate the relationship between the orthographic and the phonological systems of representation. See, for instance, section 3 above, and also note 41 to this chapter.

(30) The reader is reminded that none of the inflected forms in this column is, strictly, a lexical or surface structure representation; all such items include a morpheme boundary before the relevant suffixes; these boundaries are not indicated in the representations as irrelevant to the discussion. See also note 11 to chapter 2.

(31) Actually, all the items in this column should have the nasal segment enclosed in parentheses, e.g. [a(m)béli], to show its optional realization.

See 'Notational Conventions' in chapter 1; also discussion of the 'Pre-obstruent nasal deletion' process in chapter 4.

(32) Word-initial cases like /NPeno/ ----->[béno], 'I enter', will be dealt with in section 5 of the present chapter, and also in chapter 4.

(33) But see discussion on the specification of [+nasa][+nasa] sequences in section 4.2.3, p. 72 below.

(34) In fact, the nasal in such words is labiodental, specified [-distributed] in contrast to the bilabial nasal which is marked [+distributed]. (See Chomsky & Halle, 1968: 312-14); thus, for example, [amfivolía] should actually read [aɱfivolía].

(35) Cf. notes 31 and 34 above.

(36) Chomsky & Halle, 1968: 428 "It is crucial that the same feature or set of features" be operated upon in the process of assimilation.

(37) Cf. discussion on pp. 52-55.

(38) But notice the existence of some odd exceptions like clumsy, James, Thames, etc.

(39) Cf. note 14 to this chapter.

(40) Cf. note 31 above.

(41) The historical explanation for this phenomenon is that as there were no voiced stops in Classical Greek, there was no provision for their representation in orthography.

(42) For a somewhat more detailed discussion of this processing of English data by a Greek learner, see chapter 4, note 8, pp. 101-102.

(43) Notice the consistent correspondence between orthographical and phonological (and, in this case, phonetic) representation concerning the specification of the stop segment in this list of examples from English.

(44) See Tables 12 (pp. 278-79) and 14 (pp. 284-85), and Table 10 (items 21-32; pp. 273-74), respectively.

C H A P T E R 4

PHONOLOGICAL RULES AND THEIR RELEVANCE TO THE PEDAGOGICAL PROBLEMS

1. Introduction

Chapter 3 was given to a detailed discussion of certain Redundancy Rules which are pertinent to the subject-matter of this thesis. It was also indicated there how the grammar of Greek can gain in simplicity and generality by permitting some of the processes of phonology to be accounted for in the set of the Redundancy rather than of the Phonological rules of the language.

In this investigation, it has been assumed that any operation involving filling-in of incompletely specified lexical matrices with predictable feature values is included in the R-rules of a language - that is, in so far as it takes place within the boundaries of the phonological word.

However, not all phonological processes involve a simple 'feature completion' operation like those we have been discussing so far. Very frequently, the feature composition of segments within (and across) phonological words has to be changed. Such changes may be attributed to:

(a) addition of new features or, ultimately, of whole segments (as in 'epenthesis');

(b) deletion of certain features or even of whole segments (as in 'cluster simplification'); or

(c) permutation of features or of feature complexes (as in 'metathesis').

As has already been stated in chapter 2, p. 42 , the function of P-rules is precisely this: to change feature values, and to add, delete, or permute features in the process of generating a word, phrase, or sentence.

Notice, incidentally, that phonological processes of the kind just discussed provide one more piece of evidence with regard to the claim (cf. p. 37) that phonological and phonetic matrices may, but need not, be identical.

In this chapter, we shall be concerned with two (related) processes and with the formulation of the rules that account for them: (i) 'Identical-consonant cluster simplification', and (ii) 'Pre-obstruent nasal deletion'. We shall also examine one aspect of the process of 'Epenthesis' and give the (phonetic) rule that explains this particular aspect. As was done in the case of the R-rules in the previous chapter, the English counterparts of the Greek processes under examination here will be briefly considered. Finally, we shall show how certain pedagogical problems can be related to differences between the phonological systems of the two languages involved in this study.

2. Identical-consonant cluster simplification

When two consonantal segments identically or very similarly specified in the lexicon are found in sequence within the phonological word in Greek, they are obligatorily reduced to one. This simplification process is particularly interesting (and relevant to this work) when the two consonants occur between a prefix and some base, as in the examples on the next page.

Output from Surface Structures	Output from R-rules	Output from P-rules	Output from Phonetic Real. Rules	Gloss
/eF+foros/	/ef+foros/	/eforos/	[éforos]	fertile
/eK+kenosi/	/ek+kenosi/	/ekenosi/	[ekénosi]	evacuation
(/ðiS+sevis/	/ðis+sevis/	/ðisevis/	[ðisevís]	impious)
/siN+loγi/	/sil+loγi/	/siloγi/	[siloγí]	collection
/siN+riza/	/sir+riza/	/siriza/	[síriza]	by the root
/eN+mesos/	/em+mesos/	/emesos/	[émesos]	indirect
/siN+nefo/	/sin+nefo/	/sinefo/	[sínefo]	cloud

Regarding the materials just presented, the following points may be noted:

First, not all consonantal segments occur in 'twin' form in such sequences (extending over prefix-base combinations) as are examined here: only prefix-final /F/, /K/, /S/, and /N/ in association with some similarly specified base-initial consonant are possible; and it is an easily verifiable fact of Greek that prefix-/siN/-finally, the combinatorial possibilities with base-initial consonants are greater than they are in the case of any other prefix-final segment in the same environment.(1)

Second, complete identity in the lexicon of the segments in question is not a necessary condition (cf. Chomsky & Halle, 1968: 428): identical specification may be observed after the application of the relevant R-rules(2) and is certainly a prerequisite for entry into this P-rule; this is especially obvious in the last four entries. However, this fact does not impede application of the 'Identical-consonant cluster simplification' rule.

Finally, the process of reduction exemplified in the items above is obligatory.

Rule (1), the 'Identical-consonant cluster simplification' rule, expresses these facts formally.

(1) $$\begin{bmatrix}+\text{cons}\\ X\end{bmatrix} \dashrightarrow \emptyset \;/\; \underline{\qquad} \begin{bmatrix}+\text{cons}\\ X\end{bmatrix}$$

where X is some feature complex defining, in part, the feature composition of a consonantal segment.

Rule (1), which is a collapsing of a number of similar rules, deletes the first of two identically specified consonants in sequence anywhere inside the phonological word; in this respect, rule (1) is a more general formalization than is required by the data presented. Notice that the rule also deletes any morpheme boundaries that may cross such sequences.

The following question, relating to the formulation of rule (1), could be raised: "Why should the first and not the second of two identical consonants in sequence be deleted?" The answer to this question is given by the examples on the previous page, especially the last four words: the fact that the second of the consonantal segments that form the sequence is <u>always</u> phonetically realized suggests that it must be the first segment which is deletable.(3)

2.1 The 'Identical-consonant cluster simplification' rule that we have just given for Greek is of very wide applicability not only in that language but also in English, as the following examples show.(4)

/ɒp+pəzɨt/	[ɒ́pəzɨt]	opposite
/əf+fend/	[əfénd]	offend
/ek+kɒst/	[əkɒ́st]	accost
/əs+sent/	[əsént]	assent
/ɨr+relɨvənt/	[ɨrélɨvənt]	irrelevant
/ɨm+mɒrəl/	[ɨmɒ́rəl]	immoral

As will have been noticed, the items on the previous page have undergone some kind of "assimilation of the [prefix] final consonant under certain conditions";(5) so the representations in the leftmost column cannot be considered lexical. As in the corresponding case in Greek, nevertheless, this has no bearing whatsoever on the applicability of rule (1) that simplifies the matrices in the non-phonetic representations above. Notice once again that these 'intermediate', non-phonetic representations (which are, in fact, outputs from the R-rules) are in accord with orthographical demands. Observe, finally, that rule (1), in the general form in which we have formulated it here, accounts for a great variety of sequences, some of which are potential in Greek but actually occurrent in English.

No language learning problem is involved in the phonological area just examined. This is presumably so because the learner processes the relevant surface structure matrices in identical ways in Greek and in English; that is, he applies at this point the general 'Identical-consonant cluster simplification' rule irrespective of whether the input is (originally) the Greek word /eN+mesos/ or the English word /ɨN+mɒrəl/.

3. Pre-obstruent nasal deletion

Before we begin discussion of the conditions under which the process of 'Pre-obstruent nasal deletion' may take place, let us establish that it would not be unjustifiable to regard this operation as an instance of the general 'Identical-consonant cluster simplification' process that was considered in the previous section. For the purposes of this thesis, however, separate examination of the environments in which nasality may be dropped before certain consonants in Greek is warranted in view of the serious pedagogical implications such a process can have.

Let us now look again at some of the data we gave on pp. 76-7, presented here in a slightly modified form.

(a)	/NPeno/	[béno]	
	/NTino/	[díno]	
	/NKremos/	[gremós]	
(b)	/aNPeli/	[a(m)béli]	
	/aNTi/	[a(n)dí]	
	/aNKonas/	[a(ŋ)gónas]	
(c)	/siN+Paθia/	[si(m)báθia]	
	/siN+Tomos/	[sí(n)domos]	
	/siN+Krino/	[si(ŋ)gríno]	
(d)	/toN+Papu/	[to(m)bapú]	the grandfather (acc.)
	/tiN+Taksi/	[ti(n)dáksi]	the classroom (acc.)
	/toN+Kero/	[to(ŋ)geró]	the weather (acc.)

In the phonetic representation of the items in (b - d) above, the parentheses indicate optional realization of the nasal elements they enclose. The relevant examples demonstrate in effect an instance of the phenomenon of free variation in which lexical $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ sequences either occurring morpheme-medially or crossing morpheme boundaries within the phonological word can be phonetically actualized with or without the nasal segment.(6)

On the other hand, in (a) above we observe that whenever the nasal archi-segment occurs word-initially before a stop, it is obligatorily deleted.

Rule (2), a first approximation to the general 'Pre-obstruent nasal deletion' rule, explains these phonological processes formally.

(2)
$$[+\text{nasa}] \dashrightarrow \left\{ \begin{array}{l} \emptyset \;/\; {++} \;\_\_\_\_ \\ \sim\emptyset \;/\; \_\_\_\_ \end{array} \right\} \begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$$

where $\sim$ means "applies optionally".

Rule (2) receives the following interpretation: word-initially, the nasal segment preceding a stop is obligatorily deleted; in all other positions, i.e. morpheme-medially and across morphemes, the deletion of the nasal segment in this segmental environment is optional.

Notice that P-rule (2) that we have just given follows application of the R-rules that govern the processes of 'Regressive point-assimilation of pre-consonantal nasals' and 'Progressive voice-assimilation of post-nasal stops', presented in chapter 3. Notice also that rule (2), the 'Pre-stop nasal deletion' rule, makes use of the assumption that underlying each voiced stop is a sequence of a nasal archi-segment and a stop archi-segment (each unspecified for some feature value(s)) where the nasal archi-segment is variously phonetically realizable in accordance with the point-of-articulation features of the following stop in a manner explained by R-rule (9), p. 73.

3.1 As we know, there is no rule in English phonology that deletes, optionally or obligatorily, a pre-obstruent-stop nasal segment anywhere within the domain of the phonological word. This constitutes another difference between the two phonological systems under examination in this thesis. Moreover, in view of the fact that nasal deletion in the environment specified in the previous section is shown empirically(7) to be the normal way of rendering in the surface lexical $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ sequences in Greek, a pronunciation problem on the part of the Greek learner of English can be anticipated in such cases. Indeed, an important language learning and teaching problem <u>is</u> involved in this phonological area: when a pupil is faced with an English lexical entry containing the sequence $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$, he processes it according to the Greek P-rule (2) - after he has submitted it to R-rules (9) and (11), pp. 73 and 77 - thus ending up with the wrong phonetic realization. For example, the non-English phonetic forms below are yielded because of transfer and misapplication of Greek rules to the English system:

Lexical form	Processed by	Phonetic form	Gloss
/ɨgzampl/	R-rules (9) and (11) pp. 73, 77	[ɨgzámbl]	example
/ɨgzampl/	R-rules (9) and (11) pp. 73, 77 P-rule (2), p. 91	[ɨgzábl]	example

As stated in chapter 3, this pronunciation problem is more acute when it relates to $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ sequences within rather than across morphemes.

Note that the Greek pupil's behaviour in processing such sequences in English is as systematic and consistent as it is when he processes the 'same' sequences in Greek; that is to say, he processes the English input in accordance with <u>those of the Greek rules</u> that he would have applied in that language under similar entry conditions; for instance, if, in Greek, he applies the 'Pre-stop nasal deletion' rule, he does so in the foreign language as well, thus producing *[ɨgzábl] instead of the correct [ɨgzámpl].(8)

3.2 Let us next turn our attention to the examples we cited on p. 71 presented in a slightly modified form in this section:

	Surface Structure Representation	Phonetic Representation	Gloss
(a)	/aNfivolia/	[amfivolía]	doubt
	/aNvonas/	[ámvonas]	pulpit
	/aNθos/	[ánθos]	flower
	/iNδalma/	[ínδalma]	ideal (n.)
(b)	/tiN+filise/	[ti(m)fílise]	(he) kissed her
	/tiN+varka/	[ti(m)várka]	the boat (acc.)
	/tiN+θia/	[ti(n)θía]	the aunt (acc.)
	/tiN+δiran/	[ti(n)δíran]	they beat her (past)
	/toN+sosan/	[to(n)sósan]	they saved him
	/toN+zosan/	[to(n)zósan]	they surrounded him
	/tiN+xara/	[ti(ŋ)xará]	the joy (acc.)
	/tiN+γata/	[ti(ŋ)γáta]	the cat (acc.)

From the examination of these examples we observe that deletion of the nasal element before any non-stop obstruent is possible at morpheme boundaries (as in list (b)), but <u>not</u> permissible anywhere else (cases like those under (a)) within the phonological word.(9) Notice that as there are no $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\-\text{stop}\end{bmatrix}$ sequences beginning a morpheme in Greek, the deletion transformation obligatorily applying to $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ sequences is inoperative (or vacuous) in the case of sequences of the former type.

Rule (3), another instance of the general 'Pre-obstruent nasal deletion' rule, summarizes these facts formally on the next page.

$$(3) \qquad [+\text{nasa}] \dashrightarrow \sim \emptyset \ / \ \underline{\quad} + \begin{bmatrix}+\text{obst}\\-\text{stop}\end{bmatrix}$$

i.e. across morphemes, the nasal segment preceding a non-stop obstruent is optionally deleted. By implication, this rule also states that in all other positions in the same segmental environment, the nasal <u>is</u> obligatorily realized.

Now, English phonology lacks a rule that parallels the function of rule (4). However, this asymmetry does not affect pupil performance in English.

We can now present formally P-rule (4), the general 'Pre-obstruent nasal deletion' rule, of which rules (2) and (3) are specific instances:

$$(4) \qquad [+\text{nasa}] \dashrightarrow \left\{ \begin{array}{l} \emptyset \ / \ {+}{+} \underline{\quad} \\ \\ \sim \emptyset \ / \ \underline{\quad} \end{array} \right\} [+\text{obst}] \qquad \begin{array}{c}(a)\\ \\(b)\end{array}$$

Rule (4) states that a word-initial nasal is obligatorily deleted when followed by an obstruent segment (case (a) of the rule); in all other positions in the same segmental environment, the nasal may, but need not, be deleted (case (b) of the rule).

4. <u>Epenthesis</u>

Epenthesization of segments in certain specifiable environments within the phonological word is a very common and highly productive process in Greek phonology. It is in fact an additioning transformation whereby feature complexes defining whole segments are affixed to morphemes thus changing the phonological, syntactic, and, quite frequently, semantic structure of the relevant lexical entry.

The phenomenon of epenthesis is systematically observed in word production, and then:

(a) one lexical entry may be added to: for example, from the base /esx-/ we get [ésxos], 'shame', in the normal way; we also get, through addition of the segment /r/, [esxrós], 'obscene'.

(b) two lexical items may be combined: for example, addition of /o/ between the bases /peδ-/ and /pol-/ results in [peδópoli], 'children's town/camp'.

However, as this 'functional' type of epenthesis does not fall inside the scope of the present investigation, we shall not be further concerned with it.

It is another, 'non-functional' form of epenthesis which is of interest in this work, the kind that relates to the addition, word-finally, of the segment [ᵊ], which is linguistically insignificant in Greek though, as we shall see presently, it is distinctive in English.

The phenomenon itself is neither frequently nor systematically observable in the normal speech of Greeks[10] and is, therefore, far from being typical of Greek phonology. It becomes pertinent only when performance of Greek learners in English in the position just mentioned is considered. More specifically, when the final segment of an English word is consonantal, the Greek pupil tends to add the neutral, non-tense vowel [ə] after this consonant; and according to whether the word-final consonant is voiced or voiceless, this epenthetic [ᵊ] is phonetically realized either as fully voiced or as whispered, respectively, as is indicated in the examples on the next page.

(a) [ᵊ] whispered		(b) [ᵊ] fully voiced	
[bʌ́mpᵊ]	bump	[snɒ́bᵊ]	snob
[séntᵊ]	cent	[séndᵊ]	send
[sɨ́ŋkᵊ]	sink	[sɨ́ŋgᵊ]	sing
[snɨ́fᵊ]	sniff	[slívᵊ]	sleeve
[ténθᵊ]	tenth		

This tendency of a Greek to epenthesize [ᵊ] after a word-final consonant in English can be explained if we consider (informally) the syllable structure in the two languages. In English, the great majority of words end in a syllable of the 'closed' type, i.e. with one or more consonants syllable-finally. On the other hand, 'open' syllables, i.e. syllables ending in a vowel, are typical of the Greek phonological structure.(11) So, when a Greek is confronted with an English word ending in one or more consonants, he is inclined to transfer and apply the wrong generalization to this word; and he can only impose the salient condition of 'open' syllables in the phonological system of his mother tongue on the foreign language by epenthesizing a vowel segment (with a non-distinctive value in Greek) at the end of the English word. In other words, when performing in English, the Greek learner puts to operation a very low-level <u>phonetic</u> rule, rule (5), which he does not normally apply when he speaks in Greek. For all practical purposes, rule (5) is limited to word-final obstruents, as is shown below:

(5) $$\emptyset \dashrightarrow \begin{bmatrix} \text{ə} \\ \alpha\ \text{voic} \end{bmatrix} \ / \ \begin{bmatrix} +\text{obst} \\ \alpha\ \text{voic} \end{bmatrix} \ \underline{\qquad} \ {+}{+}$$

i.e. word-finally, the 'neutral', non-tense vowel [ə] (12) is added after an obstruent segment with which [ə] must agree as to voice state.

It must be noted that epenthesization of this sort is more frequent when the (English) word-final consonantal segment is further specified [+stop] than when it receives any other specification.

Now, the pedagogical implications of this phonetic process arise from the fact that although this (non-phonological) kind of epenthesization is non-distinctive in Greek, it can be functional when applied to English words, and may cause serious problems of ambiguity frequently resulting in a break in communication. This becomes an especially sharp pronunciation problem when epenthesization of [ᵊ] is combined with the processes of 'Regressive point-assimilation of pre-consonantal nasals' and 'Progressive voice-assimilation of post-nasal stops' with or without subsequent 'Pre-obstruent nasal deletion'. As an example, let us take the lexical entry /sɨNk/, 'sink', and consider the various phonetic forms it can assume when processed so that it may comply with the demands of the Greek phonological system.

/sɨNk/	is realized as	after application of
i.	[sɨ́ŋkᵊ]	Phonetic rule (5) ('Epenthesis')
ii.	[sɨ́ŋgᵊ]	R-rules (9, 11) ('Regressive point-assimilation of pre-consonantal nasals' and 'Progressive voice-assimilation of post-nasal stops')
iii.	[sɨ́gᵊ]	P-rule (4) ('Pre-obstruent nasal deletion')

However, even more important than the pronunciation problems that may arise from rule misapplication as explained above[(13)] is the fact that the syntactic specification of a great number of English words will be systematically altered (in the surface) when rule (5) above is applied to them.[(14)] This is so because of the important linguistic function [ə] may perform word-finally in English, especially after a consonant; in this position, [ə] may act as:

(i) a <u>comparative</u> marker when added to adjectives or to adverbs, as when

[bɨ́g], 'big', becomes [bɨ́gə], 'bigger', or

[fást], 'fast', becomes [fástə], 'faster'; and

(ii) an <u>agentive</u> marker when added to nouns or to verbs, as when

[kíp], 'keep', becomes [kípə], 'keeper', or

[líd], 'lead', becomes [lídə], 'leader', or

[béɨk], 'bake', becomes [béɨkə], 'baker'.

The multiple ambiguity that can result from this sort of rule misapplication is not always easy to resolve - sometimes even despite the existence of contextual clues.

NOTES TO CHAPTER 4

(1) At the present juncture, it would not be irrelevant to consider the case of the interesting, though pedagogically not problematic, items below, all of which contain the sequence /siN/-final + base-initial sibilant.

	Surface Structure Representation	Phonetic Representation	Gloss
(i)	/siN+sitio/	[sisítio]	mess
	/siN+somos/	[sísomos]	in unison
	/siN+sorevo/	[sisorévo]	I amass
(ii)	/siN+spirono/	[sispiróno]	I wound/gather round
	/siN+sfiŋgo/	[sisfíŋgo]	I tighten
	/siN+stelo/	[sistélo]	I contract
	/siN+skevazo/	[siskevázo]	I pack
	/siN+sxetizo/	[sisxetízo]	I compare

In all the examples above, the application of the 'Pre-obstruent nasal deletion' P-rule (p. 94) is clearly well-motivated. What is not so clear is whether this P-rule operates on some intermediate matrices with /n+s/ sequences arrived at through application of R-rule (9) (p. 73), or with /s+s/ sequences, that presuppose complete assimilation of the nasal, which can be accounted for only by a P-rule.

Two solutions to the problem suggest themselves:

(a) We may allow the appropriate case of R-rule (9), the 'Regressive point-assimilation of pre-consonantal nasals' rule, to effect the assimilation of the point-of-articulation features of the prefix-final nasal to those of a following base-initial obstruent, and thus to have

/siN+sitio/ ----> /sin+sitio/ , etc.

and then to submit the output from R-rule (9) /sin+sitio/ to a special instance of the 'Pre-obstruent (here, pre-sibilant) nasal deletion' P-rule (4), p. 94, which will delete the nasal obligatorily

$$[+\text{nasa}] \dashrightarrow \emptyset \ / \ \underline{\qquad} + [+\text{stri}]$$

thus yielding

Surface Structure Representation	Output from R-rules	Output from P-rules
/siN+sitio/	/sin+sitio/	/sisitio/

and similarly with the examples above.

(b) Alternatively, we might permit the obligatory 'Pre-sibilant nasal deletion' P-rule to apply directly to such surface structure matrices, i.e. without the intervention of R-rule (9), in which case we would have

Surface Structure Representation	Output from P-rules
/siN+sitio/	/sisitio/

and the like.

Of the two solutions, the former seems more plausible and general as we will have to have R-rule (9) in the phonology anyway - for example, to take care of cases like

Surface Structure Representation	Phonetic Representation	Gloss
/eN+fialono/	[emfialóno]	I bottle
/eN+vaðon/	[emvaðón]	area (geom.)
/eN+θimio/	[enθímio]	souvenir
/eN+ðiksi/	[énðiksi]	indication
/eN+simo/	[énsimo]	stamp
/eN+zimo/	[énzimo]	yeast
/eN+xorios/	[eŋxórios]	local
/eN+γamos/	[éŋγamos]	married

where the nasal segment of the prefix /eN/ assimilates to a following base-initial non-stop obstruent consonant (whether strident or not) - though the nasal is not deletable in this case.

A third possibility is that recorded in note 3 below whereby the nasal is assimilated completely to the following sibilant - presumably by force of a P-rule - and the sequence /s+s/ so obtained is then submitted to the 'Identical-consonant cluster simplification' P-rule (1), p. 88. Notice, however, that, in addition to the reasoning just outlined regarding preference of procedure (a) to procedure (b) above, this solution is costly as it involves a P-rule, one that describes a feature-changing, not a feature-filling-in operation.

The handling of prefix-final /N/ + base-initial sibilant sequences seems to be a morpho-tactic idiosyncrasy of the language. As this phonological area does not present any difficulty to Greeks learning English, we shall confine ourselves to just posing the theoretical problem and proposing the above tentative treatment.

(2) See chapter 2, note 29, p. 46.

(3) See Chomsky & Halle, 1968: 148, 222.

According to another interpretation of the process of consonant-cluster simplification, the first consonant is assimilated completely to the second and then one of the now two identical consonants is lost. (Warburton, 1970; Newton, 1972) Whichever interpretation is preferred, it has no bearing on the simplification process under consideration.

(4) For a detailed argumentation of the case for English, see Chomsky & Halle, 1968: 46-8, 148-49, 221-22, and elsewhere.

(5) See Chomsky & Halle, 1968: 222.

(6) Cf. note 5 above.

(7) In Spring, 1970, a preliminary experiment was conducted in Thessaloniki by the present writer. The thirty participants were all Third Year students of the Department of English and were all Thessalonikians. The object of this experiment was to find how Greeks processed items with Greek $[+\text{nasa}]\begin{bmatrix}+\text{obst}\\+\text{stop}\end{bmatrix}$ and $[+\text{stri}]\begin{bmatrix}+\text{cons}\\+\text{voic}\end{bmatrix}$ sequences in them. The experiment was divided in two parts: first the students were given sheets with extracts (from Kazandzakis's "Alexis Zorbas", and Palamas's "O Tafos", 'The Grave') containing the critical sequences; they were asked to read them out in a 'natural' way; second, the students were asked a number of questions in Greek the answers to which (also in Greek) all contained the sequences in question. In both phases of the experiment their performance was recorded. The results showed that (a) all students voiced the stop after the nasal, and (b) all students voiced the sibilant before a voiced consonant; the results also indicated that the overwhelming majority of students consistently dropped the nasal before the stop (they had previously voiced).

No statistical evaluation of these experimental results appear in this thesis.

(8) At various places in this thesis it has been suggested (in a rather vague manner that interference of the pupils' mother tongue in learning the foreign language is caused by transfer and misapplication of Greek rules to the English phonological system. However, it has not been explicitly stated just at what point the basic error occurs. The postulated process is, in fact, as follows:

First, the Greek learner processes the correct English input (i.e. the actual speech signal) by applying rules of Greek perception; next, he stores the incorrect form he has so produced in his own lexicon of 'English', a lexicon that follows the Greek patterns; finally, in production, he applies Greek phonological (and phonetic) rules to this incorrectly decoded and stored 'lexical form'. So once he has made an error in perception, he is committed to subsequent error in production, as he has got the wrong 'lexical' entry to operate on. To take the example in the text:

On HEARING the English word [ɨgzámpl], the Greek learner decodes it as *[ɨgzá(m)bl] and enters it in his lexicon as */ɨgzaNPl/, i.e. in accordance with the Greek pattern.

When PRODUCING the word, he operates not on the correct English input /ɨgzampl/, but on the item he has erroneously stored in his lexicon, i.e. on */ɨgzaNPl/: it is to this form that he applies the Greek R-rules (9) and (11), which yield */ɨgzambl/, and, optionally and subsequently, the Greek P-rule (2) that produces */ɨgzabl/, ultimately *[ɨgzábl].

(9) See Newton, 1972: 116.

(10) See also chapter 5, note 11, p. 128.

(11) See Setatos, 1969.

(12) With regard to the phonetic specification of [ə], the reader is referred to Chomsky & Halle, 1968: 59, note 1; 85, note 34; and 245, note 7.

(13) See also note 8 above.

(14) Note that, as the following examples show, the semantic specification of a great number of items may also be affected owing to such epenthesization; thus,

[lɨ́t] , 'lit', becomes [lɨ́tᵊ] , 'litter/litre'

[mít] , 'meet/meat', becomes [mítᵊ] , 'metre'

[síd] , 'seed', becomes [sídᵊ], 'cedar'

and so on.

P A R T T W O

EXPERIMENTAL

CHAPTER 5

DESCRIPTION OF THE EXPERIMENT

1. Aim

The general aim of this experiment is to find out how Greek learners hear and vocally produce consonantal segments and segment sequences intra- and inter-morphemically within **the phonological** word.

This operation was undertaken to provide support for some of the claims postulated in the theoretical part of the present thesis. One important point should be emphatically made here: 'support' should by no means be taken to imply 'proof'; no amount of statistical information can prove or disprove a theory; such information can, nevertheless, be useful as an indication of the validity of the predictions made within some theoretical framework.

The hypothesis underlying the whole experiment is that:

Greek learners of English make more, and more persistent, errors when

(a) either the input to a relatively high-level rule or the rule itself or both occur in one of the languages being compared but not in the other, and

(b) low-level rules determining the phonetic realization of utterances differ in the two languages.

This hypothesis, which concerns all six sections of the experiment, has the following corollaries:(1)

(i) If one or more rules of the set of rules that characterize the possible segments or segment sequences occur in English but not in Greek, or not in the same environment in Greek, Greek learners may fail to observe such rules when performing in English, this failure being demonstrable experimentally.

(ii) If a phonological sequence, common to both languages, serves as the input to a rule which is in some respects different in Greek from its English counterpart, Greek learners of English may be expected frequently to transfer and misapply the Greek rule to the English phonological system, this transfer and erroneous application of rules being reflected experimentally in the amount of error observed in the learners' performance.

Note that with regard to (i-ii) above the converse statement can also be made: in cases of complete input- and rule-identity, these learners may be expected to transfer correctly application of a Greek rule or set of rules to the English phonological system. This statement too should be subject to experimental validation.

The extent to which the results obtained 'justify' the assumptions made in Part One is discussed in chapter 6.

2. The Subjects

The participants in the experiment were First and Second Year students at the Department of English, The University of Thessaloniki; they had received a minimum of four and a maximum of seven years of instruction in English prior to their entering the university, with an average of four fifty-minute periods per week. It follows that not being naive in English, they made fewer mistakes than they would have made had they been complete beginners, as ideally the case should have been; this is a point that ought to be constantly borne in mind in the evaluation of the experimental results in chapter 6.

It was only owing to technical difficulties that subjects of this particular level of achievement were selected: it would have been practically impossible to conduct the experiment under reasonably controlled conditions with any other population; practical problems such as recruiting the right people (Thessalonikians), gathering them together for the administration of each of the six sections of the test would have been insurmountable. As far as the present subjects are concerned, however, recruitment was not a serious problem as they were fairly easily accessible.

While the subjects were by no means naive, their linguistic sophistication should not be exaggerated. They were deliberately chosen from among the poorest students in the Department of English in the belief that they still made mistakes typical of a Greek learner of English. To be measured, error has to occur; an experiment with subjects better trained in English would not have 'proved' anything in this case.

Selection of the population was made as follows: all students belonging to the lower four (out of six) groups in the First Year, and all students belonging to the lower five (out of eight) groups in the Second Year were given a questionnaire to complete. This questionnaire included questions relating to (a) the students' own immediate environment (origin, place of living and education of their parents and, where applicable, of their brothers and sisters), (b) the educational and cultural background of the students (birthplace, place where they received their schooling, proficiency in the mother tongue), and (c) the students' previous training in English and any other foreign language (where and for how long they had been taught the language, which books they had used, name of the - invariably privately run - 'institute' they had attended). Finally, the students were asked whether or not they would be willing to help by taking part in an experiment I was conducting. To their queries as to the nature of the experiment, general, vague, and for the most part misleading answers were intentionally given; this was considered necessary so that the purposes of the experiment could be disguised later.

Two hundred and twenty-eight students in all filled and handed in their questionnaires - this part of the operation was also voluntary. Of these, sixty-five students were selected on the basis of two main criteria: (i) knowledge of English, and (ii) whether or not they had been residents of Thessaloniki and area for the best part of their lives. Criterion (ii) was, in fact, of vital importance as the phonological description in the theoretical part of this thesis is based on the speech of the writer, who is a Thessalonikian by birth; so if such observations as were made in Part One could be substantiated by other speakers of the same speech community, this would lend greater validity to the descriptive statements made than would otherwise have been possible.

In an effort to secure maximal subject suitability, the next step taken before the final selection was to consult those of my colleagues in the Department who taught these particular students and had formed some idea of their actual language behaviour in class. This led to the final selection of thirty-six students, twenty-three from the First and thirteen from the Second Year. Of these, all thirteen Second Year students and seventeen First Year students appeared in all the phases of the experiment. Accordingly, only these thirty subjects' performance was considered in the evaluation of the results in chapter 6.

3. Experimental conditions

Originally, the auditory perception part of the experiment was planned to be conducted collectively for all the subjects in the thirty-six-booth language laboratory of "Anatolia College", a Greek-American high-school in Thessaloniki. Owing to financial and other technical difficulties, however, this idea had to be abandoned and the next best solution had to be chosen: the experiment was still collectively administered at the Polytechnic School language laboratory; at the time, this was just being installed; there were enough students' desks to accommodate all the subjects, but with no partitions yet installed there were no actual booths; no individual recorders, earphones, etc. were in operation yet. So transmission of the stereo-taped(2) material was done through a Hi-Fi, Stereo, AKAI recorder, amplifiers and two loudspeakers. And although that was not a really sound-proof room, various devices (e.g. curtains on the windows) were used to minimize external interference. Also the time of the experiment was so chosen as to guarantee minimal noise in and near the premises.

All these measures produced very satisfactory results: subjects' aural perception was not hindered by any external noise; they could all hear the material transmitted very distinctly.

The vocal production part of the experiment was planned to be - and was - individually delivered. Ideally, each subject should be interviewed in a regular recording studio, or, short of this, in an adequately insulated room. For lack of both these alternatives, however, a relatively quiet room in the Department had to be used. (See also section 4.2 below) In spite of the unfavourable effects that it may have had, this solution - imposed though it was on the experimenter - had one beneficial effect: its 'informality' contributed to a more natural performance on the part of these subjects who would most probably have been 'machine-awed' in a studio.

All the recordings were done on the Departmental Hi-Fi, Stereo tape recorder, the Grundig TK 46 model, at a speed of 9.5 cm/sec. Two multi-directional microphones were used, one for the subject, the other for the experimenter; so all recordings were stereo ones.

4. Administration of the experiment

Part I and Part II of the experiment dealt with subject aural perception. Of these, Part I was administered on December 2nd, 1971, and both Sections of Part II followed on December 7th. Part III (Sections I, II, and III), which was concerned with subject vocal production, started on the 8th of December and was finished exactly one week later.

Throughout the conduct of the experiment special attention was given to the psychological factor of putting the subjects at their ease as far as was possible. In addition to measures 'locally' taken in the various Sections, points such as the following were generally observed:

- informality at first meeting when the general procedure was outlined to the subjects
- congenial, informal tone at all meetings and subsequent interviews
- personal interest in their studies
- 'small talk' about the weather, etc. - particularly in the case of Part III
- offer of refreshments or of a cigarette.

4.1 Parts I and II

At all times the experimenter was controlling transmission. Each time the subjects had to turn to a new page the tape was, naturally, stopped for a few seconds. They had been told that they could use any kind of writing device - pens, ball-point pens, felt pens, pencils. All subjects worked at the same pace and their performance per answer-sheet page was timed as indicated below.

4.1.1 Part I (Instructions page plus eight-page answer-sheet).

Date: Dec. 2nd, 1971.

Started at 10:45, finished at 12:42. (Instructions: 10:45 - 10:55)

The subjects heard the instructions (in Greek) on tape along with the examples; at the same time they were asked to read them from the front page attached to their answer-sheet.(3) When all questions had been asked and answered, they were instructed to turn to page one of their answer-sheet.

	started at	finished at
page 1	10:55	11:05
page 2	11:06	11:18
page 3	11:19	11:31
page 4	11:32	11:44

There was a sixteen-minute break at this point; the subjects were offered refreshments and sandwiches, they had a smoke; then the room was aired, after which they resumed their work.

page 5	12:00	12:11
page 6	12:11	12:21
page 7	12:22	12:34
page 8 (a half page)	12:35	12:42

4.1.2 Part II

(a) Section I (Instructions page plus five-page answer-sheet).

Date: Dec. 7th, 1971

Started at 12:30, finished at 13:38. (Instructions: 12:30 - 12:36)

The subjects heardthe instructions on tape along with the examples; at the same time they were asked to read them from the front page attached to their answer-sheet.(3) When all questions had been asked and answered, they were instructed to turn to page one of their answer-sheet.

	started at	finished at
page 1	12:36	12:47
page 2	12:47	12:59
page 3	12:59	13:10

There was a five-minute break at this point.

	started at	finished at
page 4	13:15	13:26
page 5	13:26	13:38

At this point there was a ten-minute break for refreshments . after which the subjects proceeded to

(b) Section II (Instructions page plus one-page answer-sheet).

Date: Dec. 7th, 1971.

Started at 13:50, finished at 14:14. (Instructions: 13:50 - 14:00)

The subjects heard the instructions on tape along with the examples; at the same time they were asked to read them from the front page attached to their answer-sheet.(3) When all questions had been asked and answered, they were instructed to turn to their answer-sheet.

	started at	finished at
page 1	14:00	14:14

4.2 Part III

Owing to the difference in aim (vocal production) and construction, the three Sections of Part III of the experiment were administered differently from the first two Parts. Each subject fixed his/her own time and day for the interview and stayed with the experimenter for a maximum of ninety minutes. A relatively quiet room was chosen in the Department of English for this operation and although traffic noise could occasionally creep in, this was never a distracting factor on the subjects' performance as all they heard this time was a Greek word or sentence (which could not possibly be misunderstood) which they had to render in English.(4) The lack of a regular sound-proof recording studio, however, did have some effect on the quality of the tapes so produced. This in its turn made judgement of subjects' vocal production a little more difficult than it would otherwise have been. Nevertheless, this problem was quite satisfactorily met by giving the three Judges more 'training'. (See section 6.2 below.)

Each subject did all three Sections of this Part in their numerical order. The subject began each section by listening to the prerecorded instructions and at the same time reading them from a specially prepared sheet which was given to him/her. As in all Sections of all Parts, the instructions included two examples done for the subject (on both tape and paper) and also six 'training examples' they themselves had to do before actually attempting the experimental material.

After questions, if any, had been asked and answered, the subject was presented with the material in each Section as follows: the experimenter said first the number of each item and then the

Greek word (for Section I) or sentence (in Section II) was read by him, after which the subject gave the English equivalent of the Greek item. All of this was recorded. Naturally, all items were consistently presented in the same order - their numerical one.

Following is an indication of what interval times were observed:

Number + 1 sec. + time for Greek word/sentence + whatever time the subject needed for thinking(5) + subject rendering in English + 4-5 secs; then the next number followed.(6)

Subjects who had never before made recordings of their own voice appeared to be a little nervous at the beginning. To give them some of the self-confidence they lacked, the experimenter played back to each of them the recording of the first twenty items. This was an additional measure in the effort to put the subjects at their ease - and it worked very satisfactorily: subjects became less stiff and their voices ceased being hesitant and 'creaky' thereafter; this effect was audible as well as visible.

In cases of memory failure, the experimenter helped the subject to remember the English version of a Greek word/sentence - mainly by providing the word/sentence in its written form. When a rendering was not heard clearly enough to be unambiguously rated by the judges, the subject was asked to repeat 'faster' or 'louder'.(7)

The time taken by each subject to complete performance in the three Sections of Part III could not possibly be standardized under these circumstances. However, it never dropped under seventy minutes and never exceeded ninety minutes,(8) depending on such factors as subject memory capacity, ease and speed of articulation, and a number of various interruptions and repetitions.

5. Description of the experimental materials

As stated earlier,[9] the chief object of this experiment was to find out whether and to what extent predictions made on the basis of the phonological analysis drawn in Part One of this thesis received any empirical justification under reasonably controlled experimental conditions. Put more simply, the aim was to find out how Greeks learning English hear and vocally produce English consonantal segments and segment sequences, the latter occurring both within and across morphemes - always inside the phonological word.

The experiment was focused in particular on certain pedagogically interesting instances of transfer and (mis)application, by the Greek learner, of a number of Greek rules to the English phonological system. Specifically, the following phonological (and, in 4 below, phonetic) phenomena were put to test:

(1) Appication of the Greek rule governing 'Progressive voice-assimilation of post-nasal stops' to English words. This R-rule assigns the feature 'voiced' to English items with the result that Greek learners frequently misperceive and mispronounce words like bumper as *[bʌ́mbə].
Cf. discussion in chapter 3, pp. 76-9.

(2) Application of the Greek 'Pre-stop nasal deletion' P-rule that causes nasality to be dropped before voiced (oral) stops. Here, Greeks are inclined to misperceive and mispronounce English words like tend (or tent; see previous rule) as [téd].
Cf. discussion in chapter 4, pp. 89-94.

(3) Application to English of the Greek 'Regressive voice-assimilation of pre-consonantal sibilants' R-rule, by force of which the feature 'voiced' is assigned to the archi-segment /S/[10]

before voiced consonants. In this case, the Greek learner generally misperceives or mispronounces English words like small as *[zmól].

Cf. discussion in chapter 3, pp. 57-64.

(4) Application to the English system of the Greek phonetic rule(11) of 'Epenthesis' which adds a [ə] after a word-final stop. For example, Greeks often hear or say *[séndə] instead of the correct [sénd], 'send'.

Cf. discussion in chapter 4, pp. 94-8.

Finally, and rather marginally, application of a rule of the following form is tested

$$[+\text{obst}] \dashrightarrow [-\text{voic}] \;/\; \underline{\quad\quad} \# \# \quad (12)$$

which, in fact, states that word-finally the feature 'voiced' is neutralized in true consonants.

5.1 Before beginning to examine the actual organization of the materials in the experiment, a number of points should be stated clearly.

(a) In Part I the items were pronounced by Prof. I.E. Jago, Director of the British Council, and head of the Department of English, The University of Thessaloniki. Prof. Jago is a native speaker of English with an R.P. accent.

(b) In both Sections of Part II the items were pronounced by the experimenter, a native speaker of Thessalonikian Greek, in a fully randomized order. Every effort was made to vary only the critical sequence and keep the rest of the environment not only constant but also as 'English' as possible. This took a lot of rehearsing to accomplish.

(c) In all Parts and Sections all items and all repetitions of items were presented in a fully randomized order.

(d) With very few exceptions, which do not affect the validity of the results in any way, each item was presented to the subjects four times.

(e) Whenever the same instructions applied, items demonstrating different phenomena and operations were placed in the same Section. This was considered a necessary measure in further disguising from the subjects the object of what was being tested in each Section.

(f) To ensure complete comprehension of what the problem was each time, instructions were phrased in Greek.

With these points in mind, the organization of the experimental material can now be considered per Part and per Section.

5.2 Part I

This Part has three different functions:

(a) It examines cases of complete matching in the phonological systems of Greek and English in the sense that the two segments considered in each case occur in both languages and in the same positions; with the partial exception of /s, z, r/ (cf. chapter 2, note 5, pp. 43-4), these segments (placed in words which are provided in minimal-pair form but are randomized in the actual experiment) receive identical feature specification in the lexicon except for one feature value which is different each time; i.e. the critical segment may have, for example, the feature [+voiced] in one of the members of the pair and the feature [-voiced] in its 'partner' member, as in vine vs. fine; or the value of the feature 'peripheral' may be contrasted, as in mine vs. nine; etc.

This Section of Part I is meant to function as control for assessing deviations from it in either direction.

Such items in the test are: 1-28, and, taking /h/ to correspond to Greek /x/, and /w/ to /γ/, 29-32, and 53-64, inclusive. (Cf. Appendix A, Part I, 'Student Training Sheet', pp. 201-202)

(b) It examines cases lying outside the matching area of the two phonological systems in that, although the consonantal segments tested are identically specified in Greek and English (except for /s, z, r/), they are considered in environments possible in English but impossible in Greek. In such cases a significant opposition word-finally in English is considered neutralized in Greek, as explained by the last rule given in section 5, p. 115 above; for example, *cap* vs. *cab*.

Such items in the test are: 65-102. (Cf. Appendix A, pp. 201-2)

(c) It examines cases which again lie outside the matching area of the two systems in that, while both the critical segments involved in each pair occur in English phonology and are contrasted as to the specification of one feature, only the segment in the first member of the pair exists in Greek. For example, the initial segments in *sake* and *shake* are contrasted only in the value of the feature 'anterior' in English, /s/ being specified [+anterior], and /š/ being marked [-anterior], all their other features being identical and identically specified.[13] The 'special' case of oppositions in *affricates* is also (peripherally) included here but interest in them is rather academic, as affricates are not treated in Part One of this thesis; for example, *cats* vs. *catch*.

Such items in the test are: 33-52 and 103-129, inclusive. (Cf. Appendix A, pp. 201-202)

5.3 Part II

5.3.1 Section I

The aim of this Section was to test both intra- and inter-morphemically how

(a) nasal + stop , and

(b) sibilant + voiced consonant

sequences are heard by Greek learners of English.

There were some double and a number of triple items in that part of this Section which dealt with sequences like (a) above. In the double items the first member, involving a nasal + voiced stop sequence, was pronounced in the normal way, while the second member was pronounced without the nasal; as has been stated, the rest of the environment was kept constant each time. For example, ambassador was pronounced:

(i) [æmbǽsədə] and (ii) [æbǽsədə].

The nasal was deliberately dropped to form a basis for testing the extent of transference of application of the 'Pre-stop nasal deletion' P-rule (cf. p. 91) into English.

Triple items had a nasal + voiceless stop English sequence in the first member; in the second member, however, the Greek rule that governs 'Progressive voice-assimilation of post-nasal stops' (cf. p.77) was assumed to operate, so the rendering included a nasal + voiced stop sequence, but was otherwise 'good' English; in the third member the results of subsequently dropping nasality (cf. p. 91) were tested. For example, empirical was pronounced:

(i) [empɨ́rɨkəl] (ii) [embɨ́rɨkəl] (iii) [ebɨ́rɨkəl] .

In cases like (b) above a different point was tested: whether and to what extent the Greek rule that assings [+voiced] to an underlying sibilant before a voiced consonant is transferred and applied to

English words containing the sequence sibilant + voiced consonant. For example, disgrace was pronounced:

(i) [dɨsgréɨs] (ii) [dɨzgréɨs] .

5.3.2 Section II

Although extremely important from a pedagogical point of view, this Section is of relatively secondary significance if considered in the framework of the restricted aims of this thesis. Its overt objectives are (a) to support the assumption that (because of the Greek tendency for 'open' syllables) Greek learners are inclined to epenthesize a [ᵊ] after a nasal + stop sequence word-finally by applying the phonetic rule (4) on p. 96 above; thus, for example, bump was pronounced:

(i) [bʌ́mp] (ii) [bʌ́mpᵊ] ;

and (b) to provide some explanation for the ambiguity resulting from transfer and application of rule (4) just mentioned to the end of English words. (Cf. discussion on pp. 94-8) To test application of this rule, bump, for example, was used to demonstrate a threefold contrast:

(i) [bʌ́mp] (ii) [bʌ́mpᵊ] (iii) [bʌ́mbə].

Indirectly, however, and somewhat redundantly, this Section was meant to further support conclusions of the sort expected in the respective part of Section I through such oppositions as:

(i) [bʌ́mp] (ii) [bʌ́mpᵊ] (iii) [bʌ́mbᵊ] .

Incidentally, it should be noted that problems like that in bomb and bomber, and, perhaps to a lesser degree, in sing and singer are of a different order, owing to the influence of orthography exerted on the subjects. (Cf. chapter 6, note 13, pp. 195-98) This influence of orthography on both auditory perception and vocal production raises another point, which need not, nevertheless, be pursued here, viz. that ideally the subjects should not be familiar with the spelling of the foreign language whose phonology is tested against that of their mother tongue.

5.4 Part III

Part III, the vocal production part of this experiment, consists of three Sections. Sections I and II are concerned with exactly the same points as those tested in Part II, Sections I and II, i.e. the voicing of a voiceless stop immediately following a nasal, and the voicing of a sibilant immediately preceding a voiced consonant.(14) In Section I this is done through words either provided in minimal-pair form but randomized in the experiment (e.g. tent vs. tend) or unrelated to other words (e.g. smoke); whereas in Section II the same phenomena are observed across morphemes in sentences (e.g. He came in person. or This voice sounds familiar.). Section III deals additionally - and perhaps a little redundantly - only with sibilant + voiced consonant sequences across morphemes in sentences (e.g. This desk is mine.); this is disguised as an 'insert-the-right-demonstrative' exercise.

6. Judging subject performance

6.1 In Parts I and II the subjects' performance was judged objectively in the sense that responses could be rated (by the present writer) either 'right' or 'wrong'.

More specifically, in both Sectionsof Part II the subjects were asked to indicate whether they considered each item they heard absolutely English or whether they thought it had some foreign traces in it, marking it accordingly on specially prepared answer-sheets. (See sample page of answer-sheet in Appendix A, p. 223)

In Part I the procedure for rating was essentially the same, only this time the subjects heard an English word which was in effect one of the members of a 'minimal pair' and they had to associate this word (by marking in their answer-sheet) with one of two Greek words - the one they regarded as the correct rendering of the English word they had just heard. The other Greek word on their answer-sheet translated the unheard member of the minimal pair; at another point in this test the subjects did in fact hear this second member of the pair and were naturally presented with the same Greek translations in the same order. To make this clear: the students heard, for example, [pén], 'pen', and on their answer-sheet they could see the translations πέννα and Μπέν , ('pen' and 'Ben' being the relevant minimal pair) and they had to indicate their response by encircling πέννα the translation for 'pen'; then, at some other point in the same test, they heard [bén], 'Ben', and on their answer-sheet they could see again the words πέννα and Μπέν , only this time the correct response would be to encircle Μπέν . (See Appendix A, pp. 203–16) The choice on the subjects' part was, then, always a matter of "either ... or".

The amount of subjectivity involved in this kind of decision-making could not be and was not taken into account in assessing subject performance: the scorer went only by responses as marked in each individual's answer-sheet.

6.2 In Part III, the subjects' vocal production could only be rated subjectively. Each of the three judges on the panel heard on tape and assessed (on specially prepared Judges' Rating Sheets. See Appendix A, pp.234 ff.) each subject's performance, item after item, Section after Section. Judgement was absolute in the sense that responses were rated either 'Acceptable' or 'Unacceptable'; if degrees of acceptability had been considered, they would have had to be rigorously established beforehand, a practical impossibility in the circumstances.

Several measures were taken, however, in an effort to reduce judgement subjectivity thus increasing judgement reliability:

(a) Three judges, instead of one, were used.

(b) All three judges were given simultaneously a fairly long 'training session' with the experimenter on materials carefully selected from among those recorded by the subjects. Two tapes were used in this session: (i) an ear-training tape: here the judges were just exposed to student vocal production of varying degrees of correctness randomized on tape; and (ii) a rating-practice tape: here the judges heard a second set of performances <u>and</u> were requested to rate them on an 'acceptable' - 'unacceptable' basis. Both tapes were frequently stopped, whenever one or more of the judges wanted to ask the experimenter a question or to discuss the impression an item made on them. It was after considerable agreement among the judges had been reached that they started actually rating regular responses on the tapes.

(c) Each of the judges worked separately so that one judge's opinion was not allowed to influence another's thus contaminating assessment.

6.3 The particular procedure of eliciting subject responses adopted here was arrived at after careful examination of the alternatives in testing that this writer is familiar with. Technical considerations also influenced this decision - e.g. the fact that, although selected from among the poorest students in the Department, the subjects were not naive in English.

6.3.1 <u>Aural Perception</u>

(a) The popular 'Same' - 'Different' technique was considered but discarded because it would most probably prove nothing.

Discrimination between (but not necessarily identification of) two minimally different forms would be too easy a task even in the case of entirely naive subjects, this excessive ease making the reliability of the procedure questionable. What intensifies this argument is the fact that only phonological, not finer phonetic distinctions (like aspiration and length), were under examination here. In constructing the materials, the guiding question was always, "Can the subjects identify a sound even and especially in the absence of its contrasting counterpart?"

(b) Identification can be effected either (i) by introducing orthography of the English word, or (ii) by introducing meaning. (The temptation of having students identify by using visual aids, attractive though it was, had unfortunately to be resisted chiefly for financial and administrative reasons.) The disadvantages of (i) are obvious: English spelling would inevitably interfere with auditory impression coming from the tapes. (Cf. chapter 6, note 13, pp. 195-98) Biased by orthography, the subjects would THINK they heard a certain sound; at the very least, this would confuse the subjects thus invalidating the results of the experiment. In (ii), on the other hand, the interfering factor, i.e. orthography, is absent. And teaching meaning to subjects such as these was no problem; it generally meant refreshing their memory.

6.3.2 <u>Vocal Production</u>

In addition to the alternative solutions mentioned in the previous section, the following were also examined.

(a) <u>Mimicry</u>. Its main disadvantage is that it lacks spontaneity as well as any form of 'originality'. The subject just repeats, or tries to repeat, what he hears the model voice say. But what was being tested here was not the subject's ability to reproduce a model word that he heard; it was rather his ability to produce the word or sentence <u>unaided</u>. Thus, if adopted, this technique would have defeated the purpose of the experiment.

A further shortcoming of this procedure is that it is always accompanied by <u>learning</u> during the experiment. The amount of this learning is not easy to determine and in any case contaminates the results.

(b) <u>Visual Aids</u>. Evoking vocal production from the subjects by the use of visual aids would probably present fewer administrative difficulties in this case than in the case of aural perception (cf. previous page); but the essential objection to the technique, viz. the cost involved, would still remain.

It should be noted in passing, however, that this procedure in testing is related to and an improvement over the 'translation' method: they both introduce meaning into the experiment. Of the two, the more economical had to be selected.

(c) <u>Passage</u>. Getting the students to read from a specially prepared passage incorporates, perpetuates, and intensifies all the disadvantages of the contaminating influence of orthography that were listed earlier (cf. previous page; also chapter 6, note 13, pp. 195-98). Accordingly, it was also discarded as a testing technique.

(d) Ideally, the only alternative would be to record subject production without <u>trying</u> to elicit the desired responses. But then the subjects (i) should be unaware of the fact that their performance is being recorded, (ii) (and this follows from condition (i)) should have no idea of what the test is really all about, and (iii) might never produce what one expects them to produce.

It can be argued that if they knew precisely what was expected from them and if they were placed in the right situations, the subjects would sooner or later emit the response the experimenter is after. However, the experience gained from the preliminary experiment conducted by this writer in Thessaloniki in spring, 1970 contradicts this; various factors can and do influence the subjects' performance: excessive carefulness, self-consciousness, hesitation in production, all tend to render invalid the results of observation and judgement, especially when phonological phenomena across morphemes are being considered.

7. Subcategorization of materials - Appendices

7.1 Subcategorization of materials

For reasons stated in section 5.1.e, p. 116 of this chapter, whenever the same instruction applied, items meant to demonstrate quite distinct phonological phenomena were lumped together into one Section or Part in the actual administration of the test. For the statistical evaluation of the obtained results, however, this practical but crude grouping of the materials would be meaningless. For this latter purpose each Section of each Part of the experiment had to be broken down into sub-tests on the basis of the different function each item in each such sub-test performed - according to the original design arrived at partly through the conclusions of the theoretical analysis in Part One of this thesis and partly through the writer's teaching experience. To take an example: all items containing a <u>nasal</u> + <u>stop</u> sequence <u>within</u> morphemes were placed in one sub-test, while those containing the same sequence but <u>across</u> morphemes were grouped separately; in this way a meaningful comparison of the subjects' performance in the two sub-tests could be made.

However, both theory and experience demanded that finer sub-classifications of the materials be made: for example, items containing nasal + stop sequences had to be further subdivided into items with nasal + voiced stop sequences and those having nasal + voiceless stop sequences, as the relationship of subject performance in these two cases is of some theoretical interest; and so on.

Once the various crude and finer categories had been set up, the behaviour of the subjects in each one of them had to be assessed and properly recorded. This was done in two ways per test or sub-test: first, total scores for thirty subjects were entered against the relevant items, i.e. there were as many rows with the respective scores as items in a test; and second, the score each subject got in the totality of the items in a test or sub-test was also recorded, i.e. all listings of the latter type had thirty rows, one for each subject, with the columns giving the score of each subject in a particular sub-test.

One point must be stated clearly: in all cases it was ERRORS, not correct responses, that were counted. This was an arbitrary decision of convenience as, in the greater number of the items, fewer errors were expected to be (and were) made than correct responses to be given; the decision, however, does not in the least affect the validity of the statistical analysis made or the conclusions reached.

7.2 Appendices

All the materials used in the experiment as well as the Tables with the relevant scores (and means) have been arranged in two Appendices.

7.2.1 Appendix A (pp. 200-250) contains per Part and Section:

(a) Parts I and II - Aural Perception (pp. 201-226)

(i) Student Training Sheets.
(ii) Master/Subject Instructions Sheets.
(iii) Master Sheets with all the materials as administered.
(iv) Subject Answer-Sheets.

(b) Part III - Vocal Production (pp. 227-250)

(i) Student Training Sheets (except for Section III).
(ii) Master/Subject Instructions Sheets.
(iii) Master Sheets with all the materials that were recorded in the form they appeared in the test.
(iv) Judge's Instructions Sheet (valid for all three Sections).
(v) Judge's Rating Sheets, which contain the correct responses expected of the subjects.

Additionally for Section III of this Part there are also 'Auxiliary Answer-Sheets' to help the students to silently fill in the existing blank and subsequently read out the completed sentence. These are essentially the same as the Judge's Rating Sheets, only the gaps in the sentences are left blank and there are naturally no concatenation marks and no blank lines for rating in the Students' Auxiliary Answer-Sheets.

Appendix A does not include any scores.

7.2.2 Appendix B (pp. 251-286) contains fourteen (14) double Tables with data relating to the various sub-tests in the finer sub-classification of problems and materials, as follows:

(a) The first of each pair of tables (e.g. Table 1) presents in rows the items in the sub-test in question as explained in section 7.1 above; it also givestotal and mean scores[15] per type of sub-test. Symbols standing for the various sub-tests are briefly glossed.

(b) The second table in each pair (e.g. Table 1a) presents in thirty rows each subject's scores as explained in section 7.1 above.

NOTES TO CHAPTER 5

(1) It is important to remember the empirical fact that in cases of similarity one is led to expect identity and vice versa.

(2) Ideally, all the items in the 'Aural Perception' part of the experiment (i.e. Parts I and II) should have been synthesized so that a number of factors that might give away the correct response e.g. 'personal voice-quality', some unavoidable emphasis on critical points in the articulation of items, etc.) could be controlled and eliminated. However, owing to the excessive amount of the experimental materials, this was considered too ambitious a scheme to indulge in, so the mere thought of it had to be resisted.

(3) See ΟΔΗΓΙΕΣ ('Instructions') in Appendix A, e.g. pp. 203-204.

(4) Prior to starting the experiment, all subjects were given specially prepared 'Student Training Sheets' which contained all the materials per Part and per Section (there was no such sheet for Section III, Part III). These sheets contained (for Parts I and II) all the English words and their Greek translations, and (for Part III) all the Greek words/sentences and their English translations. See 'Student Training Sheets' in Appendix A.

(5) Almost invariably under 1 sec.

(6) For economy of tape, the Greek word/sentence was later erased and interval times were considerably shortened in 2/3 of the tapes made. These tapes were then reproduced in this 'economy' form.

(7) This was for disguising the real aims of the experiment.

(8) This does not include the two five-minute breaks between Sections.

(9) See section 1 above; also chapter 1, pp. 2-5.

(10) See chapter 4, note 8, pp. 101-102.

(11) This is a 'latent', very low-level phonetic rule in the sense that although it reflects an intuitive generalization concerning 'openness' of syllables (cf. chapter 4, p. 96), it is not observed in the speech of most Greeks; the only evidence of application of such a rule is to be found in foreign imitations and certain very careful and emphatic articulations - mainly in the speech of radio and TV newscasters. For instance, the commentary in Greek on the rescue of the 'Apollo 16' space capsule was irritatingly full of epenthesizations of this sort.

The rule, however, was included here to satisfy inter-language comparative needs as it clearly becomes operative in the case of Greeks performing in English.

(12) A rule of this form would be vacuous in the phonology of that version of Greek which is examined in this thesis as there are no word-final consonantal segments other than [n] and [s]. Nevertheless, it is very helpful for comparative purposes. Cf. chapter 6, pp. 142, 144-45.

(13) If, following Chomsky & Halle (1968), we require that the same set of features be used for the specification of both vowels and consonants, the segments in question will contrast additionally in the value of the feature 'high'. But this does not affect the point being made here in any way.

(14) But see relevant discussion in chapter 3, pp. 65 ff., and 76-9; also chapter 4, note 8, pp. 101-102.

(15) The computation of mean scores in the Tables in Appendix B as well as all computations involved in the discussion of the statistical tests in chapter 6 were done by the present writer on a DIEHL DELTRONIC machine in the Department of Psychology, The University of Thessaloniki. I would like to take this opportunity to record my thanks to Prof. L. Housiadas, Head of that Department, for kindly extending this facility to me.

CHAPTER 6

EVALUATION OF THE EXPERIMENTAL RESULTS

1. Introduction

In this chapter we shall try to evaluate statistically the results of the experiment in order to establish how far, if at all, predictions that can be made on the basis of the linguistic analysis and description in Part One of this thesis are supported by experimental evidence.

The pronunciation problems of a Greek that relate to the perception of single consonantal segments in English words (Part I of the experiment) will be considered separately from those pertaining to the perception and the production of English words involving sequences of consonantal segments (Parts II and III, respectively).

In all the comparisons that follow, two levels of significance of the statistical findings have been selected: the result of a statistic is considered

(a) significant, if it equals or exceeds the value required, for that statistic, for significance at or beyond the 5% level.

(b) highly significant, if it equals or exceeds the value required, for that statistic, for significance at or beyond the 1% level.

2. Part I - Perception of single consonants

The general aim in Part I of the experiment is to find out whether the subjects' perception of single consonantal segments varies with the familiarity of the segments in question and/or with the position of such segments in English words.

To establish this, the statistical test of the Analysis of Variance has been applied to the relevant data. In cases where this test has yielded statistically significant results, the observed difference between the means in two sets of scores is compared with the mean difference required for significance at the two levels chosen (5% = significant, 1% = highly significant) to determine the degree of significance of the observed mean difference in the various paired categories. This procedure makes computation of the corresponding t.s unnecessary: the results become obvious from mere inspection of the tables.

All the relevant data for the Analysis of Variance and for the significance of the observed difference between mean scores are given in tabulated form to make reading easier. In the case of the latter statistical test, the headings in the tables are given the following interpretation:

$\bar{d}$ = the difference between the two means being compared each time.

$se_{\bar{d}}$ = the standard error of the mean difference under consideration; this is computed on the formula

$$se_{\bar{d}} = \sqrt{\frac{EV_1}{N_1} + \frac{EV_2}{N_2}}$$

where EV_1 and EV_2 are the error variances in categories 1 and 2, respectively, and N_1 and N_2 stand for the number of observations in categories 1 and 2, respectively. Now, since in all comparisons made, $EV_1 = EV_2 = MS_{error}$ (= Mean Square for error in the relevant analysis of variance) and $N_1 = N_2 = N$ in each case, the formula for the $se_{\bar{d}}$ is simplified as follows:

$$se_{\bar{d}} = \sqrt{\frac{2MS_{error}}{N}}$$

As the N may differ from comparison to comparison, it is given beneath each table, along with the value of that mean difference which is required for significance at the 5% and the 1% level. The procedure for computing each of these values is given in detail only in 2.1, p. 135 f. Thereafter, just the two critical values appear below each table.

In the comparisons made in this section, the following abbreviations have been observed throughout: those of the segments being tested which occur in both Greek and English in the same position in the word are labelled "Same" (S); segments occurring in both languages word-initially and word-medially, but only in English word-finally are grouped under the cover term "Location" (L) (this term is used only in the two-way Analysis of Variance in section 2.3 below where it is pertinent); and segments which exist in English, but are non-occurrent in Greek are named "Different" (D). Finally, the three positions in which the segments under examination are considered are: word-Initial (I), word-Medial (M), and word-Final (F).(1)

2.1 Comparisons within the category "Same"

(1) Situation

Comparing thirty subjects' perception of single consonantal segments common to both Greek and English, in word-initial, word-medial, and word-final position.

(2) Data

Table (i) Errors made in the items tested

Item No.	SI	Errors	SM	Errors	SF	Errors
1.	Ben	64	wrap it	27	ass	31
2.	deem	38	rabbit	37	lass	20
3.	goat	30	ladder	25	mass	19
4.	fine	7	echo	7	cane	55
5.	vine	56	ego	15	Shane	57
6.	rain	6	safer	5	can	35
7.	mine	48	saver	26	thin	25
8.	sake	8	jam it	55	kin	36
9.	sigh	24	Asa	15	sin	32
	Totals	281		212		310
	MEANS	9.37		7.07		10.33

where:

S = "Same" segment, i.e. common to both Greek and English

SI = Same segment, word-initially

SM = Same segment, word-medially

SF = Same segment, word-finally

(3) A priori expectations

(i) Subjects are expected to differ significantly in their perception of single consonantal segments according to segment position in the English words tested.

(ii) Fewest errors in the perception of such segments are expected to occur in word-medial environment . This is so because word-medially the segments being tested appear in inter-vocalic position and this environment makes it easier for the subjects to decide which segment is being articulated each time.

(4) Null hypothesis

(i) There are no real differences in the subjects' perception of single consonantal segments which are caused by different segment position in the English words tested.

(ii) There is no difference in the amount of difficulty in perceiving "Same" segments in each of the three positions tested.

(5) Appropriate statistical tests

(i) Two-way Analysis of Variance.

(ii) Test of significance of mean differences.

(6) Discussion of the Analysis of Variance

Classification: 30 Rows (Individuals) x 3 Columns (Initial, Medial, and Final Position).

Cf. Table 1a, p. 253.

Table (ii). Analysis of Variance for judgement of aural perception of single consonantal segments by 30 Individuals for 3 Positions

Source of Variation	df.s	Sum of Squares	Mean Squares	F	Probability
Between Positions	2	168.96	84.48	20.11	P $<$.01
Between Individuals	29	529.79			
Error (interaction PxI)	58	243.71	4.20		
Total	89	942.46			

In view of this highly significant value of F_P (cf. Table A, pp. 287-89) we must reject the null hypothesis and conclude that there are non-chance differences in aural perception which are caused by the different position of the segments in the items tested.

(7) Discussion of the significance of mean differences

The existence of real differences among the three sets of scores (shown by the Analysis of Variance above) says nothing about how many and which pairs of scores cause these differences. To find out whether and to what extent the difference between the means of any two sets of scores is significant, we normally apply the t-test to the relevant mean scores in pairs. However, it is not necessary to compute the t separately for every mean difference obtained in these tests; it is sufficient to compare the observed mean difference with that required for significance at the 5% level and at the 1% level. With df.s = 58 in all the comparisons made in Part I, the critical values of t are, very nearly,

$\underline{t_{.05} = 2.000}$, and $\underline{t_{.01} = 2.660}$ (Cf. Table B, p. 290)

Now, as $t = \dfrac{\bar{d}}{se_{\bar{d}}}$, and, in the Table below, $se_{\bar{d}} = \sqrt{\dfrac{2MS_{error}}{N}} =$

$= \sqrt{\dfrac{2 \times 4.20}{30}} = \underline{.529}$ (where N = number of observations in each set = 30),

it follows that the required mean difference for significance

- at the 5% level is (2.000 x .529 =) 1.058 , and
- at the 1% level is (2.660 x .529 =) 1.407

Hence, any observed mean difference equal to or greater than 1.058 is significant at or beyond the 5% level, accordingly; and any observed mean difference equal to or greater than 1.407 is significant at or beyond the 1% level, accordingly.

As can be seen from Table (iii) below, where N = 30, and the Means are as in Table (i), p. 133,

Table (iii)

Means		Mean differences ($\bar{d}$)	$se_{\bar{d}}$	Significant at 5%	Significant beyond 1%
(1)	$\overline{SI}$ = 9.37	(1) - (2) = 2.30	.529	-----	Yes
(2)	$\overline{SM}$ = 7.07	(3) - (2) = 3.26	.529	-----	Yes
(3)	$\overline{SF}$ = 10.33	(3) - (1) - .96	.529	No	-----

two of the three observed mean differences are greater than 1.407: these are significant beyond the 1% level. Therefore, we reject the null hypothesis of no true differences, and conclude that "Same" segments are easiest to perceive word-medially.

8) Conclusion

In the light of the preceding discussion we may conclude that the *a priori* expectation is confirmed statistically, i.e. that there are real differences in the subjects' perception of single consonantal segments caused by the segment position in the English words tested, and that subjects find it easiest to perceive such segments word-medially.

2 Comparisons within the category "Different"

.) Situation

Comparing thirty subjects' perception of single consonantal segments occurring in English but not in Greek, in three positions: word-initially, word-medially, and word-finally.

(2) Data

Table (i). Errors made in the items tested

Item No.	DI	Errors	DM	Errors	DF	Errors
1.	wait	1	a hair	0	ash	26
2.	shake	36	aware	10	mash	36
3.	shame	33	ashes	44	beige	31
4.	shy	39	lashes	45	catch	18
5.	wane	13	Asia	86	cadge	47
6.	wait	10	away	59	age	37
7.	wail	11	all wed	62	edge	29
8.	char	63	a wing	50	badge	43
Totals		206		356		267
MEANS		6.87		11.87		8.90

where:

D = "Different" segment, i.e. occurring in English but not in Greek

DI = Different segment, word-initially

DM = Different segment, word-medially

DF = Different segment, word-finally

(3) A priori expectations

(i) Subjects are expected to differ significantly in their perception of single consonantal segments according to segment position in the English words tested.

(ii) Fewest errors in the perception of such segments are expected to occur in word-medial environment . This is so because when the segments being tested occur in inter-vocalic position (i.e. word-medially), this environment makes it easier for the subjects to decide which segment is being articulated each time.

(4) Null hypothesis

(i) There are no real differences in the subjects' perception of single consonantal segments which are caused by different segment position in the English words tested.

(ii) There is no difference in the difficulty with which subjects perceive "Different" segments in each of the three positions.

(5) Appropriate statistical tests

(i) Two-way Analysis of Variance.

(ii) Test of the significance of mean differences.

(6) Discussion of the Analysis of Variance

Classification: 30 Rows (Individuals) x 3 Columns (Initial, Medial, and Final Position).

Cf. Table 2a, p. 255.

Table (ii). Analysis of Variance for judgement of aural perception of single consonantal segments by 30 Individuals for 3 Positions

Source of Variation	df.s	Sum of Squares	Mean Squares	F	Probability
Between Positions	2	379.36	189.68	34.42	$P < .01$
Between Individuals	29	1,110.32			
Error (Interaction PxI)	58	319.31	5.51		
Total	89	1,808.99			

In view of the obtained highly significant value of F_P (cf. Table A, pp. 287-89) we must reject the null hypothesis and condlude that there are non-chance differences in aural perception which are caused by the different position of the segments in the items tested.

(7) Discussion of the significance of mean differences

Table (iii).

Means		Mean differences ($\bar{d}$)		$se_{\bar{d}}$	Significant beyond 1%
(1) $\overline{DI}$ =	6.87	(2) - (1) =	5.00	.61	Yes
(2) $\overline{DM}$ =	11.87	(2) - (3) =	2.97	.61	Yes
(3) $\overline{DF}$ =	8.90	(3) - (1) =	2.03	.61	Yes

where: - the Means are those in Table (i), p. 137; and

- N = 30, the number of observations in each category.

Required $\bar{d}$ for significance at 5% : 2.000 x .61 = 1.22

Required $\bar{d}$ for significance at 1% : 2.660 x .61 = 1.62

Inspection of Table (iii) above shows that the three observed mean differences are greater than 1.62: they are all significant beyond the 1% level. Therefore, we reject the null hypothesis. As for the alternative hypothesis, it appears that the subjects find it significantly more difficult to perceive "Different" segments word-medially than either word-finally or word-initially, and significantly more difficult to perceive such segments word-finally than word-initially.

(8) Conclusion

In the light of the findings in (6) and (7) above it seems reasonable to conclude that the *a priori* expectations receive partial statistical support, i.e. that expectation is confirmed which predicts real differences in the subjects' perception of single consonantal segments caused by segment position in the words tested; the other prediction made in (3) above, that most errors will occur word-finally and fewest word-medially, is not confirmed. In fact, as can be readily seen from the mean scores in Table (i), p. 137, this <u>a priori</u> expectation is contradicted in two out of three cases: word-medially a greater amount of error is observed than either word-finally or word-initially despite the linguistic fact that inter-vocalic position of the consonantal segments examined word-medially should make the perception of such segments easier than in word-initial or word-final position where the vocalic environment appears on <u>one</u> side of the consonant tested each time. Notice, however, the following points: first, although single consonantal segments (which occur in English but not in Greek) are tested in all three positions, the actual segments tested differ from position to position: word-initially these segments are [w, š, č], word-medially they are [h, w, š, ž], and word-finally we have [š, ž, č, ǰ]. This discrepancy(2) may be partly responsible for the apparent contradiction noted above. Second, although such sounds receive a lot of classroom drilling because of their unfamiliarity to Greeks, this drilling is practically always limited to monosyllabic words, which precludes segments in word-medial position; it is, therefore, plausible to suppose that the unexpectedly high mean in the DM set can be partly attributed to inadequate practice that these subjects had in the perception of the English sounds [h, w, š, ž] word-medially. Third, owing to the requirement that an equal number of items should appear in each of the three categories in (2) above (for the purposes of the Analysis of Variance), the eight words in each set were <u>randomly selected</u> from a larger number of items; it is possible, then, that another random selection might yield different item-scores, and thus the relevant means and other numerical values in Table (iii) above might be different.

In view of the reservations just expressed, which suggest that these experimental results may not be replicated on repeating the experiment (with the same items or with different items containing these particular segments), it seems intuitively risky to reject the linguistic prediction that most errors will occur word-finally and fewest word-medially: further experimentation will be necessary before any definite conclusion can be reached.

2.3 Comparisons across the categories "Same" - "Location" - "Different"

(1) Situation

Comparing thirty subjects' perception of three types of phonemic conditions always word-finally:

- Segments common to both Greek and English word-finally (SF)
- Segments occurring in both languages but never word-finally in Greek (LF)
- Segments not occurring in Greek at all (DF)

(2) Data

Table (i). Errors made in the items tested

Item No.	SF	Errors	LF	Errors	DF	Errors
1.	ass	31	cab	35	ash	26
2.	lass	20	save	41	lash	25
3.	mass	19	leave	27	mash	36
4.	cane	55	sheathe	26	beige	31
5.	Shane	57	bays	37	cadge	47
6.	can	35	appear	44	age	37
7.	thin	25	shame	45	edge	29
8.	sin	36	sing	66	batch	27
9.	kin	32	aids	44	badge	43
	Totals	310		365		301
	MEANS	10.33		12.17		10.03

where SF, LF, DF are as defined in (1) above.

(3) A priori expectations

(i) Subjects are expected to differ in their perception of single consonantal segments according to segment position in the English words tested.

(ii) Most errors are expected in the perception of segments which are common to both Greek and English but which do not occur word-finally in Greek (LF position) and fewest errors in the perception of segments occurring word-finally in both languages (SF position).

At first sight, the latter expectation may appear to contradict, in part, those expressed in 2.1 and 2.2 above (pp. 133,, and 137, respectively) where more errors were expected with unfamiliar segment positions. However, certain linguistic considerations justify the present prediction: first, word-finally the 'voiced' vs. 'voiceless' opposition in Greek obstruents is lost (i.e. neutralized); this implies that the final segment in the English words cab, save, sheathe, and bays may be heard as the voiceless [p], [f], [θ], and [s], respectively; and second, word-finally in Greek the only possible nasal segment is [n]; this suggests that the opposition 'peripheral' versus 'non-peripheral' nasal becomes non-functional in this position in Greek, which in turn means that the final segment in the English words shame and sing may not be distinguished from [n].

(4) Null hypothesis

(i) There are no real differences in the subjects' perception of single consonantal segments which are caused by the unfamiliarity of such segments in word-final position.

(ii) Subjects do not find it more difficult to perceive unfamiliar segments in one category than in another.

(5) Appropriate statistical tests

(i) Two-way Analysis of Variance.

(ii) Test of the significance of mean differences.

(6) Discussion of the Analysis of Variance

Classification: 30 Rows (Individuals) x 3 Columns (Conditions SF, LF, DF).

Cf. Table 3a, p. 257.

Table (ii). Analysis of Variance for judgement of aural perception of single consonantal segments by 30 Individuals for 3 Conditions

Source of Variation	df.s	Sum of Squares	Mean Squares	F	Probability
Between Conditions	2	80.02	40.01	7.22	$P < .01$
Between Individuals	29	802.49			
Error (Interaction CxI)	58	321.31	5.54		
Total	89	1,203.82			

In view of this highly significant value of F_C (cf. Table A, pp. 287-89) we must reject the null hypothesis and conclude that unfamiliarity of segments and/or of their position in the items tested causes real differences in the perception of these subjects.

(7) Discussion of the significance of mean differences

Table (iii).

Means	Mean differences ($\bar{d}$)	$se_{\bar{d}}$	Significant at 5%	Significant beyond 1%
(1) $\overline{SF}$ = 10.33	(2) - (1) = 1.84	.608	-----	Yes
(2) $\overline{LF}$ = 12.17	(2) - (3) = 2.14	.608	-----	Yes
(3) $\overline{DF}$ = 10.03	(1) - (3) = .30	.608	No	-----

In Table (iii): - The Means are those in Table (i), p. 141; and
- N = 30, the number of observations in each category.

Required $\bar{d}$ for significance at 5% : 2.000 x .608 = 1.216

Required $\bar{d}$ for significance at 1% : 2.660 x .608 = 1.617

From inspection of Table (iii) above we may conclude that the perception of segments common to both Greek and English but impossible at the end of Greek words (LF) is significantly more difficult than the perception of segments which are either permissible word-finally in both languages or non-occurrent in Greek at all. On the other hand, we see that the mean difference between the sets SF and DF could have occurred by chance (much) more often than five times in a hundred; therefore, we retain, at the 5% level, the null hypothesis and conclude that the observed difference may be attributed to chance alone.

(8) Conclusion

On the basis of the preceding discussion we may conclude that the *a priori* expectations are largely confirmed by statistical evidence, i.e. there are non-chance differences in the subjects' perception of single consonantal segments at the end of English words, and, for reasons explained in (3), p. 142 , subjects find it more difficult to perceive segments common to both languages but non-occurrent in Greek word-finally than to perceive segments that either are common to Greek and English word-finally or do not occur in Greek at all. However, one prediction made in (3) above is not supported by the statistical findings: it does not appear to be more difficult for subjects to perceive segments totally unfamiliar to them than it is to perceive segments which are common to both languages in word-final position. This apparent contradiction can be explained if we consider two factors: the nature of the segments examined in the DF category, and also the subjects' previous knowledge of English. The particular unfamiliar segments tested are [š, ž, ǰ, č]; from the point of view of the difficulty they present in their perception, these segments happen to rank high among the segments which occur in English but not in Greek; consequently, they receive constant practice in the classroom. And as the subjects in this experiment were by no means naive in English, it is reasonable to accept that in the course of their learning the foreign language their attention will have been drawn repeatedly to the pronunciation problem the sounds in question involve. In other words, the unexpectedly low mean score in the DF set may be regarded as the effect of practice: a considerably higher mean may reasonably be expected in this category with absolute beginners in English. Regarding this particular prediction, then, it would not seem to be safe to arrive at any final conclusion before further experimental evidence becomes available.

2.4 Comparisons across the categories "Same" - "Different", and "Initial" - "Medial" - "Final"

(1) Situation

Comparing thirty subjects' aural perception of single consonantal segments in two phonemic dimensions (i.e. "Same" = segments common to both languages versus "Different" = segments not occurring in Greek) and in three positions (i.e. word-Initial, word-Medial, and word-Final).

(2) Data

See next page.

(2) Data

Table (i). Errors observed in the follolowing items tested

Item No.	SI	Errors	SM	Errors	SF	Errors	DI	Errors	DM	Errors	DF	Errors
1.	Ben	64	wrap it	27	ass	31	wait	1	a hair	0	ash	26
2.	deem	38	rabbit	37	lass	20	shake	36	aware	10	mash	36
3.	goat	30	ladder	25	cane	55	shame	33	ashes	44	beige	31
4.	fine	7	echo	7	Shane	57	shy	39	lashes	45	catch	18
5.	vine	56	ego	15	can	35	wane	13	Asia	86	cadge	47
6.	rain	6	saver	26	thin	25	wait	10	away	59	age	37
7.	mine	48	jam it	55	kin	36	wail	11	all wed	62	edge	29
8.	sigh	24	Asa	15	sin	32	char	63	a wing	50	badge	43
Totals		273		207		291		206		356		267
MEANS		9.10		6.90		9.70		6.87		11.87		8.90

where:

SI = "Same" segments, word-initially
SM = "Same" segments, word-medially
SF = "Same" segments, word-finally

DI = "Different" segments, word-initially
DM = "Different" segments, word-medially
DF = "Different" segments, word-finally

(3) A priori expectations

(i) Subjects are expected to differ in their perception of single English consonantal segments according to their familiarity with the segments and/or to the position in English words in which these segments are tested.

(ii) Subjects are expected to make most errors in the perception of unfamiliar segments in unfamiliar positions, and fewest errors in the perception of familiar segments in familiar positions.

(4) Null hypothesis

(i) Unfamiliarity with the segments tested and/or with their position in English words does not affect significantly the subjects' perception of such segments.

(ii) Subjects do not find it significantly more difficult to perceive unfamiliar segments in unfamiliar positions in English words than to perceive familiar segments in familiar positions in such words.

(5) Appropriate statistical tests

(i) Three-way Analysis of Variance.

(ii) Test of the significance of mean differences.

(6) Discussion of the Analysis of Variance

Classification: 30 Rows (Individuals) x 2 Blocks ("Same" - "Different") x 3 Columns (word-Initial, word-Medial, and word-Final Position).

Cf. Table 4a, p. 259.

Table (ii). Analysis of Variance for judgement of aural perception of single consonantal segments by 30 Individuals for 2 phonemic dimensions and 3 positions

Source of Variation	df.s	Sum of Squares	Mean Squares	F	Probability
Between Segments	1	18.69	18.69	3.90	$P > .05$
Between Positions	2	74.01	37.01	.17	$P > .05$
Between Individuals	29	1,458.44	50.29		
Interaction S x P	2	435.74	217.87	45.48	$P < .01$
Interaction S x I	29	205.98	7.10		
Interaction P x I	58	261.33	4.51		
Interaction S x P x I	58	277.59	4.79		
Total	179	2,731.78			

From Table (ii) above and Table A, pp. 287-89, we see that:

(a) the obtained value of F_S is smaller than that required for significance at the 5% level (4.00). Therefore, we may retain, at this level, the null hypothesis and accept that, regardless of segment position, the familiarity or unfamiliarity of the English segments tested does not seem to influence the subjects' perception of such segments in any significant way. However, for the practical purposes of this investigation and considering the linguistically based prediction, it is not without interest that F_S just fails to be significant at the .05 level (required F=4.00).

(b) the obtained value of F_P is very much smaller than that required for significance at the 5% level (19.00). Therefore, we may accept, at this level, the null hypothesis of no real differences and conclude that, regardless of whether the segments tested are familiar (i.e. common to both languages) or not, the position of these segments has no effect on the perception of the subjects.

The reason why the F_P obtained in this test fails to be significant can be seen in the table of totals (Fig. 1) and in the graphs of trends (Figs. 2 and 3) below.

Fig. 1. Category and Total scores by segment position and phonemic distinction

Segments	Initial	Medial	Final	Total
"Same"	273	207	291	771
"Different"	206	356	267	829
Total	479	563	558	1,600

Fig. 2. Graph of trends by Position total scores (I, M, F)

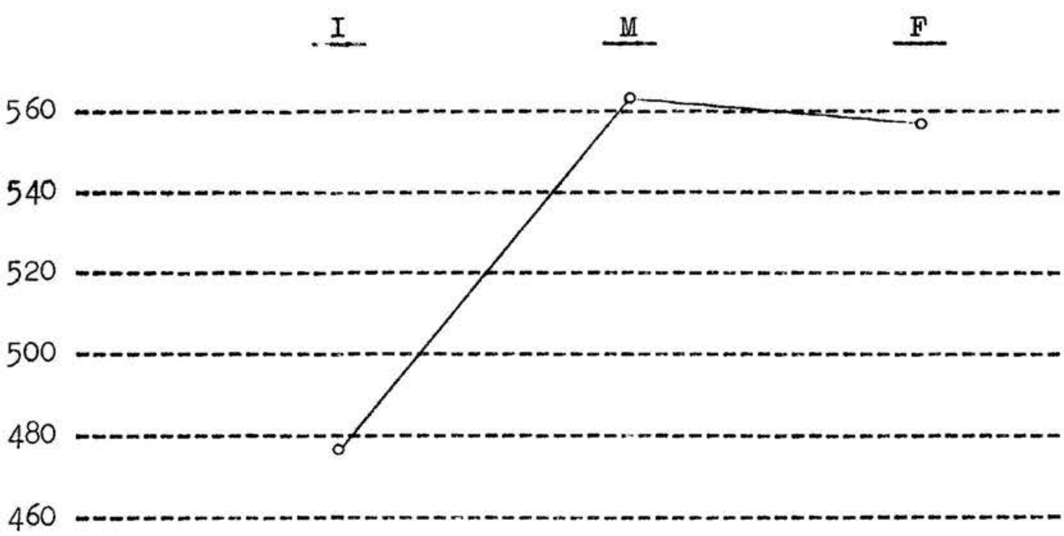
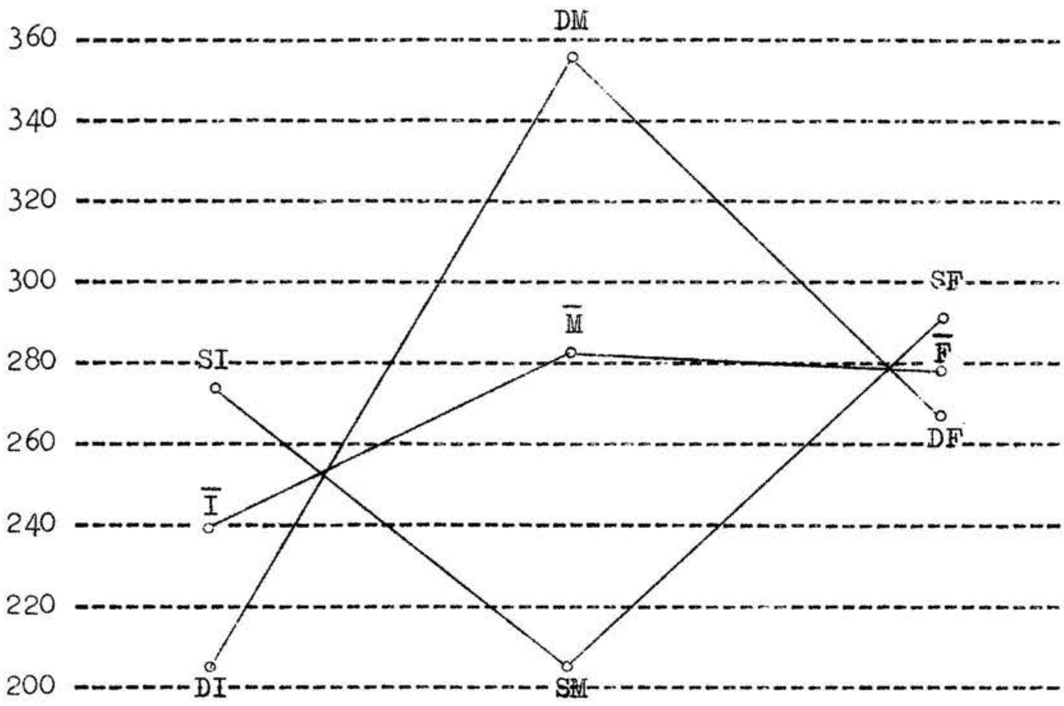


Fig. 3. Graph of trends by segment position and phonemic distinction (SI, SM, SF; DI, DM, DF; and $\overline{I}$, $\overline{M}$, $\overline{F}$)



where $\overline{I} = \dfrac{SI + DI}{2}$, $\overline{M} = \dfrac{SM + DM}{2}$, and $\overline{F} = \dfrac{SF + DF}{2}$

As we have seen (pp. 134-36, and 138-41, respectively) the position of the segments tested causes significant differences in the subjects' perception when the influence of segment position is considered separately within each of the categories "Same" and "Different". However, the trends in the corresponding positions in these two categories are not identical, as Fig. 3 above shows - in fact, they follow opposite directions when examined in the pairs: SI - DI, SM - DM, SF - DF; this is especially apparent in the sets SM and DM, i.e. in the case of segments belonging to the categories "Same" and "Different" and occurring word-medially. So when total scores are considered (i.e. when "Same" scores and "Different" scores are taken together) for each position, the previously observed significant differences tend to balance each other out, especially in the case of the categories M and F, and $\overline{M}$ and $\overline{F}$ as shown in Figs. 2 and 3, thus yielding the obtained small value for F_P.

For reasons explained on pp. 139-41 , the number (and nature) of the segments considered for the purposes of the present analysis does not exhaust the whole inventory of the segments actually tested in the experiment but is in effect a random selection from it. It is, therefore, possible that these results may not be replicated on repeating the experiment or if another random selection of items were to be made.

(c) the obtained value of F_{SP} exceeds by far that required for significance at the 1% level (4.98). Therefore, we may reject, at this level, the null hypothesis of no real differences and conclude that the subjects' perception of single consonantal segments was significantly affected by familiarity or unfamiliarity of segments and by the position of such segments in the English items tested.

(7) Discussion of the significance of mean differences

(a) Within "Same"

Table (a).

M e a n s	Mean differences ($\bar{d}$)	$se_{\bar{d}}$	Significant beyond 1% at .05
(1) $\overline{SI}$ = 9.10	(1) - (2) = 2.20	.565	— Yes
(2) $\overline{SM}$ = 6.90	(3) - (2) = 2.80	.565	— Yes
(3) $\overline{SF}$ = 9.70	(3) - (1) = .60	.565	No —

In Table (a): - the Means are those in Table (i), p. 146; and
- N = 30, the number of observations in each category.

Required $\bar{d}$ for significance at 5% : 2.000 x .565 = 1.130
Required $\bar{d}$ for significance at 1% : 2.660 x .565 = 1.503

Inspection of Table (a) above shows that two of the three observed mean differences are greater than 1.503: these are significant beyond the 1% level. Therefore, we reject the null hypothesis and conclude that subjects find it significantly more difficult to perceive "Same" segments word-finally initially or word-medially.

(b) Within "Different"

Table (b)

M e a n s			Mean differences ($\bar{d}$)		$se_{\bar{d}}$	Significant beyond 1%
(1)	$\overline{DI}$ =	6.87	(2) - (1) =	5.00	.565	Yes
(2)	$\overline{DM}$ =	11.87	(2) - (3) =	2.97	.565	Yes
(3)	$\overline{DF}$ =	8.90	(3) - (1) =	2.03	.565	Yes

where: - the Means are those in Table (i), p. 146; and
- N = 30, the number of observations in each category.

Required $\bar{d}$ for significance at 5% : 2.000 x .565 = 1.130
Required $\bar{d}$ for significance at 1% : 2.660 x .565 = 1.503

Inspection of Table (b) above shows that the three observed mean differences are greater than 1.503: they are all significant beyond the 1% level. Therefore, we reject the null hypothesis and conclude that subjects find it significantly more difficult to perceive "Different" segments word-medially than either word-finally or word-initially, and significantly more difficult to perceive such segment word-finally than word-initially.

(c) Across "Same"$_{total}$ - "Different"$_{total}$

No further statistical testing is necessary when considering I + M + F totals in the categories "Same" and "Different". The mean difference of the categories in question just fails to be significant even at the .05 level. This can be seen from the top line in the Analysis of Variance on p. 148 (where $F = 3.90$, and $t = \sqrt{F} = 1.975$).

(d) Across Initial$_{total}$ - Medial$_{total}$ - Final$_{total}$

Table (d).

M e a n s	Mean differences ($\bar{d}$)	$se_{\bar{d}}$	Significant at 5%
(1) $\bar{I} = 7.98$	(2) - (1) = 1.40	2.695	No
(2) $\bar{M} = 9.38$	(2) - (3) = .08	2.695	No
(3) $\bar{F} = 9.30$	(3) - (1) = 1.32	2.695	No

where: - $\bar{I} = \frac{479}{30 \times 2} = 7.98$, $\bar{M} = \frac{563}{30 \times 2} = 9.38$, $\bar{F} = \frac{558}{30 \times 2} = 9.30$

(Cf. Fig. 1, p. 149)

- N = 60, the number of observations in each category (30 x 2)

Required $\bar{d}$ for significance at 5% : 2.000 x 2.695 = 5.39
Required $\bar{d}$ for significance at 1% : 2.660 x 2.695 = 7.17

From inspection of Table (d) above we see that, when considering "Same" and "Different" totals in I, M, and F positions, there does not appear to be any significant difference in the perception of items belonging to these three categories. This is so because as scores for medial positions follow opposite directions, there cannot be any overall significant trend. (Cf. Fig. 3, p. 150)

(e) <u>Across SI - DI, SM - DM, SF - DF</u>

Table (e).

Means	Mean differences ($\bar{d}$)	$se_{\bar{d}}$	Significant at 5%	Significant beyond 1%
(1) $\overline{SI}$ = 9.10 (2) $\overline{DI}$ = 6.87	(1) - (2) = 2.23	.565	-----	Yes
(3) $\overline{SM}$ = 6.90 (4) $\overline{DM}$ = 11.87	(4) - (3) = 4.97	.565	-----	Yes
(5) $\overline{SF}$ = 9.70 (6) $\overline{DF}$ = 8.90	(5) - (6) = .80	.565	No	-----

where: - the Means are those in Table (i), p. 146; and
- N = 30, the number of observations in each category.

Required $\bar{d}$ for significance at 5% : 2.000 x .565 = 1.130
Required $\bar{d}$ for significance at 1% : 2.660 x .565 = 1.503

From inspection of Table (e) above we see that two of the three observed mean differences are greater than 1.503: these are significant beyond the 1% level. It appears that word-initially "Same" segment are significantly harder to perceive than "Different" segments, but that in word-medial position the subjects find "Different" segments significantly more difficult to perceive than "Same" segments. For segments in word-final position, there is no significant difference.

3) Conclusion

In the light of the preceding discussion we may conclude that the *a priori* expectations are confirmed by statistical evidence: there *are* non-chance differences in the subjects' perception of single consonantal segments within English words, and, with certain exceptions, which may be rather 'idiosyncratic' to this experiment as explained earlier, subjects are shown to find it most difficult to perceive unfamiliar segments in unfamiliar positions and least difficult to perceive familiar segments in familiar positions.

3. Parts II and III : Perception and Production of consonantal sequences

The object of this section is to evaluate statistically the results in Parts II and III of the experiment. Specifically, the aim in the discussion that follows is to establish whether and to what degree there is communality of subject behaviour in the following phonological problems all of which involve sequences of consonantal segments:

(a) When a voiceless stop in an English $[+\text{nasal}]\begin{bmatrix}+\text{stop}\\ -\text{voiced}\end{bmatrix}$ sequence is aurally perceived or vocally produced as voiced; for example, when *[ǽndounɨm] is mistaken for the correct [ǽntounɨm].

(b) When a voiceless stop in an English $[+\text{nasal}]\begin{bmatrix}+\text{stop}\\ -\text{voiced}\end{bmatrix}$ sequence is heard or spoken as voiced and when, additionally, the nasal segment is deleted before the stop; for example, when *[ǽdounɨm] is mistaken for the correct [ǽntounɨm].

(c) When the nasal segment preceding a voiced stop in an English $[+\text{nasal}]\begin{bmatrix}+\text{stop}\\ +\text{voiced}\end{bmatrix}$ sequence is deleted; for example, when *[æbǽsədə] is mistaken for the correct [æmbǽsədə].

(d) When a voiceless sibilant preceding a voiced consonant in an English $\begin{bmatrix}+\text{anterior}\\ +\text{strident}\\ -\text{voiced}\end{bmatrix}\begin{bmatrix}+\text{consonantal}\\ +\text{voiced}\end{bmatrix}$ sequence is heard or pronounced as voiced; for example, when *[zmól] is mistaken for the correct [smól].

Where feasible, all of these problems(3) are considered separately within Perception (Part II) and within Production (Part III); and each of them is considered inside as well as across morphemes. In all of the above four instances principled predictions (i.e. predictions based on the linguistic analysis in Part One of this thesis) can be, and are, made.

However, in a number of other cases, no such predictions are possible, a fact which is stated where relevant. This is, for example, the case when examining

(e) judgement reliability in Part III.

(f) the possible influence of conventional orthography on subject performance; for example, whether and how far the spelling in bomb, sing, etc., misleads the learner.

(g) the degree of relationship of subject performance in the totality of the linguistic problems tested in Perception (Part II) and those tested in Production (Part III).

(h) the potential tendency of subjects to correspond in their behaviour in the various types of problems examined; that is, whether subjects who make a certain amount of error in one problem tend to make a comparable amount of error in another problem; for example, when mistaking *[ǽndounɨm] for the correct [ǽntounɨm], on the one hand, and *[bʌ́mpᵊ] for the correct [bʌ́mp], on the other.

To find whether two sets of scores (i.e. two separate performances on two different types of tests) correspond with each other, the relevant data are correlated. The PEARSON formula below (for establishing 'product moment correlation co-efficients') is used in all correlations:

$$r = \frac{\Sigma' xy}{\sqrt{(\Sigma' x^2)(\Sigma' y^2)}} \qquad \text{(Formula I)}$$

where:

r = the correlation co-efficient desired,

x, y = the two sets of scores being correlated, and

Σ' = the corrected sum of .....

The significance of the r so obtained is then compared with the r.s required for significance at the levels chosen: in all the correlations that follow (where the df.s = N - 2 = 30 - 2 = 28) the r

- required for significance at the .05 level is .361 , and
- required for significance at the .01 level is .463

To find whether the subjects find one test (i.e. one phonological problem) significantly more difficult than another, the mean scores that the two tests received are examined: the *t*-test for significance of the difference between means is applied to determine whether or not the observed difference in two means could have occurred by chance alone. The following formula for small samples is used:(4)

$$t = \frac{\bar{a} - \bar{b}}{\sqrt{\left(\frac{\Sigma' a^2 + \Sigma' b^2}{Na + Nb - 2}\right)\left(\frac{1}{Na} + \frac{1}{Nb}\right)}} \qquad \text{(Formula II)}$$

where:

$\bar{a}$, $\bar{b}$ = the two mean scores being compared
Σ' = the corrected sum of .....
Na, Nb = the number of observations in tests *a* and *b*, resp.
Na+Nb − 2 = degrees of freedom.

3.1 Comparisons within Perception (Part II, Sections I-II)

3.1.1 Situation

Comparing thirty subjects' aural perception of underlying English [+nasal]$\begin{bmatrix}\text{+obstruent}\\ \text{+stop}\end{bmatrix}$ sequences *after* such sequences have been processed by one or both of the following Greek rules:

(i) 'Progressive voice-assimilation of post-nasal stops' (Cf. p. 77)

(ii) 'Pre-stop nasal deletion' (Cf. p. 91)

(1) Types of problems considered

a. Mistaking *[ǽndoʉnɨm] for the proper pronunciation [ǽntoʉnɨm]. One Greek rule operates assigning [+voiced] to the stop following the nasal segment. (Cf. p. 76-8)

b. Mistaking *[ǽdoʉnɨm] for the proper pronunciation [ǽntoʉnɨm]. Two Greek rules operate, one assigning [+voiced] to the stop following the nasal, the other deleting the nasal segment. (Cf. pp. 76-78, 89-91, respectively)

c. Mistaking *[æbǽsədə] for the proper pronunciation [æmbǽsədə].

One Greek rule operates deleting the nasal before the voiced stop. (Cf. p. 91)

(2) Data

The relevant data appear in Appendix B, Tables 5-5a, pp. 260-61.

(3) A priori expectations

(i) The more closely related the segment sequences being tested or the rules that operate on these sequences, the greater the degree of correspondence of subject performance in them. Thus, subjects are expected to agree most in their perception of items like *[ǽndounɨm] and *[ǽdounɨm] (as these are derived from identical underlying sequences and one of the rules that process them is common to both), and least in their perception of items like *[ǽdounɨm] and *[æbǽsədə] (since these are derived from non-identical sequences although, again, they share one of the rules they undergo).

(ii) The greater the number of Greek rules to which a sequence is submitted, the less difficult this sequence to perceive. Thus, *[ǽdounɨm], which is two rules away from the proper English pronunciation, is more distorted and consequently more easily detected as incorrect than either *[ǽndounɨm] or *[æbǽsədə] each of which has been submitted to one Greek rule.

(4) Null hypothesis

(i) There is no non-chance correspondence in the subjects' perception of the consonantal sequences under examination.

(ii) There is no real difference between the mean scores in each of the three categories.

(5) Appropriate statistical tests

(i) Correlation of individual subject scores on each of the problems tested.

(ii) Test of significance of the difference between means (*t*-test).

(6) Discussion of the Correlation

By applying the Pearson formula (I; cf. p. 157) to the data presented in Appendix B (Table 5a, p. 261) we get the following table of correlation co-efficients:

Table (i). Correlation co-efficients between the categories[5] *a*, *b*, *c*, *T*

	a	*b*	*c*	*T*
a	-	.731	.435	.859
b		-	.254	.829
c			-	.813
T				-

From the correlation co-efficients presented in tabulated form in Table (i) above it appears that:

(i) the value of the obtained r_{ab} far exceeds that required for significance at the .01 level (.463). Therefore, we reject, at this level, the null hypothesis of no non-chance agreement, and conclude that there is a clear tendency for those subjects who misjudge *[ǽndoʉnɨm] as correct also to misjudge *[ǽdoʉnɨm] as correct.

(ii) the value of r_{ac} is smaller than that required for significance at the .01 level (.463) but greater than that necessary for significance at the .05 level (.361). We may, then, reject the null hypothesis at the .05 level and conclude that in more than 95% (in fact, in more than 98%) of the cases those subjects who misjudge *[ǽndoʊnɨm] as correct appear also to misjudge *[æbǽsədə] as correct.

(iii) the value of r_{bc} is smaller that that necessary for significance at the .05 level (.361). We may reasonably retain the null hypothesis and conclude that the subjects do not appear to perceive words like *[ǽdoʊnɨm] and *[æbǽsədə] in significantly equivalent ways. This may be so because although the underlying sequences may be similar (though not identical), the segmental environment in which these sequences occur differs in each category (cf. Table 5, p. 260); and also, and perhaps more importantly, because items like *[ǽdoʊnɨm] have been submitted to two Greek rules whereas words like *[æbǽsədə] have been processed only by one Greek rule. (Cf. (1) above)

(iv) the values of the three part - whole correlation co-efficients r_{aT}, r_{bT}, r_{cT} far exceed that which is required for significance at the .01 level (.463). This would normally be taken as an indication that the inclusion of each one of these subtests (i.e. a, b, and c) in the battery along with the other two subtests is justified.(6) However, as part - whole correlations are almost invariably expected to be (highly) significant, interest in them is only academic. Hence, such correlations will not be discussed hereafter — although the relevant co-efficients will be given in the tables.

(7) Discussion of the significance of mean differences (t-test)

Application of the t-test of significance of the differences between the relevant means in Table (ii) below will show whether the subjects find items in one subtest significantly more difficult to perceive than items in another test.

Table (ii). Error-types by mean scores for 30 subjects in the perception of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	MEAN	$\sum' x^2$
c	557	8	30	18.57	1,341
a	534	8	30	17.80	719
b	302	8	30	10.07	756

where $\sum' x^2$ is the corrected sum of sqares of x scores (i.e. x represents a, or b, or c)

By substituting the appropriate numerical values in the formula (II) for t we get

$$t_{ab} = \frac{17.80 - 10.07}{\sqrt{\left(\frac{719 + 756}{30 + 30 - 2}\right)\left(\frac{1}{30} + \frac{1}{30}\right)}} = \frac{7.73}{1.304} = \underline{5.928}$$

By computing the values of $t_{cb}^{(7)}$ and t_{ca} in the same way we arrive at the Table below:

Table (iii)

Value of t	df.s	Probability
$t_{ab} = 5.928$	58	$P < .01$
$t_{cb} = 5.463$	58	$P < .01$
$t_{ca} = .499$	58	$P > .05$

From Table (iii) above and Table B, p. 290 , we see that:

(i) with df.s = 58, the obtained values of t_{ab} and t_{cb} lie far beyond that required for significance at the .01 level (2.660). Therefore, we reject, at this level, the null hypothesis of no true differences in the relevant means, and conclude that the higher means in the categories a and c indicate that subjects make significantly more errors in the perception of English consonantal sequences which have been processed by one Greek rule (as in categories a and c) than they make when perceiving such sequences processed by two Greek rules (as in category b).

(ii) with df.s = 58, the obtained value of t_{ca} is much smaller than that necessary for significance at the .05 level (2.000). Therefore, we retain the null hypothesis and conclude that there is no non-chance difference in the amount of error the subjects make in their perception of items belonging to the categories a and c : such a difference could have occurred by chance alone more than five times (in fact, far more than ten times) in a hundred. This suggests that so long as the underlying English [+nasal][+stop] sequences have been processed by one Greek rule, it is immaterial to the subjects' aural perception whether the relevant rule is the same or not. (Cf. (1) above.)

(8) Conclusion

In the light of the preceding discussion, we may conclude that both the a priori expectations are confirmed: (i) closely related sequences processed by one Greek rule are more similarly perceived than when either the sequences involved or the number of rules that process them differs; and (ii) sequences operated upon by one Greek rule are more difficult for the subjects to judge as incorrect than are sequences that have undergone two Greek rules (i.e. a greater amount of distortion).

3.1.2 Situation

Comparing thirty subjects' aural perception of underlying English $\begin{bmatrix}\text{+anterior}\\ \text{+strident}\\ \text{-voiced}\end{bmatrix}\begin{bmatrix}\text{+consonantal}\\ \text{+voiced}\end{bmatrix}$ sequences within and across morphemes after such sequences have been processed by the Greek 'Regressive voice-assimilation of pre-consonantal sibilants' rule. (Cf. p. 59)

(1) Types of problems considered[8]

a. Word-initially

Mistaking *[zmól] for the proper pronunciation [smól].

One Greek rule operates that assigns [+voiced] to the sibilant before a nasal, a liquid, or a (voiced) glide. (Cf. p. 61)

b. Across morphemes (between prefix and base)

Mistaking *[dɨzgréɨs] for the proper pronunciation [dɨsgréɨs].

One Greek rule operates that assigns [+voiced] to the prefix-final sibilant before any morpheme with an initial voiced consonant.

c. Across morphemes (between this and a noun or noun-modifier)

Mistaking *[ðɨzdrɨ́ŋk] for the proper pronunciation [ðɨsdrɨ́ŋk].

One Greek rule operates that assigns [+voiced] to the sibilant in /ðɨs/ before any noun or noun-modifier that has an initial voiced consonant or glide.

(2) Data

The relevant data appear in Appendix B, Tables 6-6a, pp. 262-63.

(3) A priori expectations

(i) As the segment sequences involved in each sub-test are essentially of the same type and as they are all processed by the same general rule, individual subjects may be expected to aurally perceive words like *[zmól], *[dɨzgréɨs], and *[ðɨzdrɨ́ŋk] in corresponding ways.

(ii) There is no principled expectation as to which category should receive a greater amount of error.

(4) Null hypothesis

(i) There is no non-chance agreement in the subjects' perception of the consonantal sequences under consideration.

(ii) There is no real difference between the mean scores in each of the three sub-tests.

(5) Appropriate statistical tests

(i) Correlation of individual subject scores on each of the problems tested.

(ii) Test of the significance of mean differences (t-test)

(6) Discussion of the Correlations

By applying the Pearson formula (I) to the data presented in Appendix B, Table 6a, we get the following Table of correlation co-efficients:

Table (i). Correlation co-efficients obtaining between the categories a, b, c, and T

	a	b	c	T
a	-	.382	.518	.595
b		-	.894	.961
c			-	.949
T				-

In Table (i), the categories a, b, and c indicate error-types as defined in (1) above; and T is the total a + b + c.

From inspection of the correlation co-efficients presented in tabulated form in Table (i) above, [redacted] it appears that:

(i) the value of r_{ab} is greater than that necessary for significance at the .05 level (.361). Therefore, we may reject, at this level, the null hypothesis of no non-chance agreement in subject perception and conclude that there is a tendency for subjects who misjudge *[zmól] as correct also to misjudge *[dɨzgréɨs] as correct.

(ii) the value of r_{ac} exceeds by far that required for significance at the .01 level (.463). Therefore, it seems reasonable to reject, at this level, the null hypothesis of no true agreement and to conclude that there is a clear tendency for those subjects who misjudge *[zmól] as correct also to misjudge *[ðɨzdrɨ́ŋk] as correct.

(iii) the value of r_{bc} is very much greater than that required for significance at the .01 level (.463). Therefore, we reject, at this level, the null hypothesis of no real agreement and conclude that there appears to be an obvious tendency for those subjects who misjudge *[dɨzgréɨs] as correct also to misjudge *[ðɨzdrɨ́ŋk] as correct.

(7) Discussion of the significance of mean differences (t-test)

Application of the t-test of significance of the differences between the relevant means in Table (ii) below will show whether the subjects find items in one sub-test significantly more difficult to perceive than items in another sub-test.

Table (ii). Error-types by mean scores for 30 subjects in the perception of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	MEAN	$\sum' x^2$
b	389	4*	30	12.97	211
c	356	4	30	11.87	231
a	83	4	30	2.77	125

where $\sum' x^2$ is the corrected sum of squares of x scores (i.e. x represents a, or b, or c).

By substituting the appropriate numerical values in the formula (II) for t we get:

$$t_{ca} = \frac{11.87 - 2.77}{\sqrt{\left(\frac{231 + 125}{30+30-2}\right)\left(\frac{1}{30} + \frac{1}{30}\right)}} = \frac{9.10}{.641} = \underline{14.197}$$

By computing the values of t_{ba} (9) and t_{bc} in the same way we arrive at the table below:

Table (iii).

Value of t	df.s	Probability
$t_{ba} = 16.372$	58	$P < .01$
$t_{ca} = 14.197$	58	$P < .01$
$t_{bc} = 1.538$	58	$P > .05$

From Table (iii) above and Table B, p. 290, we see that:

(i) the obtained value of t_{ca} lies well beyond that required for significance at the .01 level (2.660). Therefore, we reject, at this level, the null hypothesis of no non-chance difference in means, and conclude that subjects find it significantly more difficult to perceive sibilant + voiced consonant sequences when these sequences contain a morpheme boundary. In other words, the higher mean score in c can be attributed to

* For the purposes of the t-test, only the first four items in column b, p. 262, are considered.

the presence of a morpheme boundary within the sequences examined in this category.

(ii) as can be readily seen from the Table of t values just given, a parallel observation can be made concerning items in the categories b and a. t_{ba} is also highly significant , which means that the null hypothesis may be rejected and the conclusion reached that the higher mean score in the b set can be attributed to the presence of a morpheme boundary within the sequences sibilant + voiced consonant under consideration.

(iii) with df.s = 58, the obtained value of t_{bc} is smaller than that required for significance at the .05 level (2.000). Therefore, we retain the null hypothesis, at this level, and conclude that subjects do not find items in b significantly more difficult to perceive than items in category c : the observed difference could have occurred by chance alone more often than five times (actually, more often than ten times) in a hundred. This suggests that so long as the sequences in question contain a morpheme boundary, it is immaterial whether this boundary occurs after one of the prefixes mis- or dis- and before a base, or between the demonstrative this and a base.

The following points should be noted:

First, the relevant (Greek) 'voicing' rule seems to apply more consistently to words like /dɨsgreɨs/ and /δɨsdrɨŋk/, and less to words like /smól/. This is reflected in the scores against each item in each of the three groupings; it is also apparent from inspection of the three group means.

Second, in across-morpheme cases, the bonds holding between prefix + base (as in /dɨsgreɨs/) seem to be slightly stronger than those between this + noun (as in /ðɨsdrɨŋk/). This again is seen from the relevant scores and means. This 'loosening' of association in /ðɨsdrɨŋk/ as against /dɨsgreɨs/ may be due to the different amount of stress that the two forms receive - there is a stronger stress on /ðɨs/ than there is on /dɨs/.

Third, inside morphemes, words with an underlying /sl/ or /sw/ sequence contribute little towards a high mean score in category a - i.e. they are easily detected as incorrect.

Fourth, the categories a and c contain only four items each, which may be too small a number on which to base any valid judgement; further experimentation is probably desirable.

(8) Conclusion

On the basis of the preceding discussion we may conclude that (i) there is a higher degree of correspondence in the perception of two sibilant + voiced consonant sequences both of which extend over morphemes than when one of them contains a morpheme boundary while the other occurs intra-morphemically; and
(ii) sibilant + voiced consonant sequences crossing morpheme boundaries are more significantly difficult for the subjects to perceive correctly than when these sequences occur inside a morpheme - in particular, morpheme-initially.

3.1.3 Situation

Comparing thirty subjects' aural perception of underlying English $[+\text{nasal}][+\text{stop}]$ and $\begin{bmatrix}+\text{anterior}\\+\text{strident}\\-\text{voiced}\end{bmatrix}\begin{bmatrix}+\text{consonantal}\\+\text{voiced}\end{bmatrix}$ sequences as well as their perception of items with an epenthesised [ᵊ] word-finally after a consonant, <u>after</u> these underlying structures have been processed by the relevant Greek rules. (Cf. pp. 77, 91, 59, and 96, respectively.)

(1) <u>Types of problems considered</u>

<u>a</u>. Mistaking *[ǽndoʉnɨm] for the proper pronunciation [ǽntoʉnɨm].

One Greek rule operates that assigns [+voiced] to the stop following a nasal.

<u>b</u>. Mistaking *[ǽdoʉnɨm] for the proper pronunciation [ǽntoʉnɨm].

Two Greek rules operate, one that assigns [+voiced] to the stop following the underlying nasal, and another that deletes the nasal segment.

<u>c</u>. Mistaking *[æbǽsədə] for the proper pronunciation [æmbǽsədə].

One Greek rule operates that deletes the nasal before the (voiced) stop.

<u>d</u>. Mistaking *[zmól] for the proper pronunciation [smól].

One Greek rule operates that assigns [+voiced] to the sibilant that precedes a voiced consonant.

<u>e</u>. Mistaking *[bʌ́mp^{ə}] for the proper pronunciation [bʌ́mp].

One <u>phonetic</u> Greek rule operates that adds [^{ə}] word-finally after a consonant.

(2) <u>Data</u>

The relevant data appear in Appendix B, Tables 7-7a, pp. 264-66.

(3) <u>A priori expectations</u>

(i) The more closely related the consonantal sequences being tested or the rules that operate on such sequences or both, the greater the degree of correspondence of subject performance in them. Thus:

— *[ǽndounɨm], *[ǽdounɨm], and *[æbǽsədə] all involve an underlying *nasal* + *stop* sequence and are all processed by identical or related Greek rules, so subjects are expected to perceive words with such mispronounced sequences in equivalent ways.

— *[ǽdounɨm] and *[æbǽsədə] involve an underlying *nasal+* + *stop* sequence *and* a nasal-deletion Greek rule; *[zmól] has an underlying */s/* + *voiced consonant* sequence and is processed by a Greek rule that 'voices' this /s/. As both the underlying sequences and the Greek rules that process them are different in the two instances, subjects are not expected to aurally perceive words with such mispronounced sequences in corresponding ways.

— *[ǽndounɨm], *[ǽdounɨm], and *[æbǽsədə], on the one hand, and *[bʌ́mp^{ə}], on the other, both involve an underlying *nasal* + *stop* sequence,(10) but the sequence in *[bʌ́mp^{ə}] is processed by a rule ('Epenthesis') to which the former sequences are not submitted. So subjects are not expected to behave aurally in corresponding ways in the two cases.

— in *[zmól] and *[bʌ́mp^{ə}] both the relevant underlying sequences and the Greek rules that they undergo are different; so equivalence in subject behaviour in the two pronunciation problems is not expected.

(ii) The items in sub-test *b* (e.g. *[ǽndounɨm]) have been processed by *two* Greek rules unlike items in the other subtests which have been submitted to *one* Greek rule. Subjects are, therefore, expected to detect mispronunciations in sub-test <u>b</u> more easily (and thus to make fewer mistakes) than in any of the remaining four categories. With regard to the sub-tests <u>a</u>, <u>c</u>, <u>d</u>, and <u>e</u>, there is no principled prediction as to which one of them should receive a greater amount of error.

(4) <u>Null hypothesis</u>

(i) There is no non-chance agreement in the subjects' perception of the sequences under examination.

(ii) There is no real difference between the mean scores in each of the five sub-tests.

(5) <u>Appropriate statistical tests</u>

(i) Correlation of individual subject scores on each of the problems tested.

(ii) Test of the significance of mean differences (<u>t</u>-test).

(6) <u>Discussion of the Correlations</u>

By applying the Pearson formula (I) to the data presented in Appendix B, Table 7a, we get the gollowing table of correlation co-efficients:

Table (i). Correlation co-efficients obtaining between the categories <u>a</u>, <u>b</u>, <u>c</u>, <u>d</u>, <u>e</u>, and <u>T</u>

	<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>	<u>T</u>
<u>a</u>	-	.770	.609	.400	.416	.856
<u>b</u>		-	.458	<u>.203</u>	.422	.549
<u>c</u>			-	<u>.062</u>	-<u>.031</u>	.385
<u>d</u>				-	<u>.357</u>	.419
<u>e</u>					-	.433
<u>T</u>						-

In Table (i), the categories a, b, c, d, and e indicate error-types as defined in (1) above, and T is the total a + b + c + d + e .

From inspection of the correlation co-efficients in Table (i) above, [redacted] it appears that:

(i) the value of r_{ab} is far greater than that required for significance at the .01 level (.463). Therefore, we reject, at this level, the null hypothesis of no non-chance agreement in the subjects' perception of the sequences in question, and conclude that there is an obvious tendency for those subjects who misjudge items like *[ǽndoʉnɨm] as correct also to misjudge items like *[ǽdoʉnɨm] as correct.

(ii) the value of r_{ac} is greater than that necessary for significance at the .01 level (.463). Therefore, we may reject, at this level, the null hypothesis of no true agreement, and conclude that there is a clear tendency for those subjects who misjudge items like *[ǽndoʉnɨm] as correct also to misjudge items like *[æbǽsədə] as correct.

(iii) the value of r_{bc} is greater than that necessary for significance at the .05 level (.361) (In fact, this value just fails to be significant at the .01 level: required r = .463). Therefore, we may reject, at the .05 level, the null hypothesis, and conclude that there is some tendency for subject mishearings in the sub-tests b and c to go together; that is, that there is a tendency for subjects who misjudge items like *[ǽdoʉnɨm] as correct also to misjudge items like *[æbǽsədə] as correct.

(iv) the value of r_{ad} is greater than that required for significance at the .05 level (.361). Therefore, we may reject, at this level, the null hypothesis of no real agreement, and conclude that there is a (small) tendency for those subjects who misjudge items like *[ǽndounɨm] as correct also to misjudge items like *[zmól] as correct. This small tendency may be accidental or it may be attributed, in part, to the fact that although the underlying sequences involved in the two cases are different, the Greek rules that process them have some similarity; they are both 'voicing' rules of some sort: in *[ǽndounɨm] the underlying /t/ was voiced because of the preceding nasal, and in *[zmól] the underlying /s/ was voiced because of the presence of the immediately following voiced consonant.

(v) the value of r_{ae} exceeds that necessary for significance at the .05 level (.361). Therefore, we may reject, at this level, the null hypothesis, and conclude that there appears to be some small tendency for subjects who misjudge words like *[ǽndounɨm] as correct also to misjudge words like *[bʌ́mpᵊ] as correct. Again, the observed small amount of correspondence in the subjects' perception may be coincidental or it may be partly attributed to the fact that both *[ǽndounɨm] and *[bʌ́mpᵊ] involve an underlying <u>nasal</u> + <u>voiceless stop</u> sequence, though the relevant sequences are not processed by the same Greek rule in the two cases.

(vi) the value of r_{bd} is much smaller than that required for significance at the .05 level (.361). Therefore, we retain the null hypothesis and conclude that there seems to be no significant correspondence in the aural perception of words like *[ǽdounɨm] and of words like *[zmól]: the observed agreement in the subjects' perception of such sequences could have occurred by chance alone more often than five times in a hundred. Presumably, this is so because both the underlying sequences in the two sub-tests and the relevant rules are different. Notice that words like *[ǽdounɨm] have already undergone two Greek rules.

(vii) the value of r_{be} is greater than that required for significance at the .05 level (.361). Therefore, we reject, at this level, the null hypothesis and conclude that there is some tendency for subjects who misjudge *[ǽdounɨm] as correct also to misjudge items like *[bʌ́mpᵊ] as correct. As in case (v) above, this may be accidental or due to the fact that in both instances there is an underlying nasal + voiceless stop sequence.

(viii) the values of r_{cd} and r_{ce} are far smaller than that required for significance at the .05 level (.361): the coefficients obtained are hardly significantly different from zero. Therefore, we retain the null hypothesis and conclude that there is no correspondence at all between the subjects' perception of words like *[æbǽsədə] and of words like either *[zmól or *[bʌ́mpᵊ]. Notice that the negative co-efficient $r_{ce} = -.031$ is too near zero to be of any significance.

(ix) the value of r_{de} lies below that required for significance at the .05 level (.361). Therefore, it seems to be reasonable to retain the null hypothesis, at this level, and conclude that there is not a tendency for subjects who misjudge words like *[zmól] as correct also to misjudge words like *[bʌ́mpᵊ] as correct: the observed relationship of subject performance could have occurred slightly more often than five times in a hundred by chance. The little tendency of the subjects' scores to go together in these two sub-tests must be accidental as there is no similarity in either the underlying sequences or the rules that process these sequences.

(7) Discussion of the significance of mean differences (t-test)

Application of the t-test of significance of the differences between the relevant means in Table (ii) below will show whether the subjects find items in one sub-test significantly more difficult to perceive than items in another sub-test.

Table (ii). Error-types by mean scores for 30 subjects in the perception of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	MEAN	$\Sigma' x^2$
d	792	8 *	30	26.40	761
c	557	8 *	30	18.57	1,341
e	547	8 *	30	18.23	751
a	534	8 *	30	17.80	719
b	302	8 *	30	10.07	756

where $\Sigma' x^2$ is the corrected sum of squares of x scores (i.e. x represents a, or b, or c, or d, or e)

By substituting the appropriate numerical values in the formula for t we get:

$$t_{ab} = \frac{17.80 - 10.07}{\sqrt{\left(\frac{719 + 756}{30+30-2}\right)\left(\frac{1}{30} + \frac{1}{30}\right)}} = \frac{7.73}{1.30} = \underline{5.946}$$

By computing the values of t for the remaining pairs of means in the same way we arrive at the table below:

Table (iii).

Value of t	df.s	Probability
t_{ab} = 5.946	58	P < .01
t_{ca} = .499	58	P > .05
t_{da} = 6.575	58	P < .01
t_{ea} = .331	58	P > .05
t_{cb} = 5.463	58	P < .01
t_{db} = 12.334	58	P < .01
t_{eb} = 6.187	58	P < .01
t_{dc} = 5.026	58	P < .01
t_{ce} = .319	58	P > .05
t_{de} = 6.180	58	P < .01

* For the purposes of the t-test, Table 7i, p. 264a, is valid.

From Table (iii) above and Table B, p. 290, we see that:

(i) the values of <u>t</u> for the significance of the differences between the means in the category <u>b</u> and in each of the remaining four categories are significant well beyond the <u>.01</u> level. Therefore, we reject the null hypothesis of no non-chance differences between the relevant means, and conclude that items in the category <u>b</u> (such as **[ǽdounɨm]) are easier to perceive than items in any of the categories <u>a</u>, <u>c</u>, <u>d</u>, <u>e</u> (such as *[ǽndounɨm], *[æbǽsədə], *[zmól], *[bʌ́mp^{ə}], resp.). That is, items that have been submitted to <u>two</u> Greek rules are more distorted and thus easily recognizable as incorrect than items which have been processed by only <u>one</u> Greek rule.

(ii) the obtained values of <u>t</u> show that the mean differences, in pairs, between category <u>d</u> and each of <u>a</u>, <u>c</u>, and <u>e</u> are significant well beyond the <u>.01</u> level. Therefore, the null hypothesis is rejected and the alternative hypothesis accepted that subjects find it more difficult to perceive items in category <u>d</u> (such as *[dɨzgréɨs]) than items in any of the other three categories (such as *[ǽndounɨm], *[aebǽsədə], or *[bʌ́mp^{ə}], respectively). This is an empirical fact for which there is no principled explanation.

(iii) the obtained values of <u>t</u> show that the mean differences, in pairs, between the categories <u>a</u>, <u>c</u>, and <u>e</u> are not significant even at the <u>.05</u> level. Therefore, we retain the null hypothesis and conclude that the observed differences in the categories in question do not indicate that items in any one of them are more difficult to perceive than items in any other of these categories: such mean differences could have occurred by chance alone more frequently than five times in a hundred.

At this juncture, it should be noted that these conclusions can be reached by mere inspection of Table (ii) on the previous page.

(8) Conclusion

From the preceding discussion it may be concluded that:

(i) the closer the relationship between the consonantal sequences that are tested or between the rules that operate on such sequences, the greater the degree of correspondence of subject behaviour in them; and

(ii) those of the items tested which depart from the normal English pronunciation by two Greek rules are less frequently mistaken for English than items in which proper English pronunciation is violated by the operation on them of one Greek rule.

3.1.4 Situation

Comparing thirty subjects' aural perception of English items containing consonantal sequences processed by Greek rules with that of items that contain consonantal sequences not so processed.

All types of consonantal sequences examined in this thesis are included in this comparison.

(1) Types of problems considered

a. Mistaking correctly pronounced English words for Greek; for example, English [ǽntounɨm] regarded as mispronounced.

None of the words in this group has been submitted to any Greek rules.

b. Mistaking incorrectly pronounced words for English; for example, *[ǽndounɨm], *[zmól], etc. misjudged as proper English pronunciations.

All of the items in this category have undergone some phonological processing by one or more Greek rules.

(2) Data

The relevant data appear in Appendix B, Tables 8-8a, pp. 267-69.

(3) *A priori* expectations

(i) There is no principled prediction as to the degree of equivalence that subjects exhibit in the perception of items in the two categories above.

(ii) A greater amount of error may be expected in the perception of words processed by Greek rules than in the perception of words not so processed.

(4) Null hypothesis

(i) There is no non-chance agreement in the subjects' perception of the two categories of items under examination.

(ii) There is no real difference between the means of the two sub-tests.

(5) Appropriate statistical tests

(i) Correlation of individual subject scores on each of the (sets of) problems tested.

(ii) Test of the significance of mean differences (*t*-test).

(6) Discussion of the Correlation

By applying the Pearson formula (I) to the data presented in Appendix B, Table 8a, we get the following correlation coefficient: $r_{ab} = \underline{.650}$

which, with df.s = 28, far exceeds the value of *r* required for significance at the *.01* level (.463). Therefore, we reject, at this level, the null hypothesis or no real agreement, and conclude that there appears to be a very clear tendency for those subjects who misjudge correctly pronounced English words (like [ǽntoʊnɨm]) for Greek also to misjudge incorrectly pronounced words (such as *[ǽndoʊnɨm]) for English.

(7) Discussion of the significance of the mean difference (t-test)

Mere inspection of the raw scores below shows that items in category b receive far more errors than items in category a.

Error-types by mean scores for 30 subjects in the perception of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	MEAN	$\sum' x^2$
b	3,607	53(12)*	30	120.23	18,513
a	1,462	53(12)	30	48.73	11,534

where $\sum' x^2$ is the corrected sum of squares of x scores (i.e. x represents a and b).

Indeed, by substituting the appropriate numerical values in the formula (II) for t we get:

$$t_{ba} = \frac{120.23 - 48.73}{\sqrt{\left(\frac{18,513 + 11,534}{30 + 30 - 2}\right)\left(\frac{1}{30} + \frac{1}{30}\right)}} = \frac{71.50}{5.891} = \underline{12.137}$$

From Table B, p. 290, we see that, with df.s = 58, this value of t is significant well beyond the .01 level (2.660). Therefore, we reject the null hypothesis of no non-chance difference, and conclude that processing of English items by Greek rules makes such items harder to perceive than when no Greek rules are involved. In fact, the very large difference in the Means makes the t-test almost superfluous.

8) Conclusion

In the light of the preceding discussion we may conclude that (i) there appears to be a close relationship between the ways in which subjects perceive English words processed according to the rules of English grammar and 'English' words processed by the rules of the Greek phonological system; and (ii) the subjects' perception of English items rendered according to Greek rules is significantly more difficult than the perception of such items when the latter have not been passed through any rules of Greek phonology.

* See note on p. 268.

3.2 Comparisons within Production (Part III, Sections I - III)

Situation

Comparing thr three Judges' assessment of the thirty subjects' performance in the vocal production of underlying [+nasal][+stop] and $\begin{bmatrix}\text{+anterior}\\ \text{+strident}\\ \text{-voiced}\end{bmatrix}\begin{bmatrix}\text{+consonantal}\\ \text{+voiced}\end{bmatrix}$ English sequences within and across morphemes.

(1) Data

The relevant data appear in Appendix B, Tables 9a-11a, pp. 272-77.

(2) *A priori* expectations

Owing to the fact that the three judges were given a long practice session in judging samples of the subjects' vocal performance before actually marking responses, these judges are expected to have assessed subject vocal production in equivalent ways.

(3) Null hypothesis

There is no non-chance agreement in these judges' assessment of the subjects' vocal production of the English underlying consonantal sequences in the words or sentences tested.

(4) Appropriate statistical test

Correlation of the three judges' assessment of the subjects' vocal performance in the totality of the problems tested, separately in each of the three Sections of Part III of the experiment.

(5) Discussion of the Correlations

By applying the Pearson formula (I) to the data presented in Appendix B, Tables 9a-11a, we get the following three tables, one for each of the three Sections under examination:

Table (a) Inter-Judge correlation in Part III, Section I

	A	B	C	T
A	-	.969	.982	.991
B		-	.979	.990
C			-	.995
T				-

where:

A = Judge A's assessment of 30 subjects' performance on the totality of the phonological problems examined in Section I.

B = Judge B's assessment of 30 subjects' performance on the totality of the phonological problems examined in Section I.

C = Judge C's assessment of 30 subjects' performance on the totality of the phonological problems examined in Section I.

T = the grand total of the three judges' assessments.

Table (b) Inter-Judge correlation in Part III, Section II

	A	B	C	T
A	-	.922	.942	.978
B		-	.924	.972
C			-	.978
				-

where A, B, C are as for Table (a) above for the phonological problem (/s/[+voiced consonant] sequences) examined in Section II, and T stands for the three jusdges' pooled assessment in Section II.

Table (c) Inter-Judge correlation in Part III, Section III

	A	B	C	T
A	-	.855	.891	.954
B		-	.893	.959
C			-	.964
				-

In Table (c), A, B, C are as for Table (a) above for the phonological problem (/s/[+voiced consonant] sequences) examined in Section III, and T stands for the three judges' pooled assessment in Section III.

By merely inspecting the co-efficients just presented in the three tables we readily see that, with df.s = 28, the obtained values of *r* exceed by far that required for significance at the .01 level (.463). Therefore, we reject the null hypothesis of no non-chance agreement in the assessment of these subjects' vocal performance in English, and conclude that the observed (near perfect) correspondence of judgement of the subjects' vocal behaviour in each of the three Sections considered cannot be coincidental but must be the effect of practice.

(6) Conclusion

On the basis of the preceding discussion we may conclude that the three judges assessed the subjects' vocal production of the sequences tested within and across morphemes in highly corresponding ways - which established judgement reliability.

3.3 Comparisons across Aural Perception and Vocal Production

3.3.1 Situation

Comparing thirty subjects' aural perception and vocal production of English underlying [+nasal][+stop] sequences.

Items presenting orthographical complications (e.g. words like *bomb*, *sing*, etc.) are excluded from the comparison.(13)

(1) Types of problems considered

a. From aural perception: mishearing incorrectly pronounced words containing a *nasal* + *stop* sequence as English.

For example, mistaking *[ǽndounɨm] for the proper English pronunciation.

b. From vocal production: mispronouncing English words which have an underlying nasal + stop sequence.
For example, saying *[bʌ́mbə] instead of the correct [bʌ́mpə].

(2) Data

The relevant data appear in Appendix B, Tables 12-12a, pp. 278-80.

(3) A priori expectations

There is no principled prediction as to either

(i) whether there should be any significant correspondence of subject behaviour in the perception and the production of the sequences in question; or

(ii) whether the perception of the sequences being tested should prove easier or more difficult than the production of these sequences.

(4) Null hypothesis

(i) There is no non-chance correspondence in the subjects' perception and production of underlying English nasal + stop sequences.

(ii) There is no real difference in the difficulty with which the subjects perceive and produce nasal + stop underlying English sequences.

(5) Appropriate statistical tests

(i) Correlation of individual total scores in perception (Part II) and in production (Part III, Section I).

(ii) Test of the significance of the difference between the relevant total means in perception and production (t-test).

6) Discussion of the Correlation

By applying the Pearson formula (I) to the data presented in Appendix B, Table 12a, we get the following correlation co-efficient: $r_{ab} = .327$, which, with df.s = 28, is smaller than the value of r required for significance at the .05 level (.361). Therefore, we reject, at this level, the null hypothesis, and conclude that subjects do not appear to perform in equivalent ways when aurally perceiving and vocally producing English words that contain an underlying nasal+ +stop sequence: the observed correspondence could have occurred by chance (slighly) more frequently than five times in a hundred.

7) Discussion of the significance of the mean difference (t-test)

Mere inspection of the raw scores in the Table below shows that subjects make more errors in the perception than they were judged to make in the production of the sequences in the items tested.

Error-types by mean scores for 30 subjects in the perception and the production of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	No. of Judges	MEAN	$\Sigma'x^2$
a	5,832*	$31^{(11)}$	30		64.80	57,471
b	2,724	31**	30	3	30.27	49,277

where $\Sigma'x^2$ is the corrected sum of squares of x scores (i.e. x represents a and also b).

Indeed, by substituting the appropriate numerical values in the formula (II) for t we get:

$$t_{ab} = \frac{64.80 - 30.27}{\sqrt{\left(\frac{57,471 + 49,277}{30 + 30 - 2}\right)\left(\frac{1}{30} + \frac{1}{30}\right)}} = \frac{34.53}{11.11} = \underline{3.108}$$

* The actual number of errors is 1,944. This figure has been multiplied by 3 to make perception scores comparable in scale to production scores, which represent the pooled assessment of 3 judges. (Cf. pp. 278-80)

** To equalize the number of opportunities for error in Perception and in Production, item No. 31 in test b, Production (score: 0), was eliminated.

In fact, the very large difference between the Means in a and b almost obviates the need for a formal statistical test. The conclusion must be that, given the criteria of success and failure employed in this investigation, the perception of the sequences under examination is more difficult than the production of these sequences.

(8) Conclusion

In the light of the preceding discussion it may be concluded that

(i) there does not appear to be a tendency for subject misperceptions and misproductions of underlying English nasal + stop sequences to go together; and

(ii) subjects find it more difficult to perceive incorrect renderings of underlying English nasal + stop sequences than to produce such sequences correctly - given the present criteria of judgement.

3.3.2 Situation

Comparing thirty subjects' aural perception and vocal production of underlying $\begin{bmatrix}\text{+anterior}\\ \text{+strident}\\ \text{-voiced}\end{bmatrix}\begin{bmatrix}\text{+consonantal}\\ \text{+voiced}\end{bmatrix}$ sequences.

(1) Types of problems considered

a. From aural perception: word-initially, subjects mistake items like *[zmól] for the proper English pronunciation [smól]. (Part II)

b. From vocal production: word-initially, subjects pronounce English items like [smól] incorrectly as *[zmól]. (Part III, Section I)

c. From aural perception: across morphemes, subjects mistake items like *[dɨzgréɨs] for the proper English pronunciation [dɨsgréɨs]. (Part II)

d. <u>From vocal production</u>: across morphemes, subjects pronounce English words like [ðɨsbɨ́ə] incorrectly as *[ðɨzbɨ́ə]. (Part III, Section II)

e <u>From vocal production</u>: across morphemes, subjects pronounce English words like [ðɨslǽnd] incorrectly as *[ðɨzlǽnd]. (Part III, Section III)

(2) <u>Data</u>

The relevant data appear in Appendix B, Tables 13-13a, pp. 281-83.

(3) <u>*A priori* expectations</u>

There is no principled prediction as to either

(i) whether there should be any significant correspondence of subject behaviour in the aural perception and the vocal production of underlying English <u>sibilant</u> + <u>voiced consonant</u> sequences in identical or in similar environments; or

(ii) whether the perception or the production of <u>sibilant</u> + <u>voiced consonant</u> sequences in identical or in similar environments should prove easier or more difficult.

(4) <u>Null hypothesis</u>

(i) There is no non-chance correspondence in the subjects' perception and production of underlying English <u>sibilant</u> + <u>voiced consonant</u> sequences.

(ii) There is no real difference in the difficulty with which the subjects perceive and produce underlying English <u>sibilant</u> + <u>voiced consonant</u> sequences.

(5) <u>Appropriate statistical tests</u>

(i) Correlation of individual scores in perception and in production.

(ii) Test of the significance of mean differences (*t*-test).

(6) Discussion of the Correlations

By applying the Pearson formula (I) to the relevant pairs of sets of scores presented in Appendix B, Table 13a, we get the following correlation co-efficients:

$$r_{ab} = .286 \qquad r_{cd} = .185 \qquad r_{ce} = .166$$

where a, b, c, d, and e are as defined in (1) above.

From the co-efficients just presented it appears that, with df.s = 28, they all lie below the value of r that is necessary for significance at the .05 level (.361). Therefore, we retain, at this level, the null hypothesis, and conclude that subjects do not seem to perform in equivalent ways where the aural perception and the vocal production of sibilant + voiced consonant sequences is concerned - regardless of whether such sequences occur within one morpheme or extend over two successive morphemes.

(7) Discussion of the significance of mean differences

From inspection of the relevant pairs of means in Table (i) it becomes clear that there are no significant differences in the perception and the production of sibilant+voiced consonant sequences (separately considered morpheme initially and across morphemes).

Table (i). Error-types by means for 30 subjects in the perception and the production of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	No. of Judges	MEAN	$\sum 'x^2$
a	249*	4	30		2.77	1,128
b	208*	4*	30	3	2.31	3,632
c	2,781*	10*	30		30.90	1,382
e	2,742	10	30	3	30.47	9,815
d	2,585	10*	30	3	28.72	11,026

* The actual number of errors in tests a and c are 83 and 927, respectively. These have been multiplied by 3 to equalize the number of opportunities for error in Perception and in Production (tests b, d, and e) for the purposes of the t-test. The number of items in a and b, and in c, d, and e have also been equalized for the same reason.

See notes (*) and (**) on p. 281a.

Indeed, by substituting the appropriate numerical values in the formula (II) for <u>t</u> we get the following Table (ii).

Table (ii).

Value of <u>t</u>	df.s	Probability
t_{ab} = .196	58	$P > .05$
t_{cd} = .576	58	$P > .05$
t_{ce} = .120	58	$P > .05$
t_{ed} = .357	58	$P > .05$

From Table (ii) above and Table B, p. 290, we see that the values of the <u>t</u> for the significance of the differences between the means in the categories <u>a</u>, <u>b</u>, <u>c</u>, <u>d</u>, and <u>e</u>, as paired in Table (ii), are not significant even at the .05 level. Therefore, we retain the null hypothesis, and conclude that the observed differences in the paired means does not indicate that – given the present criteria of judgement – the perception of <u>sibilant + voiced consonant</u> sequences is more difficult than their production, irrespective of whether such sequences are considered morpheme-initially or across morphemes.

(8) <u>Conclusion</u>

On the basis of the preceding discussion, we may conclude that

(i) there seems to be no tendency for subject misperceptions and misproductions of underlying English <u>sibilant + voiced consonant</u> sequences (occurring within or across morphemes) to follow parallel ways; and

(ii) subjects appear to find it about equally difficult (or easy) to perceive erroneous renderings of underlying English <u>sibilant + voiced consonant</u> sequences as to produce such sequences correctly.

3.4 Overall comparison across Aural Perception (Part II, Section I) and Vocal Production (Part III, Section I).

Situation

Comparing thirty subjects' performance in the aural perception and the vocal production of underlying English [+nasal][+stop] and $\begin{bmatrix}\text{+anterior}\\ \text{+strident}\\ \text{-voiced}\end{bmatrix}\begin{bmatrix}\text{+consonantal}\\ \text{+voiced}\end{bmatrix}$ sequences.

Items causing complications because of the influence of conventional orthography (for example, bomb, sing) or because of epenthesization of [ᵊ] word-finally (for example, *[bʌ́mpᵊ]) are excluded from this comparison.(15)

(1) Types of problems considered

a. From aural perception: mishearing as English incorrectly pronounced words containing either a nasal + stop or a sibilant + voiced consonant sequence

For example, mistaking *[ǽndounɨm] and *[zmɔ́l] for the proper English pronunciations [ǽntounɨm] and [smɔ́l].

b. From vocal production: mispronouncing English words with an underlying nasal + stop or sibilant + voiced consonant sequence.

For example, saying *[bʌ́mbə] and *[zmɔ́l] instead of the correct English pronunciations [bʌ́mpə] and [smɔ́l].

(2) Data

The relevant data appear in Appendix B, Tables 14-14a, pp.284-86.

(3) A priori expectations

There is no principled prediction as to either

(i) whether there should be any significant correspondence of subject behaviour in the aural perception and vocal production of the sequences under examination; or

(ii) whether the perception of the sequences being tested should be easier or more difficult than the production of these sequences.

(4) Null hypothesis

(i) There is no non-chance correspondence in the subjects' perception and production of the totality of the sequences being examined.

(ii) There is no real difference in the difficulty with which subjects perceive and produce underlying English nasal + stop and sibilant + voiced consonant sequences taken together.

(5) Appropriate statistical tests

(i) Correlation of individual scores (in the totality of the problems) in perception and in production.

(ii) Test of the significance of the difference between the relevant total means in perception and production (*t*-test).

(6) Discussion of the Correlation

By applying the Pearson formula (I) to the data presented in Appendix B, Table 14a, we get the following correlation coefficient: $r_{ab} = .231$

which, with df.s = 28, is smaller than the value of *r* needed for significance at the .05 level (.361). Therefore, we retain, at this level, the null hypothesis and conclude that subjects do not appear to perform in equivalent ways when aurally perceiving or vocally producing English words which contain an underlying nasal + stop or sibilant + voiced consonant sequence: the obtained relationship could have occurred by chance alone considerably more frequently than five times in a hundred.

7) Discussion of the significance of the mean difference (t-test)

Inspection of Table (i) shows that, with the present criteria of judgement, subjects make more errors in the perception than in the production of items containing the sequences being examined.

Table (i). Error-types by means for 30 subjects in the perception and the production of consonantal sequences

Error-type	No. of errors	No. of items	No. of subjects	No. of Judges	MEAN	$\sum' x^2$
a	8,502 *	43	30		94.47	129,955
b	3,722	43 **	30	3	41.36	100,420

where $\sum' x^2$ is the corrected sum of squares of x scores (i.e. x represents a and b).

Indeed, by substituting the appropriate numerical values in the formula (II) for t we get: $t = 3.256$. In fact, the very large difference between the means in a and b almost obviates the need for a formal test of significance. The conclusion must be that, with the criteria for success and failure employed in this investigation, the aural perception of the totality of consonantal sequences tested in this experiment is more difficult than the vocal production of the same sequences.

) Conclusion

In the light of the preceding discussion we may conclude that, given the present criteria of judgement,

(i) subjects do not appear to perceive and produce the totality of the consonantal sequences tested in parallel ways; and

(ii) subjects are shown to find it more difficult to perceive incorrect renderings of English items with an underlying nasal+stop and sibilant+voiced consonant sequence (taken together) than to produce such sequences correctly.

---

* See note (*) on p. 279.

** See note (**) on p. 279.

NOTES TO CHAPTER 6

(1) In addition to the Analysis of Variance and the test of the significance of the differences between means, the x^2 test was also applied on one occasion to determine whether and to what extent unfamiliarity with the meaning of the English words tested could have 'contaminated' the results in Part I of the experiment; that is, to see whether errors in the perception of single consonantal segments are more frequent when such segments occur in unfamiliar than in familiar English words.

In the list below, each of the (unfamiliar) items is followed by its corresponding score, i.e. by the number of errors made by all thirty subjects in the auditory perception of that item. Parenthesized on the right is the number each item has in the 'Student Training Sheet', Part I, Appendix A, p. 217.

	Items whose meaning was unfamiliar to the subjects	Number of errors	No. in Student Training Sheet
1.	deem	38	(6)
2.	lane	1	(21)
3.	lasses	12	(41)
4.	wane	13	(53)
5.	wail	11	(57)
6.	mop	8	(69)
7.	sheath	3	(85)
8.	sheathe	26	(86)
9.	sheer	20	(96)
10.	cam	64	(101)
11.	cads	38	(119)
12.	cadge	47	(120)
	Total	281	

Table of Observed and Expected frequencies of error

Errors	Items: Familiar	Items: Unfamiliar	Total
Observed	2,820	281	3,101
Expected	2,813	288	3,101

By substituting the appropriate numerical values in the formula for the x^2 on the next page (where Σ = sum of all .....; fo = observed frequency of error-occurrence; and fe = expected frequency of error-occurrence) we get

$$x^2 = \frac{(fo - fe)}{fe} = \frac{7^2}{2,813} + \frac{-7^2}{288} = .0174 + .1701 = .1875$$

which, with df.s = 1, is not significant at the .05 level. Therefore, we go on considering the 12 unfamiliar items above along with the rest of the items in Part I. Such a difference of frequency of error occurrence could be attributed to chance alone in more than five cases in a hundred.

(2) Notice that there is a technical difficulty in testing the same segments in each of the three positions; for instance, it is impossible to test the perception of [ž] or of [ŋ] word-initially in English as there are no English words beginning with either [ž] or [ŋ].

(3) In Vocal Production (Part III), nasal + stop sequences cannot be examined inter-sectionally as they are tested only in Section I and thus have no equivalent in Sections II and III to be compared to; they are, nevertheless, compared with their counterparts in Aural Perception (Part II).

(4) Given in Ingram (1972), mimeographed.

(5) Hereafter, values of r (and also of t) which are not significant at or beyond the .05 level are underlined with an interrupted line, like this: -----

(6) See McNemar, p. 164.

(7) Notice that once the significance of the difference between $\bar{a}$ - $\bar{b}$ has been established, that between $\bar{c}$ - $\bar{b}$ is predictable from mere inspection of the three means.

(8) The rules referred to below are really instances of the same general Greek rule that assigns the feature [+voiced] to a sibilant segment before any voiced consonant anywhere within the phonological word. Cf. pp. 59.

(9) See note 7 above. A parallel observation can be made concerning the value of t_{ba}.

(10) It must be noted that the presence of a nasal segment before the word-final (stop) consonant is not a necessary condition for the operation of the phonetic rule of [ᵊ]-epenthesization. Thus, /kip/, 'keep', with no underlying nasal before the /p/, would also be subject to epenthesization of this kind; the resulting phonetic form would be [kípᵊ]. Cf. chapter 4, note 14, p. 102.

(11) In error-type e (epenthesis) there are really 8 items, but [séndᵊ] receives 8 instead of 4 repetitions, [síŋgᵊ] receives 7, and [síŋgə] receives 5. There are 8 extra repetitions, the equivalent of two extra items.

(12) See note 11 above. In the case of error-type b the actual number of items is 55 to which 2 extra items are added owing to the 8 extra repetitions. In the case of error-type a (words not processed by any Greek rules) there are in fact 52 items, but sender is repeated 8 instead of 4 times, which makes up for the extra 53rd item in this set.

(13) The reason why this should be so in both perception (cases A - C) and production (case D) is shown below through comparison of the observed and the expected frequencies of error in the items tested in the various (specified) sub-tests of the experiment.

In the lists that follow, each item is accompanied by its corresponding score, i.e. by the number of errors made by all thirty subjects in the aural perception or vocal production, accordingly, of that item.

In the formula for the x^2 used below

$$x^2 = \Sigma \frac{(fo - fe)}{fe}$$

Σ = sum of all ....
fo = observed frequency of error occurrence
fe = expected frequency of error occurrence.

A. In aural perception

Cf. (3.1.1), pp. 158-60; also Tables 5 and 7, pp. 260, 264-65.

(a) Items containing no orthographical complications

Items	Errors
1. [ǽndounɨm]	64
2. [embɨ́rɨkəl]	74
3. [eŋglɨ́tɨk]	21
4. [eŋgóumɨəm]	54
5. [ɨgzámbl]	41
6. [ɉʌ́mb]	86
7. [ɉʌ́mbə]	90
8. [téndətɨv]	104
Total	534

(b) Items likely to contain orthographical complications

Items	Errors
1. [sɨ́ŋg]	77
2. [sɨ́ŋgə]	96
	173

Table A.

Errors	Items: 'Non-orthographic'	'Orthographic'	Total
Observed	534	173	707
Expected	566	141	707

$$x^2 = \Sigma \frac{(fo - fe)}{fe} = \frac{32^2}{566} + \frac{32^2}{141} = 1.81 + 7.26 = \underline{9.07}$$

With df.s = 1, the obtained value of x^2 is significant beyond the .01 level, which indicates that an extra variable (that of orthography) is operating; so items such as those in (b) above may reasonably be excluded from the comparisons.

B. In aural perception

Cf. (3.1.1), pp. 158-60 ; also Tables 5 and 7, pp. 260, 264-65.

(a) Items containing no orthographical complications

Items		Errors
1.	[ǽdounɨm]	18
2.	[ebɨ́rɨkəl]	59
3.	[eglɨ́tɨk]	13
4.	[egóumɨəm]	21
5.	[ɨgzábl]	29
6.	[ʒʌ́b]	47
7.	[ʒʌ́bə]	62
8.	[tédətɨv]	53
	Total	302

(b) Items likely to contain orthographical complications

Items		Errors
1.	[sɨ́g]	52
2.	[sɨ́gə]	76
	Total	128

Table B.

Errors	Items: 'Non-orthographic'	'Orthographic'	Total
Observed	302	128	430
Expected	344	86	430

$$x^2 = \Sigma \frac{(fo - fe)}{fe} = \frac{42^2}{344} + \frac{42^2}{86} = 5.13 + 20.50 = \underline{25.63}$$

With df.s = 1, the obtained value of x^2 is significant far beyond the .01 level. Therefore, we reject the null hypothesis of no real difference between the observed and the expected frequencies of error-occurrence, and conclude that the significantly higher frequency of error in items like those in (b) above (with 'orthographic' complications) can be attributed to the influence exerted by conventional orthography on aural perception. It is reasonable, then, to exclude such items from comparisons because of the extra variable (of orthography) operating.

C. In aural perception

Cf. (3.1.4), pp. 178-80; also Table 8, pp. 267-68.

(a) Items containing no orthographical complications

Items		Errors
1.	antonym	17
2.	empirical	13
3.	enclitic	18
4.	encomium	15
5.	example	24
6.	jump	16
7.	jumper	6
8.	tentative	12
	Total	121

(b) Items likely to contain orthographical complications

Items		Errors
1.	sing	35
2.	singer	36
	Total	71

(Such items were correctly pronounced but misheard as Greek by the subjects.)

Table C.

	Items		
Errors	'Non-orthographic'	'Orthographic'	Total
Observed	121	71	192
Expected	154	38	192

$$x^2 = \Sigma \frac{(fo - fe)}{fe} = \frac{33^2}{154} + \frac{33^2}{38} = 7.07 + 28.66 = \underline{35.73}$$

With df.s = 1, the obtained value of x^2 is significant far be- the .01 level. Therefore, we reject the null hypothesis of no real difference between the observed and the expected frequencies of error-occurrence, and conclude that errors occur significantly more frequently in set (b) above (i.e. with words containing 'orthographic' complications) because of the operation of the extra variable of orthography.

D. <u>In vocal production</u>

(The three Judges' pooled assessment is considered.)

Cf. (3.3.1), pp. 183-86; also Tables 9 and 12, pp. 270-1, 278-9.

(a) Items containing no orthographical complications

Items		Errors
1.	symbol	11
2.	emblem	37
3.	endanger	32
4.	laundry	56
5.	bends	274
6.	tend	317
7.	tender	28
8.	send	309
9.	sender	65
10.	engagement	13
11.	angry	23
	Total	1,165

(b) Items likely to contain orthographical complications

Items		Errors
1.	bomber	354
2.	thumb	334
3.	thumbs	354
4.	comb	331
5.	comber	346
6.	banging	360
7.	bang	360
8.	things	360
9.	sing	358
10.	singer	360
	Total	3,517

<u>Table D.</u>

Errors	Items: 'Non-orthographic'	'Orthographic'	Total
Observed	1,165	3,517	4,682
Expected	2,452	2,230	4,682

$$x^2 = \Sigma \frac{(fo - fe)}{fe} = \frac{1,287^2}{2,452} + \frac{1,287^2}{2,230} =$$

$$= 675.88 + 742.76 = \underline{1,418.64}$$

With df.s = 1, this value of x^2 lies far beyond that required for significance at the <u>.01</u> level. Therefore, we reject the null hypothesis of no non-chance difference between the observed and the expected frequencies of error occurrence in the two categories of items, and conclude that the extra variable of orthography is operating on items such as those under (b) above. Consequently, such items are excluded from the comparison.

(14) The 2,724 errors observed in the production of <u>nasal</u> + <u>stop</u> sequences reflect the pooled assessment of the 3 Judges. The items tested are in fact 32 (cf. Table 12, pp. 278-9), which multiplied by the number of Judges gives the statistically relevant 'number of items' 96.

(15) It must be noted that the 'pattern' described in this section does not change even when such items <u>are</u> included in the comparison; that is, the new values are:

r_{ab} = <u>.272</u>

which is still not significant at the <u>.05</u> level, and

t_{ab} = <u>6.735</u>

which, with df.s = 221, is still significant far beyond the <u>.01</u> level (3.373).

A P P E N D I X A

PART I

STUDENT TRAINING SHEET

1.	pen	πέννα	35.	same	ἴδιος
2.	Ben	Μπέν (ὄνομα)	36.	shame	ντροπή
3.	wrap it	τύλιξτο	37.	sigh	ἀναστεναγμός
4.	rabbit	κουνέλι	38.	shy	ντροπαλός
5.	team	ὁμάδα	39.	asses	γαϊδούρια
6.	deem	θεωρῶ	40.	ashes	στάχτες
7.	latter	δεύτερος	41.	lasses	κοπέλλες
8.	ladder	σκάλα	42.	lashes	μαστίγια
9.	coat	σακκάκι	43.	ass	γαϊδούρι
10.	goat	κατσίκα	44.	ash	στάχτη
11.	echo	ἠχώ	45.	lass	κοπέλλα
12.	ego	ἐγώ	46.	lash	μαστίγιο
13.	fine	ὡραῖα	47.	mass	μάζα
14.	vine	κλῆμα	48.	mash	πουρές
15.	safer	ἀσφαλέστερος	49.	Asa	Ἄζα (ὄνομα)
16.	saver	σωτήρας	50.	Asia	Ἀσία
17.	seal	σφραγίδα	51.	bays	ὅρμοι
18.	zeal	ζῆλος	52.	beige	μπέζ
19.	lacy	δαντελωτός	53.	wane	λιγοστεύω
20.	lazy	τεμπέλης	54.	rain	βροχή
21.	lane	δρομάκι	55.	wait	περιμένω
22.	rain	βροχή	56.	rate	ἀναλογία
23.	allows	ἐπιτρέπει	57.	wail	θρῆνος, θρηνῶ
24.	arouse	ξεσηκώνω	58.	rail	σιδηροτροχιά
25.	mine	δικό μου	59.	away	μακριά
26.	nine	ἐννέα	60.	array	παράταξη
27.	jam it	συμπίεστο	61.	all wed	ὅλοι παντρεμένοι
28.	Janet	Τζάνετ	62.	all red	ὅλοι κόκκινοι
29.	hate	μισῶ	63.	a wing	μία πτέρυγα
30.	wait	περιμένω	64.	a ring	ἕνα δαχτυλίδι
31.	a hair	μιά τρίχα	65.	cap	τραγιάσκα
32.	aware	ἐνήμερος	66.	cab	ταξί
33.	sake	χάρη	67.	lap	ἀγκαλιά
34.	shake	τρέμω	68.	lab	ἐργαστήριο

69. mop ξεσκονιστήρι
70. mob ὄχλος
71. safe ἀσφαλής
72. save σώζω
73. life ζωή
74. live ζωντανός
75. leaf φύλλο
76. leave ἀφήνω
77. not δέν
78. nod νεύω
79. wrote ἔγραψα
80. road δρόμος
81. seat θέση
82. seed σπόρος
83. teeth δόντια
84. teethe βγάζω δόντια
85. sheath θήκη
86. sheathe θηκαρώνω
87. back πίσω
88. bag σάκκα
89. lock κλειδαριά
90. log κούτσουρο
91. buck δολλάριο
92. bug κοργιός
93. appeal κάνω ἔκκληση
94. appear ἐμφανίζομαι
95. she'll αὐτή θά ...
96. sheer ἀπόλυτος
97. came ἦρθα
98. cane μπαστούνι
99. shame ντροπή
100. Shane Σέην (ἐπώνυμο)
101. cam δόντι γραναζιοῦ
102. can κονσερβοκούτι
103. thin λεπτός
104. thing πράγμα
105. sin ἁμαρτία
106. sing τραγουδῶ
107. kin συγγενεῖς
108. king βασιλιάς
109. Tsar Τσάρος
110. char ἀπανθρακώνω
111. bits κομμάτια
112. bitch σκύλα
113. its δικό του
114. itch φαγούρα
115. cats γάτες
116. catch ἁρπάζω
117. heights ὕψη
118. hides κρύβει
119. cads παλιάνθρωποι
120. cadge ἐπαιτῶ
121. Ritz Ρίτς (ξενοδοχεῖο)
122. rids ἀπαλλάσσει
123. aids βοήθειες
124. age ἡλικία
125. Ed's τοῦ Ἔντ
126. edge ἄκρη
127. batch φουρνιά
128. badge σῆμα
129. aitch (h) Ἀγγλικό γράμμα

(PART I) ΜΕΡΟΣ I (Instructions)

ΟΔΗΓΙΕΣ

Ὁ καθένας σας ἔχει τώρα μπροστά του ἕνα "φύλλο ἀπαντήσεων" πού εἶναι ἀριθμημένο ἀπό τό 1 ἕως τό 516 . Σέ λίγο θ'ἀκούσετε 516 'Αγγλικές λέξεις. Τόσο οἱ 'Αγγλικές λέξεις ὅσο καί ἡ 'Ελληνική τους μετάφραση θά πρέπει τώρα νά σᾶς εἶναι γνωστές ἄν μελετήσατε τίς ειδικές σελίδες πού σᾶς ἔδωσα. 'Η ἴδια φωνή θά προφέρει ὅλες τίς λέξεις, ΜΙΑ ΦΟΡΑ ΜΟΝΟ τήν κάθε λέξη γι'αὐτό θά πρέπει νά εἶστε προσεκτικοί. Στήν κάθε λέξη πού θ'ἀκοῦτε ἀντιστοιχεῖ κι ἀπό ἕνας ἀριθμός στό "φύλλο ἀπαντήσεων". Δεξιά ἀπό τόν κάθε ἀριθμό ὑπάρχουν δυό λέξεις ἤ φράσεις 'Ελληνικές. Μία μόνο ἀπ'αὐτές τίς δύο λέξεις ἤ φράσεις ἀποτελεῖ τήν 'Ελληνική μετάφραση τῆς 'Αγγλικῆς λέξης πού θά ἔχετε ἀκούσει. 'Εσεῖς θά πρέπει νά βάζετε σέ κύκλο τήν 'Ελληνική λέξη ἤ φράση πού μεταφράζει τήν 'Αγγλική λέξη πού θ'ἀκοῦτε. Μετά ἀπό κάθε 'Αγγλική λέξη, θά μεσολαβεῖ ἀρκετός χρόνος γιά νά προλάβετε νά σημειώσετε τήν ἀπάντησή σας.

Δῶστε μιάν ἀπάντηση γιά ὅ λ ε ς τίς λέξεις πού θ'ἀκούσετε ἔστω κι ἄν δέν εἶστε ἀπόλυτα βέβαιοι γιά τήν ὀρθότητά της.

Προσέξτε τώρα τά ἀκόλουθα παραδείγματα :

1. [šíp] πρόβατο πλοῖο (3")

'Η λέξη πού ἀκούσατε σημαίνει πρόβατο· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τήν λέξη 'πρόβατο'.

2. [béd] κρεβάτι στοίχημα (3")

'Η λέξη πού ἀκούσατε σημαίνει κρεβάτι· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τήν λέξη 'κρεβάτι'.

Σημείωση : "Αν ἀλλάξετε γνώμη καί θελήσετε νά διαγράψετε μιάν ἀπάντηση γιά νά δώσετε ἄλλην, κάντε το ὡς ἑξῆς :

κρεβάτι ~~στοίχημα~~

'Ακολουθοῦν 6 ἀκόμη παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει ἐσεῖς νά σημειώσετε τόν κύκλο γύρω ἀπό τήν 'Ελληνική λέξη ἤ φράση πού θ'ἀκούσετε. 'Αφοῦ σημειώσετε τή μετάφραση πού νομίζετε ὅτι εἶναι σωστή, θά ἀκούσετε καί τήν ὀρθή ἀπάντηση γιά νά τή συγκρίνετε μέ τή δική σας πού ἴσως θά χρειαστεῖ νά τή διορθώσετε μέ τόν τρόπο πού ἐξηγήσαμε.

Παραδείγματα :

3. [kʌ́m] ἔλα μαστίχα 'Ορθή ἀπόκριση: ἔλα (2")

4. [gʌ́n] ὅπλο μαστίχα 'Ορθή ἀπόκριση: ὅπλο (2")

5. [sít] θέση κάτσε 'Ορθή ἀπόκριση: θέση (2")

6. [sít] θέση σεντόνι 'Ορθή ἀπόκριση: θέση (2")

7. [péə] ζευγάρι ἀρκούδα 'Ορθή ἀπόκριση: ζευγάρι (2")

8. [béə] ζευγάρι ἀρκούδα 'Ορθή ἀπόκριση: ἀρκούδα (2")

'Από δῶ κι ὕστερα δέ θά σᾶς δίνεται ἡ σωστή ἀπάντηση.

'Αν δέν προλάβετε νά σημειώσετε ἤ νά διορθώσετε μιάν ἀπάντηση, μήν τό σκέφτεστε καθόλου γιατί αὐτό μπορεῖ νά σᾶς ἐπηρεάσει καί νά κάνετε κι ἄλλα λάθη στή συνέχεια.

ΜΗ ΓΥΡΙΣΕΤΕ ΑΚΟΜΗ ΣΕΛΙΔΑ. Θά σᾶς πῶ ἐγώ πότε νά τό κάνετε.

Καταλαβαίνετε ἀ κ ρ ι β ῶ ς τί πρέπει νά κάνετε; Ἄν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε τό τώρα.

Γυρῖστε τώρα στή σελίδα 1 καί ἑτοιμαστεῖτε ν'ἀρχίσουμε. Ἕτοιμοι;

(NB. Actually, this is a picture of what the Master Sheet looked like. The transcription of examples enclosed in square brackets (e.g. [kʌ́m]) as well as the correct response (e.g. 'Ορθή ἀπόκριση: ἔλα) were on the Master Sheet and heard on tape but, naturally, did NOT appear on the students' Instruction Sheets; neither did the indications in parentheses which showed the interval of time between the end of one item (along with the correct response accompanying it) and the beginning of the next one.)

PART I

MASTER SHEET

1.	a ring	36.	kin	71.	lazy	106.	latter
2.	shame	37.	wane	72.	beige	107.	wrap it
3.	Ed's	38.	ashes	73.	rain	108.	sheer
4.	bag	39.	hate	74.	Ed's	109.	ego
5.	array	40.	shame	75.	road	110.	itch
6.	leave	41.	she'll	76.	age	111.	nod
7.	teeth	42.	jam it	77.	latter	112.	a ring
8.	shy	43.	vine	78.	lash	113.	deem
9.	bays	44.	lasses	79.	ashes	114.	kin
10.	Asia	45.	safer	80.	cap	115.	array
11.	pen	46.	live (adj.)	81.	badge	116.	lashes
12.	deem	47.	fine	82.	rail	117.	sigh
13.	vine	48.	mop	83.	a wing	118.	bug
14.	lane	49.	mine	84.	mash	119.	mob
15.	aids	50.	wrap it	85.	cane	120.	same
16.	appeal	51.	sheathe	86.	lashes	121.	pen
17.	mob	52.	arouse	87.	wrote	122.	badge
18.	bug	53.	catch	88.	lacy	123.	shy
19.	leaf	54.	lap	89.	aware	124.	rids
20.	Asa	55.	sheathe	90.	wait	125.	ladder
21.	thin	56.	safe	91.	safe	126.	deem
22.	a wing	57.	aware	92.	she'll	127.	seal
23.	Asa	58.	wail	93.	all wed	128.	seat
24.	rain	59.	Shane	94.	ladder	129.	cadge
25.	cab	60.	aware	95.	not	130.	team
26.	thing	61.	sigh	96.	pen	131.	wait
27.	appeal	62.	wane	97.	Janet	132.	lash
28.	all red	63.	goat	98.	beige	133.	rate
29.	buck	64.	team	99.	lab	134.	a hair
30.	kin	65.	sing	100.	mash	135.	cats
31.	array	66.	mass	101	lacy	136.	back
32.	ash	67.	fine	102.	deem	137.	sheer
33.	Shane	68.	char	103.	all wed	138.	bits
34.	a ring	69.	arouse	104.	same	139.	catch
35.	echo	70.	Shane	105.	teeth	140.	Janet

141. Ben
142. Asa
143. king
144. batch
145. mash
146. Ben
147. Asia
148. a ring
149. ask
150. shame
151. hate
152. all red
153. buck
154. Asia
155. lazy
156. batch
157. zeal
158. ashes
159. lazy
160. Tsar
161. safer
162. shake
163. teethe
164. cane
165. pen
166. wait
167. mine
168. saver
169. shame
170. nine
171. away
172. h
173. bitch
174. rate
175. ladder
176. cab
177. bits
178. live (adj.)
179. goat
180. appear
181. rain
182. seal
183. life
184. jam it
185. cab
186. ego
187. ashes
188. all red
189. leave
190. cats
191. shake
192. not
193. life
194. lasses
195. sake
196. a wing
197. goat
198. teethe
199. can
200. sheer
201. a hair
202. lash
203. bays
204. wail
205. shy
206. sheathe
207. thing
208. latter
209. safe
210. wait
211. cadge
212. king
213. lashes
214. mass
215. seed
216. mob
217. rate
218. all wed
219. allows
220. latter
221. rabbit
222. wait
223. hides
224. cab
225. buck
226. sheathe
227. char
228. teeth
229. edge
230. bits
231. teethe
232. sake
233. lacy
234. Janet
235. safer
236. rain
237. catch
238. she'll
239. Ritz
240. cads
241. beige
242. fine
243. allows
244. hate
245. mine
246. lane
247. fine
248. wail
249. Ed's
250. can
251. heights
252. sing
253. log
254. aids
255. bays
256. came
257. rabbit
258. asses
259. lashes
260. arouse
261. hides
262. shake
263. lab
264. Tsar
265. bitch
266. zeal
267. cats
268. wait
269. allows
270. sing
271. lap
272. log
273. lass
274. echo
275. came
276. life
277. lacy
278. teeth
279. shame
280. live (adj.)
281. Ed's
282. lass
283. wrote
284. Ben
285. saver
286. sigh
287. sing
288. a wing
289. char
290. shame
291. its
292. sin

293. coat
294. lock
295. aids
296. ass
297. Tsar
298. away
299. h
300. nod
301. log
302. mass
303. echo
304. Shane
305. mine
306. hides
307. ash
308. asses
309. ego
310. allows
311. wait
312. ass
313. badge
314. shy
315. thin
316. a hair
317. vine
318. rail
319. seat
320. h
321. cane
322. cadge
323. bag
324. ago
325. coat
326. lock
327. rain
328. a hair
329. asses
330. Ben
331. lock
332. array
333. cam
334. goat
335. lap
336. cads
337. away
338. leaf
339. ass
340. sheath
341. edge
342. seed
343. Asa
344. kin
345. thing
346. mop
347. wrote
348. Ritz
349. all wed
350. thin
351. jam it
352. bitch
353. saver
354. mop
355. sheath
356. wrote
357. teethe
358. wrap it
359. nine
360. log
361. heights
362. Tsar
363. age
364. save
365. cam
366. cane
367. leave
368. coat
369. char
370. ego
371. itch
372. seal
373. appear
374. ash
375. king
376. back
377. seat
378. badge
379. can
380. away
381. wail
382. mass
383. shake
384. bug
385. team
386. lazy
387. lass
388. lane
389. sin
390. lash
391. echo
392. its
393. zeal
394. appear
395. thin
396. sake
397. all red
398. cap
399. wane
400. h
401. beige
402. Ritz
403. its
404. cap
405. buck
406. cam
407. bag
408. ladder
409. sake
410. shame
411. lasses
412. its
413. rain
414. saver
415. rain
416. batch
417. mop
418. wrap it
419. Asia
420. cads
421. save
422. not
423. seed
424. life
425. lasses
426. jam it
427. rail
428. lane
429. sheer
430. aware
431. Ritz
432. lock
433. same
434. bag
435. zeal
436. hate
437. sin
438. rids
439. wait
440. live (adj.)
441. came
442. sin
443. nine
444. same

445. appear
446. leave
447. bits
448. heights
449. sheath
450. wane
451. asses
452. mash
453. lab
454. save
455. appeal
456. nod
457. bug
458. nine
459. bays
460. save
461. Janet
462. mob
463. cap
464. road
465. cadge
466. rate
467. team
468. lap
469. itch
470. nod
471. cam
472. aids
473. cats
474. not
475. batch
476. rabbit
477. coat
478. leaf
479. appeal
480. leaf
481. catch
482. back
483. rain
484. came
485. rail
486. lab
487. shame
488. vine
489. ash
490. sigh
491. seed
492. arouse
493. can
494. hides
495. cads
496. safe
497. sheath
498. seal
499. edge
500. lass
501. thing
502. rids
503. age
504. heights
505. bitch
506. seat
507. king
508. road
509. back
510. edge
511. she'll
512. safer
513. rabbit
514. rids
515. itch
516. road

ΜΕΡΟΣ _I
(PART II)

ΟΝΟΜΑ: ____________________
NAME :

ΦΥΛΛΟ ΑΠΑΝΤΗΣΕΩΝ

(Answer Sheet)

1.	ἕνα δαχτυλίδι	μία πτέρυγα	34.	ἕνα δαχτυλίδι	μία πτέρυγα
2.	ντροπή	ἴδιος	35.	ἠχώ	"'Εγώ"
3.	τοῦ Ἔντ	ἄκρη	36.	συγγνεῖς	βασιλιάς
4.	σάκκα	πίσω	37.	λιγοστεύω	βροχή
5.	παράταξη	μακριά	38.	στάχτες	γαϊδούρια
6.	ἀφήνω	φύλλο	39.	μισῶ	περιμένω
7.	δόντια	βγάζω δόντια	40.	ντροπή	ἴδιος
8.	ντροπαλός	ἀναστεναγμός	41.	αὐτή θά...	ἀπόλυτος
9.	ὅρμοι	μπέζ	42.	συμπίεστο	Τζάνετ
10.	'Ασία	Ἄζα(ὄνομα)	43.	κλῆμα	ὡραῖα
11.	πέννα	Μπέν(ὄνομα)	44.	κοπέλλες	μαστίγια
12.	θεωρῶ	ὁμάδα	45.	ἀσφαλέστερος	σωτήρας
13.	κλῆμα	ὡραῖα	46.	ζωντανός	ζωή
14.	δρομάκι	βροχή	47.	κλῆμα	ὡραῖα
15.	βοήθειες	ἡλικία	48.	ὄχλος	ξεσκονιστήρι
16.	κάνω ἔκκληση	ἐμφανίζομαι	49.	δικό μου	ἐννέα
17.	ὄχλος	ξεσκονιστήρι	50.	τύλιξτο	κουνέλλι
18.	κοργιός	δολλάριο	51.	θηκαρώνω	θήκη
19.	ἀφήνω	φύλλο	52.	ξεσηκώνω	ἐπιτρέπει
20.	'Ασία	Ἄζα(ὄνομα)	53.	ἁρπάζω	γάτες
21.	λεπτός	πράγμα	54.	ἀγκαλιά	ἐργαστήριο
22.	ἕνα δαχτυλίδι	μία πτέρυγα	55.	θηκαρώνω	θήκη
23.	'Ασία	Ἄζα(ὄνομα)	56.	ἀσφαλής	σώζω
24.	δρομάκι	βροχή	57.	ἐνήμερος	μιά τρίχα
25.	ταξί	τραγιάσκα	58.	θρηνῶ	σιδηροτροχιά
26.	λεπτός	πράγμα	59.	Σέην (ἐπώνυμο)	ντροπή
27.	κάνω ἔκκληση	ἐμφανίζομαι			
28.	ὅλοι κόκκινοι	ὅλοι παντρεμένοι	60.	ἐνήμερος	μιά τρίχα
29.	κοργιός	δολλάριο	61.	ντροπαλός	ἀναστεναγμός
30.	συγγενεῖς	βασιλιάς	62.	λιγοστεύω	βροχή
31.	παράταξη	μακριά	63.	κατσίκα	σακκάκι
32.	στάχτη	γαϊδούρι	64.	θεωρῶ	ὁμάδα
33.	Σέην(ὄνομα)	ντροπή	65.	τραγουδῶ	ἁμαρτία

66. μάζα	πουρές
67. κλῆμα	ὡραῖα
68. ἀπανθρακώνω	Τσάρος
69. ξεσηκώνω	ἐπιτρέπει
70. Σέην (ἐπώνυμο)	ντροπή
71. τεμπέλης	δαντελωτός
72. ὅρμοι	μπέζ
73. λιγοστεύω	βροχή
74. τοῦ Ἔντ	ἄκρη
75. ἔγραφα	δρόμος
76. h (τό γράμμα)	ἡλικία
77. δεύτερος	σκάλα
78. μαστίγιο	κοπέλλα
79. στάχτες	γαϊδούρια
80. ταξί	τραγιάσκα
81. σῆμα	φουρνιά
82. θρηνῶ	σιδηροτροχιά
83. ἕνα δαχτυλίδι	μία πτέρυγα
84. μάζα	πουρές
85. ἦρθα	μπαστούνι
86. κοπέλλες	μαστίγια
87. ἔγραφα	δρόμος
88. τεμπέλης	δαντελωτός
89. ἐνήμερος	μιά τρίχα
90. περιμένω	ἀναλογία
91. ἀσφαλής	σώζω
92. αὐτή θά...	ἀπόλυτος
93. ὅλοι κόκκινοι	ὅλοι παντρεμένοι
94. δεύτερος	σκάλα
95. δέν	νεύω
96. πέννα	Μπέν(ὄνομα)
97. συμπίεστο	Τζάνετ
98. ὅρμοι	μπέζ
99. ἀγκαλιά	ἐργαστήριο
100. μάζα	πουρές
101. τεμπέλης	δαντελωτός
102. θεωρῶ	ὁμάδα
103. ὅλοι κόκκινοι	ὅλοι παντρεμένοι
104. ἴδιος	ντροπή
105. δόντια	βγάζω δόντια
106. δεύτερος	σκάλα
107. τύλιξτο	κουνέλλι
108. αὐτή θά...	ἀπόλυτος
109. ἠχῶ	"Ἐγώ"
110. δικό του	φαγούρα
111. δέν	νεύω
112. ἕνα δαχτυλίδι	μία πτέρυγα
113. θεωρῶ	ὁμάδα
114. συγγενεῖς	βασιλιάς
115. παράταξη	μακριά
116. κοπέλλες	μαστίγια
117. ντροπαλός	ἀναστεναγμός
118. κοργιός	δολλάριο
119. ὄχλος	ξεσκονιστήρι
120. ἴδιος	ντροπή
121. πέννα	Μπέν(ὄνομα)
122. σῆμα	φουρνιά
123. ντροπαλός	ἀναστεναγμός
124. ἀπαλλάσσει	RITZ (ξενοδοχεῖο)
125. δεύτερος	σκάλα
126. θεωρῶ	ὁμάδα
127. σφραγίδα	ζῆλος
128. θέση	σπόρος
129. ἐπαιτῶ	ἁρπάζω
130. θεωρῶ	ὁμάδα
131. περιμένω	ἀναλογία
132. μαστίγιο	κοπέλλα
133. περιμένω	ἀναλογία
134. ἐνήμερος	μιά τρίχα

135.	ἁρπάζω	γάτες
136.	σάκκα	πίσω
137.	αὐτή θά...	ἀπόλυτος
138.	κομμάτια	σκύλα
139.	ἁρπάζω	ἐπαιτῶ
140.	συμπίεστο	Τζάνετ
141.	πέννα	Μπέν(ὄνομα)
142.	'Ασία	"Αζα(ὄνομα)
143.	συγγενεῖς	βασιλιάς
144.	σῆμα	φουρνιά
145.	μάζα	πουρές
146.	πέννα	Μπέν(ὄνομα)
147.	'Ασία	"Αζα(ὄνομα)
148.	ἕνα δαχτυλίδι	μία πτέρυγα
149.	στάχτη	γαϊδούρι
150.	Σέην (ἐπώνυμο)	ντροπή
151.	μισῶ	περιμένω
152.	ὅλοι κόκκινοι	ὅλοι παντρεμένοι
153.	κοργιός	δολλάριο
154.	'Ασία	"Αζα(ὄνομα)
155.	τεμπέλης	δαντελωτός
156.	σῆμα	φουρνιά
157.	σφραγίδα	ζῆλος
158.	στάχτες	γαϊδούρια
159.	τεμπέλης	δαντελωτός
160.	ἀπανθρακώνω	Τσάρος
161.	ἀσφαλέστερος	σωτήρας
162.	χάρη	τρέμω
163.	δόντια	βγάζω δόντια
164.	ἦρθα	μπαστούνι
165.	πέννα	Μπέν(ὄνομα)
166.	μισῶ	περιμένω
167.	δικό μου	ἐννέα
168.	ἀσφαλέστερος	σωτήρας
169.	ἴδιος	ντροπή
170.	δικό μου	ἐννέα
171.	παράταξη	μακριά
172.	h (τό γράμμα)	ἡλικία
173.	κομμάτια	σκύλα
174.	περιμένω	ἀναλογία
175.	δεύτερος	σκάλα
176.	ταξί	τραγιάσκα
177.	κομμάτια	σκύλα
178.	ζωντανός	ζωή
179.	κατσίκα	σακκάκι
180.	κάνω ἔκκληση	ἐμφανίζομαι
181.	δρομάκι	βροχή
182.	σφραγίδα	ζῆλος
183.	ζωντανός	ζωή
184.	συμπίεστο	Τζάνετ
185.	ταξί	τραγιάσκα
186.	ἠχώ	"'Εγώ"
187.	στάχτες	γαϊδούρια
188.	ὅλοι κόκκινοι	ὅλοι παντρεμένοι
189.	ἀφήνω	φύλλο
190.	γάτες	παλιάνθρωποι
191.	χάρη	τρέμω
192.	δέν	νεύω
193.	ζωντανός	ζωή
194.	κοπέλλες	μαστίγια
195.	χάρη	τρέμω
196.	ἕνα δαχτυλίδι	μία πτέρυγα
197.	κατσίκα	σακκάκι
198.	δόντια	βγάζω δόντια
199.	κονσερβοκούτι	δόντι γραναζιοῦ
200.	αὐτή θά...	ἀπόλυτος
201.	ἐνήμερος	μιά τρίχα
202.	μαστίγιο	κοπέλλα
203.	ὅρμοι	μπέζ
204.	θρηνῶ	σιδηροτροχιά

205. ντροπαλός	ἀναστεναγμός	242. κλῆμα	ὡραῖα
206. θηκαρώνω	θήκη	243. ξεσηκώνω	ἐπιτρέπει
207. λεπτός	πράγμα	244. μισῶ	περιμένω
208. δεύτερος	σκάλα	245. δικό μου	ἐννέα
209. ἀσφαλής	σώζω	246. δρομάκι	βροχή
210. περιμένω	ἀναλογία	247. κλῆμα	ὡραῖα
211. ἐπαιτῶ	παλιάνθρωποι	248. θρηνῶ	σιδηροτροχιά
212. συγγενεῖς	βασιλιάς	249. τοῦ Ἔντ	ἄκρη
213. κοπέλλες	μαστίγια	250. κονσερβοκούτι	δόντι γραναζιοῦ
214. μάζα	πουρές		
215. θέση	σπόρος	251. ὕφη	κρύβει
216. ὄχλος	ξεσκονιστήρι	252. τραγουδῶ	ἁμαρτία
217. περιμένω	ἀναλογία	253. κλειδαριά	κούτσουρο
218. ὅλοι κόκκινοι	ὅλοι παντρεμένοι	254. βοήθειες	ἡλικία
219. ξεσηκώνω	ἐπιτρέπει	255. ὅρμοι	μπέζ
220. δεύτερος	σκάλα	256. ἦρθα	μπαστούνι
221. τύλιξτο	κουνέλλι	257. τύλιξτο	κουνέλλι
222. μισῶ	περιμένω	258. στάχτες	γαϊδούρια
223. ὕφη	κρύβει	259. κοπέλλες	μαστίγια
224. ταξί	τραγιάσκα	260. ξεσηκώνω	ἐπιτρέπει
225. κοργιός	δολλάριο	261. ὕφη	κρύβει
226. θηκαρώνω	θήκη	262. χάρη	τρέμω
227. ἀπανθρακώνω	Τσάρος	263. ἀγκαλιά	ἐργαστήριο
228. δόντια	βγάζω δόντια	264. ἀπανθρακώνω	Τσάρος
229. τοῖ Ἔντ	ἄκρη	265. κομμάτια	σκύλα
230. κομμάτια	σκύλα	266. σφραγίδα	ζῆλος
231. δόντια	βγάζω δόντια	267. ἁρπάζω	γάτες
232. χάρη	τρέμω	268. μισῶ	περιμένω
233. τεμπέλης	δαντελωτός	269. ξεσηκώνω	ἐπιτρέπει
234. συμπίεστο	Τζάνετ	270. τραγουδῶ	ἁμαρτία
235. ἀσφαλέστερος	σωτήρας	271. ἀγκαλιά	ἐργαστήριο
236. λιγοστεύω	βροχή	272. κλειδαριά	κούτσουρο
237. ἁρπάζω	γάτες	273. μαστίγιο	κοπέλλα
238. αὐτή θά...	ἀπόλυτος	274. ἠχώ	"'Εγώ"
239. ἀπαλλάσσει	RITZ (ξενοδοχεῖο)	275. ἦρθα	μπαστούνι
240. γάτες	παλιάνθρωποι	276. ζωντανός	ζωή
241. ὅρμοι	μπέζ	277. τεμπέλης	δαντελωτός

278.	δόντια	βγάζω δόντια
279.	Σέην (ἐπώνυμο)	ντροπή
280.	ζωντανός	ζωή
281.	τοῦ Ἔντ	ἄκρη
282.	μαστίγιο	κοπέλλα
283.	ἔγραφα	δρόμος
284.	πέννα	Μπέν(ὄνομα)
285.	ἀσφαλέστερος	σωτήρας
286.	**ντροπαλός**	ἀναστεναγμός
287.	τραγουδῶ	ἁμαρτία
288.	ἕνα δαχτυλίδι	μία πτέρυγα
289.	ἀπανθρακώνω	Τσάρος
290.	ἴδιος	ντροπή
291.	δικό του	φαγούρα
292.	τραγουδῶ	ἁμαρτία
293.	κατσίκα	σακκάκι
294.	κλειδαριά	κουτσουρο
295.	βοήθειες	ἡλικία
296.	στάχτη	γαϊδούρι
297.	ἀπανθρακώνω	Τσάρος
298.	παράταξη	μακριά
299.	h(τό γράμμα)	ἡλικία
300.	δέν	νεύω
301.	κλειδαριά	κούτσουρο
302.	μάζα	πουρές
303.	ἠχώ	"'Εγώ"
304.	Σέην (ἐπώνυμο)	ντροπή
305.	δικό μου	ἐννέα
306.	ὕφη	κρύβει
307.	στάχτη	γαϊδούρι
308.	στάχτες	γαϊδούρια
309.	ἠχώ	"'Εγώ"
310.	ξεσηκώνω	ἐπιτρέπει
311.	περιμένω	ἀναλογία
312.	στάχτη	γαϊδούρι
313.	σῆμα	φουρνιά
314.	ντροπαλός	ἀναστεναγμός
315.	λεπτός	πράγμα
316.	ἐνήμερος	μιά τρίχα
317.	κλῆμα	ὡραῖα
318.	θρηνῶ	σιδηροτροχιά
319.	θέση	σπόρος
320.	h (τό γράμμα)	ἡλικία
321.	ἦρθα	μπαστούνι
322.	ἁρπάζω	ἐπαιτῶ
323.	σάκκα	πίσω
324.	βοήθειες	ἡλικία
325.	κατσίκα	σακκάκι
326.	κλειδαριά	κούτσουρο
327.	δρομάκι	βροχή
328.	ἐνήμερος	μιά τρίχα
329.	στάχτες	γαϊδούρια
330.	πέννα	Μπέν(ὄνομα)
331.	κλειδαριά	κούτσουρο
332.	παράταξη	μακριά
333.	κονσερβοκούτι	δόντι γραναζιοῦ
334.	κατσίκα	σακκάκι
335.	ἀγκαλιά	ἐργαστήριο
336.	ἐπαιτῶ	παλιάνθρωποι
337.	παράταξη	μακριά
338.	ἀφήνω	φύλλο
339.	στάχτη	γαϊδούρι
340.	θηκαρώνω	θήκη
341.	τοῦ Ἔντ	ἄκρη
342.	θέση	σπόρος
343.	'Ασία	Ἄζα(ὄνομα)
344.	συγγενεῖς	βασιλιάς
345.	λεπτός	πράγμα
346.	ὄχλος	ξεσκονιστήρι
347.	ἔγραφα	δρόμος
348.	ἀπαλλάσσει	RITZ (ξενοδοχεῖο)

349.	ὅλοι κόκκινοι	ὅλοι παντρεμένοι
350.	λεπτός	πράγμα
351.	συμπίεστο	Τζάνετ
352.	κομμάτια	σκύλα
353.	ἀσφαλέστερος	σωτήρας
354.	ὄχλος	ξεσκονιστήρι
355.	θηκαρώνω	θήκη
356.	ἔγραφα	δρόμος
357.	δόντια	βγάζω δόντια
358.	τύλιξτο	κουνέλλι
359.	δικό μου	ἐννέα
360.	κλειδαριά	κούτσουρο
361.	ὕφη	κρύβει
362.	ἀπανθρακώνω	Τσάρος
363.	h(τό γράμμα)	ἡλικία
364.	ἀσφαλής	σώζω
365.	κονσερβοκούτι	δόντι γραναζιοῦ
366.	ἦρθα	μπαστούνι
367.	ἀφήνω	φύλλο
368.	κατσίκα	σακκάκι
369.	ἀπανθρακώνω	Τσάρος
370.	ἠχώ	"Ἐγώ"
371.	δικό του	φαγούρα
372.	σφραγίδα	ζῆλος
373.	κάνω ἔκκληση	ἐμφανίζομαι
374.	στάχτη	γαϊδούρι
375.	συγγενεῖς	βασιλιάς
376.	σάκκα	πίσω
377.	θέση	σπόρος
378.	σῆμα	φουρνιά
379.	κονσερβοκούτι	δόντι γραναζιοῦ
380.	παράταξή	μακριά
381.	θρηνῶ	σιδηροτροχιά
382.	μάζα	πουρές
383.	χάρη	τρέμω
384.	κοργιός	δολλάριο
385.	θεωρῶ	ὁμάδα
386.	τεμπέλης	δαντελωτός
387.	μαστίγιο	κοπέλλα
388.	δρομάκι	βροχή
389.	τραγουδῶ	ἁμαρτία
390.	μαστίγιο	κοπέλλα
391.	ἠχώ	"Ἐγώ"
392.	δικό του	φαγούρα
393.	σφραγίδα	ζῆλος
394.	κάνω ἔκκληση	ἐμφανίζομαι
395.	λεπτός	πράγμα
396.	χάρη	τρέμω
397.	ὅλοι κόκκινοι	ὅλοι παντρεμένοι
398.	ταξί	τραγιάσκα
399.	λιγοστεύω	βροχή
400.	h(τό γράμμα)	ἡλικία
401.	ὅρμοι	μπέζ
402.	ἀπαλλάσσει	RITZ (ξενοδοχεῖο)
403.	δικό του	φαγούρα
404.	ταξί	τραγιάσκα
405.	κοργιός	δολλάριο
406.	κονσερβοκούτι	δόντι γραναζιοῦ
407.	σάκκα	πίσω
408.	δεύτερος	σκάλα
409.	χάρη	τρέμω
410.	Σέην (ἐπώνυμο)	ντροπή
411.	κοπέλλες	μαστίγια
412.	δικό του	φαγούρα
413.	λιγοστεύω	βροχή
414.	ἀσφαλέστερος	σωτῆρας
415.	δρομάκι	βροχή
416.	σῆμα	φουρνιά

417.	ὄχλος	ξεσκονιστήρι
418.	τύλιξτο	κουνέλλι
419.	'Ασία	"Αζα(ὄνομα)
420.	γάτες	παλιάνθρωποι
421.	ἀσφαλής	σώζω
422.	δέν	νεύω
423.	θέση	σπόρος
424.	ζωντανός	ζωή
425.	κοπέλλες	μαστίγια
426.	συμπίεστο	Τζάνετ
427.	θρηνῶ	σιδηροτροχιά
428.	δρομάκι	βροχή
429.	αὐτή θά...	ἀπόλυτος
430.	ἐνήμερος	μιά τρίχα
431.	ἀπαλλάσσει	RITZ (ξενοδοχεῖο)
432.	κλειδαριά	κούτσουρο
433.	ἴδιος	ντροπή
434.	σάκκα	πίσω
435.	σφραγίδα	ζῆλος
436.	μισῶ	περιμένω
437.	τραγουδῶ	ἁμαρτία
438.	ἀπαλλάσσει	RITZ (ξενοδοχεῖο)
439.	μισῶ	περιμένω
440.	ζωντανός	ζωή
441.	ἦρθα	μπαστούνι
442.	τραγουδῶ	ἁμαρτία
443.	δικό μου	ἐννέα
444.	ἴδιος	ντροπή
445.	κάνω ἔκκληση	ἐμφανίζομαι
446.	ἀφήνω	φύλλο
447.	κομμάτια	σκύλα
448.	ὕφη	κρύβει
449.	θηκαρώνω	θήκη
450.	λιγοστεύω	βροχή
451.	στάχτες	γαϊδούρια
452.	μάζα	πουρές
453.	ἀγκαλιά	ἐργαστήριο
454.	ἀσφαλής	σώζω
455.	κάνω ἔκκληση	ἐμφανίζομαι
456.	δέν	νεύω
457.	κοργιός	δολλάριο
458.	δικό μου	ἐννέα
459.	ὅρμοι	μπέζ
460.	ἀσφαλής	σώζω
461.	συμπίεστο	Τζάνετ
462.	ὄχλος	ξεσκονιστήρι
463.	ταξί	τραγιάσκα
464.	ἔγραψα	δρόμος
465.	ἐπαιτῶ	παλιάνθρωποι
466.	περιμένω	ἀναλογία
467.	θεωρῶ	ὁμάδα
468.	ἀγκαλιά	ἐργαστήριο
469.	δικό του	φαγούρα
470.	δέν	νεύω
471.	κονσερβοκούτι	δόντι γραναζιοῦ
472.	βοήθειες	ἡλικία
473.	γάτες	παλιάνθρωποι
474.	δέν	νεύω
475.	σῆμα	φουρνιά
476.	τύλιξτο	κουνέλλι
477.	κατσίκα	σακκάκι
478.	ἀφήνω	φύλλο
479.	κάνω ἔκκληση	ἐμφανίζομαι
480.	ἀφήνω	φύλλο
481.	ἐπαιτῶ	ἁρπάζω
482.	σάκκα	πίσω
483.	λιγοστεύω	βροχή
484.	ἦρθα	μπαστούνι
485.	θρηνῶ	σιδηροτροχιά
486.	ἀγκαλιά	ἐργαστήριο
487.	Σέην (ἐπώνυμο)	ντροπή
488.	κλῆμα	ὡραῖα

489. στάχτη	γαϊδούρι
490. ντροπαλός	αναστεναγμός
491. θέση	σπόρος
492. ξεσηκώνω	επιτρέπει
493. κονσερβοκούτι	δόντι γραναζιοῦ
494. ὕψη	κρύβει
495. ἐπαιτῶ	παλιάνθρωποι
496. ἀσφαλής	σώζω
497. θηκαρώνω	θήκη
498. σφραγίδα	ζῆλος
499. τοῦ Ἔντ	ἄκρη
500. μαστίγιο	κοπέλλα
501. λεπτός	πράγμα
502. ἀπαλλάσσει	RITZ(ξενοδοχεῖο)
503. βοήθειες	ἡλικία
504. ὕψη	κρύβει
505. κομμάτια	σκύλα
506. θέση	σπόρος
507. συγγενεῖς	βασιλιάς
508. ἔγραψα	δρόμος
509. σάκκα	πίσω
510. τοῦ Ἔντ	ἄκρη
511. αὐτή θά...	ἀπόλυτος
512. ἀσφαλέστερος	σωτήρας
513. τύλιξτο	κουνέλλι
514. ἀπαλλάσσει	RITZ(ξενοδοχεῖο)
515. δικό του	φαγούρα
516. ἔγραψα	δρόμος

PART II- SECTIONS I & II

STUDENT TRAINING SHEET

1.	antonym	λέξη μέ ἀντί-θετη ἔννοια	26.	misrepresent	διαστρέφω
2.	bomb	βόμβα	27.	send	στέλνω
3.	bomber	βομβαρδιστικό	28.	sender	ἀποστολέας
4.	bump	χτύπημα	29.	sing	τραγουδῶ
5.	bumper	προφυλακτήρας	30.	singer	τραγουδιστής
6.	cent	$\frac{1}{100}$ δολλαρίου	31.	sink	βυθίζω
7.	centre	κέντρο	32.	sinker	πού βυθίζει
8.	ambassador	πρεσβευτής	33.	sleep	κοιμοῦμαι
9.	dislike	δέ μ'ἀρέσει	34.	small	μικρός
10.	dismember	διαμελίζω	35.	snob	ξενομανής
11.	disgrace	ντροπιάζω	36.	Miss Brown	Δίς Μπράουν
12.	distinguish	ξεχωρίζω	37.	sue	ἐνάγω
13.	embroidery	κέντημα	38.	swell	πρήζομαι
14.	enclitic	ἐγκλιτικός	39.	tend	τείνω
15.	encomium	ἐγκώμιο	40.	tender	τρυφερός
16.	empirical	ἐμπειρικός	41.	tent	ἀντίσκηνο
17.	entrance	εἴσοδος	42.	tentative	δοκιμαστικός
18.	example	παράδειγμα	43.	this drink	αὐτό τό ποτό
19.	ingressive	εἰσερχόμενος	44.	this valley	αὐτή ἡ κοιλάδα
20.	jump	πήδημα	45.	this wall	αὐτός ὁ τοῖχος
21.	jumper	μπλούζα	46.	this year	φέτος
22.	misbehave	συμπεριφέρομαι ἄσχημα	47.	understand	καταλαβαίνω
23.	misdirect	κατευθύνω λάθος	48.	undress	ξεντύνω / -ομαι
24.	misguided	παραπλανημένος			
25.	misname	ὀνομάζω λάθος			

(PART II - -SECTION I) | ΜΕΡΟΣ II - ΤΜΗΜΑ I | (Instructions)

ΟΔΗΓΙΕΣ

'Ο καθένας σας ἔχει τώρα μπροστά του ἕνα "φύλλο ἀπαντήσεων" πού εἶναι ἀριθμημένο ἀπό τό 1 ἕως τό 348. Σέ λίγο θά ἀκούσετε 348 λέξεις. 'Η ἴδια φωνή θά προφέρει ὅλες τίς λέξεις. Μερικές ἀπ'αὐτές τίς λέξεις θ'ἀκουστοῦν ὅπως ἀκριβῶς θ'ἀκούγονταν ἄν τίς πρόφερε ἕνας "Αγγλος· σ'αὐτή τή περίπτωση ἐσεῖς θά πρέπει νά σημειώσετε ἕναν κύκλο γύρω ἀπό τό γράμμα E πού ὑπάρχει δεξιά ἀπό κάθε ἀριθμό : ἔτσι E . (Τό γράμμα E σημαίνει "ENGLISH"). Θ'ἀκουστοῦν ὅμως καί λέξεις πού θά ἔχουν κάποιον "ξενικό" ἦχο μέσα τους· ὅταν ἀκούσετε μιά τετοια λέξη, θά πρέπει νά βάλετε ἕναν κύκλο γύρω ἀπό τό γράμμα F πού ὑπάρχει δεξιά ἀπό τόν κάθε ἀριθμό στό φύλλο τῶν ἀπαντήσεων : ἔτσι F . (Τό γράμμα F σημαίνει "FOREIGN"). Τήν κάθε λέξη θά τήν ἀκούσετε ΜΟΝΟ ΜΙΑ ΦΟΡΑ, γι'αὐτό θά πρέπει νά εἶστε προσεκτικοί. Μετά ἀπό κάθε λέξη πού θ'ἀκοῦτε θά μεσολαβεῖ ἀρκετός χρόνος γιά νά προλαβαίνετε νά σημειώνετε τήν ἀπάντησή σας.

<u>Δῶστε μιάν ἀπάντηση γιά ὅ λ ε ς τίς λέξεις ἔστω κι'ἄν δέν εἶστε ἀπόλυτα σίγουροι γιά τήν ὀρθότητά της .</u>

Προσέξτε τώρα τά ἀκόλουθα παραδείγματα :

1. [wót] 'Ορθή ἀπόκριση: E F (2")

'Η λέξη πού ἀκούσατε δέν εἶχε κανένα ξενικό στοιχεῖο μέσα της· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τό γράμμα E .

2. [γuél] 'Ορθή ἀπόκριση: E F (2")

Στή λέξη πού ἀκούσατε ὁ πρῶτος ἦχος προφέρθηκε μέ ξενικό τρόπο· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τό γράμμα F .

<u>Σημείωση</u> : "Αν ἀλλάξετε γνώμη καί θελήσετε νά διαγράψετε μιάν ἀπάντηση γιά νά δώσετε μιάν ἄλλην, κάντε το ὡς ἑξῆς :

~~E~~ F

'Ακολουθοῦν 6 ἀκόμη παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει <u>ἐσεῖς</u> νά σημειώσετε τήν ἀπάντηση πού θεωρεῖτε σωστή βάζοντας τόν κύκλο ἀνάλογα γύρω ἀπό τό E ἤ γύρω ἀπό τό **F** . 'Αφοῦ σημειώσετε τόν κύκλο εἴτε γύρω ἀπό τό E εἴτε γύρω ἀπό τό **F**, θά ἀκούσετε τή σωστή ἀπάντηση γιά νά τή συγκρίνετε μέ τή δική σας πού ἴσως χρειαστεῖ νά τή διορθώσετε μέ τόν τρόπο πού ἐξηγήσαμε.

Παραδείγματα :

3. [péɨpor] E F 'Ορθή ἀπόκριση:
Βάλτε τόν κύκλο γύρω ἀπό τό F. (2")

4. [pítə] E F 'Ορθή ἀπόκριση:
Βάλτε τόν κύκλο γύρω ἀπό τό E. (2")

5. [méərɨ] E F 'Ορθή ἀπόκριση:
Βάλτε τόν κύκλο γύρω ἀπό τό E. (2")

6. [méri] E F 'Ορθή ἀπόκριση:
Βάλτε τόν κύκλο γύρω ἀπό τό F. (2")

7. [péɨns] E F 'Ορθή ἀπόκριση :
Βάλτε τόν κύκλο γύρω ἀπό τό F. (2")

8. [pénz] E F 'Ορθή ἀπόκριση :
Βάλτε τόν κύκλο γύρω ἀπό τό E. (2")

'Από δῶ κι ὕστερα δέ θά σᾶς δίνεται ἡ σωστή ἀπάντηση.

"Αν δέν προλάβετε νά σημειώσετε ἤ νά διορθώσετε μιάν ἀπάντηση, μήν τό σκέφτεστε **καθόλου** γιατί αὐτό μπορεῖ νά σᾶς **ἐπηρεάσει** καί νά κάνετε κι ἄλλα λάθη στή συνέχεια.

ΜΗ ΓΥΡΙΣΕΤΕ ΑΚΟΜΗ ΣΕΛΙΔΑ. Θά σᾶς πῶ ἐγώ πότε νά τό κάνετε.

Καταλαβαίνετε ἀ κ ρ ι β ῶ ς τί πρέπει νά κάνετε; "Αν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε το τώρα.

Γυρῖστε τώρα στή σελίδα 1 κι ἑτοιμαστεῖτε ν'ἀρχίσουμε. "Ετοιμοι;

(NB. Actually, this is a picture of what the Master Sheet looked like. The transcription of examples enclosed in square brackets (e.g. [méri]) as well as the correct response (e.g. 'Ορθή ἀπόκριση: Βάλτε τόν κύκλο γύρω ἀπό τό F) were on the Master Sheet and heard on tape but did NOT appear on the Students' Instructions Sheets; neither did the indications in parentheses which showed the interval of time between the end of one item (along with the correct response accompanying it) and the beginning of the next one.)

PART II - SECTION I

MASTER SHEET

1. [zwél]
2. [ðɨs vǽ lɨ]
3. [ðɨs yɨ́ə]
4. [ǽndoʉnɨm]
5. [ténd]
6. [znɔ́b]
7. [sɨ́ŋk]
8. [mɨsdɨrékt]
9. [dɨzláɨk]
10. [ʌdrés]
11. [ɨgzámbl]
12. [ðɨs vǽ lɨ]
13. [ðɨs drɨ́ŋk]
14. [sɨ́gə]
15. [mɨznéɨm]
16. [tént]
17. [sɨ́g]
18. [ɨgzábl]
19. [mɨzdɨrékt]
20. [æ b ǽsədə]
21. [téd]
22. [sxyú]
23. [eŋkóʉmɨəm]
24. [ebɨ́rɨkəl]
25. [éntrəns]
26. [dɨstɨ́gwiš]
27. [ǽ doʉnɨm]
28. [egóʉmɨəm]
29. [ʌndəstǽ nd]
30. [dɨstɨ́gwɨš]
31. [ǰʌ́bə]
32. [sɨ́g]
33. [æ bǽ sədə]
34. [snɔ́b]
35. [ǽ ntoʉnɨm]
36. [mɨsdɨrékt]
37. [dɨstɨ́ŋgwɨš]
38. [ebɨ́rɨkəl]
39. [éntrəns]
40. [sɨ́ŋə]
41. [eŋglɨ́tɨk]
42. [zwél]
43. [ðɨz wɔ́l]
44. [ǽ ndoʉnɨm]
45. [ʌdəstǽ nd]
46. [zlíp]
47. [ǰʌ́b]
48. [ɨgzámbl]
49. [ǽ doʉnɨm]
50. [mɨsbɨhéɨv]
51. [eŋgóʉmɨəm]
52. [ðɨs vǽ lɨ]
53. [ténd]
54. [zwél]
55. [empɨ́rɨkəl]
56. [sɨ́gə]
57. [sxyú]
58. [sɨ́g]
59. [embɨ́rɨkəl]
60. [snɔ́b]
61. [smɔ́l]
62. [tédətɨv]
63. [ɨmbrɔ́ɨdərɨ]
64. [éndrəns]
65. [dɨzmémbə]
66. [éndrəns]
67. [æmbǽ sədə]
68. [swél]
69. [zmɔ́l]
70. [sɨ́ŋg]
71. [téd]
72. [ǰʌ́mb]
73. [ðɨs wɔ́l]
74. [éntrəns]
75. [slíp]
76. [ǽ doʉnɨm]
77. [swél]
78. [dɨstɨ́ŋgwɨš]
79. [mɨsreprɨzént]
80. [znɔ́b]
81. [ǽ ntoʉnɨm]
82. [ǰʌ́mpə]
83. [ebɨ́rɨkəl]
84. [ɨgrésɨv]
85. [éntrəns]
86. [mɨzbráʉn]
87. [ebɨ́rɨkəl]
88. [mɨzbɨhéɨv]
89. [eŋklɨ́tɨk]
90. [sɨ́ŋgə]
91. [dɨzmémbə]
92. [eŋglɨ́tɨk]
93. [mɨzgáɨdɨd]
94. [zlíp]
95. [dɨsmémbə]
96. [sɨ́gə]
97. [mɨsbráʉn]
98. [téndə]
99. [ðɨz drɨ́ŋk]
100. [mɨsnéɨm]
101. [ɨbrɔ́ɨdərɨ]
102. [mɨzreprɨzént]
103. [dɨzgréɨs]
104. [ðɨz wɔ́l]
105. [ðɨs drɨ́ŋk]
106. [mɨzbɨhéɨv]
107. [téntətív]
108. [ðɨs yɨ́ə]
109. [téntətɨv]
110. [ǰʌ́mbə]
111. [tédətɨ́v]
112. [ʌndrés]
113. [ðɨz yɨ́ə]
114. [ðɨz drɨ́ŋk]

115. [tént]
116. [ǰʌ́mb]
117. [dɨsmémbə]
118. [téndətɨv]
119. [mɨzbráʉn]
120. [ɨŋgrésɨv]
121. [mɨzbɨhéɨv]
122. [éndrəns]
123. [ðɨs drɨ́ŋk]
124. [ǰʌ́bə]
125. [téndətɨv]
126. [snɔ́b]
127. [sɨ́ŋə]
128. [empɨ́rɨkəl]
129. [sɨ́ŋ]
130. [ǽndoʉnɨm]
131. [ɨmbróɨdərɨ]
132. [eglɨ́tɨk]
133. [tédətɨv]
134. [ǰʌ́b]
135. [mɨsbɨhéɨv]
136. [ɨbróɨdərɨ]
137. [ɨgzámpl]
138. [dɨsgréɨs]
139. [eŋkóʉmɨəm]
140. [mɨsgáɨdɨd]
141. [eglɨ́tɨk]
142. [smól]
143. [empɨ́rɨkəl]
144. [ʌdəstǽnd]
145. [embɨ́rɨkəl]
146. [swél]
147. [dɨstɨ́ŋgwɨ́š]
148. [mɨsbráʉn]
149. [zlíp]
150. [mɨzreprɨzént]
151. [dɨzmémbə]
152. [ðɨs wól]
153. [ʌdəstǽnd]
154. [embɨ́rɨkəl]
155. [sɨ́g]
156. [ʌndrés]
157. [ðɨs wól]
158. [ǰʌ́b]
159. [tédə]
160. [smól]
161. [dɨzláɨk]
162. [ǰʌ́bə]
163. [sɨ́ŋg]
164. [ðɨs yɨ́ə]
165. [mɨsgáɨdɨd]
166. [mɨsnéɨm]
167. [ʌndəstǽnd]
168. [ǰʌ́mbə]
169. [tént]
170. [dɨsgréɨs]
171. [sɨ́ŋgə]
172. [ɨgzámbl]
173. [ɨgrésɨv]
174. [ǽmbǽsədə]
175. [dɨsmémbə]
176. [mɨzbráʉn]
177. [ǰʌ́mp]
178. [dɨsgréɨs]
179. [téndətɨv]
180. [ǰʌ́mpə]
181. [æbǽsədə]
182. [slíp]
183. [sɨ́ŋk]
184. [eŋklɨ́tɨk]
185. [mɨsbráʉn]
186. [tédə]
187. [mɨzdɨrékt]
188. [ǰʌ́b]
189. [ðɨs yɨ́ə]
190. [empɨ́rɨkəl]
191. [mɨsreprɨzént]
192. [ðɨz yɨ́ə]
193. [sɨ́ŋə]
194. [eŋglɨ́tɨk]
195. [ɨgzábl]
196. [sɨ́ŋ]
197. [eŋgóʉmɨəm]
198. [mɨzbráʉn]
199. [mɨznéɨm]
200. [mɨsbɨhéɨv]
201. [mɨsreprɨzént]
202. [mɨsgáɨdɨd]
203. [éndrəns]
204. [sɨ́ŋk]
205. [mɨznéɨm]
206. [ɨgzámpl]
207. [mɨsbɨheɨv]
208. [slip]
209. [zmól]
210. [ǰʌ́mb]
211. [ɨgzámbl]
212. [ðɨz vǽ lɨ]
213. [sɨ́ŋk]
214. [dɨstɨ́gwɨš]
215. [zmól]
216. [dɨzláɨk]
217. [téndə]
218. [ðɨz drɨ́ŋk]
219. [tédə]
220. [dɨzmémbə]
221. [embɨ́rɨkəl]
222. [sɨ́ŋ]
223. [æmbǽsədə]
224. [ténd]
225. [mɨzgáɨdɨd]
226. [ɨgrésɨv]
227. [sɨ́g]
228. [dɨsláɨk]
229. [dɨsgréɨs]
230. [téd]
231. [syú]

232. [eŋgóʉmɨəm]
233. [sɨ́ŋkə]
234. [téntətɨv]
235. [ʌdrés]
236. [ðɨz yɨ́ə]
237. [mɨ́sdɨrékt]
238. [eŋgóʉmɨəm]
239. [ʌndəstǽnd]
240. [æ bǽ sədə]
241. [sɨ́ŋkə]
242. [egóʉmɨəm]
243. [sɨ́ŋg]
244. [slíp]
245. [zwél]
246. [egóʉmɨəm]
247. [znɒ́b]
248. [téntətɨv]
249. [iŋgrésɨv]
250. [ǰʌ́mb]
251. [ǽndoʉnɨm]
252. [znɒ́b]
253. [dɨstɨ́ŋgwɨš]
254. [ɨgzábl]
255. [ɨmbróɨdərɨ]
256. [mɨsnéɨm]
257. [ðɨs wól]
258. [ɨbróɨdərɨ]
259. [sɨ́ŋkə]
260. [ðɨz vǽ lɨ]
261. [ǽdoʉnɨm]
262. [ǰʌ́mpə]
263. [ðɨz drɨ́ŋk]
264. [sxyú]
265. [téndətɨv]
266. [téndə]
267. [sɨ́ŋə]
268. [egóʉmɨəm]
269. [dɨzláɨk]
270. [sxyú]
271. [mɨsbráʉn]
272. [smól]
273. [dɨstɨ́gwɨš]
274. [ǰʌ́mp]
275. [ðɨz yɨ́ə]
276. [tédətɨv]
277. [ɨŋgrésɨv]
278. [téndə]
279. [ʌndəstǽnd]
280. [mɨsdɨrékt]
281. [ʌndrés]
282. [ǽntoʉnɨm]
283. [snɒ́b]
284. [mɨsnéɨm]
285. [mɨzgáɨdɨd]
286. [mɨzbɨhéɨv]
287. [syú]
288. [eglɨ́tɨk]
289. [æ bǽ sədə]
290. [ɨbróɨdərɨ]
291. [ǰʌ́mp]
292. [ɨgzámpl]
293. [dɨsláɨk]
294. [mɨznéɨm]
295. [ɨgzámbl]
296. [ǰʌ́mbə]
297. [téd]
298. [ǰʌ́mpə]
299. [sɨ́ŋgə]
300. [eŋglɨ́tɨk]
301. [ǽntoʉnɨm]
302. [mɨzdɨrékt]
303. [mɨsgáɨdɨd]
304. [ðɨs vǽ lɨ]
305. [ɨŋgrésɨv]
306. dɨzgréɨs]
307. [mɨsreprɨzént]
308. [ǰʌ́mp]
309. [mɨzreprɨzént]
310. [eŋglɨ́tɨk]
311. [ɨgzábl]
312. [syú]
313. [zlíp]
314. [mɨzgáɨdɨd]
315. [dɨsláɨk]
316. [ðɨz wól]
317. [dɨzgréɨs]
318. [sɨ́gə]
319. [eŋglɨ́tɨk]
320. [mɨzreprɨzént]
321. [ʌdrés]
322. [zmól]
323. [ǰʌ́mbə]
324. [ʌndrés]
325. [ɨmbróɨdərɨ]
326. [eŋglɨ́tɨk]
327. [tént]
328. [eŋkóʉmɨəm]
329. [mɨzdɨrékt]
330. [ðɨz wól]
331. [ðɨz vǽ lɨ]
332. [dɨzgréɨs]
333. [ʌdəstǽnd]
334. [swél]
335. [tédə]
336. [ʌndrés]
337. [ðɨz vǽ lɨ]
338. [dɨsmémbə]
339. [ǰʌ́bə]
340. [syú]
341. [ténd]
342. [sɨ́ŋ]
343. [sɨ́ŋkə]
344. [ɨgrésɨv]
345. [sɨ́ŋgə]
346. [ðɨz drɨ́ŋk]
347. [dɨsláɨk]
348. [eŋkoʉmɨəm]

-

(S A M P L E Page)

ΜΕΡΟΣ II
(PART II)

ΟΝΟΜΑ:
NAME :

ΦΥΛΛΟ ΑΠΑΝΤΗΣΕΩΝ
(Answer Sheet)

1.	E	F	27.	E	F
2.	E	F	28.	E	F
3.	E	F	29.	E	F
4.	E	F	30.	E	F
5.	E	F	31.	E	F
6.	E	F	32.	E	F
7.	E	F	33.	E	F
8.	E	F	34.	E	F
9.	E	F	35.	E	F
10.	E	F	36.	E	F
11.	E	F	37.	E	F
12.	E	F	38.	E	F
13.	E	F	39.	E	F
14.	E	F	40.	E	F
15.	E	F	41.	E	F
16.	E	F	42.	E	F
17.	E	F	43.	E	F
18.	E	F	44.	E	F
19.	E	F	45.	E	F
20.	E	F	46.	E	F
21.	E	F	47.	E	F
22.	E	F	48.	E	F
23.	E	F	49.	E	F
24.	E	F	50.	E	F
25.	E	F	....		
26.	E	F	....		

(PART II - SECTION II) ΜΕΡΟΣ II - ΤΜΗΜΑ II (Instructions)

ΟΔΗΓΙΕΣ

'Ο καθένας σας ἔχει τώρα μπροστά του ἕνα "φύλλο ἀπαντήσεων" πού εἶναι ἀριθμημένο ἀπό τό 1 ἕως τό 92. Σέ λίγο θά ἀκούσετε 92 λέξεις. 'Η ἴδια φωνή θά προφέρει ὅλες τίς λέξεις. Μερικές ἀπ'αὐτές τίς λέξεις θ'ἀκουστοῦν ὅπως ἀκριβῶς θ'ἀκούγονταν ἄν τίς πρόφερε ἕνας "Αγγλος· σ'αὐτή τήν περίπτωση ἐσεῖς θά πρέπει νά σημειώσετε ἕναν κύκλο γύρω ἀπό τό γράμμα E πού ὑπάρχει δεξιά ἀπό κάθε ἀριθμό : ἔτσι E . (Τό γράμμα E σημαίνει "ENGLISH"). Θ'ἀκουστοῦν ὅμως καί λέξεις πού θά ἔχουν κάποιον "ξενικό" ἦχο μέσα τους· ὅταν ἀκούσετε μιά τέτοια λέξη, θά πρέπει νά βάλετε ἕναν κύκλο γύρω ἀπό τό γράμμα F πού ὑπάρχει δεξιά ἀπό τόν κάθε ἀριθμό στό φύλλο τῶν ἀπαντήσεων : ἔτσι F . (Τό γράμμα F σημαίνει "FOREIGN"). Τήν κάθε λέξη θά τήν ἀκούσετε ΜΟΝΟ ΜΙΑ ΦΟΡΑ γι'αὐτό θά πρέπει νά εἶστε προσεκτικοί. Μετά ἀπό κάθε λέξη πού θ'ἀκοῦτε θά μεσολαβεῖ ἀρκετός χρόνος γιά νά προλαβαίνετε νά σημειώνετε τήν ἀπάντησή σας.

<u>Δῶστε μιάν ἀπάντηση γιά ὅ λ ε ς τίς λέξεις ἔστω κι'ἄν δέν εἶστε ἀπόλυτα σίγουροι γιά τήν ὀρθότητά της.</u>

<u>Προσέξτε τώρα τά ἀκόλουθα παραδείγματα</u> :

1. [lént] 'Ορθή ἀπόκριση: E F (2")

'Η λέξη πού ἀκούσατε δέν εἶχε κανένα ξενικό στοιχεῖο μέσα της· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τό γράμμα E .

2. [lént^{ə}] 'Ορθή ἀπόκριση: E F (2")

Τό τέλος τῆς λέξης πού ἀκούσατε προφέρθηκε μέ ξενικό τρόπο· ἔτσι βάλαμε τόν κύκλο γύρω ἀπό τό γράμμα F .

<u>Σημείωση</u> : "Αν ἀλλάξετε γνώμη καί θελήσετε νά διαγράψετε μιάν ἀπάντηση γιά νά δώσετε μιάν ἄλλην, κάντε το ὡς ἑξῆς:

~~E~~ F

'Ακολουθοῦν 6 ἀκόμη παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει <u>ἐσεῖς</u> νά σημειώσετε τήν ἀπάντηση πού θεωρεῖτε σωστή βάζοντας τόν κύκλο ἀνάλογα γύρω ἀπό τό E ἤ γύρω ἀπό τό F . 'Αφοῦ σημειώσετε τόν κύκλο εἴτε γύρω ἀπό τό E εἴτε γύρω ἀπό τό F, θά ἀκούσετε τή σωστή ἀπάντηση γιά νά τή συγκρίνετε μέ τή δική σας πού ἴσως χρειαστεῖ νά τή διορθώσετε μέ τόν τρόπο πού ἐξηγήσαμε.

Παραδείγματα :

3. [bénd] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό E . (2")

4. [mónɨŋ] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό E . (2")

5. [ívnɨŋk] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό F . (2")

6. [lǽmp] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό E . (2")

7. [kóum] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό E . (2")

8. [lǽmb] E F 'Ορθή απόκριση:
Βάλτε τόν κύκλο γύρω άπό τό F . (2")

'Από δῶ κι ὕστερα δέ θά σᾶς δίνεται ἡ σωστή ἀπάντηση .

"Αν δέν προλάβετε νά σημειώσετε ἤ νά διορθώσετε μιάν ἀπάντηση μήν τό σκέφτεστε καθόλου γιατί αὐτό μπορεῖ νά σᾶς ἐπηρεάσει καί νά κάνετε κι ἄλλα λάθη στή συνέχεια.

ΜΗ ΓΥΡΙΖΕΤΕ ΑΚΟΜΗ ΣΕΛΙΔΑ . Θά σᾶς πῶ ἐγώ πότε νά τό κάνετε.

Καταλαβαίνετε ἀ κ ρ ι β ῶ ς τί πρέπει νά κάνετε; "Αν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε το τώρα.

Γυρῖστε τώρα στή σελίδα 1 κι ἑτοιμαστεῖτε ν'ἀρχίσουμε. "Ετοιμοι;

(NB. Actually, this is a picture of what the Master Sheet looked like. The transcription of examples enclosed in square brackets (e.g. [bénd]) as well as the correct response (e.g. 'Ορθή ἀπόκριση: Βάλτε τόν κύκλο γύρω ἀπό τό E) were on the Master Sheet and heard on tape but did NOT appear on the Students' Instructions Sheet; neither did the indications in parentheses which showed the interval of time between the end of one item (along with the correct response accompanying it) and the beginning of the next one.)

PART II - SECTION II

MASTER SHEET

1. [sɨ́ŋ]
2. [bʌ́mbə]
3. [sénd^{ə}]
4. [sɨ́ŋk^{ə}]
5. [séndə]
6. [bʌ́mpə]
7. [bʌ́mbə]
8. [sénd]
9. [sɨ́ŋə]
10. [sɨ́ŋk]
11. [sénd^{ə}]
12. [bʌ́mbə]
13. [bɒ́m]
14. [sénd^{ə}]
15. [bʌ́mb^{ə}]
16. [sénd^{ə}]
17. [séntə]
18. [sɨ́ŋkə]
19. [sént^{ə}]
20. [bʌ́mp^{ə}]
21. [séndə]
22. [sɨ́ŋg^{ə}]
23. [bʌ́mp^{ə}]
24. [sént]
25. [séndə]
26. [sɨ́ŋ]
27. [sénd]
28. [sént^{ə}]
29. [sɨ́ŋg^{ə}]
30. [sént^{ə}]
31. [bɒ́mə]
32. [sɨ́ŋg^{ə}]
33. [sénd]
34. [sɨ́ŋgə]
35. [bʌ́mp]
36. [sɨ́ŋgə]
37. [sɨ́ŋkə]
38. [bɒ́m]
39. [sént^{ə}]
40. [bɒ́m]
41. [sént]
42. [séntə]
43. [sɨ́ŋk]
44. [sɨ́ŋ]
45. [séndə]
46. [sɨ́ŋgə]
47. [bɒ́mə]
48. [sɨ́ŋ]
49. [sɨ́ŋə]
50. [sénd^{ə}]
51. [sɨ́ŋg^{ə}]
52. [bʌ́mbə]
53. [sɨ́ŋk]
54. [séndə]
55. [bʌ́mp]
56. [sɨ́ŋə]
57. [bɒ́m]
58. [bɒ́mə]
59. [sɨ́ŋgə]
60. [bʌ́mp]
61. [séntə]
62. [bʌ́mpə]
63. [sɨ́ŋgə]
64. [séndə]
65. [bʌ́mpə]
66. [sɨ́ŋə]
67. [sént]
68. [bʌ́mp^{ə}]
69. [sénd^{ə}]
70. [sɨ́ŋg^{ə}]
71. [bʌ́mp]
72. [sénd]
73. [bʌ́mb^{ə}]
74. [sɨ́ŋk]
75. [séndə]
76. [bʌ́mpə]
77. [sɨ́ŋkə]
78. [bʌ́mpə]
79. [sénd^{ə}]
80. [bɒ́mə]
81. [bʌ́mb^{ə}]
82. [sɨ́ŋkə]
83. [bʌ́mp^{ə}]
84. [sɨ́ŋk^{ə}]
85. [sént]
86. [séndə]
87. [bɒ́m]
88. [sɨ́ŋk^{ə}]
89. [séntə]
90. [sɨ́ŋk^{ə}]
91. [sénd^{ə}]
92. [sɨ́ŋg^{ə}]

PART III - SECTION I

STUDENT TRAINING SHEET

1.	simple	ἁπλός	32.	thump	γροθιά
2.	symbol	σύμβολο	33.	tent	ἀντίσκηνο
3.	jump	πήδημα	34.	tend	τείνω
4.	thumb	ἀντίχειρας	35.	bank	Τράπεζα
5.	amplify	ἐνισχύω	36.	bang	ἀπότομος κρότος
6.	emblem	ἔμβλημα	37.	bumper	προφυλακτήρας
7.	pumps	ἀντλίες	38.	bomber	βομβαρδιστικό
8.	thumbs	ἀντίχειρες	39.	tenter	πλαίσιο γιά ἅπλωμα ρούχων
9.	entomology	ἐντομολογία	40.	tender	τρυφερός
10.	endanger	βάζω σέ κίνδυνο	41.	banking	τραπεζιτικές ἐργασίες
11.	cent	ἑκατοστό δολλαρίου	42.	banging	κλείνοντας μέ κρότο
12.	send	στέλνω	43.	slave	σκλάβος
13.	sentry	φρουρός	44.	sleep	ὕπνος
14.	laundry	ροῦχα γιά πλύσιμο	45.	sleeve	μανίκι
15.	tents	ἀντίσκηνα	46.	small	μικρός
16.	bends	στροφές	47.	smell	μυρωδιά
17.	blanket	κουβέρτα	48.	smoke	καπνός
18.	engagement	ἀρραβώνας	49.	snob	ξενομανής
19.	sink	βυθίζω	50.	snore	ροχαλίζω
20.	sing	τραγουδῶ	51.	snow	χιόνι
21.	bankrupt	χρεωκοπημένος	52.	swell	πρήζομαι
22.	angry	θυμωμένος	53.	sweep	σκουπίζω
23.	(he) thinks	νομίζει	54.	swine	γουρούνι
24.	things	πράματα	55.	sue	ἐνάγω
25.	comb	χτένα	56.	suit	κοστούμι
26.	jumper	μπλούζα			
27.	comber	ξαντική μηχανή (λανάρα)			
28.	centre	κέντρο			
29.	sender	ἀποστολέας			
30.	sinker	πού βυθίζει			
31.	singer	τραγουδιστής			

(PART III - SECTION I) **ΜΕΡΟΣ ΤΡΙΤΟ - ΤΜΗΜΑ ΠΡΩΤΟ** (Instructions)

ΟΔΗΓΙΕΣ

Σέ λίγο θ'ἀκούσετε 224 'Ελληνικές λέξεις ἤ φράσεις. Κάθε λέξη ἤ φράση θά ἀκουστεῖ ΜΙΑ ΜΟΝΟ ΦΟΡΑ γι'αὐτό θά πρέπει νά εἶστε προσεκτικοί. 'Η κάθε λέξη ἤ φράση μεταφράζεται μονολεκτικά στ''Αγγλικά στίς εἰδικές σελίδες πού σᾶς ἔδωσα· ἄν τίς μελετήσατε θά πρέπει νά μπορεῖτε νά πεῖτε στ''Αγγλικά αὐτό πού ἀκοῦτε στά 'Ελληνικά χωρίς νά κομπιάζετε. 'Αμέσως μόλις ἀκούσετε μιά 'Ελληνική λέξη ἤ φράση πέστε τήν ἀντίστοιχη 'Αγγλική της μετάφραση.

Δῶστε μιάν ἀπάντηση γιά ὅλες τίς λέξεις ἤ φράσεις πού θ'ἀκούσετε ἔστω κι ἄν δέν εἶστε ἀπόλυτα βέβαιοι γιά τήν ὀρθότητά της.

Προσέξτε τώρα τά ἀκόλουθα παραδείγματα :

1. (Λάμπα) 'Ορθή μετάφραση : LAMP
2. (Φυλακίζω) 'Ορθή μετάφραση : IMPRISON

'Ακολουθοῦν 6 ἀκόμη παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει ἐσεῖς νά πεῖτε τή μετάφραση. Μετά ἀπό κάθε 'Ελληνική λέξη ἤ φράση πού θά ἀκοῦτε θά μεσολαβεῖ ἀρκετός χρόνος γιά νά προλαβαίνετε νά λέτε τήν 'Αγγλική της μετάφραση. Στή συνέχεια, καί μόνο γιά τά ἑπόμενα 6 παραδείγματα, θά σᾶς δίνεται ἐπίσης καί ἡ σωστή 'Αγγλική μετάφραση.

3. θυμωμένος (STUDENT RESPONSE) 'Ορθή μετάφραση : ANGRY
4. Πόρτα (STUDENT RESPONSE) 'Ορθή μετάφραση : DOOR
5. Στέλνω (STUDENT RESPONSE) 'Ορθή μετάφραση : SEND
6. Τετράδιο (STUDENT RESPONSE) 'Ορθή μετάφραση : NOTEBOOK
7. Γουρούνι (STUDENT RESPONSE) 'Ορθή μετάφραση : SWINE
8. Θεία (STUDENT RESPONSE) 'Ορθή μετάφραση : AUNT

'Από δῶ κι ὕστερα δέ θά σᾶς δίνεται ἡ 'Αγγλική μετάφραση.

Καταλαβαίνετε ἀκριβῶς τί πρέπει νά κάνετε; "Αν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε το τώρα.

Εἶστε ἕτοιμοι τώρα ν'ἀρχίσουμε;

(NB. All eight examples were done orally. The Students' Instructions sheets were left blank in the respective spaces. The Greek word and the correct response were heard from tape.)

PART III - SECTION I

MASTER SHEET

1. τρυφερός
2. ἀρραβώνας
3. πήδημα
4. πράματα
5. γροθιά
6. θυμωμένος
7. σύμβολο
8. βομβαρδιστικό
9. βυθίζω
10. κοστούμι
11. χτένα
12. θυμωμένος
13. καπνός
14. πού βυθίζει
15. ἀντλίες
16. σύμβολο
17. ἑκατοστό δολλαρίου
18. ἀντίχειρες
19. χρεωκοπημένος
20. τραγουδῶ
21. πλαίσιο γιά ἅπλωμα ρούχων
22. ἐνάγω
23. ροχαλίζω
24. ἐνισχύω
25. ἀρραβώνας
26. στέλνω
27. ροχαλίζω
28. ἀντίσκηνα
29. μυρωδιά
30. ὕπνος
31. μπλούζα
32. μικρός
33. βυθίζω
34. χρεωκοπημένος
35. ἀποστολέας
36. σκουπίζω
37. ἁπλός
38. θυμωμένος
39. ξαντικη μηχανή (λανάρα)
40. ξενομανής
41. ἐνισχύω
42. κουβέρτα
43. τράπεζα
44. κουβέρτα
45. ἀντίχειρες
46. ἀντίσκηνο
47. ἐνάγω
48. ξαντική μηχανή (λανάρα)
49. ἐνισχύω
50. χιόνι
51. σύμβολο
52. προφυλακτήρας
53. ἀντίσκηνα
54. ροῦχα γιά πλύσιμο
55. καπνός
56. ἀντίχειρας
57. βάζω σέ κίνδυνο
58. σκουπίζω
59. ἀποστολέας
60. πράγματα
61. προφυλακτήρας
62. ροῦχα γιά πλύσιμο
63. ἀντλίες
64. χρεωκοπημένος
65. κουβέρτα
66. γουρούνι
67. πλαίσιο γιά ἅπλωμα ρούχων
68. βάζω σέ κίνδυνο
69. μυρωδιά
70. ἐνισχύω

71. φρουρός
72. μπλούζα
73. ἀντλίες
74. ἑκατοστό δολλαρίου
75. ἀντίχειρες
76. κέντρο
77. πρήζομαι
78. γουρούνι
79. τραγουδιστής
80. ἀπότομος κρότος
81. ἀντίσκηνο
82. ἀντίχειρες
83. πού βυθίζει
84. ἀντίσκηνα
85. ἁπλός
86. στροφές
87. ἐνάγω
88. προφυλακτήρας
89. ροχαλίζω
90. σκλάβος
91. τραγουδιστής
92. ἀντλίες
93. πλαίσιο γιά ἅπλωμα ρούχων
94. σκουπίζω
95. γροθιά
96. ἔμβλημα
97. ροῦχα γιά πλύσιμο
98. πήδημα
99. μικρός
100. γουρούνι
101. ἀντίχειρας
102. κουβέρτα
103. ἀποστολέας
104. στροφές
105. τείνω
106. μυρωδιά
107. ἀντίσκηνο
108. ξενομανής
109. ἀντίχειρας
110. μυρωδιά
111. βομβαρδιστικό
112. πράγματα
113. βάζω σέ κίνδυνο
114. τραγουδῶ
115. τείνω
116. πρήζομαι
117. φρουρός
118. νομίζει
119. τραγουδιστής
120. ἀρραβώνας
121. ἀπότομος κρότος
122. στέλνω
123. κλείνοντας μέ κρότο
124. γροθιά
125. τραπεζικές ἐργασίες
126. σκουπίζω
127. ὕπνος
128. ἀπότομος κρότος
129. ἐνάγω
130. σκλάβος
131. προφυλακτήρας
132. ἐντομολογία
133. χιόνι
134. χτένα
135. βυθίζω
136. φρουρός
137. βομβαρδιστικό
138. κοστούμι
139. τρυφερός
140. τραγουδῶ
141. νομίζει
142. πλαίσιο γιά ἅπλωμα ρούχων
143. ροῦχα γιά πλύσιμο
144. ἀρραβώνας
145. κέντρο
146. μανίκι

147. ἔμβλημα
148. τρυφερός
149. ἐντομολογία
150. σύμβολο
151. χρεωκοπημένος
152. ξαντική μηχανή (λανάρα)
153. θυμωμένος
154. κοστούμι
155. τραπεζιτικές ἐργασίες
156. ἁπλός
157. ἔμβλημα
158. χτένα
159. στροφές
160. ξενομανής
161. τείνω
162. τραγουδῶ
163. στροφές
164. τραπεζιτικές ἐργασίες
165. ὕπνος
166. ἔμβλημα
167. κλείνοντας μέ κρότο
168. τραγουδιστής
169. μπλούζα
170. κλείνοντας μέ κρότο
171. νομίζει
172. πήδημα
173. θυμωμένος
174. ξαντική μηχανή (λανάρα)
175. μανίκι
176. φρουρός
177. πρήζομαι
178. ἑκατοστό δολλαρίου
179. μανίκι
180. πράγματα
181. τρυφερός
182. ἁπλός
183. χρεωκοπημένος
184. χτένα
185. νομίζει
186. σκλάβος
187. ἀπότομος κρότος
188. γουρούνι
189. ξενομανής
190. μικρός
191. στέλνω
192. σκλάβος
193. βάζω σέ κίνδυνο
194. τραπεζιτικές ἐργασίες
195. ἐντομολογία
196. μπλούζα
197. ἐντομολογία
198. ἀντίσκηνα
199. κέντρο
200. πρήζομαι
201. ροχαλίζω
202. μανίκι
203. ἀποστολέας
204. χιόνι
205. ὕπνος
206. καπνός
207. χιόνι
208. τράπεζα
209. γροθιά
210. βομβαρδιστικό
211. ἀντίσκηνο
212. κέντρο
213. τράπεζα
214. κοστούμι
215. καπνός
216. κλείνοντας μέ κρότο
217. τείνω
218. ἀντίχειρας
219. πού βυθίζει
220. ἀποστολέας
221. ἑκατοστό δολλαρίου
222. τράπεζα
223. πήδημα
224. στέλνω

PART III - ALL SECTIONS

INSTRUCTIONS FOR THE JUDGES

The Production part of this experiment consists of three sections. In Section I the students are given a number of spoken Greek words and are asked to give a fluent translation of each in English. In Section II the students hear a number of Greek sentences and are asked again to record a fluent translation of each in English. The students have previously been trained in the translation of these items through special training sheets containing the material to be tested; so they should be familiar with it at the time of testing. In both sections what is being tested is student vocal production of (a) [+nasal][+stop], and (b) /s/[+voiced consonant] English sequences; these sequences are examined both within words and across words. Section III is a further attempt to test student production of /s/[+voiced consonant] English sequences; this time the material is disguised as a grammatical exercise: cued by the parenthesized words and also by the singularity or plurality of the relevant noun in each sentence, the student is asked to give a fluent rendering of each sentence after having silently decided on <u>this</u>, <u>these</u>, <u>those</u>. What you, as judges, are requested to do is to decide whether the 'sibilant' terminating these 'demonstratives' is differentiated or pronounced identically in this environment.

You have been given a scoring sheet with the translations expected of the students. On this sheet the relevant sequences have been concatenated for your convenience, like this: "this‿boy". Now, you are to please listen carefully to student renderings separately per item, per section. Please pay close attention to the relevant (marked) sequence which is being tested each time. Ignore all other aspects of the pronunciation of the item you hear - such as pronunciation of other consonants and vowels, speed, and prosodic features. You would probably prefer to locate on your sheet the problematic area of each item before you listen to its production on tape so you may concentrate on this area only.

It is essential that idiosyncratic features be taken into account in rating. For example, if a student consistently partially 'devoices' a regular /z/ in his speech, he cannot be expected to make the mistake of fully 'voicing' the /s/ before a voiced consonant:

if the z in razor sounds like something between a [s] and a [z], then the s in this razor (which is hypothesized as erroneously voiced before a voiced consonant) will probably also sound like something between a [s] and a [z].

Please rate student performance of the critical sequences as either 'acceptable' (if it is perfect or near perfect English) or 'unacceptable' (if it has Greek traces in it). It is important that ALL ITEMS BE RATED and that each item be rated after ONE SINGLE hearing. The items are, of course, numbered identically on both the tape and your scoring sheet. If you regard the sequence in question as 'Acceptable', write an A in the space provided at the right of the relevant item. Otherwise, write a U in this space. If you find that a student has produced a word/sentence which is completely different from that predicted in your own sheet, do not write anything in the blank.

You will now hear three sets of examples (one for each section of Part III) which are meant to help you to establish standards for rating differences. Each set is divided into (i) items the critical part of which is pronounced 'acceptably', and (ii) items which contain an 'unacceptable' sound sequence. As the 'answer' appears after each student response, you do not have to do anything but listen at this stage.

Finally, after you have listened to these examples, you will hear some practice student-renderings which are to be rated on the special 'Practice Rating-Sheet' provided. Listen to each item and then rate it as explained. When you have finished rating the practice tape, we shall compare your ratings to see whether and how they differ from one another.

If there are any questions, please ask them - now or as you work with the practice tape.

JUDGE'S RATING SHEET — STUDENT'S NAME: ______________

Expected Student Responses — JUDGE'S NAME: ______________

PART III - SECTION I

1. tender ______
2. engagement ______
3. jump ______
4. things ______
5. thump ______
6. angry ______
7. symbol ______
8. bomber ______
9. sink ______
10. suit ______
11. comb ______
12. angry ______
13. smoke ______
14. sinker ______
15. pumps ______
16. symbol ______
17. cent ______
18. thumbs ______
19. bankrupt ______
20. sing ______
21. tenter ______
22. sue ______
23. snore ______
24. amplify ______
25. engagement ______
26. send ______
27. snore ______
28. tents ______
29. smell ______
30. sleep ______
31. jumper ______
32. small ______
33. sink ______
34. bankrupt ______
35. sender ______
36. sweep ______
37. simple ______
38. angry ______
39. comber ______
40. snob ______
41. amplify ______
42. blanket ______
43. bank ______
44. blanket ______
45. thumbs ______
46. tent ______
47. sue ______
48. comber ______
49. amplify ______
50. snow ______
51. symbol ______
52. bumper ______
53. tents ______
54. laundry ______
55. smoke ______
56. thumb ______
57. endanger ______
58. sweep ______
59. sender ______
60. things ______
61. bumper ______
62. laundry ______
63. pumps ______
64. bankrupt ______
65. blanket ______
66. swine ______
67. tenter ______
68. endanger ______
69. smell ______
70. amplify ______
71. sentry ______
72. jumper ______
73. pumps ______
74. cent ______
75. thumbs ______
76. centre ______
77. swell ______
78. swine ______
79. singer ______
80. bang ______
81. tent ______
82. thumbs ______
83. sinker ______
84. tents ______
85. simple ______
86. bends ______
87. sue ______
88. bumper ______
89. snore ______
90. slave ______
91. singer ______
92. pumps ______
93. tenter ______
94. sweep ______
95. thump ______
96. emblem ______
97. laundry ______
98. jump ______
99. small ______
100. swine ______
101. thumb ______
102. blanket ______
103. sender ______
104. bends ______
105. tend ______
106. smell ______
107. tent ______
108. snob ______

109. thumb ____
110. smell ____
111. bomber ____
112. things ____
113. endanger ____
114. sing ____
115. tend ____
116. swell ____
117. sentry ____
118. (he) thinks ____
119. singer ____
120. engagement ____
121. bang ____
122. send ____
123. banging ____
124. thump ____
125. banking ____
126. sweep ____
127. sleep ____
128. bang ____
129. sue ____
130. slave ____
131. bumper ____
132. entcnology ____
133. snow ____
134. comb ____
135. sink ____
136. sentry ____
137. bomber ____
138. suit ____
139. tender ____
140. sing ____
141. (he) thinks ____
142. tenter ____
143. laundry ____
144. engagement ____
145. centre ____
146. sleeve ____
147. emblem ____
148. tender ____
149. entomology ____
150. symbol ____
151. bankrupt ____
152. comber ____
153. angry ____
154. suit ____
155. banking ____
156. simple ____
157. emblem ____
158. comb ____
159. bends ____
160. snob ____
161. tend ____
162. sing ____
163. bends ____
164. banking ____
165. sleep ____
166. emblem ____
167. banging ____
168. singer ____
169. jumper ____
170. banging ____
171. (he) thinks ____
172. jump ____
173. angry ____
174. comber ____
175. sleeve ____
176. sentry ____
177. swell ____
178. cent ____
179. sleeve ____
180. things ____
181. tender ____
182. simple ____
183. bankrupt ____
184. comb ____
185. (he) thinks ____
186. slave ____
187. bang ____
188. swine ____
189. snob ____
190. small ____
191. send ____
192. slave ____
193. endanger ____
194. banking ____
195. entomology ____
196. jumper ____
197. entomology ____
198. tents ____
199. centre ____
200. swell ____
201. snore ____
202. sleeve ____
203. sender ____
204. snow ____
205. sleep ____
206. smoke ____
207. snow ____
208. bank ____
209. thump ____
210. bomber ____
211. tent ____
212. centre ____
213. bank ____
214. suit ____
215. smoke ____
216. banging ____
217. tend ____
218. thumb ____
219. sinker ____
220. sender ____
221. cent ____
222. bank ____
223. jump ____
224. send ____

PART III - SECTION II

STUDENT TRAINING SHEET

1. Πόσο ψηλός εἶναι αὐτός ὁ τοῖχος;
   - How high is this wall?

2. Σ'ἀρέσει αὐτή ἡ μπύρα;
   - Do you like this beer?

3. Ζεῖ στή φτώχεια.
   - He lives in poverty.

4. Τά μωρά κοιμοῦνται σέ κρεββατάκια.
   - Babies sleep in cots.

5. Βάλε αὐτό τό βάζο πάνω στό τραπέζι.
   - Put this vase on the table!

6. Αὐτή ἡ φωνή μοῦ φαίνεται γνωστή.
   - This voice sounds familiar.

7. Βρίσκεται σέ κίνδυνο.
   - He is in danger.

8. Ἦρθε αὐτοπροσώπως.
   - He came in person.

9. Βάλτο πάνω-πάνω.
   - Put it on top!

10. Αὐτή ἡ γῆ εἶναι πολύ εὔφορη.
    - This land is very fertile.

11. Αὐτό τό θρανίο εἶναι δικό μου.
    - This desk is mine.

12. Τόν γνωρίζεις αὐτόν τόν ἄνθρωπο;
    - Do you know this man?

13. Τό ξέρω αὐτό τ'ἀγόρι.
    - I know this boy.

14. Δέ μ'ἀρέσει αὐτή ἡ μουσική.
    - I don't like this music.

15. Δόσμου αὐτό τό κίτρινο μολύβι.
    - Give me this yellow pencil!

16. Ἄνοιξε αὐτή τήν αὐλόπορτα.
 - Open this gate!

17. Σκοτώθηκε στή μάχη.
 - He was killed in battle.

18. Ζεῖ μέ ἀνέσεις.
 - He lives in comfort.

19. Νομίζω πώς θά τ'ἀγοράσω αὐτό τό ραδιόφωνο.
 - I think I'll buy this radio.

20. Δέν πιστεύουν στό Θεό.
 - They don't believe in God.

21. Ἄνοιξε αὐτή τήν πόρτα.
 - Open this door!

22. Σ'ἀρέσει αὐτός ὁ κῆπος;
 - Do you like this garden?

23. Πληρώθηκε σέ χρυσάφι.
 - He was paid in gold.

24. Τήν ἔχεις διαβάσει αὐτή τήν ἀναφορά;
 - Have you read this report?

25. Αὐτός ὁ νεαρός εἶναι πολύ ἔξυπνος.
 - This young man is very clever.

26. Ἄκου αὐτό τό θόρυβο.
 - Listen to this noise!

27. Εἶναι χρεωμένος.
 - He is in debt.

28. Τό ξέρω αὐτό τό ὄνομα.
 - I know this name.

29. Μένουν σ'ἀντίσκηνα.
 - They live in tents.

30. Δέν τή ξέρω αὐτή τήν κυρία.
 - I don't know this lady.

31. Ἐλᾶτε ἀπό δῶ, παρακαλῶ.
 - Come this way, please!

32. Βάλτο σέ βραστό νερό.
 - Put it in boiling water!

(PART III - SECTION II) **ΜΕΡΟΣ ΤΡΙΤΟ - ΤΜΗΜΑ ΔΕΥΤΕΡΟ** (Instructions)

ΟΔΗΓΙΕΣ

Σέ λίγο θ'άκούσετε 128 'Ελληνικές προτάσεις άπό μιά φορά τήν κάθε πρόταση γι'αύτό θά πρέπει νά είστε προσεκτικοί. 'Η κάθε πρόταση σᾶς ἔχει δοθεῖ μεταφρασμένη στ''Αγγλικά σέ ειδικές σελίδες· ἄν τίς μελετήσατε, θά μπορέσετε τήν πρόταση πού θ'άκούσετε στά 'Ελληνικά νά τήν μεταφράσετε καί νά τήν πεῖτε στ''Αγγλικά χ ω ρ ί ς ν ά κ ο μ π ι ά σ ε τ ε ἤ ν ά σ τ α μ α τ ή σ ε τ ε γιά νά σκεφτεῖτε.

Δῶστε μιά γρήγορη μετάφραση γιά ὅλες τίς προτάσεις πού θά άκούσετε ἔστω κι ἄν δέν εἶστε ἀπόλυτα βέβαιοι γιά τήν ὀρθότητά της.

Προσέξτε τώρα τ'ἀκόλουθα παραδείγματα :

1. Ἔχω ζήσει σ'αὐτό τό σπίτι.

   'Ορθή μετάφραση : I've lived in this house.

2. Τά ξέρεις ἐκεῖνα τ'ἀγόρια;

   'Ορθή μετάφραση : Do you know those boys?

'Ακολουθοῦν 6 ἀκόμη παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει ἐσεῖς νά πεῖτε τή σωστή μετάφραση. Μετά ἀπό κάθε 'Ελληνική πρόταση θά μεσολαβεῖ ἀρκετός χρόνος γιά νά προλάβετε νά πεῖτε τήν 'Αγγλική της μετάφραση. Στή συνέχεια , καί μόνο γιά τά ἑπόμενα 6 παραδείγματα, θά σᾶς δίνεται ἐπίσης καί ἡ σωστή 'Αγγλική μετάφραση.

3. Σ'ἀρέσει αὐτό τό σακκάκι; (STUDENT RESPONSE)

   'Ορθή μετάφραση : Do you like this coat?

4. Πάω σπίτι. (STUDENT RESPONSE)

   'Ορθή μετάφραση : I'm going home.

5. Τόν ξέρω. (STUDENT RESPONSE)

   'Ορθή μετάφραση : I know him.

6. Βάλτο πάνω στό τραπέζι. (STUDENT RESPONSE)

   'Ορθή μετάφραση : Put it on the table.

7. 'Ακολουθεῖστε με, παρακαλῶ. (STUDENT RESPONSE)

   'Ορθή μετάφραση : Follow me, please.

8. Τούς ἀρέσουν τ'ἀντίσκηνα. (STUDENT RESPONSE)

   'Ορθή μετάφραση : They like tents.

'Από δῶ κι ὕστερα δέ θά σᾶς δίνεται ἡ 'Αγγλική μετάφραση.

Καταλαβαίνετε ἀ κ ρ ι β ῶ ς τί πρέπει νά κάνετε; Ἄν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε το τώρα .

Εἶστε ἕτοιμοι τώρα ν'ἀρχίσουμε;

(NB. Except for the students' responses, everything else was taped.)

PART III - SECTION II

MASTER SHEET

1. Πόσο ψηλός εἶν'αὐτός ὁ τοῖχος;
2. Σ'ἀρέσει αὐτή ἡ μπύρα;
3. Ζεῖ στή φτώχια.
4. Τά μωρά κοιμοῦνται σέ κρεβατάκια.
5. Βάλε αὐτό τό βάζο πάνω στό τραπέζι.
6. Αὐτή ἡ φωνή μοῦ φαίνεται γνωστή.
7. Βρίσκεται σέ κίνδυνο.
8. Ἦρθε αὐτοπροσώπως.
9. Βάλτο πάνω-πάνω.
10. Αὐτή ἡ γῆ εἶναι πολύ εὔφορη.
11. Αὐτή ἡ φωνή μοῦ φαίνεται γνωστή.
12. Τόν γνωρίζεις αὐτόν τόν ἄνθρωπο;
13. Τό ξέρω αὐτό τ'ἀγόρι.
14. Τά μωρά κοιμοῦνται σέ κρεβατάκια.
15. Πόσο ψηλός εἶν'αὐτός ὁ τοῖχος;
16. Δέ μ'ἀρέσει αὐτή ἡ μουσική.
17. Αὐτό τό θρανίο εἶναι δικό μου.
18. Δόσμου αὐτό τό κίτρινο μολύβι.
19. Ἄνοιξε αὐτή τήν αὐλόπορτα.
20. Δέ μ'ἀρέσει αὐτή ἡ μουσική.
21. Σκοτώθηκε στή μάχη.
22. Ζεῖ στή φτώχια.
23. Ζεῖ μέ ἀνέσεις.
24. Βάλε αὐτό τό βάζο πάνω στό τραπέζι.
25. Νομίζω πώς θά τ'ἀγοράσω αὐτό τό ραδιόφωνο.
26. Αὐτή ἡ γῆ εἶναι πολύ εὔφορη.
27. Βάλτο σέ βραστό νερό.
28. Πόσο ψηλός εἶν'αὐτός ὁ τοῖχος;
29. Τόν γνωρίζεις αὐτόν τόν ἄνθρωπο;
30. Δέν πιστεύουν στό Θεό.
31. Ἄνοιξε αὐτήν τήν αὐλόπορτα.
32. Πόσο ψηλός εἶν'αὐτός ὁ τοῖχος;
33. Αήτό τό θρανίο εἶναι δικό μου.
34. Δόσμου αὐτό τό κίρτινο μολύβι.
35. Ἄνοιξε αὐτή τήν πόρτα.
36. Σ'ἀρέσει αὐτή ἡ μπύρα;

37. Ζεῖ στή φτώχια.
38. Ἦρθε αὐτοπροσώπως.
39. Πληρώθηκε σέ χρυσάφι.
40. Τόν γνωρίζεις αὐτόν τόν ἄνθρωπο;
41. Αὐτό τό θρανίο εἶναι δικό μου.
42. Τήν ἔχεις διαβάσει αὐτήν τήν ἀναφορά;
43. Αὐτός ὁ νεαρός εἶναι πολύ ἔξυπνος.
44. Ἄκου αὐτό τό θόρυβο.
45. Ζεῖ στή φτώχια.
46. Εἶναι χρεωμένος.
47. Αὐτή ἡ φωνή μοῦ φαίνεται γνωστή.
48. Τό ξέρω αὐτό τ'ἀγόρι.
49. Σ'ἀρέσει αὐτός ὁ κῆπος;
50. Πληρώθηκε σέ χρυσάφι.
51. Βάλτο πάνω-πάνω.
52. Τό ξέρω αὐτό τό ὄνομα.
53. Μένουν σ'ἀντίσκηνα.
54. Δέν τήν ξέρω αὐτή τήν κυρία.
55. Ἐλᾶτε ἀπό δῶ, παρακαλῶ.
56. Δέν πιστεύουν στό Θεό.
57. Βάλε αὐτό τό βάζο πάνω στό τραπέζι.
58. Σκοτώθηκε στή μάχη.
59. Ζεῖ μέ ἀνέσεις.
60. Ἄνοιξε αὐτή τήν πόρτα.
61. Σ'ἀρέσει αὐτός ὁ κῆπος:
62. Τά μωρά κοιμοῦνται σέ κρεβατάκια.
63. Δέν πιστεύουν στό Θεό.
64. Τήν ἔχεις διαβάσει αὐτή τήν ἀναφορά;
65. Βάλτο σέ βραστό νερό.
66. Σ'ἀρέσει αὐτή ἡ μπύρα;
67. Βάλτο πάνω-πάνω.
68. Εἶναι χρεωμένος.
69. Αὐτή ἡ γῆ εἶναι πολύ εὔφορη.
70. Τό ξέρω αὐτό τ'ἀγόρι.
71. Αὐτός ὁ νεαρός εἶναι πολύ ἔξυπνος.
72. Εἶναι χρεωμένος.
73. Σ'ἀρέσει αὐτός ὁ κῆπος;
74. Ἄνοιξε αὐτή τήν πόρτα.
75. Δέν πιστεύουν στό Θεό.

76. Άκου αυτόν τόν θόρυβο.
77. Ἦρθε αὐτοπροσώπως.
78. Τό ξέρω αὐτό τό ὄνομα.
79. Σκοτώθηκε στή μάχη.
80. Τόν γνωρίζεις αὐτόν τόν ἄνθρωπο;
81. Βάλτο σέ βραστό νερό.
82. Ἄνοιξε αὐτή τήν αὐλόπορτα.
83. Αὐτό τό φρανίο εἶναι δικό μου.
84. Βρίσκεται σέ κίνδυνο.
85. Πληρώθηκε σέ χρυσάφι.
86. Τά μωρά κοιμοῦνται σέ κρεβατάκια.
87. Βάλε αὐτό τό βάζο πάνω στό τραπέζι.
88. Αὐτός ὁ νεαρός εἶναι πολύ ἔξυπνος.
89. Ζεῖ μέ ἀνέσεις.
90. Μένουν σέ ἀντίσκηνα.
91. Αὐτός ὁ νεαρός εἶναι πολύ ἔξυπνος.
92. Ζεῖ μέ ἀνέσεις.
93. Νομίζω πώς τά τ'ἀγοράσω αὐτό τό ραδιόφωνο.
94. Ἐλᾶτε ἀπό δῶ, παρακαλῶ.
95. Νομίζω πώς τά τ'ἀγοράσω αὐτό τό ραδιόφωνο.
96. Δέν τήν ξέρω αὐτή τήν κυρία.
97. Τό ξέρω αὐτό τ'ἀγόρι.
98. Σκοτώθηκε στή μάχη..
99. Δέν τήν ξέρω αὐτή τήν κυρία.
100. Δέν μ'ἀρέσει αὐτή ἡ μουσική.
101. Βρίσκεται σέ κίνδυνο.
102. Ἄνοιξε αὐτή τήν πόρτα.
103. Τό ξέρω αὐτό τό ὄνομα.
104. Μένουν σ'ἀντίσκηνα.
105. Δέν μ'ἀρέσει αὐτή ἡ μουσική.
106. Βρίσκεται σέ κίνδυνο.
107. Δόσμου αὐτό τό κίτρινο μολύβι.
108. Ἄκου αὐτό τό θόρυβο.
109. Βάλτο σέ βραστό νερό.
110. Σ'ἀρέσει αὐτός ὁ κῆπος;
111. Ἐλᾶτε ἀπό δῶ, παρακαλῶ.
112. Τήν ἔχεις διαβάσει αὐτή τήν ἀναφορά;
113. Ἄκου αὐτό τό θόρυβο.
114. Ἦρθε αὐτοπροσώπως.

115. Τό ξέρω αὐτό τό ὄνομα.
116. Βάλτο πάνω-πάνω.
117. Νομίζω πώς θά τ'ἀγοράσω αὐτό τό ραδιόφωνο.
118. Ἄνοιξε αὐτή τήν αὐλόπορτα.
119. Εἶναι χρεωμένος.
120. Πληρώθηκε σέ χρυσάφι.
121. Ἐλᾶτε ἀπό δῶ, παρακαλῶ.
122. Μένουν σ'ἀντίσκηνα.
123. Δέν τήν ξέρω αὐτή τήν κυρία.
124. Αὐτή ἡ φωνή μοῦ φαίνεται γνωστή.
125. Σ'ἀρέσει αὐτή ἡ μπύρα;
126. Αὐτή ἡ γῆ εἶναι πολύ εὔφορη.
127. Δόσμου αὐτό τό κίτρινο μολύβι.
128. Τήν ἔχεις διαβάσει αὐτή τήν ἀναφορά;

JUDGE'S RATING SHEET — STUDENT'S NAME: ____________

Expected Student Responses — JUDGE'S NAME: ____________

PART III - SECTION II

1. How high is this wall? ________
2. Do you like this beer? ________
3. He lives in poverty. ________
4. Babies sleep in cots. ________
5. Put this vase on the table! ________
6. This voice sounds familiar. ________
7. He is in danger. ________
8. He came in person. ________
9. Put it on top! ________
10. This land is very fertile. ________
11. This voice sounds familiar. ________
12. Do you know this man? ________
13. I know this boy. ________
14. Babies sleep in cots. ________
15. How high is this wall? ________
16. I don't like this music. ________
17. This desk is mine. ________
18. Give me this yellow pencil! ________
19. Open this gate! ________
20. I don't like this music. ________
21. He was killed in battle. ________
22. He lives in poverty. ________
23. He lives in comfort. ________
24. Put this vase on the table! ________
25. I think I'll buy this radio. ________
26. This land is very fertile. ________
27. Put it in boiling water! ________
28. How high is this wall? ________
29. Do you know this man? ________
30. They don't believe in God. ________
31. Open this gate! ________
32. How high is this wall? ________
33. This desk is mine. ________
34. Give me this yellow pencil! ________

35. Open this door! ________
36. Do you like this beer? ________
37. He lives in poverty. ________
38. He came in person. ________
39. He was paid in gold. ________
40. Do you know this man? ________
41. This desk is mine. ________
42. Have you read this report? ________
43. This young man is very clever. ________
44. Listen to this noise! ________
45. He lives in poverty. ________
46. He is in debt. ________
47. This voice sounds familiar. ________
48. I know this boy. ________
49. Do you like this garden? ________
50. He was paid in gold. ________
51. Put it on top! ________
52. I know this name. ________
53. They live in tents. ________
54. I don't know this lady. ________
55. Come this way, please. ________
56. They don't believe in God. ________
57. Put this vase on the table! ________
58. He was killed in battle. ________
59. He lives in comfort. ________
60. Open this door! ________
61. Do you like this garden? ________
62. Babies sleep in cots. ________
63. They don't believe in God. ________
64. Have you read this report? ________
65. Put it in boiling water! ________
66. Do you like this beer? ________
67. Put it on top! ________
68. He is in debt. ________
69. This land is very fertile. ________
70. I know this boy. ________
71. This young man is very clever. ________
72. He is in debt. ________

73. Do you like this garden? ____________
74. Open this door! ____________
75. They don't believe in God. ____________
76. Listen to this noise! ____________
77. He came in person. ____________
78. I know this name. ____________
79. He was killed in battle. ____________
80. Do you know this man? ____________
81. Put it in boiling water! ____________
82. Open this gate! ____________
83. This desk is mine. ____________
84. He is in danger. ____________
85. He was paid in gold. ____________
86. Babies sleep in cots. ____________
87. Put this vase on the table! ____________
88. This young man is very clever. ____________
89. He lives in comfort. ____________
90. They live in tents. ____________
91. This young man is very clever. ____________
92. He lives in comfort. ____________
93. I think I'll buy this radio. ____________
94. Come this way, please. ____________
95. I think I'll buy this radio. ____________
96. I don't know this lady. ____________
97. I know this boy. ____________
98. He was killed in batlle. ____________
99. I don't know this lady. ____________
100. I don't like this music. ____________
101. He is in danger. ____________
102. Open this door! ____________
103. I know this name. ____________
104. They live in tents. ____________
105. I don't like this music. ____________
106. He is in danger. ____________
107. Give me this yellow pencil! ____________
108. Listen to this noise! ____________
109. Put it in boiling water! ____________
110. Do you like this garden? ____________

111. Come this way, please. ____________
112. Have you read this report? ____________
113. Listen to this noise! ____________
114. He came in person. ____________
115. I know this name. ____________
116. Put it on top! ____________
117. I think I'll buy this radio. ____________
118. Open this gate! ____________
119. He is in debt. ____________
120. He was paid in gold. ____________
121. Come this way, please. ____________
122. They live in tents. ____________
123. I don't know this lady. ____________
124. This voice sounds familiar. ____________
125. Do you like this beer? ____________
126. This land is very fertile. ____________
127. Give me this yellow pencil! ____________
128. Have you read this report? ____________

(PART III - SECTION III)

ΜΕΡΟΣ ΤΡΙΤΟ - ΤΜΗΜΑ ΤΡΙΤΟ

(Instructions)

ΟΔΗΓΙΕΣ

Ἔχετε ὅλοι τώρα μπροστά σας ἀπό τρεῖς σελίδες μέ μερικές ἐλλιπεῖς προτάσεις. Ἡ κάθε μία ἀπ'αὐτές τίς προτάσεις ἔχει ἕνα κενό. Τό κενό αὐτό πρέπει νά συμπληρωθεῖ μέ μιά ἀπό τίς λέξεις THIS, THESE, THAT, THOSE. Διαβάστε σιωπηλά τήν κάθε πρόταση μέ προσοχή κι ἀποφασίστε μέ ποιά λέξη θά συμπληρώσετε τό κάθε κενό. Ὕστερα πέστε τήν πρόταση ΟΣΟ ΠΙΟ ΓΡΗΓΟΡΑ μπορεῖτε ,ω, , τί κομπιάσετε ἤ νά σταματήσετε γιά νά σκεφτεῖτε.

ΣΗΜΕΙΩΣΗ : Χρησιμοποιοῦμε THIS γιά ἕνα καί THESE γιά πολλά πρόσωπα ἤ πράγματα πού βρίσκονται κοντά στόν ὁμιλητή (NEAR). Χρησιμοποιοῦμε THAT γιά ἕνα καί THOSE γιά πολλά πρόσωπα ἤ πράγματα πού βρίσκονται ΜΑΚΡΙΑ ἀπ'τόν ὁμιλητή (FAR).

Προσέξτε τώρα τά ἀκόλουθα παραδείγματα :

1. _______ pencil is mine. (NEAR)

   'Ορθή ἀπόκριση : This pencil is mine.

2. Do you know _______ girls? (FAR)

   'Ορθή ἀπόκριση : Do you know those girls?

. 'Ακολουθοῦν ἀκόμη 6 παραδείγματα γιά ἐξάσκησή σας. Αὐτή τή φορά θά πρέπει ἐσεῖς νά πεῖτε τή συμπληρωμένη πρόταση. Μετά ἀπό κάθε πρόταση πού θά ἔχετε πεῖ θά ἀκούσετε τή σωστή ἀπόκριση.

3. Do you see _______ man? (FAR)

   'Ορθή ἀπόκριση : Do you see that man?

4. _______ boys are very young. (FAR)

   'Ορθή ἀπόκριση : Those boys are very young.

5. Give me _______ pen, please. (FAR)

   'Ορθή ἀπόκριση : Give me that pen, please.

6. May I use _______ telephone? (NEAR)

   'Ορθή ἀπόκριση : May I use this telephone?

7. _______ notebooks are mine. (FAR)

   'Ορθή ἀπόκριση : Those notebooks are mine.

8. I like _______ cigarette. (NEAR)

   'Ορθή ἀπόκριση : I like this cigarette.

'Από δῶ και ὕστερα δέ θά σᾶς δίνεται ἡ σωστή πρόταση οὔτε γραπτά οὔτε προφορικά.

Μήν γράψετε ἀπολύτως τίποτε στό φύλλο ἀπαντήσεων πού σᾶς ἔχει δοθεῖ.

ΜΗ ΓΥΡΙΖΕΤΕ ΑΚΟΜΗ ΣΕΛΙΔΑ. Θά σᾶς πῶ ἐγώ πότε νά τό κάνετε.

Καταλαβαίνετε ἀ κ ρ ι β ῶ ς τί πρέπει νά κάνετε; Ἄν θέλετε νά ρωτήσετε τίποτε, ρωτῆστε το τώρα.

Γυρῖστε τώρα τή σελίδα κι ἑτοιμαστεῖτε ν'ἀρχίσουμε. Ἕτοιμοι;

(NB. Except for student responses, everything else was taped.)

(PART III - SECTION III) | ΜΕΡΟΣ ΤΡΙΤΟ — ΤΜΗΜΑ ΤΡΙΤΟ | (Auxiliary Answer Sheet)

ΒΟΗΘΗΤΙΚΟ ΦΥΛΛΟ ΑΠΑΝΤΗΣΕΩΝ

STUDENT'S NAME: ____________

JUDGE'S NAME: ____________

1. We must change those lights. (far) ______
2. I've seen those young men before. (far) ______
3. This land belongs to my father. (near) ______
4. I'll buy this dark suit. (near) ______
5. Do you like those gold rings? (far) ______
6. We must change those lights. (far) ______
7. I've seen those young men before. (far) ______
8. Remember this number! (near) ______
9. I've seen those young men before. (far) ______
10. I hate these receptions. (near) ______
11. I like this book very much. (near) ______
12. Don't drink this water! (near) ______
13. This land belongs to my father. (near) ______
14. I recommend this very interesting book. (near) ______
15. Don't drink this water! (near) ______
16. Have you read these novels? (near) ______
17. This land belongs to my father. (near) ______
18. I've never met this man. (near) ______
19. We must change those lights. (far) ______
20. I've been to those villages. (far) ______
21. I've never seen those men before. (far) ______
22. I hate these receptions. (near) ______
23. I know these boys. (near) ______
24. Do you like this yard? (near) ______
25. I'll buy this dark suit. (near) ______
26. Have you read these novels? (near) ______
27. We bought this gas-stove yesterday. (near) ______
28. I don't like any of these watches. (near) ______
29. This roof leaks. (near) ______
30. Have you read these novels? (near) ______
31. I recommend this very interesting book. (near) ______
32. This land belongs to my father. (near) ______

33. I've never met ___this___ man (near) ________
34. We bought ___This___ gas-stove yesterday. (near) ________
35. Remember ___this___ number! (near) ________
36. Do you like ___this___ yard? (near) ________
37. I like ___this___ book very much. (near) ________
38. Don't drink ___this___ water! (near) ________
39. I hate ___these___ receptions. (near) ________
40. Do you like ___those___ gold rings? (far) ________
41. We bought ___this___ gas-stove yesterday. (near) ________
42. I like ___this___ book very much. (near) ________
43. ___~~s~~ This___ roof leaks. (near) ________
44. I like ___this___ book very much. (near) ________
45. Don't drink ___this___ water! (near) ________
46. Do you like ___those___ gold rings? (far) ________
47. I recommend ___this___ very interesting book. (near) ________
48. Do you like ___this___ yard? (near) ________
49. I don't like any of ___these___ watches. (near) ________
50. Do you like ___those___ gold rings? (far) ________
51. I've never met ___this___ man. (near) ________
52. I can explain ___these___ details. (near) ________
53. I've been to ___those___ villages. (far) ________
54. I'll buy ___this___ dark suit. (near) ________
55. Have you read ___these___ novels? (near) ________
56. I've never seen ___those___ men before. (far) ________
57. I know ___these___ boys. (near) ________
58. I've seen ___those___ young men before. (far) ________
59. I can explain ___these___ details. (near) ________
60. Remember ___this___ number! (near) ________
61. I've been to ___those___ villages. (far) ________
62. Do you like ___this___ yard? (near) ________
63. I don't like any of ___these___ watches. (near) ________
64. I know ___these___ boys. (near) ________
65. We must change ___those___ lights. (far) ________
66. I know ___these___ boys. (near) ________
67. I recommend ___This___ very interesting book. (near) ________
68. I've never seen ___those___ men before. (far) ________
69. I'll buy ___this___ dark suit. (near) ________

70. I've been to those villages. (far) ______

71. I can explain these details. (near) ______

72. I don't like any of these watches. (near) ______

73. I hate these receptions. (near) ______

74. I've never met this man. (near) ______

75. I can explain these details. (near) ______

76. We bought this gas-stove yesterday. (near) ______

77. This roof leaks. (near) ______

78. Remember this number! (near) ______

79. I've never seen those men before. (far) ______

80. This roof leaks. (near) ______

APPENDIX B

Table 1

Part I: Aural perception of single consonantal segments.

Category: "Same" - segments common to both Greek and English in all positions.

Positions: word-Initial, word-Medial, word-Final.

Errors made by 30 subjects in the following items tested

Item No.	SI	Errors	SM	Errors	SF	Errors
1.	Ben	64	wrap it	27	ass	31
2.	deem	38	rabbit	37	lass	20
3.	goat	30	ladder	25	mass	19
4.	fine	7	echo	7	cane	55
5.	vine	56	ego	15	Shane	57
6.	rain	6	safer	5	can	35
7.	mine	48	saver	26	thin	25
8.	sake	8	jam it	55	kin	36
9.	sigh	24	Asa	15	sin	32
Totals		281		212		310
MEANS		9.37		7.07		10.33

where:

S = "Same" segment - i.e. common to both Greek and English.

SI = Same segment, word-initially.

SM = Same segment, word-medially.

SF = Same segment, word-finally.

Number of items in each category	:	9
Number of repetitions per item	:	4
Number of subjects	:	30
Number of opportunities for error in each category	:	1,080

Table 1a

Errors made by individual subjects in the category "Same"

Subjects	SI	SM	SF	Total
1.	13	8	15	36
2.	13	6	10	29
3.	6	6	7	19
4.	10	7	8	25
5.	8	5	8	21
6.	10	6	11	27
7.	8	6	5	19
8.	9	7	6	22
9.	10	6	5	21
10.	9	9	10	28
11.	12	5	12	29
12.	9	7	9	25
13.	13	10	15	38
14.	8	8	10	26
15.	9	8	11	28
16.	13	9	15	37
17.	7	7	9	23
18.	9	9	15	33
19.	6	4	10	20
20.	5	6	11	22
21.	14	13	15	42
22.	9	4	9	22
23.	8	5	10	23
24.	7	3	9	19
25.	13	3	12	28
26.	4	5	10	19
27.	10	16	16	42
28.	12	14	14	40
29.	10	7	7	24
30.	7	3	6	16
Total	281	212	310	803

Table 2

Part I : Aural perception of single consonantal segments.

Category: "Different" - segments occurring in English but not in Greek.

Positions: word-Initial, word-Medial, word-Final.

Errors made by 30 subjects in the following items tested

Item No.	DI	Errors	DM	Errors	DF	Errors
1.	wait	1	a hair	0	ash	26
2.	shake	36	aware	10	mash	36
3.	shame	33	ashes	44	beige	31
4.	shy	39	lashes	45	catch	18
5.	wane	13	Asia	86	cadge	47
6.	wait	10	away	59	age	37
7.	wail	11	all wed	62	edge	29
8.	char	63	a wing	50	badge	43
Totals		206		356		267
MEANS		6.87		11.87		8.90

where:

D = "Different" segment - i.e. occurring in English but not in Greek.

DI = Different segment, word-initially.

DM = Different segment, word-medially.

DF = Different segment, word-finally.

Number of items in each category	:	8
Number of repetitions per item	:	4
Number of subjects	:	30
Number of opportunities for error in each category	:	960

Table 2a

Errors made by individual subjects in the category "Different"

Subjects	DI	DM	DF	Total
1.	11	17	17	45
2.	9	11	4	24
3.	10	18	3	31
4.	6	9	7	22
5.	3	11	6	20
6.	4	11	7	22
7.	5	9	7	21
8.	2	9	6	17
9.	5	13	7	25
10.	9	13	8	30
11.	5	9	5	19
12.	8	9	5	22
13.	11	18	17	46
14.	4	10	6	20
15.	3	18	13	34
16.	12	18	18	48
17.	5	8	7	20
18.	11	13	7	31
19.	4	7	6	17
20.	5	6	6	17
21.	13	18	14	45
22.	3	7	7	17
23.	2	6	7	15
24.	6	9	7	22
25.	6	11	8	25
26.	5	8	5	18
27.	13	14	16	43
28.	13	17	16	46
29.	10	15	16	41
30.	3	14	9	26
Total	206	356	267	829

Table 3

Part I : Aural perception of single consonantal segments.

Category: "Same" - "Location" - "Different"
("Location" is explained below.)

Position: always word-Final.

Errors made by 30 subjects in the following items tested

Item No.	SF	Errors	LF	Errors	DF	Errors
1.	ass	31	cab	35	ash	26
2.	lass	20	save	41	lash	25
3.	mass	19	leave	27	mash	36
4.	cane	55	sheathe	26	beige	31
5.	Shane	57	bays	37	cadge	47
6.	can	35	appear	44	age	37
7.	thin	25	shame	45	edge	29
8.	sin	36	sing	66	batch	27
9.	kin	32	aids	44	badge	43
Totals		310		365		301
MEANS		10.33		12.17		10.03

where:

L = "Location" - i.e. segments occurring in both languages but never word-finally in Greek.

SF = "Same" segments, word-finally.

LF = "Location" segments, word-finally.

DF = "Different" segments, word-finally.

Number of items in each category	:	9
Number of repetitions per item	:	4
Number of subjects	:	30
Number of opportunities for error in each category	:	1,080

Table 3a

Errors made by individual subjects in the categories SF, LF, DF

Subjects	SF	LF	DF	Total
1.	15	15	17	47
2.	10	11	8	29
3.	7	14	7	28
4.	8	12	7	27
5.	8	12	7	27
6.	11	13	7	31
7.	5	11	7	23
8.	6	6	8	20
9.	5	15	7	27
10.	10	9	10	29
11.	12	11	6	29
12.	9	8	9	26
13.	15	17	18	50
14.	10	9	7	26
15.	11	13	13	37
16.	15	15	18	48
17.	9	8	7	24
18.	15	11	10	36
19.	10	9	7	26
20.	11	8	7	26
21.	15	17	17	49
22.	9	12	9	30
23.	10	16	7	33
24.	9	11	5	25
25.	12	13	10	35
26.	10	10	6	26
27.	16	17	18	51
28.	14	14	17	45
29.	7	18	15	40
30.	6	10	10	26
Total	310	365	301	976

Table 4 Part I : Aural perception of single consonantal segments.

Categories: "Same" , "Different".

Positions: word-Initial, word-Medial, word-Final.

Errors made by 30 subjects in the categories "Same" and "Different" in word-Initial, word-Medial, word-Final position

Item No.	SI	Errors	SM	Errors	SF	Errors	DI	Errors	DM	Errors	DF	Errors
1.	Ben	64	wrap it	27	ass	31	wait	1	a hair	0	ash	26
2.	deem	38	rabbit	37	lass	20	shake	36	aware	10	mash	36
3.	goat	30	ladder	25	cane	55	shame	33	ashes	44	beige	31
4.	fine	7	echo	7	Shane	57	shy	39	lashes	45	catch	18
5.	vine	56	ego	15	can	35	wane	13	Asia	86	cadge	47
6.	rain	6	saver	26	thin	25	wait	10	away	59	age	37
7.	mine	48	jam it	55	kin	36	wail	11	all wed	62	edge	29
8.	sigh	24	Asa	15	sin	32	char	63	a wing	50	badge	43
	Totals	273		207		291		206		356		267
	MEANS	9.10		6.90		9.70		6.87		11.87		8.90

where:

SI = "Same" segments, word-initially
SM = "Same" segments, word-medially
SF = "Same" segments, word-finally

DI = "Different" segments, word-initially
DM = "Different" segments, word-medially
DF = "Different" segments, word-finally

Number of items in each category : 8
Number of repetitions per item : 4
Number of subjects : 30
Number of opportunities for error in each category : 960

Table 4a

Errors made by individual subjects in the category-combinations S - D / I - M - F

	Block 1: Same				Block 2: Different				Sums through Blocks			
Subj.	SI	SM	SF	Total	DI	DM	DF	Total	I	M	F	TOTAL
1.	13	8	15	36	11	17	17	45	24	25	32	81
2.	10	5	10	25	9	11	4	24	19	16	14	49
3.	5	6	6	17	10	18	3	31	15	24	9	48
4.	10	7	7	24	6	9	7	22	16	16	14	46
5.	8	5	8	21	3	11	6	20	11	16	14	41
6.	10	6	10	26	4	11	7	22	14	17	17	48
7.	8	6	4	18	5	9	7	21	13	15	11	39
8.	9	7	6	22	2	9	6	17	11	16	12	39
9.	10	6	5	21	5	13	7	25	15	19	12	46
10.	9	9	9	27	9	13	8	30	18	22	17	57
11.	10	5	9	24	5	9	5	19	15	14	14	43
12.	8	7	7	22	8	9	5	22	16	16	12	44
13.	13	10	15	38	11	18	17	46	24	28	32	84
14.	8	8	9	25	4	10	6	20	12	18	15	45
15.	9	8	10	27	3	18	13	34	12	26	23	61
16.	13	9	15	37	12	18	18	48	25	27	33	85
17.	7	7	8	22	5	8	7	20	12	15	15	42
18.	9	8	13	30	11	13	7	31	20	21	20	61
19.	6	4	10	20	4	7	6	17	10	11	16	37
20.	5	5	11	21	5	6	6	17	10	11	17	38
21.	14	13	15	42	13	18	14	45	27	31	29	87
22.	9	4	8	21	3	7	7	17	12	11	15	38
23.	8	5	10	23	2	6	7	15	10	11	17	38
24.	7	3	8	18	6	9	7	22	13	12	15	40
25.	13	5	12	30	6	11	8	25	19	16	20	55
26.	4	3	10	17	5	8	5	18	9	11	15	35
27.	10	15	15	40	13	14	16	43	23	29	31	83
28.	12	14	14	40	13	17	16	46	25	31	30	86
29.	9	6	6	21	10	15	16	41	19	21	22	62
30.	7	3	6	16	3	14	9	26	10	17	15	42
Total	273	207	291	771	206	356	267	829	479	563	558	1,600

Table 5

Part II : Aural perception of consonantal sequences: nasal + stop

Sub-tests: a, b, c

Errors made by 30 subjects in the following items tested

Item No.	a 1-Greek-rule processed	Errors	b 2-Greek-rule processed	Errors	c 1-Greek-rule processed	Errors	Total
1.	[ǽndoʊnɨm]	64	[ǽdoʊnɨm]	18	[æbǽsədə]	93	175
2.	[embɨ́rɨkəl]	74	[ebɨ́rɨkəl]	59	[dɨstɨ́gwɨʃ]	85	218
3.	[eŋglɨ́tɨk]	21	[eglɨ́tɨk]	13	[ɨbróɨdərɨ]	80	114
4.	[eŋgóʊmɨəm]	54	[egóʊmɨəm]	21	[ɨgrésɨv]	60	135
5.	[ɨgzámbl]	41	[ɨgzábl]	29	[téd]	50	120
6.	[ʤʌ́mb]	86	[ʤʌ́b]	47	[tédə]	63	196
7.	[ʤʌ́mbə]	90	[ʤʌ́bə]	62	[ʌdəstǽnd]	46	198
8.	[téndətɨv]	104	[tédətɨv]	53	[ʌdrés]	80	237
Totals		534		302		557	1,393
MEANS		17.80		10.07		18.57	

where:

a = mistaking *[ǽndoʊnɨm] for the correct [ǽntoʊnɨm].
b = mistaking *[ǽdoʊnɨm] for the correct [ǽntoʊnɨm].
c = mistaking *[æbǽsədə] for the correct [æmbǽsədə].

Number of items in each sub-test	:	8
Number of repetitions per item	:	4
Number of subjects	:	30
Number of opportunities for error in each sub-test	:	960

NB. No words presenting orthographical complications are included.

Table 5a

Errors made by individual subjects in the sub-tests a, b, c

Subjects	a	b	c	Total
1.	17	11	18	46
2.	23	17	16	56
3.	18	12	9	39
4.	16	9	8	33
5.	19	5	15	39
6.	22	20	26	68
7.	6	3	11	20
8.	12	5	8	25
9.	15	11	26	52
10.	16	15	26	57
11.	13	8	21	42
12.	14	6	10	30
13.	21	12	12	45
14.	18	12	15	45
15.	18	12	16	46
16.	24	13	19	56
17.	14	5	6	25
18.	13	1	20	34
19.	18	13	23	54
20.	18	12	29	59
21.	12	4	12	28
22.	11	3	18	32
23.	22	18	23	63
24.	19	2	25	46
25.	28	19	24	71
26.	16	9	18	43
27.	27	14	26	67
28.	25	12	28	65
29.	22	10	26	58
30.	17	9	23	49
Total	534	302	557	1,393

Table 6

Part II : Aural perception of consonantal sequences: /s/+voiced cons.
Sub-test: a, b, c

Errors made by 30 subjects in the following items tested

Item No.	a Within morphemes	Errors	b Across morphemes	Errors	c Across morphemes	Errors	Total
1.	[zlíp]	2	[dɨzgréɨs]	103	[ðɨz drɨ́ŋk]	85	190
2.	[zmól]	56	[dɨzláɨk]	85	[ðɨz vǽlɨ]	80	221
3.	[znɔ́b]	20	[dɨzmémbə]	108	[ðɨz wól]	96	224
4.	[zwél]	5	[mɨzbɨhéɨv]	93	[ðɨz yɨ́ə]	95	193
5.			[mɨzbráʉn]	101			101
6.			[mɨzdɨrékt]	110			110
7.			[mɨzgáɨdɨd]	102			102
8.			[mɨznéɨm]	90			90
9.			[mɨzreprɨzént]	85			85
	Totals	83		877		356	1,316
	MEANS	2.77		12.97		11.87	

where:

a = mistaking *[zmól] for the correct [smól].

b = mistaking *[dɨzgréɨs] for the correct [dɨsgréɨs].

c = mistaking *[ðɨz drɨ́ŋk] for the correct [ðɨs drɨ́ŋk].

Number of items in sub-test a	:	4
Number of items in sub-test b	:	9
Number of items in sub-test c	:	4
Number of repetitions per item	:	4
Number of subjects	:	30
Number of opportunities for error in all three sub-tests	:	2,040

—3. For the purposes of the t-test, only the first 4 items in sub-test b were considered. The new Total is now 389 and the new MEAN is 12.97. See Column b_1 on next page.

Table 6a

Errors made by individual subjects in the sub-tests a, b, c

Subjects	a	b	b_1	c	Total
1.	3	32	15	15	50
2.	5	35	16	13	53
3.	2	24	12	10	36
4.	1	21	9	9	31
5.	8	35	15	16	59
6.	0	32	13	12	44
7.	2	32	15	12	46
8.	1	17	7	8	26
9.	7	30	13	13	50
10.	4	32	13	12	48
11.	2	35	15	13	50
12.	2	17	8	7	26
13.	3	24	12	10	37
14.	2	23	11	8	33
15.	3	25	11	10	38
16.	7	31	14	13	51
17.	1	18	7	6	25
18.	2	35	15	14	51
19.	0	33	13	13	46
20.	1	30	15	14	45
21.	1	21	8	7	29
22.	2	31	15	9	42
23.	1	32	14	13	46
24.	3	34	15	13	50
25.	2	31	15	13	46
26.	4	33	14	15	52
27.	6	34	15	15	55
28.	4	37	16	16	57
29.	3	32	14	15	50
30.	1	31	14	12	44
Total	83	877	389	356	1,316

NB. Column **b** gives scores for 9 items (for Correlations)
Column $\mathbf{b_1}$ gives scores for 4 items (for *t*-tests)
"Total" = a + b + c

Table 7

Part II : Aural perception of English underlying nasal + stop and sibilant + voiced consonant sequences.
Sub-tests: a , b , c , d , e .

Errors made by 30 subjects in the following items tested

Item No.	a	Errors	b	Errors	c	Errors	d	Errors	e	Errors
1.	[ǽndoʉnɨm]	64	[ǽdoʉnɨn]	18	[æbǽsədə]	93	[zlíp]	2	[bʌ́mpᵊ]	80
2.	[embɨ́rɨkəl]	74	[ebɨ́rɨkəl]	59	[dɨstɨ́gwɨš]	85	[zmól]	56	[bʌ́mbᵊ]	98
3.	[eŋglɨ́tɨk]	21	[eglɨ́tɨk]	13	[ɨbrɔ́ɨdərɨ]	80	[znɒ́b]	20	[bʌ́mbə]	104
4.	[eŋgóʉmɨəm]	54	[egóʉmɨəm]	21	[ɨgrésɨv]	60	[zwél]	5	[séntᵊ]	62
5.	[ɨgzámbl]	41	[ɨgzábl]	29	[téd]	50	[dɨzgréɨs]	103	[séndᵊ]	128
6.	[ʒʌ́mb]	86	[ʒʌ́b]	47	[tédə]	63	[dɨzláɨk]	85	[sɨ́ŋkᵊ]	79
7.	[ʒʌ́mbə]	90	[ʒʌ́bə]	62	[ʌdəstǽnd]	46	[dɨzmémbə]	108	[sɨ́ŋgᵊ]	90
8.	[téndətɨv]	1C4	[tédətɨv]	53	[ʌdrés]	80	[mɨzbɨhéɨv]	93	[sɨ́ŋgə]	110
9.	[éndrəns]	63	[sɨ́g]	52			[mɨzbráʉn]	101		
10.	[sɨ́ŋg]	77	[sɨ́gə]	76			[mɨzdɨrékt]	110		
11.	[sɨ́ŋgə]	96					[mɨzgáɨdɨd]	102		
12.							[mɨznéɨm]	90		
13.							[mɨzreprɨzént]	85		
14.							[ðɨz dráŋk]	85		
15.							[ðɨz vǽlɨ]	80		
16.							[ðɨz wól]	96		
17.							[ðɨz yɨ́ə]	95		
	Totals	770		430		557		1,316		751
	MEANS	25.67		14.33		18.57		43.87		25.03

NB. See notes on next page

Table 7 (i)

Part II : Aural perception of English underlying <u>nasal + stop</u> and <u>sibilant + voiced consonant</u> sequences

Sub-tests: <u>a</u>, <u>b</u>, <u>c</u>, <u>d</u>, <u>e</u> .

Errors made by 30 subjects in the following items tested

Item No.	a	Errors	b	Errors	c	Errors
1.	[ǽndoʉnɨm]	64	[ǽdoʉnɨm]	18	[æbǽsədə]	93
2.	[embɨ́rɨkəl]	74	[ebɨ́rɨkəl]	59	[dɨstɨ́gwɨʃ]	85
3.	[eŋglɨ́tɨk]	21	[eglɨ́tɨk]	13	[ɨbróɨdərɨ]	80
4.	[eŋgóʉmɨəm]	54	[egóʉmɨəm]	21	[ɨgrésɨv]	60
5.	[ɨgzámbl]	41	[ɨgzábl]	29	[téd]	50
6.	[ʤʌ́mb]	86	[ʤʌ́b]	47	[tédə]	63
7.	[ʤʌ́mbə]	90	[ʤʌ́bə]	62	[ʌdəstǽnd]	46
8.	[téndətɨv]	104	[tédətɨv]	53	[ʌdrés]	80
	Totals	534		302		557
	MEANS	17.80		10.07		18.57

Item No.	d	Errors	e	Errors
1.	[dɨzgréɨs]	103	[bʌ́mp^{ə}]	80
2.	[dɨzlɨ́ɨk]	85	[bʌ́mb^{ə}]	98
3.	[dɨzmémbə]	108	[bʌ́mbə]	104
4.	[mɨzbɨhéɨv]	93	[sént^{ə}]	62
5.	[mɨzbráʉn]	101	[sénd^{ə}]	128
6.	[mɨzdɨrékt]	110	[sɨ́ŋk^{ə}]	79
7.	[mɨzgáɨdɨd]	102	[sɨ́ŋg^{ə}]	90
8.	[mɨznéɨm]	90	[sɨ́ŋgə]	110
	Totals	792		547
	MEANS	26.40		18.23

<u>NB</u>. (1) For the purposes of the <u>t</u>-test, only the above 8 items were chosen for consideration. For scores per subject, see p. 266a.

(2) To equalize the number of opportunities for error in <u>e</u>, [sénd^{ə}], [sɨ́ŋg^{ə}], and [sɨ́ŋgə] scores were scaled down (and then rounded up to the nearest integer number) by 4/8, 4/7, and 4/5, resp. See also note 11, p. 194.

In Table 7:

<u>a</u> = mistaking *[ǽndoʉnɨm] for the correct [ǽntoʉnɨm].
<u>b</u> = mistaking *[ǽdoʉnɨm] for the correct [ǽntoʉnɨm].
<u>c</u> = mistaking *[æbǽsədə] for the correct [æmbǽsədə].
<u>d</u> = mistaking *[zlíp] for the correct [slíp].
<u>e</u> = mistaking *[bʌ́mpᵊ] for the correct [bʌ́mp].

Number of items in <u>a</u>	:	11
Number of items in <u>b</u>	:	10
Number of items in <u>c</u>	:	8
Number of items in <u>d</u>	:	17
Number of items in <u>e</u>	:	8
Number of repetitions per item	:	4
Number of subjects	:	30

Number of opportunities for error in:	<u>a</u> =	1,320
	<u>b</u> =	1,200
	<u>c</u> =	960
	<u>d</u> =	2,040
	<u>e</u> =	960
Total opportunities for error	:	6,480

Table 7a

Errors made by individual subjects in sub-tests a, b, c, d, e

Subjects	a	b	c	d	e	Total
1.	26	16	18	50	29	139
2.	32	24	16	50	39	161
3.	23	15	9	48	26	121
4.	21	13	8	46	25	113
5.	26	7	15	50	19	117
6.	32	23	26	37	30	148
7.	13	7	11	37	30	98
8.	17	7	8	38	18	88
9.	24	18	26	41	12	121
10.	26	19	26	34	21	126
11.	22	13	21	45	26	127
12.	19	9	10	41	22	101
13.	29	17	12	55	32	145
14.	24	16	15	48	25	148
15.	26	16	16	54	29	141
16.	32	19	19	58	34	162
17.	19	7	6	39	22	93
18.	18	2	20	46	16	102
19.	26	17	23	39	15	120
20.	25	19	29	37	22	132
21.	21	9	12	23	35	100
22.	19	5	18	35	22	99
23.	31	24	23	43	27	148
24.	25	5	25	42	13	110
25.	38	25	24	33	22	142
26.	23	14	18	38	21	114
27.	38	20	26	61	35	180
28.	37	17	28	57	31	170
29.	32	16	26	59	32	165
30.	26	11	23	32	21	113
Total	770	430	557	1,316	751	3,824

Table 7a (i)

Errors made by individual subjects in sub-tests a, b, c, d, e

Subjects	a	b	c	d	e
1.	17	11	18	29	22
2.	23	17	16	32	27
3.	18	12	9	22	20
4.	16	9	8	19	19
5.	19	5	15	32	14
6.	22	20	26	30	22
7.	6	3	11	28	19
8.	12	5	8	15	12
9.	15	11	26	28	9
10.	16	15	26	29	13
11.	13	8	21	31	19
12.	14	6	10	16	16
13.	21	12	12	22	24
14.	18	12	15	21	19
15.	18	12	16	23	21
16.	24	13	19	28	25
17.	14	5	6	16	16
18.	13	1	20	31	14
19.	18	13	23	29	11
20.	18	12	29	27	16
21.	12	4	12	20	24
22.	11	3	18	27	12
23.	22	18	23	29	20
24.	19	2	25	30	9
25.	28	19	24	29	15
26.	16	9	18	30	18
27.	27	14	26	30	26
28.	25	12	28	32	24
29.	22	10	26	29	24
30.	17	9	23	28	17
Totals	534	302	557	792	547
MEANS	17.80	10.07	18.57	26.40	18.23

B. The scores and means in each of the 5 sub-tests above reflect the amount of error made in the 8 items per sub-test which are relevant for the purposes of the t-test.

Cf. p. 264a and also the discussion on pp. 176-78.

Table 8

Part II : Aural perception of consonantal sequences.

Sub-tests: a, b.

Errors made by 30 subjects in the following items tested

Item No.	a Items not processed by Greek rules.	Errors	b Items processed by Greek rules.	Errors	Total
1.	antonym	17	[ǽndoʉnɨm]	64	81
2.	empirical	13	[embɨ́rɨkəl]	74	87
3.	enclitic	18	[eŋglɨ́tɨk]	21	39
4.	encomium	15	[eŋgóʉmɨəm]	54	69
5.	example	24	[ɨgzámbl]	41	65
6.	jump	16	[ǰʌ́mb]	86	102
7.	jumper	6	[ǰʌ́mbə]	90	96
8.	tentative	12	[téndətɨv]	104	116
9.	ambassador	9	[æbǽsədə]	93	102
10.	distinguish	11	[dɨstɨ́gwɨš]	85	96
11.	embroidery	10	[ɨbróɨdərɨ]	80	90
12.	ingressive	25	[ɨgrésɨv]	60	85
13.	tend	30	[téd]	50	80
14.	tender	12	[tédə]	63	75
15.	understand	30	[ʌdəstǽnd]	46	76
16.	undress	30	[ʌdrés]	80	110
17.	sleep	13	[zlíp]	2	15
18.	small	12	[zmól]	56	68
19.	snob	24	[znɒ́b]	20	44
20.	swell	4	[zwél]	5	9
21.	disgrace	51	[dɨzgréɨs]	103	154
22.	dislike	37	[dɨzláɨk]	85	122
23.	dismember	23	[dɨzmémbə]	108	131
24.	misbehave	34	[mɨzbɨhéɨv]	93	127
25.	Miss Brown	20	[mɨzbráʉn]	101	121
26.	misdirect	25	[mɨzdɨrékt]	110	135
27.	misguided	36	[mɨzgáɨdɨd]	102	138
28.	misname	36	[mɨznéɨm]	90	126
29.	misrepresent	25	[mɨzreprɨzént]	85	110
30.	this drink	41	[ðɨz drɨ́ŋk]	85	126
31.	this valley	35	[ðɨz vǽlɨ]	80	115

Table 8 (cont'd)

32.	this wall	12	[ðɨz wɔ́l]	96	108
33.	this year	36	[ðɨz yɨ́ə]	95	131
34.	entrance	15	[éndrəns]	63	78
35.	tent	25	[sɨ́ŋg]	77	102
36.	sink	30	[sɨ́ŋgə]	96	126
37.	sinker	9	[sɨ́g]	52	61
38.	sing	35	[sɨ́gə]	76	111
39.	singer	36	[sxyú]	62	98
40.	sue	35	[aédounɨm]	18	53
41.	bomb	80	[ebɨ́rɨkəl]	59	139
42.	bump	32	[eglɨ́tɨk]	13	45
43.	bumper	31	[egóumɨ əm]	21	52
44.	send	55	[ɨgzábl]	29	84
45.	cent	30	[ǰʌ́b]	47	77
46.	centre	14	[ǰʌ́bə]	62	76
47.	sender	55	[tédətɨv]	53	108
48.	sing	45	[bʌ́mpᵊ]	80	125
49.	singer	43	[bʌ́mbᵊ]	98	141
50.	sink	26	[bʌ́mbə]	104	130
51.	sinker	14	[séntᵊ]	62	76
52.	bomber	110	[séndᵊ]	128	238
53.			[sɨ́ŋgᵊ]	90	90
54.			[sɨ́ŋgə]	110	110
55.			[sɨ́ŋkᵊ]	79	79
	Totals	1,462		3,886	5,348
	MEANS				

where:

a = English items correctly pronounced but mistaken for Greek.

b = 'English' items incorrectly pronounced but mistaken for English.

Number of items in sub-test a	:	53	See chapter 6,
Number of items in sub-test b	:	57	note 12, p. 194
Number of repetitions per item	:	4	
Number of subjects	:	30	
Number of opportunities for error in the two sub-tests	:	13,200 (=6,840 + 6,360)	

13. For the purposes of the t-test, the last three items in sub-test b ([sɨ́ŋgᵊ], [sɨ́ŋgə], and [sɨ́ŋkᵊ]) were eliminated. The new Total is now 3,607 and the new MEAN is 120.23. See Column b_1 on next page.

Table 8a

Errors made by individual subjects in the sub-tests a and b

Subjects	a	b_1	b	Total
1.	46	131	141	187
2.	46	149	165	211
3.	30	101	110	140
4.	26	90	99	125
5.	54	125	129	183
6.	57	146	159	216
7.	55	93	108	163
8.	14	70	77	91
9.	64	129	133	197
10.	57	132	143	200
11.	48	128	136	184
12.	19	79	87	106
13.	46	116	128	174
14.	40	105	114	154
15.	46	116	126	172
16.	66	145	157	223
17.	16	72	80	96
18.	51	103	108	159
19.	40	122	128	168
20.	23	133	142	165
21.	21	97	111	132
22.	70	99	108	178
23.	45	144	154	199
24.	72	117	122	194
25.	75	147	157	232
26.	31	125	130	161
27.	79	165	177	256
28.	81	161	172	253
29.	65	147	158	223
30.	79	120	127	206
Total	1,462	3,607	3,886	5,348

Table 9

Part III - Section I : Assessment of vocal production of English underlying nasal + stop and sibilant + voiced consonant sequences.

Three judges: A , B , C .

Errors made by 30 individual subjects in the following items tested as assessed by the 3 judges

Item No.	Items	Judge A	Judge B	Judge C	Total
1.	simple	53	59	58	170
2.	symbol	4	3	4	11
3.	bumper	58	60	60	178
4.	bomber	118	118	118	354
5.	amplify	49	51	51	151
6.	emblem	11	14	12	37
7.	thump	22	33	29	84
8.	thumb	110	111	113	334
9.	pumps	8	11	7	26
10.	thumbs	119	117	118	354
11.	jump	20	22	24	66
12.	jumper	59	64	63	186
13.	comb	109	110	112	331
14.	comber	115	116	115	346
15.	entomology	70	72	72	214
16.	endanger	10	12	10	32
17.	sentry	18	32	29	79
18.	laundry	15	19	22	56
19.	tents	0	0	0	0
20.	bends	92	89	93	274
21.	tent	2	3	2	7
22.	tenter	27	34	30	91
23.	cent	0	0	0	0
24.	centre	32	44	39	115
25.	tend	107	103	107	317
26.	tender	9	8	11	28
27.	send	102	104	103	309
28.	sender	21	21	23	65
29.	blanket	1	1	2	4
30.	engagement	3	6	4	13

Table 9 (cont'd)

Item No.	I t e m s	Judge A	Judge B	Judge C	Total
31.	banking	6	5	5	16
32.	banging	120	120	120	360
33.	bankrupt	38	41	46	125
34.	angry	4	11	8	23
35.	bank	0	0	0	0
36.	bang	120	120	120	360
37.	(he) thinks	1	0	1	2
38.	things	120	120	120	360
39.	sink	0	0	0	0
40.	sinker	13	16	16	45
41.	sing	119	119	120	358
42.	singer	120	120	120	360
43.	slave	0	1	0	1
44.	sleep	0	0	1	1
45.	sleeve	0	0	0	0
46.	small	32	34	32	98
47.	smell	40	41	42	123
48.	smoke	40	44	49	133
49.	snob	13	12	13	38
50.	snore	4	10	6	20
51.	snow	5	7	5	17
52.	sweep	8	10	6	24
53.	swell	9	10	11	30
54.	swine	11	14	15	40
55.	sue	90	87	98	275
56.	suit	87	89	87	263
Totals		2,364	2,468	2,472	7,304

where:

Each item-score represents errors made by all 30 subjects.

Number of items	:	56
Number of repetitions per item	:	4
Number of subjects	:	30
Number of judges	:	3
Total number of opportunities for error	:	19,160 (=3 x 6,720)

Table 9a

Errors made by individual subjects as assessed by the three judges

Subjects	Judge A	Judge B	Judge C	Total
1.	68	61	61	190
2.	64	60	60	184
3.	87	81	90	258
4.	75	84	79	238
5.	108	102	105	315
6.	75	87	77	239
7.	55	54	52	161
8.	64	61	66	191
9.	62	67	72	201
10.	67	71	75	213
11.	73	78	81	232
12.	105	104	110	319
13.	80	81	84	245
14.	64	70	66	200
15.	99	103	101	303
16.	73	78	79	230
17.	80	81	87	248
18.	66	69	67	202
19.	62	65	65	192
20.	57	63	59	179
21.	72	84	76	232
22.	72	82	78	232
23.	102	109	112	323
24.	90	95	97	282
25.	72	78	75	225
26.	47	53	49	149
27.	125	134	136	395
28.	93	99	100	292
29.	128	131	129	388
30.	79	83	84	246
Total	2,364	2,468	2,472	7,304

Table 10

Part III - Section II : Assessment of vocal production of English underlying nasal + stop and sibilant + voiced consonant sequences.

Three Judges: A , B , C .

Errors made by 30 individual subjects in the following items tested as assessed by the three judges

Item No.	Items	J. A	J. B	J. C	Total
1.	Do you like this beer?	97	108	107	312
2.	I know this boy.	107	110	110	327
3.	This desk is mine.	100	106	108	314
4.	Open this door!	101	105	105	311
5.	Do you like this garden?	100	105	107	312
6.	Open this gate!	98	104	107	309
7.	Put this vase on the table!	100	109	109	318
8.	This voice sounds familiar.	102	105	107	314
9.	How high is this wall?	112	116	119	347
10.	Come this way, please.	111	111	113	335
11.	Give me this yellow pencil!	117	119	119	355
12.	This young man is very clever.	118	117	120	355
13.	Do you know this man?	64	76	73	213
14.	I don't like this music.	55	78	66	199
15.	I know this name.	59	76	71	206
16.	Listen to this noise!	42	69	58	169
17.	I don't know this lady.	63	77	72	212
18.	This land is very fertile.	79	81	90	250
19.	I think I'll buy this radio.	72	85	85	242
20.	Have you read this report?	80	84	81	245
21.	He was killed in battle.	8	9	5	22
22.	Put it in boiling water!	1	1	0	2
23.	He came in person.	0	3	1	4
24.	He lives in poverty.	0	0	0	0
25.	They live in tents.	0	1	0	1
26.	Put it on top!	0	0	0	0
27.	He is in danger.	4	7	7	18
28.	He is in debt.	4	3	4	11

Table 10 (cont'd)

Item No.	Items	J. A	J. B	J. C	Total
29.	He lives in comfort.	0	1	1	2
30.	Babies sleep in cots.	1	0	2	3
31.	They don't believe in God.	7	8	12	27
32.	He was paid in gold.	10	11	10	31
	Totals	1,812	1,985	1,969	5,766

where:

Each item-score represents errors made by all 30 subjects.

Number of items	:	32
Number of repetitions per item	:	4
Number of subjects	:	30
Number of judges	:	3
Total number of opportunities for error	:	11,520 (= 3 x 3,840)

Table 10a

Errors made by individual subjects as assessed by the three judges

Subjects	Judge A	Judge B	Judge C	Total
1.	70	71	73	214
2.	51	53	59	163
3.	56	55	63	174
4.	53	50	55	158
5.	61	72	66	199
6.	59	63	65	187
7.	42	48	42	132
8.	43	42	50	135
9.	50	60	62	172
10.	76	77	80	233
11.	56	61	59	176
12.	83	82	70	235
13.	70	76	76	222
14.	70	77	78	225
15.	63	79	67	209
16.	66	77	76	219
17.	46	52	52	150
18.	52	60	54	167
19.	25	44	36	105
20.	53	63	59	175
21.	61	73	69	203
22.	60	64	65	189
23.	76	85	85	246
24.	78	80	81	239
25.	47	53	52	152
26.	76	76	78	230
27.	73	81	81	235
28.	76	81	81	238
29.	71	81	80	232
30.	48	49	55	152
Total	1,812	1,985	1,969	5,766

Table 11

Part III - Section III : Assessment of vocal production of English underlying **sibilant + voiced consonant** sequences.

Three judges: A , B , C .

Errors made by 30 individual subjects in the following items tested as assessed by the three judges

Item No.	I t e m s	J. A	J. B	J. C	Total
1.	We must change those lights.	0	0	0	0
2.	I've seen those young men before.	0	0	1	1
3.	This land belongs to my father.	61	71	79	211
4.	I'll buy this dark suit.	113	114	114	341
5.	Do you like those gold rings?	0	0	0	0
6.	Remember this number!	62	65	71	198
7.	I hate these receptions.	1	1	0	2
8.	I like this book very much.	111	110	116	337
9.	Don't drink this water!	112	109	115	336
10.	I recommend this very interesting book.	102	106	113	321
11.	Have you read these novels?	0	4	2	6
12.	I've never met this man.	62	63	84	209
13.	I've been to those villages.	0	0	0	0
14.	I know these boys.	0	0	0	0
15.	Do you like this yard?	113	106	113	332
16.	We bought this gas-stove yesterday.	81	86	97	264
17.	I don't like any of these watches.	0	1	0	1
18.	This roof leaks.	57	67	69	193
19.	I can explain these details.	1	1	0	2
20.	I've never seen those men before.	0	0	0	0
	Totals	876	904	974	2,754

where:

Each item-score represents errors made by all 30 subjects.

Number of items	:	20
Number of repetitions per item	:	4
Number of subjects	:	30
Number of judges	:	3
Total number of opportunities for error	:	7,200 (3 x 2,400)

Table 11a

Errors made by individual subjects as assessed by the three judges

Subjects	Judge A	Judge B	Judge C	Total
1.	37	36	37	110
2.	20	18	26	64
3.	29	25	33	87
4.	27	23	29	79
5.	38	37	39	114
6.	31	30	36	97
7.	23	15	23	61
8.	20	20	23	63
9.	27	28	32	87
10.	27	28	31	86
11.	23	19	23	65
12.	40	40	36	116
13.	36	36	35	107
14.	36	36	39	111
15.	30	37	35	102
16.	35	33	40	108
17.	21	26	24	71
18.	29	31	31	91
19.	26	32	32	90
20.	27	28	31	86
21.	26	30	36	92
22.	20	25	27	72
23.	31	38	39	108
24.	40	40	40	120
25.	24	26	26	76
26.	25	26	28	79
27.	38	38	40	116
28.	39	39	40	118
29.	31	37	36	104
30.	20	27	27	74
Total	876	904	974	2,754

Table 12

Parts II and III : Aural perception and vocal production of English underlying nasal + stop sequences

Sub-tests: a = Perception (Sections I and II)
b = Production (Section I)

Errors made by 30 subjects in the following items tested

Item No.	a Perception	Errors	b Production	Errors	Total
1.	[æbǽsədə]	93	symbol	11	104
2.	[dɨstɨ́gwɨš]	85	emblem	37	122
3.	[ɨbrɔ́ɨdərɨ]	80	endanger	32	112
4.	[ɨgrésɨv]	60	laundry	56	116
5.	[téd]	50	bends	274	324
6.	[tédə]	63	tend	317	380
7.	[ʌdəstǽnd]	46	tender	28	74
8.	[ʌdrés]	80	send	309	389
9.	[ǽndoʉnɨm]	64	sender	65	129
10.	[embɨ́rɨkəl]	74	engagement	13	87
11.	[eŋglɨ́tɨk]	21	angry	23	44
12.	[eŋgóʉmɨəm]	54	simple	170	224
13.	[ɨgzámbl]	41	bumper	178	219
14.	[ǰʌ́mb]	86	amplify	151	237
15.	[ǰʌ́mbə]	90	thump	84	174
16.	[téndətɨv]	104	pumps	26	130
17.	[ǽdoʉnɨm]	18	jump	66	84
18.	[ebɨ́rɨkəl]	59	jumper	186	245
19.	[eglɨ́tɨk]	13	entomology	214	227
20.	[egóʉmɨəm]	21	sentry	79	100
21.	[ɨgzábl]	29	tents	0	29
22.	[ǰʌ́b]	47	tent	7	54
23.	[ǰʌ́bə]	62	tenter	91	153
24.	[tédətɨv]	53	cent	0	53
25.	[bʌ́mpᵊ]	80	centre	115	195
26.	[bʌ́mbᵊ]	98	blanket	4	102
27.	[bʌ́mbə]	104	banking	16	120
28.	[séntᵊ]	62	bankrupt	125	187

Table 12 (cont'd)

Item No.	a Perception	Errors	b Production	Errors	Total
29.	[séndᵊ]*	128	bank	0	128
30.	[sɨ́ŋkᵊ]	79	(he) thinks	2	81
31.			sink	0	0
32.			sinker	45	45
Totals (for Correl.)		1,944		2,724	4,668
Means (by No. of subj.)		64.8		90.8	
TOTALS (for t-test)**		5,832		2,724	
MEANS (for t-test)**		64.8		30.27	

where:

a (Perception) = Greek-rule processed words included only (except for items presenting orthographical complications).

b (Production) = relevant items from Section I of Part III (no 'orthographical' words included).

Number of items in sub-test a	:	31	(See * below)
Number of items in sub-test b	:	96	(See ch. 6, n. 14, p.199)
Number of repetitions per item	:	4	
Number of subjects	:	30	
Number of judges in sub-test b	:	3	
Number of opportunities for error in sub-test a	:	3,720	
Number of opportunities for error in sub-test b	:	11,520	
Total number of opportunities for error in sub-tests a + b	:	15,240	

* [séndᵊ] received 8 instead of 4 repetitions, which brings the number of items in this category to 31. Cf. note 11, p. 194.

** The actual number of errors is 1,944. However, for the purposes of the t-test, this figure has been multiplied by 3 to make perception scores comparable in scale to production scores, which represent the pooled assessment of the 3 judges.
The second set of MEANS is arrived at by dividing the second set of TOTALS by 90 (30 subjects x 3 judges).

Table 12a

Errors made by individual subjects in the sub-tests a and b

Subjects	a Perception	a_1	b Production	Total
1.	68	204	54	122
2.	83	249	43	126
3.	59	177	111	170
4.	52	156	104	156
5.	54	162	121	175
6.	89	267	95	184
7.	39	117	39	78
8.	38	114	64	102
9.	60	180	65	125
10.	69	207	78	147
11.	62	186	93	155
12.	46	138	141	187
13.	69	207	105	174
14.	64	192	69	133
15.	67	201	148	215
16.	82	246	104	186
17.	41	123	73	114
18.	48	144	51	99
19.	64	192	49	113
20.	75	225	37	112
21.	53	159	97	150
22.	45	135	74	119
23.	84	252	158	242
24.	54	162	109	163
25.	85	255	51	136
26.	63	189	26	89
27.	94	282	168	262
28.	89	267	135	224
29.	83	249	179	262
30.	65	195	83	148
Total	1,944	5,832	2,724	4,668

NB. See notes on previous page.

Table 15

Parts II - III : Aural perception and vocal production of English underlying <u>sibilant+voiced consonant</u> seqs.
Sub-tests: Perception <u>a</u> and <u>b</u>; Production <u>b</u>, <u>d</u>, <u>e</u>.

Errors made by 30 subjects in the following items tested

Item No.	a	Errors	b	Errors	c	Errors	d	Errors	e	Errors
1.	[zlíp]	2	slave	1	[dɨzgréɨs]	103	this beer	312	this land	211
2.	[zmól]	56	sleep	1	[dɨzláɨk]	85	this boy	327	this dark	341
3.	[znɔ́b]	20	sleeve	0	[dɨzmémbə]	108	this desk	314	this number	198
4.	[zwél]	5	small	98	[mɨzbɨhéɨv]	93	this door	311	this book	337
5.	[		smell	123	[mɨzbráʉn]	101	this garden	312	this water	336
6.			smoke	133	[mɨzdɨrékt]	110	this gate	309	this very	321
7.			snob	38	[mɨzgáɨdɨd]	102	this vase	318	this man	209
8.			snore	20	[mɨznéɨm]	90	this voice	314	this yard	332
9.			snow	17	[mɨzreprɨzént]	85	this wall	347	this gas-stove	264
10.			sweep	24	[ðɨz drɨ́ŋk]	85	this way	335	this roof	193
11.			swell	30	[ðɨz vǽlɨ]	80	this yellow	355		
12.			swine	40	[ðɨz wól]	96	this young	355		
13.					[ðɨz yɨ́ə]	95	this man	213		
14.							this music	199		
15.							this name	206		
16.							this noise	169		
17.							this lady	212		
18.							this land	250		
19.							this radio	242		
20.							this report	245		
	Totals	83		525		1,233		5,645		2,742
	MEANS	2.77		5.83		41.10		62.72		30.47

NB. To arrive at the MEANS, Totals <u>a</u> and <u>c</u> were divided by 30, and Totals <u>b</u>, <u>d</u>, <u>e</u> by 90 (3 Judges x 30 subjects)

Table 13 (i)

Parts II - III : Aural perception and vocal production of English underlying sibilant + voiced consonant sequences

Sub-tests: Perception a, c; Production b, d, e .

Errors made by 30 subjects in the following items tested

Item No.	a Perception*		Errors	b Production	Errors
1.	[zlíp]	(3 x 2)	6	smell	123
2.	[zmól]	(3 x 56)	168	snob	38
3.	[znɒ́b]	(3 x 20)	60	snow	17
4.	[zwél]	(3 x 5)	15	swell	30
	Totals		249*		208
	MEANS		2.77		2.31

Item No.	c Perception*		Errors	d Production**	Errors	e Production	Errors
1.	[dɨzgréɨs]	(3x103)	309	this beer	312	this land	211
2.	[dɨzláɨk]	(3x85)	255	this garden	312	this dark	341
3.	[mɨzbɨhéɨv]	(3x93)	279	this vase	318	this number	198
4.	[mɨzbráʉn]	(3x101)	303	this young	355	this book	337
5.	[mɨzdɨrékt]	(3x110)	330	this man	213	this water	336
6.	[mɨznéɨm]	(3x90)	270	this music	199	this very	321
7.	[mɨzreprɨzént]	(3x85)	255	this noise	169	this man	209
8.	[ðɨz drɨ́ŋk]	(3x85)	255	this lady	212	this yard	332
9.	[ðɨz vǽ lɨ]	(3x80)	240	this land	250	this gas-stove	264
10.	[ðɨz yɨ́ə]	(3x95)	285	this report	245	this roof	193
	Totals		2,781		2,585		2,742
	MEANS		30.90		28.72		30.47

* The actual number of errors in Perception are 83 for test a and 927 for test c. For the purposes of the t-test, these figures were multiplied by 3 to make perception scores comparable in scale to production scores, which represent the pooled assessment of the 3 judges. The MEANS are arrived at by dividing all TOTALS by 90 (30 subjects x 3 judges). The ten items that appear under c were drawn from the original 13 items.

** The 10 items that appear under d as well as the 4 items in b were drawn from the original 20 and 12 items, respectively. Cf. note 2, p. 264a.

In Table 13:

a = mistaking *[ǽndoʉnɨm] for the correct [ǽntoʉnɨm].

b = mispronouncing *slave*.

c = mistaking *[dɨzgréɨs] for the correct [dɨsgréɨs].

d = mispronouncing *this beer*.

e = mispronouncing *this land*.

Number of items in *a*	:	4
Number of items in *b*	:	12
Number of items in *c*	:	13
Number of items in *d*	:	20
Number of items in *e*	:	10
Number of repetitions per item	:	4
Number of subjects	:	30
Number of judges in *b*, *d*, *e*	:	3

Number of opportunities for error in:	*a* =	480
	b =	4,320
	c =	1,560
	d =	7,200
	e =	3,600
Total opportunities for error	:	17,160

Table 13a

Errors made by individual subjects in Perception (a, c) and Production (b, d , e)

Subjects	a	b	c	d	c	e
1.	3	25	47	214	47	110
2.	5	0	48	163	48	64
3.	2	10	34	174	34	87
4.	1	0	30	158	30	79
5.	8	55	51	199	51	114
6.	0	6	44	185	44	97
7.	2	0	44	132	44	61
8.	1	0	25	135	25	63
9.	7	3	43	172	43	87
10.	4	5	44	230	44	86
11.	2	0	48	175	48	65
12.	2	37	24	225	24	115
13.	3	8	34	219	34	107
14.	2	0	31	223	31	111
15.	3	12	35	172	35	96
16.	7	0	44	218	44	108
17.	1	33	24	147	24	71
18.	2	9	49	166	49	91
19.	0	1	46	105	46	90
20.	1	0	44	175	44	86
21.	1	3	29	200	29	92
22.	2	15	40	189	40	72
23.	1	32	45	229	45	105
24.	3	33	47	238	47	120
25.	2	39	44	151	44	76
26.	4	4	48	217	48	77
27.	6	90	49	126	49	116
28.	4	14	52	235	52	118
29.	3	67	47	231	47	104
30.	1	24	43	142	43	74
Total	83	525	1,233	5,645	1,233	2,742

Table 13a (i)

Errors made by individual subjects in Perception (a and c) and Production (b, d, and e)

Subjects	a	b	c	d	e
1.	9	9	105	109	110
2.	15	0	108	73	64
3.	6	1	72	91	87
4.	3	0	63	52	79
5.	24	23	117	95	114
6.	0	1	99	88	97
7.	6	0	105	43	61
8.	3	0	54	49	63
9.	21	1	93	73	87
10.	12	1	96	115	86
11.	6	0	108	76	65
12.	6	16	54	113	115
13.	9	4	75	115	107
14.	6	0	69	110	111
15.	9	0	81	70	96
16.	21	0	99	104	108
17.	3	12	54	56	71
18.	6	0	111	61	91
19.	0	0	102	49	90
20.	3	0	105	72	86
21.	3	0	66	96	92
22.	6	8	96	88	72
23.	3	12	99	110	105
24.	9	11	108	118	120
25.	6	17	99	60	76
26.	12	0	108	105	77
27.	18	46	111	114	116
28.	12	2	120	119	118
29.	9	35	105	114	104
30.	3	9	99	47	74
Totals	249	208	2,781	2,585	2,742
MEANS	2.77	2.31	30.90	28.72	30.47

NB. The raw scores in a and b reflect the amount of error made in 4 items; those in c, d, and e represent errors made in 10 items. Similarly with the MEANS. The items in b, c, and d were drawn from a larger number. Cf. p. 281a and discussion on pp. 188-89.

Table 14

Parts II - III : Aural perception and vocal production of English underlying nasal + stop and sibilant + voiced consonant sequences.

Sub-tests: a = Perception (Section I)

b = Production (Section I)

Errors made by 30 subjects in the following items tested

Item No.	a Perception	Errors	b Production	Errors	Total
1.	[ǽndouɨnɨm]	64	simple	170	234
2.	[embɨ́rɨkəl]	74	bumper	178	252
3.	[eŋglɨ́tɨk]	21	amplify	151	172
4.	[eŋgóuɨmɨəm]	54	thump	84	138
5.	[ɨgzámbl]	41	pumps	26	67
6.	[ɟʌ́mb]	86	jump	66	152
7.	[ɟʌ́mbə]	90	jumper	186	276
8.	[téndətɨv]	104	entomology	214	318
9.	[ǽdouɨnɨm]	18	sentry	79	97
10.	[ebɨ́rɨkəl]	59	tents	0	59
11.	[eglɨ́tɨk]	13	tent	7	20
12.	[egóuɨmɨəm]	21	tenter	91	112
13.	[ɨgzábl]	29	cent	0	29
14.	[ɟʌ́b]	47	centre	115	162
15.	[ɟʌ́bə]	62	blanket	4	66
16.	[tédətɨv]	53	banking	16	69
17.	[æbǽsədə]	93	bankrupt	125	218
18.	[dɨstɨ́gwɨɟ̈]	85	bank	0	85
19.	[ɨbróɨdərɨ]	80	(he) thinks	2	82
20.	[ɨgrésɨv]	60	sink	0	60
21.	[téd]	50	sinker	45	95
22.	[tédə]	63	symbol	11	74
23.	[ʌdəstǽnd]	46	emblem	37	83
24.	[ʌdrés]	80	endanger	32	112
25.	[zlíp]	2	laundry	56	58
26.	[zmól]	56	bends	274	330
27.	[znɒ́b]	20	tend	317	337
28.	[zwél]	5	tender	28	33

Table 14 (cont')

Item No.	a Perception	Errors	b Production	Errors	Total
29.	[dɨzgréɨs]	103	send	309	412
30.	[dɨzláɨk]	85	sender	65	150
31.	[dɨzmémbə]	108	engagement	13	121
32.	[mɨzbɨhéɨv]	93	angry	23	116
33.	[mɨzbráʉn]	101	slave	1	102
34.	[mɨzdɨrékt]	110	sleep	1	111
35.	[mɨzgáɨdɨd]	102	sleeve	0	102
36.	[mɨznéɨm]	90	small	98	188
37.	[mɨzreprɨzént]	85	smell	123	208
38.	[ðɨz drɨ́ŋk]	85	smoke	133	218
39.	[ðɨz vǽ lɨ]	80	snob	38	118
40.	[ðɨz wól]	96	snore	20	116
41.	[ðɨz yɨ́ə]	95	snow	17	112
42.	[éndrəns]	63	sweep	24	87
43.	[sxyú]	62	swell	30	92
44.			swine	40	40
45.			sue	275	275
46.			suit	263	263
	Totals	2,834		3,787	6,621
	MEANS	65.907		27.442	

where:

a Perception = mistaking deliberately mispronounced words for English.

b Production = subject-mispronunciations of English words.

Number of items in sub-test a	:	43
Number of items in sub-test b	:	46
Number of repetitions per item	:	4
Number of subjects	:	30
Number of judges in sub-test b	:	3
Number of opportunities for error in a + b	:	23,720 (5,160 + 16,560)

NB. Words presenting complications because of the influence of orthography or epenthesis are not included in the two lists.

NB. For the purposes of the t-test, the items 10 (tents), 20 (sink), and 30 (sender) were eliminated by drawing in sub-test b. The new Total is now 3,722 and the new MEAN 41.36. See Column b1 in next page.

Table 14a

Errors made by individual subjects in Perception (a) and in Production (b)

Subjects	a_1	a. Total errors in Perception	b_1	b. Total errors in Production
1.	300	100	92	93
2.	333	111	65	65
3.	231	77	140	140
4.	198	66	109	118
5.	312	104	183	195
6.	360	120	106	119
7.	201	67	52	52
8.	159	53	73	75
9.	327	109	80	81
10.	336	112	94	94
11.	297	99	112	112
12.	174	58	201	202
13.	252	84	122	125
14.	240	80	74	82
15.	258	86	181	183
16.	333	111	111	111
17.	156	52	128	128
18.	264	88	83	83
19.	309	103	72	72
20.	327	109	59	59
21.	189	63	117	117
22.	231	77	113	113
23.	348	116	195	203
24.	303	101	162	162
25.	363	121	102	105
26.	300	100	50	50
27.	384	128	280	280
28.	384	128	170	172
29.	339	113	270	270
30.	294	98	126	126
Totals	8,502	2,834	3,722	3,787

3, The scores in Columns **a** and **b** have been used for Correlations. The scores in Columns a_1 (= a × 3, to bring the scale up to the Production scores where there are 3 Judges) and b_1 have been used for the t-test. See also note on previous page.

Table A. Table of F for .05 (first of two entries against each n_2) and .01 (second such entry) levels of significance *

n_2 \ n_1	1	2	3	4	5	6	8	12	24	∞
1	161	200	216	225	230	234	239	244	249	254
	4052	4999	5403	5625	5724	5859	5981	6106	6234	6366
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.45	19.50
	98.49	99.01	99.17	99.25	99.30	99.33	99.36	99.42	99.46	99.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.84	8.74	8.64	8.53
	34.12	30.81	29.46	28.71	28.24	27.91	27.49	27.05	26.60	26.12
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.77	5.63
	21.20	18.00	16.69	15.98	15.52	15.21	14.80	14.37	13.93	13.46
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.53	4.36
	16.26	13.27	12.06	11.39	10.97	10.67	10.27	9.89	9.47	9.02
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.84	3.67
	13.74	10.92	9.78	9.15	8.75	8.47	8.10	7.72	7.31	6.88
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.41	3.23
	12.25	9.55	8.45	7.85	7.46	7.19	6.84	6.47	6.07	5.65
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.12	2.93
	11.26	8.65	7.59	7.01	6.63	6.37	6.03	5.67	5.28	4.86
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.90	2.71
	10.56	8.02	6.99	6.42	6.06	5.80	5.47	5.11	4.73	4.31
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.74	2.54
	10.04	7.56	6.55	5.99	5.64	5.39	5.06	4.71	4.33	3.91
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.61	2.40
	9.65	7.20	6.22	5.67	5.32	5.07	4.74	4.40	4.02	3.60
12	4.75	3.88	3.49	3.26	3.11	3.00	2.85	2.69	2.50	2.30
	9.33	6.93	5.95	5.41	5.06	4.82	4.50	4.16	3.78	3.36

* Table A has been extracted from McNemar, Psychological Statistics, pp. 431-433.

Table A. Table of F for .05 (first of two entries against each n_2) and .01 (second such entry) levels of significance * (Cont'd)

n_2 \ n_1	1	2	3	4	5	6	8	12	24	∞
13	4.67 9.07	3.80 6.70	3.41 5.74	3.18 5.20	3.02 4.86	2.92 4.62	2.77 4.30	2.60 3.96	2.42 3.59	2.21 3.16
14	4.60 8.86	3.74 6.51	3.34 5.56	3.11 5.03	2.96 4.69	2.85 4.46	2.70 4.14	2.53 3.80	2.35 3.43	2.13 3.00
15	4.54 8.68	3.68 6.36	3.29 5.42	3.06 4.89	2.90 4.56	2.79 4.32	2.64 4.00	2.48 3.67	2.29 3.29	2.07 2.87
16	4.49 8.53	3.63 6.23	3.24 5.29	3.01 4.77	2.85 4.44	2.74 4.20	2.59 3.89	2.42 3.55	2.24 3.18	2.01 2.75
17	4.45 8.40	3.59 6.11	3.20 5.18	2.96 4.67	2.81 4.34	2.70 4.10	2.55 3.79	2.38 3.45	2.19 3.08	1.96 2.65
18	4.41 8.28	3.55 6.01	3.16 5.09	2.93 4.58	2.77 4.25	2.66 4.01	2.51 3.71	2.34 3.37	2.15 3.00	1.92 2.57
19	4.38 8.18	3.52 5.93	3.13 5.01	2.90 4.50	2.74 4.17	2.63 3.94	2.48 3.63	2.31 3.30	2.11 2.92	1.88 2.49
20	4.35 8.10	3.49 5.85	3.10 4.94	2.87 4.43	2.71 4.10	2.60 3.87	2.45 3.56	2.28 3.23	2.08 2.86	1.84 2.42
21	4.32 8.02	3.47 5.78	3.07 4.87	2.84 4.37	2.68 4.04	2.57 3.81	2.42 3.51	2.25 3.17	2.05 2.80	1.81 2.36
22	4.30 7.94	3.44 5.72	3.05 4.82	2.82 4.31	2.66 3.99	2.55 3.76	2.40 3.45	2.23 3.12	2.03 2.75	1.78 2.31
23	4.28 7.88	3.42 5.66	3.03 4.76	2.80 4.26	2.64 3.94	2.53 3.71	2.38 3.41	2.20 3.07	2.00 2.70	1.76 2.26
24	4.26 7.82	3.40 5.61	3.01 4.72	2.78 4.22	2.62 3.90	2.51 3.67	2.36 3.36	2.18 3.03	1.98 2.66	1.73 2.21

* Table A has been extracted from McNemar, Psychological Statistics, pp. 431-433.

Table A. Table of F for .05 (first of two entries against each n_2) and .01 (second such entry) levels of significance* (Cont'd)

n_2 \ n_1	1	2	3	4	5	6	8	12	24	∞
25	4.24 7.77	3.38 5.57	2.99 4.68	2.76 4.18	2.60 3.86	2.49 3.63	2.34 3.32	2.16 2.99	1.96 2.62	1.71 2.17
26	4.22 7.22	3.37 5.53	2.98 4.64	2.74 4.14	2.59 3.82	2.47 3.59	2.32 3.29	2.15 2.96	1.95 2.58	1.69 2.13
27	4.21 7.68	3.35 5.49	2.96 4.60	2.73 4.11	2.57 3.78	2.46 3.56	2.30 3.26	2.13 2.93	1.93 2.55	1.67 2.10
28	4.20 7.64	3.34 5.45	2.95 4.57	2.71 4.07	2.56 3.75	2.44 3.53	2.29 3.23	2.12 2.90	1.91 2.52	1.65 2.06
29	4.18 7.60	3.33 5.42	2.93 4.54	2.70 4.04	2.54 3.73	2.43 3.50	2.28 3.20	2.10 2.87	1.90 2.49	1.64 2.03
30	4.17 7.56	3.32 5.39	2.92 4.51	2.69 4.02	2.53 3.70	2.42 3.47	2.27 3.17	2.09 2.84	1.89 2.47	1.62 2.01
40	4.08 7.31	3.23 5.18	2.84 4.31	2.61 3.83	2.45 3.51	2.34 3.29	2.18 2.99	2.00 2.66	1.79 2.29	1.51 1.80
60	4.00 7.08	3.15 4.98	2.76 4.13	2.52 3.65	2.37 3.34	2.25 3.12	2.10 2.82	1.92 2.50	1.70 2.12	1.39 1.60
120	3.92 6.85	3.07 4.79	2.68 3.95	2.45 3.48	2.29 3.17	2.17 2.96	2.02 2.66	1.83 2.34	1.61 1.95	1.25 1.38
∞	3.84 6.64	2.99 4.60	2.60 3.78	2.37 3.32	2.21 3.02	2.09 2.80	1.94 2.51	1.75 2.18	1.52 1.79	1.00 1.00

* Table A has been extracted from McNemar, Psychological Statistics, pp. 431-433.

Table B. Distribution of t *

n	P = .1	.05	.02	.01	.001
1	6.314	12.706	31.821	63.657	636.619
2	2.920	4.303	6.965	9.925	31.598
3	2.353	3.182	4.541	5.841	12.941
4	2.132	2.776	3.747	4.604	8.610
5	2.015	2.571	3.365	4.032	6.859
6	1.943	2.447	3.143	3.707	5.959
7	1.895	2.365	2.998	3.499	5.405
8	1.860	2.306	2.896	3.355	5.041
9	1.833	2.262	2.821	3.250	4.781
10	1.812	2.228	2.764	3.169	4.587
11	1.796	2.201	2.718	3.106	4.437
12	1.782	2.179	2.681	3.055	4.318
13	1.771	2.160	2.650	3.012	4.221
14	1.761	2.145	2.624	2.977	4.140
15	1.753	2.131	2.602	2.947	4.073
16	1.746	2.120	2.583	2.921	4.015
17	1.740	2.110	2.567	2.898	3.965
18	1.734	2.101	2.552	2.878	3.922
19	1.729	2.093	2.539	2.861	3.883
20	1.725	2.086	2.528	2.845	3.850
21	1.721	2.080	2.518	2.831	3.819
22	1.717	2.074	2.508	2.819	3.792
23	1.714	2.069	2.500	2.807	3.767
24	1.711	2.064	2.492	2.797	3.745
25	1.708	2.060	2.485	2.787	3.725
26	1.706	2.056	2.479	2.779	3.707
27	1.703	2.052	2.473	2.771	3.690
28	1.701	2.048	2.467	2.763	3.674
29	1.699	2.045	2.462	2.756	3.659
30	1.697	2.042	2.457	2.750	3.646
40	1.684	2.021	2.423	2.704	3.551
60	1.671	2.000	2.390	2.660	3.460
120	1.658	1.980	2.358	2.617	3.373
∞	1.645	1.960	2.326	2.576	3.291

* Table B has been copied from McNemar, Psychological Statistics, p. 430.

BIBLIOGRAPHY

[The dates and other particulars quoted below are those of the editions, etc., that have been consulted.]

Abercrombie, D., (1964). "English Phonetic Texts." Faber & Faber: London.

Abercrombie, D., (1968). "Elements of General Phonetics." Edinburgh University Press: Edinburgh.

Allen, H.B., (1958). "Readings in Applied English Linguistics." Appleton-Century-Crofts: New York.

Amos, J.R, Brown, F.L., and Mink, O.G., (1965). "Statistical Concepts: A Basic Program." Harper and Row: New York.

Anderson, J., (1969). "Syllabic or Non-Syllabic Phonology?" Journal of Linguistics, 5, 136-41.

Andhriotis, N., (1971). "Etymologiko Lexico This Koenis Neoellinikis." Institute of Neo-Hellenic Studies: Thessaloniki.

Andhriotis, N., (1940). "Peiramatike Erevne peri Tis Physeos ke Tis Dhiarkias Ton Neoellinikon Phoniendon." Athina, 50-90

Bach, E., (1964). "An Introduction to Transformational Grammars." Holt, Rinehart and Winston: New York.

Bazell, C.E., Catford, J.C., Halliday, M.A.K., and Robins, R.H., (eds) (1966). "In Memory of J.R. Firth." Longmans: London.

Bleckert, L., (1969). "On The Auditory Perception of Swedish Dentals And Alveolars." Phonetica, 19, 1-25.

Bloch, B., (1941). "Phonemic Overlapping." American Speech, 16, 278-84. Reprinted in Joos, 1957, 93-6.

Bloch, B., and Trager, G.L., (1942). "Outline of Linguistic Analysis." Waverley Press: Baltimore.

Bloomfield, L., (1926). "A Set of Postulates for The Science of Language." Language, 2, 153-64. Reprinted in Joos, 1957, 26-31.

Bloomfield, L., (1969). "Language." George Allen & Unwin: London.

Boisacq, E., (1923). "Dictionaire Étymologique de La Langue Grecque." C. Klincksieck: Paris.

Bolinger, D.L., (1955). "Intersections of Stress And Intonation." Word, 11, 195-203.

Bondarko, L.V., (1969). "The Syllable Structure of Speech And Distinctive Features of Phonemes." Phonetica, 20, 1-40.

Briere, E.J., (1966). "An Investigation of Phonological Interference." Language, XLII, 768-96.

Brown, G., (1969). "Syllables And Redundancy Rules in Generative Phonology." Journal of Linguistics, 6/1, 1-17.

Brown, G., (1971). "On The Function of Redundancy Rules." Journal of Linguistics, 7/1, 85-90.

Buchanan, C.D., (1963). "A Programed Introduction to Linguistics: Phonetics And Phonemics." D.C. Heath and Co.: Boston.

Campbell, R., and Wales, R., (1970). "The Study of Language Acquisition." In Lyons, 1970, 242-60.

Chantraine, P., (1968). "Dictionaire Étymologique de La Langue Grecque." C. Klincksieck: Paris.

Chomsky, N., (1957). "Syntactic Structures." Mouton: The Hague.

Chomsky, N., (1961). "On The Notion 'Rule of Grammar'." In Fodor and Katz, 119-136.

Chomsky, N., (1964). "Current Issues in Linguistic Theory." Mouton: The Hague.

Chomsky, N., (1965). "Aspects of The Theory of Syntax." M.I.T. Press: Cambridge, Mass.

Chomsky, N., (1967). "Some General Properties of Phonological Rules." Language, 47/1, 102-128.

Chomsky, N., (1968). "Language And Mind." Harcourt, Brace and World: New York.

Chomsky, N., (196?). "Phonology And Reading."

Chomsky, N., and Halle, M., (1965). "Some Controversial Questions in Phonological Theory." Journal of Linguistics, 1/2, 97-138.

Chomsky, N., and Halle, M., (1968). "The Sound Pattern of English." Harper and Row: New York.

Chomsky, N., and Miller, G.A., (1963). "Introduction to The Formal Analysis of Natural Languages." In Luce, Bush, and Galanter (eds) Handbook of Mathematical Psychology, chapter 6, 'Sound Structures', 306-321.

Clark, H.H., (1970). "Word Associations And Linguistic Theory." In Lyons, 1970, 271-286.

Contreras, H., and Saporta, S., (1960). "The Validation of A Phonological Grammar." Lingua, IX, 1-15.

Cooper, F.S., Delattre, P.C., Liberman, A.M., Borst, J.M., and Gerstman, L.J., (1952). "Some Experiments on The Perception of Synthetic Speech Sounds." Journal of The Acoustical Society of America, 24/6, 597-606.

Cox, D.R., (1958). "Planning of Experiments." John Wiley & Sons: New York.

Davies, A., (ed.), (1968). "Language Testing Symposium: A Psycholinguistic Approach." Oxford University Press: London.

Delattre, P.G., Liberman, A.M., and Cooper, F.S. (1955). "Acoustic Loci And Transitional Cues for Consonants." The Journal of The Acoustical Society of America, 27/4, 769-73.

Dickoff, J., and James, P., (1965). "Symbolic Logic And Language: A Programmed Text." McGraw-Hill: New York.

Efstathiadis, E., (1967). "On The Greek PARATATIKOS And Its English Equivalents: Some Problems of Teaching Tense And Aspect to Greek Learners of English." Unpublished M.Litt. Dissertation: Edinburgh.

Efstathiadis, E., (1973). "Distinctive Features in Generative Phonology." In The Faculty of Philosophy Yearbook, The University of Thessaloniki: Thessaloniki.

Ferguson, C.A., (1966). "Assumptions about Nasal: A Sample Study in Phonological Universals." In Greenberg, 1966, 53-60.

Fodor, J.D., (1970). "Formal Linguistics And Formal Logic." In Lyons, 1970, 198-214.

Fodor, J.A. and Katz, J.J., (eds), (1964). "The Structure of Language: Readings in The Philosophy of Language." Prentice-Hall: Englewood Cliffs, N. J.

Frisk, H., (1954). "Griechisches Etymologisches Wörterbuch." Carl Winter - Universitätsverlag: Heidelberg.

Fry, D.B., (1970). "Speech Reception And Perception." In Lyons, 1970, 29-52.

Fudge, E.C., (1967). "The Nature of Phonological Primes." Journal of Linguistics, 3/1, 1-36.

Fudge, E.C., (1969a). "Mutation Rules And Ordering in Phonology." Journal of Linguistics, 5/1, 23-38.

Fudge, E.C., (1969b). "Syllables." Journal of Linguistics, 5/2, 253-86.

Fudge, E.C., (1970). "Phonology." In Lyons, 1970, 76-95.

Gleason, H.A., (1967). "An Introduction to Descriptive Linguistics." Holt, Rinehart and Winston: New York.

Greenberg, J.H., (1966). "Universals of Language.". M.I.T. Press: Cambridge, Mass.

Halle, M., (1954). "The Strategy of Phonemics." Word, 10/2-3, 197-209.

Halle, M., (1958). "On The Bases of Phonology." Il Nuovo Cimento, 13, Series X, 497-517. Revised and reprinted in Fodor and Katz, 1964, 324-33.

Halle, M., (1962). "Phonology in Generative Grammar." Word, 18, 54-72. Reprinted in Fodor and Katz, 1964, 334-52.

Halle, M., (1969). "How Not to Measure Length of Lexical Representations And Other Matters." Journal of Linguistics, 5/2, 305-308.

Halle, M., Lunt, H., and MacLean, N., (eds), (1956). "For Roman Jakobson." Mouton: The Hague.

Halle, M., and Stevens, K.N., (1964). "Speech Recognition: A Model And A Program for Research." In Fodor and Katz, 1964, 604-12.

Halliday, M.A.K., (1967). "Intonation And Grammar in British English." Mouton: The Hague.

Halliday, M.A.K., McIntosh, A., and Strevens, P., (1965). "The Linguistic Sciences And Language Teaching." Longmans: London.

Hamp, E.P., Householder, F.W., Austerlitz, R., (1966). "Readings in Linguistics, II." The University of Chicago Press: Chicago.

Harms, R.T., (1966). "The Measurement of Phonological Economy." Language, 42/3, 602-11.

Harms, R.T., (1968). "Introduction to Phonological Theory." Prentice-Hall: Englewood Cliffs, N. J.

Harris, Z.S., (1961). "Structural Linguistics." The University of Chicago Press: Chicago.

Herriot, P., (1970). "An Introduction to The Psychology of Language." Methuen: Mondon.

Hill, T., (1966). "The Technique of Prosodic Analysis." In Bazell et al., (eds). Longmans: London.

Hockett, C., (1942). "A System of Descriptive Phonology." Language, 18, 3-21. Reprinted in Joos, 1957, 97-108.

Hockett, C., (1948). "A Note on Structure." IJAL, 14, 269-71. Reprinted in Joos, 1957, 279-80.

Hockett, C., (1954). "Two Models of Grammatical Description." Word, 10/2-3, 209-33.

Hockett, C., (1966). "The Problem of Universals in Language." In Greenberg, (ed.), 1966, 1-29.

Hope, K., (1967). "Elementary Statistics." Pergamon Press: Oxford.

Householder, F.W., (1959). "On Linguistic Terms." Word, 15, 231-39. Reprinted in Saporta, 1961, 15-25.

Householder, F.W., (1964). "The Three Dreams of Modern Greek Phonology." Word, 20/3, 17-27. In Papers in Memory of George C. Papageotes. (Special Publication No. 5. Issued as a Supplement to Word, 20.)

Householder, F.W., (1965). "On Some Recent Claims in Phonological Theory." Journal of Linguistics, 1/1, 13-34.

Householder, F.W., (1971). "Linguistic Speculations." Cambridge University Press: Cambridge.

Householder, F.W., Kazazis, K., and Koutsoudas, A., (1964). "Reference Grammar of Literary Dhimotiki." Mouton: The Hague.

Ingram, E., (1969). "Testing in The Context of A Language Learning Experiment." Language Learning, 19, 147-157.

Ingram, E., (1970). "A Further Note on The Relationship between Psychological And Linguistic Theories." Mimeographed: Edinburgh.

Jakobson, R. (1962). "Selected Writings I: Phonological Studies." Mouton: The Hague.

Jakobson, R., (1932). "Phoneme And Phonology." In Jakobson, 1962, 231-233.

Jakobson, R., (1949). "On The Identification of Phonemic Entities." Travaux du Cercle Linguistique de Copenhague, V, 205-213. Reprinted in Jakobson, 1962, 218-25.

Jakobson, R., (1951). "For The Correct Presentation of Phonemic Problems." Symposium, V. Reprinted in Jakobson, 435-42.

Jakobson, R., (1966). "Implicatios of Language Universals for Linguisitcs." In Greenberg, 1966, 263-78.

Jakobson, R., (with E.C. Cherry and M. Halle). (1962). "Toward The Logical Description of Languages in Their Phonemic Aspect." In Jakobson, 449-463.

Jakobson, R., Fant, G., and Halle, M., (1963). "Preliminaries to Speech Analysis." M.I.T. Press: Cambridge, Mass.

Jakobson, R., and Halle, M., (1962a). "Phonology And Phonetics." In Jakobson, 1962, 464-504.

Jakobson, R., and Halle, M., (1962b). "Tenseness And Laxness." In Jakobson, 1962, 550-555.

Jakobson, R., and Lotz, J., (1949). "Notes on The French Phonemic Pattern." Word, V. Reprinted in Jakobson, 1962, 426-34.

Jakobson, R., and Halle, M., (1968). "Phonology in Relation to Phonetics." In Malmberg (ed.), Manual of Phonetics. North Holland Publishing Company: Amsterdam.

Johnson-Laird, P.N., (1970). "The Perception And Memory of Sentences." In Lyons, 1970. 261-70.

Jones, D., (1944). "Some Thoughts on The Phoneme." Transactions of The Philological Society.

Jones, D., (1967). "The Phoneme: Its Nature And Use." Heffer: Cambridge.

Jones, D., (1967a). "English Pronouncing Dictionary." J.M. Dent & Sons: London.

Jones, D., (1967b). "The Pronunciation of English." Cambridge University Press: Cambridge.

Joos, M. (ed.), (1957). "Readings in Linguistics." American Council of Learned Societies: Washington, D.C.

Kaiser, L., (ed.), (1957). "Manual of Phonetics." North Holland Publishing Company: Amsterdam.

Katz, J.J., and Postal, P.M., (1964). "An Integrated Theory of Linguistic Descriptions." M.I.T. Press: Cambridge, Mass.

Kazandzakis, N., (1959). "Alexis Zorbas." Difros: Athens.

Kenyon, J.S., and Knott, T.A., (1953). "A Pronouncing Dictionary of American English." G. & C. Merriam Company: Springfield, Mass

Kim, Chin-Wu, (1970). "Two Phonological Notes: $A^{\#}$ and B^{b}." Mimeographed: University of Illinois.

Koutsoudas, A., (1962). "Verb Morphology of Modern Greek: A Descriptive Analysis." International Journal of American Linguistics, Part II, 28/4.

Koutsoudas, A., (1964). "The Handling of Morphophonemic Processes in Transformational Grammars." Word, 20/3, 28-42. In Papers in Memory of George C. Papageotes. (Special Publication No. 5. Issued as a Supplement to Word, 20.)

Koutsoudas, A., (1966). "Writing Transformational Grammars: An Introduction." McGraw-Hill: New York.

Krzeszowski, T., (1968). "An Outline of American English Phonetics: I." Panstwowe Wydawnictwo Naukowe: Warszawa.

Labov, W., (1964). "Stages in The Acquisition of Standard English." Proceedings of The Bloomington, Indiana, Conference, 77-103.

Ladefoged, P., (19 ?). "The Classification of Vowels."

Ladefoged, P., (1962). "Elements of Acoustic Phonetics." The University of Edinburgh Press: Edinburgh.

Lado, R., (1965). "Language Testing." Longmans: London.

Laver, J., (1970). "The Production of Speech." In Lyons, 1970, 53-75.

Lees, R.B., (1961). "The Phonology of Modern Standard Turkish." Mouton: The Hague.

Lenneberg, E.H., (1964). "The Capacity for Language Acquisition." in Fodor and Katz, 1964, 579-603.

Lewis, D.G., (1967). "Statistical Methods in Education." The University of London Press: London.

Lexicon Tis Ellinikis Glossis. (1934). 'Proía': Athens.

Lyons, J., (1962). "Phonemic And Non-Phonemic Phonology: Some Typological Reflections." IJAL, 28, 127-133.

Lyons, J., (1968). "Introduction to Theoretical Linguistics." Cambridge University Press: Cambridge.

Lyons, J., (ed.), (1970). "New Horizons in Linguistics." Penguin: Middlesex.

Lyons, J., (1970). "Generative Syntax." In Lyons, 1970, 115-39.

Miller, G.A, Heise, G, and Lichten, W., (1951). "The Intelligibility of Speech As A Function of the Context of The Test Materials." Journal of Experimental Psychology, 41, 329-35.

Mirambel, A., (1932). "L' Opposition de ts a dz en Grec Moderne." Bulletin de La Société de Linguistique de Paris, XLVI/132, 58-68.

Mirambel, A., (1933). "Le Traitement du Double Nasale-Occlusive dans Les Parleurs Néo-Grecques Et Le Probléme de La Classification." Bulletin de La Société de Linguistique de Paris, XXXIV,145-64.

Mirambel, A., (1939a). "Remarques de Phonétique Néo-Grecque: La Qualité Vocalique." Bulletin de La Société de Linguistique de Paris, XL, 118, 58-61.

Mirambel, A., (1939b). "Remarques de Phonétique Néo-Grecque: Accent Et Diphthongaison." Bulletin de La Société de Linguistique de Paris, XL, 118, 55-57.

Mirambel, A., (1953). "Monosyllabes en Grec Moderne." Bulletin de La Société de Linguistique de Paris, XLIV, 138, 52-66.

Newton, B.E., (1961). "The Rephonemicization of Modern Greek." Lingua, X, 275-284.

Palamas, K., (1957). "Complete Works." Biris: Athens.

Palmer, H.E., (1922). "English Intonation." Heffer: Cambridge.

Papageotes, G.C., and Makris, J., (1964). "The Language Question in Modern Greek." Word, 20/3, 53-9. In Papers in Memory of George C. Papageotes. (Special Publication No. 5. Issued as a Suplement to Word, 20.)

Peterson, G.E., Wang, W.S-Y, and Sivertsen, E., (1958). "Segmentation Techniques in Speech Synthesis." Journal of The Acoustical Society of America, 30/8, 739-42.

Pike, K.L., (1945). "Intonation of American English." The University of Michigan Publications in Linguistics, I. The University of Michigan Press: Ann Arbor, Mich.

Pike, K.L., (1947). "Phonemics: A Technique for Reducing Languages to Writing." The University of Michigan Press: Ann Arbor, Mich.

Pike, K.L., (1958). "Phonetics." The University of Michigan Press: Ann Arbor: Mich.

Pilliner, A.E.G., (1968). "Subjective And Objective Testing." In Davies, 1968, 19-35.

Pimsleur, P., Mace, L., and Keislar, E., (1961). "Preliminary Discrimination Training in The Teaching of French Pronunciation." University of California: Los Angeles.

Pittman, R.S., (1948). "Nuclear Structures in Linguistics." Language, 24, 287-92. Reprinted in Joos, 1957, 275-58.

Politzer, R.L., (1961). "Auditory Discrimination of French Vowels by English Speakers." Canadian Journal of Linguistics, 7/1, 32-44.

Postal, P., (1968). "Aspects of Phonological Theory." Harper and Row: New York.

Prator, J.T., (1954). "Manual of American English Pronunciation." The University of California Press: California.

Pring, J.T., (1948). "A Grammar of Modern Greek." Oxford University Press: London.

Rivers, W.M., (1964). "The Psychologist And The Foreign Language Teacher." The University of Chicago Press: Chicago.

Robins, R.H., (1966). "General Linguistics: An Introductory Survey." Longmans: London.

Romeo, L., (1964). "Toward A Phonological Grammar of Modern Greek." Word, 20/3, 60-78. In Papers in Memory of George C. Papageotes. (Special Publication No. 5. Issued as a Supplement to Word, 20.)

Sapir, E., (1921). "Language: An Introduction to The Study of Speech." Harcourt, Brace & World: New York.

Sapir, E., (1925). "Sound Patterns in Language." Language, 1, 37-51. Reprinted in Joos, 1957, 37-51.

Saporta, S., (ed.), (1961). "Psycholinguistics: A Book of Readings." Holt, Rinehart and Winston: New York.

Saporta, S., (1966). "Phoneme Distribution And Language Universals." In Greenberg, 1966, 61-72.

Saussure, F. de, (1959). "Course in General Linguistics." (Translated by Wade Baskin) Philosophical Library: New York.

Setatos, M., (1969). "Phonological Problems of Modern Greek KOINE." Thessaloniki.

Shamjan, S.K., (1965). "Dvukhstupench Ataya Teoriya Fonologii v Svete Sovremennoy Logiki Nanki." ('The Two-Level Theory of Phonology in The Light of The Modern Logic of Science.') Phonetica, 12, 3/4, 218-35.

Shannon, C.L., and Weaver, W., (1953). "The Mathematical Theory of Communication." Reviewed by C.F. Hockett, Language, 29, 69-93. Reprinted in Saporta, 1961, 44-67.

Shipp, Von G.P., (1958). "The Phonology of Modern Greek." Glotta, 37, 3-4, 233-58.

Smith, G.M., (1970). "A Simplified Guide to Statistics." Holt, Rinehart and Winston: New York.

Snedecor, G.W., and Cochran, W.G., (1971). "Statistical Methods." The Iowa State University Press: Ames, Iowa.

Stanley, R., (1967). "Redundancy Rules in Phonology." Language, 43/2, 393-436.

Stetson, R.H., (1945). "Bases of Phonology." Oberlin College: Oberlin, Ohio.

Stoll, R.R., (1961). "Sets, Logic, And Axiomatic Theories." W.H. Freman and Company: San Francisco.

Swadesh, M., (1934). "The Phonemic Principle." Language, 10, 117-29. Reprinted in Joos, 1957, 32-7.

Swadesh, M., and Voegelin, C.F., (1939). "A Problem in Phonological Alternation." Language, 15, 1-10. Reprinted in Joos, 1957, 88-92.

Swanson, D.C., (1958). "English Loanwords in Modern Greek." Word, 14.

Sweet, H., (1891). "A Handbook of Phonetics." Henry Frowde: Oxford.

Sweet, H., (1899). "The Practical Study of Languages." Edited by R. Mackin in the Language and Language Learning series (1964) Oxford University Press: London.

The Principles of The International Phonetic Association, (1963). Department of Phonetics, University College: London.

Trager, G.L., and Smith, H.L., (1957). "An Outline of English Structure." American Council of Learned Societies: Washinton, D.C.

Triandafyllidis, M., et al., (1941). "Neoelliniki Grammatiki." Organismos Ekdhoseos Scholikon Vivlion: Athens.

Trubetzkoy, N.S., (1968). "Introduction to The Principles of Phonological Descriptions." (Translated by L. A. Murray, edited by H. Blunme) Martinus Nijhoff: The Hague.

Twaddell, W.F., (1935). "On Defining The Phoneme." Language, Monograph 16. Reprinted in Joos, 1957.

Tzartzanos, A., (1946). "Neoelliniki Syntaxis." Vols I-II. Organismos Ekdhoseos Scholikon Vivlion: Athens.

Vennemann, T.G.N., (1972). "Rule Inversion." Lingua, 29/3-4, 209-242.

Wang, W.S-Y, and Peterson, G.E., (1958). "Segment Inventory for Speech Synthesis." Journal of The Acoustical Society of America, 30/8, 743-46.

Wardhaugh, R., (1967). "Three Approaches to Contrastive Phonological Analysis." Canadian Journal of Linguistics, 13/1, 3-14.

Wells, R., (1947). Review of K.L. Pike, "The Intonation of American English." Language, 23, 255-273.

Zimmer, K.E., (1969). "On The Evaluation of Alternative Phonological Descriptions." Journal of Linguistics, 6, 89-98.

ADDENDA

Anderson, J., and Jones, C., (1972). "Three theses concerning Phonological Representations." Mimeographed: Edinburgh.

Bach, E., and Harms, R.T., (eds), (1968). "Universals in Linguistic Theory." Holt, Rinehart and Winston: New York.

Brown, G., (1972). "Phonological Rules And Dialect Variation: A Study of The Phonology of Lumasaaba." Cambridge Studies in Linguistics, No. 7. Cambridge University Press: Cambridge.

Hamp, E., (1961). "To Rhima en Ti Simerini Omiloumeni Elliniki Glossi." ('The Verb in Today's Spoken Greek Language.') Athina, LXV, 101-28.

Ingram, E., (1973). "Psychology nd Language Learning." Mimeographed: Edinburgh.

Malikouti, A.M., (1970). "Metaschematistikē Morphologia Tou Neoellēnikou Onomatos." Bibliothēkē Tes en Athēnais Philekpaideutikēs Hetairéias, No. 56: Athens.

Newton, B., (1972). "The Generative Interpretation of Dialect: A Study of Modern Greek Phonology." Cambridge Studies in Linguistics, No. 8. Cambridge University Press: Cambridge.

Warburton, I.P., (1970). "On The Verb in Modern Greek." Indiana University Publications, Language Series Monographs, Volume 4.

Warburton, I.P., (1970a). "Rules of Accentuation in Classical and Modern Greek." Glotta, XLVIII/1-2, 107-121.

Warburton, I.P., (1972). "Verb Conjugation in Modern Greek." Mimeographed: Reading