



Book review

A Lateral Theory of Phonology. What is CVCV and Why Should it be? Tobias Scheer, Berlin: Mouton de Gruyter (2004). 854 pp. + lix, ISBN 3 11 017871 0

1. Dependency versus Constituency

This is a book about what would traditionally be called syllable structure and syllabification. However, Scheer's goal in this book is to develop a new and innovative model of phonological structure which relies on "laterality not arborescence". In other words, the explanation that is otherwise afforded by constituents such as syllable, onset, nucleus, and rime is to be replaced by sets of pairwise relations between segments, the most important of which is the right-to-left acting *government* relation. The debate about whether to model linguistic structure using laterality versus arborescence is actually strikingly similar to one which has taken place in syntactic theory: the development of models of DEPENDENCY VERSUS CONSTITUENCY.

In a constituency approach (e.g., Chomsky, 1957 et. seq.), a sentence consists of a set of phrases which in turn consist of other phrases or words. Thus, syntactic elements form constituent into phrases that reflect their grouped behavior. By contrast, in dependency grammar (Tesnière, 1959; Hays, 1964; Gaifman, 1965; Mel'čuk, 1988), one word depends on another, and a sentence is represented as a set of dependency relations among elements with no higher level grouping. There are a number of arguments for each of these syntactic frameworks and we cannot do them justice here. Suffice it to say that the best arguments for constituency come from syntactic operations such as movement, in which the set of moved words form a constituent, whereas some of the counterarguments for dependency come from apparently discontinuous constituency, such as the separation of an adjective and its associated noun at a long distance (it is for this reason that dependency grammar has been especially popular in describing and parsing Slavic languages, in which left-branch extraction is well-attested). Of course, many extant theories employ a blend of both constituency and dependency, as in a number of current phrase structure models of syntax that nonetheless employ dependency relations to achieve case and theta-role assignment and the determination of agreement.

The debate between these approaches in syntax is particularly illuminating when evaluating the arguments for dependency versus constituency in phonological structure (on which, see also Takahashi (1993) and Pöchtrager (2006), for opposing arguments and developments). In this book, Scheer has clearly achieved his goal of replacing syllabic constituency with intersegmental dependency, and the resulting theory is thorough and coherent. In brief, Scheer's model is one in which the entire skeleton of a phonological word is (CV)*, with the possibility of empty vowels

(notated here as v_{\emptyset}). Thus, the representation of a word such as *simple* includes $[simv_{\emptyset}p\emptyset lv_{\emptyset}]$, with a number of lateral relations between the segments. Final empty nuclei are automatically licensed by virtue of position, and all non-final empty nuclei must be licensed by a following vowel. As one can see, (governed) empty vowels (which I will abbreviate as GEVs) correspond to syllable frontiers in constituency theory. Thus, constituent-based notions such as “coda” correspond to relational notions such as *followed by an empty vowel*.

In the syntactic debate between dependency and constituency, many researchers have shown that there are logical equivalences and isomorphic mappings between the two sets of models, and thus that some of the important arguments for choosing one over the other must come from empirical evidence that would be possible but perhaps more cumbersome to express in one model. It is thus important to consider sources of evidence for syllabic constituency that, while possible to describe in terms of dependency, prove to be much more naturally captured with constituency.

Perhaps some of the most striking evidence for syllables as constituents comes from the experimental evidence on speech perception. Mehler et al. (1981) found that if French listeners are asked to detect, as rapidly as possible, the phonological fragment *ba-* in a series of spoken words, they respond faster to the word *ba.lance* than to *bal.con*; conversely, the target *bal-* is detected more rapidly in *bal.con* than in *ba.lance*. Syllable boundaries in French are clear: the first syllable of *balance* is *ba-* and the first syllable of *balcon* is *bal-*. Thus, listeners consistently respond faster to targets which correspond precisely to the initial syllable of a word. This result is easily captured by models in which syllables qua constituents exist, and cannot be captured naturally in a model in which both *balance* and *balcon* simply contain the sequences *bala . . .* versus *balv_{\emptyset} . . .*. These results have been replicated with other languages, including with illiterate speakers (Morais et al., 1989), and thereby seem to provide fairly convincing evidence for the psychological reality of the constituent-based unit of the syllable.

Within morphophonological structure-building, a number of affixational processes refer to syllables as constituents. Perhaps some of the most robust evidence here comes from the typology of ludlings, as described by Laycock (1972) and Bagemihl (1989). In patterns such as French *Verlan*, when there are polysyllabic inputs, the order of adjacent CVC syllables is switched, e.g., *mor.tel* → *tel.mor* ‘mortal’.¹ The behavior of polysyllabic inputs is easily described using the syllable as a manipulable constituent, but rather difficult to describe without the tool of grouping afforded by constituency. In addition to ludling processes, a number of infixing and reduplicative patterns of affixation are most simply expressed in terms of direct manipulation of whole syllables.

If we are to take this evidence seriously, the constituency versus dependency debate in phonology cannot be played out in terms of formal primitives alone. The evidence points towards the syllable as a constituent that is processed and manipulated as a unit. Whether this can ever be

¹ The evidence for constituent-transposition is clearest with CVC.CVC words, such as *mor.tel* in the text. As Tobias Scheer (personal communication) points out, the final *-r* of infinitives is not always kept in reversals such as *part.tir*; *dor.mir* ‘sleep’, though this is perhaps consistent with inversion of the lexical but not functional material. The behavior of monosyllabic inputs is different from that of polysyllabic words, and inverts the position of initial and final consonants in CVC words. Rizzolo (2007) discusses the parallel phenomenon of apparent schwa insertion in the Serbo-Croatian language game *Šatrovački*, in which *rad* → *d̥ra* ‘work’, even though *dr-* is a permissible cluster. If one follows Rizzolo in assuming final empty nuclei in Serbo-Croatian, this pattern is actually fully consistent with inversion of constituents: $ra.dV_{\emptyset} \rightarrow dV_{\emptyset}.ra$. The final empty nucleus undergoes vocalization when transposed to non-final position, either because of failure to be licensed or to satisfy a bimoraic template on *Šatrovački* outputs.

naturally captured in a model without constituents is an open question. Nonetheless, Scheer's formalization of phonological structure in terms of lateral relations rather than in terms of syllabic constituents allows for the unification of a number of seemingly unrelated phonological environments that do not otherwise emerge naturally in the constituency model. One of the most important achievements, in my view, is the unification of the word-initial position and the post-consonantal onset achieved by Scheer's notion of the *Coda Mirror* (developed from Ségéral and Scheer, 2001). In what follows I will demonstrate the utility of the Coda Mirror in the analysis of Brazilian Portuguese.

2. The Coda Mirror

We begin by reviewing the phonology of rhotics in Brazilian Portuguese, focusing on the dialect spoken in Rio de Janeiro. BP has three basic rhotics: [r, ʁ, x], whose surface distribution is the following:

- (1) [ʁ] occurs syllable-initially when not postvocalic²:
 - a. *ra*bo [ʁabu] 'tail'
 - b. *re*i [ʁej] 'king'
 - c. *roquenrou* [ʁɔ.kẽ.ʁow] 'rock and roll'
 - d. *honra* [õ.ʁa] 'honor'
 - e. *Israel* [iz.ʁa.ɛw] 'Israel'
- (2) [r] occurs in complex onsets:
 - a. *pra*to [pra.tu] 'plate'
 - b. *abre* [a.brɨ] 'open!'
 - c. *freio* [frɛj.ju] 'brake'
- (3) [x] occurs in the coda:
 - a. *mar* [max] 'ocean'
 - b. *carta* [kax.ta] 'letter'
 - c. *circo* [six.ku] 'circus'
- (4) [r] and [x] contrast intervocalically³:
 - a. *carro* [ka.ʁu] 'car'
 - b. *caro* [ka.ru] 'dear'
 - c. *barra* [ba.ʁa] 'bar'
 - d. *barato* [ba.ra.tu] 'cheap'
- (5) Sandhi-based alternations:
 - a. *por* [pox] 'through'
 - b. *por cima* [pox.sɨ.ma] 'through above'
 - c. *por aqui* [po.ra.ki] 'through here'

² We assume that words like *honra* have an underlying nasal coda consonant that is deleted, following Mattoso Câmara (1953). This coda consonant conditions the allophony of the following postconsonantal [ʁ].

³ Fricatives are subject to intervocalic voicing in BP, hence the allophone [x] undergoes a further change to [ʁ]. Regressive voicing in consonantal sequences also yields [ʁ] in words like *turma* [tuʁ.ma] 'group'.

The literature on whether the fricatives and the rhotic are simply distinct phonemes or are allophones in (near-)complementary distribution is vast. We adopt the view, following [Mattoso Câmara \(1953\)](#), and [Abaurre and Sandalo \(2003\)](#), that all of these surface allophones reflect a single underlying phoneme, which we posit is /r/. There are thus two allophonic rules, one of Coda velarization and one of Debuccalization.⁴ The velar fricative allophone results from a rule of coda velarization. Note that a tendency for coda velarization is also responsible for turning the lateral /l/ into [w] in these same environments.

$$(6) \quad /r/ \rightarrow [x] / - \{ \#, C \}$$

Clearly, inspecting (6), the disjunctive set of environments eclipsed by word-boundary and prior to a heterosyllabic consonant represent a singular and repeating phenomenon in structural descriptions, which prompted [Kahn \(1976\)](#) to introduce the syllable Coda into phonological representations. Given CVCV theory, the representation of both word-internal and word-final Coda is a consonant that precedes an empty nucleus.

Turning to the other rhotic allophone of BP, this is the result of a process of debuccalization:

$$(7) \quad /r/ \rightarrow \text{fi} / \{ \#, C \} -$$

Again, note that here is no particular reason, looking at (7), that a word-boundary and a heterosyllabic consonant should form a natural class of environments. Scheer points out that the set of environments in which rules such as debuccalization apply is disjunctive in the standard constituency theory. Thus, in view of the obvious parallelism between the set of environments in (6) (unified as the Coda) and (7), Scheer proposes to unify the environments in (7) in terms of a position called “the Coda Mirror”. In other words, (7) can be replaced with the statement “BP rhotic debuccalization occurs in the position: Coda Mirror”.⁵

We turn to a formal explanation of the environment of the Coda Mirror in (CV)* theory.

Following [Lowenstamm \(1999\)](#), Scheer proposes that all words begin with an empty CV sequence. There are two types of languages: those in which this initial CV sequence must be

⁴ Intervocalic cases of the velar fricative in (4) are analyzed as underlying heterosyllabic geminates. The coda /r/ undergoes velarization, and the postconsonantal onset /r/ undergoes debuccalization. The resulting sequence of adjacent heterorganic fricatives [xɾi] undergoes assimilation and surfaces as [x]. Geminates are represented as surrounding an empty nucleus in CVCV theory; this is consistent with the rules developed below. Note that this would not be the only geminate in BP: if [Wetzels \(1997\)](#) is correct, the palatal nasal [ɲ] is always geminated in BP, explaining a host of stress- and epenthesis-related properties.

⁵ Joaquim Brandão de Carvalho (personal communication) reminds me that the Coda Mirror predicts an implicational relationship, whereby there will always be less or the same amount of weakening in the Coda Mirror position as in Coda or intervocalic positions, and also that the Coda Mirror should not only have the mirror-image structural description from the Coda, but a mirror-image structural change. Initial debuccalization is thus an unexpected process given this position. While I embrace the introduction of the Coda Mirror as a position to be referred to in phonological theory, I believe that the conjecture that only processes of strengthening can occur there to be too strong. In word-initial position, debuccalization is also attested in Japanese ([McCawley, 1968](#); [Ito et al., 2001](#)) and [Kuikuro \(Franchetto, 1995\)](#), in both of which (singleton) labial obstruents become [h] in word-initial position. Perhaps the strongest evidence of non-complementarity of processes in the Coda and in the Coda Mirror comes from the fact that a process of obstruent devoicing can be found in word-initial position in some languages; see, for example, [Kaye \(1979\)](#), [Iverson \(1983\)](#) on initial-devoicing in Lac Simon Algonquian.

licensed, such as English, French, and Brazilian Portuguese, and those in which it need not be licensed, such as Biblical Hebrew.⁶ In Scheer’s model, all non-final empty vowels must be in a relationship of right-to-left *Government*. Thus, both the empty vowel in an initial CV and the empty vowel between the two consonants in [simv_∅pəlv_∅] must be Governed. The relevant relationships of Government for the words [fiabo] and [izfiæw] of (1) are depicted by an arrow below. In effect, what this arrow demonstrates is the licensing of an empty category through Government.

(8) C V_∅ r a b o

(9) ... i z V_∅ r a ...

Scheer remarks that “The antipodal structural description and effect of the Coda and its Mirror now enjoy a theoretical expression since their respective phonological identities are the reverse of each other: ‘before vs. after a governed empty Nucleus” (p. 133). In this way, the inclusion of empty nuclei, and an initial empty CV unit, along with the requirement of right-to-left Government of empty nuclei, allow for a unified expression of the environments in which rhotic debuccalization occurs, namely after a governed empty vowel:

(10) r → fi / V_∅ - V

Note that an analogous concept is virtually impossible to express in traditional constituency theory. It is not enough to say that debuccalization happens in syllable-initial position, because it cannot occur in an onset position which is intervocalic. A feature such as [±postvocalic], in which [−postvocalic] environments undergo debuccalization, would not work, for the simple reason that the second member of branching onsets in (2) do not undergo debuccalization.⁷ Thus, “[−postvocalic] first member of onset” is probably the best one can do in a constituency theory in order to approximate the natural result obtained in Scheer’s model. In fact, a strong prediction emerges: languages independently concluded to lack the initial CV parameter, such as Biblical Hebrew, should have no phonological processes that occur exclusively in word-initial and postconsonantal onsets.⁸

Having presented evidence from Brazilian Portuguese for one aspect of Scheer’s model, I will turn to two aspects of the theory that are slightly problematic, or at least require further research, in light of Brazilian Portuguese phonology.

⁶ Lowenstamm correlates the setting of this parameter with proclisis behavior and morphological structure. Scheer views the parameter as whether the morphosyntactic information of initial CV is sent to phonology or not; if sent to phonology, as in Brazilian Portuguese, it must be licensed.

⁷ In Scheer’s model, the empty nucleus between two consonants of rising sonority does not need to be Governed.

⁸ Interestingly, the well-known process of spirantization in Biblical Hebrew applies exclusively in the *complement* of these environments, namely codas and intervocalic onsets. Though this may cast doubt on the classification of Biblical Hebrew as a no-initial-CV language (a position for which there may be independent motivation based on schwas in segholate clusters, according to Tobias Scheer (personal communication)), this would not necessarily constitute evidence against the more general model of parameterization of the initial CV, for which Scheer provides ample evidence. I refer to Biblical Hebrew in the text in an effort to best represent Lowenstamm’s original exposition.

3. The representation of s+ voiceless stop clusters

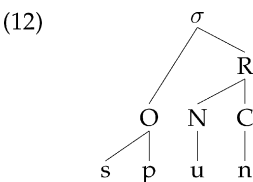
As remarked above, in clusters of rising sonority, CVCV theory proposes an empty nucleus that does not need to be governed. However, sC clusters are not of rising sonority, and thus an important question that arises in the model is whether there is a governed empty vowel between the fricative and the following stop. Recall that in our comparison of CVCV theory and syllable-constituent theory, the analogue of a governed empty vowel (GEV) is a syllable-break. Indeed, the tradition within Government Phonology, as proposed by [Kaye \(1992\)](#), is that apparent word-initial sC clusters are in fact heterosyllabic. Following this line of reasoning, Scheer remarks that “CVCV now adds there is an empty Nucleus indeed, and we do not know how it can remain empty. However, this Nucleus follows, rather than precedes the [s]” (p. 107). In other words, the representation of English *spoon* is as follows:

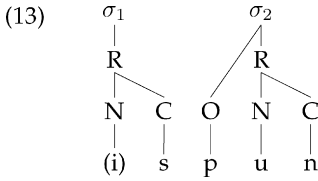
$$(11) \quad s V_{\emptyset} p u n V_{\emptyset}$$

Thus, as remarked above, GEVs correspond to syllable breaks in constituent theory, and thereby the claim would seem to be that sC clusters are universally heterosyllabic. Though the present book is not fully committed to the issue of sC-cluster syllabification, I will outline below an important distinction that could potentially be made within CVCV theory, but would represent a departure from the universal heterosyllabic status of sC clusters.

The relevant evidence comes from a comparison of the pronunciation of s+ voiceless stop words such as *spoon* by native English speakers with the pronunciation of English *spoon* by L2 speakers whose native language is Brazilian Portuguese. For speakers of Brazilian Portuguese English (BPE) who have mastered the aspiration of voiceless stops in absolute-word-initial position and in stressed syllables, it is nonetheless extremely common that Brazilian L2 speakers of English pronounce *spoon* with aspiration, as [sp^hun]. By contrast, (most) native English speakers do not pronounce this or other sC words with aspiration.

In constituent-based theory, the representation of word-initial sC clusters in English involves the [s] actually being affiliated with the syllable constituent, either directly as a complex onset, or at the level of a pre-margin syllable appendix (e.g., [Cairns and Feinstein, 1982](#)). Inhibition of the syllable-initial aspiration rule is thus achieved by the fact that the voiceless stop is not the leftmost element in the syllable. Thus, for native English speakers, the [s] and the stop are in fact tautosyllabic. By contrast, for Brazilian English, the [s] and the stop actually are heterosyllabic, in large part probably due to influence from the L1 in which a prothetic vowel [i] is obligatory. Brazilian English, by hypothesis, retains the heterosyllabic division of [s] and the stop, with optional realization of the [i]. Thus, in constituent theory, the representational contrast between native English and Brazilian English stops can be distinguished as in (12) and (13)





As a consequence of (13), the normal rule of aspiration in (word-initial or stressed) syllable-initial position applies, yielding BPE [sp^hun]. Thus, while in a certain sense, the heterosyllabic division of sC clusters adopted by Scheer and generally held within Government Phonology is empirically attested, it is but one of at least two possible syllabifications available within Universal Grammar. Thus, the existing version of the theory is too restrictive, unable to capture the difference between native and Brazilian English aspiration.⁹ However, the modification suggested above in (12) could in principle be implemented within the general representational model of complex onsets in CVCV theory (an un-Governed empty nucleus between members of the onset cluster; see footnote 7).

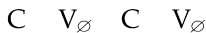
4. The distribution of epenthesis sites

The claim that there are governed empty vowels following what have traditionally been called coda consonants is particularly interesting in light of languages that display vowel/zero alternations between consonants. A great portion of the theory is devoted to epenthesis that is, by hypothesis, triggered by the nature of conditions to the right of the alternating vowel. Thus, for example, Moroccan Arabic shows the form *kātV_∅bu* ‘they wrote’ because the final vowel governs the interconsonantal GEV between **tb**, but *kV_∅tībV_∅* ‘he wrote’ when the final vowel is itself empty and thus cannot govern the interconsonantal vowel between **tb**. The ungoverned [i] in turn governs the GEV in between **kt**.¹⁰ Thus, in all cases of vowel-zero alternations between what Scheer calls RT sequences (C₁C₂ sequences for which there is no rise in sonority from C₁ to C₂), an empty vowel in between C₁ and C₂ will surface or not entirely depending on whether it is governed or not by a following vowel:

- (14) Scenario 1: Initial Empty Vowel is Governed, may be expressed as zero (i.e. phonetically null)



- (15) Scenario 2: Initial Empty Vowel is not Governed, cannot be expressed as zero



The general idea of CVCV theory, developing a research tradition initiated in [Charette \(1991\)](#), is that what is often called “epenthesis” is really just the forced realization of a vowel that is

⁹ The phenomenon of post-[s] aspiration of voiceless stops is probably not limited to L2 learners of English whose first language is Portuguese and most likely can be found with a range of speakers of native languages that disallow surface word-initial sC clusters.

¹⁰ The right-to-left governing relations that allow silencing of GEVs in *kātīb*, in which an empty final vowel induces vocalization of a vowel to its left, whose vocalization in turn inhibits vocalization of the vowel to its left, is thus reminiscent of the conditions on the vocalization of yers in Slavic, and one of Scheer’s overarching goals in the book is to generalize the treatment of Slavic yers to vowel/zero alternations more broadly.

underlyingly present and fails to be governed. This model of vowel-zero alternations in terms of lateral, internuclear relations allows for an elegant solution when it comes to vowel-zero alternations in Slavic, the distribution of schwa in French, and epenthesis in Moroccan Arabic. However, it seems to me that the focus on deriving all vowel-zero alternations in RT sequences from leftward-acting internuclear relations of government fails to express the important role of the consonant to the *left* of the alternating vowel.

Brazilian Portuguese has a number of RT sequences (in the sense of Scheer's use of the term for "non-rising sonority"), and a phenomenon that has received a great deal of study is the process of variable or optional epenthesis to break up these sequences (Cagliari, 1981; Freitas, 1992; Lee, 1992; Collischonn, 1997). Importantly, in these C_1C_2 sequences, the nature of C_1 determines whether epenthesis will happen or not: Brazilian Portuguese allows optional epenthesis of the vowel [i] in between CC sequences in which the first element is a non-sibilant obstruent, such as in (16), but never allows this epenthesis when C_1 is a sonorant or a sibilant fricative (17). Note that these are representative examples of a massively general process in the language.

- (16) Variable epenthesis when C_1 is a stop and C_2 is non-liquid¹¹ (the grapheme *j* represents the voiced fricative [ʒ]):
- a. **advogado** 'lawyer'
 - b. **absoluto** 'absolute'
 - c. **objeto** 'object'
 - d. **ritmo** 'rhythm'
 - e. **admirar** 'admire'
 - f. **compacto** 'compact'
 - g. **sintagma** 'phrase'
 - h. **afta** 'chancre'
 - i. **hipnose** 'hypnosis'
 - j. **pepsi** 'Pepsi'
 - k. **étnico** 'ethnic'
 - l. **técnico** 'coach'
 - m. **Édson** 'Edson' (name)
- (17) No variable epenthesis when C_1 is [r,s]¹²
- a. **abertura** 'aperture'
 - b. **máscara** 'mask'
 - c. **bispo** 'bishop'
 - d. **mercado** 'market'
 - e. **pasta** 'folder'
 - f. **serpente** 'serpent'
 - g. **órfão** 'orphan'

¹¹ The last three examples are of some interest because they illustrate that epenthetic vowels do not count for stress; if they did, stress would be ante-ante-penultimate, which is otherwise impossible in BP. Importantly, however, insertion of the epenthetic [i] does condition the normal process of affrication of a preceding coronal stop, thus yielding variation between [ad.vo.ga.do] and [a.dʒi.vo.ga.do] for (16-a). The epenthetic urge with these sequences is especially well-revealed by the last example; the Brazilian soccer player Edson Arantes do Nascimento (better known as Pelé) remarks in his autobiography that his birth certificate unwittingly records his name as *Edison*.

¹² There are a host of additional examples with the postnuclear glides [j,w], which are not necessary to make the point here. Note also that clusters such as *tl-* behave like other stop-liquid clusters, and hence epenthesis is also impossible in words such as *atlântico* 'atlantic'.

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