

# **REPRESENTATION VS DERIVATION: THE CASE FOR A MODULAR VIEW OF PHONOLOGY<sup>1</sup>**

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**Abstract.** Plurilinear representations and constraint-based derivation have been the tools used in the last 40 years by autosegmental approaches and OT respectively. It will be argued here that the border between representation and derivation depends on another key division in phonological theory: in phonology proper, there are no such things as processes involving feature propagation or delinking; only by virtue of morphophonological alternations, that is of phonology/morphosyntax interaction, may an object be said to change into another one. Thus, representational theories better describe core phonology, seen as an autonomous module of grammar, while constraint-based models are more appropriate to deal with computation associated with phonology's upper interfaces.

**Keywords:** Phonological representation, phonological derivation, morphophonological alternation, modular grammar.

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<sup>1</sup> This squib resumes and elaborates two papers that were presented at the 1<sup>st</sup> meeting of the Phonological Theory Agora (Lublin, 2015) and at the 40<sup>th</sup> anniversary conference of the Centro de Linguística da Universidade do Porto (Porto, 2016). I am grateful to Noam Faust and Francesc Torres Tamarit for their input on a first draft of this article, and to Tobias Scheer, Marc van Oostendorp and Heather Newell for their reviews of a previous version.

## 1 THE DUAL LEGACY OF *SPE*

### 1.1 FROM RULES TO CONFIGURATIONS

It is instructive to look back upon the last forty years of research in phonology. The crisis caused by Chomsky & Halle's (1968) book (henceforth *SPE*) came to a provisional end in the mid-seventies, when Goldsmith (1976) introduced a break whose effects are felt to this day, and are commonly labeled under the term "autosegmental phonology". It was, according to Encrevé (1988:146), the most "spectacular innovation" in the history of phonological representations since the invention of the alphabet. From then on, it has no longer been possible to view words as mere sequences of letter-like tokens: phonologists have come to the conclusion that a distinction has to be made between the phonemes of a morpheme and the positions they occupy, that the phoneme has an internal structure, and that representations are based on how melodies and positions are synchronized, features behaving much in the same manner as only tones were previously supposed to do.

While the number of possible phonological operations has been drastically reduced to two (spreading and delinking), this milestone naturally made representations much more complex – and possibly more abstract as well: for example, there is nothing more abstract than a pure timing slot. It should be noted that abstraction is not, in itself, a reason for criticism or rejection. A theory should not be dismissed because it is too abstract; it should, however, if it is *arbitrary*. Arbitrariness was precisely the "serious flaw" of their own proposal that Chomsky & Halle emphasized in the last chapter of their book: rules are arbitrary as they are not able to distinguish a commonplace phenomenon from one that is unlikely or even impossible. By contrast, within autosegmental approaches, processes are supposed to be *motivated* if they obey a small number of principles, i.e. well-formedness conditions, imposed to autosegmental configurations (OCP, No Line-crossing, etc.), contrary to other processes which are therefore said to be ungrammatical. Thus, autosegmen-

talism, whose main representative is currently Government phonology, appeared to certain scholars (see, e.g., Encrevé 1988, Kaye *et al.* 1990, Goldsmith 1993) as a project where, thanks to representational devices, the expressive power of *SPE*-type computation could be both restricted and motivated. In particular, the serial nature of early generative phonology was hardly tolerable for many people in the 1980s, and was eventually abandoned in (classic) Optimality theory.

## 1.2 FROM RULES TO CONSTRAINTS

It is also instructive to compare the contribution of autosegmental phonology with the second great break in our field, which dates back to Prince & Smolensky (1993), and is now mainstream: Optimality theory (OT). As is well-known, three main points characterize this approach in relation to the *SPE* original framework:

- (1) a. Violable constraints, which, unlike *SPE* rules, are supposed to be universal, only their ranking (or weight) being language-specific.
- b. Dialectic tension between markedness and faithfulness constraints, the former applying to the surface representations (SR), and the latter to the relation between SRs and underlying representations (UR); in *SPE* faithfulness effects were obtained by default, through the absence (or underapplication) of rules.
- c. Parallel derivation, which replaces *SPE* serialism (at least in the classic version of OT).

With respect to autosegmental approaches, however, one point has been less often noted:

- (2) With some exceptions (like tonology or metrical phonology), the UR's *used* in OT-based research are identical to those of *SPE*, that is mere sequences of letters.<sup>2</sup>

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<sup>2</sup> Admittedly, in the original Prince & Smolensky's text, it is argued that OT builds on Autosegmental Phonology, and there is no specific theory of phonological representation that 'goes with' OT. Nonetheless, usage matters. A typical instance of this is the systematic denial of any underlying status to the syllable, in line with *SPE*.

The comparison between autosegmental and OT accounts is thus extremely interesting as it provides two different ways of answering the following question: what should a rule-free phonology be like? So as to get rid of serial rules, the autosegmental approach focuses on the structure of *representations*, OT on (parallel) *derivation*, i.e. to a process involving an input and an output, whereby an object is changed into another one. The question then arises: should we try to overcome this opposition by unifying the two theories? This is, as Anderson (1985) had already sensed, one of the most challenging epistemological problems that emerge from the phonology of these last forty years.

### 1.3 IS UNIFICATION POSSIBLE?

To begin with, is this unification desirable? I think it is, because the two approaches show major and specific drawbacks. Interestingly, both involve the same flaw as earlier rules, although in different domains: arbitrariness, such as defined in §1.1.

On the representational side, Government phonology is unable to provide a straightforward account of variation.<sup>3</sup> Variability is assumed to follow from parameters associated to the principles mentioned above. Yet, parameter settings through licensing relations look like ad hoc stipulations: consider, for example, the variable behaviour of word-final empty nuclei from language to language according to whether they can or cannot dispense licensing (Charette 1991:132-142). In contrast to this "legalist" approach (Boltanski 1999:153), the same markedness constraints can be said to be differently ranked cross-linguistically in OT according to their ranking vis-à-vis faithfulness constraints; in other words, unlike parameter settings, the ranking of markedness constraints has an *extrinsic*

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<sup>3</sup> Most proponents of GP may argue that variation is extra-phonological and therefore should not be accounted for within a theory of phonology. I have a different stance: grammars generally model one arbitrarily chosen variety of a language; since the same speakers always employ more than one variety, at least a certain type of variation should be viewed as an integral part of grammar. At any rate, the line between phonology and variation is not of the same nature as those between phonology and morphology or between phonology and phonetics; there is no sociolinguistic module.

motivation. More interestingly for a theory of phonology, recent developments of OT have led to the most interesting formal accounts of free variation since Labov's times (see e.g. Boersma 1997; Anttila 1997, 2007; Hayes 2000; Hayes & Wilson 2008).

As to OT, markedness constraints can also be said to be ad hoc, as they lack formal motivation.<sup>4</sup> For example, why are CV syllables unmarked *vis-à-vis* CVC (with one additional element) and V (with one element less)? ONSET and NOCODA simply record typological and acquisitional evidence; they do not explain anything. By contrast, Strict CV allows a unified account of CVCv and cV markedness, assuming that empty positions (v, c) are marked.

There are several cases of theoretical competition and eventual unification in the history of science. Physics offers at least three different examples. The first and the simplest one is when a new and more global approach annexes an earlier and “narrower” theory, the latter becoming a particular case of the former. This is the case of general relativity and classical mechanics. I do not think that this applies to the phonological frameworks at stake: neither of them can be shown to be more global than the other.

The second example is when two competing theories account for different empirical domains. This is the case of the theory of relativity *versus* quantum theory. Here a real unification should occur (and is still expected), both theories becoming particular cases of a third more global one. This case does not seem more relevant than the former, since the domains of configurational and constraint-based approaches largely overlap.

The third example may be the most appropriate for our purpose. Until the twenties of the last century, certain natural phenomena – light for example – seemed to exhibit a mysterious dualism: some data supported the view that they had a corpuscular nature, and

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<sup>4</sup> For most phonologists working in the OT framework, formal motivation might be unnecessary as markedness constraints are supposed to be “phonetically grounded” (see Archangeli & Pulleyblank 1994, Hayes & Steriade 2004, Bermúdez-Otero & Börjars 2006, de Lacy 2006, Kingston 2007). However, not only is this groundedness problematic in many cases, but phonologists are far away from a consensus on the relationship between phonology and phonetic substance (see, e.g., Iosad 2017 and Reiss 2017).

that a particle should therefore be sought; other data pointed towards a wave theory. This continued until Louis de Broglie succeeded in explaining that light was *simultaneously* a particle and a wave, according to the “perspective”: one is the other’s limit. I have long forgotten what de Broglie’s perspectives are, but I think there might be a similar way to answer the question that arises from the dual nature of phonology: if representation and derivation are both part of our field, *where should we draw the line between them?* Interestingly, the response I will argue for squares with repeated claims for the autonomy of phonology in relation to upper modules (see in particular Scheer 2011).

## 2 BACK TO BASICS

### 2.1 THE DUAL NATURE OF RULES

Let us remember the scope of *SPE* rules. They are a legacy of structural phonology, and, as such, they are dependent on its two main historical trends: Prague School and American structuralism. Due to the former source, rules should affect phonemes that are strictly defined through distributional analysis. For example, as shown in (3a), Spanish has three nasal phonemes – a labial /m/, a coronal /n/ and a palatal /ɲ/ – that contrast in onset position, while, as shown in (3b), only an underspecified nasal can occur in coda position – an “archiphoneme”, whose place feature is imposed by the following onset, if there is any.

(3) Trubetzkoy's "(archi)phonemes"

a. Spanish /m/ ~ /n/ ~ /ɲ/

[ˈkama]	“bed”	[ˈkana]	“rattan, stick”	[ˈkaɲa]	“reed”
[soˈmaɾ]	“to sum”	[soˈnaɾ]	“to sound”	[soˈɲaɾ]	“to dream”

b. Spanish /N/ = {nasal}

[ˈkampo]	“countryside”	[ˈkanto]	“I sing”	[ˈbaŋko]	“bank”
[ˈaɲtʃo]	“large”	[ˈpan/ŋ]	“bread”	[ˈbjen/ŋ]	“well, asset”

It follows that Spanish will be said to have the "allophonic rule" in (4).

- (4) Sp. /N/ → [m, n, ɲ] / \_P, T, C, K  
 → [n/ɲ] (according to the variety) / \_#

However, in accordance with a tradition that dates back to Bloomfield (1933), the input of *SPE* rules is not only based on distribution; it can also follow from morphophonological alternations. Consider the data from Somali in (5). Distributional evidence would have led to posit /la:N, siN, da:N, sa:N/ in the singular and definite forms for the same reasons as in Spanish: no place contrast is allowed in coda. Yet, as this would make the plural form unpredictable, the /m/ ~ /n/ contrast is assumed to exist in all positions at the underlying level.

- (5) (Neo-)Bloomfieldian "morpho-phonemes"

	<i>singular</i>	<i>definite</i>	<i>plural</i>	
a. Somali /m/	[la:n] [sin]	[la:nta] [sinta]	[la:mo] [simo]	“branch” “hip”
b. Somali /n/	[da:n] [sa:n]	[da:nta] [sa:nta]	[da:no] [sa:no]	“shore” “hiding place”

Thus, the rule at stake here no longer affects an archiphoneme, but specified nasal phonemes, in particular /m/ which, as shown in (6), loses its labial feature.<sup>5</sup>

- (6) Som. /m/ → [n] / \_T, #

<sup>5</sup> In fact, Spanish also shows a few alternations which are parallel to Somali [la:mo]-[la:n] (Torres Tamarit, p. c.) (the same way there might be cases of intramorphemic NC sequences in Somali from which no alternation can be subsumed): these alternations concern rare loans or learned words like [islámiko]-[islán] or [álbumes]-[álbun]. In any case, if the reader wants an example of a language where such alternations are totally absent, I suggest Japanese, which has homorganic NC clusters, but whose nasal coda never alternates with [m] before morpheme-initial vowel.

The rules in (4) and (6) differ considerably due to the motivation of their inputs; they do not play the same role. As said above, (4) is dictated by distributional analysis, while (6) is supposed to account for the *morphological* knowledge of speakers: the plural of [la:n] is [la:mo], not \*[la:no]; therefore, its [n] is not a "real" /n/ but an /m/ that changes into [n]. Despite that difference, due to Chomsky & Halle's denial of an intermediate phonemic level, (4) and (6) have long been assumed to be formally identical instances of phonological derivation, whereby an object is converted into another one. Does this hypothesis hold? It might be the case that the difference between (4) and (6) dispenses with the need for derivation in at least one of the two examples. We should thus ask if derivation is necessary in both cases.

## 2.2 SAME PHONOLOGY BUT DIFFERENT LEXICON

Is the derivation in (4) necessary? I contend that it is not. The concept /N/ follows from the classic view of phonemic representations where features do not overlap (hence /N+p/). However, strict linearity at the underlying level – causing place spreading at the phonetic level (hence [mp]) – results from unidimensionality. The autosegmental approach does not require feature spreading or delinking in such cases: homorganic NC clusters should simply be viewed as underlying geminates, in which linearity (i.e. the sequence Nasal+place features) is expressed *in the melodic tier*, as shown in (7b). Furthermore, no one has ever claimed that lexical geminates or long vowels result from spreading.



The same holds, say, for palatalization: in languages where front vowels palatalize adjacent consonants beyond what is expected universally (that is, at what Bermúdez-Otero & Trousdale (2012) call the "phonologisation" level), the I-element is underlyingly associated with two positions as well.

Accordingly, both Spanish and Somali have the representations in (7), where the nasal coda lacks a place feature of its own. However, unlike Spanish, Somali is supposed to have the rule in (6). This is because *the two languages have the same (nasal) phonology but different lexicons*: Somali, unlike Spanish, has radicals ending with either /m/ or /n/, hence the derivation in (8a) for [(la:)n] and (8b) for [(la:)mo] (according to whether [Labial] is seen as an anchored or a floating feature in the lexicon respectively).



Note that non-derivational alternatives to alternation-based rules have long been proposed: e.g. the "via-rules" of Natural Generative Phonology (Hooper 1976), whereby (6) could be replaced with an alternation / correspondence between /m/ and the archiphoneme /N/. For my part, I think that both representations are potential options: /la:m/ (and the resulting derivation) should entail word-final [m] before vowel *even in sandhi contexts*, while /la:N/, with a lexicalized archiphoneme (= (7a,b)), precludes [m] in sandhi.<sup>6</sup>

In any event, the facts discussed above suggest the following answer to the question asked in §1.3 about the border between representation and derivation:

- (9) a. There is no derivation in morpheme-internal phonology.  
 b. Only when it comes to morphophonological alternations – due to affix concatenation or to sandhi – may derivation emerge.<sup>7</sup>

<sup>6</sup> Also, Korean *lenis* /p, t.../, aspirated /p<sup>h</sup>, t<sup>h</sup>.../ and *fortis* /p\*, t\*.../ consonants merge word-finally into voiceless plosives ([p<sup>ʰ</sup>, t<sup>ʰ</sup>...]) that undergo the same voicing process in sandhi as the word-internal unmarked *lenis* between vowels. Clearly, despite regular allomorphic alternations with marked phonemes, these word-final plosives can be argued to be underlyingly archiphonemes that have lost all connection with their historical sources.

<sup>7</sup> To give another example, all harmonic phenomena simply require many-to-one association, as in (7a); only affixation allows us to speak about derivation, as in Turkish /ip-uun/ → [ipin] 'rope-genitive', /ip-lar/ → [ipler] 'rope-pl.'

Before concluding, three points are worth noting. First, the claim "same phonology but different lexicon" departs from OT, where there are no lexical differences, and everything is put into the grammar to a point that the examples above would be explained in a quite paradoxical manner. It is the simplest case, Spanish, the one with place neutralization in coda position and no morphophonological alternations, that would require the most complex treatment, where the principles of Richness of the Base and Lexicon Optimization must be taken into account for banning specified /m, n/ inputs in coda position.

Secondly, as the reader may have understood, the divide I propose between morpheme-internal phonology and its interfaces does not parallel the one between the so-called "lexical" and "post-lexical" levels posited by Lexical phonology and its heirs: the rule in (4) is post-lexical, and so may be the one in (6). Nor can one object that the same work is done twice, once by phonology, a second time by phonology's upper interfaces, since Spanish and Somali share the same (nasal) phonology. What is at stake here is not a matter of levels but of perspectives (cf. §1.3): (4) and (6) can be considered as the same phenomenon seen from different angles.

Thirdly, and most importantly, it is worth pointing out the limits assigned here to the term "derivation". I have argued that there is no modification of underlying forms whatsoever in the morpheme-internal situation, and that Spanish NC sequences involve underlying geminates. Therefore, Spanish URs cannot be said to result from constraints which, for example, outlaw non-homorganic NC sequences. I agree that representations do not come out of the blue; rather, they are subject to well-formedness principles (No Line-crossing, etc.) and implicational markedness scales. What I mean is that since there is no underlying /NC/ with a placeless N, homorganic and non-homorganic NC clusters do not compete against each other; the latter does not occur simply because Spanish does not admit bogus clusters, which involve an entirely different representation. Homorganic NC sequences are not derived because there is no "repair" to be considered.

## CONCLUSION

The idea expressed in this article may seem obvious to anyone familiar with the history of phonology. My point is that it may shed light on the ongoing discussions about the work sharing between representational and computational approaches to our field. If I am right, the dual legacy of *SPE* should not be seen as contradictory: representations and derivation do complementary jobs. Representational approaches account for the internal workings of the phonological module, and might help to motivate the markedness constraints required by phonological computation. Constraint-based approaches deal with the latter, that is derivation which emerges when phonology interacts with other modules such as morphology, syntax, and the lexicon. Thereby, the respective roles of representation and derivation strongly support modularist theories of grammar, and the autonomy of the phonological module.

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