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Address of the organizing committee:

CIL 17
Center for Computational Linguistics MFF UK
c/o Mrs Anna Kot_ovcov_
Malostransk_ n_m. 25
118 00 Prague 1
Czech Republic

e-mail: cil17@cil17.org
fax: ++420-2-2191 4304
web page: http://www.cil17.org

On the Neither-Onset-Nor-Coda status of some elements in natural languages

Paloma García-Bellido. University of Oxford[1]
paloma.garcia-bellido@mod-langs.ox.ac.uk

1. Introduction.

One basic line of research in linguistic theory has been to find the properties of minimal well formedness. The linguistic construct of Onset (O) and Coda (Co) is the cornerstone of syllable theory (Van der Hulst & Ritter 1999). It is proved here that there are phonological elements (E) which may sequence as O, Co and neither O nor Co (NONC). Since the NONC case cannot be analysed as ambisyllabicity, it must be concluded that current autosegmental theories are too weak to predict NONC. It was suggested in Garcia-Bellido (1999) that the existence of a minimal ternary sequencing is homologous to the existence of Coordination in word sequencing. Linguistic sequencing, is argued here, derives from the inestability of E as a Predicate (P) which only becomes stable when it selectively finds an argument to combine. The unstable nature of a P, or its incompleteness, is what makes stabilisation contingent since its successful completeness may depend on many other factors which are outside the specific task of a particular predicate. However the manifestation of a NONC state shows here that linguistic stabilisation does not produce two states simultaneously or at random i.e 60% one state, 40% another state. What we show here is that the possibility of forming different types of sequencing: O, Co, NONC, derives from a selective combinatorial property which appears to stabilise unstable states. Each different sequencing may correlate with the choosing of one out of many theoretically possible value resolutions of E, i.e there might be many different ways of pronouncing a rhotic. In fact, each type of sequencing: O, Co, NONC, may be used by the language in question to assign different meanings. This is the case of Spanish. NONC, under this approach then, represents only one particular case where the unstable P of E stabilises in a sequence with two arguments, one at each side in real time. We call this approach, i.e the linguistic stabilisation of unstable states via selective combinatorial mechanisms, the Selective Combinatorial Theory (SCT)[2].

2.Outline of the problem.

It is widely accepted that the two notions of O and Co, respond to the behaviour that, for instance, a consonant (C) displays in the utterance when sequenced in time with other segments. In (1-3) below, [a] [b] stand for variables which range over pronunciations; E is a Rhotic element; V is a vowel category; F is the representation of an element E in some stable state.

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[1] This paper was presented at XVII International Congress of Linguists in Prague in July 2003. I would like to thank Norval Smith and many members of the audience in Prague for their comments to this work. In particular I am grateful to Emmon Bach, Joan Mascaró and David Michaels. All mistakes are mine.

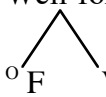
[2] The name of SCT was first used in García-Bellido (2001).

(1) Onset behaviour: (1a)

(a) If the sequence $[b]_C\,[a]_V$ is a well-formed utterance, then $[b]_C$ is an Onset $^{O}[a]_C$.

Example: The Rhotic E in the language L. L= Castilian Spanish

(b) Well-formed minimal utterance



^{O}F V "musical note"

$^{O}[r]_C$ $[e]_V$ The value of F= Trill and is well-formed pronounced utterance initially in L.

$*[ɹ]_C$ $[e]_V$ The value of F= Fricative and is not well-formed pronounced utterance initially in L.

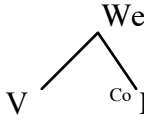
$*[ɾ]_C$ $[e]_V$ The value of F= Flap and is not well-formed pronounced utterance initially in L.

(2) Coda behaviour: (2a)

(a) If the sequence $[a]_V\,[b]_C$ is a well-formed utterance, then $[b]_C$ is a Coda $^{Co}[b]_C$

Example: The Rhotic E in L

(b) Well-formed minimal utterance



V ^{Co}F "to go"

$[i]_V$ $^{Co}[ɹ]_C$ The value of F= Fricative and is well-formed pronounced utterance finally in L.

$*[a]_V$ $[r]_C$ The value of F= trill and in not well-formed pronounced utterance finally in L.

$*[a]_V$ $[ɾ]_C$ The value of F=flap and is not well-formed pronounced utterance finally in L.

(3) NONC behaviour: (3 a,b,c)

(a) If the sequence $[b]_C\,[a]_V$ is not a well-formed utterance, then $[b]_C$ is not an Onset

(b) If the sequence $[a]_V\,[b]_C$ is not well formed utterance, then $[b]_C$ is not a Coda

(c)If both (3a) and (3b) are not well-formed utterances while at the same time the sequence $[a]_V\,[b]_C$ $[a]_V$ is a well-formed utterance, then $[b]_C$ is NONC.

Example: The Rhotic E in L

(d) Well-formed minimal utterance

V F V "altar"

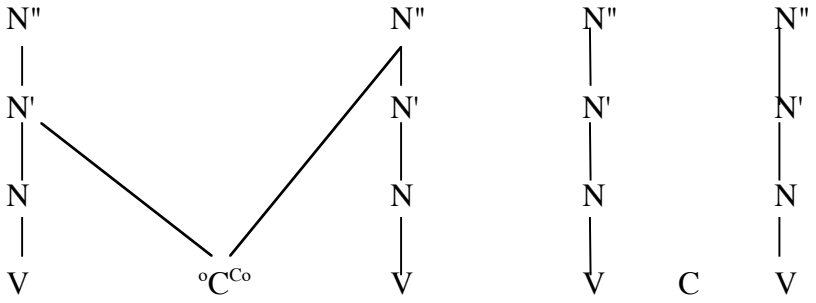
$[a]_V$ $[ɾ]_C$ $[a]_V$ The value of F=Flap and is not well-formed pronounced utterance initially or utterance finally in L.

The value of F=Flap and is well-formed pronounced neither utterance Initially nor utterance finally in L.

Under a theory which only has O and Co, there is no explanation for why E in (3d) does not sequence, when it does it intervocalically, always as [r] or [ɹ], or as both [ɹ r], or as none, or as any one of these

four possibilities at random. The fact that it behaves as NONC could be assumed to be an ambisyllabic notion (Khan 1976), i.e one segment which is simultaneously both O and Co, as (4a) represents.

(4a) (4b)



However, if this were the case, according to the Inalterability Principle (Hayes 1986, Sheine and Steriade 1966), we would expect its multiple association status to block any phonological process which mentions VC or CV. This principle predicts that C in (4a) may not be deleted, say under identity with V. Since we have empirical evidence that a NONC segment is deleted by, for instance, a Voiced Palatal Simplification process in Spanish, then we must conclude that NONC is not an ambisyllabic concept. However NONC needs to be represented in the theory. The only way the autosegmental theory may represent the NONC property is by depriving C of association lines as in (4b). Not being connected to others in a sequence, as in (4b), makes the theory of the syllable vacuous.

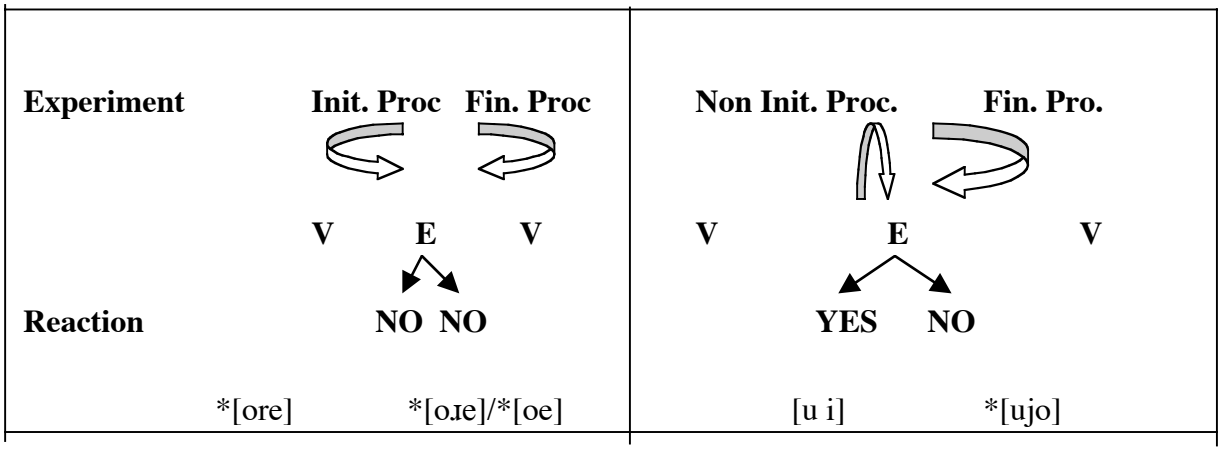
3. The method of argumentation

In order to prove the existence of NONC two different Es are taken from Spanish: the Rhotic element (R) and the Voiced-Palatal element (V-P)[3]. It can be proved that both elements stabilise with a NONC sequence. We will prove it by applying specific processes that detect only O or only Co to an intervocalic rhotic. This is shown in (5a). When the stabilisation of the Rhotic does not respond as a Co and does not react as an O, as shown in (5a), then this reaction is proof that the Rhotic is in a NONC state of stabilisation. The NONC behaviour arises differently when we test the intervocalic V-P in (5b). When we apply processes which do not affect Onsets, i.e Non-Initial processes, like Voiced Palatal Simplification, to the V-P E intervocalically, this element reacts by inhibiting its resolution, but processes which target only Codas, do not affect this intervocalic sequence. This proves that the stabilisation of this element is in a NONC state.

[3] We have to bind Voicing to Palatality in one element because in Spanish unvoiced palatality ch [cç] does not participate in VPS.

(5a) (5b)

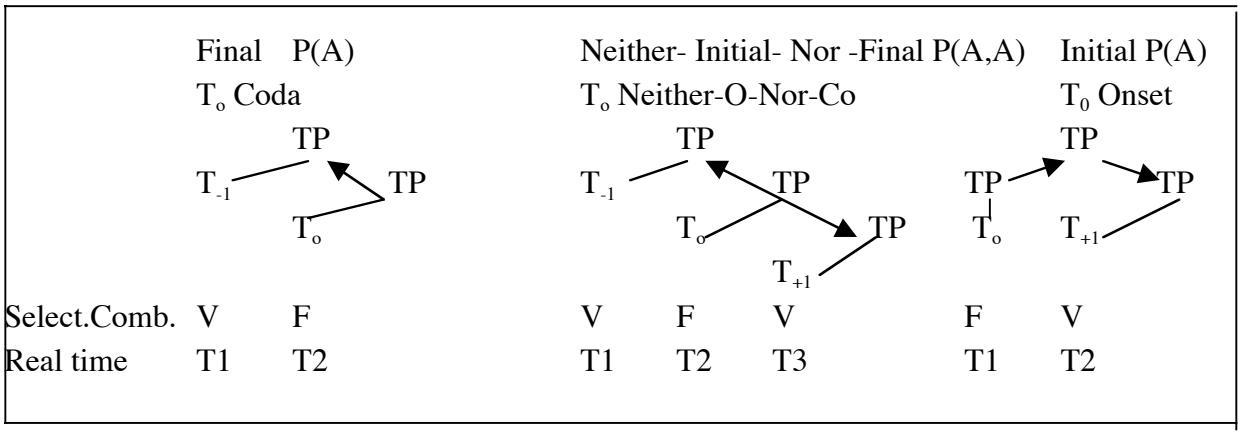
Method



4. The proposal in SCT.

We suggest here that this minimal ternary construction VCV derives from an unstable selective combinatorial property (P) associated with E. E behaves then like a searcher whose only task is trying to combine with some selected argument (A) in order to stabilise. A minimal ternary sequence therefore naturally derives here from the possibility of E to stabilise non-simultaneously not only with one Vowel argument, P(A), but with two Vowel arguments, P(A,A).[4]

(6a) Selective combinatorial non-simultaneous sequencings of P of E



[4] The idea of using a Predicate Argument categorial grammar for generating prosodic templates was taken from work done in Montague Grammar (Montague 1974). This idea can be found in Wheeler (1981) for prominance metrical stress and Garcia-Bellido (1981) for constructing different syllable templates. Here and in Garcia-Bellido 1996, 1997, 1999, 2000, 2001, 2002, 2003 a phonological element E with some phonological name: rhoticity, nasality, voiced palatality and svarabhakticity, is assumed to be responsible for stabililisng in specific minimal sequences, via epenthesis in some cases (Garcia-Bellido 2001,2002,2003), which happen to violate canonical syllable structure since they are not constructing one telic canonical template (Smith 1999, 2003).

We say P in SCT is selective because it must discriminate, say, vocoids from consonantoids. P of E in (6a) selects only Vs , a type of vocoid, as its arguments.[5] We say P in SCT is combinatorial because its basic function is to search to combine and bind with an argument. In (6a) the combination has been sequenced in a time different from the time of P, T_o . In other words, P's combination in (6) is non-simultaneous.

(6b) Sequenced resolutions of the P of E's stabilisation in an utterance.E=R.

	Final	Medial	Initial
	F= T_o = [aɪ]	F= T_o = [aɾa]	F= T_o= [ra]
Real Time	T1 T2	T1 T2 T3	T1 T2
	"military "go!"	"altar"	"congratulatory call"

In (6a) an asymmetric hierarchical representation (Kayne 1984) is used to express recursive Time (T_o) sequencing. Crucially, the formal properties of stabilisation in the Initial F in (6a) are of Adjunction: T_o does not C-command T_{+1} because the first node up that directly dominates T_o does not directly or indirectly dominate T_{+1}, while the formal properties of stabilisation in NONC in (6a) are not of Adjunction since T_o does C-Command T_{+1} because the first node up that directly dominates T_o dominates indirectly T_{+1} (Garcia-Bellido 1999, 2000). This formal difference seems to have important consequences. For instance, E=V-P stabilising as adjoined is not inhibited in presence of its following V-P argument, while E =V-P stabilising as a NONC does inhibit its resolution in presence of its following V-P argument, as we will show below. Adjunction functions as a linguistic island with respect to V-P Identity checking (García-Bellido 2000).

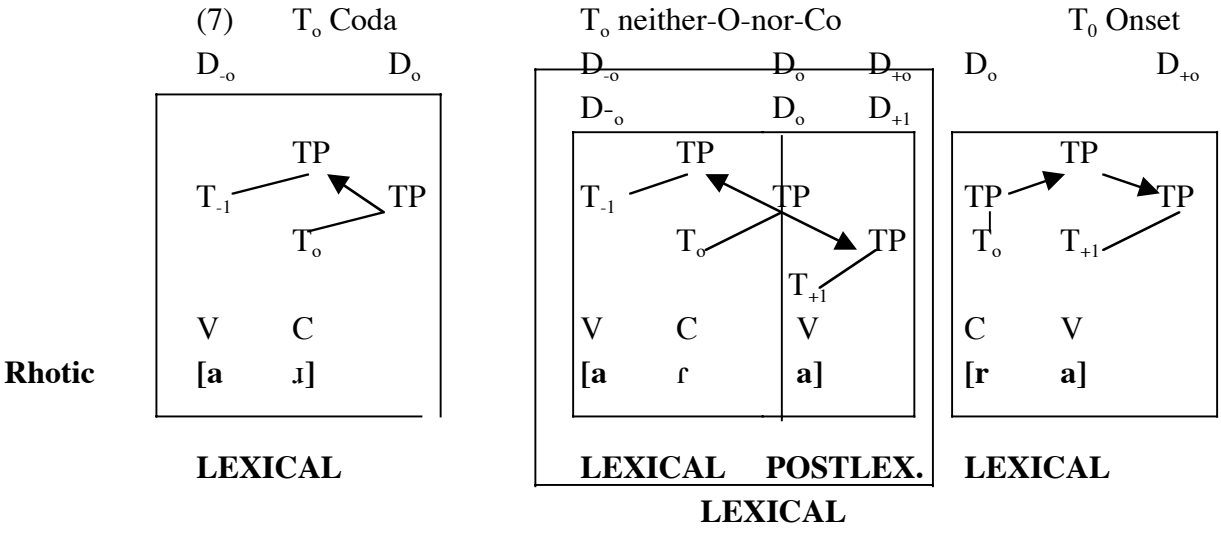
This selective combinatorial property of P of E stabilising as NONC is homologous to Coordination in the syntax of words: *John and; *and Mary while √John and Mary. Like coordination the NONC state is non-compositional since the well-formedness of the whole expression is not made out of the well-formedness of its parts (3d).

We also say in SCT that the search is selective with respect to discriminating the domain D_- or D_+ in which each of its arguments must be searched (7). Thus, the Rhotic E in Spanish, for any of its three stabilisation states, must search and combine with at least one Vocoid as argument[6]. In Spanish the stabilisation of this argument happens to need to take the form of a V which stabilises in the same domain of E's word: D_0. Suppose now that Coda and Onset processes can be Lexical and Postlexical

[5] The NONC stabilisation could be VCV: p [aɾa]do "stopped",[aɾa]te "plaugh for yourself"; vCV p[aɾa]do, "moor";VCv [aɾa]te "art", where v is a svarabhakti vocoid (Garcia-Bellido 1997, 2003); GCV a[jɾe] "air"(Garcia-Bellido 2001); VCG [aɾg]a "aria".

[6] Of course this requirement of R in SCT is not universal since in other languages, like for instance Imdlawn Tashlihiyt Berber (Dell & Elmedlaoui 1985) an element does not require to stabilise with a vocoid as its argument since an utterance may be well-formed with one Consonant, a geminate consonant or a sequence of two consonants (personal communication of Mohamed Lahrouchi. LLF, University of Paris 7).

processes (Kiparsky 1985). Following this theory, F in Co and O stabilisations in (7) are Lexical processes since both F and its argument V manifest themselves inside something we call the Lexical word. However NONC stabilisation may happen as well when its following argument is a V from the following word, here D_{+1}: as am[oɾe]terno "eternal love" shows. This sequence is made out of two meanings: "love" am[oɹ] followed by "eternal" [e]terno. In this particular NONC case, E's stabilisation with NONC is neither a Lexical process nor a Postlexical one. If the process were Lexical, F would be a Co combining only with the previous V in D_{-0} and we would expect it to be a fricative. If it were a Postlexical process, F would be an O combining only with the following V of the following word D_{+1} and we would expect F to be a trill. Since none of these outcomes is true, then we must conclude that F is neither a Lexical nor a Postlexical process. We can neither say that a NONC F is the outcome of both a Lexical and Postlexical process without making Lexical Theory to become vacuous.



Under our approach a Predicate can have a different D, D_o , than that of one or both of its arguments. For instance in (7), the right Argument in a NONC stabilisation can be a member of a different domain from that of E, D_{+1} as we have shown with am[oɾe]terno. The Coordination word in Spanish is a Voiced-Palatal Element (V-P). Its selective combinatorial property may search for an argument in the previous word D_{-1} and another argument in the following word, D_{+1}.Which type of phonological category it stabilises with, depends on what V-P finds in those words and what it can make according to the stabilisation sequences the language has chosen to stabilise theV-P element with (Garcia-Bellido 2000, see (13) below). Crucially under this approach the stabilisation on NONC F in (7) can be neither a member of D_{-0} nor a member of D_{+1}, i.e. neither Lexical nor Postlexical under Kiparsky's terms. While the element R in (7) must in Spanish must search for an argument in its own word, D_o, : Co, O, the stabilisation of R in NONC is neither a member of D- nor of D+. This shows that P's search to combine and its stabilisation F are two different mental states.

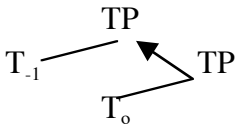
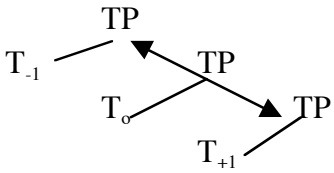
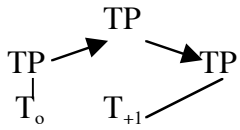
5. The Rhotic element E

(8) shows that each different type of E's sequencing has a different resolution in Castilian (Quilis 1981).

(8) Each stabilisation of P of R has a different resolution in Castilian

Onset	N-O-N-C	Coda
[r]	[ɾ]	[ɹ]
Trill	Flap	Fricative
	Medial	Final
Initial	Second	

(9) Representation of the selective combinatorial properties of P of R sequenced in time with its phonological stabilisation in Castilian.

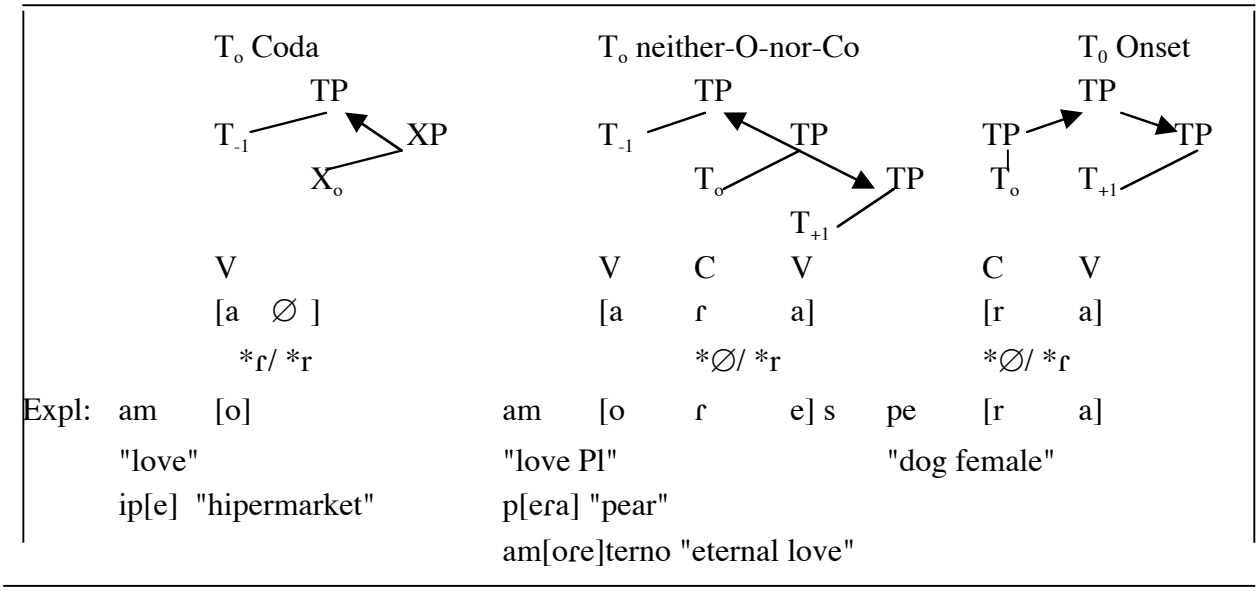
	T_o Coda	T_o neither-O-nor-Co	T_0 Onset
			
	V C	V C V	C V
	[a ɹ]	[a ɾ a]	[r a]
Cast.	*r/*ɾ	*r/*ɹ	*ɾ/ *ɹ
Expls:	am [o ɹ] "love"	am [o ɾ e] s "love Pl"	pe [r a] "dog female"
	ip[eɹ] "hipermarket"	p[eɾa] "pear"	
		am[oɾe]terno "eternal love"	

If an intervocalic stabilisation of P of R were O in "pear", we would expect its resolution to be a trill. If it were Co, we would expect its resolution to be a fricative. Since none of these resolutions is true, we must conclude that the stabilisation of P of R in "pear" and all the other cases of Flap are NONC states. Now observe the following case of many other viarieties: Andalusian variety as shown in (10) (Zamora Vicente 1985) .

(10) Each stabilisation of P of E has a different phonological resolution in Andalusian

Onset	N-O-N-C	Coda
[r]	[ɾ]	
Trill	Flap	
	Medial	Final
Initial	Second	

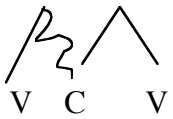
(11) Representation of the selective combinatorial properties of P of R sequenced in time with its phonological stabilisation in Andalusian



If the intervocalic stabilisation of P of R in (11) were O in "love" we would expect its resolution to be a trill. If it were Co, we would expect its resolution to be silence [∅]. Since none of these two resolutions are true: * am[or]es, *am[oe]s, we must conclude that the intervocalic stabilisation of P of R in "love" is a NONC state and that its P has a Non-Initial stabilisation (8,10) in bothe varieties.

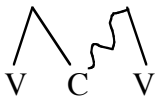
Suppose we said that the resolutions of the rhotic in the Spanish "love Pl" could be predicted using a Processing theory. Processing in twos from left to right gives us Co bracketing and processing in twos from right to left gives us O bracketing (Ito 1989). Suppose further that once we have processed in one direction we can undo the bracketing and process in the opposite direction. Changing from a Left to Right into a Right to Left is called "resyllabification" (12a) (Harris 1983). Changing from a Right to Left to a left to Right can be called "recodification" (12b). This processing/bracketing grammar is too week because it stills gives the wrong result and cannot predict the NONC resolution anyway.

(12a) All dialects:



*[r]

(12b) Castilian/Andalusian



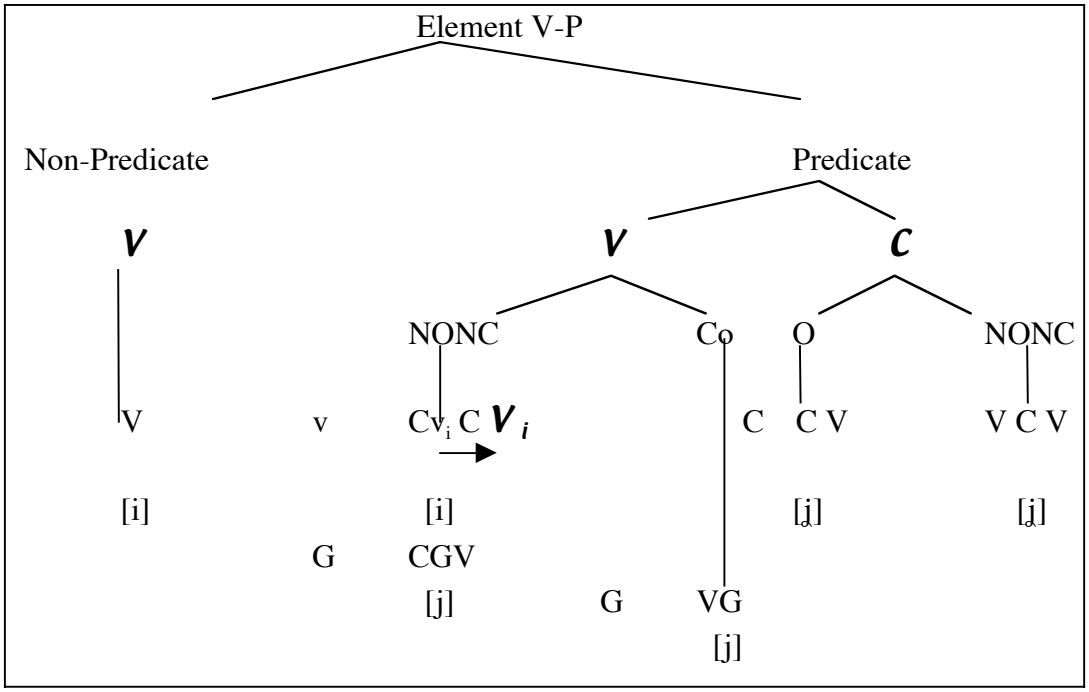
[ɹ]/[∅]

Processing

6. The V-P element E

Here we use the case of V-P as a Predicate to show that one of its stabilisations is NONC.[7] In (13) Vocoids are ***V*** and Consonantoids are ***C***. Small v represents a svarabhakti vocoid whose point of articulation depends on the following Vocoid (Garcia-Bellido 2003). Coreference is marked with **i** subscripts in (13).

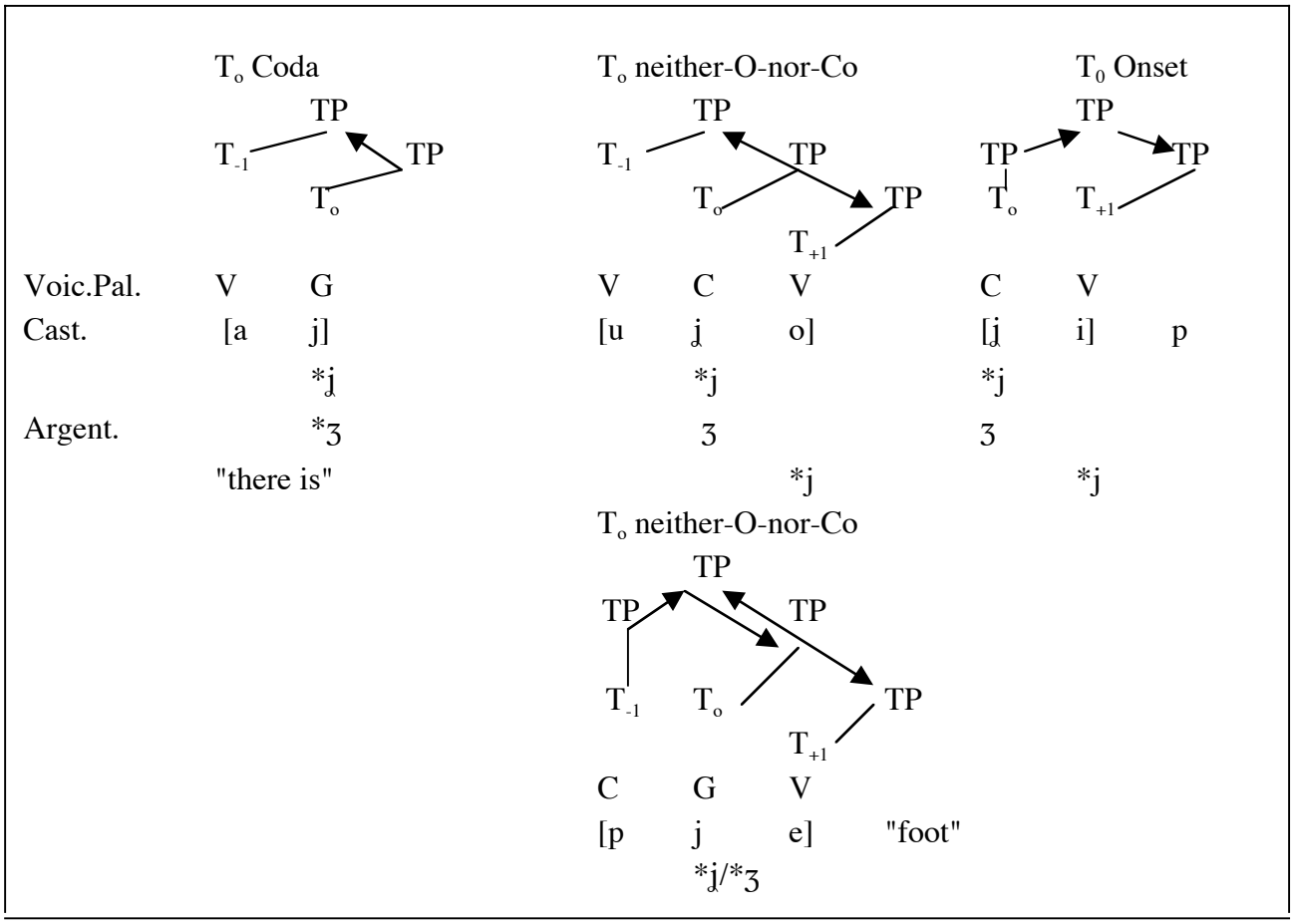
(13) Sequencings of the element V-P in Castilian Spanish



We will first show that the Predicate V-P stabilises as a Glide Vocoid but not as a V-P Consonant in a Co sequence.The evidence is clearly produced by the Argentinian Spanish dialect where a V-P Consonant is prepalatal [ʒ] (Harris & Kaisse 1999).

[7] See Garcia-Bellido (2000) for a full discussion of the behaviour of the V-P element in SCT.

(14) Representation of the selective combinatorial properties of the Predicate of V-P sequenced with its phonological stabilisation in two Spanish dialects: Castilian and Argentinian. See (16).



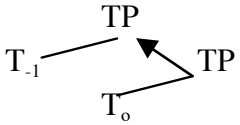
Voiced Palatal Simplification is a process which affects all V-Ps except V-P Vowels (García-Bellido 2000). Under our SCT approach the fact that V-P Vowels do not simplify derives from the fact that only Predicates check for Identity (I) of V-P and they do so stabilising in their own selective combinatorial sequencing. Some of its effects are given in (16 d,e,) below.

We know that V-P Vowels do not simplify in presence of any V-P. We also know that utterance initial stabilisation of the Predicate V-P, i.e Onset, does not simplify when followed by a V-P Vowel. Crucially the example is (15a). So, any V-P Consonant which does not simplify in presence of a V-P vowel is an Onset (15) and (16 f).

(15)	(a)	^{O}[j][i] p	*[i] p	" Jeep"
	(b)	tu ^{O} [j][i]r	*tu[i]r	"beat" Inf.
	(c)	p[i] ^{O} [j][a]r	*p[i]ar	"catch" Inf

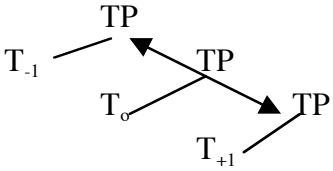
(16)Voiced Palatal stabilisation by Simplification (VPS) under Identity (I).

(a) T_o Coda



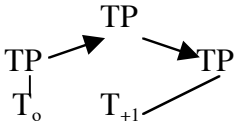
	V	**G**	
com	[e	+j]	s
Expls: "eat"	+ II Pl		
"You eat"			
	[u	j]	
	"Exclamation"		

(b) T_o neither-O-nor-Co

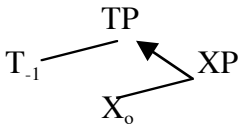


	V	**C**	**V**		
	[u	j	+ o]	t u	[j +o]
"flee"	+ I Sg			"beat"	+I Sg
"I flee"				"I beat"	
t	[u	j+	o]		
"Yours Masc" + Nom. Class.					

(c) T_0 Onset

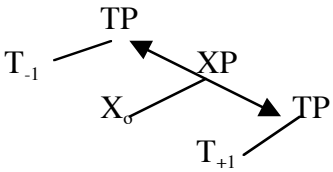


(d) T_o Coda



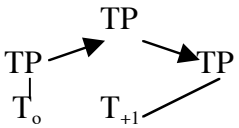
	V	G	
	I	I	
	[i	-]	
VPS	YES		
Expls part	[i	-]s	
"leave"	+II Pl		
"You leave"			

(e) T_o neither-O-nor-Co



	V	C	V		
	I	I	I		
	[i	-	i]		
	YES				
	[u	-	i]r	tu	[j i] r
'flee"	+ Inf			'beat'	+ Inf
"To flee"				"To beat"	
m	[i	-	+o]		
"mine Masc" + Nom. Class					

(f) T_0 Onset



C	V	
I	I	
[j	i]	
NO		

Therefore we assume that any V-P Consonant stabilisation which simplifies when surrounded by a V-P stabilisation is not an Onset. The examples where VPS is active are (16 d,e).

Now, if the V-P of "flee" were stabilising like O, we would expect this stabilisation not to be targeted by VPS. Since it is targeted, we conclude that the V-P of "flee" is not an O. If its stabilisation were a Co, we would expect it to be a Glide. Since it is not, then we conclude that it cannot be a Co. Therefore the V-P of "flee" is a NONC.

7. Conclusion

It has been proved that natural languages produce at least three different types of minimal well-formed sequences that we call O, Co, NONC. It has been suggested that this is produced by an unstable P whose sole function is to combine with at least one argument.[8] P has been found to operate in Spanish in a Rhotic E and a V-P E. We have proved that the ternarity of NONC, when it is VCV, is not equivalent to the ternarity of ambisyllabicity VCV, since NONC is not subject to the Inalterability Principle while ambisyllabicity, due to its multiple association status, is. Therefore NONC cannot be predicted by the current theories of syllable structure. This fact motivates the SCT approach.

8. Discussion

Contrary to Castairs -Mccarthy (1998) where it is claimed that the structure of the syllable formed an evolutionary model for the structure of the clause, we prove here that the syllable theory cannot in its autosegmental form account for NONC sequences since these cannot be syllabifiable. Yet NONC and VPS exist as linguistic stabilising processes regulated by simple elements.Therefore, although there is evidence that there are linguistic minimal sequences, there is no prove that the canonical syllable template CVC exists as a telic linguistic construct. If there is no evidence that there is a telic syllable template, then there is no evidence either that there is an evolutionary model for the structure of the clause. Telic constructs belong to the realm of platonic science.

Contrary to Tallerman (2002, 2003) where it is claimed that phonotactic restrictions of the phonology do not have counterpart in the syntax, we provide here evidence for the contrary. The evidence comes from the phonotactic wellformedness of a P, for instance the V-P or Rhotic, which selects, like the "syntotactic" of the element "AND" in word coordination, two identical categories as its arguments. These three elements, from different levels of organisation, happen to stabilise when they sequence their arguments one at each side. In the same way a morpheme M <u>tont</u> "silly" in Spanish, may require that when it takes a CAUSATIVE as an argument, this causative morpheme, say ✗, be split into two phonological E arguments: Nasal + Sibilant, with Non-Initial phonological stabilisations each. Each of them, X X, combines with <u>tont</u> and stabilises at each side of it. The sequence X M-CAUS X [<u>entontec</u>] "to make some one to be silly" is a Verb formed by simple Predicate tactics of stabilisation. Morphology uses, therefore, homologous tactics to other levels of linguistic organisation. We may want to say that CAUS in Spanish which is a P uses "morphotactics", homologous to coordination and Rhotic and V-P to stabilise an unstable state.

Contrary therefore to both scholars, it is assumed here that "structures" do not exist. However, the selective combinatorial sequencing processes of simple linguistic elements seem to give outcomes to which we call, perhaps misleadingly, structures. We probably would be more accurate if we would call these outcomes "mental states of stabilisation". To give an example of the mental nature of these sequencings. The trill case in Spanish, in say pe[ro] "dog", is a case of mental denial of P. P insists that there is not a preceding V. If it would not deny this and accept that there is also a V preceding, P would

[8] Tone in SCT is a Predicate which takes as argument a Vocoid in Spanish. The stabilisation of Tone is a simultaneous process which uses its Vowel argument to resolve its value.This accounts for the possibility of a Vowel in Spanish to be the sole V in an utterance [i]? "and?".

stabilise as a NONC with a flap resolution. Therefore P can mentally stabilise using a preceding deafening mechanism, or a following deafening one, or a stereo hearing one regardless of what the real world happens to be like. The same is true with am[oɹ] eterno. P here insists that there is no following V. If it would not deny this and accept that there is also a following V, P would stabilise as a NONC. Insisting that there is no following V is insisting that there is no mental stabilisation with a following V, regardless of the fact that V is pronounced right away: am[oɹ][e]terno. Making a stabilisation choice inhibits simultaneously all the other stabilisations which could have been also possible in that environment .

What types of minimally wellformed combinatorial possibilities are there, what is responsible for them and how these combinations are stabilised when they interact with each other is, for the moment, a matter which needs research. [9] It would be surprising to find evidence which shows that each level of linguistic organisation cannot be unified by simple "tactics". In the same way, it would also be surprising to find that sign language can neither be unified with spoken language.

So it seems, in our opinion, that there is no interest in debating whether phonology is the source of syntax or viceversa once it is assumed that all levels of linguistic organisation, syntax, phonology and morphology included, may derive from the same linguistic ability: stabilising unstable simple and more complex elements and integrating all these stabilisations in one coherent linguistic utterance.

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[9] For instance in Spanish Co stabilisation seems to be a default stabilisation of a NONC Consonant in "love", am[oɾe]s .i.e if there is no following V in the utterance then R stabilises as a Co=VC am[oɹ]. However in Korean (Wheeler 1981) the default of a NONC nasal Consonant when it does not find a previous C argument to combine with, is an O stabilisation. I owe this observation to Emmon Bach.

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