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From Phonological Rules to the Person Case Constraint. Monovalent vs. Bivalent Features in Grammar

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Abstract:

In phonology, segmental content has been predominantly represented in terms of binary features. Although binary features may provide an elegant description of some segmental contrasts, it is far from clear that speaker/hearer's knowledge about segments is organized in a binary way, as we illustrated with specific reference to vocalic alternations (metaphony etc.). The debate about binarity in phonology has a potential parallel in morphosyntax. While syntactic categories (N, V, v, T etc.) are monovalent, a model like Distributed Morphology depends on standard generative phonology for a number of formal properties, including the adoption of binary features. Thus 1st and 2nd persons are [+participant] while 3rd person is the absence of such properties, namely [-participant]. We argue that this is not the most economical set of assumptions, specifically in the explanation of the syntactic generalization known as the Person Case Constraint (PCC). For both phonology and morphology, we show that the inherent richness of binary features leads to formal and conceptual problems, such as the fact that atomic segments or lexical items have as complex a feature matrix as non-atomic ones.

Keywords: *Features, Elements, Vowel alternation, Person, Person Case Constraint*

1. Introduction

In phonology, segmental content has been predominantly represented in terms of binary features. If we regard segmental features as mere notational devices to be used with the purpose of describing phonological facts by means of a formal vocabulary, we may conclude that e.g. [±nasal] is a convenient way to provide an elegant description of the fact that some segments are nasal and all

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others are oral. However, two further aspects should be considered. First, only a part of segmental contrasts and related processes can be described as due to presence vs. absence of a given property. Second, in a theoretically oriented perspective, features are a hypothesis about the way phonetic information is categorized in the grammar. From this point of view, it is far from clear that speaker/hearer's knowledge about segments, differing from other modules of the grammar, is organized in a binary way.

An aspect of this debate which is not often appreciated is that it potentially has a parallel in morphosyntax. Leaving aside the brief interlude of Chomsky (1968), ssyntactic categories (N, V, v, T etc.) are monovalent. Thus D represents the quantificational/deictic anchoring of a predicative content, yielding a referential interpretation (Higginbotham 1985), while features like [+def] and [-def] are formally possible, but theoretically irrelevant. For instance, English *some* has the positive content of an existential quantifier, not some negative [-def] content. At the same time, what is widely perceived as the standard model in generative morphology, namely Distributed Morphology (DM, Halle and Marantz 1993), depends on standard generative phonology for a number of formal properties, including the adoption of binary features. Thus 1st and 2nd persons are [+participant] while 3rd person is the absence of such properties, namely [-participant]. While there is no immediate contradiction, one wonders whether this is the most economical state of affairs.

This article consists of two main parts. In the first part, corresponding to section 2, the descriptive and explanatory adequacy of monovalent features compared to binary features are discussed in relation to vowels.

The second part of the article (sections 3-5) concerns the Person feature in morphology, given its importance for both binary features and underspecification theorists. Specifically sections 4-5 are a case study concerning the application of binary or underspecification feature systems in the explanation of the syntactic generalization known as the Person Case Constraint (PCC). Binary feature systems, being richer, allow formal interactions that cannot be mimicked by monovalent systems, specifically with respect to intervention constraints, i.e. Minimality. This suggests to us that intervention is the wrong key to the PCC.

For both phonology and morphology, we argue that no empirical evidence stands in the way of the adoption of simpler monovalent properties. As we will see, the inherent richness of binary features systems leads to formal problems and also to what we call 'ontological' problems, such as the fact that atomic segments or lexical items have as complex a feature matrix as non-atomic ones.

2. Phonology: Vowels

The fact that a binary feature model was adopted by Chomsky and Halle 1968, a hugely influential work in generative phonology, has certainly contributed to the overwhelming success of binarism in phonological theory. In fact, in most cases, the binary nature of features has been more taken

for granted than thoroughly discussed. The hypothesis that the primitives of segmental phonology are monovalent, positive units is the simplest one. As van der Hulst (2016: 85) puts it, "the burden of proof should be placed on proponents of binary features". Yet the assumption that binary features represent relevant phonological categories better is hardly supported by clear evidence. Nevertheless, as a matter of fact, binary feature theories have maintained their supremacy for decades.

The binarist tradition started with early work on distinctive features (Jakobson 1941, Jakobson, Fant, Halle 1963, but firstly appeared in 1952). In that work, the structuralist notion of contrastive pairs, considered as fundamental in the analysis of segmental systems of individual languages and of phonological acquisition (cf. Jakobson 1941; Dresher 2009), was extended to the representation of segmental content. Indeed, in Jakobson, Fant, Halle, the definition of distinctive feature does not directly imply the binary nature of segmental primitives; it is rather a way to conceptualize the way the hearers make choices about what they hear. According to Jakobson, Fant, Halle (1963: 3), a distinctive feature is the choice between "two polar qualities of the same categories", e.g. grave vs. acute, or "between the presence and absence of a certain quality", e.g. voiced vs. unvoiced. This definition corresponds, respectively, to the Trubetzkoyan distinction between equipollent oppositions, in which two different segmental properties give rise to the contrast, and privative oppositions. Notice that the [±feature] notation, that later on became generalized in phonological theory, accurately expresses the latter case, but not the former.

The ambiguity about binarity is retained in classical generative phonology. In binary feature theory, a given feature [F] defines two sets of segments, the [+F] set and the [-F] set, and again this may correspond to two different situations. In the first, both values of [F] define a natural class of sounds, i.e. they each correspond to a positive property, as in the case of [±sonorant], that identifies two classes of consonants, sonorant vs. obstruent, with different phonological behaviour. In the second, [F] is a positive characteristic of segments that may be either present or absent; only [+F] is active in phonological processes (e.g. processes of assimilation that involve feature spreading), while no phonological activity of [-F] is observable. This is the case of features like [nasal] or [round], whose positive value is the only relevant one.

Obviously, no ambiguity of the kind just mentioned arises in the unary view, in which each subsegmental unit is only identified by the phonologically relevant information it contains and may only be present in a segment or absent from it. So conceived, each feature can only give rise to privative contrasts, i.e. between segments that contain that feature, and segments that, everything else being equal, do not contain it. Examples of this kind of contrast are [m]/[b] or [b]/[p], due to the presence/absence of, respectively, [nasality] and [voice]. Equipollent contrasts, like [p]/[t], involve two different monovalent features, respectively [labiality] and [coronality].

In this conception, monovalency often goes together with stand-alone phonetic interpretability, whereby each feature has a phonetic identity. This means that features need not group in bundles to display their identity, i.e. to be pronounced. Though autonomous interpretability is not necessarily implied by monovalency (and not maintained in all unarist approaches), it reinforces the unary view; for, each feature, when it is the only content of a segment, reveals its positive nature. The combination of monovalency and stand-alone interpretability is consistent with a primary aim of Element Theory, integrated with a restricted model of phonological structure like Government Phonology (Kaye, Lowenstamm and Vergnaud 1998, 1990), that is, the aim of avoiding arbitrariness in phonological representation. Adopting only monovalent features means that only locally present positive features may be used in derivation and in the representation of phonological processes.

A key model of monovalent feature theory is Harris and Lindsey's Element Theory (Harris 1994; Harris and Lindsey 1995; 2000), and we will refer to that formulation here. Although in subsequent work many researchers have proposed significant changes concerning other aspects of the theory, monovalency and autonomous interpretability have remained identifying characteristics of any approach in the framework of Element Theory.

The conception of segmental primitives elements started in the approach to vowels, based on the empirical observation that, across the world's languages, the segments standing at the corners of the vocalic triangle have a pivotal role in vowel systems. In monovalent feature theories corner vowels are conceived as the embodiment of one of the elements **A I U**, while mid and front-round vowels are compounds of these elements (Anderson and Jones 1974, Schane 1984, Anderson and Ewen 1987, among others).

The classical model of Element Theory (Harris 1994, Harris and Lindsey 1995, 2000) includes not only the resonance elements **A I U** but also the "neuter element" **@**, whose phonetic interpretation is a vowel belonging to the central area of the triangle, corresponding to schwa (approximately [ə]). The neutral element is defined as "a blank canvas to which the colours represented by [A], [I] and [U] can be applied" (Harris and Lindsey 1995: 60). Phonetically, schwa consists of formants that are equidistant in the spectrographic space, corresponding to the absence of articulatory modifications of the supralaryngeal tract, i.e. a vowel devoid of resonance characteristics, pronounced with articulators in neuter position. The introduction of **@** in the inventory of vocalic elements conceptualises the behaviour of schwa as the vowel that emerges when other elements are absent, as in vowel epenthesis, or stripped away, as in vowel reduction. The neutral element is omnipresent in segmental expressions (i.e. segments), but reveals its identity in only two circumstances: when it is alone, as in the cases just mentioned, and when it is the head of the expression. In more recent versions of Element Theory, the neuter vowel has been excluded from the set of elements, mainly because of

its nature of inactive category, besides general arguments about economy of the representation (cf. Backley 2011).

We would argue that, compared with binary features, monovalent primitives offer considerable advantages in the explanation of the vowel patterns of the world's languages. In this regard, here we discuss three issues, partly intertwined with one another: vowel height, vowel neutralisation and vowel harmony and metaphony.

2.1 The representation of vowel height

In classical binary feature theory, the two features concerning height, [±high] and [±low], allow only three combinations, given that [+high +low] must be excluded because it is impossible for articulatory reasons. This exclusion follows from a conception of features as instructions for articulation (as in Bromberger and Halle 1989; Halle, Vaux e Wolfe 2000). On a different line of thinking, Element Theory maintains the Jakobsonian view that "the speech signal [...] is after all the communicative experience that is shared by both speaker and hearer" (Harris and Lindsey 1995: 50); as Kaye (2005: 285) puts it "phonological grounding is acoustically and not articulatory based. Phonological objects such as elements [...] are associated with acoustic signatures which are to be found somewhere in the signal". A consequence of this conception is that features cannot be prevented from combining on the basis of articulatory incompatibility. More specifically, it is possible in principle that the acoustic properties encoded by [+low] mix with the properties of [+high], which is what actually emerges in formant patterns of mid vowels.

Anyway, the restriction against [+high +low] is at odds with the fact that vowel systems with four (or five) degrees of height do exist. The problem has mostly been solved by bringing into play a third feature with the purpose of discriminating pairs of mid vowels, e.g. e/ɛ, o/ɔ, having the same values [-high -low]. Usually, the crucial difference concerns tenseness, so that mid-high vowels are [+tense] (cf. Chomsky e Halle 1968) or [+ATR] (cf. Vaux 1996 for discussion), while mid-low vowels are [-tense] or [-ATR]. A seven-term inventory with four degree of height, such as the one that many Italian varieties show in stressed position, can be represented by means of [±ATR] as in (1).

(1)	i u	[+ high]	[+ATR]
	e o	[-high -low]	[+ATR]
	ɛ ɔ	[-high -low]	[-ATR]
	a	[+low]	[-ATR]

Whether tenseness is a relevant category in all vowel systems is, at least to a certain extent, controversial (see Vaux 1996 for discussion); but even disregarding this point, the fact remains that binary features cannot adequately

deal with a scalar property like vowel height (cf. Fant 1966, Ladefoged and Maddieson 1996).

Tentative solutions for this puzzling aspect were put forward, by modifying the [±high ±low] combination. Wang (1968) replaces [low] with [mid], a solution that avoids the articulatory contradiction of [+high +low] and can describe four degree of vowel height, as in (2).

(2) i u [+ high -mid]
e o [+high +mid]
ɛ ɔ [-high +mid]
a [+low -mid]

Clements (1990 [2015]) proposes a hierarchical representation of vowel height, with the multiple occurrence of a single binary feature [±open], that may be active in a number of hierarchically embedded levels or "registers" (p. 25). A language with only two degrees of height has the [+open]/[-open] contrast only at the first hierarchical level, while languages with three or four degrees involve respectively two or three levels. In this way, the binary feature is actually adapted to a multi-valued representation. Systems with two, three and four degrees of height are represented in (3).

(3)

primary register	[+open]			[-open]	
	a			i u	
secondary register			[+open]		[-open]
	a		e o		i u
tertiary register		[+open]		[-open]	
	a	ɛ ɔ		e o	i u

Both models are able to express differentiation in vowel height by using only features that specifically encode properties of height or aperture, while maintaining a binary feature approach. However, the results so obtained attains more to a descriptive level than to a theoretical insight.

No problem concerning vowel height exists with elements, since monovalency and autonomous interpretability can coherently combine with the hypothesis that in a segmental expression one of the features contributes melodic content to a larger extent than the others do. In Element Theory, this unequal contribution to segmental content is formalised through headedness, whereby in each segmental expression an asymmetric relation holds between one element, the head, and the other elements, so that the properties of the head predominate in the segment. Applied to vowels, headedness provides a straightforward representation of height. For example, a set of vowels with four degrees of height, as in Standard Italian, can be represented as in (4) (the head is underlined).

(4) i [I] e [I A] ɛ [I A]
u [U] o [U A] ɔ [U A]
a [A]

We will not go in further details into headedness; suffice to say here that this notion is independently motivated by empirical evidence of different kinds, concerning segmental inventories, phonotactics and phonological processes involving both vowels and consonants.

Further vocalic contrasts can be expressed by including the neuter element in segmental expressions. As noted above, **@** is present in all the vowels, but it only emerges when it is the head or the only element in the segment. Therefore, the content of corner vowels is reformulated as in (a) (although in ordinary notation **@** is omitted when non-head). Expressions containing **@** as the head are exemplified in (5b).

(5) a. i [I @] b. ɪ [I @]
u [U @] ʊ [U @]
a [A @] ɐ [A @]

It is also possible that the contrast between mid-high and mid-low vowels derives from the different role of **@**, respectively head vs. non-head. If so, the representations in (4) may be changed to (6) and a fifth degree of height may be easily represented. These representations show that the neutral element in the role of head serves the same cause of [-ATR]. In (4), the content of mid-low vowels corresponds to that in (1) involving [±ATR].

(6) i [I @] e [I A @] ɛ [I A @] æ [I A @]
u [U @] o [U A @] ɔ [U A @] ɒ [U A @]
a [A @]

If the neuter vowel is not assigned the role of element, as in the models mentioned above, the distinction between +ATR/-ATR vowels may be obtained by allowing a singleton element to either be a head or not. For example, Backley (2011: 47; 50) represents the contrast between tense vs. lax high vowels in English as in (7).

(7) a. i [I] (e.g. *gr**ee**n*) b. ɪ [I] (e.g. *b**e**cause*)
u [U] (e.g. *ch**oo**se*) ʊ [U] (e.g. *infl**u**ence*)

The representation in (7) are in fact equivalent to the ones in (5). They imply that the properties corresponding to I and U may be either dominant or recessive in the segment, compared to the carrier signal, represented by @ in (5). Therefore, although they appear simpler, the expressions in (7b) are as complex as those in (5b), the difference being a notational one. Furthermore, the assumption that the element of a singleton segment may be a head weak-

ens the relational conception of headedness, with consequences that cannot be pursued here (see Bafile 2015 for discussion).

To sum up, unary feature models are powerful enough to account for vocalic inventories of different size. Elements A, I, U, while forming an extremely small set of essential vocalic properties, may combine in more or less complex compounds and thus represent the variety of vowel systems of the world's languages.

2.2 Vowel neutralisation

Processes of neutralisation of vocalic contrasts are those where a syllabic nucleus is allowed to host only a subset of the vowels occurring elsewhere, when specific conditions are met.

Across the world's languages, a strong correlation emerges between prosodic conditions and segmental quality, whereby the presence vs. absence of stress on a nucleus may determine its capacity to display, respectively, a larger vs. a smaller variety of vowels. The reduction of vocalic sets in unstressed positions follows two possible patterns, seemingly opposite, a centrifugal and a centripetal one. By centrifugal neutralisation, vowel subsets reduce to corner vowels, by centripetal neutralisation they tend to centralise and reduce to schwa. Centralisation may also coexists with centrifugal reduction. This is the case, for example, of Neapolitan dialect that in pretonic syllables show raising of back mid vowels ([ɔ o] > [u]); front mid vowels may reduce to schwa or alternatively, in favourable contexts, e.g. before a palatal consonant, raise ([ɛ e] > [i/ə]). As a result, in pretonic position [a u i/ə] are allowed; by contrast, in post-tonic syllables only [ə] (and generally also [a]) may occur; see the alternations in (8a). The Romagna dialect of Finale Emilia (8b) shows centrifugal outcomes for pretonic mid vowels, while most final (except [a]) and post-tonic vowels are deleted:

(8)	a.	ˈtɔrnɐ / turˈnate	'(s)he comes back / you-PL come back'
		ˈmannəlɐ / mannuˈllɐ	'almond / small almond'
		ˈtsɔkkəlɐ / tsukkuˈlonə	'rat / big rat'
		ˈpeʃkɐ / piʃkaˈtorə	'(s)he fishes / fisher'
		ˈlɛggə / lidˈdʒɛttə	'I read / he read'
	b.	ˈboka / buˈkal	'mouth / mug'
		ˈpɔk / puˈkin	'few, little / ATTENUATIVE'
		ˈpensa / pinˈsar	'(s)he thinks / think.INF'
		ˈtsesta / tsasˈton	'basket / big basket'

What a phonological theory needs in order to explain prosodic vowel reduction is a way to express the descriptive concept of prosodic weakness:

why stress preserves segmental content, why in languages like Italian dialects the pretonic domain is stronger than the post-tonic one. As far as the segmental level is concerned, elements allow to represent straightforwardly what segmental weakening consists in: impoverishment of elemental content. The representation of segmental content in terms of elements sheds light on the nature of stress-connected vowel weakening. The restricted set of vowels that occur in unstressed nuclei, i.e. in prosodically weak positions, is the outcome of the loss of segmental content. Corner vowels [i a u] result from the exclusion of complex segmental expressions, while [ə] is the effect of the loss of any content but the 'neuter' element @. This explains why the world's languages exhibit two different patterns of neutralisation that may also coexist in the same language: in fact, they are not unrelated processes, but successive stages of elemental loss.

This is illustrated in (9), with vowel reduction after stress shift in Neapolitan. The alternation in (9a) exemplifies the centrifugal reduction that takes place in pretonic positions, where the previously stressed nucleus loses part of its content because of A-delinking. In the example in (9b), a post-tonic nucleus, compared to the corresponding pretonic one, undergoes centripetal vowel reduction, i.e. reduction to schwa, consisting in the delinking of all elements but @.

(9) a. t ɔ r n ɐ

t u r n a t ə

b. ts u k k u l o n ɐ

ts ɔ k k ə l ɐ

Neutralisation of vocalic contrasts may also depend on morphological conditions, in which stress does not play any role. It is the case, for example, of some Bantu languages that have a five-vowel inventory in roots, but only allow [a i u] in "extensional" suffixes. The following examples, referring to Punu, are taken from Hyman (1999: 240)

(10) a. -kil-il-a ‘repasser’
-sub-il-a ‘uriner sur’
-ded-il-a ‘obéir à’
-gol-il-a ‘se frotter avec’
-gab-il-a ‘distribuer à’

b. -kib-ul-a ‘découvrir’
-fung-ul-a ‘révéler’
-tes-ul-a ‘briser’
-dob-ul-a ‘extraire, extirper’
-gab-ul-a ‘séparer’

As in the case of pretonic nuclei in Italian dialects, in Bantu languages the restricted set of vowels allowed in extensional suffixes consists of the corner vowels.

On the whole, the approach based on elements to vowel neutralisation phenomena provides a more coherent picture compared to binary feature analyses. Being unable to represent segmental complexity, and hence simplification as delinking of elements, binary features accounts leave unexplained the existence, sometimes in the same language, of two seemingly contradictory patterns of vowel weakening. As far as the centripetal reduction is concerned, it has been proposed that, in a binary approach, schwa should be characterised as having all the features with negative value, except [+syllabic], where negative value equals null specification. Interestingly, arguing in favour of this proposal, Pulleyblank (2011: 20) observes that the features “[high], [low], [front], and [labial] are not simply binary classificatory features that divide speech sound into opposite sets. They each correspond to specific actions of the vocal organs. [...] For example, [+front, +labial] y is, in a real sense, a combination of [+front, -labial] i and [-front, +labial] u, and not merely one of four equally possible slots”. Clearly, this formalisation treats features in a privative way, assigning to binarity a mere notational significance. The problem is more serious with binary features applied to centrifugal reduction. On the one hand, vowel raising in unstressed positions cannot be connected in a non-arbitrary way to the weakening sites, because high vowels, as opposed to schwa, cannot be characterised as ‘lighter’, ‘simpler’ or ‘weaker’ by only using features. Moreover, binary features fail to express the regularity emerging from both stress-dependent and morphologically-conditioned centrifugal neutralisation, i.e. the fact that corner vowels are the restricted set that is allowed in neutralisation sites and therefore that they form a natural class as opposed to mid vowels (Harris and Lindsey 2000).

2.3 Vowel harmony

An alleged drawback of elements in the explanation of vowel alternations is the fact that they miss the generalisation expressed by [+high], and cannot depict high vowels as a natural class. The question emerges in phenomena like height harmony or metaphony, in which both [i] and [u] can trigger raising in both front and back vowels; for example when [i] and [u] trigger *e* > *i* and *o* > *u* raising in the target nuclei. Generally speaking, this kind of vowel raising is compatible with a [+high]-spreading analysis,

while it cannot be described as spreading of **I** or **U**, since the spreading of **U** to [e] would yield a front round mid vowel [ø] and the same would result from **I** spreading to [o].

The approach to height harmony from the perspective of Element Theory is discussed by Harris and Lindsey (1995). Pasiego Spanish shows a stress-dependent height harmony whereby, if the stressed vowel is [+high], all unstressed vowels to its left, except [a], are also [+high]. The following examples are taken from Harris and Lindsey (1995: 42)

(11) a.	*bebér*	b.	*beberé*	c.	*bibirí:s* 'drink INF; FUT 1P; FUT 2P'
	komér		*komeré*		*kumirí:s* 'eat INF; FUT 1P; FUT 2P'

In Element Theory, while the spreading-analysis is not available for this kind of data, vowel raising can be represented as **A**-delinking. Again, the crucial distinction is the one between simple and complex vowels: only a complex vowel in the harmonic head, in this case the stressed nucleus, can license a complex vowel in recessive positions. When in a paradigm alternation, as in (11a) vs. (11b), (11c), a stressed nucleus becomes unstressed, it only retains **A** if A is also present in the head, i.e. the stressed vowel (see 11b and 12a); otherwise, the nucleus undergoes A-delinking (see 11c and 12b).

(12) a.

b	e	b	e	r	é
	|		|		|
	I		I		I
	|		|		|
	A		A		A

b.

b	i	b	i	r	í	s
	|		|		|	
	I		I		I	
	‡		‡			
	A		A			

A classical case study of harmony affecting vowel height concerns several Bantu languages which, differing from the ones exemplified in (10), show a complex vowel system, combining centrifugal neutralisation with harmonic effects, the so called "low harmony" (cf. Katamba 1984; Goldsmith 1985; Harris and Moto 1989; Harris and Lindsey 1995, 2000). These languages follow the general Bantu pattern whereby roots may host any of the five vowels of the inventory, while suffixes may basically contain only [a i u]. However, when a mid vowel is in the root, a mid vowel appears in the suffix, as in (13b).[1] The following examples are about Luganda and are taken from Katamba (1984: 260)

[1] Katamba (1984) highlights the fact that roots of the form -C*e*C- do not cause lowering on the suffix *-ul-*, cf. *tem-ul-a* in (13b) and accounts for this oddity by resorting to a diacritic. We ignore this point here.

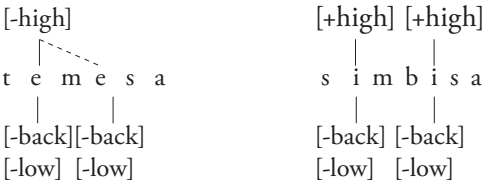
(13)	*Root*	*Root+causative*	*Root+conversive*	
a.	simb-a	simb-is-a	simb-ul-a	'plant; cause to plant; uproot'
	fumb-a	fumb-is-a		'cook; cause to cook'
	lab-a	lab-is-a	lab-ul-a	'see; cause to see; warn'
b.	tem-a	tem-es-a	tem-ul-a	'cut; cause to cut; murder'
	gob-a	gob-es-a	gob-ol-a	'chase; cause to chase; draw bolt of a rifle'

Binarist analyses generally account for low harmony by referring to either the spreading of both values [±high] or the spreading of [-high]. Katamba (1984) accounts for phenomena of the kind reported in (13) in an autosegmental approach, in which both [+high] and [-high] spread from the root to the suffix (example in 14a is adapted from Katamba 1984).

The alternative analysis takes [-high] as the only harmonic feature and, assuming an underspecification framework, considers that vowels in extensional suffixes are unspecified as for [high]. Accordingly, they receive [+high] by a default rule, as in both *simb-is-a* and *lab-is-a,* and receive [-high] by spreading from the root, as in *tem-es-a.* (see 14b, adapted from Harris 1994b). Such an account actually results in a quasi-privative analysis, substantially very close to fully-fledged unarist approaches, whereby a monovalent feature **A** in the root extends to suffixes (cf. Goldsmith 1985). In the examples, dotted lines indicate spreading.

(14) a.

b.



A problem shared by all the accounts of Bantu low harmony that propose spreading of A or [-high] is that an [a] in the root has not the effect of lowering the high vowel in the suffixes, as *lab-is-a, lab-ul-a* in (13a) show. We will not go into the details of the different solutions proposed in this regard, in most cases resorting to some diacritic feature, with the effect of blocking A or [-high] spreading under specific circumstances. As Harris and Lindsey (2000) interestingly point out, Bantu low harmony can essentially be conceived as the contrastive behaviour of two sets of vowel: corner vowels, which occur in any position, and mid vowels, which basically may only occur in roots. The former is the set of simple, i.e. one-element vowels, the latter is the set of complex, i.e. two-element vowels. In this perspective, Bantu height harmony

simply consists in the fact that a complex vowel in a suffix may only occur if it is licensed by a complex vowel in the root, i.e. by the harmonic head. Therefore, this kind of harmony is not simply a matter of spreading, i.e. copying of features from the root to the suffixes; rather, it implies licensing relationship among nuclei that also concerns segmental complexity.

Crucially, this essential characterization cannot be obtained by means of binary features, because there is no meaningful way in which [+high] vowels [i u] and [+low] vowel [a] can be grouped together as a class while excluding mid vowels. Instead, the privative A, I, U elements can nicely capture the essence of [a i u] as a natural class.

The same contrast between corner and mid vowels characterises vowel system of the Piedmontese dialect of Piverone (Savoia 2005, Canalis 2008). In the dialect of Piverone, if the stressed vowel is high the final nucleus may contain [i u a], while if the stressed nucleus contains a mid vowel or [a] the final vowel may be [e o a]. The examples in (15) are from Canalis (2008); (15a) contains forms with low or mid stressed vowels, (16b) the forms with high stressed vowels.

(15)	a.	ˈmɑska	ˈmɑske	‘witch F.S/F.PL’
		ˈberta	ˈberte	‘magpie F.S/F.PL’
		a ˈkanto	ˈit kante	‘they sing/you sing’
		it ˈpɔrte		‘you carry’
		it ˈlɛze		‘you read’
	b.	kasˈtiɲa	kasˈtiɲi	‘chestnut F.S/F.PL’
		ˈlyva	ˈlyvi	‘she-wolf F.S/F.PL’
		a ˈrumpu	it ˈrumpi	‘they break/you break’
		a ˈskrivu	it ˈskrivi	‘they write/you write’

In his discussion of possible analyses within binarist and unarist paradigms, Canalis (2008) considers the different hypotheses that may be put forward in the representation of height/low harmony.

In a binary feature approach, one hypothesis is that both [+high] and [-high] are harmonic triggers and spread from the stressed to the final nucleus. The clear drawback of this account is that it cannot explain the fact that a final *-a* is not targeted by [+high] and remains unaffected. Canalis mentions two possible causes for this specific behaviour of [a], which acts as a trigger but not as a target. The first refers to a special status of [a] as an ‘opaque’ vowel, observable crosslinguistically in regard to harmony; however, as Canalis observes, this characterization is nothing more than a descriptive label. The second explanation is consistent with a fundamental constraint of binary feature theory against [+high]/[+low] combination, discussed here in section 2.1: the spreading of [+high] to the [+low] vowel is blocked, since its result would be filtered out as not phonetically interpretable. Interestingly, however, as Cana-

lis highlights, final [a] is affected by vowel raising in harmonic or metaphonic processes in some Italian dialects; we will return to this in section 2.4.

The second hypothesis in a binarist framework is that only [-high] is the harmonically active feature, which avoids the issue of the opacity of final [a]. The problem here is that with [i u] in the stressed nucleus [e o] are excluded in final position. If this correlation is not attributed to the spreading of [+high], the only consistent explanation is the now familiar claim that the basic set of final vowels only contains [a i u] and that [e o] are the harmonised outcomes. As already observed, the latter representation is not substantially different from the one assuming monovalent features, expressed in terms of spreading of **A**. The following example is adapted from Canalis (2008: 25).

(16) a. /'k a n t -U/ b. /'s k r i v - U/

A **U** **I** **U**

['kanto] ['skrivu]

The effects of vowel harmony of the dialect of Piverone have strong analogies with those of Pasiego Spanish and of Luganda. On the one hand, low harmony of Piverone, like height harmony of Pasiego, is a prodically conditioned process, with the stressed nucleus playing the dominant role. At the same time, it is the position that can display the largest inventory of vowels and the trigger in the harmonic span (cf. Savoia 2005). On the other hand, just as in the case of Luganda, the effects of the harmonic head on the target vowels are superimposed to a pattern of asymmetric distribution of vowels due to neutralisation, whereby only the restricted set [a i u] is allowed in final position. Final [i u] lower to [e o] when the conditions for harmony are met.

To sum up, given this complex of data, this kind of low harmony can be expressed in terms of binary or unary features, as the spreading of [-high] or of A, with substantially similar results. However, the crucial advantage of elements is that they can positively identify the restricted set [a i u] as the set of mono-elemental vowels.

2.4 Metaphony

Let us now turn to the representation of metaphony in Italian dialects, which is an intriguing issue for any segmental theory. Italo-Romance languages offer a wide and complex variety of metaphonic phenomena. A pretheoretical description of metaphony is that final high vowels exert their

influence on the stressed nucleus of the word.[2] The most frequent pattern is metaphony of mid-high vowels, regularly resulting in raising *e* > *i*, *o* > *u*. Several Italian dialects also show metaphony of mid-low vowels, which produces a variety of outcomes, the most frequent being diphthongization with different results, as well as raising *ɛ* > *e/i*, *ɔ* > *o/u*.

Italo-Romance metaphony has been treated within both binarist (cf. Calabrese 1995, 1998, 2011; Savoia 2015, 2016 among others) and unarist approaches (cf. Maiden 1991; Savoia 2005; Savoia and Baldi 2016, 2018; Canalis 2016 among others).

In the accounts using binary features, a controversial issue is whether mid-high and mid-low stressed vowels undergo one and the same phonological process (cf. Calabrese 1995, 1998, 2011) or should instead receive separate representations, thus accounting for the fact that they are independent phenomena from the historical point of view and that they produce different outcomes (cf. Savoia 2015, 2016). According to Calabrese, all different effects of metaphony on mid vowels are due to the spreading of [+high] from the final nucleus.[3] Savoia argues for the alternative view that metaphony of mid-high vowels is triggered by [+high], while metaphony of mid-low vowels is triggered by [+ATR].

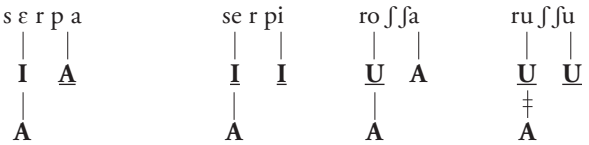
As already observed, this seems to be a weak point of Element Theory, in which the information encoded by [+high] is split between elements **I** and **U**. We have seen however that in monovalent accounts of vowel raising, the absence of a [high] category does not constitute a theoretical issue, since the crucial role in vowel raising of any kind is played by the element **A.** Partial raising *ɛ* > *e, ɔ* > *o,* due to **A** becoming recessive within the segment, and complete raising to *i* and *u*, due to **A**-delinking, are effects of progressive weakening of **A**, known as **A**-demotion (cf. Maiden 1991). As already observed about other kinds of vowel harmony, in Element Theory metaphony is not simply conceived as a matter of feature spreading; rather, in a more comprehensive view, it is defined as the effect of licensing relationship among nuclei within the dominant foot, i.e. the main stress domain. Put in other terms, **A**-demotion is the result

[2] We do not focus here on the fact that in many Italian dialects the actual phonetic content of final nuclei is obscured by reduction to schwa or deletion, or that in some dialects all mid vowels raise to [i u], which makes them identical to originally metaphonic triggers /i u/ (see for discussion Maiden 1991, Calabrese 1998, Savoia 2015, Canalis 2016). When this is the case, metaphony is crucially involved in the expression of inflectional content, e.g. masc. s/pl. for nouns, 2P IND PRES, etc. We assume that also in morphologized metaphony final nuclei preserve some abstract phonological content, anchored to inflectional content, that is able to determine regular phonological effects on the stressed nucleus.

[3] In Calabrese's model of metaphony, repair strategies apply to the outcomes of [+high]-spreading when they violates language-specific constraints. For example, the spreading of [+high] to [-high -ATR] vowels, i.e. to [ɛ ɔ], would produce the ungrammatical combination [+high -ATR], which is repaired by 'negation' and tranformed to [-high +ATR], a well-formed feature setting corresponding to [e o]. We will not discuss this aspect here.

of a partial or complete alignment as for elemental content between the stressed nucleus and the final one (cf. Maiden 1991, Savoia 2005, 2015, 2016, Canalis 2016 among others). The following representations refer to the Abruzzese dialect of Mascioni (cf. Savoia 2015) in which metaphony causes the raising of the stressed mid vowels. Mid-low vowel raising corresponds to **A** loosing its headhood, mid-high vowel raising corresponds to **A**-delinking.

(17)



['sɛrpa] / ['serpi] 'snake F.S / F.PL' '['roʃʃa] / ['ruʃʃu] 'red F.S / M.S'

Despite the now long history of the **A**-demotion analysis, the issue about the incapacity of Element Theory to positively define high vowels as a natural class is not completely devoid of relevance for theorist defending monovalent features within various frameworks (cf. van der Hulst 2018). Within Element Theory, Savoia and Baldi (2016, 2018), propose a new element, namely **F1**, which encodes an acoustic property shared by high vowels, i.e. a low value of frequency for the first formant (F1). Thus, F1 categorizes an acoustic and therefore perceptual property, like all the other elements, althogh it does not share the autonomous interpretability that carachterizes the primes in the standard formulation of Element Theory (cf. Backley 2011).

We maintain here that autonomous interpretability is essential in the representation of different phonological phenomena, like consonant lenition and vowel weakening as loss of segmental content. More specifically, the explanation of vowel raising as **A**-delinking preserves its crucial insight in regard to phenomena of vowel neutralisation and vowel harmony of the kind discussed above, especially when segmental simplification takes place in prosodically weak configurations.

To conclude our discussion about features in phonology, we now turn to the case of metaphony affecting [a]. This phenomenon rises a few descriptive intricacies that we believe are of some theoretical interest.

In Italian varieties, metaphony affects a stressed [a] much less frequently than stressed mid vowels. The phenomenon is documented for some Northern-Western dialects, especially in the Alpine area and in Romagna, and for some Central-Southern dialects, mostly on the Adriatic side (cf. Rohlfs 1966: 43-46; Savoia and Maiden 1997). To the best of our knowledge, the only outcome of metaphony of á is a front vowel, in most cases [ɛ] or [e], while back outcomes are undocumented. Almost without exceptions, the metaphony of á is only triggered by *-i*. In fact, in most systems that show metaphony of á, *-i* is

the only metaphonic trigger for target vowels of any kind. In few dialects, while the metaphony of mid vowels is activated by both *-i* and *-u,* á is only sensitive to *–i.* One such system is the Abruzzese dialect of Colledimacine (Savoia 2015: 234-235). In this dialect, final vowels are all reduced to schwa, and metaphony is caused by phonological features anchored to inflectional content (see footnote 2). The examples in (19) are taken from Savoia (2015: 234)

(18) a. *final /i/*

ˈmeːsə / ˈmiːʃə	‘month s/pl’
ˈveːtə / ˈviːtə	‘see 1P/2P’
ˈdɔrmə / ˈduərmə	‘sleep 1P/2P’
ˈkaːnə / ˈkɛːnə	‘dog s/pl’
ˈmaɲɲə / ˈmɛɲɲə	‘eat 1p/2P’

b. *final /u/*

ˈkortə / ˈkurtə	‘short f/m’
ˈsordə / ˈsurdə	‘deaf f/m’

From the complex of data just presented, a strong correlation emerges between the presence of a final /i/ and the metaphony of [a], a correlation that concerns both the conditions for application and the outcome of the process. On the one hand, this picture is naturally suitable for a representation by means of elements. A head **I** element contained in the final nucleus spreads to the stressed position containing **A**, thus producing raised and fronted outcomes (cf. Canalis 2016 on Ticinese metaphony). This treatment is also consistent with the representation of metaphony of mid vowels as a process of **A**-demotion. In fact, the outcomes of raising and fronting of [a], i.e. ɛ>e>i, correspond to progressive steps of decreasing predominance of **A** within the segment. On the other hand, this model has no intrinsic explanation for the fact that, in systems like the one in (18), only *-i*, but not *-u*, is a metaphonic trigger for á. For these cases, some stipulation seems necessary to restrict the condition for á metaphony to the presence of *-i.*

In terms of binary features, the correlation between the metaphony of [a] and the final /i/ does not find a straightforward account. Firstly, the feature active in metaphony, i.e. [+high], is shared by [i] and [u] and cannot restrictively link metaphony to the presence of *-i.* Secondly, [+high] is not sufficient to account for the fact that a metaphonized á only results in front vowels. Further information is necessary for the process to take place, and two alternative solutions are available: i) the stipulation that [a] is inherently [-back], or ii) the statement that when [a] is the metaphonic target, and only then, [-back] together with [+high] spreads from the final nucleus (cf. Savoia 2015: 234-235). A further complication that arises in binarist analysis of metaphony of á is that the spreading of [+high] to a [+low] segment causes an impossible combination. This undesirable outcome can be avoided by stipulating that the repair strategy ‘negation’ applies, whereby [+high +low] → [-high -low] (cf. Calabrese 1995) or by stating that [-low] is the relevant feature instead of [+high] (cf. Savoia 2015: 235).

To resume up to this point, a drawback common to unarist and binarist approaches is that none of them can provide a wholly non-stipulative explanation of the special behaviour of á in metaphony.

We now briefly consider a last, much less frequent system showing the metaphony of á, which is documented for a small Campanian area, mostly represented by the dialect of Ischia, Procida and Pozzuoli (cf. Rohlfs 1966: 45). The data in (19), taken from Rohlfs (and adapted to IPA), refer to Monte di Procida e Pozzuoli, the ones in (20), reported by Savoia and Maiden (1998: 19), refer to Ischia. All the systems exemplified have final vowels reduced to schwa. In the examples, the phonological content anchored to inflectional endings is indicated in brackets.

(19)	+ *metaphony*		- *metaphony*	
	ˈesənə	‘donkey M.S/M.PL’ (-u / -i)	ˈasənə	‘donkey F.S/F.PL (-a / -e)
	ˈnɛsə	‘nose M.S’ (-u)	ˈkrapə	‘goat F.S’ (-a)

(20)	+ *metaphony*		- *metaphony*	
	kajəˈnɛtə	‘brother-in-law M.S/M.PL’ (-u / -i)	kajəˈnatə	‘sister-in-law F.S/F.PL’ (-a / -e)
	ˈkɛnə	‘dog M.S’ (-i)	ˈkanə	‘dog M.PL’ (-e)

In the dialects of (19) and (20), metaphony is activated for all target vowels, including á, by both *-i* and *-u;* the outcome of metaphony of á is always a front mid vowel [ɛ] or [e].

The data in (19) and (20) pose a puzzling question for any account, since two aspects in the metaphony of á must be explained, i.e. raising, and fronting in presence of *-u*. A unarist approach is at loss with this set of data, since elements cannot represent a change $a \rightarrow \varepsilon$ unless an element **I** is locally available. On the contrary, with binary features, raising is not a problem given a [+high] final vowel and the crucial question is the fronting of á. Indeed, in a strictly binary feature theory, any vowel must is either [+back] or [-back]. If [a] in the systems of (19) and (20) is labelled as [-back] the correct outcome is predicted, i.e. a front mid vowel. However, it could be noticed that in systems like many Italian varieties that do not contrast a front with a back low vowel, in absence of any other phonological evidence, the setting of [back] is an arbitrary operation.

With elements, the null hypothesis is that [a] is a central vowel. The representation is enriched with **I** or **U** when phonological evidence is available that this is the case. For example, Passino (2016) provides convincing evidence that in the dialect of Teramo (Adriatic Abruzzi) the outcome of Latin Ă / Ā is a compound [**A I**]. Passino’s proposal accounts for the fact that the phonetic form [æ] appears in specific contexts, but refers essentially to the behaviour of the segment in metaphonic and prosodically conditioned vowel alternations.

With this in mind, we believe that the exact content of /a/ in the systems of (19) and (20) should be reconsidered in light of a closer scrutiny of its pho-

nological and phonetic behaviour. Rohlfs (1966: 45) reports the presence of spontaneous, i.e. non-metaphonic fronting of á, which is typical of Adriatic Italian varieties, also in dialects of the small Campanian area to which also the systems in (19) and (20) belong. Therefore, we hypothesize provisionally that á in those varieties could be adequately represented as [**A** **I**]. If our hypothesis is on the right track, the fronting of á in presence of *-u* ceases to be a problem for an Element Theory approach, since with **I** contained in the stressed nucleus, the metaphonic effects of raising and fronting can be represented as **A**-demotion.

3. Morphology: Person

The question whether the primitives of the system are binary features or are monovalent properties applies not only to PHON primitives, but also to SEM primitives, which enter morphosyntactic computation. The framework of Distributed Morphology (DM, Halle and Marantz 1993) adopts the view that morphological features are binary. Specifically, a consistent stream of literature argues for a binary characterization of Person. Another feature which prominently enters the syntactic debate in a binary/underspecification format is Number, for instance as regards so-called omnivorous number effects in the Romance languages (D'Alessandro and Roberts 2010; Nevins 2011). In order to keep the discussion manageable, we disregard Number aside here (with a partial exception at the end of this section). In this section, we illustrate existing proposals arguing for binary features characterizations of Person or for what we take to be a variant of them, namely underspecification systems; we also propose a monovalent alternative.

Bobaljik (2008) presents an argument in favour of binary features for person based on a well-known substantive universal – namely the existence of exactly four persons: roughly 1 Exclusive (Speaker), 1 Inclusive (Speaker and Hearer), 2 (Hearer) and 3 (other, i.e. neither Speaker nor Hearer). This are exactly the persons predicted to exist by crossing the two binary features ±Speaker, ±Hearer, as indicated in (21).

(21)	1 Excl	+speaker, -hearer
	1 Incl	+speaker, +hearer
	2	-speaker, +hearer
	3	-speaker, -hearer

On the basis of our general considerations concerning binary feature systems we expect to find two kinds of problems with this system. The first problem is formal. We take it that features are properties, and as such they define sets of individuals (or sets of sets of individuals) having the relevant property. This much seems unquestionable. More interestingly, we may wonder how

to interpret clusters of features. The natural interpretation would seem to be that a set of features defines a set of individuals each of which has the relevant properties. This construal seems to be the intended one for instance for 3 in (21) – which is the set of individuals which are both -Speaker and -Hearer. Similarly 1Excl is a set of individuals each of which has both the property of being a hearer and the property of not being a speaker – and conversely for 2.

However, the same cannot be true of 1Incl, since there is no single individual which has the property of both being a hearer and that of being a speaker; the intersection of the two sets is empty. In order for (21) to go through as a characterization of 1Incl we must construe the clustering of features in a different way from that adopted so far – we must join the individuals which are (only) speakers to those that are (only) hearers. But this in turn cannot be extended to 1Excl or 2. 1Excl may include just the speaker – the conjunction with non-hearers (which include 3rd person) is not necessary – and similarly for 2. The reason we run through this matter in some detail is to stress the general point that while single binary features are easily legible, their proposed clusters are not – nor are we aware of any general discussion of how they interact.

The issues that we just raised depend only in part on the specific proposal of Bobaljik (2008). Halle (1997) adopts a feature system which characterizes just three Persons, namely the traditional ones, as in (22). All three persons have a well-formed intersective reading. But then note that the supposed argument of Bobaljik in favour of binary features collapses – because it turns out that the crossing of two binary features does not yield four persons, but only three.

(22) 1 +author, +participant
2 -author, +participant
3 -author, -participant
* +author, -participant (logically impossible)

The second general problem with binary features is so to speak, ontological. For the purposes of illustration, we will stick with the system of features in (21). Consider 1Excl. In order to get reference to the Speaker, we need to partition the Person lattice by means of the ±speaker, ±hearer features. Therefore, the grammar contains only an indirect representation of the speaker, as a partition of the referential space. The speaker is any individual who has the speaker property but in addition – and in a completely redundant manner, also has the property of not being a hearer. Thus, the ontology of the conceptual system includes the primitive content SPEAKER – otherwise we wouldn't be able to define the predicates ±speaker at all. However the computational system does not recognize the SPEAKER content as a primitive, rather it is forced to define it as the crossing of both positive and negative values of various predicates. To put it otherwise, the Speaker and Hearer, anchoring the Universe of Discourse, cannot have an atomic

status in the computational component. They are as complex as non-participant referent, defined by the same crossing of binary features.[4]

For the sake of explicitness, in (23) we provide a formulation of what a monovalent system for Person looks like under the assumption that 1Excl and 2 are to be identified with the conceptual primitives SPEAKER and HEARER. 1Incl is defined by the union of HEARER and SPEAKER. Remember that the conjunctive characterization of 1Incl was not argued to be a problem *per se* for binary feature systems. The issue that we highlighted was that there was no consistent reading of feature clusters.[5]

(23) 1Excl: SPEAKER
1Incl: SPEAKER ∧ HEARER
2: HEARER

Under (23), we cannot characterize 3 as the non-person – apparently meeting the limit of our system. However, we argue that this consequence is correct. In the absence of Hearer and Speaker content, reference is achieved through deixis D or quantification Q, along the lines of (24). There is no sense in which *s/he* (or *the*) is defined by absence of speaker and hearer properties. Like everything else in grammar, it is defined by positive properties.

(24) 3: Def/Q

Summarizing so far, it is possible to characterize the person system both in terms of binary features and in terms of monovalent features/properties – along the lines of (21)-(22) and (23)-(24) respectively. If we have Speaker and Hearer primitives we do not need to turn them into binary features to

[4] We are aware of recent work by Harbour (2016) defining Persons in terms of functions, which at least prima facie seems even more complex than the characterization in terms of features. Our discussion takes us in the opposite direction of radical simplification, cf. (23)-(24) below. We note that at least the ontological issue holds of Harbour (2016). In other words, 1P as represented in the grammar is not atomic.

[5] There shouldn't be any special difficulty in drawing number into the picture. In essence, plural amounts to set divisibility. Thus, the 1P plural denotes a set x such that x includes the Speaker (1Excl) or the Speaker and the Hearer (1Incl) – and similarly for 2P. In the syntax of a 1P pronoun we can assume that the [Speaker] property is modified by a superset relator ⊇, namely [[Speaker] ⊇], and this syntax is read as referring to some superset including the speaker (and eventually the hearer), along the lines of (i). The same syntax holds for other person plurals. We refer to Manzini and Savoia (2018b, 2019), Savoia *et al.* (2018), Manzini *et al.* (2019) for a discussion of number in DPs (see also the references quoted there).

(i) 1Excl: [[Speaker] ⊇] → ∃x, x ⊇ SPEAKER
1Incl: [[Speaker∧Hearer] ⊇] → ∃x, x ⊇ (SPEAKER ∧ HEARER)
2: [[Hearer] ⊇] → ∃x, x ⊇ HEARER

predict the 3 Participant persons. Rather, as in (23), the system consists of Speaker, of Hearer, and of the only logical operation that returns a meaning, namely their conjunction. Furthermore, as in (24), it is perfectly possible to identify 3P with D – effectively a different referential system than the Person/Participant system, based on operators binding variables restricted by descriptive content.

A possible argument in favour of the binary feature characterization is that it manages to capture natural classes (namely negative classes) that escape instead the conceptual primes characterization we are supporting. As pointed out in a classical work by Zwicky (1977), in languages which have only three persons, 1Incl is syncretic with 1Excl, as in English *we* – while 1Incl is never syncretic with 2. As it turns out, the binary features schema in (21) is not able to capture this basic fact, since syncretism based on the +speaker feature between 1Incl and 1Excl is equally favoured as syncretism between 1Excl and 2 based on the +hearer feature. In this respect, therefore, there is nothing to be gained with respect to the conceptual primes characterization in (23).

Noyer (1992), in his seminal discussion of Person, argues that the pattern is due to the interaction of the feature matrix with the Person hierarchy in (25). We take it that the latter is just the initial segment of the Animacy/Definiteness hierarchy, which is generally deemed responsible for such behaviours as Differential Object Marking (DOM) and Differential Subject Marking (DSM, or split ergativity). Kiparsky (2008) suggests that it is a D-hierarchy, or as we shall say here a Referential Hierarchy.

(25) 1 > 2/other

According to Noyer, the binary feature characterization of person interact with the hierarchy 1 > 2 in the following terms. The syncretism of 1Incl and 1Excl is derived by Impoverishment (in the DM sense of the term), i.e. deletion of the [hearer] feature. However, in order to get syncretism between 1Incl and 2, one would need to impoverish the [speaker] feature. But "such deletions always obey the hierarchy of features" (Noyer 1992: 154), blocking Zwicky's **syou*.

There is no reason why the hierarchy in (25) can be used in conjunction with a monovalent feature system. 1Incl can be syncretic with 1Excl – because this means that the highest ranked referent in 1Incl is externalized. However 2 cannot be syncretic with 1Incl – because this would mean that the highest ranked element in 1Incl remains without externalization. Formally, we may invoke the general principle that externalization is subject to the hierarchy (25) so that no 2/other content can be lexicalized if 1P content is not. This avoids Impoverishment, but seems otherwise comparable to what Noyer proposes.

Finally, an important variant of binarism, namely underspecification, has not been discussed so far, though it is applied to Person features in an important work of Harley and Ritter (2002). In the range of literature which we consider in section 4, devoted to the interaction of Person features with syntactic principles, the privative system is endorsed in particular by Bejar and Rezac (2009). In the notation used by Bejar and Rezac, the feature composition of the different persons is as in (26), assuming the standard Person hierarchy 1 > 2 >3. The feature [π] stands for Person. The 1Excl vs 1Incl distinction is noted (in their fn.9) but not discussed.

(26)
3:	π
2:	π, Participant
1:	π, Participant, Speaker

Bejar and Rezac are more explicit than most on the nature of the feature system they adopt. First, it "requires specifying default interpretations for underspecified representations". Therefore, despite the lack of plus and minus signs, the system in (26) is a variant of (22). Only positive, marked values are specified. In the absence of specification, however, the default negative value is implied. Furthermore, Bejar and Rezac explicitly note that "it is only the feature structure as a whole that corresponds to a traditional category like 1st person", so that the segment [speaker] cannot be read as 1P by itself. This is important in the economy of their analysis – and represents a particularly clear enunciation of what we have called the ontological complexity of binary/privative feature systems in previous discussion.

Now, recall that in section 2, we not only considered phonological segment inventories defined on the basis of monovalent and bivalent features – but we also discussed their interaction with phonological computation/representations. When it comes to morphological repertories, their interaction is with syntactic computation. Therefore, in the following sections, we will launch into a case study concerning the interaction of person feature systems with syntactic principles, as regards one specific phenomenon, namely the Person Case Constraint (PCC).

4. Interactions of bivalent feature systems with syntactic computation: The PCC

The bivalent characterization of Person has been used by recent syntactic theory in conjunction with the rule of Agree and with the locality conditions governing Agree (Minimality) to derive interactions between Person and Case/Agree such as the Person Case Constraint (PCC). We begin by introducing the basic PCC facts. In so called strong PCC languages, in Dat-Acc sequences the Acc can only be 3P. Pancheva and Zubizarreta (2017) describe French as strong PCC, as in (27).

(27) *French, strong PCC*

a.	*Il	te/me	lui	presenterà	*3Dat, 1/2Acc
	He	me/you	to.him	will.introduce	
	'He will introduce me/you to him'				
b.	*Il me te/	te me	presenterà		*1/2Dat,1/2Acc
	He me you/	you me	will.introduce		
	'He will introduce me to you/you to me'				
c.	Il	me/te	le	presenterà	OK1/2Dat, 3Acc
	He	me/you	him	will.introduce	
	'He will introduce him to me'				

Catalan is a Weak PCC language, characterized as such by Bonet (1991). It allows 1/2P Acc in dative contexts, when Dat is 1/2P, along the lines of (28).

(28) *Catalan, Weak PCC*

a.	*Al director,	me li	ha recomanat la Mireia.	*3Dat, 1/2Acc
	to.the director,	me to.him	has recommended the Mireia	
	'As for the director, Mireia has recommended me to him'			
b.	Te' m van recomanar per aquesta feina.			OK 1/2Dat, 1/2Acc
	You me will recommend for this job			
	'They will recommend me to you/you to me for this job'			
c.	El director, me l' ha recomanat la Mireia.			OK 1/2Dat, 3Acc
	the director, me him has recommended the Mireia			
	'As for the director, Mireia has recommended him to me'			

Romanian is described as observing a different PCC pattern yet, dubbed Me-First. In essence, Romanian is like a Weak PCC language in allowing combinations of Participant Dat with Participant Acc. However, it is consistently reported to differ from, say, Catalan, in that only 1Dat, 2Acc is allowed, not the reverse, along the lines of (29b-b'). One may expect 2Acc to be allowed with 3Dat – which it is.

(29) *Romanian, Me-First PCC*

a.	I te	au recomandat		ieri	OK3Dat, 2Acc
	to.him you	have recommended		yesterday	
	'They have recommended you to him yesterday'				
a'.	#I m	au recomandat		ieri	#3Dat, 1Acc
	to.him me	have recommended		yesterday	
	'They have recommended me to him yesterday'				
b.	*Ti m a prezentat Ion la petrecere				*2Dat, 1Acc
	to.you me has introduced Ion at.the party				
	'Ion introduce me to you at the party'				
b'.	mi te a prezentat Ion la petrecere				OK1Dat, 2Acc
	to.me you has introduced Ion at.the party				
	'Ion introduced you to me at the party'				

One of the earliest Agree and Minimality accounts of the PCC is Anagnostopoulou's (2005). She takes 1/2P to be [+person/participant] and 3P datives to be [-person/ participant]. The schema in (30) summarizes how this distribution of feature values works in excluding the co-occurrence of 3Dat and 1/2Acc. For, a [-person] 3Dat counts as an intervener on the Agree relation between the Person probe on *v* and its 1/2P object goal. In (30b), the radical absence of [Person] features on 3Acc removes the violation, because the object is no longer a goal for the person probe on *v*. There is however more than a disadvantage. First, in the schema in (30a), 3Dat acts as an intervener for the probing of 1/2P Acc by *v*, despite the fact that they have opposite value of [person]. Reported back to other instances of Minimality, this seems very dubious, as if -wh could act as an intervener for +wh.

(30) a. [$_{vP}$ *v* [$_{ApplP}$ lui [$_{VP}$ presenterà te] cf. (27a)
-pers +pers
→*

b. [$_{vP}$ *v* [$_{ApplP}$ me [$_{VP}$ presentera le] cf. (27c)
+pers
→ OK

Second, Anagnostopoulou assumes that 3P Acc elements lack the [person] feature altogether, while 3P Dat elements ae assigned the feature [-person]. From a very general perspective, it is difficult to see the difference between having the non-person feature and not having the person feature. But even disregarding this abstract concern, what does it mean empirically to have a 3Dat associated with the person/participant system (even if only negatively) and 3Acc not associated with it? 3P pronouns always function alike, has exactly the same referential range (deictic, anaphoric, bound variable) independently of the case slot it happens to be associated with.

A way out of this ontological problem is to invoke a connection between dative and animacy – so that 3Dat would have obligatory animacy properties accruing to it, unlike 3Acc. This line of justification does not work. In Italian, a Weak PCC language, 3Dat are actually preferred for inanimates in at least some contexts, such as those involving a possessor construal such as (31a). There are furthermore contexts where animate goals can be referred to by locative pronouns as in (31b).

(31) a. (Al vestito) gli/*ci ho rifatto l'orlo
to.the dress to.it/there I.have re-made the hem
'I made a new hem to the dress'

b. A mia sorella, non ci/le somiglio
to my sister not there/to.her I.resemble
'I don't resemble my sister'

As for the Weak PCC, Anagnostopoulou has recourse to Multiple Agree, i.e. the ability of one probe to have multiple goals. Under Multiple Agree, *v* can probe into the [+person] feature of both a 1/2P Dat and a 1/2P Acc at the same time, explaining the Catalan pattern. 3P datives, being [-person] still block probing into 1/2P Acc. This strengthens the issue we noted for Minimality, since a [-person] element which cannot be a goal for [+person] Multiple Agree, nevertheless counts as an intervener on the Agree path. We are not sure about the formal status of this assumption – it certainly violates the spirit of Minimal Search, whereby an intervener is simply a goal closer to the probe. Anagnostopoulou also discusses why clitics but not full pronouns undergo the PCC. The answer is that "absence of an accusative clitic/agreement marker… signifies the absence of a Move/Agree relation between the accusative and *v*". Again, it is not clear that this is in keeping with standard Minimalism, specifically the assumption that accusative case is a reflex of Agree with *v*.

Zooming to a dozen years later, an account of the PCC based on binary features systems and on intervention constraints on Agree is proposed by Pancheva and Zubizarreta (2017) (Zubizarreta and Pancheva (2017) consider Inverse Agree within the same framework). These authors complicate the feature system further. The basis for the system in (32) is (22) above; an additional feature, namely [proximate] splits 3P into a proximate and an obviative set. We quote: "1P and 2P arguments are inherently proximate, being part of the speech event. 3P arguments may or may not be proximate, depending on context. Proximate 3Ps are grammatically marked as having a perspective on the described event".

(32) 1: [+proximate], [+participant], [+author]
2: [+proximate], [+participant], [-author]
3prox: [+proximate], [-participant], [-author]
3obv: [-proximate], [-participant], [-author]

According to Pancheva and Zubizarreta, Appl is a head of phase and a probe (an enrichment on which we will not comment further). By a constraint called P-principle (specifically the P-prominence clause), there must be a D in the edge of Appl that provides its goal. In the Strong PCC condition, Appl probes for [+proximate] and a constraint called P-uniqueness (also part of the P-principle) requires that there can be at most one D in the phase which provides Appl's goal. Since the indirect object, sitting in the edge of Appl, is [+proximate], a [+proximate] direct object is excluded, including a 1/2P one.

In the Weak PCC condition, P-Uniqueness does not hold. Therefore two [+proximate] elements, such as two 1/2P clitics can freely combine as Appl and Acc. Here another condition comes into play namely that 3P can be marked [+proximate] only in the context of another 3P. Therefore "in the

absence of another 3P, the 3P indirect object in <3, 1> and <3, 2> cannot be marked proximate, leading to a violation". In the Me-First PCC what varies is that Appl probes for [+author]. P-Uniqueness then filters out contexts where the direct object is 1P, allowing the others.

From the point of view of feature ontology, the system in (32) presents a proximate/obviative distinction which has abundant morphosyntactic correlates in Algonquian languages, but lacks such correlates in the Romance languages. One question then is whether the distribution of abstract [proximate] features in Romance matches that independently known from languages with overt proximate morphology. According to Aissen (1997) "in a context with two third persons, unbalanced for animacy, the animate must be proximate and the inanimate obviative". Thus leads us back to the question whether 3Dat is always animate. We have already seen that this is not the case – in fact in an example like (33), 3Dat is lower ranked in animacy with respect to 3Acc.

(33) A questo tavolo, gli dobbiamo trovare un proprietario
to this table, to.it we.must find an owner
'We must find an owner for this table'

Another problem is represented by the fact that in Algonquian [+proximate] is the unmarked value of the feature, since if a single 3P occurs, it is in the proximate morphology; the presence of an obviative 3P depends on that of a proximate 3P (Aissen 1997). Pancheva and Zubizarreta require the reverse condition for the Weak PCC, as summarized above. Obviously, Algonquian and Romance may differ – but this is precisely our point. If the comparison between the two families does not warrant extending the proximate/obviative distinction from Algonquian to Romance, then the Romance feature system loses explanatory force.[6] Pancheva and Zubizarreta also address the question why full pronouns, unlike clitics, do not trigger the PCC. Their answer is essentially the same as Anagnostopoulou's (2005) – namely that "if the direct object does not agree with Appl – an agreement relation that is manifested as cliticization – it is excluded from the domain of application of the P-Constraint, even though it remains in the Appl phase". The same objection applies as for Anagnostopoulou. It is certainly not unreasonable to tie Agree to cliticization (in clitic languages) – yet this is not formalized either by the authors or by independent literature.

[6] Pancheva and Zubizarreta (2017) support their characterization of Appl by reference to a different set of facts, namely Charnavel and Mateu's (2015) Clitic Logophoric Restriction (CLR). However "discourse participants" (i.e. 1/2P) and "empathy locus" (i.e. Dat) behave differently under the CLR, as Charnavel and Mateu discuss. Vice versa for (Pancheva and Zubizarreta's) PCC to work they must work alike and hence enter into competition.

One difference between Anagnostopoulou and Pancheva and Zubizarreta is that the latter authors require a P-principle. Bejar and Rezac (2003) also propose a Person Licencing Condition (PLC) (see also Bejar and Rezac (2009) on Inverse Agree). The PLC states that "an interpretable 1st/2nd person feature must be licensed by entering into an Agree relation with a functional category". They consider the Strong PCC, which they derive by the interaction of the PLC with minimalist Agree and the standard Minimality condition on it. The relevant configuration is roughly as in (34) where goals of the *v* probe have π=3P or π=1/2P. In (34), by Minimality, the π probe on *v* matches the π value on the dative. This means that it "never enters into an Agree relationship with the accusative … This is fine if the accusative is 3rd person. If it is a 1st or 2nd person, the PLC will take effect".

(34) v(π) DAT ACC

In its early statement by Bejar and Rezac it is easier to see that the PLC encodes a certain amount of the PCC, which it is meant to derive – namely that licencing requirement applies to 1/2P internal arguments and not to 3P ones. The same is true of the P-principle of Pancheva and Zubizarreta (2017). Bejar and Rezac also consider the question why the PLC would apply to clitics and not to full pronouns and they propose that "inherent case and focus" missing in clitics (Cardinaletti and Starke 1999) are present on full pronouns. This cannot be so. As for case, Romance clitics are overtly marked for Dat, whereas full pronouns generally are not. As for Focus, if we understand the Focus category proper, it is obvious that not all full pronouns are Foci even in Romance (for instance pronouns objects of prepositions). If we understand the ability to be stressed, then we have to look no further than French enclitics for examples of stressed clitics observing the PCC, as in (35).

(35) *Presente-lui-moi/-me-lui
introduce-him-me/me-him
'Introduce me to him'

We are now ready to draw some conclusions on accounts of the PCC based on the interaction between the various binary/underspecification features systems, whether (20) or (22) or (32), and standard minimalist Agree and Minimality:

(i) binary/underspecification systems must be supplemented by assumptions such as the [-person] vs. lack of person feature distinction of Anagnostopoulou (2005); the application of the proximate feature to Romance in Pancheva and Zubizarreta (2017); the dative/animacy connection. All of these assumptions appear dubious on empirical as well as on simplicity grounds.

(ii) Agree and Minimality must be supplemented with dedicated principles, such as Bejar and Rezac's (2003) PLC or Pancheva and Zubizarreta's (2017) P-Principle.

(iii) Minimality is invoked to derive the PCC in languages, where Dat plays intervener on Agree even though it is incapable of agreeing. Why would an element which cannot serve as a goal for Agree, play Minimality intervener on the Agree path? Or in Anagnostopoulou's version, why would [–person] intervene on a [+person] path?[7]

5. A monovalent account of the PCC in Romance

Are monovalent feature systems at all adequate to interact with Agree, Minimality, phases and the other fundamental principles and operations of minimalist grammars? We explore this question in relation to the PCC in Romance. In section 5.1 we preliminarily address the question of clitics, their derivation and structure. In section 5.2 we address DOM in Romance. In section 5.3 we return to the PCC arguing that it feeds not on Agree and Minimality but on DOM.

5.1 Clitic structures

Following Kayne's (1991) classical work, we take it that clitics in most Romance languages surface as heads adjoined to T(P). A few derivations are open and have been proposed in the theoretical literature. Kayne's classical proposal has cliticization from a first-merged DP position. Sportiche (1996) proposes base-generation of clitics in a clitic field associated with *v*, whence they raise to T. Roberts (2010) takes clitics to undergo head-movement to *v*. Here we assume first-merge of object clitics, construed as D heads, with vP, hence essentially Sportiche's analysis.

The Acc clitic enters Agree with the *v* head; following Chomsky (2001), Acc case reduces to Agree with *v*. The Acc clitic further alternates with the Part(itive)

[7] Alternatives to binary feature systems, or their underspecification variant include cartographic ones. Thus, Bianchi (2006) uses the categories 3P or SAP (Speech Act Participant) to label the syntactic tree. Bianchi shows that an analysis entirely based on (monovalent) categories of 1/2P and 3P can express the PCC and the Inverse Agreement facts in terms of Minimality intervention on movement. Full pronouns must check Person projections no less than clitics but different types of chains are involved. Nevertheless cartographic hierarchies have problems of their own (Chomsky *et al.* 2017). Bianchi invokes the representation of Person in the universe of discourse to postulate SAP and 3P projections. However, discourse considerations may licence the presence of SAP projections, but not necessarily of 3P. More to the point, if the justification for SAP projections is to be sought in discourse factors one may predict differences between sentence types (e.g. indicative vs subjunctive, Giorgi 2009) which are obviously irrelevant for PCC effects.

clitic in the expression of the IA. Other clitics are Oblique (Obl), namely Dat and Loc(ative)/Inst(rumental). The clitic series is closed the Voice clitic *se/si*. Manzini and Savoia (2017) propose that the order of the object clitics just listed reproduces that of phrasal arguments once one abstracts from the rightward orientation of the latter as opposed to the leftward orientation of clitics. Indeed there is a good match between the order of clitics in (36a) and the leftward oriented order of routinely assumed functional heads like those in (36b). The reverse order of Acc and Dat clitics in French is discussed in section 5.3, example (45).

(36)	a.	Obl >	EA >	Obl >	Acc/Part
	b.	[ApplP	[VoiceP	[ApplP	[vP

Two different kinds of labelling are open for sequences like (36a). Under the cartographic labelling each clitic is the head of a projection Appl or Voice; alternatively all clitics added on top of *v* correspond to the addition of an Appl or Voice elementary relator, but one which does not project, resulting in a recursive *v*P label for the whole clitic field. We adopt the latter.

Recall that in most Romance languages, including French, Italian and Romanian exemplified above, clitics are seen in the TP field of the sentence. Now, according to Chomsky (2001: 37-38) "a substantial core of head-raising processes… may fall within the phonological component… Overt V-to-T raising, T-to-C raising and N-to-D raising are phonological properties, conditioned by the phonetically affixal character of the inflectional categories… Considerations of LF-uniformity might lead us to suspect that an LF-interpretive process brings together D-N and C-T-V… to form wordlike LF supercategories in all languages, not only those in which such processes are visible". The discussion just quoted falls short of a formal implementation. Yet, the overall idea is clear, namely that lexical categories and their functional spines form LF units which may be externalized at any of the positions that the extended projection comprises. In this perspective, we may assume that what applies to the C-T-v sequence applies to any heads adjoined to (a member of) the sequence – so that in the Romance languages the verb is pronounced in T and so are the clitics adjoined to vP. The *v* field is simply pronounced at the next phase head up, namely T.

As for the leftward orientation of clitics, we do not adopt Kayne's (1994) LCA, but rather endorse Chomsky's (2005:15) proposal that Merge yields non-ordered couples (sets) of the type {X, Y}. At the same time, "one asymmetry imposed by the phonetic interface is that the syntactic object derived must be linearized… If linear order is restricted to the mapping to the phonetic interface, then it gives no reason to require the basic operation Merge to depart from the simplest form … unstructured Merge, forming a set". In this perspective there is nothing much to be said about the leftward orientation of clitics in (36a) since it is the normal orientation of heads, as in (36b).

In short, (Romance) clitics are D heads first merged in vP adjoined position where they introduce either φ features matching those of *v* (Acc) or functional specifications of *v* (Appl, Voice). Their ordering by dominance relations is predicted on the basis of whatever orders the corresponding verbal heads. Their linear ordering to the left is what is normally expected of heads in Romance.

5.2. 1/2P clitic DOM

Manzini and Savoia (2014b, 2018a), while remarking on some of the problems highlighted here in section 4 for current theories of the PCC, argue that the PCC should be discussed in the light of DOM, as applying to 1/2P referents. In this section we will briefly review the analysis of DOM we adopt and then go to consider 1/2P vs 3P splits in the light of DOM.

Recent approaches to Romance DOM provide a theoretical framework in which DOM objects are not just morphologically syncretic with obliques (specifically datives), but are represented as obliques in the syntax. Torrego (2010), Pineda (2014), working in an Appl framework, assign both goal datives and DOM arguments to the Appl projection. Manzini and Franco (2016) avoid the Appl projection, in that it does not seem to correspond to the actual morphosyntactic organization of Indo-European languages. Rather, the oblique/dative content is lexicalized by adpositions or case inflections. In their terms, the Romance *a* 'to' preposition, or the Punjabi *-nu* postposition, carry inclusion content in the sense of Belvin and den Dikken (1997), as does the *of*/genitive preposition in DP contexts.

Following Kayne (1984) and much subsequent literature, in a goal dative sentence such as *He gave the book to them,* a possession relation holds between the dative (*to them*) and the theme of the ditransitive verb (*the book*). The elementary *to* relator takes as its internal argument its sister DP, *them* (the possessor) and as its external argument the sister to its projection, i.e. the theme of the verb, *the book* (the possessee) yielding a possession relation between them. The syncretism of goal dative and of DOM, is based on the fact that object DPs which are referentially highly ranked require the elementary relator P introducing goals for their embedding, as in (37). In Appl terminology, they must be introduced as Appl arguments, no less than goals.

(37) *DOM*
[$_{vP}$ … [*(P/K) DP] …]where DP is highly ranked on the referential / D-scale (where high ranking is subject to parametric variation)

The intuition is that in a Spanish example like (38a) the verb *contratar* 'hire' can be paraphrased as 'give/make a contract to/with'. In structure

(38b), we adopt the standard minimalist assumption that transitive predicates result from the incorporation of an elementary state/event V into a transitivizing *v* layer. Within such a framework, in (38b) the two arguments of *a* are its object DP *una amiga* 'a friend' and the result event *contrato* 'contract', where 'a friend' includes/locates/possesses the 'contract' result. Under (37), the sensitivity to the two layered *v*-V structure characterizes only highly ranked referents. By contrast, indefinite/inanimate complements are embedded as accusative themes.

(38) a. Han contratado *(a) una amiga/Julia/mi amiga.
they.have hired (to) a friend/Julia/my friend
'They hired a friend/Julia/my friend' Spanish (Torrego 2010)
b. $[_{vP}\ v\ [_{VP}$ contratado $[_{PP}$ a $[_{DP}$ una amiga]]]]

With this much background on DOM, let us then consider how it applies to 1/2P clitics in Romance. Descriptively, 1/2P object clitics differ from 3P ones with respect to their distribution (i.e. their position in the clitic string), their morphological make-up (i.e. the presence vs. absence of gender and Case distinctions) and their agreement properties (i.e. the presence or absence of agreement with the perfect participle). We succinctly illustrate the case and agreement peculiarities in (39). In Italian, accusative 3P clitics have a different form from dative clitics, cf. the contrast between *la* in (39a) and *le* in (39c); however 1/2P clitics have a single morphology (*mi* for 1P) for both contexts. This may be treated as a syntactically irrelevant syncretism except that it corresponds to what are undoubtedly syntactically significant behaviours. Accusative 3P clitics obligatorily agree with the perfect participle, as in (39a) vs (39b). On the other hand, datives do not agree, as in (39c), independently of whether they are 1/2P or 3P. In turn, 1/2P clitics corresponding to an internal argument can either agree with the perfect participle, as in (39a), or not agree with it, as in (39b). (39b) is therefore the crucial example, showing the contrast between 3P and 1/2P.

(39) a. Mi/la hanno chiamata
me.F/her they.have called.F
'They called me/her'
b. Mi/*la hanno chiamato
me.F/her they.have called.M
'They called me/her'
c. Mi/le hanno parlato/*parlata
to.me.F/her they.have spoken.M/spoken.F
'They spoke to me/her' Italian

Consider first case patterns, namely the fact that there is a single 1/2P clitic for both direct objects (39a-b) and goal datives (39c), as opposed to the

different morphologies observed for 3P. Manzini and Savoia (2014a, 2018a) argue that 1/2P clitics undergo DOM, which in present terms means that they are obliques, consisting of a lexical base *m-/t-* and of a K dative inflection *-i*, as illustrated in (40).[8]

(40) … [$_{D}$ m] [$_{K}$ i] [$_{VP}$ chiamato/chiamata]

Let us then go on to consider agreement, provisionally accepting the conclusion that 1/2P clitics undergo DOM. Arguably, the two logically possible agreement patterns for an oblique which is also an internal argument of a verb are instantiated. Specifically, DOM elements may agree with perfect participles, patterning with other internal arguments, as in (39a). Alternatively, they may pattern with other obliques, for instance goal datives, in not undergoing perfect participle agreement, as in (39b).[9]

We follow Manzini and Franco (2019) in assuming that labelling is ultimately responsible for this double possibility. Specifically, we propose that the K relator may either label the whole clitic, i.e. behave like a traditional adposition, or not label it. In the latter case, the clitic is labelled by D, so that the K relator behaves more like a traditional case/inflection. We further propose that a DOM object labelled as D will undergo Agree like a bare object D(P). A DOM object labelled as K will not undergo Agree, like any KP/PP. Thus the structure in (40) is to be refined as in (41). If PP projects, agreement is not triggered, as in (41a). If DP projects, agreement is triggered, as in (41b)

(41) a. … [$_{K}$ [$_{D}$ m] [$_{K}$ i]] [$_{VP}$ chiamato]
b. … [$_{D}$ [$_{D}$ m] [$_{K}$ i]] [$_{VP}$ chiamata]

The double labelling possibility proposed for DOM arguments ultimately derived from that proposed by much literature on so-called pseudo-partitives (Pesetsky 1982). One non-obvious property of the labelling parameter is that it affects structural obliques (DOM objects, pseudopartitive complements of quantificational expressions), but not to inherent obliques. Thus, it does not affect dative goals as opposed to DOM objects. In other words, only a struc-

[8] In Italian, at least in the normative variety, DOM does not affect 1/2P full pronouns. Thus lexical DPs and clitics are associate with slightly different case systems. The 1/2P vs 3P cut is independently attested for full pronouns in Abruzzese varieties (Manzini and Savoia 2005).

It is also possible that the same language has DOM in both the clitic domain and the full argument domain, but not with the same cut on the referential hierarchy – as seems to be indicated by some of the intrincate data concerning clitic doubling (*leismo*, *loismo*, etc.), cf. Manzini (forthcoming, and references quoted there).

[9] The same alternation affects DOM objects in Indo-Aryan. In ergative alignments, absolutive objects agree with the perfect participle; DOM objects agree in some languages, while in others (e.g. Hindi) they don't.

ture like (42) is possible for goal datives in (39c). We propose that labelling by D as opposed to labelling by K is impossible with inherent obliques, because they need to project the K content as part of their inherent status, i.e. as part of the fact that their P/K properties are selected by a verb. Hence, the agreement parameter only affects structural obliques such as DOM and not the same cases when they are inherent.[10]

(42) … $[_{K}\ [_{D}\ m]\ [_{K}\ i]]$ $[_{VP}$ parlato]

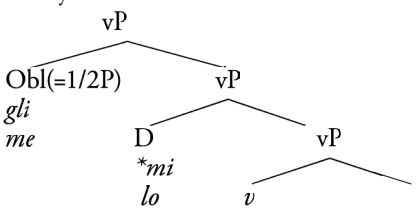
Other split behaviours of 1/2P vs 3P clitics in Romance, which can only be briefly mentioned here, are consistent with the conclusion that 1/2P are obliques. Thus 3P accusative clitics follow all obliques in the clitic string (e.g. Italian *ce lo porta* 'He brings him/it there'). 1/2P clitics precede some obliques, even when they are internal arguments (e.g. Italian *mi ci porta* 'He brings me there'), see Manzini and Savoia (2017). Even in acquisition, there is a well attested pattern of omission opposing 3Acc clitics (more frequently omitted) and 3Dat or 1/2P clitics, less frequently omitted (Guasti 2017: 299 and references quote there).

5.3 Core analysis of the PCC

The core configuration for the PCC is represented by Italian (43). The 1/2/3Dat - 3Acc combination is allowed and the *3Dat -1/2Acc combination is excluded under both the strong and the weak PCC.

(43) a. Me lo/ glielo/ *gli mi presentano
to.me him/ to.him-him/ to.him me they.introduce
'They introduce me to him/him to me/him to him' Italian

b.



[10] E. Kiss (2013, 2017) highlights the relevance of Uralic languages, including Hungarian, for the theoretical debate on the PCC, also in connection with DOM. The lack of accusative case marking and the anti-agreement effects with 1/2P in Uralic are strikingly similar to those observed for Italian 1/2P clitics. Barany (2017) applies the Cyclic Agree model of Bejar and Rezac (2009) to the Hungarian facts; see E. Kiss (2017) for possible problems.

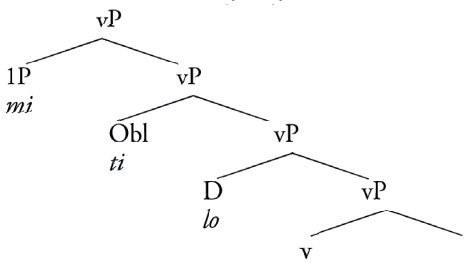
Let us begin with the wellformed combinations *glielo* (3Dat – 3Acc) and *me lo* (1Dat - 3Acc). The D clitic *lo* merges with v(P); from its position, it is able to Agree with *v* and hence satisfy the Case Filter/Visibility. Either *gli* or *me* can then be associated with the Obl/Appl clitic position, interpreted as either a goal or as a DOM. Consider however the illformed pattern **gli mi* (3Dat – 1Acc). The 1/2P clitic cannot be hosted by the direct case D clitic position for the simple reason that it must undergo DOM, and therefore become associated with Obl. If it is inserted under Obl it prevents a goal from doing so, leading to illformedness, given the absence of other suitable host positions for the goal argument.

This proposal is essentially as put forth by Manzini and Savoia (2014b, 2018a). In a similar vein, E. Kiss takes it that "the … constraint … restricting the assignment of accusative case to 1st and 2nd person nominals, is known cross-linguistically as the Person–Case Constraint". Effectively, then, we reduce the (apparently) global PCC to a local constraint. The insertion of 1/2P creates conditions (namely DOM, or pairing with Obl) which put severe restrictions on the subsequent build-up of the structure, essentially in the way suggested by Georgi (2012). The crucial property of our account of the PCC, which sets it apart from the family of accounts reviewed in section 4, is that Minimality intervention on the Agree path plays no role in blocking PCC configurations. Furthermore, the account that we sketch is unlike the accounts reviewed in section 4 in not requiring any ad hoc principles stating the special visibility needs of 1/2P, P-uniqueness or other. For, the special status of 1/2P is taken care of directly by DOM.

Italian however is not a strong, but a weak PCC language, where1Dat > 2Acc or 2Dat > 1Acc are both licit. Though the surface order *mi ti* in (44a) is obligated, either reading is possible. In Agree approaches the switch from strong to weak PCC is signaled by a switch from Agree to Multiple Agree (Anagnostopoulou 2005) or from P-uniqueness to lack thereof (Pancheva and Zubizarreta 2017). We suggest that weak PCC languages have a dedicated 1P or 2P position in addition to the Obl position used to far, along the lines of (44b).

(44) a. Mi ti/me lo presenta
me you/me him he.introduces
'He introduces me to you/you to me/me to him'

b.

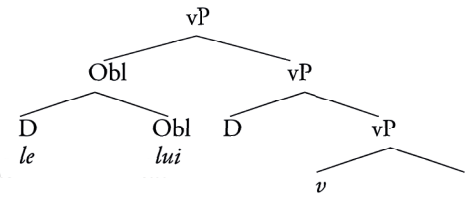


Preliminarily, we need to insure that the facts in (43) still follow. To begin with, *me lo* 'to me it' is licit. A 3P internal argument is merged in D, creating no interference with the 1/2P clitic. By contrast **mi gli* 'me to him' is still excluded. The 1P internal argument merges with the DOM position Obl blocking the 3P goal. Crucially, we need to assume that some principle of minimal merge (Earliness) makes the additional 1P position unavailable. Such a principle is not in any way construction specific or feature specific. Simply it imposes to Merge in the first available position – and can possibly be reduced to Minimal Search under the not unreasonable idea that selection (here argument selection) is probing (Cecchetto and Donati 2015).

Consider next the licit *mi ti* combination in the reading 'me to you'. Merger of the 2P clitic as the internal argument of the verb leads to DOM and hence association with Obl. The specialty of Italian in (44b) is that there is an extra 1P position where the goal 1P clitic can be merged, saving the configuration. Furthermore, *mi ti* can have not only the 1Dat - 2Acc interpretation but also the reverse one, namely 1Acc - 2Dat. In order to understand this reading, we need to take a small detour. Recall that according to Kayne (1984), Pesetsky (1995), Harley (2002) and many others, ditransitive verbs embed a locative or possession predication between the theme and the dative – to the effect that the theme is possessed/located by the dative. In other words *I gave a book to Peter* embeds a small clause [*the book to Peter*], where the accusative is the possessee and the dative is the possessor in a possession relation.

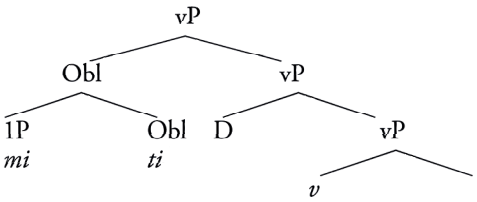
Manzini and Savoia (2017) suggest the account in (45) for French *le lui* 'it/him to him', where the order of clitics illustrated for Italian (36) is reversed. In (45), Acc/D is adjoined to Obl and the Obl constituent is attached to vP. The adjunction in (45) is read like a small clause predication, namely the D clitic *le* is a possessee/located element, while the Obl clitic *lui* is the possessor/locator. The structure in (45) does not interfere with the strong PCC, since 1/2P refuse association with D and require association with Obl, whatever the structure.

(45)



Something similar to (45) is formally possible for the *mi ti* string of Italian, in the reading 'me to you'. In (46), the extra 1P position is adjoined to Obl allowing the reading where 1P is the possessee element of the Obl predication, i.e. the theme. The 2P element is read as the possessor, i.e. the dative argument. The structure in (46) does not interfere with the strong PCC, since any 1/2P internal argument homes in for Obl either by substitution of by adjunction, locking a 3P Dat out of it.

(46)



In short, the weak PCC in Italian depends on the availability of an extra 1P position, which can further be deployed in one of two logically possible structural ways, namely (44) and (46). Since Catalan is like Italian but the order of the string *te m* is reversed, we can assume that the extra position available in Catalan is 2P. Other well-known facts also follow from the present approach. Spanish differs from both Italian and Catalan in presenting DOM with 3P clitics, in the so-called *leista* dialects. As predicted under the present account, these interact with 1/2P clitics exactly as any goal dative would, yielding instances of the PCC, for instance in (47b) (Ormazabal and Romero 2007, 2013).

(47) a. Le lleve a tu hijo a casa
3DOM brought.I to your son to home
'I brought your son home'

b. Te (*le) lleve (a) tu hijo a casa
to.you 3DOM brought.I to your son to home
'I brought you your son home'

c. Te lo lleve a casa
to.you him brought.I to home
'I brought you it/him home'

Before considering the Me-First PCC of Romanian, we take a brief detour into some Balkan languages. As detailed by Manzini and Savoia (2014b, 2018a), Albanian and its dialects have a clitic system similar to that of Italian. 3P singular clitics differentiate an accusative form /ɛ/ from a dative form /i/. In the 1/2P, there is a single form /mə/, /tə/. Therefore we analyze Albanian as Italian, namely as presenting systematic DOM of 1/2P. In the (Geg Albanian) variety of Shkodër, the co-occurrence of a 1/2P clitic with a 3P dative or another 1/2P clitic is excluded (strong PCC), as in (48). The account of the strong PCC given in (43) can be adopted for Albanian.

(48) a. *ai m i kɑ prezan'tu:
he me him has introduced
'He has introduced me to him'

b. *m tə kɑ prezan'tu:
me you he.has introduced
'He has introduced me to you/you to me' Shkodër (Geg Albanian)

Greek also has the strong PCC as in (49). Evidently, we want to be able to apply to Greek the same analysis adopted in the discussion surrounding (43) for Romance. In turn this implies that 1/2P clitics undergo DOM and are merged as Obl.

(49) a. *Tha su me sistisune
will to.you me introduce
'They will introduce me to you'
b. *Tha tu se stilune
will to.him you send
'They will send you to him'

However, Greek presents the not insignificant problem that the language has distinct forms for 1/2P singular direct object (Acc) and 1/2P singular indirect objects (Dat), as seen in table (50).

(50)

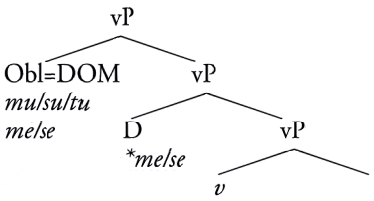
	Acc (m./f./n.)		*Obl (m./f./n.)*	
1sg	me		mu	
2sg	se		su	
3sg	to-n/ti-n/to		tu/tis/tu	
1pl		mas		
2pl		sas		
3pl	tus/tes/ta		tus/ta	Greek

Note that in (50), the 1/2P oblique forms *mu/su* 'to/of me/you' have a clear morphological similarity to the 3P forms, specifically masculine/neuter *tu* 'to/of him/it'. On the contrary, the objective forms *me/se* 'me/you' lack the distinctive *-n* morphology of 3P singular, e.g. *ton/tin* 'him/her', as well as any nominal class (i.e. gender) inflection. Importantly the *-n* inflection characterizes the accusative singular of all non-neuter lexical Ns as well as their Ds and adjectival predicates. Therefore, 1/2P object clitics have a morphological shape distinct from that of 3P clitics and lexical categories. As ever, two routes of analysis are open to us. One is the traditional one, namely imputing the 1/2P vs. 3P split to morphological quirks and external accidents, without any significance or consequence for the grammar as a whole. We take the alternative approach, namely that 1/2P *me/se* in (50) are morphologically different from 3P *ton/tin* because they are exponents of DOM case rather than Acc case. In other words, the conceptual prominence of 1/2P translates into a DOM syntactic treatment. The externalization component simply records this differential treatment in a transparent fashion.

Now, if the construal of DOM in section 5.1 is correct, DOM is a form of obliquization. In other words, the essence of DOM is that a highly ranked referent cannot be embedded as a theme, but must be raised to a possessor/locator/experiencer position. Therefore, independently of syncretism, expo-

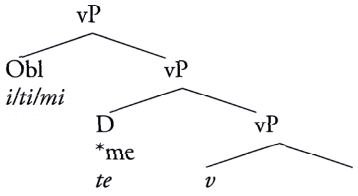
nents of DOM are lodged in the same slot as inherent Obl in the sentence tree. As a specific instance of this, 1/2P clitics can never be merged in the same D position as 3P objects, but must be merged in the same Obl position as inherent goals. This creates configurations of the type in (51), which yield the strong PCC in Greek in exactly the same way as discussed for (43) – namely, first merging a 1/2P element in Obl (=DOM) prevents any inherent goal from doing so.

(51)



Finally, consider Romanian, where the PCC takes neither the strong not the weak shape but the Me-First shape. In essence, the data reproduced at the beginning of section 5 include any combination except *3Dat>1Acc and *2Dat>1Acc. The obvious conclusion seems to us to be that Romanian is a language where the PCC isolates 1P as opposed to 2/3P. The relevant structure is then as in (52), to be read as follows: any (i.e. 1/2/3P) Dat element can combine with *te* in Acc position (and of course with a 3P clitic) but not with *me*. We may assume that this is a language where 1P is targeted by DOM; as such it cannot be inserted under D, but targets Obl. Thus combinations Dat - 1P are excluded, while other logically possible combinations are allowed.

(52)



6. Conclusions

In sections 2-3 we have addressed binary features in the Hallean tradition, both in phonology and in morphology. In order to keep the discussion manageable we have focused on two specific case studies, namely vocalic features in phonology and person features in morphology. We have argued that the relative formal richness of bivalent features (as opposed to monovalent ones) does not have obvious empirical advantages – rather the reverse may be argued to be true. Specifically, under monovalent feature systems, the vocalic

triangle /i/, /a/, /u/ or the person referents Speaker (1P), Hearer (2P), Definite/Demonstrative (3P) can be treated as atomic – a treatment that has no possible counterpart under binary feature systems. We have seen that, being formally more complex, binary systems are prone to formal issues that do not touch monovalent systems, concerning for instance the interpretation of two positively specified and contradictory properties. We have found in Person feature repertories the same formal and substantive issues as in phonological ones. In essence, binary notation adds richness, creating potential formal problems and conceptual ones (e.g. the non-primitive status of 1P). The parallelism between binarism in phonology and morphology further shows that the issues we have raised are inherent to binarism and not simply accidental to one or other of its applications.

In section 2, we have considered vowel inventories defined on the basis of monovalent and bivalent features and their interaction with phonological computation/representations. Morphological inventories, such as those concerning Person in section 3, ultimately interact with syntactic computation. Therefore, sections 4-5 are devoted to the interaction of Person features with DOM, construed as a form of obliquization, and with the PCC. Our idea is that the latter does not involve Minimality. Rather 1/2P subject to DOM, hence to obliquization, merge in the Obl (Appl) position of the verbal spine, blocking merger of inherent obliques (dative goals) in the same position.

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