The Case of Segmental Complexity in Aphasia and in Acquisition of French: Evidence (or not?) for Element Theory

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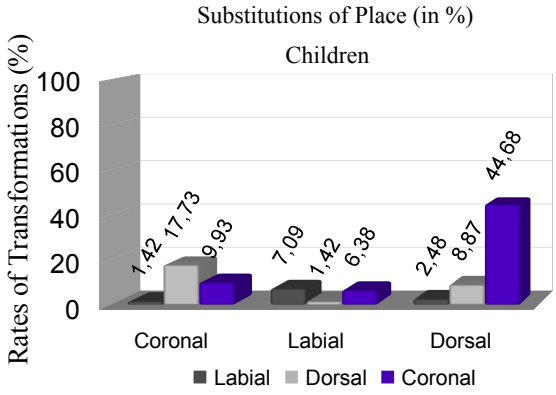
Introduction. As proposed by Jakobson (1941[1968]), we can draw a parallel between acquisition of the phonological system and language disorders in aphasia. It is the observation of this parallel between those two systems that defines and allows us to understand the notion of scale of complexity – and markedness – for the phonological system architecture. We propose to explore the processes of substitution as far as French-speaking aphasics and children are concerned. To explain these phenomena, we argue that Element Theory -ET- (Harris, 1994, Scheer:1998 and Backley:1993, 2011), as we shall see, can provide a direct measure of complexity and markedness. For these reasons, we propose that our data in aphasia and acquisition can inform us about the differing complexity patterns of Places of Articulations (PoAs) and can bring new elements to a definition of Element Theory. We propose to compare especially two models on the basis of data: Backley's (2011) and Scheer's (1998).

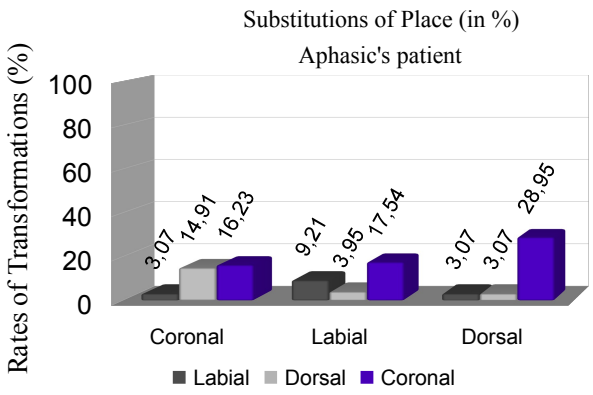
Experimental conditions. We consider the experimental results based on a sample of 20 aphasics (7 Broca, 6 Wernicke, 4 Conduction and 3 Transcortical) of the stroke unit in *Centre Hospitalier Universitaire* and 20 children between 2,1 and 3,8 years. An experimental protocol composed of 40 items was tested using a naming task and repetition task. We have extracted all substitutions cases. ***Results*** In table (1), you will find a list of some examples.

(1)

	Productions		
Target	**Labial /P/**	**Coronal /T/**	**Dorsal /K/**
Lab.	*serpent* 'snake': /sɛʁ**p**ɑ̃/ [sɛʁ**m**ɑ̃] *barbe* 'beard': /baʁ**b**/ [baʁ**p**]	*pastèque* 'watermelon': /pastɛk/ [**t**atɛk] *sport* 'sport': /spɔʁ/ [s**t**ɔʁ]	*aspirateur* 'vacuum': /as**p**iʁatœʁ/ [as**k**yʁa] *remorque* 'trailer': /ʁømɔʁk/ [mɔ̃kɔʁ]
Cor.	*corde* 'rope': /kɔʁ**d**/ [ʃɔ**p**] *tortue* 'tortoise': /tɔʁ**t**y/ [tɔʁ**p**]	*serpillière* 'mop': /sɛʁpijɛʁ/ [tɛʁpijɛʁ] *tortue* 'tortoise': /tɔʁ**t**y/ [tɔʁ**d**y]	*pastèque* 'watermelon': /pas**t**ɛk/ [pa**k**ɛk] *cartable* 'satchel': /kaʁ**t**ablə/ [kaʁ**k**wab]
Dor.	*parking 'parking' :* /paʁ**k**iŋ/ [ta**p**in] *scarabée* 'beetle': /s**k**aʁabe/ [**p**aʁape]	*cartable* 'satchel': /**k**aʁtablə/ [**t**atab] *capuche* 'hood': /**k**apyʃ/ [**t**apyʃ]	*aspirateur* 'vacuum': /aspi**ʁ**atœʁ/ [**k**atœʁ] *escargot* 'snail': /ɛs**k**aʁgo/ [ge**g**ago]

Substitutions are not random. Most of the time, children and aphasics produce more substitutions of place of articulations, but substitutions of manner are not very significant. See the following tables for percentages of PoAs substitutions.





If we consider the most substituted class among phonological disorders in aphasia, we obtain that: coronals are substituted in 34.21% and dorsals in 35.09%. coronals are the major substituents – in 62.72%. Moreover, in acquisition, dorsals are mostly substituted – 56.03%, labials are substituted in 14.89% and coronals are substituted in 29.08%. Apparently, as for aphasics, coronals are the most common substituents – 60.99% of the cases and dorsals appears more complex than others because they undergo the greatest number of transformations. In both cases, coronals are the most common substitutes whatever the nature of the consonant, which tends to support the view that *coronals* have a special status (Avery & Rice, 1989, Béland & Favreau, 1991, Scheer, 1998, Kirk, 2008, Rice, 2009, *inter alia)*. In addition, we want to discuss a strange case of substitution called: coalescence (Kirk & Demuth: 2003). In this case, both members of clusters merged into a third member, which can be considered a type of substitution. We would like to propose an explanation for these cases.

Discussion. We assume that our data will also allow us to confront the different models of ET. Backley propose that labials are more complex (where {U} is head). *Per contra*, in Scheer's model, dorsals are more complex than labials. coronals do not contain an element for melodic substance, they contain only little {v} for the rest position of the tongue.

	coronal /T/	labial /P/	dorsal /K/
Scheer (1998):	{vʔh}	{B̲ʔh}	{vUʔh}
Backley (2011):	{Iʔ}	{U̲ʔ}	{Uʔ}

Unlike Backley's representation, Scheer's model does reflect our data. However, Scheer's model does not explain why labials and coronals should have the same complexity. We propose that this complexity results from the number of elements involved **and** the nature of the specification used to define segments. We think that aphasia and acquisition inform us about the complexity scale of PoAs. Moreover, we propose an explanation for this scale of complexity.

	coronal /T	labial /P/	dorsal /K/
stops	{vʔh}	{Uʔh}	{IUʔh}

As proposed by Scheer (1998), coronals are not specified because they do not contain an element which represents this articulatory property. [coronal] class does not contain a melodic substance/element of place, so it is less complex. Moreover, this is the reason why coronals are acquired earlier by children and why they are often the target of phonological processes such as assimilation or epenthesis. For these reasons, we postulate that coronals are "unspecified" and less complex. Contrary to coronal, dorsals appear to be more marked and more specified for children and aphasics: they contain two elements of PoAs: the union of {I} and {U}. Labials are less complex than dorsals but specified, (contrary to coronals) because it includes only one element of PoA, which is {U}, for labiality/graveness, whence their relative stability in acquisition and in pathology. Substitutions are the result of adjustments and parameter-setting. The discussion of these data highlights some important aspects of the ET. This kind of analysis of data in acquisition and pathology will improve the current theoretical models based on unary elements.

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