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Agreement, Anti-agreement, and the Structure of the Verbal Paradigm*

0. Introduction

It has been proposed that syntax and a part of morphology are one module (Anderson 1982; Baker 1985, 1990). In view of the fact that morphology makes use of binary-hierarchical structures, there does not seem to be any *a priori* reason why such a reduction would not be possible. Anticipating such a reduction, we may say that the syntagmatic aspects of morphology might be subsumed to syntax.

However, morphology must in the ideal case also account for the paradigmatic aspects of language. Consider the vowel mutation in the following paradigm of the Dutch verb *kunnen*, 'can' in (1).

As to the stem vowel, we observe that the second person singular form links up with the plural forms whereas the 1st and 2nd person forms seem to relate to each other. It is not immediately clear how the

1. *The paradigm of the Dutch verb 'can', present tense.*

ik kan
jij kunt
hij kan
wij kunnen
jullie kunnen
zij kunnen

paradigmatic structure (i.e. the analogical cross-links) can be reduced to a hierarchic, binary structure. Moreover, such cross-links do not seem to correlate with the semanto-syntactic features [person] and [number]. As to this paradigmatic dimension, reduction to the syntax seems much less conceivable.

On the other hand, it has recently been discovered that some relation does exist between the paradigmatic structure of the verb and syntactic properties like verb movement (Pollock 1989, Platzack & Holmberg 1989, Chomsky 1992, Pollock 1993). Unfortunately, in order to characterize the verbal paradigm, these studies generally resort to concepts like "strong" and "weak", or "rich" and "poor", "person agreement", "number agreement" which lack a clear-cut empirical basis. In order to understand the apparent relation between the verbal paradigm and syntax in a more precise way, it seems desirable to study the paradigmatic structure in itself first.

It is the aim of this paper to find a proper, i.e. exception-less description of the paradigmatic structure of the verbal paradigm in a language. In the optimal case, this structure represents all *analogical* cross-links within a verbal paradigm of that language. In

other words, we want to have a description that can account for the analogical relations and mutual influences within the verbal paradigm. It will be shown that the verbal paradigm can best be characterized by a structure which has circular topology which is fully antisymmetric with respect to the syntactic features person and number. Only on the basis of such a paradigmatic characterization an attempt can be made to lay a link with syntactic processes like verb movement. It will be argued that the curious antisymmetry can be derived by the assumption that the relation between syntactic subject and the inflected verbal form is not a sharing of features, but a complementarity of features. If a verbal form shows overt person/number alternations, the verb has to move outside VP to check *whether these features are not already present on the subject.*, Under the assumption that two morphosyntactic entities can only enter a morphosyntactic unity (IP), both members have to check off whether they are of the different type. The replacement of an agreement model of the traditional grammar by a model based on complementarity of features provides us with an explanation of the seemingly irregularities in verbal paradigms.

1. The system behind analogical cross-links

The 19 century linguists were always aware of the phenomenon of analogy, but considered it just as a mechanism that disturbed the (diachronic) system of the sound laws.[1] Within their diachronic approach it was not really necessary to develop a theory of analogy. That is why these linguists often invoked *ad hoc* explanations using analogy whenever phenomena were observed that violated the sound laws discovered. Usually, the Neogrammarians did so with a lot of linguistic intuition, so that many of their results will be probably correct. But the synchronic approach of the structuralists and generativists did not lead to a serious investigation of analogy either.[2] Yet, it remains unsatisfactory not to understand why for instance the Dutch verbal form /jij kunt/ 'you can' is subject to analogical pressure of /hij kan/, 'he can' instead of the other way around, especially because the ongoing language change works *against* regularization of the paradigm. We see that /jij kunt/ which looks like a regular form singular of the infinitive *kunnen* is being replaced by the irregular mutated form /jij kan/ (2).

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[1] See for instance Kruszewwski 1881/1978:81."Every sound law must be conceived of as allowing no exceptions; everything that diverges from it must be assumed to be due to analogical formation".

[2] In most introductory books to general linguistics and historical linguistics, a brief discussion of analogy is offered. In the scientific literature, however, the phenomenon is virtually ignored. "the whole issue provokes ennui", Anttila 1977:76. Exceptions are Kurylowicz (1945), Manczak 1958, Vincent 1974, who formulate some "tendencies". For an overview of the literature, see Collinge 1985:249-253. We further mention Kiparsky (1974).

(2) kunnen: ik kan   (3) hebben: Ik heb
        jij kunt → jij kan   jij hebt
        hij kan   hij heeft   → hij heb
        wij kunnen   wij hebben
        U kunt   U hebt/heeft
        zij kunnen   zij hebben

The traditional answer is that the third person singular is more often used and that frequent forms can keep their irregularity more easily. These frequent forms would influence more easily other forms. This answer, however, immediately gives wrong predictions if we apply it to the verb *hebben* 'have' (cf. 3). Two things are conspicuous: in the first place we once more encounter in the transition /hij heeft/→/hij heb/, a transition which leads away from regularity (the regular form would be /*hij hebt/), and second, it is the 3rd person which is subject to analogical pressure of the 1st person. Is the 1st person form by any chance the more frequent one? And if so, why analogical pressure shows up in the frequent verb *kunnen* and not in less frequent verbs?

According to the traditional understanding, there are two sources of morphological language change (Bynon 1977:34). On the one hand, we have phonological changes: these often lead away from regularity of the paradigm, e.g. older Dutch *holden-hield-geholden*→ modern Dutch *houden-hield-gehouden* ('to hold'). On the other hand we have analogical changes: this is the process that drives towards regularity (Anderson 1973:166, Sturtevant 1971:109). Only frequent verbs can resist the latter process. In this understanding, paradigmatic irregularity is a result of phonological change in frequent verbs (e.g. Lyons 68:38, Beekes 1991:109).

In order to show that the frequency argument is incorrect, let us consider the most frequent verb BE. This verb would be so irregular because all results of sound laws could not be erased under analogy because of its high frequency. Suppose that all Romance forms of the verb BE derive from Latin. Now, the Latin verb ESSE was already irregular, e.g. having forms with and without initial s-. Since in none of the Romance languages a sound law has been active of deletion or metathesis of a word initial s-, one might expect that all Romance languages would have preserved this distribution of this initial s- as it was in Latin; was BE not conservative? If we inspect the data, the opposite turns out to be the case. Only the French paradigm conserved the Latin distribution and can be explained out of phonological changes. Most Romance languages, however, have a characteristic distribution of this initial s-, as can be seen from table 4.[3]

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[3]For a similar table on BE in the different branches of Indo-European, see e.g. Bonfante (1932:112).

(4) *The verb BE in Latin and in Romance (after Vincent 1988:49)*

Lat	Fr	Port	Sp.	Cat.	Rum.	It.	Sard.	R-R	Mil.
sum	suis	sou	soy	so(c)	sînt	sono	sòe	sun	son(t)
es	es	és	eres	ets	esti	sei	ses	eis	see(t)
est	est	é	es	és	e(ste)	è	est	ei	è
sumus	sommes	somos	somos	som	sîntem	siamo	semus	essan	semm
estis	êtes	sois	sou	sou	sînteti	siete	sedzis	essas	sii
sunt	sont	são	son	són	sînt	sono	sun	ein	inn

From (4) we can learn that the 2nd person singular and plural in Italian (*sei, siete*) do not derive from the Latin forms directly. They seem to have undergone analogical influence of the other s-forms. The reverse process also occurs, e.g. in Rhaeto-Romance *essan* (1pl), which does not derive phonologically from *sumus*, but was subject to analogical influence of a form like 2pl *essas*, without initial s-. In (4) all analogical formations are printed in bold. We must conclude that the most frequently used verb is not most conservative but as it seems - the wildest. In other words: even highly frequent forms as those of BE are subject to analogy. If these considerations are correct, the capriciousness of the paradigms of BE in the Romance languages must not get a phonological explanation but a structural one. In the next section, we will argue that these forms of BE are in paradigmatic respect not irregular but an optimal reflex of the paradigmatic systems in these languages.

2. The Structure of the Italian paradigm

In order to understand analogy, we should have a system in which the verbal forms would be ordered on the basis of purely formal criteria. Let us investigate the system of Italian without being influenced by our preconceived opinion what is regular and what is not. Even the usual features [person] and [number] will be kept outside consideration. We just look to the structure of the paradigm. In Italian, even the least-articulated paradigms are sufficiently rich to base a morphological structure on. Consider some more or less randomly chosen paradigms.

| (5)	avere	essere	tenére	perf.	servire-imp
1	ebbi	sono	tèngo	ténni	servivo
2	avesti	sei	tièni	tenesti	servivi
3	ebbe	è	tiène	ténne	serviva
1'	avemmo	siamo	teniamo	tenemmo	servivamo
2'	aveste	siete	tenete	teneste	servivate
3'	ebbero	sono	tèngono	ténnero	servivano

In (5) various paradigms are ordered in the traditional way namely on the basis of the features [person] and [number]. In this ordering, the paradigms seem hardly regular. The question arises whether an other ordering principle can be found that yields a better result. The introduction of an other feature would *de facto* imply a reordering of the rows in (5). If we try to change the order in such a way that morphologically similar forms are put together,

this is only possible if we order the forms circularity. Only then all related forms can be given an adjacent place. We find the following correlations:

(6) *Some correlations of the Italian verbal paradigm*

a	1233'	rhizotony[4] in present	bijv.	tèngo, tièni, tiène, tèngono
b	133'	rhizotony in perfect	bijv.	ténni, ténne, ténnero
c	13'	equal root	bijv.	sono, sono; tèngo-tèngono
d	23	diphtongization	bijv.	tièni, tiène
e	1'2'	diphtongization	bijv.	siamo, siete
f	21'2'	special onset	bijv.	avesti, avemmo, aveste
g	1'2'3'	syllabic structure (4σ)	bijv.	servivamo, servivate, servivano

Using these correlations, one and only one structure can be drawn, namely (7). The topology is *circular* (1322'1'3'1).
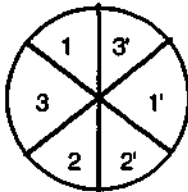
7. Morpological Circle of Italian

This circle must be read in such a way that certain morpho-phonemic features only occur adjacently. In other words, if a circle segment α and an other circle segment β share a feature, intermediate segments share this property as well. We will call (7) the morphological circle of Italian. The idea is now that this morphological circle represents the system which causes the analogical influence, or in other words, the system behind analogical pressure. As an instance, I will consider some alternates of the Italian paradigm of *dovere* and *giacere* (8).

In (8), we observe that the spreading of gemination over the paradigm, including existing variants, proceeds in concordance with the morphological circle (7) of Italian. We can also say that these variants are

(8) *Paradigmatic variants in an Italian paradigm*

	dovere		giacére	
1	dèvo	dèbbo	-	giaccio
2	dèvi	-	giaci	-
3	dève	-	giace	-
1'	-	dobbiamo	giaciamo	giacciamo
2'	dovete	-	giacete	-
3'	dèvono	debbono	-	giacciono

different realizations of one and the same morphological circle. The only thing that happens is that certain features (in this case: gemination) 'spread'[5] over neighbouring segments of the morphological circle. The 'spreadings' observed can be found under (9).

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[4]Rhizotonic forms of the verbal paradigm are the forms which carry the stress on the root. In Romance, rhizotonic forms often behave in a special way within a paradigm.

[5]It is immaterial whether (9) represents transitions or regional variants. In both cases, we can say that both paradigms are realizations of the same underlying system, i.o.w. that they belong to the same linguistic system.

(9)

l' ↔ l'3'l
13'↔ l'3'l   If it is true that the morphological circle is a good reflex of the underlying paradigmatic structures, we may say that the analogical

transitions in (9) take place under structure preservation.[6] In the optimal case, such a circle holds for all paradigms in one language. The circle found indeed holds without exception for all primary conjugations of Italian. For the subjunctive and conditional forms, however, a second circle exists (cf. 19-F). We will call this circle the secondary circle. The special thing of the formulation using circles is that even the so-called irregular forms are regular in the sense that they obey to the same morphological circle as the so-called regular verbs.

We can formulate it even more sharply. Suppose that in a language all forms of a paradigm would be absolutely different. Then any morphological circle could be assigned to this language. The same is true for a language in which all verbal forms would be equal. Also then, any morphological circle would hold. Hence, both maximal correlation and minimal correlation of forms do not produce structure. Structure - and the circle that represents this structure - is optimally defined by the richest paradigm. The 'irregular' paradigms are in other words, an optimal reflex of the underlying structure (i.e. the morphological circle).

3. Theoretical backgrounds of the Morphological Circle

If it is true that the morphological circle is a proper representation of the paradigms in a certain language, the circles must be present a knowledge of the native speaker. Otherwise it would be unexplainable how language change could be in concordance with the morphological circle. If so, the question arises whether the existence of such a circle is rooted in UG, or that the language user concludes to such a *circular* structure with help of positive evidence. If the circularity of the morphological system turns out to be rooted in UG, then the question arises of the reason of such a structure.

It would be outside the scope of this paper to show that also other languages have such a circularity in their morphological system. For the sake of the argument I will just give a paradigm with a language that is not directly related to Italian and which has a reasonably rich inflectional system, namely West-Flemish (it has even inflected complementizers).

(10) *A random verbal paradigm of West-Flemish (Haegeman 1990:148)*

1.	dan-k ik werken	?dan - ik werken
2.	da-j gie werkt	*da - gie werkt
3.	dat-j ij werkt	?da - ij werkt
1'.	da-me wunder werken	dan - wunder werken
2'.	da-j gunder werkt	*da - gunder werkt
3'.	dan-ze zunder werken	dan - zunder werken

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[6]Meillet (1912:133) writes: "..l'analogie peut renouveler le détail des formes, mais laisse le plus souvant intact le plan d'ensemble du système existant.". Anderson (1973:167) writes: "the occurrence and subsequent spread of a morphological form replacing other more widely distributed forms must be governed by restrictions inherent in the particular language system.

The correlations present are: *werken* 11'3'; *dan* (13'), non-drop of the pronominal clitic (22'), easy drop pronominal clitic (1'3'), *-under* (1'2'3'). These correlations produce exactly the same morphological circle as the one of Italian. Furthermore, the form correlations observed can exclusively be represented in circular way. Hence, both Italian and West-Flemish have a circular structure. So let us assume that the circular structure is a principle of Universal Grammar. Especially, since also Spanish, and Portuguese and - as we will see soon - Dutch seem to have such a circular structure. We summarize this in (11).

(11) <u>Topology of the verbal paradigm</u>
      The verbal paradigm has a circular topology

Notice that the circle is arranged in such a way that all (relevant[7]) morpho-phonological features divide the circle in two connected subspaces. This potentially has interesting implications for the theory of morphological features (cf. section 6).

3.1 *The representation of the traditional system*

The semantic feature system of the verbal inflection is two-dimensional: the verbal forms are specified for [person] and [number]. The forms are usually represented as in (12).

(12) Traditional ordering of the verbal paradigm for person and number
      1, 2, 3, 1', 2', 3'

The structure in (12) seems to imply that 1 relates to 2 as 1' to 2'. It also implies that 1 relates to 1' like 2 to 2'. Idealiter, this would lead to the following paradigm, cf. (13).

(13) *An Ideal Paradigm*
   1 R-a-α
   2 R-b-α
   3 R-c-α
   1' R-a-β
   2' R-b-β
   3' R-c-β

In such an ideal paradigm, a, b, c would be the morphemes for 1st, 2nd and 3rd person, attached to a root R, and α and β the morphemes for singular and plural respectively. Such a paradigm exhibits some symmetries. The paradigm in (13) is clearly a two-dimensional paradigm, varying along a person-dimension (x) and an number-dimension (y), hence R-x-y. If we render the system (13) as in (14), the representation shows a symmetry to number (under a shift along x-axis), and person (under a shift along y-axis).

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[7]We leave as an empirical matter what relevant features are. Admittedly, this makes the theory more flexible but also more interesting, since by this the theory might render new insights in what the relevant features are within a paradigm. We do not intend to offer an algorithm for science. See also the discussion in section 5.

In fact, the two-dimensional system (14) has two symmetries: we can carry out a rearrangement along the person axis without [number] being affected. In the same way, we can carry out a rearrangement along the number

(14) Symmetries in an Ideal Paradigm

$$y \rightarrow$$

x	R-a-α	R-a-β
↓	R-b-α	R-b-β
	R-c-α	R-c-β

axis without person being affected. In other words, person and number are entirely de-coupled in the semantic system (13)[8]. It may be clear that the paradigms of Italian does *not* exhibit these symmetries. Person and number do not seem to be de-coupled in this way.

Remarkably, we can in no way represent the system (13/14) in a morphological circle. Hence, if the circular topology is a basic property of the (Italian) paradigm, then we may consider the circular structure responsible for the impossibility of a complete person-and-number symmetry and hence for the appearance of port-manteau morphemes. In other words, the traditional, semantic system is characterized in a way that is principally different from a paradigmatic system that corresponds to a morphological circle. If the circular topology might turn out to be a universal requirement on *inflectional-morphological* systems, then we have found a principled distinction between a semantic system as in (13) and an inflectional paradigmatic system as in (7). So, the question arises in what respect the circular system differ from such a two-dimensional system at a fundamental level.

Morphological circles do *not* have the symmetries of [person] and [number]. Why is the Italian paradigm represented by precisely circle (7)? Is it entirely accidental that Flemish has a similar circle? These questions become even more urgent if we calculate the number of really different morphological circles, namely 60.[9] It may be clear that this diminishes the predictive force of the theory considerably. Hence the question arises: can we formulate requirements that cut down the set of possible morphological circles? And if so, what is the deeper reason of this curtailment?

3.2 The new system and maximal symmetry-breaking

In the previous section, we saw that morphological paradigms do *not* represent the semantic system optimally: the paradigms of Italian and West-Flemish make use of so-called *port-*

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[8]If we say that an object has a symmetry, we mean that the object has an invariance with respect to a certain mapping. Hence, the question after a symmetry is under what mapping(s) a verbal paradigm is invariant. For instance, if in (14) we move the form R-x-y along the number axis, the paradigm exhibit a symmetry with respect to person. If we symbolize this shift with T, then we can say that 123 is projected onto 1'2'3' under T. In other words, [person] is a conserved property under T, whereas number maximally varies under T. In the same way, an mapping S exists under which number is invariant.

(i) T: [α person] → [α person]   (-α means: "not α")
     [β number]   → [-β number]

(ii) S: [α person] → [-α person]
     [β number]   → [β number]

T and S correspond with the two symmetries of (14). This more formal description is relevant if we want to describe the real difference of a traditional semantic system (14) and an inflectional system expressed by the morphological circle in a more precise way (cf. note 8).

[9]The number of different circles is 6!=6.5.4.3.2.1=720. However, various circles are equal to each other upto a rotation (6) or reflection (2). Hence we must divide this result by 6.2=12. This yields 60.

manteau morphemes. Why would language not choose for an optimal, semantic system? Further more, what is the structure of the coupling between person and number?

The question of what the precise nature is of the interaction between person and number and the question whether the number of possible morphological circles can be reduced will be answered simultaneously. We would like to claim that a paradigmatic system like the one of Italian and West-Flemish is an optimal system too: it exhibits a total *anti-symmetry* of person and number. A more technical analysis is needed to show that (7) does not show just an arbitrary interaction between person and number, but precisely a maximal anti-symmetry. This would exceed the scope of this paper.[10] The maximal anti-symmetry of person and number shows up in our circle representation in the fact that opposite segments of the circle always differ maximally, i.e. with respect to both [person] and [number].

In this paper we will simply take this result as a starting point. In the optimal case, this property would be a property of paradigmatic morphology. If we generalize this property of the morphological circle of Italian, we get (18).

(18) **Law of the Paradigmatic Breaking**
If L is a natural language with morphological circle C_L, then C_L exhibits a total anti-symmetry for the syntactic features [person] en [number]

If we take (18) as a property of the grammar of natural language, this grammar allows for only 8 possible morphological circles, instead of the original number of 60. Just 8 *morphological circles satisfy the requirement of a complete anti-symmetry of [person] and* [number]. We will assume that natural language realizes this optimal situation.

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[10]Consider the following mapping U which replaces the symmetries T and S of the semantic system (cf. note 6). This U consist of a rotation of the morphological circle around its center over 180 degrees. Under U, not one singular is projected on a singular, nor a first person on a first person etc. So:

(iii)   U: [α number]   → [-α number]   (-α means: "not α")
          [β person]   → [-β person]

The mapping U implies that if we carry out a maximal shift in the number dimension, a maximal shift in the person dimension is implied. In other words, the morphological system is fully - i.e. both as to person and as to number - anti-symmetric under U. Put differently, the morphological system is characterized by a mapping U which breaks the person and number symmetries maximally. The reader can check by himself that the Italian Circle (7 / 19B) meets this anti-symmetry under a rotation over 180°.

(19) The 8 Morphological Circles with complete anti-symmetry for person and number

11'22'33'1
(A)

;

11'22'33'1
(B)

11'22'33'1
(C)

11'22'33'1
(D)

11'22'33'1
(E)

;

11'22'33'1
(F)
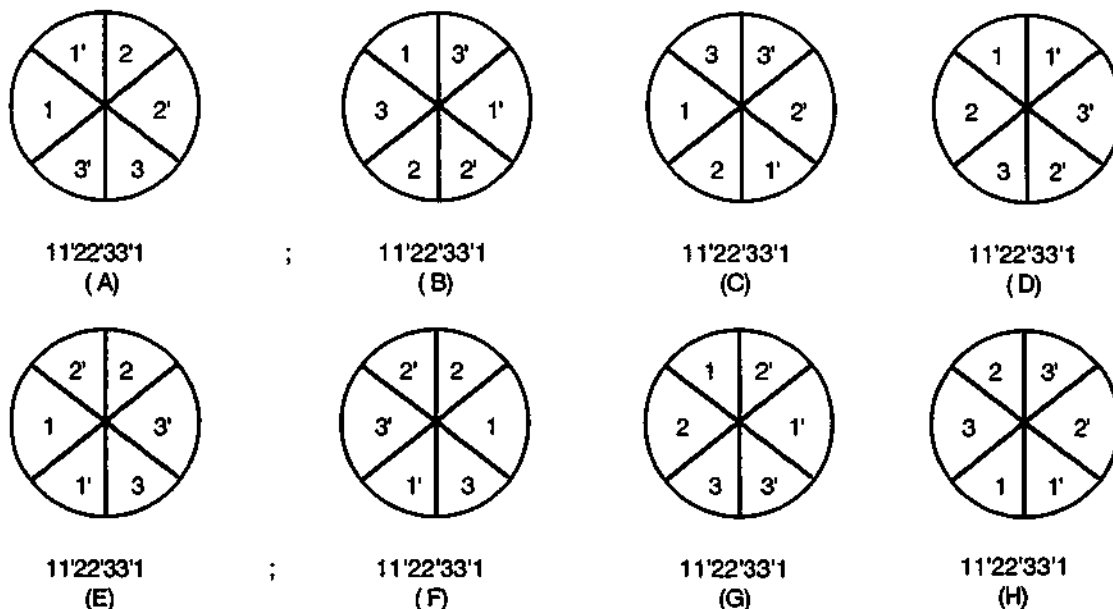
11'22'33'1
(G)

11'22'33'1
(H)

These 8 circles are typologically divisible in a doublet (19AE) with full person analogy but without number analogy; and a sextet with number analogy and just one person analogy (cf. 19-BCDFGH). For instance (19A) exhibits adjacency of 11',22',33': it allows for complete person analogy, but disallows for number analogy entirely. On the other hand, (19-B), the circle of Italian, allows for number analogy, and an additional analogy between 2 and 2'. A similar behaviour is present in the other members of this sextet (19CDFGH).

Upon first inspection of the data, it turns out that all morphological circles fall within this set of 8 morphological circles. It does not seem probable that the set of (19) can be further reduced, as only for circle 19E, I did not find a language yet.

So, we may safely assume that the circular topology is a characteristic of the inflectional-morphological module. If so, it follows that it is impossible for languages with an inflectional-morphological verbal paradigm to exhibit *both* a full person-analogy *and* a full number analogy. This entails that a 'regular' system as (13) is excluded on principled grounds, as it violates all morphological circles. Recall that in this way the rise of *portmanteau* morphemes (e.g. It. *-mo*, 1 pers + pl) in languages with an inflectional paradigm gets a fundamental explanation. Reversely, it follows that languages that have a system like (13) must form their verbal morphology in a syntactic-agglutinating way. In other words, the morphemes a, b, c, α, β must be syntactic clitics. If our considerations are correct, we made a fundamental division between syntactic morphology and lexical morphology, or between agglutination/clisis on the one hand and inflection on the other hand.

These considerations also give a better understanding what was wrong with the traditional idea to consider a verb like Italian *tenére* (cf. 5) as morphological irregular. The traditional concept 'regular' silently presupposed the idea of agglutination. From a syntactic point of view, these forms were called 'irregular', as these forms can not be created through clisis/agglutination to a stem. The Italian verb, however, does not form the verb through agglutination, but in the morphological module. As we have seen, this verb is with respect to its paradigmatic relations entirely regular.

In the previous sections, we determined the structure behind the verbal paradigm. The idea is that this structure also forms the base of analogical influence.

4   The Morphological Circle and Language Change in Dutch

Let us now apply the theory to Dutch. A representative set of paradigms is listed under (20). In this table we assumed that the verbal form connected to *jullie* (you-pl.) is not a primitive form, as the corresponding verbal forms coincide exceptionless with the forms of the 3rd plural. The verbal form connected to the honorific pronoun *U* ('you' sg/pl-honorific) on the other hand is morphological independent.[11]

(20) Some paradigms of Standard Dutch:

		walk	do	be	have	can
a	1.	ik loop	ik doe	ik ben	ik heb	ik kan
	2.	jij loopt	jij doet	jij bent	jij hebt	jij kanVkunt
	3.	hij loopt	hij doet	hij is	hij heeft	hij kan
	1'.	wij lopen	wij doen	wij zijn	wij hebben	wij kunnen
	2'.	U loopt	U doet	U bent	U hebt	U kunt
	3'.	zij lopen	zij doen	wij zijn	zij hebben	zij kunnen
b	1.	loop ik	doe ik	ben ik	heb ik	kan ik
	2.	loop jij	doe jij	ben jij	heb jij	kan/kun jij
	3.	loopt hij	doet hij	is hij	heeft hij	kan hij
	1'.	lopen wij	doen wij	zijn wij	hebben wij	kunnen wij
	2'.	loopt U	doet U	bent U	hebt U	kunt U
	3'.	lopen zij	doen zij	zijn zij	hebben zij	kunnen zij

The above paradigm exhibits, among others, the following correlations:

In (20a): (loopt: 232') (lopen: 1'3') (kan: 13) (ben-: 122') (bent/hebt : 22').

In (20b): (loop:12) (loopt :32')......

Curiously, not a single morphological circle conforms to all these correlations, despite the wide-spread idea that Dutch would not have a rich morphological system. The data listed above are already sufficient to conclude that Dutch has more than one morphological circle. (By the way, this says something on the restrictivity of the theory presented). So we must conclude to two circles, a "main circle" (19-D) and an "auxiliary circle" (19-F).

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[11] The /U loopt/-form differs from 2sg by the fact that the inverted form is always equal to the uninverted form (e.g. *kunt u*). The /U/-form is also independent from 3sg, in view of forms like *u kunt, u bent, etc.*
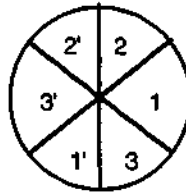
(21) Some correlations in the Dutch verbal paradigm

V:	loopt 232'; lopen 1'3' Inv: loop 12; loopt 32'	→ circle (19-D)
Aux:	ben 12; ben- 122' kunt 22' kun- 21'2'3' ; kan 13	→ circle (19-F)

On the basis of these correlations, we arrive at the following circles, (19D) en (19F).

(22) The Morphological Circles of Dutch
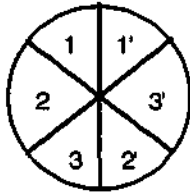
main verbs
(circle 19-D)

auxiliary verbs
(circle 19-F)

It needs some argumentation that we also deal with a *circular* structure in Dutch. Until now, we did not present evidence for a connection between 1 and the plural in circle 19-D. Without such a connection between 1 and 1', the structure could be laid open and would loose circular topology. Evidence for a connection between 1 and the plural can be derived from substandard Dutch. The data that induce circular topology are parallel to those of West-Flemish (cf. 10) and Frisian (23b). Consider the following paradigm in substandard Amsterdamish. The dialect of Amsterdam has precisely the same paradigm as standard Dutch. However, in Amsterdamish the monosyllabic verbs (*doen, gaan, zien, staan*...) have an deviant paradigm in the inverted forms, as was reported by Van Haeringen (1958), when he reported comparable phenomena in the dialect of Dedemsvaart (in the East of the Netherlands).

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(23) a. <u>Substandard Amsterdamish</u>

|	
Dat doen' ik[12]	'that do I'
Dat doe jij	
Dat doet -ie	
Dat doene we[13]	
Dat doet U	
Dat doen zij	

b. <u>Frisian 'go for'</u>

Ik helje
Dou hellest
Hy hellet
Wy helje
jim/jo helje
hja helje

In (23), we see that the form of the 1sg links up with the plural.[14] This can only be explained if the first person singular is subject to analogy of these plural forms. Hence we must conclude that also the Dutch paradigm is circular.

As we have developed a theory on the structure behind analogical pressure, we can return to our original questions: why can't a transition *hij kan* → *hij kunt* occur in order to regularize the paradigm? Why does the language prefer a transition *jij kunt*→ *jij kan* ? Why can the transition *hij heeft*→*hij heb* occur and why is the one with a 'regular' result (*hij heeft*→*hij hebt*) impossible? Why does the paradigm (seemingly) move away from regularity?

The special morphological circle (19-F) for auxiliaries (*hebben* 'have', *zijn* 'be', *kunnen* 'can', *mogen* 'may', *zullen* 'shall', etc.) makes some interesting predictions with respect to these questions. Suppose that - as a simplification of the paradigm - *hij kan* would be replaced with *hij kunt* (which is seemingly a more 'regular' form), then we would get circle (25a).
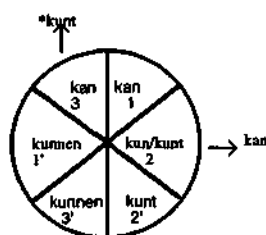
25a   *hij kunt/jij kan
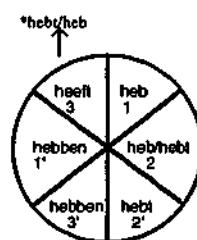
b.   *hij hebt/hij heb

The thus created circle (25a), however, does not have a connected /kunt/ form. As a result, such a development cannot occur without changing the morphological circle. In

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[12]Notice that the appearance of an /n/ in the 1st person sg cannot be a mere phonological phenomenon (a so-called hiatus-'n'), as such an -n- never occurs after stressed vowels.
(iv)   dat zei ik
          *dat zei-n ik
          that said I

[13]Common is also : *dat doene me* ('that do we'). The subject form *we* 'we') is replaced by a form identical to 1sg ACC. The same phenomenon can be observed after inflected complementizers in substandard Dutch: *datte me stoere jongens zijn* ('that-AGR we brave boys are')

[14]Notice that according to the circle of (22a) 1 is linked up with 1' and not with 3'. This implies that in *Dat doen' ik* an underlying vowel must be present, hence: /doene ik/. This vowel is probably catalectic. If so, this would explain why the realisation of the ending /nV/ is only possible in the inverted order. Further evidence for such a catalectic vowel can be found in the fact that contraction of the verb-pronoun sequence is blocked in the present tense of main verbs.
(v)   *Dat doen'k niet
          That do-I not
(vi)   Toen ging'k weg/ Dat von'k niet leuk
          Then go-past-I away / That found-I not nice
a comparable block on the contraction of the verb-pronoun sequence was noticed by Booij (1991).
(vii)   *Dan va'k naar beneden   *va'k< val + ik   main verb
(viii)   Dat za'k doen   za'k< zal + ik   auxiliary
The presence of an underlying vowel in (vii) blocks the contraction. The fact that such a contraction is possible with the auxiliary *zullen* (viii) is in concordance with the different morphological circle for auxiliary verbs in Dutch, viz. (22b). Such an underlying vowel in 1sg forms can not be present in auxiliaries, as in auxiliaries 1 does not link up with the plural, as can be seen from circle (22b). Notice that the presence of these catalectic vowels in Dutch brings the Dutch morphology quite in line with German, which shows an overt -e in the present tense of main verbs (*ich werk-e* 'I work'), but not in the present tense of auxiliaries (*ich kann* 'I can').

other words, *kunt* cannot exert influence on the 3rd person sg. form, since these two are not adjacent. What is possible, however, is that the 1st person sg form influences 3sg., and this is precisely what is going on in present-day Dutch. Along the same lines of reasoning, we can show that the language change *hij heeft* → *hij hebt* cannot occur without changing the morphological circle, as the neologistic *hebt* form would not be a connected subspace on the morphological circle. In other words, these transitions cannot be carried out under structure preservation. Analogy can never be the trigger of such a language change.
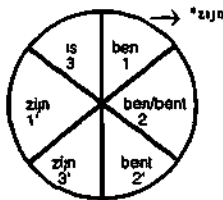
In a similar way, the plural form can execute analogical influence on the first person singular, as these are adjacent *doe ik* → *doen' ik*. A similar transition *ben ik* *→ *zijn ik* for the monosyllabic verb *zijn* 'be' is, however, impossible under structure preservation, because of the auxiliary status

(26)　　ben ik *—> zijn ik

of *zijn*. Being an auxiliary, ZIJN is subject to the other morphological circle 19-F. This circle does not allow for such an analogical influence.

5. Some Speculations on the Rise and Decline of Inflectional Systems

In section 3, we investigated the possibility that a fundamental demarcation exists between agglutinative systems and inflectional systems. Whereas agglutinative systems can and must reflect semanto-syntactic features as they are put together through syntax, inflectional systems cannot simultaneously realize the semantic dimensions [person] and [number] morphologically, because of restrictions imposed by the topology of the morphological circle. If inflectional systems are inherently not supported by syntax, they must be stored in the lexicon. This opens the possibility that the restrictions imposed by the morphological circle might be a mere consequence of storage of paradigmatic information in the memory. In this section, I would like to explore the possibility that the topology of the morphological circle can be characterized as a storage phenomenon. We will see that some naive but plausible assumptions on economic storage will provide us with insight in the structure of the paradigm.

Suppose that members of a inflectional paradigm are stored in a small, confined part of the brain. In other words, suppose that all six forms of the present tense of *avere* etc. (cf. 5) are stored close to each other at a certain location. The six forms of *essere* are stored in a similar way in some other place. For reasons of access, the mutual arrangement of the forms of *avere* is similar to the mutual arrangement of the forms of *essere*. We further assume that these forms are stored two-dimensionally to warrant optimal access from outside (27).

(27) Hypothetical storage and access of six different paradigmatic forms of two random verbs
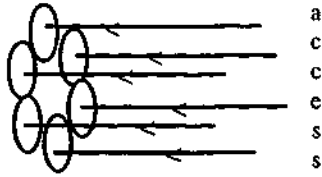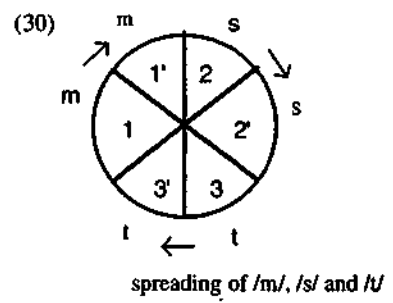

a. paradigmatic forms of V_1 b. paradigmatic forms of V_2,...... etc.

To minimize the memory, the forms are compactized more and more, and will take the overall shape of a circle, just like a drip of water takes a spherical shape to reduce its surface. This might be the background of the circular topology (11). The process of compactification of the paradigmatic forms in (27a) can go on until the six forms will start to experience cross-talk from each other. Now, as soon as cross-talk occurs, it becomes important in what way the (six) forms are arranged with respect to each other. The best way to deal with the situation of cross-talk is that the slots that are at a maximal distance from each other are occupied by forms that are semantically maximally different. This means that the opposite sides of the circle are filled by forms that differ in both semanto-syntactic features [person] and [number]. It is precisely this requirement that the Italian, Dutch and the West-Flemish circles seem to meet. So, an economy of storage could be the basis of both the circular topology and the Law of the Paradigmatic Breaking (18). Moreover, this view offers us the possibility to identify the spreading of morpho-phonemic features over the paradigm as a case of cross-talk. This means that the morphophonemic features do not reflect syntactic features, but rather the adjacency of the storage of the verbal forms. Obviously, this state of affairs indeed does produce a correlation between the morphological shape and the syntactic features, simply by the fact that semantically related forms are preferable not stored at a maximal distance of each other: this location is preferably given to a semantic opposite form. Syntactic similar forms therefore will *grosso modo* show similar morphological shape. This gives an explanation to the fact that linguists have felt seduced to assign semantic values to morphemes of an inflectional paradigm, as some correlation does exist. Our interpretation, on the other hand, also gives an explanation why these attempts have hardly given convincing results: the correlation is not absolute and fundamental, but relative and derived.

If this storage interpretation of the morphological circle is correct, it implies that also (some) regular paradigms must be stored in the memory. Otherwise it would be unexplainable why also regular paradigms are in concordance with the morphological circle. Now, although it is conceivable that even regular paradigms are stored in the memory because the retrieval of these forms might be quicker than making them real-time, we would like to have evidence that this is the case indeed. Prima facie eviidence can be obtained from language change. Consider a case taken from older Frisian. The lexical root /kin/ ('can') in Frisian is of course stored in

the lexicon. From this root, the morphological component makes the form /kin+st/ (can.2sg). Now, there was an old phonological rule in Frisian which dropped the /n/ before continuant dental consonants, like /s/; let us call this rule R. This rule produced the form /kist/[15]

28.   Lexicon -> Morphological Rules   -->   Phonological Rules
         ↓   ↓   ↓

       /kin/   /kinst/   /kist/

At this time, the form /kist/ was entirely regular, since rule R was a productive phonological rule which could link the forms /kin-kist/. In later times, rule R fell out of use. Now, if the (at that time still regular) form /kist/ were not stored, the disappearance of R would have resulted in /kinst/, i.e. in a regular derivation. However, if and only if the form /kist/ were stored, the alternation /kin-kist/ could be retained, resulting now in an irregular paradigm, since rule R had disappeared. Since modern Frisian indeed retained the now irregular /kin-kist/ alternation, /kist/ must have been stored in the lexicon, even at the time it was still regular. Only in this way, we can understand why phonological changes can the trigger of "irregularizing" paradigms. In this view, phonology can be the source of "irregularization" of *stored paradigms*. As far as the simple model (28) is correct, this shows that even (or at least some frequently used) regular forms must be stored in the lexicon.

Let us clarify the situation by giving a hypothetical description on the origin of a Latin paradigm out of a primordial agglutinative system. We do not pretend full historic adequacy, we only offer this description as an illustration of what we mean. In Proto-Indo-European, the morphemes that characterized of the first, second and third person inflection singular were /m/, /s/, and /t/ respectively (Beekes 1990:276). Now, it is a generally accepted assumption that the enclitic use of doubling pronouns (in inversion structures) is the basis of an primordial agglutinative system. In other words, we assume that verb morphology results from frozen enclitic pronouns, comparable to what is going on in present-day Friulian (29).[16]

29   jo feveli-o   (Friulian, Haiman 1990:381)
      I I-spokek-I
      'Did I speak?'

So let us take this hypothesis as a starting point. The question is how the transition from syntactic doubling to inflectional morphology can happen. One mechanism one can think of is the gradual loss of the syntactic features by these morphemes. The first step in this process is the interpretation of these markers as general person morphemes, independent of their number specification. So let us hypothesize that the morphemes /m/, /s/, and /t/ first lost

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[15]This is one of the well-known "Invaeonisms", present in Frisian and English, e.g. tand -> tooth, ons - > us, etc.

[16]See also Schönfelt (1970:169), where the origin of the Germanic 2 person sg ending -st is discussed. See also Brook (1955:61).

their specification for [number]. This means that the morpheme /m/ can be used as an ending of the first person verbal form singular and plural. Obviously, the resulting inflectional system *in nuce* then exhibits person analogy. In other words, if stored in the memory, the system will realize itself in one of the morphological circles with full person analogy (19A or 19E). Let us consider (19A), repeated as (30).

In (30) we give the morphological circle which allows for spreading of the semantic singular features /m/, /s/ and /t/ to their plurals as neighbouring segments (drawn arrows). This process reflect the fact that the morphemes /m/, /s/ and /t/ get rid of the semanto-syntactic feature [singular]. The morphemes can still be interpreted, namely as an iconic reflex of the feature [person]. Now, a crucial stage in the formation of a real paradigm is that the forms lose their feature [person] as well, i.e. they lose their syntactic dependency entirely and are just stored in the memory, instead of being produced syntactically. If the corresponding morphemes nevertheless retain, this can only be done, if storage had taken place in concordance with the morphological circle (30) (or, alternatively, with 19E). Now, if a last stage toward a purely inflectional paradigm the morphemes /m/, /s/ and /t/ also loose their [α person] feature, a further spreading of these features to the other neighbour on the morphological circle (dashed arrows) is allowed. Remarkably, this process precisely produces the main PIE paradigm (the Latin subjunctive paradigm (31)), based on the consonantal values of the endings.[17]

(30)

spreading of /m/, /s/ and /t/

In (31) we see a morpheme distribution that is in full concordance with what we would expect on the basis of the morphological circle of (30).[18] This result may also be interpreted in an other way. It is conceivable that the correct causality should be reversed, in the sense that it is the cross-talk process triggered by denser storage which induced the loss of the semanto-syntactic feature [person].

(31)		-m-	-t-	-s-
1.	vincam	+	–	–
2.	vincas	–	–	+
3.	vincat	–	+	–
1'.	vincamus	+	–	+
2'.	vincatis	–	+	+
3'.	vincant	+	+	–

---

[17]Obviously, the spreadings over the morphological circle will not always be as systematic as in Latin. Other patterns of spreading will result in other paradigms. It is however probable that PIE went through this stage, as the Latin paradigm seem to represent a conservative stage: "Pas de doute, si on compare la conjugaison du verbe *être* dans les différentes langues indo-européennes, que ce soit le latin qui nous a conservé les formes les plus anciennes." Bonfante (1932:114). Already Old-Greek transferred to the Italian circle, upon quick inspection of the data.

[18]Needless to say that the treatment is simplified, as we ignored the fact that the Indo-European paradigm included dual forms.

Probably, this is the morphological circle of all imperfect tenses in Latin.[19] Notice that even the highly irregular paradigms of *esse* ('be') and *nolle* ('not-will') exhibit correlations which are in concordance with this circle.

It is an interesting characteristic of the theory presented that it does not only give prospects to a diachronic scenario of paradigm formation

32. Some paradigms of Latin

vincere		laudare	esse	noli
vinco	vincam	laudo	sum	nolo
vincis	vincas	laudas	es	non vis
vincit	vincat	laudat	est	non vult
vincimus	vincamus	laudamus	sumus	nolumus
vincitis	vincatis	laudatis	estis	non vultis
vincunt	vincant	laudant	sunt	nolunt

and but also of paradigm change. Notice that the morphological circle (30) can *not* account for the moraic and syllabic correlations within the paradigm of (30), since 1', 2', and 3' share the property of having an extra mora but do not occupy adjacent slots on the morphological circle. Hence circle (30) can *not* account for the prosodic characteristics of the paradigm.[20] This makes the above pattern paradigmatically unstable, provided that syntax cannot account for the 'licensing' of the moraic or syllabic structure.[21] So — under certain circumstances when syntax fails to do the job — we might expect a transition of the circle of (30) to another, related circle which does allow for the moraic and syllabic correlations. Notice that any flip of two opposite segments (i.e. 1↔2', 2↔3', or 3↔1') would result in a circle that still satisfies the requirements of optimal storage ("anti-symmetry"). Notice further that any flip of such a kind will turn (30) into a circle which exhibits number analogy, namely 19BCD.[22] In other words, such a flip might correspond to a conceivable language transition. Such a transition would be non-structure preserving. Moreover, any such flip has as a draw back that one of the features /m/, /s/ or /t/ gets disconnected. For instance, the flip (1↔2') will make the /m/ feature unstable, since /m/ starts to span a disconnected subspace. In the same way, the flip (1'↔3) will make the /t/ feature unstable, since /t/ becomes a disconnected subspace (33). Recall that the latter transition will result in the morphological circle of Italian (7).

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[19]Also the present tense indicative conjugations, which replaced the labial /m/ morpheme in 1sg by a labial vowel /o/ are probably in concordance with the A-circle. We observe that the [labial] specification of de /m/ is shifted to the preceding vowel. This results in /oN/ of which the consonant is catalectic, as can be seen from nominal paradigms like homoN - hominis, caroN - carnis. This means that underlyingly both the features [labial] and [nasal] span connected subspaces. For the analysis of /o/ as [+labial] see for instance Lahiri & Evers 1991. The possibility to store the relevant feature in the vowel was facilitated by the fact that Indo-European showed the rounded mutation in the thematic vowel, o-e-e-o-e-o (e.g. Classical Greek: lu-oo, lu-esis, lu-ei, lu-o-men, lu-e-te, lu-ousi). In Greek, the /n/ in /on/ was not catalectic (e.g. Πλατων). Drop of the /n/ morpheme was perhaps the trigger for Greek to jump to the Italian Circle. Notice that our treatment takes the /o/ in the present tense conjugations in e.g. Latin as a later development. Some scholars in comparative linguistics, however, have suggested that this conjugation was already present in PIE, e.g. Kurylowicz, Symb. Rozw., 1(1927) 95-104. (Kurylowicz abandoned this idea later). The morphological circle of the passive and perfect conjugations is probably (19-F).

[20]There is a correlation between the moraic structure and the number of morphemes in Latin (cf. 30). One could suggest that the morpho-moraic structure is a derived property in Latin rather than a primitive. However, we feel that all independent morpho-phonemic dimensions within a paradigm must be accounted for directly either by the syntagmatic or by the paradigmatic module. If so, the moraic structure in the Latin paradigm must be accounted for by syntax.

[21]Obviously, syntax cannot account for morphemes that lost all syntactic features, like /m/, /t/, and /s/ in (30). However, syntax might (but does not need) account for the intonational, moraic and syllable patterns in the paradigm, if we assume that this are properties of the interface of syntax and phonology. For a proposal concerning the properties of this moraic interface of syntax and phonology, see Postma 1990, 1993a/b.

[22]These flips turn the circles 19ABCD into each other. The two sets 19ABCD and 19EFGH seems to be entirely separated universes under these flips. Apparently, language transitions that transform a circle of one class into one of the other must of a different type.

Proto-Indo-European
/Latin - 19A

Italian - 19B

33. Non-structure preserving paradigmatic flip 1'↔3
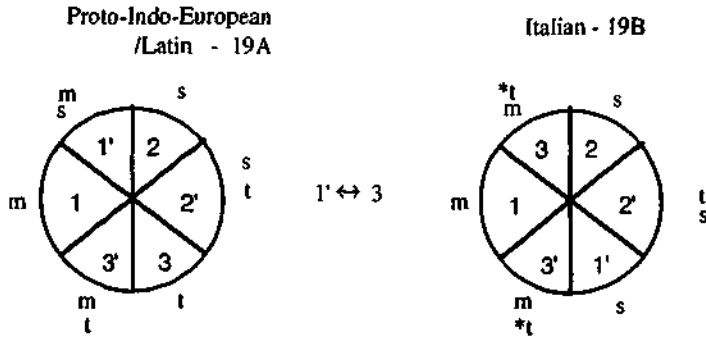
This means that the /t/ morpheme becomes unstable under a transition from the Latin circle to the Italian circle, as the /t/ feature will form a disconnected subspace. To keep the /t/ space connected, at least two instances of /t/ must be dropped. This is precisely what we observe if we compare the Italian paradigm with the Latin one: the /t/ morpheme is dropped in Italian with the exception of the second person plural. Consider for instance the paradigm of *tenere* (5) repeated here as (34).

We see that in the present tense of Italian only the /t/ morpheme is retained in one form (2'). In the past tense, the Latin /t/ morpheme in 2sg/2pl can be retained since it remains adjacent to 2' in the morphological circle of Italian.[23]

34. tenére	perf.
tèngo	ténni
tièni	tenesti
tiène	ténne
teniamo	tenemmo
tenete	teneste
tèngono	ténnero

We may conclude that the fact that the morphological circle does not allow for person and number analogy at the same time might be a trigger for language change. In principle, any non-structure-preserving flip creates new possibilities of analogy, but looses at the same time other analogies. In this way, a continuous instability and subsequent flipping would be a mechanism that can potentially undermine a morphological system. Any flip might cause the loss of a morpheme and contribute to the decline of inflectional morphology. We see that the

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[23]Notice that Italian also dropped the /s/ morpheme. This would be explained if an intermediate stage existed in which the /s/ was unstable. In other words, it is conceivable that Latin first went first through stage 19-D in its way towards Italian. In the tetrahedron below the possible language transitions based on flips are summarized. We abbreviated (1↔2') as (12'), etc. The capital characters correspond to the circles of (19). If correct, the theory gives quite precise predictions on the paradigmatic nature of the intermediate stage, namely it has to obey 19D. We do not know whether any evidence is available for this intermediate stage.

/t/ instable

/s/ instable

A=Latin
B=Italian
D=Hypothetical Intermediate stage

/m/ instable
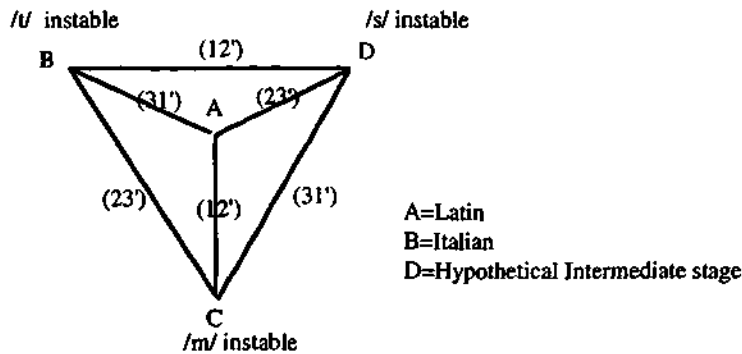
The group-theoretical properties of these flips are interesting and have a well-studied mathematics. The transitions (12'), (31'), (23') and 1 (i.e. no change) form an abelian group, the so-called "Vierergruppe" (cf. e.g. Arfken 1970:169, 203-211).

structural impossibility to simultaneously meet the analogy requirements on person and number sheds new light on the instability of morphological systems.

In view of the fact that the theory presented is not fully worked out with respect to the role syntax plays in the licensing of morpho-phonemic properties, further elaboration of the interaction of syntax and the shape of the paradigm is needed. What this impressionistic sketch, however, shows is that the theory of morphological circles might offer a framework for the study of the rise and decline of morphological systems.

6. The morphological circle and feature-licensing by syntactic movement

As we saw in section 2, morphophonemic features define connected subspaces on the morphological circle. Put differently, all possible connected subspaces on the morphological circle define morphophonemic features. Actually, these features were used as an heuristic tool to find the morphological circle in a language. We further argued that the morphological circle is basic and present as knowledge of the native speaker, rather than being acquired by a learning process. On the contrary, we argued that it is the morphological circle which remains constant under analogical changes. If the morphological circle is basic, the features defined on this circle must be epiphenomenous.

Seen in this way, a morphological circle defines 9 possible non-trivial features, 3 main features, and 6 secondary features. Take for instance the possible main features defined on the Italian circle (7).

35a	Main features of (19-B)			(b)	Secondary features of (19-B).					
	α	β	γ	σ_1	σ_2	σ_3	σ_4	σ_5	σ_6	
1.	-	-	+	+	-	-	-	-	+	
2.	+	-	-	-	-	-	+	+	-	
3.	-	-	-	-	-	-	-	+	+	
1'.	+	+	+	-	+	+	-	-	-	
2'.	+	+	-	-	-	+	+	-	-	
3'.	-	+	+	+	+	-	-	-	-	

The main features (35a) divide the morphological circle in two equal halves. The secondary features (35b) cut a connected widge out of the circle. As the table in (6) indicates, most of the hypotetical main and secondary features have a morphophonemic reflex. An advantage of a feature theory which is rooted in and defined on the morphological circle is that the definition of these nine binary features do not proliferate the number of possible feature combinations (which would be $2^9/2=2048$), since most combinations are simply ruled out because they are not in concordance with the topology of the morphological circle. Put differently, a 'Redundancy Rule' like, say, (36) follows from the topology of the circle and needn't be stipulated.

(36) $+\sigma_1 \rightarrow -\alpha$

This gives prospect to interpret redundancy rules as reflections of the *topology* of the "feature space". Whereas this view is quite plausible in case of the relation between the phonological redundancy rules and the topology of the mouth space (although this has never been seriously studied), this view gives new insights in case of morphological features.

It is conceivable that the Main Features hold a relation with syntactic functional projections, be it through a picking-up process (Pollock 1989) or by a syntactic checking process (Chomsky 1992, Pollock 1993). The feature [β] clearly represent the syntactic feature [number], which the verbal root acquires syntactically (cf. Platzack & Holmberg 1989). The feature [α] correlates with the possibility of imperative-movement in Italian.

The syntactic meaning in Italian of the Main feature [γ] is not clear to me. In Latin, however, [γ] relates to NEG incorporation, cf. *noli* in example (38).

37

1. --		(-)
2. duoli-ti		+
3. se dolga		-
1'. dogliamo-ci		+
2'. dolete-vi		+
3'. se dolgano		-

38

esse	noli
s-u- m	nolo
e-s- s²⁴	non vis
e-s-t	non vult
s-u mus	nolumus
e-s-tis	non vultis
s-u- nt	nolunt

If also BE contains a clitic (viz. SE, cf. Postma 1993), the sensitivity of the initial /s/ in the paradigm of *esse* suggests a sensitivity for the functional projection where these clitics reside. This might result in the proclitic or endoclitic position of this /S/.²⁵ Further investigation is necessary to decide whether it is true that the three Main Features must be acquired/checked in syntax under head movement.

7. The stability of the Latin paradigm: agreement or anti-agreement?

In the prevous sections, we concluded that the verbal paradigm in Latin has full person analogy but no number analogy (19A). Nevertheless, there are features in Latin that seem to correlate with number: the moraic length of the forms. The forms of the plural seem to have one mora more than the forms of the singular.

Now, if the moraic length were stored in the lexicon, we would expect that the morphological paradigm in Latin were fundamentally instable. Although this can have been the case in the transitory phase towards Italian (cf. section ...), this cannot be maintained for Latin in the Classical period. This is a severe problem for the theory of the morphologcal circle. Asv a solutiom, we suggested in section ...that the

39 *Latin Paradigm, Morphological Circle (19A).*

1.vinc-am	1	m	-	-	μ
2. vinc-as	2	-	-	s	μ
3. vinc-at	3	-	t	-	μ
1' vinc-amus	1	m	-	s	2μ
2' vinc-atis	2	-	t	s	2μ
3' vinc-ant	3	m	t	-	2μ

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²⁴The presence of a double -s- can be traced from the imperative form *es*. Since imperatives are paradigmatically related to the second person present tense indicative minus the ending /s/, the retention of final -s in case of *es* shows an underlying form e-s-s.

²⁵In Lithuanian, the SE-morpheme occurs meso-clitically after the first morpheme of the verb: pa-i⁻mti 'to take'; pà-imu 'I take'; pa-si-i⁻mti 'to take oneself' (Nevis 1992). According to Stolz 1989:18), dialectal Lithuanian allows for mesoclisis of SE between the verbal root and the person endings.

moraic structure of the Latin paradigm might be acquired syntactically, rather than in the Lexicon. In this section we would like to present a first attempt of theory formation how syntax might be invoved in the licensing of the verbal paradigm. We will take Chomsky's checking theory as a starting point.

In a checking theory as proposed by Chomsky (1992), the verbal form with all its phonological material is inserted in VP. The morphological features which indirectly represent the ϕ-features (person and number) are checked in functional heads (say F^0) against the corresponding ϕ-features of subject through spec-head agreement in F^0.

40.   [SU F^0 .... $V\{k\}^0$
          ϕ_i ϕ_k i=k
          pron
              ⌐_____⌐

In such a checking system, no binding effects arise from Kayne's rule, as the ϕ-features present in the functional head F^0 because of the properties of the verbal form have a different status. These features in F^0 remain 'abstract', i.e. they are not lexical. Probably their status can be compared with the relation traces maintain with their antecedent: although traces are assumed to inherit the ϕ-features of their antecedent, these "copies" are not pronominal as they are not lexical. Even more: traces cannot be lexicalized, since otherwise a conflict would arise between the fundamental anaphoric nature of a NP-trace and the pronominal status (on behalf of Kayne's rule) of such lexicalized ϕ-features. So, Chomsky's checking theory is fully compatible with Kayne's rule, provided that the forms of the paradigm are not agglutinative but make part of the form inserted in VP. They are checked against purely formal ϕ-features in the functional head F^0.

After this brief survey and interpretation of Chomsky's checking theory, let us return to the properties of the Latin paradigm. As we saw, most the properties of the Latin paradigm could be accounted for by considerations of the lexicon: optimal storage. Only the distribution of the moraric lenght could not fit in the properties of the morphologoical circle. Now, the moraically long forms have also a double specification for the three morphemes the latin paradigm seems to be composed of {m,s,t}. This correlation can hardly be accidental.

If this correlation is real, it is probable that both the acquisition of morae and the checking of the morphological features are simultaneously carried out in syntax. If we project the number of morae of the number of functional projection where checking has to occur, we get a syntactic licensing as schematized under (41).[26]

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[26]For some morphosyntactic evidence for the one-one correspondence between functional categories and moraic length, see my paper: "Oer de sintaktyske analize fan Feitsma en oare sibskip- en plaknammen". *Tydskrift foar Fryske Taalkunde*, 8, 82-97.

41   IP[SU F⁰........G⁰..... .....V-{ms}
          μ   μ
        [pron] [pron]
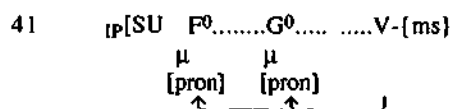
Now, if these functional categories contain phonological material (μ), and φ-features, these functional heads contain pronouns. As all pronouns are [+pronominal] in the sence of the Binding Theory (Kayne 1992), the checking of the morphological features of the verbs in functional heads will be subject to the binding theory. In other words, syntactic licensing of features in functional projections is problematic with respect to Principle B of the Binding Theory (Chomsky 1981), provided that the same features are present in the structural subject position. The only way to avoid a principle B violation in case of syntactic aquisition of inflectional material is to swich to a system in which no features are doubled: only a system that checks off whether features are not used yet within the same binding domain. We wmay call this option of language "anti-agreement" (42a). It is represented formally in (42b).
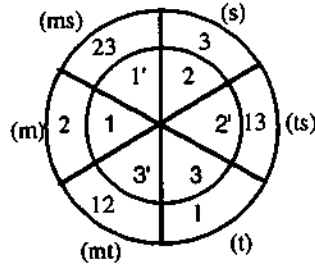
42   *Syntactic Anti-agreement*
a   • The syntactic φ -features of a specifier are complementary with the syntactic φ features of its head
b   • [SU$_i$ V$_{jk...}$ i≠j≠k   (anti-agreement)

With this in mind, let us have a look at the Latin paradigm. Whereas we were unable to assign a unitary feature value to the morphemes of the Latin paradigm based on agreement, this is possible in a system with anti-agreement. The assignment can be done in terms of the features 123 person only. To see how, notice first that in the plural of the paradigm, one of the morphemes {m,s,t} is missing. A system based on anti-agreement must identify the missing feature with the feature value of the subject. This gives us the assignments of (43).

43   m=2, t=1, s=3

These values are at the same time compatible with their occurrence in the singular. The morpheme /t/ does not occur in the 1rst person, the morpheme /m/ does not occur in the 2nd person nor does the morpheme /s/ occur in the 3rd person. Supporting evidence for the systactic stauts of the morphemes in Latin isd that they are compatible with Baker's Mirror Principle. In (44) we represented the anti-agreement in the form of two circles. The inner circle represents the features of the subject. The outer circle represents the features on the verbal paradigm. In no segment a feature occurs twice.

Notice that in such a system, [number] need not be taken as an independent morphological feature, since it can be defined in terms of saturation of the person features. So, all plural forms are fully saturated with respect to the features [123], whereas the singular forms have an unsaturated slot. The non-

Spec-head Anti-agreement in the Latin paradigm of (39). (m=2;t=1;s=3)

44.

syntactic ststus of [number] in Latin gets confirmation within the nominal paradigms in which identifation of a number features is virtually impossible.

It may be clear that a system with anti-agreement is slightly relaxed with respect to a system with agreement, that is to say provided that feature is concerned that have more than two values. In case of a binary system, agreement and anti-agreement give the same correlations. It is therefore conceivable that all person agreement systems can be formulatable in terms of anti-agreement. I leave this for further research. An other possibility is that both agreement and anti-agreement systems occur in natural language.

If both agreement and anti-agreement are options UG allows for, it will give rise to the following paradigmatic systems. 1. Either the verbal form is inserted witin VP in all its phonological aspects and the Binding Theory is not in vigor. In this case the phonological shape must only be licensed by the lexicon and entirely be licensed by the lexicon (Morphological Circle: "optimal storage"). This might be the case in the Italian paradigm. 2. Or some phonological material is not licensed by the lexicon, but is acquired syntactically in a functional head. In that case, the ϕ-features in the functional head get the [+pronominal] status in sense of the Binding Theory on behalf of Kayne's Rule (lexicalization). In this case, it must obey anti-agreement in order to avoid a Binding Principel B violation.

8 Conclusions

In this paper, I proposed a representation for the structure of the verbal paradigm. This structure can be held responsible for the so-called analogical changes within the verbal paradigm.

As a first characterization of the paradigmatic structure, I proposed a circular topology, as it can describe the cross-links within the paradigm in a more adequate way than a linear structure. This topology gives a fundamental explanation for the phenomenon of *port-manteau* morphemes in languages with inflectional, i.e. non-agglutinative verb morphology.

As a special property, this morphological circle, i.e. a structure which is exclusively based on the morphophonemic features, shows a complete anti-symmetry for the semanto-syntactic features [person] and [number]. We coined this the Law of the Paradigmatic Breaking.

As a first application of the theory, transitions in Dutch paradigms, like *jij kunt→ jij kan* en *hij heeft→ hij heb*, which until now resisted a proper explanation, could be formulated in this model.

Finally, we speculated on the rise and decline of inflectional systems. We found that the circular topology of paradigms might be a storage phenomenon. The restrictions imposed by the morphological circle might be the origin of paradigmatic changes.

An uncertain factor is still the limited knowledge of what should be counted as independent morphemes on the morphological circle. In other words, it is still unclear under what circumstances phonological material will be iconic to characterize the verbal form or as secondary. Presumably, the interaction between syntax and the morphological module is involved. This might be the starting point for further research.

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