Phonological markedness, acquisition and language pathology: what is left of the Jakobsonian legacy?

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ABSTRACT

This chapter looks at some of the phonological theses put forward by Roman Jakobson (1941/1968) concerning language acquisition and language impairment. We argue, with special reference to the French language and on the basis of aphasiological data, that the notion of markedness, which played a central role in Jakobson's work, is still relevant. If built into our representational machinery, markedness can provide an insightful account of the development of phonology and its destructuring and restructuring in various types of aphasia.

Keywords: phonology, acquisition, aphasia, Broca, Wernicke, conduction, markedness, distinctive feature, binary features, single-valued features, elements, dependency phonology, government phonology, syllable, syllabic constituent

INTRODUCTION

Roman Jakobson's work has been extensively discussed in the literature for its attempt to apply key concepts of structural linguistics, and particularly the notion of markedness, to the study of language acquisition and language impairment. Jakobson (1941/1968) put forward the thesis that the distinctive sounds of a language (i.e., phonemes) are acquired in an order that reflects their structural complexity, in terms of feature composition and basic syllabic structure, and lost in the reverse order in certain types of aphasia. Moreover, he claimed that the complexity of segments that can be laid bare in the development and loss of language corresponds to universal or near-universal laws that govern the sound systems of the world. We argue, with special reference to French and on the basis of aphasiological data collected by one of us (TP), that despite criticisms of the Jakobsonian programme, the notion of markedness is still relevant and, if built into our representational machinery, can provide an insightful account of some of the attested patterns in the development of phonology or its destructuring in aphasia.[1]

JAKOBSON AND ACQUISITION

Jakobson's (1941/1968) main theses concerning the acquisition of phonology have no doubt been presented before, but need to be summarized succinctly to set the scene for our own developments and our own evaluation of his overall contribution (see, too, the reassessment in Jakobson and Waugh, 1979: 165-176).

A brief overview of Jakobson's position

The central assumption is that phonological development needs to be accounted for in linguistic

[1] We are grateful for their comments to John Anderson, Ali Tifrit, Laurie Buscail, Philip Carr, Marie-Hélène Côté, Chantal Lyche, Sylvain Navarro, Cécile Viollain and Sophie Wauquier-Gravelines, as well as two anonymous reviewers. They are not responsible for any remaining errors or debatable theses defended here. We also wish to acknowledge the generous help and advice given to us over the years by Jean-Luc Nespoulous.

terms, as it is not simply derivable from physical, perceptual or conceptual limitations in children. The first stage is one of babbling, during which a vast gamut of sounds is produced, often unrelated to the ambient language (e.g., clicks or obstruent liquids for a French learner). This can be seen as a preliminary tuning up of the articulatory system. A major discontinuous change then occurs, during which sounds are put to the service of meaning, thus allowing for the emergence of distinctive oppositions between words. Jakobson claimed that 'the relative chronological order of development remains everywhere and at all times the same' (1968: 46), although the pace of development was acknowledged to vary tremendously across children. For instance, at a given stage of development, 'the Swedish child says *tata* for "kaka", the German child *topf* for "kopf", the English child *tut* for "cut", and the Japanese child also changes /k/ to /t/ (*ibid*: 47)'. The point at which velar plosives are acquired may vary enormously between children, but it seems a universal fact that velar stops appear after dental ones (hereafter *coronals*, since *dental* appears to be used by Jakobson as an umbrella term for sounds that can equally well be alveolar).

In this scenario, all children start with the combination of an open or low vowel of the [a] type and a single consonant that is a forward articulated stop, usually a labial ([p]). This CV structure constitutes the basic syllabic template on which more complicated sequences will be based. Thereafter, the initial stop is split into orals versus nasals (/p/ vs. /m/), followed by the opposition between labials and coronals (/p/ vs. /t/). Cross-cutting the acquisition of consonant manner and place of articulation, one needs to consider voicing (leaving aside the question of tenseness). Basically, voiceless obstruents are acquired before voiced ones, but the child may well vacillate between voiceless and voiced realizations according to the context. As far as vowels are concerned, the single initial vowel /a/ gives rise to an initial split between a low (/a/) vowel and a high one (/i/), creating the opposition between compact and diffuse vowels, to use Jakobson's terms. This opposition can lead to a linear system with three degrees of vowel height, but in most cases it gives rise to systems based on the vocalic triangle /i, a, u/. In the beginning, as Jakobson stresses, the

child possesses ‘only those sounds which are common to all the languages of the world, while those phonemes which distinguish the mother tongue from the other languages of the world appear only later’ (1968: 50).

A further thesis defended by Jakobson is that identical laws operate in the phonological development of child language and in the synchronic structure of the world’s languages. Thus, the acquisition of fricatives presupposes the acquisition of stops, in the same way as, in the languages of the world, the former cannot exist without the latter. Equally, the class of liquids is claimed to be acquired after obstruents, reflecting its typological distribution. Furthermore, ‘[t]he currency of a single liquid among the sense-discriminative elements in the word’s languages [...] is paralleled by the fact that, as has been observed repeatedly, in the experience of children the second liquid, usually some kind of “r” sound, belongs to their last acquisitions’ (Jakobson and Waugh 1979: 161). Finally, and this is the topic of the section on speech pathology from a phonological perspective, the implicational laws that unite language acquisition and typology find confirmation in the study of aphasia, which is claimed to provide a mirror image of the developmental sequence of language acquisition. Thus, the sounds that are acquired last, because of their inherent complexity, their markedness (see ‘Distinctive features and markedness section’) are affected first.

Evaluating Jakobson’s claims regarding acquisition

Jakobson’s position is usually acknowledged as having given a major impetus to the study of phonological acquisition by children. Over the years, however, a number of corrections or objections have been formulated. First of all, the discontinuity hypothesis at the core of Jakobson’s account, which flags first a babbling stage, then an initial stage divorced from the ultimate system, has been found wanting, and babbling itself is generally split into two stages (e.g., Vihman 1985, forthcoming; Fikkert 2007). We now know that the foetus is already an active perceiver of sounds

(particularly the mother's productions) and that babbling is not limited to a tuning up of the vocal system, but is already shaped by the ambient language (e.g., Boysson-Bardies 1996). Second, while Jakobson's hypothesis on the relevance of features drew support from the idea that our speech abilities are in some sense special and innate, in that they are based on uniquely human mechanisms for production and/or perception, there is now a substantial body of work questioning this assumption. Thus, Chomsky himself in collaboration with other researchers (see Hauser and others 2002: 1574) argue that there appears to be a stronger continuity between animals and humans with respect to speech than previously believed. For them, 'the continuity hypothesis thus deserves the status of a null hypothesis'. In our opinion, though, this does not necessarily challenge the postulation of a universal network of distinctive features (or *elements*, as we refer to them below). Third, it has been argued that the order of acquisition of sounds by children does not necessarily match the Jakobsonian scenarios, and that children may work in a very different way, starting out by producing sounds or sound sequences that would be classified as complex in Jakobsonian terms, then using these as a template for generating other sounds or sound sequences. Along with this idea, the role of frequency and usage is often cited in support of the idea that statistical regularities in the input are far more relevant than the feature classifications proposed in the Jakobsonian tradition (e.g. Beckman et al. 2003; Carr 2004; Vihman 1993, forthcoming).

A proper review of the literature is far beyond the scope of this chapter. On the question of variability, Jakobson and Waugh (1979) agree that a detailed analysis of the idiosyncratic paths that particular children follow to learn their language is essential but, as they point out, such variation need not be incompatible with overall patterns of invariance and, indeed, successive expansions of the domain of invariance 'can reduce the dominion of variance to tractable proportions' (ibid: 158). They also point out that 'even where the claims of universality appear to be overstated and the alleged universality is demoted to the status of a near-universal, the importance of rules with probability near 1.0 remains highly relevant to the question of general linguistic laws' (ibid: 157)'.

As far as French is concerned, we note with interest that a body of fairly recent work on the emergence of phonology has yielded results which that are, by and large, in agreement with a number of Jakobsonian predictions (cf., Demuth and Kehoe 2006; Demuth and McCullough 2009; Rose and Wauquier-Gravelines 2007; Yamaguchi 2012). Thus, Rose and Wauquier-Gravelines (2007: 374) show that, in French, plosives are acquired before fricatives and nasals, which in turn precede the stable use of liquids. Voiceless plosives are also acquired before voiced ones, a pattern that has often been observed across languages of the world and which is also characteristic of many aphasic participants (especially those suffering from Broca's aphasia). As far as the liquids are concerned, Rose and Wauquier-Gravelines (2007), Dos Santos (2007), Kehoe and others (2008) and Yamaguchi (2012) all agree that in the acquisition of the French phonology, a single liquid is initially present, and of the two liquids, /ʁ/ is acquired later than /l/. Other authors, such as Vihman (1993) and Beckman and others (2003), report results for English that contradict Jakobson's claims and emphasize the role of frequency and usage. While some of their examples are persuasive, it can be argued that in French, the later acquisition of /ʁ/ in relation to /l/, for example, cannot be due to frequency, given that /ʁ/ is more frequent than /l/. Assuming, however, that such observations are correct (and they are reinforced by our observations on aphasia in the section on speech pathology), we believe it is interesting to examine what phonology can tell us about the complexity of certain sounds, that is, their markedness in terms of feature composition.

Distinctive features and markedness

As is well known, Jakobson, in the wake of Trubetzkoy (1939), played a major role in placing distinctiveness and the reduction of redundancies at the core of phonology and in putting forward a universal set of distinctive features that are part of our cognitive make-up. We believe that he was correct in doing so, and while some research has questioned this assumption, it is not clear to us how one can really proceed if distinctiveness is to fall by the wayside. We note that some of the

research in question is often ambiguous, sometimes acknowledging distinctiveness and other times not (see Anderson 2011: 78). We will assume here that phonological systems make crucial use of distinctive features, and adopt the term *elements* to separate our own approach from the Jakobsonian tradition.

Jakobson's work is associated with the idea that, as far as phonology is concerned, distinctive features are binary - a hypothesis articulated in depth in Jakobson and others (1952) and taken further by Chomsky and Halle (1968). Carrying on where Trubetzkoy left off, Jakobson also stressed the importance of markedness, the idea that within the values of a feature, one of the poles is, so to speak, more basic and less complex than the other. Thus, we know from the study of vowel systems throughout the world that nasal vowels are rarer than oral vowels, that the presence of nasal vowels within a system presupposes that of oral vowels, and that the set of nasal vowels is never larger than the set of oral vowels. From an acoustic standpoint, nasal vowels are indeed more complex than oral vowels, since they involve a supplementary resonator (the nasal cavity), and experimental work has often acknowledged the complexity of the acoustic signature of nasality in vowels.[2] The + value for the [nasal] attribute can therefore be regarded as marked. It should, however, be noted that the binary hypothesis as defended in the Jakobsonian tradition does not directly reflect markedness. For instance, the [±strident] feature could just as well be expressed as [±mellow] (i.e., its opposite), without any consequences for the formulation of phonological generalizations. In what follows, we make a different assumption.

We consider here that phonological *elements* are single valued, or unary, and that this gives us a direct measure of complexity.[3] The more elements a sound possesses the more complex it is. Thus, using Jakobsonian features for the moment, a system containing three oral vowels /i a u/ would (as a

[2] For a thorough discussion and references, see Delvaux (2003).

[3] The two authors of this article work within different frameworks, and so have tried to converge on minimal assumptions. One of us (JD) espouses Dependency Phonology (Anderson 2010; Anderson and Ewen 1987; Anderson and Jones 1974), the other (TP) Government Phonology (Backley 2011; Kaye and others 1985; Scheer, 2004).

very first approximation) entail simple characterizations as follows: /i/ = {diffuse} (= high), /u/ = {flat} (= round) and /a/ = {compact} (= low). These three vowels would have the same degree of complexity (i.e., 1). By contrast, if these vowels had nasal counterparts, the latter would come out as more complex, as they would include the |nasal| element,[4] as with, /ã/ = {compact, nasal} (where the elements are not ordered and are, in fact, simultaneous, as in a traditional feature matrix). A simple formal consequence of considering that a segment is a set of elements is the possibility of having an empty set (i.e., a segment that is empty either for all elements or else for a particular subbundle of elements). For example, if /a/ were taken as unmarked in relation to /i/ and /u/, it could be treated as containing no element { }. We will set this possibility aside for the time being, so as not to complicate matters, but return to the idea of underspecification or nonspecification later on. The main point at this stage is to realize that, while Jakobson stressed the role of markedness, the notational apparatus he used did not reflect this. Markedness constitutes a dimension that is external to formalization, an approach that also characterizes Chomsky and Halle's *The Sound Pattern of English* (1968) and many of its descendants.

SPEECH PATHOLOGY FROM A PHONOLOGICAL PERSPECTIVE

Relatively few studies have been specifically devoted to the phonology of aphasias, particularly as far as French is concerned. Nevertheless, a number of aphasiology specialists have acknowledged the existence of strategies favouring simplification within certain types of aphasia (e.g., Béland 1985; Béland and Valdois 1989; Moreau 1993; Nespoulous 1998; Valdois 1987; among others). As in the ideal Jakobsonian scenario, the literature presents cases that seem to be the mirror image of the order attested in acquisition. One well known example is that of patients with Broca's aphasia, who produce, voiceless instead of voiced obstruents (e.g., *brosse* (brush) /bʁɔs/ → /pʁɔs/).[5] We have

[4] To distinguish *elements* from classic binary features, we place them between vertical bars whenever we refer to them individually. Elements characterizing a segment are given a set-theoretic interpretation and are listed within curly brackets.

[5] See Nespoulous et al. (2013) for a recent reexamination of voicing from a phonological and phonetic point of view with participants suffering from left anterior brain damage presenting clinical profiles of Broca's aphasia and/or

already noted that for obstruents in the initial or final position, voicelessness is the unmarked value. Such substitutions may be the result of phonetic disorders arising from motor impairments (more or less pronounced, according to the type of patient), but can still reflect a clear systematicity. We note in passing that, even if participants with Broca's aphasia exhibit deficiencies of an articulatory nature, this does not mean that they do not also suffer from phonological deficiencies. Thus, Prince (2011) provides as a very concrete example the substitution of /t/ for /k/ in words such as *crocodile* (crocodile): /kʁokodil/ → /tʁotodil/, *crapaud* (toad): /kʁapo/ → /tʁapo/ and *casquette* (cap): /kaskɛt/ → /tastɛt/, among many others. We discuss this preference for coronal segment over the velar place of articulation below.

It should, however, be stressed that not all types of aphasia exhibit transformations in the direction of less marked structures. On the contrary, there are examples where the data reveal multiple transformations that appear at first sight quite *chaotic*, although deeper explanations may well exist. Thus, the range of allophones for what is a phoneme in the ambient language may go well beyond what is normally attested (e.g., /k/ realized as [t], [k], [p], [ɡ] or even as a fricative), what is a single sound in the unimpaired language may result in clusters, and there may well be insertions that once again depart from *normal* usage (e.g,. Béland and Valdois 1989). These questions demand that we go beyond purely segmental phonology, since as Moreau (1993: 62) reminds us, 'A repair can account for a less complex structure locally, but may well engender a greater degree of complexity for the word as a whole' (our translation). This is the perspective we adopt to understand some of the mechanisms involved in aphasic productions.

One important question in aphasiology relates to the nature of transformations across different types of aphasia. For instance, there is an ongoing debate as to whether fluent and dysfluent aphasias lead to the same processes of transformation. Nespoulous (2006) and Nespoulous and others (1987)

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anarthria.

reach the conclusion that the transformations do indeed differ from one type of aphasia to another, especially as far as Broca's aphasia and conduction aphasia are concerned: the first is characterized by a phonetic deficit, and the second by a phonemic deficit. However, this result is true only of substitutions, and other types of transformation still need investigating. By contrast, Valdois' thesis (1987) was specifically concerned with insertions and deletions, and argued that the transformations due to aphasia do not differ from one type of impairment to another. Of course, some participants with aphasia exhibit different strategies, but the same phonological processes and constraints are involved. The only strategy that differentiates between them is the use of metathesis, which Valdois claims to be characteristic only of conduction aphasia.

As far as segmental transformations are concerned, Béland and Favreau (1991) conclude on the basis of a study of 29 participants with aphasia (7 Broca's, 10 Wernicke's, 6 conduction, and 6 mixed) that labials are replaced by coronals in 56.25 per cent of cases, and the same type of substitution also applies to velar sounds. (Coronals themselves are replaced in 50 per cent of cases by other coronals). Nespoulous and others (1987) also point out that coronality is maximally used in substitutions. However, Béland and Favreau (1991) go further: while they confirm that coronals are the default substitute for other sounds, they also note that they are the least resistant in the initial and intervocalic positions, in that they are often deleted, they are the only segments to be clearly transparent in processes of vocalic harmony, and lastly they are the most frequent epenthetic consonants (Béland and Favreau 1991: 213). We explore below one solution that consists in treating them as empty elements in terms of place features. In the ensuing section ('Beyond segments'), we stress the need to go beyond purely segmental phonology.

The special status of coronals

Ongoing collaborative work by one of the authors of this paper has confirmed the special status of

coronals (cf., Prince and Tifrit 2012, 2013). The first study was based on a sample of 15 participants with aphasia (6 Broca's, 7 Wernicke's, 2 conduction aphasia). These were recorded from Day 1 to Day 15 at the stroke unit of Nantes University Hospital (CHU).[6] All these participants had aphasia caused by lesions resulting from brain damage. An experimental protocol composed of 40 items with clusters was tested using a naming and repetition task. Data revealed that substitutions followed a variety of routes, with some appearing quite chaotic at first sight (see Table 1):

Substitutions affecting place of articulation

	Labial	**Velar**	**Coronal**
Source	P[7]	K	T
Lab.	serpent (snake): /sɛʁ**p**ɑ̃/ [sɛʁ**m**ɑ̃] barbe (beard): /baʁ**b**/ [baʁ**p**]	aspirateur (vacuum): /as**p**iʁatœʁ/ [as**k**yʁa] brosse (brush): /**b**ʁɔs/ [**g**ʁɔʃ]	aspirateur (vacuum): /as**p**iʁatœʁ/ [as**t**iʁatœʁ] moustique (mosquito): /**m**ustik/ [**b**ustik]
Cor.	tortue (tortoise): /tɔʁ**t**y/ [tɔʁ**p**] corde (rope): /kɔʁ**d**/ [ʃɔ**p**]	pastèque (watermelon): /pas**t**ɛk/ [pas**k**ɛl] dromadaire (dromedary): /**d**ʁomadɛʁ/ [**g**ʁomadɛʁ]	tortue (tortoise): /tɔʁ**t**y/ [tɔʁ**d**y] ordinateur (computer): /ɔʁ**d**inatœʁ/ [ɔʁ**n**inatœʁ]
Vel.	crocodile (crocodile): /**k**ʁokodil/ [**p**okʁodil] *grenouille* (frog): /**g**ʁœnuj/ [**b**ʁœnuj]	orque (orc): /ɔʁ**k**/ [ɔʁ**ʃ**] grenouille (frog): /**g**ʁœnuj/ [**k**ʁœnuj]	cartable (satchel): /**k**aʁtablə/ [**t**aʁtablə] escargot (snail): /ɛskaʁ**g**o/ [ɛskaʁ**d**o]

Table 1. Some examples of substitutions in participants with aphasia

On closer examination, it turns out that the substitutions followed an organized pattern, which is explored in terms of frequency below. Most of the time, a member of the velar class K was substituted by a member of the coronal class T, as in (1), where we first give the expected pronunciation.

(1) casquette (cap): /kaskɛt/ → [taspɛt], [tastɛt]

crapaud (toad): /kʁapo/ → [tʁapo]

[6] Day 1 = one day after the stroke, Day 2 = two days after the stroke, and so on.

[7] The capital letters P, T and K that we use here and below refer not to archiphonemes but to the classes of labial plosives (/p, b/), velar plosives (/k, **g**/) and coronal plosives (/t, d/).

coccinelle (ladybird): /kɔksinɛl/ → [tɔtsinɛl]

concombre (cucumber): /kɔ̃kɔ̃bʁə/ → [tɔ̃tɔ̃b]

Equally, a member of the labial class P tended to be substituted by a member of the coronal class T:

(2) aspirateur (vacuum cleaner): /aspiʁatœʁ/ → [tastiʁatœʁ]

crapaud (toad): /kʁapo/ → [tʁato]

serpillière (floor cloth): /sɛʁpijɛʁ/ → [tɛʁtijɛʁ]

harpe (harp): /aʁp/ → [aʁt]

Finally, a coronal T tended to become another coronal or else disappear:

(3) casquette (cap): /kaskɛt/ → [kaskɛs]

moustique (mosquito): /mustik/ → [musik], [mosi]

stylo (pen): /stilo/ → [silo]

This initial research was followed by an expanded study for which we provide additional frequency results. Prince and Tifrit (2013) studied 26 participants with aphasia, 20 of whom were once again recorded between Days 1-15 at the stroke unit of the Nantes CHU (8 Broca's including 3 in speech therapy, 10 Wernicke's including 2 in speech therapy, 5 conduction including 1 in speech therapy, 2 transcortical and 1crossed aphasia). We extracted 292 cases instances of coronal substitutions. As in our earlier study, the data summarized in Table 2 below reflect the general trends exemplified in (1) to (3) above:

Substitutions affecting place of articulation

Source	[labial] *obs*	[labial] *exp*	[velar] *obs*	[velar] *exp*	[coronal] *obs*	[coronal] *exp*	*Total*
[coronal]	9 (3.08%)	**12 (4.14%)**	**33 (11.30%)**	15 (5.04%)	44 (15.07%)	**59 (20.27%)**	86 (29.45%)
[labial]	**18 (6.16%)**	11 (3.70%)	7 (2.40%)	**13 (4.52%)**	52 (17.81%)	**53 (18.15%)**	77 (26.37%)
[velar]	14 (4.79%)	**18 (6.20%)**	10 (3.42%)	**22 (7.56%)**	**105 (35.96%)**	89 (30.41%)	129 (44.18%)
Total	41 (14.04%)	41 (14.04%)	50 (17.12%)	50 (17.12%)	**201 (68.84%)**	201 (68.84%)	292 (100.00%)

Table 2. Patterns of plosive substitution[8]

Chi-square test: $\chi 2 = 45.568$, $df = 4$, p-value < 0.01

Table 2 shows both the number of plosive substitutions for each source class and their frequency, expressed as a percentage (in brackets). Overall, labial sounds were substituted in 26.37 per cent of cases, coronals in 29.45 per cent and velars in 44.18 per cent. Velars were the most susceptible to change. This table also indicates that the coronal place of articulation (201 occurrences) was the most frequent result of a transformation, contrasting with just 41 occurrences for the labial place and 50 for the velar place. In Table 3, we present the rate of substitutions (expressed as a percentage) for each class out of the total number of substitutions for the relevant class (e.g., [coronal] > [labial] / total substitutions [coronal]).

Substitutions affecting place of articulation

Source	Labial P	Velar K	Coronal T	*total*
[coronal]	9 (10.47%)	33 (38.37%)	44 (51.16%)	86 (29.45%)
[labial]	18 (23.38%)	7 (9.09%)	52 (67.53%)	77 (26.37%)
[velar]	14 (10.85%)	10 (7.75%)	105 (81.40%)	**129 (44.18%)**
total	41 (14.04%)	50 (17.12%)	**201 (68.84%)**	292 (100%)

Table 3. Within-category patterns of substitution

Looking at all the within-category substitutions, we can see that the coronal place of articulation was the preferred target of a substitution even for the coronals themselves (51.16 per cent versus 10.47 per cent of labial substitutions and 38.37 per cent of velar substitutions). The above observations confirm the Jakobsonian prediction that velars are the most affected sound class (44.18 per cent), mostly by coronals (81.40 per cent,). Coronals constitute the major target of substitution

[8] In this table, 'obs' refers to our observations (i.e., our data) and 'exp' refers to the statistically expected substitutions.

(68.84 per cent), while labials are in between coronals and velars. Why should this be? What might be special about coronals from a phonological point of view?

One avenue that we wish to explore briefly is the use of single-valued features, or *elements* as we have called them above, investigating the possibility that some segments are underspecified or unspecified.[9] Thus, let us assume (along with research within the unary frameworks cited in Footnote 3) that all the plosives we have examined in this chapter have a feature specifying that they involve a closure of the articulators. Let us represent this feature by a single symbol, in this case [ʔ]. Now, let us further assume that the labials /p/ and /b/, the coronals /t/ and /d/, and the velars /k/ and /g/ are analyzed as in (4), summarized with the class labels in (4'), which we remind the reader are not archiphonemes here:

(4)	/p/ {ʔ,u}	/t/ = {ʔ,l}	/k/ = {ʔ,l,u}
	/b/ = {ʔ,u,v}	/d/ = {ʔ,l,v}	/g/ = {ʔ,l,u,v}
(4')	**P** = {ʔ,u}	**T** = {ʔ,l}	**K** = {ʔ,l,u}

In these representations, apart from |ʔ| which has already been defined, |u| is a feature corresponding closely to Jakobson's feature [grave], |v| stands for voice and |l| represents linguality, that is, the involvement of the body or blade/tip of the tongue (see Lass 1984: 285; Anderson and Ewen 1987). As the representations stand, the first result is that the K class comes out as more complex than the P and T classes. If the partial destructuring in aphasia reflected complexity, then we would expect the more complex class K to be affected before its two congeners. Furthermore, although we have repeatedly observed that the T class is special in that it is the main target of substitution, our representation in (4) ranks P and T as equal in terms of complexity. Moreover, other studies of

[9] Concerning the elements used here, we refer the reader to Footnote 3 above. For the postulation of underspecified or unspecified segments within a framework, see, for example, Anderson and Durand (1988) on Nez Perce and Durand (1988) on southern French.

French-speaking participants with aphasia have argued that the T class proves transparent to harmonic processes. T therefore behaves as though it had no articulatory content. Independently of these observations, if we look at the representations in (4), we can see that they do not maximize contrastivity. That is, not all the elements mentioned are needed to separate the P, T and K classes. Jakobson always made the important point that distinctive features are inherently relational. They do not label phonetic classes independently of the language one is dealing with. Applying this idea to the categories in (4), we now formulate them as in (5) and (5'), where the coronals have no place features.[10]

(5)	/p/ = {ʔ,u}	/t/ = {ʔ}	/k/ = {ʔ,l,u}
	/b/ = {ʔ,u,v}	/d/ = {ʔ,v}	/g/ = {ʔ,l,u,v}
(5')	**P** = {ʔ,u}	**T** = {ʔ}	**K** = {ʔ,l,u}

The idea of underspecifying phonemes is by no means new. It has been articulated in various frameworks, and coronals, as we saw in connection with the work of Béland and Favreau (1991), have indeed been argued by many specialists to be the most unmarked of the consonantal segments[11] (e.g., Paradis and Prunet 1991, Rice 2009).We submit that theories of elements provide a natural way of expressing this. It should be observed that, on totally independent grounds, Durand (1988), in his analysis of nasality phenomena in Midi French, argued that the coronal /n/ was unspecified for articulatory features (in relation to /m/ and /ɲ/), and provided a full analysis in terms of single-valued elements.

Beyond segments

[10] One of our readers correctly points out that nothing then would separate a /t/ from a glottal stop. A proper debate on this issue would require an examination of phonation features in opposition to place features, and would go beyond the scope of this chapter. In any case, it should be noted that the glottal stop does not belong to the inventory of contrastive phonological segments in French, which are the subject under discussion here.

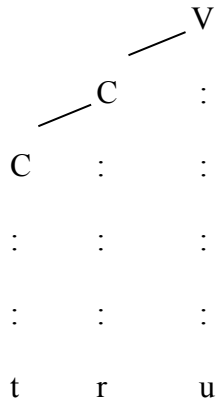
[11] See, in particular, Lahiri and Reetz (2010: 47) for a recent discussion of this question from a processing point of view.

One of the possible criticisms that can be levelled at Jakobson's work is its over-emphasis on phonemic units and the lack of a deeper reflection on units larger than segments and *prosodic* phenomena in general (the prosodic hierarchy from the syllable upwards, the role of stress, tone, intonation, as well as harmonic processes). In this paper, we examine just one of these issues, namely the need for a theory of syllabic constituents if one wants to deal appropriately with a number of phenomena linked to aphasia. Despite the impetus given by Blumstein and others (1977), there are still comparatively few essays on the relevance and structure of syllabic constituents for the analysis of data from different types of aphasia. Nevertheless, contributions by authors such as Béland (1985), Valdois (1987), Béland and Valdois (1989) and Nespoulous and Moreau (1997) seem to converge on the idea that paraphasias are governed by different phonological processes, and that epentheses and syncopes can often be seen as repair strategies helping participants to cope with structures that are proving *costly* at a given stage. In particular, patients are often observed to find syllabic clusters problematic, but more attention needs to be paid to the solutions they find as the simplifications can vary in nature. For example, setting epentheses aside, initial CCV clusters are regularly simplified to CV clusters. Moreover, when in an initial CC cluster is made up of Obstruent + Liquid (e.g., (e.g. /pʁ-/, /tʁ-/, / gl-/), it is overwhelmingly the liquid that is dropped, leaving the obstruent as the sole onset of the syllable onset. Thus, Nespoulous and Moreau (1997: 76) observed that it is always C_2 that is omitted within initial /fricative + liquid/ clusters, whereas it is C_1 with clusters of the form /s/ + obstruent. In a study examining 15 participants with aphasia (6 Broca's, 7 Wernicke's and 2 conduction aphasia), Prince (2013), found that 37.8 per cent of transformations of an OL group involved the deletion of C_2 (e.g., *prune* /pʁyn/ → [pyn]). By contrast, only 3.7 per cent involved the deletion of C_1 (e.g., [bʁɔs] → [ʁɔs]).

Branching OL onsets (e.g., /tʁu/ *trou*) are, in a sense, puzzling. If we look at them in terms of the classic sonority curve, liquids are ideally placed between the obstruent and the vowel. In fact, in the early work on dependency phonology in the 'seventies (e.g., Anderson and Jones, 1974; Durand

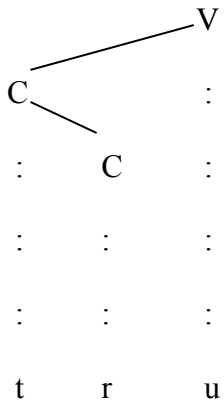
1990: 279), a syllable such as *trou* was represented as in (6):

(6) Initial dependency graph for *trou*



But then, why should the liquid be preferentially deleted? It should be noted that the dependency representation in (6) embodies the idea that the liquid is the head of the initial CC structure, in the same way as the vowel labelled V here is the head of the whole construction. If the initial plosive /t/ were deleted, it would leave behind a perfectly well formed structure. The answer is that, contrary to (6), the plosive in such structures is actually the head, and that sonority in onsets is not the determining factor. Plosives provide an ideal onset, and other members of an initial onset are subordinated to the plosive as in (7):

(7) Revised dependency graph with the obstruent as head



The structure in (7) is not put forward to deal with these data. It was independently argued for in Anderson (1986) and is related to the claim made in government phonology that within OL clusters, the obstruent is the governor and the liquid is a governed element (see Kaye and others 1985). Heads are central to a given construction and, evidently, as governors, they prove more resistant to deletions than dependents.

Let us now turn briefly to C_1C_2 onsets made up of /s/ + obstruent onsets. We pointed out earlier that Nespoulous and Moreau (1997: 76) argue that such onsets are characterized by the opposite pattern to the previous one. Thus, it is C_1 (i.e., the /s/) that is deleted - a result supported by Prince (2013) on aphasia and acquisition. Why should the target of deletion be C_1 now and not C_2? First, it should be noted that the presence of a fricative /s/ in such onsets is unusual in terms of sonority. The onsets of syllables normally respect the sonority curve (e.g., *froid* /fʁwa/), with an obstruent, a liquid and a glide preceding the vowel. Second, /s/ does not stand in opposition to other fricatives in the core vocabulary of French (no initial *#ft-, *#fk-, #ʃp-, *#ʃk, etc.). The initial /s/ in such clusters is isolated, and in terms of an approach inspired by Trubetzkoy (1939), it would actually be an archiphoneme representing the neutralization of all voiceless fricatives in that position. Various solutions have been put forward in the literature to account for the special nature of this initial /s/. Kaye (1992) treats it as, in some sense, extrametrical - part of a degenerate syllable with an empty vowel head reminding us that many words beginning with /s/ once had a vowel (e.g., *spatule* < OF *espatule* < Lat. *espat(h)ula*). Another possible solution is that, as in (7) above, the /s/ is part of the onset, but subordinate to the obstruent that is always the head of the onset (as in Anderson 1986). Do we need to stress that, once again, the patterns of deletion favour segments whose nature and position are marked in relation to the unmarked CV syllable containing an obstruent and a vowel, as in the classic Jakobsonian picture?

CONCLUSION

Our aim in this chapter has been a modest one. On the basis of observations regarding the acquisition of phonology and its destructuring and restructuring in various types of aphasia, we have tried to show that phonological representations that have been defended on independent grounds can provide an insightful understanding of the attested patterns. Jakobson's hypotheses regarding binary features and markedness constitute a good starting point, although we have argued that better accounts are possible in terms of single-valued features (*elements*) and syllable structures that encode markedness in a direct manner. Moreover, while many of the details of Jakobson's hypotheses need to be revised, the data from aphasia that we have examined appear to provide a mirror image of the acquisition phenomena reported in some of the recent literature. We can therefore claim that Jakobson gave a major impetus to research into the acquisition of language and its destructuring in aphasia, and that the theoretical landscape he provided is still worth revisiting today. We can only concur with Nespoulous and Moreau's (1997: 71) observation that 'It was indeed the merit of Roman Jakobson to draw aphasiology away from the mere surface description of symptoms and to provide the first interpretations of aphasic language disturbances in a linguistically motivated way'.

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