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ON THE NOTION 'COMPLETELY ANAPHORIC' IN PHONOLOGY *

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0. Introduction

In Modern Athenian Greek, an apparently ill-assorted group of words is subject to a sandhi process, Contraction, which deletes the weaker of two vowels in hiatus, regardless of order. All other words undergo a completely different rule, First Vowel Deletion, when their final vowels are in hiatus with the initial vowel of a following word. The question that prompts this paper is, does the set of words subject to Contraction form a natural class? What do they have in common? The set includes the clitic pronouns, the subjunctive and conditional verbal particles, and the undeclined relative pronoun, pu, 'that, where'. Crucially, pu is homophonous with the interrogative pronoun meaning 'where?'. But only the relative undergoes Contraction. Clearly, the rule is not strictly phonologically governed.

The first section of this paper is intended to show that it is indeed only the set listed above that undergoes Contraction. Reliable tests for distinguishing between the operation of this rule and First Vowel Deletion are given. With the facts established, the second section goes on to answer our central question, using the contrast between the relative and the interrogative pronoun as a starting point. It is concluded that the relative is completely anaphoric and completely incapable of receiving sentence stress, unlike the interrogative. It is these characteristics which unite the set of items undergoing Contraction. It seems that sandhi rules may make reference to a feature like [_s sentence-stressable]. or [_s new lexical information]. The final section speculates on the use of such a feature in solving other phonological problems, and on the way a language might develop a rule that refers to a non-phonological feature like 'stressability.'

1.0 Distinguishing Contraction from First Vowel Deletion

Consider the following optional changes:

1. ta éxo --> tá 'xo (the ' marks the site of
 them I have a deleted vowel)
 CLIT.
2. me álase --> m' álase
 me it changed
 CLIT
 'It changed me.'

3. tu oðigó tín María --> t' oðigó...
to him I lead (the) Maria
CLIT.
4. tu ípa típote --> tú 'pa...
to him I said nothing
CLIT
5. tu éðosa éna vivlíó --> tú 'ðosa
to him I gave a book
CLIT

These examples demonstrate three important characteristics of Contraction which will allow us to distinguish it from First Vowel Deletion. Firstly, as seen in (1), (4) and (5), Contraction can delete the second vowel in a string, so long as it is weaker than the first. Consideration of a full set of examples has led me to set up the following strength hierarchy:

0.....a.....u.....i.....e
5 4 3 2 1
strong ←-----→ weak

The hierarchy is phonetically somewhat arbitrary. Contraction exists in some form in most of the Greek dialects, and the strength scale, as described by numerous linguists, differs in detail from what I have found for urban Athenian. Thus, the association of any one feature with 'strength' is doomed to failure. Athenian favors rounded vowels over non-rounded, back over non-back - this much is clear. Beyond that, the strength of a feature is dependent on what other features it occurs with. For instance, the non-high back vowel is stronger than the high one, but the high front vowel is stronger than the non-high. In a situation like this, a hierarchy is the easiest way to capture the environment of the rule.

The second salient characteristic of Contraction is that it is capable of deleting stressed as well as unstressed vowels. (Examples (1), (4) and (5).) We shall see that this is not true of First Vowel Deletion. Moreover, if a stressed vowel is lost, its stress is not deleted along with it, but rather becomes associated with the remaining vowel.¹ This produces stressed clitics on the surface.

The third thing to note about Contraction is that it is capable of deleting high vowels (examples (3) and (4)). This too First Vowel Deletion cannot do, leaving such vowels intact or turning them into glides instead.

We can now write a rule for Contraction:

$$\left[\begin{array}{c} \div \\ \text{syll} \\ \text{cns} \\ \text{n strong} \end{array} \right] \rightarrow \emptyset \% \left[\begin{array}{c} \div \\ \text{syll} \\ \text{cns} \\ \text{strong} \end{array} \right] (\#)\# \text{---}$$

(The % indicates that this is a mirror-image rule. We return to the question of the word boundaries in the structural description in₂ section 2.)

First Vowel Deletion², which operates between most full words, is easily distinguished from Contraction. Compare the following, for instance, with example (1).

6. tá áloga érxonde --> ...álog' érxonde
the horses are coming

While the phonological structure is identical to that of ta éxo, neither of the words belongs to the set that undergoes Contraction, and the output is entirely different. The first vowel has been deleted, even though it is stronger than the second. Nor does an example where the first word is an object behave differently:

7. áloga éxo, má... --> álog' éxo
horses I have, but...

An example with a full NP object before the verb can never be fully comparable to one with a clitic in that position, as clitics normally precede all but imperative verbs, while the normal place for a NP object is after the verb. (7) merely shows that it is not some grammatical relation such as object-verb which triggers the operation of Contraction. Indeed, as we shall see in section 2, the words undergoing Contraction can even be in different constituents.

We noted above that Contraction can delete stressed vowels. This is not true of First Vowel Deletion:

8. tá peáyá érxonde --> *...peáy' érxonde
the children are coming
9. tó atelyé agorázi xrómata --> *...ately' agorázi
the studio buys paints

Finally, while Contraction can delete high vowels, First Vowel Deletion always leaves them on the surface, although they may be shortened or, at the extreme end of shortening, turned into glides:

10. kimísu alá mín parakimísu --> kimís^u alá...
sleep but don't oversleep kimísw alá but
*kimís' alá
11. tó agóri onirévete --> ...agóriⁱ onirévete
the boy is dreaming agór^y onirévete but
*agór' onirévete

We now have enough information to formalize First Vowel Deletion:

$$\left[\begin{array}{l} + \text{ syll} \\ - \text{ hi} \\ - \text{ stress} \end{array} \right] \rightarrow \emptyset / _ \# \# [+ \text{syll}]$$

1.1. Other sequences undergoing Contraction

When Contraction has been discussed in the literature, it has always been cited as a phenomenon occurring between clitics and their governing verbs, as in the examples given above. However, there are three other environments in which this rule is operative in the dialect of Athenian I have investigated: between possessive clitic and what follows (which will generally be in a new constituent); between the verbal particles na (subjunctive) and 0a (conditional) and the verb that follows; and between the undeclined relative pronoun pu and what follows.

1.1.1 Possessive clitics

The following examples show contraction between the possessive clitics and a verb in the following constituent. Such clitics follow the noun they modify. All end in [u], or

12. ^Cí mána tu éxi filus --> ...tú 'xi...
the mother his has friends
CLIT.

'His mother has friends.'

13. í mána mu onirévete --> m' onirévete
the mother my is dreaming
'My mother is dreaming.'

Indeed, it is possible to find contexts where even an object pronoun is not in the same immediate constituent as the word that follows, namely, when the governing verb is in the imperative. In this case, the clitic follows the verb, and undergoes Contraction with the next word.

14. diàvasé ta elafrá --> ...ta 'lafrá
read them lightly

15. diàvasé tu elafrá --> ...tu 'lafrá
read to him lightly

16. diàvasé tu oléna --> ...t' oloéna
read to him continually

Such examples show all the characteristic signs of Contraction: stress shift, mirror-image environment, and deletion of high vowels. The significance of inter-constituent Contraction will become clear shortly.

1.1.2 Verbal Particles

It is now very easy to show that na (a subjunctive particle that acts like a complementizer as well) and 0a (a particle used for future and conditional tenses) both undergo Contraction. It is unfortunate that the two particles both end in the same vowel, but we are still

able to construct examples that will unmistakably show Contraction, and not First Vowel Deletion, to be the relevant process here. 3

17. $\theta a \acute{e}xo \rightarrow \theta \acute{a}$ 'xo
FUT I have
18. $na \acute{e}xis \rightarrow n \acute{a}$ 'xis
SUBJ you have
'May you have.' or 'Have!' (polite imperative)
19. $\theta a \text{ onirévese} \rightarrow \theta$ ' onirévese
FUT you dream
20. $na \text{ onirévese} \rightarrow n$ ' onirévese
SUBJ you dream

Here again are the distinguishing marks of Contraction: stress shift, mirror-image environment, deletion of stressed vowels.

1.1.3 The relative pronoun 'pu'

The pronoun pu functions as an undeclined relative⁴ meaning 'that' ('which', 'who') or 'where.' Greek relative clauses are formed much like English ones, with the exception that it is possible to leave an optional shadow pronoun in Greek. pu is the only relative commonly used in colloquial speech. The inherited, declined relative is used only in formal speech or, occasionally, when the pronoun is the object of a preposition. The behavior of these moribund pronouns was not investigated.

Again, the proof that pu undergoes Contraction is not hard to come by, even with only one undeclined relative to test. We need only place pu before words beginning first with e, then with some vowel stronger than u, in order to get the mirror-image behavior we are seeking, the deletion of u, a high vowel, and the transfer of stress from e to u.

21. $t \acute{o} \acute{a}l o g o \text{ pu } \acute{e}x u m e \rightarrow \dots p u$ ' xume
the horse that we have
22. $t \acute{o} \acute{a}l o g o \text{ pu onirévete} \rightarrow p$ ' onirévete
the horse that dreams
23. $e k \acute{i} \text{ pu } a g o r \acute{a} z i s \text{ frúta} \rightarrow \dots p$ ' agorázis
there where you buy fruit
24. $e k \acute{i} \text{ pu } \acute{e} x i s \text{ fílu s} \rightarrow \dots p \acute{u}$ 'xis
there where you have friends

What is particularly interesting about this last member of the set of words undergoing Contraction is that it is homophonous with the interrogative pronoun pu, meaning 'where?'. But this latter does not behave in the same way at all. It appears instead to belong to the class of

items that undergo First Vowel Deletion. Unfortunately, the only other interrogative pronoun that ends in a vowel is póte 'when,' and it cannot give us any information about the rule that applies to interrogatives, since an unstressed e will be deleted before any other vowel whether by Contraction or First Vowel Deletion. All we can say is that pu does not undergo Contraction when it is an interrogative pronoun, and that its failure to lose its vowel is probably due to its falling under the domain of First Vowel Deletion, which does not remove high vowels. The following examples illustrate the imperiousness of the u of interrogative pu to deletion:

25. pú éxume fílus? --> pw éxume but *pú 'xume
where we have friends"
'Where do we have friends?'

26. pú agorázis frúta? --> pw agorázis but
where you buy fruit *p' agorázis

What is the difference between the semantically almost identical interrogative and relative pronouns meaning 'where?' A first reasonable guess might be that the interrogative occurs in absolute sentence-initial position, and this may for some reason be blocking Contraction. But this explanation will not hold up. The most obvious refutation comes when we embed interrogative pu in an indirect question. It still undergoes only Glide Formation, not Contraction.

27. đen kséro pú agorázi frúta --> *p' agorázi
not I know where he buys fruit
'I don't know where he buys fruit.'

28. pés mu pú éxis fílus --> *pú 'xis
tell me where you have friends

2.0 Finding the natural class

Before we consider further the difference between interrogative and relative pronouns, it might be well to investigate the usefulness of some previous proposals for characterizing classes of 'little words' that undergo sandhi rules. When we have become convinced that these will not help us with our problem, we can return to the problem of pu for a new perspective.

Selkirk (1972), in her groundbreaking work on French liaison, proposes that liaison only occurs when one of the words is a monosyllabic grammatical item. But monosyllabicity will not give us the correct result here. Not only is it not a sufficient condition, failing as it does to distinguish between the two pu's, it is not even a necessary one. For indefinite relatives can be formed in

Greek by the prefixation of the morpheme δ -. This gives ὅποτε 'whenever', ὅποιος 'whoever', and ὅπου 'wherever.' The latter still undergoes Contraction:

29. ton vrikes ὅπου agorázis gliká -->
 him one found where- you sweets
 ever buy ...ὅπου agorázis...

Examples such as these also belie the usefulness of Rotenberg's (1975) reanalysis of Selkirk's criteria for the Greek case. He proposed that words undergoing liaison must be monomorphemic. But δ - is certainly a morpheme.

The notion of 'grammatical items' which Selkirk uses is perhaps a useful one in our case, but it needs a great deal of further clarification, which the rest of this section is intended to begin to supply. So far it is not obvious why a relative should qualify as a grammatical item while an interrogative does not, or why a clitic pronoun should so qualify when a full pronoun does not.

I believe that the beginning of an answer to our problem lies in the notion 'completely anaphoric,' introduced briefly by Hankamer (1974) in a paper that addressed the question of why English it has no possessive pronoun.

30. This book is mine.
 his.
 *its.

Hankamer suggests that 'it' is completely anaphoric in that it carries no new lexical information whatever, not even number or gender. As such, given recent pragmatic theories of sentence stress assignment (viz. Huckin, 1977), it should not be able to receive sentence stress. I am not sure if Hankamer is right in claiming this property for it, but the allied concepts of unstressability and complete anaphoricity certainly are of use in distinguishing relative from interrogative pronouns, particularly undeclined relatives like pu which carry no information about the number, gender, or case of the NP they replace. Moreover, in Greek, the relative pronoun is almost always preceded by a correlative head, so that it is essentially little more than a grammatical place marker. Not surprisingly, its counterpart in English, that, is optionally deletable in certain contexts.

Interrogative pronouns, on the other hand, do introduce new, unpredictable information. Indeed, they represent the focus of the sentence. And they are not coreferent with anything in the sentence or, generally, in the preceding discourse. This contrast between the two types of pronouns is reflected in the possibility of their receiving sentence stress. The following contrasts

in English sentences are essentially identical to those in Greek:

31. Where did you buy that hat?

32. *The place where I bought this hat is a dump.

33. Which are you going to choose?

34.*The one which I'm going to choose is magenta.

33 and 34 are ungrammatical unless we have a metalinguistic context, such as the correction of a mishearing.

The concepts of complete anaphoricity and the resulting complete unstressability are even more easy to apply to clitics. Greek has a full set of unreduced, stressed pronouns which occur in complementary distribution with the clitics, when the pronoun is contrasted or focused. Thus, in order to undergo cliticization in the first place, a clitic must be completely anaphoric. Clitics are unstressed, by definition.⁵ They too, like the relative pronoun, are essentially grammatical items, marking object agreement on a verb. Selkirk's criterion of a grammatical rather than a lexical word undergoing liaison does indeed turn out to be relevant for Greek. But it has needed a definition in terms of new information in order to be usable.

The reader may wonder how verbal particles are to be subsumed under a heading of complete anaphoricity, since they do not refer at all. But like 'it', clitics, and relative pronouns, these words do not convey lexical information, and are again grammatical items. In fact, they are on the way to becoming bound morphemes, undeletable by transformation, and allowing only a highly limited set of items to appear between themselves and the verb. While both are etymologically full words, they are suffering a certain erosion. na comes from Ancient Greek inā, a conjunction meaning 'in order to,' and ea from ēēloina 'I want to.' In Modern Greek, only clitics may intervene between ea and the verb. na is slightly more free, permitting both clitics and the negative den to intervene. Neither particle may receive sentence stress. Both are written with a stress mark in Greek, I imagine because they come from full words in the ancient language. The same is true of pu. There is no good way to test whether these words are assigned lexical stress, since Greek has no counterpart of Vowel Reduction in English. They might all be termed 'clitics' under a broad definition of the word, but this definition would have to include inability to receive sentence stress and failure to carry new lexical information, whether because of complete anaphoricity or of being completely non-lexical. pu really meets no other typical standards of

clitichood. It is clearly not enclitic on the preceding head noun, since if it were, it would cause the addition of final stress to antepenultimately stressed nouns, just as possessive clitics do. Nor is it obviously proclitic on the following word, since it can begin clauses and exhibits no restrictions on the sort of word that can come after it, the way genuine clitics in Greek do.

I therefore propose that Contraction in Greek be written to apply to items marked [-sentence stressable] in the lexicon. We might equally well have it refer to items marked [-new lexical information], save that the former is the sort of feature that a phonological rule might be (mis)interpreted to refer to by language learners. We return to this point shortly.

We are now ready to return to the formulation of Contraction that we gave in section 1.0. There we allowed one or two word boundaries to intervene between the vowels. Since clitics are generally assumed to carry no word boundaries of their own, the reader may have wondered why we did not simply restrict Contraction to apply only across single word boundary. This was essentially Selkirk's solution for French. If this approach were feasible, we could hypothesize that pu, na and θa also carried no word boundaries, and make the formulation of the rule straightforward. But we have seen that Contraction can apply between constituents, such as NP and VP. The SPE conventions that posit no word boundaries flanking clitics also require that every node dominating a major category triggers the insertion of word boundaries. The subject NF of a sentence is therefore separated from the following predicate VP by two word boundaries:

35. # [NP] # # [VP] #

A clitic at the end of that NP, such as the tu in example 12, is therefore separated from the following verb by two word boundaries. Yet Contraction applies.

3.0 On the genesis and use of a feature [$\pm$ stressable]

How would a language get a rule like Contraction which refers to a non-phonological feature like stressability? Note that something phonological like [-sentence stress] will not work, since a full NP that did not happen to receive sentence stress is nonetheless incapable of undergoing Contraction. Orrin Robinson has suggested the following scenario to me. A rule starts out with the phonological feature [-stress] as part of its structural description. Now words that are capable of receiving stress will sometimes undergo the rule, sometimes not, depending on whether they receive sentence stress. Other words, which never receive stress, invariably undergo the rule. To eliminate allomorphy in the first set of

words, analogy may undo the effect of the rule. The items left which continue to be subject to the rule are those which are incapable of receiving sentence stress.

There remains space only for the briefest sketch of the possible uses of our new features. Notice that the argument for it and pu belonging in the class made reference to their being unmarked for case, number or gender. The relation between unmarkedness, lack of lexical information, and tendency to undergo sandhi rules may be helpful in understanding some oddities of Auxiliary Reduction in English, discussed by Zwicky (1970). Zwicky notes that only pronouns, auxiliaries and certain grammatical items (e.g. that and than) undergo Auxiliary Reduction and Glide Deletion. These correspond to our items marked [-new lexical information]. In addition, only is and has, of the auxiliary verbs, undergo Auxiliary Reduction (to 's) if the preceding word is in another clause. These two are semantically unmarked, in the traditional sense - they are present tense, singular, third person. Hence they convey the least lexical information of their own, and undergo the sandhi rule to the fullest. The formalization of this variable conditioning of an already remarkably complex rule is left as an exercise to the intrepid reader.

Footnotes

* Thanks are due to Jorge Hankamer, Nick Clements, Orrin Robinson, Athan Anagnostopoulos, and most especially, Nanda Papazoglou. Data for this paper was collected in Cambridge, Mass. from a recent emigrant from Athens with excellent, unflagging intuitions and the patience of St. Philaretos. All errors are the author's.

1. See Kaisse(1976) for an autosegmental explanation for the failure of stress to be lost and the mechanism for its transfer.

2. Actually, First Vowel Deletion is a set of three rules. All require unstressed non-high vowels, but within noun phrases, unrounded vowels are not deleted, and within verb phrases, sonorous vowels are not deleted before less sonorous ones. See Kaisse(1977) for a detailed account.

3. A particularly unfortunate gap in the data is that all clitics, particles, and relative and interrogative pronouns begin with consonants, so that we cannot investigate their phonological interaction with the preceding word. The only interaction between a clitic and the word that it precedes is that, if the clitic is governed by that word, it causes the addition of an ultimate stress to antepenultimately stressed 'host' nouns or verbs.

4. I will not address here the sticky question, both for Greek and for English, of whether pu and that are undeclined relatives or complementizers.

5. D. Wanner, in an article in this volume, has found that certain post-imperative enclitics can receive contrastive stress. I do not yet know what to make of this surprising fact. I suspect that if my informant can stress such pronouns, they do not undergo Contraction, but this is only speculation.

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