On silent markedness

Edoardo Cavirani and Marc van Oostendorp, Meertens Instituut, Amsterdam

Abstract
Empty categories – positions in phonological representations that have no direct phonetic counterpart – are still controversial in phonology. In this paper we give the main arguments for still assuming such positions and furthermore establish a markedness category for empty positions: some of them are stronger than others, and we can derive this from a combination of Element Theory and Turbidity Theory. We illustrate this with Italian and Dutch dialects, and point out that the phonological hierarchy of empty positions may correspond to a hierarchy of syntactic positions.

The notion of emptiness plays an important role in many branches of grammatical theory: syntacticians, morphologists and phonologists have for a long time posited the existence of positions wihout a phonetic counterpart in their representations. This assumption is not without controversy, as there also have always been theorists adamantly claiming that a measurable phonetic trace is the ultimate, and possibly only, test for any assumed linguistic structure: only what is audible should have a place in our picture of the mental objects corresponding to linguistic reality.
In this article we propose, however, that there is little reason for such a restriction and one can put forward arguments for representational objects that do not correspond directly or even indirectly to sound, and that a by now venerable tradition has established such arguments. We concentrate on so-called empty nuclei (EN) in this paper; in other words, on objects that stand for vowels (the nuclei of syllables) within the phonological representation but are phonetically either very weak or completely absent. After having discussed the ontology of empty positions in syntax (section 1) and phonology (section 2), we aim to show in section 3 that not all EN are empty in the same way: some of them are more empty than others, and these differences in emptiness may play out in their morphosyntactically 'marked' behaviour. We will illustrate this with some data from some Dutch and Italian dialects (section 4), where we show that some geographical patterns might be understood in terms of emptiness at different levels.

1. Empty positions in syntax

1.1. How to argue for silent syntactic elements

Before we can go into these illustrations, we have to first establish, however, what are possible arguments in favour of empty positions in the first place. Such arguments typically come from the construction of theory, which can be set up more elegantly if we assume that a certain position is there even if it has no phonetics. Typically this 'theory-internal' nature of such positions is also the main point of criticism for the detractors of such positions, because it makes them somehow less 'real' to their mind; they would prefer a more complicated description of the data if it does not take recourse to such positions.
A well-studied example of this is found in generative syntax, in which empty positions have been recognized at least from the late sixties (Katz & Postal 1964). Interestingly, recent theoretical developments suggested that the number of empty positions we can postulate may be substantially larger than what has been suspected before. Take for instance the UNIFORMITY PRINCIPLE stated by Chomsky (2001):

> "In the absence of compelling evidence to the contrary, assume language to be uniform, with variety restricted to easily detectable properties of utterances"

A similar issue was raised by Cinque (1999: 127), namely "whether we should take the entire array of functional projections to be present in every sentence". Assuming a positive answer led to the blossoming field of carthography (Cinque 2002; Rizzi 2004; Belletti 2004, Shlonsky 2010):

> "[the possibility for] the entire array of functional projections to be present in every sentence […] is the least costly assumption, once we recognize that each head comes with a marked and a default value. This conclusion, if correct, opens up a new view of clausal structure – one that is further removed from what we see, but no less interesting, for that" (Cinque 1999: 127)

An important implication of Cartography is that all languages have the same positions in their structure, even if these are not filled by phonetic material – a language without overt Tense will still have Tense nodes in its spine. According to the cartographic research program, as well as to e.g. Distributed Morphology (DM; Halle & Marantz 1993; Marantz 2007), there indeed seems to be substantial evidence that

> "humans are endowed with innate syntactic elements and structures that are independent of whether or how they are expressed. We need to realize that SILENCE VARIATION underlies a substantial part or even the lion's share of language variation. If we do not acknowledge this, the wonder of Babel will remain a mystery, kept with Jehovah for all eternity" (Sigurðsson 2004: 251)

1.2. Taxonomies of empty elements in syntax

Consider the observation that in a language such as English, sentences typically have a subject. There is a small set of counterexamples, however, including sentences such as the following, in which the embedded (non-tensed) miniature sentence *to please* does not have a subject:

(1) a. *John is eager to please.*
b. *John is easy to please.*

Generative grammar, under its guise of *Government and Binding Theory* (GB, Chomsky 1981), solves this conundrum by assuming that *to please* in this case actually does have an empty position, which is called *PRO.* The alternative is to assume that some (non-tensed) sentences do not need a subject. If this would be the only fact, one might say that this is an acceptable exception to make to the universality of subjects; however, one still needs to account for the fact that semantically we understand that John is the pleaser in (1a), and the person to be pleased in (1b). In other words, it is still relevant that somebody does the pleasing, even if the phonetics does not tell us who it is. Furthermore, we purportedly can make a taxonomy of empty positions within GB, based on so-called *wanna* contraction, which is shown in (2)-(4):

(2) a. You want to visit me.
b. You wanna visit me.
(3) a. Who do you want to visit?
b. Who do you wanna visit?
(4) a. Who do you want to visit Fred?
b. *Who do you wanna visit Fred?

Adjacent *want* and *to* can 'contract' to *wanna* in (2b) and (3b) in many varieties of English; however, this is not possible in (4b). The idea put forward in Chomsky (1981) is that there are different kinds of

empty positions involved. In (2) and (3), this is *PRO*, which is apparently invisible for such contraction and which refers to *you*, but in (4) the subject of *visit* is *who* instead, which has moved to the front of the sentence, leaving a 'trace' between *want* and *to*. This trace is a different kind of empty position, which does block the contraction. While *PRO* is visible only to semantics and some layer of syntax, the 'trace' is also visible at some level of phonology.
Different empty categories have thus been proposed in the syntactic literature. However, "it is not clear whether non-pronunciation of syntactically active material is a unified phenomenon or not", while it seems clear that "we have just begun to appreciate the depth and complexity of syntactic structure, above and especially below the 'word' level, and that statements about precise constraints of (non-) pronunciation are, at this point, necessarily highly speculative." (Leu 2008: 8) [1]

As shown, the syntactic literature on empty categories mainly focuses on the mechanisms regulating the pronunciation of syntactic constituents, typically XPs or heads[2]. Less work has been done on the role played by silence "below the 'word' level". Considering the drastic enrichment of the morphosyntactic representation of the 'word' proposed by DM, though, the understanding of the role silence plays in morphosyntax is essential. E.g., it could help in deciding about the nature of (a subset of instances of) emptiness, whether particular instances of deletion should be considered as occurring in the narrow syntax or at PF. If the latter, then the formal properties of PF need to be explicitly laid out. In particular, assuming that phonetics and phonology represent two different modules (e.g. Scheer 2011), the domains in which the role of silence needs to be investigated should include the mapping of a phonological form to the relevant piece of morphosyntactic structure and, crucially, to its phonetic interpretation, for the absence of acoustic material doesn't necessarily imply the absence of phonological information (section 1.4).

2. Empty positions in phonology

2.1. Empty nuclei as limited licensers

Empty positions in phonology, in particular EN, are most known from Government Phonology. In its most 'classic' variant (Kaye, Lowenstamm, Vergnaud 1987, 1990), this theory proposes that we assume that syllabic constituency consists of a string of maximally binary-branching Onset (O) and Nucleus (N) constituents:

(5)

O	N	O	N
∧	∧	|	
d r	ɪ ŋ	k	

[1] The relevance of empty categories for syntax is discussed in a few other works (Sigurðsson 2004; Baltin 2012; Sigurðsson & Maling 2012). Baltin (2012), for instance, focuses on the dichotomy between deleted phrases and null pro-forms, and concludes that such a dichotomy does not exist, insofar as also null pro-forms involve deletion. Interestingly, he claims that deletion occurs in the overt syntax, namely much earlier than suggested e.g. by Merchant (2001) and Fox & Lasnik (2003), who consider deletion a PF process. If we take a linguistic sign to be a bundle of formal, semantic and phonological features (section 1.3; Chomsky 1965), and we assume the DM late insertion hypothesis according to which the insertion of a vocabulary item occurs at PF and depends on its formal features, the deletion (in syntax) of the relevant formal features bleeds vocabulary insertion. "By contrast, the traditional view of deletion as occurring at PF must stipulate a conjunction of two types of features that delete - formal as well as phonological" (Baltin 2012: 398).

[2] Cfr. Baltin (2012: 418): "different constructions that seem to involve deletion involve differing degrees of evidence for internal structure, an observation that has not even been made before, let alone explained. By allowing deletion to occur in the syntax, and to allow elements of different sizes to delete, we can begin to explain the different degrees of permeability of different constituents."

In a word-final consonant-cluster, the final consonant thus appears in an onset which is followed by an empty nucleus. There are no other options, as the theory does not allow for a biconsonantal coda: that would make the nucleus ternary, and it is stipulated that ternary constituents are universally unavailable. The assumption of a final empty nucleus (FEN) does not just save this claim from cases in which words do end in two consonants, but it also makes it possible to capture a generalization about English, which is that clusters such as [ŋk] are always followed by a vowel (they cannot occur before another obstruent, for instance).
The FEN has somewhat limited licensing capacities. In English, it does *not* license a preceding complex onset, for instance, as there are no words such as **drinkl.* All of this is considered to be under parametric control. There are languages which do not allow for final empty nuclei; Italian is sometimes supposed to be such a language, with a very limited set of possible word-final consonant clusters. Other languages have final empty nuclei that can also license complex onsets. Parisian French might be an example of this, which has words such as *tabl* (spelled as *table*), in which the *bl* cluster functions as an onset (Charette 1991). We will return to these limitations in section 4.2.
Another phenomenon that is seen as evidence for the existence of EN, is that these positions sometimes do get a phonetic interpretation. For instance, the Moroccan Arabic word *ktb* 'to write' (with three empty nuclei, one after every consonant) sometimes shows up with a schwa between *k* and *t*, and sometimes between *t* and *b*:

(6) a. *ktəb* 'he/she writes'
b. *kətbu* 'they write'

The generalization here is that an empty nucleus gets phonetic realization when it is followed by another, non-realized empty nucleus. Typically, these realisations are schwa-like vowels, for instance also in French:

(7) *rjəter / rəjter* 'to throw back'

We assume that the stem of *rjter* (spelled *rejeter* in French orthography) has two empty nuclei, which in this case can each be realized optionally, although you cannot leave out both of them.
This thus already establishes some hierarchy of emptiness: there are the truly empty segments which have no phonetic reflex and then there are 'realized' empty segments, which still have a phonetic realization that is fairly weak. As a matter of fact, the empty positions strengthen even further (to [ɛ]) when they occur in a stressed position (which means if they are the last realized vowel in the word):

(8) rjɛt '(he) throws back'

This thus gives us an indication that we have the following small hierarchy:

(9) phonetically empty < schwa < full vowel ([ɛ])

2.2. Schwa as almost empty

As for the internal structure of the consonants and (in particular) vowels, it is typically assumed within GP that they consist of so-called Elements (Backley 2011), which are monovalent primitives – comparable to monovalent features – and that the most relevant vocalic elements are |I|, |U| and |A|. This means that /i/ typically in a language consists only of the |I| element, /u/ of the |U| element and /a/ of the |A| element. We can combine |I| and |A| to get /e/ and |U| and |A| to get /o/. Using also a notion of headedness allows us to distinguish between /ɛ/ and /ɔ/ (where |A| is the head) and /e/ and /o/

(where |I| or |U| is the head). Schwa in such a view has no elements, but is purely an interpretation of structure.
Recent years have witnessed debate within Element Theory about the nature of different elements. The 'basic' vocalic Elements, as |I|, |U| and |A| do not seem to be as completely symmetrical as ordinary logic would imply. We have seen above that |I| and |U| each combine freely with |A|, giving us mid vowels. |I| and |U| can obviously also combine with each other, to give the front rounded high vowel /y/ (and combining all three would give its mid vowel equivalent /ø/), but it is clear that such a vowel is more marked, both typologically and within a given language.
Furthermore, |A| is known to often interact with length. As it is the element which all open (and mid-open) vowels share, it functions in some sense as an indicator of vowel lowness, which in turn both phonetically and phonologically relates to length. Some authors (Pöchtrager 2006, Pöchtrager and Kaye 2011) have therefore suggested that the |A| Element is not really an Element, but really *is* length. Since we are working within an autosegmental framework, this length in turn is represented as bipositionality, which means that the vowels /ə, a, ɛ, ɔ/ are represented (roughly) as follows (to be slightly revised below):

(10)

x	x	x	x
	/\	/\	/\
	x x	x x	x x
		I	U
/ə/=empty	/a/	/ɛ/	/ɔ/

We believe, however, that the status of schwa is problematic in element theory. In the classic version we just outlined, it does not really have any phonological content at all, but that does not do justice to the fact that schwa is *different* from empty positions in some ways. For instance, in the Moroccan and French examples we have seen above, schwa counts as a vowel that can license an empty position to stay silent, which is not a property 'really' empty positions have themselves (otherwise there would be no alternation).
The problem is solved in some versions by assuming that there is some element involved, either a dedicated one, such as |@|, which "can be thought of as a blank canvas to which the bold strokes represented by |A|, |I| and |U| can be applied" (Harris 1994:109). The issue however is how this fact about phonetic interpretation of an element leads to its special phonological behaviour. Formally, |@| is an element like any other. This problem becomes larger if we assume, with Backley (2011), that schwa can sometimes be a 'headless' segment, e.g. |A|; it is not clear why such headless elements are empty in some sense, where the |A| comes from in case of epenthesis of schwa, or how to represent this analysis if we replace |A| by length.
A solution may come from departing from classic GP as it relates to the structure of phonological computation. In particular, in the vein of Turbidity Theory (TT; Goldrick 2000, Van Oostendorp 2007, Revithiadou 2007), we assume that instead of symmetrical association relations (if a segment is associated to an element, that element is also associated to that segment), there are two independent relations:

(11) An Element projects to a segment in the lexicon (the *projection* relation)
A segment pronounces an Element in the phonetics (the *pronunciation* relation)

These relations are marked with arrows: a downward arrow (from the prosodic node to the feature/element) represents the projection relation, whereas an upward arrow (from the feature/element to the prosodic node) represents the pronunciation relation:

(12) C V

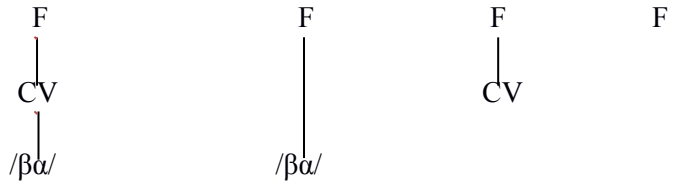
/β/ /α/

Typically, the projection and pronunciation relations will co-occur, mirroring the symmetry of ordinary autosegmental association: if an element projects to a segment, the segment will pronounce that same element. But this does not always happen (e.g. it does not happen when an element gets 'deleted', which in this case means, there is a projection relation but not a pronunciation relation; or when an element gets 'inserted', which means there is a pronunciation relation but no projection relation).

2.3 The relation between emptiness on different levels

Recent work combines the empty structures proposed by Strict CV Theory (a variety of GP; Lowenstamm 1996) with the theoretical insights provided by DM. For instance, building on the work by Marantz (2007) on the role of functional projections such as *n* and *v* in the derivation of nouns and verbs, Lowenstamm (2008:113) claims that "functional categories have phonetic content, viz. the minimal template CV". Interestingly, Bendjaballah & Maiden (2008: 29) elaborate on this claim and introduce a typology of such 'empty' functional categories, in which the silent categories are represented as structures lacking either featural (/βα/) and prosodic (CV) content (13d), or morphosyntactic features (F; 13e):

(13) a. overt marker b. floating element c. empty site d. empty category e. silence



The computational technology provided by TT allows for a further refinement of this typology. Basically, it allows an 'overt marker' such as 13a to be phonetically invisible. This is shown in (14), where, in the 'overt marker' (14a), the phonological features are both projected by the relevant prosodic node and pronounced (i.e. both the projection and the pronounciation relations are present). In the case, though, in which the pronunciation relation is absent, as in (14b), the phonological exponent of the morphosyntactic feature F receives no phonetic interpretation, even though there is a lexical projection relation:

(14) a. overt marker b. silent overt marker

Note that the lack of the pronunciation relation exclusively impact on the phonetic dimension. A 'silent overt morpheme' such as (14b) is thus still allowed to play a role in phonology (and in morphosyntax and semantics).

Similarly, TT representations provide us with some conceptual space to show the similarities and distinctions between a purely empty vowel (15a), a contentful empty vowel (15b) and a schwa (15c):

(15)

a.	b.	c.	d.	e.
EN	/ə/	/ə/	/a/	/a/
N_x	N_x	N_x	N_x	N_x
	X_n	X_n	X_n X	X_n X
[Ø]	[Ø]	[ə]	[ə]	[a]

In these representations, both schwa and the empty vowel are in some sense realisations of what would be the equivalent of an |A| element. This means we actually have the possibility for a *second* type of empty position, viz. one that does not branch at all. We thus have two 'empty' vowels ((15a) and (15b)) that are unpronounced, but still stand in a clear relation of relative complexity, and one 'empty' vowel that actually has a pronounced part and is schwa (15d). The idea will be that complexity in empty vowels should always be licensed by morphosyntactic structure.

4. Empirical tests

4.1 Silent markedness and simplex onsets

As we discussed in section 3, each onset needs to be licensed by the following nucleus within the GP tradition. This holds for word-final consonants too, which are argued to be onsets and thus followed by FEN. The licensing strength of such FEN arguably varies depending on the language. In a language like Italian, for instance, FEN have no licensing strength and no (content[3]) words can thus be found which end in a consonant. Other languages assign some more licensing strength to FEN, which translates in a (restricted) distribution of both single segments and consonantal clusters (see section 4.2 for the latter). The final devoicing occurring in Dutch is an instance of the former, inasmuch as its FEN is apparently not a strong enough licensor to sustain the voicing of its onset (see Harris 2009 for a detailed account of devoicing in terms of weakening, whereby weakening is formalized as the removal of featural/elemental content). As shown in the next section, though, exceptions to otherwise regular final devoicing can be found.

In Dutch, word-final consonants regularly undergo devoicing. This is shown in (16), where, if not protected by a following vowel, an underlyingly voiced obstruent devoices when occurring at the end of a syllable (the data come from Van Oostendorp 2007):

(16)

/bɛd/	[bɛt]		/bɛd+ən/	[bɛdən]
'bed'			'beds'	
/bɛt/	[bɛt]		/bɛt+ən	[bɛtən]
'(I) wet'			'(we) wet'	

As soon as we leave Standard Dutch and focus on Dutch dialects, though, exceptions to final devoicing can be found (De Schutter & Taeldeman 1986; De Vriendt & Goyvaerts 1989; Goeman

---

[3] Function words can be found, though, which end in a consonant. The distinction among function and content words cannot be discussed here due to space limitation, but it should be noticed that it fits with the generalization put forward in (18) about the relationship between semantic, morphosyntactic and phonological features.

1999, 2009; De Bree 2003; van Oostendorp 2007). Many of these exceptions involve 1SG.PRES verbs (and restrict to word-final fricatives; van Oostendorp 2005). This is shown in (17), where the cognate forms for 'faith(s)' and '(I/we) believe' are presented as pronounced by the speakers of the Tilligte dialect:

(17)	/ɣeløːv/	[ɣeløːf]	/ɣeløːv/	[ɣeløːv]
	'faith'		'(I) believe'	
	/ɣeløːv+ən/	[ɣeløvən]	/ɣeløːv+ən/	[ɣeløvən]
	'faiths'		'(we) believe'	

The word-final consonant apparently ends in a FEN both in 'faith' and 'I believe' in (17), so that we would need to say that FEN in one case licenses voicing of the onset and in the other case it does not. It is relevant in this respect that exceptions to final devoicing typically involve 1SG.PRES verbs[4]. Interestingly, in a diachronically preceding stage, the phonological exponent of 1SG.PRES was represented by schwa in the whole Dutch area (Goeman 1999, 2007). Furthermore, close examination of the so-called GTR-database in which we find information on the phonology of all Dutch dialects (van Oostendorp 2014) shows that Tilligte, as well as other varieties displaying the same exceptional behavior (such as Ghent; Goeman 1999), borders with an area in which the 1SG.PRES marker is still represented by schwa. Furthermore, a form such as *ik geleuve* has been reported as optionally occurring in Tilligte itself (Goossens 1977). Building on these pieces of evidence, Goeman (1999) claims that the exceptional resistance to final devoicing displayed by these varieties can be explained as due to the fact that schwa has been deleted quite recently: the 1SG.PRES schwa has just gone and final devoicing has not taken place 'yet'. In other words, these varieties behave as if the 1SG.PRES schwa *is* still there.

Fortunately, the theoretical devices introduced in section 2 allow us to give this idea a formal basis without having to assume that final devoicing is an optional process in these dialects (which does not seem to be the case). Given the fact that the FEN occurring after the word-final consonant of 1SG.PRES verbs and the noun-final FEN are both silent, the difference may reside in their underlying representation. This is shown in (18), where the representations are given of the FEN occurring in noun-final position (18a) and as a 1SG.PRES marker, both in the case it is pronounced (18c) or not (18b):

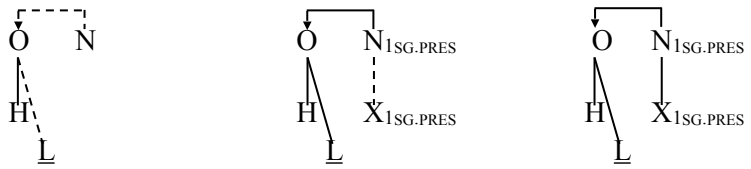
(18)	a. FEN	b. $FEN_{1SG.PRES}$	c. $FEN_{1SG.PRES}$
	N	$N_{1SG.PRES}$	$N_{1SG.PRES}$
		↓	
		$X_{1SG.PRES}$	$X_{1SG.PRES}$
	[Ø]	[Ø]	[ə]

Crucially, (18a) and (18b) are phonetically similar (both silent) but phonologically different, whereas (18b) and (18c) are phonetically different but phonologically similar (what changes is the presence *vs* absence of phonetic interpretation, formalized as presence *vs* absence of the pronunciation relationship). As a consequence, (18b) is expected to display more or less the same phonological

[4] Within the Dutch speaking area, 1SG.PRES verbs behave exceptionally with respect to other phenomena as well. For instance, it protects the word-final /n/ from the (optional) deletion it undergoes in Standard Dutch when preceding a schwa ([opə] / [opən] 'open' (adj) *vs* [ɪk *tekə] / [tekən] 'I draw); it blocks /k/ epenthesis after word-final /ŋ/ (/puliŋ/ [puliŋk] 'eel' vs /ik siŋ/ [ik siŋ] 'I sing') and triggers /d/ lenition, namely a process regularly applying in intervocalic position ([a klɪt əm] 'he dresses himself' *vs* [ik klej ma] 'I dress myself') in Brussel Dutch (van Oostendorp 2005). Such behaviour can be given a similar treatment.

behavior of (18c), and is thus not surprising that both (18b) and (18c) shelter the word-final consonant from final devoicing.
Indeed, as shown in (19), $FEN_{1SG.PRES}$ licenses the voicing specification of the preceding consonant (the absence of the pronunciation relationship is signaled henceforth by a dashed line, the solid line representing the copresence of the projection and pronunciation relationship; as for licensing, it is represented by the leftward arrow, which is dashed in the case FEN is laterally not strong enough to license the voicing specification of the preceding consonant; the voicing specification is represented, in turn, by a (privative) |L| Element, accordingly to the Element Theory literature):

(19) a. *geloo*/vØ/ b. *geloo*/vØ/ c. *geloo*/və/



geloo[f] *geloo*[v] *geloo*[və]

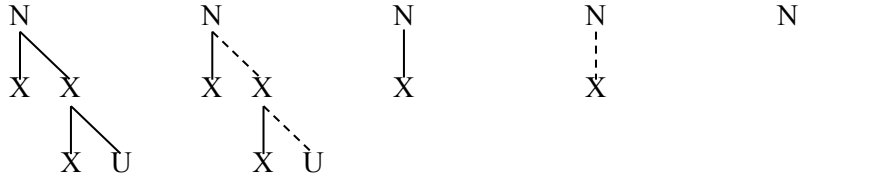
What (19) shows, thus, is the relationship between the representational complexity of a N and it's licensing strength: a N displaying some amount of elemental content exercises its lateral strength on the preceding O, no matter whether the representational content of N is phonetically interpreted or not.

4.2 Silent markedness, coda-onsets and complex onsets

As mentioned above, the representational complexity of a nucleus correlates with its ability to license simplex onsets as well as complex onsets and coda-onset sequences. This is explicitly claimed e.g. by Cyran (2008: 450), who maintains that "weak licensing [i.e. by schwa] will also have influence on the distribution of RT [i.e. coda-onset] and TR [i.e. complex onset] clusters and will be responsible for weakening processes such as, for example, epenthesis, metathesis, or cluster simplification by deletion". In the next two sections, we will discuss cases in which the syllabic structures just referred to are licensed by apparently empty nuclei.
Lunigiana dialects of Italian underwent a diachronic change whereby unstressed vowels were gradually reduced. Starting from France, where it had been carried through to completion around 6th-7th century (Loporcaro 2011), vowel reduction radiated within the Romance-speaking continuum. Crucially, Lunigiana is in the area which seems to be reached most recently and varieties can thus be found that display the various stages of vowel reduction. Carrarese and Pontremolese are two of such dialects, the former currently representing the diachronic stage that the latter has already gone through (Cavirani 2015).
For instance, a form such as the Proto-Romance /ˈmagro/ 'thin.M.SG' corresponds to [ˈmagɐr] and [ˈmagr] in, respectively, Pontremolese and Carrarese. Interestingly, Lunigianese varieties can be found that display the intermediate stages [ˈmagrə] and [ˈmagər] (Maffei Bellucci 1977; Loporcaro 2005-2006), namely the stages in which the word-final vowel hasn't been deleted yet and the one in which the epenthetic vowel hasn't become a full vowel yet, respectively.
In line with the "life cycle of a phonological process" described by e.g. Bermúdez- Otero (2015), vowel reduction is argued to start out as a phonetic process that is "at first exhaustively determined by extragrammatical factors (physics and physiology)" and then "becomes ever more deeply embedded in the grammar of a language". Coupling this proposal with the formalism proposed in this paper, we

can describe this diachronic process as involving the successive removal of the relevant pronunciation and projection relationships:

(20) a./magro/ b./magro/ c. /magrə/ d. /magrə/ e. /magrØ/



[ˈmagro] [ˈmagrə] [ˈmagrə] [magr] [ˈmagɐr]

As shown in (20), we can describe the first step along this diachronic development as a process involving the phonetic interpretation of an underlying /o/, which surfaces as [ə] as a consequence of the removal of the pronunciation relationship (of the dependents; see section 2). Assuming that (for some sociolinguistic reason) the (formerly variable) 'reduced' pronunciation becomes systematic (e.g. in specific contexts such as phrase-medially *vs* phrase-finally; Ort. [kəˈd̪ɔmo] 'that man' *vs* [d̪ɔm ˈner] 'the black man'; see also Loporcaro 2005-2006), the learner would arguably represent it as due to a phonological process that deletes the pronunciation relationship (20b). Suppose now that in a second stage the reduction process becomes fully systematic (i.e. applies in every context and no exception can be found). In such a situation, is highly unlikely for the learner to hypothesize the presence, in the last nucleus, of something more than /ə/, and she (re)structure the relevant representation accordingly (20c). The same mechanism may now reapply: the word-final schwa start being reduced more and more regularly, i.e. the learner deletes the pronunciation relationship in less and less restricted phonological contexts (20d), until she has no more evidence to infer the presence of some contentful word-final nucleus: only a FEN is left (20e; see Cavirani 2015 for a detailed discussion of these claims).

The last two stages along the diachronic development given in (20) represent the stage currently reached by Carrarese and Pontremolese, respectively. As can be noticed, there is no difference concerning the phonetic interpretation of the word-final nucleus: in both the cases it leaves no acoustic trace. What changes is the behavior of the preceding consonant cluster, which is broken up by means of epenthesis only in Pontremolese.

Weak licensing will also influence the distribution of complex consonant clusters and "will be responsible for weakening processes such as, for example, epenthesis, metathesis, or cluster simplification by deletion" (Cyran 2008: 450). The difference in behavior between Carrarese and Pontremolese with respect to complex onsets, thus, together with diatopic and diachronic considerations, provide an indication of the different licensing *strength* and, as a consequence, of the representational complexity of these final silent nuclei. Indeed, while Carrarese word-final silent nucleus licenses simplex (Lic; [lup] 'wolf') and complex onsets (IGLic; [magr] 'thin.M.SG') as well as coda-onset sequences (DGLic; [kolp] 'blow'), the Pontremolese one licenses only simplex onsets (Lic; [luv] 'wolf') and coda-onset sequences (DGLic; [kurp] 'blow'). In other words, the Pontremolese FEN is a *weak* licenser and Carrarese is strong, even though both are inaudible. Given the tight correlation between lateral strength and representational complexity, we can thus conclude that the two varieties present two representationally different nuclei, only the one in

Pontremolese being really empty[5]. The Carrarese final silent nucleus, on the other hand, is not as empty as it looks, and is thus able to dispense the full range of licensing possibilities.

5. Conclusion

If we take seriously the assumption that there are empty positions in phonology or in syntax, we inevitably are led to a differentiation of such positions: some positions are emptier than others, and there is a hierarchy of markedness among 'silent' elements. We need some representational means to make such a distinction, and after having established what emptiness means, we have proposed that combining Element Theory with Turbidity Theory can give us exactly such a miniature hierarchy of emptiness.

Underlying this discussion is that there might also some relation between the content, or lack thereof, of the phonological representation and that of the syntactic representation. It should be noted, for instance, that the fact that the first person singular in Dutch has an ending that is phonologically 'less empty' than e.g. the singular of nouns in the same language, as discussed in section 4.1, may be that the first person singular is obviously a morpheme with content, whereas singular may just be the default number, just like the fact that empty categories in syntax function like pronouns or functional heads and not like full verbs (except in circumstances like ellipsis) may also not be a coincidence. It remains a task for the future to see how such relations can be made more precise.

References

Aalberse S. P. (2007). The typology of syncretisms and the status of feature structure. Verbal paradigms across 355 Dutch dialects. *Morphology*, 17(1), pp. 109-149.

Aalberse S., & Don J. (2009). Syncretism in Dutch dialects. *Morphology*, 19(1), pp. 3-14.

Aalberse S., & Don J. (2011). Person and number syncretisms in Dutch. *Morphology*, 21(2), pp. 327-350.

Ackema P., & Neeleman A. (2013). Person features and syncretism. *Natural Language & Linguistic Theory*, 31(4), pp. 901-950.

Bendjaballah S. & Haiden M. (2008). A typology of emptiness in templates. In J. Hartmann, V. Hegedus & H. van Riemsdjik (eds.), *The Sounds of Silence: Empty Elements in Syntax and Phonology*. Elsevier, Amsterdam, pp. 21-57.

Bennis H. & MacLean A. (2006). Variation in verbal inflection in Dutch dialects. *Morphology*, 16(2), pp. 291-312.

Cavirani, E. (2015). *Modeling phonologization. Vowel reduction and epenthesis in Lunigiana dialects*. Utrecht: LOT publishing [Dissertation, Leiden University and Pisa University].

Cavirani, E., Barbiers, S. & Tjong Kim Sang E. (in preparation), Variation in subject-verb agreement in Dutch dialects.

Cinque G. (ed.) (2002). *Functional structure in DP and IP. The Cartography of Syntactic Structures, Volume 1*. New York: Oxford University Press.

Cinque G & Rizzi L. (2008). The cartography of syntactic structures V. *Working Papers on Language and Cognition, 2*, pp. 43-59.

Cyran, E. (2008). Consonant clusters in strong and weak positions. In de Carvalho, J. B., Scheer, T., & Ségéral, P. (eds.), *Lenition and Fortition*. Berlin: Mouton de Gruyter, pp. 447-481.

Embick D. (2014). Phase cyclces, φ-cycles, and phonological (in)activity. In S. Bendjaballah, M. Lahrouchi, N. Faust & N. Lampitelli (eds). *The form of structure, the structure of forms: Essays in honor of Jean Lowenstamm*, Amsteredam: John Benjamins, pp. 270-286.

[5] Notice that the weak licensing strength of Pontremolese is possibly suggested also by the outcome of word-final (etymological) stops (Carr. [lup] *vs* Pontr. [luv]) and word-internal lateral 'codas', which are reduced either to |U| (Pontr. [kaụd] *vs* Carr. [kald]) or to |A| (Pontr. [kurp] *vs* Carr. [kolp]; Cavirani 2015).

Embick D. (submitted). On the targets of phonological realization. In V. Gribanova V. & S. Shih (eds). *The morphosyntax-phonology connection: locality and directionality at the interface*. Oxford University Press.

Goeman A. C. M. (1999). *T-deletie in nederlandse dialecten. kwantitatieve analyse van structurele, ruimtelijke en temporele variatie*. Doctoral Dissertation, Vrije Universiteit Amsterdam.

Goeman A. C. M. (2007). De Morfologische Atlas van de Nederlandse Dialecten (MAND); Zero en bewaard gebleven morfologische informatie. *Taal en tongval. Themanummer*, 2006(18), pp. 66-92.

Goldrick, Matthew (2000). Turbid output representations and the unity of opacity. In: A. Coetzee, N. Hall and J. Kim, eds, *NELS 30*. GLSA, Amherst, MA, pp. 231–245.

Hacking I. (1983). *Representing and intervening: Introductory topics in the philosophy of natural science*. New York: Cambridge University Press.

Harris, J. (2009). Why final obstruent devoicing is weakening. In Nasukawa K. & Backley P. (eds.), *Strength relations in phonology*. Berlin: Mouton de Gruyter, pp. 9-46.

John P. (submitted). On the representation of empty categories. *Phonology*

Kager, R. (1989). *A metrical theory of stress and destressing in English and Dutch*. Dordrecht: Foris.

Kaye J., Lowenstamm J. & Vergnaud J. R. (1985). The internal structure of phonological representations: A theory of charm and government. *Phonology Yearbook, 2*, pp. 305-328.

Kaye J., Lowenstamm J. & Vergnaud J. R. (1990). Constituent structure and government in phonology. *Phonology, 7*, pp. 193-231.

Kayne R. (2005). Some notes on comparative syntax, with special reference to English and French. In R. Kayne & G. Cinque (eds.), *The Oxford Handbook of Comparative Syntax*. New York: Oxford University Press, pp. 3-69.

Kayne R. (2008). *Comparative syntax and the lexicon. DIUG lecture, University of Groningen* [http://www.let.rug.nl/zwart/diug/docs/kaynediug.pdf].

Kayne R. (2016). *Some Thoughts on One and Two and Other Numerals* (May, 2016) [http://linguistics.as.nyu.edu/docs/IO/2652/Kayne0516Numeral.pdf]

Krivochen D. G. & Kosta P. (2013). *Eliminating empty categories*. Peter Lang Publishing Group.

Loporcaro, M. (2005–6). I dialetti dell'Appennino tosco-emiliano e il destino delle atone finali nel(l'italo-)romanzo settentrionale. *L'Italia Dialettale* 66–67, pp. 69-122.

Loporcaro, M. (2011). Syllable, segment and prosody. In M. Maiden, J. C. Smith & A. Ledgeway (eds.), *The Cambridge History of the Romance Languages, vol. I.: Structures*. Cambridge: Cambridge University Press, pp. 50-108.

Marantz A. (2001). *Words*. Ms., MIT.

Marantz A. (2008). Phases & words. In Sook-Hee Choe (ed.), *Phases in the theory of grammar*. Seoul: Dong In, pp. 191-222.

Newell E., Kilbourn-Ceron O., Noonan M. & Travis L. (submitted). Phonological Domains vs. Root Suppletion. In H. Harley & D. Siddiqi (eds.), *Morphological Metatheory*. Benjamins.

van Oostendorp, M. (2000). *Phonological projection. A theory of feature content and prosodic structure*. Berlin: Mouton de Gruyter.

van Oostendorp, M. (2007). Exceptions to final devoicing. In van de Weijer and van der Torre (eds.), *Voicing in Dutch*. *Current Issues in Linguistic Theory*, 286. Amsterdam: John Benjamins, 81-98.

van Oostendorp, M. (2014), Phonological and phonetic databases at the Meertens Institute. In J Durand & G Kristoffersen (eds), *The Oxford Handbook of Corpus Phonology*. Oxford University Press, Oxford, pp. 546-551.

Pöchtrager, Markus A.. (2006), *The Structure of Length*. PhD dissertation, University of Vienna.

Pöchtrager, Markus A. and Jonathan Kaye. 2013. GP 2.0. *SOAS Working Papers in Linguistics*. 16. 51–64.

Revithiadou, Anthi (2007), Colored turbid accents and containment: A case study from lexical stress. In: S. Blaho, P. Bye and M. Krämer, eds, Freedom of Analysis?. Mouton De Gruyter, Berlin, New York, pp. 149–174

Samuels B. (to appear). Consequences of phases for morphophonology. In Gallego (ed.), *Phases: Developing the Framework*. Berlin: Mouton de Gruyter.

Scheer T. (2008). Why the prosodic hierarchy is a diacritic & why the interface must be direct. In J. M. Hartmann, V. Hegedus & H. van Riemsdijk (eds.), The sounds of silence. Amsterdam: North-Holland Elsevier, pp. 145-192.

Weinberg S. (1992). *Dreams of a final theory*. New York: Pantheon Books.

Werkmeister W. H. (1937a). Seven theses of logical positivism critically examined I. *The Philosophical Review*, 46, 276-297.

Werkmeister W. H. (1937b). Seven theses of logical positivism critically examined II. *The Philosophical Review*, 46, 357-376.

Yu C. H. (2004). Misconceived relationships between logical positivism and quantitative research. In *Research Methods Forum [On-line]*, pp. 33620-7750.

Zonneveld W. (1982). The descriptive power of the dutch theme-vowel. *Spektator* 11, pp. 342-365.