

ON THE STRUCTURAL AND TYPAL DIFFERENCES BETWEEN MASS AND COUNT NOUNS: EVIDENCE FROM ROMANCE*

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1 Introduction

There is an ongoing debate regarding the syntactic and semantic nature of the mass versus count-noun distinction. If we concentrate solely on the semantic side of the debate, we can distinguish two families of approaches. The first approach, represented, for instance, by Link (1983) and Chierchia (1998), among others, argues that the difference between mass and count can be reduced to homogeneity or vagueness. According to the other approach, the difference is typal (Krifka, 1989, Rothstein, 2010). This paper contributes to the debate by considering new data from Romance dialects which provide empirical support for the latter family of approaches.

Our starting position is based on two assumptions. First, we assume – following Borer (2005) and Rothstein (2010), among others – that real world homogeneity (or cumulativity for that matter) does not necessarily correspond to a grammatical representation of homogeneity (or cumulativity, respectively). Furthermore, we assume that there is no one-to-one mapping between real world countability and semantic countability.

Once we take the stand that homogeneity and countability are encoded in the grammar, the question that arises is whether the encoding happens at the level of the lexicon or whether it arises through derivation. Specifically, if the difference between mass and count is typal, does it mean that typally distinct nouns must have a distinct syntactic structure? The answer to such a question is not trivial. For example, Borer's position is that a typal difference necessarily arises out of differences in the syntactic structure, whereas Rothstein defends the position that typal differences are in principle independent of structural differences, and that semantically distinct nominal structures can in principle be syntactically identical.

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The empirical focus of our paper lies in the investigation of non-homogeneous agreement patterns in a large group of Italo-Romance dialects. Even though the gender system in Romance is mostly binary (M and F), some Italo-Romance (and Ibero-Romance) dialects¹ exhibit properties of a three-way gender system. Interestingly, the three-way gender system is attested only with a subset of nouns, namely, certain mass nouns (MN), and a certain productive class of deverbal nouns. Furthermore, unlike the binary gender system, the trinary gender system gives rise to surprising morphological mismatches in the agreement domain. We will argue that to understand the morphological properties of MN we must analyze them as NPs, i.e., nominal projections lacking a D layer encoding number and gender. Although our proposal refers directly to the syntactic structure, we will place the burden mainly on semantic types. Concretely, we will argue that there is a relation between the semantic type of the noun and its structure. Here we follow Winter (2000) in assuming that there is no type-shifting without D'. Interestingly, if D is semantically or syntactically required, a structure extension takes place and triggers morphological or morphophonological alternations. We will use the observed correspondence between syntactic processes (agreement) and semantic interpretation to argue that the semantic distinction between mass and count indeed has a structural counterpart. Moreover, we will go one step further and argue that since the differences in the interpretation of mass/count map onto syntactic structures, the distinction itself cannot be reduced to vagueness, but rather must be typical.

The broader questions that lie behind our investigation (and which unfortunately remain mostly unanswered due to limitations of space) concern the nature of nominal structures and their inherent morphological features; the relationship between a morphological structure and its semantic interpretation; and the very nature of type-shifting in natural languages.

The paper is organized as follows. First, we present the basic data (Section 2), then a new semantic generalization motivated by the data. Section 3 presents the actual proposal and section 4 explores some further predictions the proposal makes.

2 The data

The surface realization of the mass versus count noun distinction in many non-standard Romance varieties shows a wide range of variation. What is common to this wide-ranging variation is the existence of a special morphological realization that is distinct both from masculine singular (M.SG.) and feminine singular (F.SG.), and which is best characterized as a 'third' gender category. This third category often reveals itself in agreement relations. While some agreement relations exhibit a default morphological agreement (typically M.SG.), other agreement relations exhibit a marked morphological realization.

If we survey the relevant Italo-Romance dialects we can group the types of marked morphological realization into three general patterns based on their morphological and morphophonological properties. We call Pattern 1 the pattern that is attested in the Rome-Ancona

¹The Italo-Romance dialects in question are those in south-central Italy, in particular, varieties along the so-called Rome-Ancona corridor (northern boundary) to those found in Puglia and Basilicata to the south: the area includes, aside from varieties spoken in Puglia and Basilicata, dialects spoken in Campania, the southern Marche, southern Umbria, Lazio, Abruzzi, and Molise. Ibero-Romance varieties that display a similar mass-count phenomenon are located in north-western Spain, in Asturias and Cantabria. For reasons of space, this paper addresses only the properties of Italo-Romance dialects; for a complete analysis accounting for the Ibero-Romance data as well, see Kučerová and Moro (In preparation).

corridor (e.g., in the dialect of Servigliano). In this pattern mass nouns exhibit an affix which is distinct from the affix attested for masculine singular count nouns. This pattern is often characterized by morphophonemic alternations in the determiner system (stemming from the presence or absence of metaphony²), namely on demonstratives, and sporadically in the noun stem itself. Thus, two lexically related nouns may or may not exhibit a morphophonemic alternation depending on whether the intended interpretation of the noun is mass or count, but we do find distinct determiners (definite articles, demonstratives) used with mass nouns. Examples (1)–(3) exemplify these basic properties. The Italo-Romance examples presented in this section are drawn from various sources. Examples from Celano (Abruzzi) are our own; all other examples are drawn from Andalò (1991), Leonard (1978), Maiden (1991, 1997), Penny (1994), Rohlfs (1966, 1968).

(1) *Demonstratives (distinct affixes + morphophonemic alternation)*

- | | | |
|----|-------------------------------------|-----------------------|
| a. | kwístu, kwíssu, kwíllu | M.SG |
| b. | kwésta, kwéssa, kwélla | F.SG |
| c. | kwésto, kwéssu, kwéllu | MN |
| | ‘this’, ‘that’, ‘that (over there)’ | (Servigliano, Marche) |

(2) *Morphophonemic alternation in nouns*

- | | | |
|----|--------------------------|--------------------|
| a. | /ferru/ ‘iron implement’ | M.SG |
| b. | /ferro/ ‘iron’ | MN |
| | | (Borgorose, Lazio) |

(3) *Definite articles*

- | | | |
|----|----|---------------|
| a. | lu | M.SG |
| b. | lo | MN |
| | | (Servigliano) |

Patterns 2 and 3, typical for dialects south of the Rome-Ancona corridor, usually have no overt affixes because of general final atonic vowel neutralization.³ Thus, on the noun itself gender and number distinctions are marked only by morphophonemic alternations (tonic vowels). Consequently, the mass versus count distinction is overtly expressed mainly through the inflectional morphology of determiners (definite articles and demonstratives) and direct object pronouns (cf. Maiden 1997 and Maiden 2011).

Pattern 1 and Pattern 2 may be characterized as having distinct determiners (definite articles and demonstratives). In Pattern 3 the surface realization of definite articles, demonstratives and direct

²Metaphony is an assimilatory process whereby final vowels (affixes) exert pressure on, and ultimately change (raise or diphthongize), preceding tonic vowels. In the south-central Italian dialects, metaphony gave rise to a morphological system quite different from the system of Standard Italian: tonic vowel alternations, stemming from changes brought about historically by widespread metaphony, generally mark number and gender on the noun (and person on the verb), rather than final atonic vowels, as is the case in Standard Italian. For a detailed discussion of Italian metaphony, and the relationship between phonologically-conditioned metaphony and the morphologization of metaphonic alternations, see Maiden (1985, 1987, 1989, 1991) and Savoia and Maiden (1997).

³There are some exceptions to the general pattern of final vowel neutralization. For example, in many varieties the feminine singular affix is overtly realized under certain conditions, as in *la rosa bbella* ‘the beautiful rose’.

object pronouns appears to be the same for mass nouns and their masculine singular counterparts, but mass noun and masculine forms differ crucially in that the mass form produces *raddoppiamento sintattico* (lengthening of the initial consonant of the subsequent word), while the masculine does not. In Pattern 3 varieties *raddoppiamento sintattico* is normally triggered by feminine plural and mass determiners and pronouns.⁴ The following examples from the dialect of Celano (Pattern 2) and Neapolitan (Pattern 3) illustrate the basic characteristics. Forms that trigger *raddoppiamento sintattico* are labeled [+RS].

(4) *Pattern 2: Demonstratives (three-way distinction)*

- | | | |
|----|---------------|-------------------|
| a. | kwístə líbbrə | |
| | ‘this book’ | M.SG |
| b. | kwəsta kásə | |
| | ‘this house’ | F.SG ⁵ |
| c. | kwəstə pépə | |
| | ‘this pepper’ | MN |
- (Celano, Abruzzi)

(5) *Pattern 3: Demonstratives*

- | | |
|---------------------------------|--------------|
| kistu, kissu, killu | M.SG |
| kisto, kisso, killo | [+RS] MN |
| ‘this, that, that (over there)’ | (Neapolitan) |

As mentioned above, the three way distinction reveals itself also in the form of direct object clitic pronouns. As witnessed by examples (6)–(7), there are two non-feminine forms, unlike in the rest of the pronominal system, for a total of three distinct forms (M, F, MN).

(6) *Pattern 2: Direct object pronouns*

- | | | |
|----|----------------|----------|
| a. | i védə | |
| | ‘I see him/it’ | M.SG pro |
| b. | lə védə | |
| | ‘I see it’ | MN pro |
- (Celano, Abruzzi)

(7) *Pattern 3: Direct object pronouns*

- | | | | |
|----|-----------------|-----------------------|--------------|
| a. | o vidə | ‘I see it (the dog).’ | M.SG pro |
| | it.M.SG see.1SG | | |
| b. | o bbidə | ‘I see it.’ | [+RS] MN pro |
| | it.MN see.1SG | | |
- (Neapolitan)

⁴For an overview of *raddoppiamento sintattico* in the south-central Italian dialects, see Agostiniani (1976), Fanciullo (1986, 1997) and Loporcaro (1997).

⁵The F.SG pronominal form of the demonstrative would be *kwəstə*.

The crucial properties of these two patterns are captured by the forms of the definite article: there are three distinct forms of the definite article in Pattern 2, and the mass noun definite article is distinct from the masculine singular definite article; in Pattern 3 the distinction between mass nouns and masculine singular nouns is expressed solely by means of *raddoppiamento sintattico*. Examples demonstrating the principal differences between Patterns 2 and 3 are given in (8)–(11). The table in (12), adapted from Penny (1994), is intended to convey the range of attested definite article forms: the first four examples show cases where the difference between mass and masculine singular is achieved by a distinction in the definite article; the latter four cases show varieties in which the masculine singular and mass definite article appear to be the same, but where the mass definite article triggers *raddoppiamento sintattico*.

(8) *Pattern 2: Definite article*

- | | | |
|----|--------------|------|
| a. | i líbbrə | |
| | ‘the book’ | M.SG |
| b. | lə pépə | |
| | ‘the pepper’ | MN |
| c. | la vaʎʎələ | |
| | ‘the girl’ | F.SG |
- (Celano, Abruzzi)

(9) *Pattern 3: Neapolitan*

- | | | |
|----|-----------------------|----------|
| a. | o kaffé | |
| | ‘the (cup of) coffee’ | M.SG |
| b. | o kkaffé | |
| | ‘the coffee’ | MN [+RS] |

(10) *Pattern 3: S. Campania*

- | | | |
|----|------------|----------|
| a. | lu lúpu | |
| | ‘the wolf’ | M.SG |
| b. | lu llátti | |
| | ‘the milk’ | MN [+RS] |

(11) *Pattern 3: Puglia*

- | | | |
|----|------------|----------|
| a. | u pá:nə | |
| | ‘the loaf’ | M.SG |
| b. | u ppá:nə | |
| | ‘bread’ | MN [+RS] |

(12) *Summary: definite article*

<i>variety</i>	MN	M.SG
Norcia (Umbria)	lo	ru
Rieti (Lazio)	lo	lu
Nemi (Lazio)	o	u
Celano (Abruzzi)	lɔ	i
Naples (Campania)	o+	o
Bari (Puglia)	u+	u
Bisceglie (Puglia)	rɔ+	rɔ
Avigliano (Basilicata)	lu+	lu

Even though the special marking of mass nouns in Italo-Romance dialects has attracted a lot of attention in the Romance linguistics literature, to our knowledge there is no synchronic account of the data that takes into consideration the theoretical syntax-semantics literature on mass nouns. The existing accounts approach the data either from a diachronic perspective or from a Romance-internal synchronic perspective. The historical view on the Romance mass noun is that it is either a residue of the Latin neuter gender, since many mass nouns are reflexes of the Latin neuter, (Lausberg, 1965–1966, Merlo, 1906, Politzer, 1957, Maiden, 1991, 1997, 2011), or that the marked mass forms are evidence of the survival of a third Romance case, beyond the nominative and accusative (dative, genitive, ablative or syncretized form) (Hall, 1968, Leonard, 1978, Messing, 1972, Penny, 1994, 2009). Despite attempts to reconstruct the origins of the Italo-Romance and Ibero-Romance mass noun, it is not clear that a unified diachronic account is possible (one that can explain the facts of both areas): it is not entirely clear whether we have a case of separate but parallel innovations or common origin (cf. Lüdtke 2003 and Penny 1994). However, the focus on the origins of the Romance mass noun has relegated into the background some important facts about the phenomenon.

First of all, the special marking of mass nouns is both a productive and highly stable feature of the Romance varieties in question. As Romance linguists have noted, the special marking is found not only on mass nouns inherited from the Latin neuter (such as the words for ‘honey’ or ‘partially fermented grape juice’, respectively MEL and MUSTUM), but has been extended to ‘newer’ lexical items, such as the words for ‘coffee’ and ‘tea’ (Neapolitan), or for ‘sugar,’ ‘rum’ and ‘saffron’ (dialect of Celano). Furthermore, the special marking is not restricted to mass nouns but is found on nominalized adjectives and infinitives as well (which were neuter in Latin). What’s more, the productivity of the special formation continues in contact-induced borrowing. Moro (In preparation) reports that speakers of Celano (Abruzzi) living in Canada derive new nominalized infinitives (corresponding, for example, to ‘driving’ and ‘checking’); the special mass noun marking extends to various lexical items adapted from English, such as nativized forms for ‘copper,’ ‘nickel,’ ‘titanium,’ ‘peanut butter,’ ‘cottage cheese,’ ‘brown sugar,’ ‘baby oil,’ ‘baking powder,’ ‘hot chocolate,’ ‘cornstarch,’ and ‘Crisco.’⁶

⁶While for some of these borrowed forms the mass designation can be viewed as an extension or transfer of the category of the native equivalent (e.g., ‘copper,’ ‘butter’ and ‘cheese’ are mass nouns in the native variety), such a strategy does not allow us to account for all examples. Assuming English headedness plays a role in borrowed compounds (and it is not clear that this should be the case, since Italo-Romance compounding seems to be predominantly left-headed; see Vogel 1990 on Italian), then ‘cottage cheese’ and ‘peanut butter’ can be explained

In addition to the high level of productivity of these forms, the pattern raises two additional theoretical and empirical challenges that remain unaddressed. First of all, the morphophonological realization of the ‘third’ gender is in several respects unlike the morphophonological realization of any other ϕ -feature(s) in Romance. Thus, for example, we observe metaphony and *raddoppiamento sintattico* instead of a single identifiable discrete morpheme as otherwise typical for Romance.

Crucially, an additional empirical challenge is raised by a related set of data, to our knowledge not addressed in the existing literature, namely, by agreement mismatches with mass nouns. While masculine and feminine nouns in these varieties uniformly trigger masculine and feminine agreement, respectively, the agreement patterns attested with mass nouns is not homogeneous. Concretely, in these dialects one mass noun can trigger two distinct agreement patterns within the same structure, as exemplified in (13).

- (13) So kumbratə lə vinə. Lə so kumbratə pərke ɛ bbonə.
 aux bought the. MN wine.MN. It. MN aux bought because is good. M.SG
 ‘I bought wine. I bought it because it’s good.’ (Celano, Abruzzi)

The noun *vinə* ‘wine’ is a mass noun. As we can see, the referential pronoun indeed realizes the mass noun agreement. However, the predicative adjective exhibits the M.SG. agreement. This is rather puzzling from a theoretical perspective because (i) the agreement pattern is not homogenous, (ii) the less marked agreement or perhaps even default agreement, i.e., M.SG., is not likely to be the result of a non-local syntactic relation because the non-local referential pronoun is still realized by the mass-noun form, and (iii) as we will see later, the M.SG. agreement is sometimes attested even *within* the noun phrase headed by a mass noun. To sum up, this is a rather unexpected, yet very systematic pattern. Consequently, an empirically adequate theory of mass nouns need to account for it. As far as we can tell, none of the existing theories does, hence a new account is needed.

3 Proposal

Irrespective of whether one adopts a syntactic or post-syntactic view of agreement (Chomsky 1995 vs. Bobaljik 2008, among others), the agreement pattern exemplified in (13) is puzzling because it cannot be described in terms of syntactic locality. We argue that the most empirically accurate generalization needs to be stated in semantic terms. The leading idea is that the agreement reflects differences in semantic types that closely correlate with the size of the syntactic structure necessary for the relevant semantic interpretation to be available. The semantic generalization we propose is given in (14).

- (14) *A new empirical generalization:*
 If a mass noun may be predicative, it triggers a “default” vocabulary insertion. If a mass noun must be referential, it triggers a “marked” vocabulary insertion.

by noting that ‘cheese’ and ‘butter’ are mass in the native variety; however, ‘baby powder’ and ‘hot chocolate’ would elude such an explanation, since both ‘powder’ and ‘chocolate’ are feminine in the speakers’ first language. In the borrowed compounds a native term never substitutes either member of the compound adapted from English, even though it may dominate elsewhere: in other words, [kaʃə] ‘cheese’ is used more than [tʃizə], but never substitutes ‘cheese’ in ‘cottage cheese.’

If this generalization is correct, the question that immediately arises is whether and how the semantic generalization may be related to differences in the syntactic structure. We argue that indeed there is a correlation, namely, we argue that the nominal projection of mass nouns is structurally deficient in that it lacks a D layer. In other words, we argue that a mass noun is structurally an NP and as such has no number projection (Borer 2005, among others).⁷ Consequently, since gender is dependent on number, mass nouns are necessarily genderless, in the sense they are neither specified for masculine nor feminine gender, a fact which is crucial for our account of the agreement pattern.

As for the semantic properties of NPs, we closely follow Winter (2000) in that we assume that DPs are rigidly quantificational, while NPs are rigidly predicative. Furthermore, we assume that type shifting is freely available (via choice function) but crucially only if D' is present in the structure. Thus if D' is present, type shifting may take place and consequently the noun can be interpreted as referential. If there is no D' present, the referential interpretation is not available.

What does this mean for mass nouns? If mass nouns were always NPs they would be restricted only to certain argumental positions and they would never combine with determiners such as definite articles. This is clearly false. We would like to suggest that mass nouns are indeed NPs by default but the grammar can employ a *last resort structure extension* that allows the noun to integrate with the syntactic structure. This happens only if the mass noun is selected by something that requires D' (or equivalently, type $\langle e \rangle$ ⁸).

For concreteness, we follow Wurmbrand (2007) who proposed a similar structure-building operation for infinitives. Wurmbrand observed that the exact size of embedded infinitives depends on the c-selection properties of the matrix verb. Consequently, further functional projections may be inserted in the structure if required by the c-selecting head. We argue that an analogous mechanism can be implemented for mass nouns. Whenever the structure requires something larger than NP, either for syntactic or semantic reasons, an additional structure-building operation takes place.

How does the last resort extension strategy relate to the agreement facts? We argue that the observed agreement pattern reflects the structural and semantic duality of mass nouns in the following way: If a mass noun can be interpreted as $\langle e, t \rangle$ it follows that there is no D' projection, consequently there is no gender and number feature present. Without these features no Agree valuation takes place and consequently the overt agreement is realized as the morphological default (the elsewhere). In our case we obtain M.SG. on predicative adjectives.

In contrast, if the structure requires type $\langle e \rangle$, for instance when the ϕ -feature values are morphologically realized on a referential pronoun, an additional structure must be introduced. The marked morphological realization we see in these cases – our 'third' gender – is a direct reflex of the last resort semantic process implemented as a structural adjustment. Crucially, if the higher structure is introduced because of the selectional requirements of a higher head, the NP still lacks number and gender features. Yet, valued number and gender features are required by the higher projections as this projection contains unvalued features.

We assume – in the line of Distributed Morphology – that for structure adjustment to be possible, feature insertion must take place (Noyer, 1992, Embick, 2000) and be followed by

⁷The limited space does not allow us to address here the question of the semantic interpretation of mass nouns as such. We assume the view of plurality articulated in Landman (2000). It is not obvious how our proposal could be executed in semantic systems such as that of Chierchia (1998, 2010).

⁸For the sake of simplicity of the presentation we will assume that referential interpretation corresponds to type e .

vocabulary insertion (Halle and Marantz, 1993). We argue that since the valuation process cannot be successfully resolved – as there is no valued feature present, yet the features need to be valued for the derivation to pass interface filters, the system resorts to a morphologically-marked realization – our ‘third’ gender (which in many dialects is morphophonologically identical to F.PL).

4 Further predictions

The proposal makes certain predictions. First of all, if a mass noun NP gets modified by something that is of type $\langle e, t \rangle$ it should be irrelevant whether the modifying element is locally adjacent (or attached) to the noun or whether it is non-local. Thus quantifiers as possible NP modifiers should pattern as predicative adjectives rather than demonstratives or definite articles, irrespective of whether they are merged within the nominal projection of the mass noun or whether they are in a predicative position. This prediction is indeed borne out as witnessed by (15).

- (15) $\text{pøkə} \quad \text{vinə}$
 ‘little.M.SG. wine.MN’ (Celano, Abruzzi)

Another prediction concerns non-quantificational adjectival modifiers. Non-quantificational adjectival modifiers in Romance can be either post-nominal or pre-nominal. Usually, the post-nominal adjectives are analyzed as adjoined to NP, while the pre-nominal position is the result of movement to a higher functional projection. According to our proposal, since post-nominal adjectives combine directly with NP, they should reflect the D-less NP structure and as such should show an $\langle e, t \rangle$ type of agreement, i.e., M.SG. In contrast, since pre-nominal adjectives need to adjoin to a structurally adjusted nominal structure, we expect them to display the marked mass noun agreement. This prediction is borne out as well, as witnessed by the following Neapolitan examples from Andalò (1991), (16). As we can see, the post-nominal adjectives do not trigger *raddoppiamento sintattico* exactly as we expect under the default masculine singular like behavior. In contrast, the pre-nominal adjective, unlike its masculine singular counterparts, does trigger *raddoppiamento sintattico*.

- (16) a. $\text{panə} \text{ pɔvərə}$
 bread poor M.SG/[−RS]
- b. $\text{pɔvəru} \text{ ppanə}$
 poor bread MN/[+RS]

One could even strengthen this prediction and argue for the following conclusion: if an adjective is never semantically required to combine with a type other than $\langle e, t \rangle$, we expect the adjectival morphology to show only the M/F contrast. Such an adjective should never inflect for the ‘third’ gender. For reasons of space and because the dialectal data are so varied we cannot elaborate on this prediction, but it is indeed the case that certain intersective adjectives lack the three-way inflectional morphology that interests us here.

In addition to these predictions, our proposal might shed light on the intuition of native speakers who tend to describe mass nouns as ‘feeling’ masculine singular despite the fact that their surface realization often displays properties of the feminine gender: in the dialect of Celano the surface realization of the MN and F.SG. demonstrative pronoun ‘this’ is the same, [kwəstə] (see (4) and note 5), and the morphophonological patterns of the demonstrative series overall

shows greater similarity between MN and F.SG. categories. Moreover, both in the dialect of Celano and in Neapolitan, the MN category shares surface characteristics with F.PL.: in the first case the MN definite article and F.PL. definite article are identical, [lə]; in Neapolitan only the MN and F.PL. determiner system can trigger *raddoppiamento sintattico*. We believe that the discrepancy between these surface similarities and native speaker intuition stems from the fact that at the level of the lexicon mass nouns are structurally rather small, having no number and gender projection. Since in these dialects a lack of gender corresponds to masculine (default), and a lack of number corresponds to singular, it is not surprising that native speaker perception is that mass nouns are really masculine singular. This basic lexical feature seems to be unaffected by the overt morphologically-marked realization which reflects the additional structure-building process. Presumably this is because the morphological readjustment happens only at the PF-branch of the derivation and as such has no effect on the interpretation.

To conclude, we have provided evidence from Italo-Romance dialects that there is a structural difference between mass nouns and count nouns and this difference has a direct semantic counterpart. Consequently, it follows from our proposal that the difference between mass nouns and count nouns is typal and, as such, cannot be reduced to homogeneity or vagueness. The open question is whether it is always the case that a typal difference has to translate into a structural difference. We believe that the answer is in principle negative since the observed Italo-Romance pattern results from a conspiracy of several morphosyntactic and morphosemantic factors, but the question remains open to further investigation.

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