

La flexió verbal en les llenguës romàniques i el concepte d'Espai Temàtic

Aspectes teòrics i descriptius



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Introduction

- Models of morphological analysis
- Problematic data
- The representation of lexemes
 - Units of morphological analysis
 - Stem maximisation
- The Stem Space
 - Stem relations
- The question of classes
- Conclusion

Models of morphological analysis

- **constructive**

- combination of basic elements
- morpheme-based (roots and affixes are equal in nature)
- impoverished lexicon (one unit - one form)
- the task of morphology is to identify rules for combining minimal elements

cf. Blevins [2006]

Models of morphological analysis

- **abstractive**

- abstractions over full forms
- word-based (fully inflected forms are taken as basic elements)
- enriched lexicon (lexical units may have complex representations)
- the task of morphology is to describe the relations between forms

cf. Blevins [2006]

Models of morphological analysis

According to constructive approaches, all the variation actually observed, for instance in inflectional paradigms, can be reduced to a unit by postulating a (possibly abstract) basic form, from which all other forms can be derived by means of more or less general rules.

Problematic data

Present indicative of French verbs TENIR
(‘keep’) and RÉSoudRE (‘resolve’)

ISg	2Sg	3Sg	1 Pl	2Pl	3Pl
tjɛ̃	tjɛ̃	tjɛ̃	tənɔ̃	təne	tjɛn
kezu	kezu	kezu	kezolvɔ̃	kezolvε	kezolv

Problematic data

Present indicative of French verbs TENIR
(‘keep’) and RÉSoudRE (‘resolve’)

1Sg	2Sg	3Sg	1PI	2PI	3PI
tjɛ̃	tjɛ̃	tjɛ̃	tənɔ̃	təne	tjɛn

- ə > jɛ under stress
- Vn > nasalised V in open syllable
- underlying V in tjɛn

Problematic data

Most of the ‘phonological’ rules that are identified are not fully convincing:

- the variations observed have different degrees of generality
- they correspond to more or less natural phonological processes

Problematic data

Present indicative of French verbs TENIR
(‘keep’) and RÉSoudRE (‘resolve’)

1Sg	2Sg	3Sg	1PI	2PI	3PI
tjɛ̃	tjɛ̃	tjɛ̃	tənɔ̃	təne	tjɛn

ə ~ jɛ: only in a handful of verbs

Problematic data

Present indicative of French verbs TENIR
(‘keep’) and RÉSoudRE (‘resolve’)

ISg	2Sg	3Sg	1 Pl	2Pl	3Pl
kezu	kezu	kezu	kezolv̩	kezolv̩	kezolv̩

V ~ Vl: not a simple phonological process, but quite common
in French

Problematic data

Among the types of variation observed in inflectional paradigms, there are not only segmental processes which can be reduced to (more or less natural) phonological phenomena.

There are for instance, cases of adjunction of affix-like sequences (traditionally called ‘augments’ or ‘stem extensions’) whose phonological constituency is, by definition, unpredictable.

There are also several possible combinations of the two.

Problematic data

Present indicative of Catalan verb SERVIR
(‘serve’) and Italian verb FINIRE (‘finish’)

1Sg	2Sg	3Sg	1PI	2PI	3PI
sər'βεſu	sər'βεſəs	sər'βeſ	sər'βim	sər'βiw	sər'βeſən
fi'nisko	fi'nifſi	fi niſſe	fi'njamo	fi nite	fi niskono

Problematic data

Present indicative of Catalan verb SERVIR ('serve') and Italian verb FINIRE ('finish')

1Sg	2Sg	3Sg	1PI	2PI	3PI
sər'βε <u>ju</u>	sər'βε <u>ʃ</u> əs	sər'βe <u>ʃ</u>	sər'βim	sər'βi <u>w</u>	sər'βe <u>ʃ</u> ən
fi'nisko	fi'nissi	finisse	finjamo	finite	finiskono

Problematic data

Present indicative of Italian verbs FINIRE ('finish'), TENERE ('keep'), CONOSCERE ('know'), USCIRE ('go out'),

I Sg	2Sg	3Sg	I Pl	2Pl	3Pl
fi'nisko	fi'nijſi	fi'nijſe	fi'njamo	fi'nite	fi'niskono
'ten̄go	'tjeni	'tjene	te'njamo	te'nete	'tengono
ko'nosko	ko'noſſi	ko'noſſe	konoſſamo	konoſſete	ko'noskono
'esko	'eſſi	'eſſe	uſſamo	uſſite	'eskono

Problematic data

Present indicative of Italian verbs FINIRE ('finish'), TENERE ('keep'), CONOSCERE ('know'), USCIRE ('go out'),

ISg	2Sg	3Sg	IPI	2PI	3PI
EXT	EXT+P	EXT+P	—	—	EXT
g-I	D	D	—	—	g-I
—	P	P	P	P	—
—	P	P	VM+P	VM+P	—

Problematic data

Stem distribution in the present indicative
of French, Catalan and Italian

	1Sg	2Sg	3Sg	1PI	2PI	3PI
Fr	A	A	A	B	B	C
Cat	A	A	A	B	B	A
It	A	B	B	C	C	A

Problematic data

Both the variation observed and its distribution are the reflect of various historical changes languages have gone through.

Diachrony already motivates why the systems are shaped the way they are; the synchronic projection of historical changes should be explaines by independent (empirical, cognitive) arguments.

The representation of lexemes

The majority of studies on morphology today acknowledge that morphological competence cannot be reduced to a binary distinction between what is irregular and memorised and what is regular and produced on-line.

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Rather, it is quite commonly admitted that frequent regular forms are memorised by speakers on a par with irregular ones

[Stemberger & MacWhinney 1988; Baayen et al. 2003]

The representation of lexemes

The presumption that the added compactness of the lexicon ensured by constructive approaches only holds if one presupposes that lexical memory is more costly than lexical processing.

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Once again, empirical evidence is lacking for the ‘brain-as-calculator’ ideal [Baayen 2007]

The representation of lexemes

Once we acknowledge that lexemes are complex objects which may have multiple phonological representations, the task of abstractive, and more generally of paradigm-based models, is to achieve economy not by reducing the amount of memorised information, but by finding means of organising this complexity.

The representation of lexemes

Morphomes, Stem Spaces are some of the theoretical objects that have the goal of structuring paradigms according to purely morphological principles, independent of external (e.g. phonological or semantic) motivations.

[Aronoff 1994; Maiden 2005, 2009; Bonami & Boyé 2003, 2007]

Units of morphological analysis

Probably, the most neutral way of addressing the question of paradigmatic relations is the “Paradigm Cell Filling Problem”:

“Given exposure to an inflected wordform of a novel lexeme, what licenses reliable inferences about the other wordforms in its inflectional family?”

[Ackerman et al. 2009]

Units of morphological analysis

In principle, a lexeme's paradigm may be entered from any of its inflected forms.

For a 50-cell paradigm this gives 1,225 connections that are relevant in order to fill all of them.

However, in all paradigms there are sets of cells systematically covarying.

Units of morphological analysis

Stem distribution in the present indicative
of French, Catalan and Italian

	1Sg	2Sg	3Sg	1PI	2PI	3PI
Fr	A			B	C	
Cat	A			B	A	
It	A	B		C	A	

Units of morphological analysis

In abstractive approaches there is no *a priori* position about the number and the nature of the pertinent units that are supposed to emerge from the analysis.

Stress is put on the relations between word forms, with no presupposition about their nature (may correspond to a phonological operation, a non-segmental operation, an identity relation, etc.).

Units of morphological analysis

“Un ‘morfoma’ es una entidad abstracta, no concreta; una función convencional y general que distribuye diferencias formales de cualquier tipo, según subconjunto sincrónicamente arbitrarios de ‘casillas’ paradigmáticas flexivas”

[Maiden 2012]

Units of morphological analysis

Verbal systems of Romance languages:

- strong redundancy in the endings across classes
- a great deal of internal (stem-)variation within the same lexeme

Units of morphological analysis

Verbal systems of Romance languages:

- strong redundancy in the endings across classes
 - a great deal of internal (stem-)variation within the same lexeme
- ➡ less prototypical (non-canonical in Corbett's 2009 terms) inflectional classes

Units of morphological analysis

Latin noun inflection:

	I	II	III	IV	V
N	Xa	Xus	X	Xus	Xes
G	Xae	Xi	Xis	Xus	Xei
D	Xae	Xo	Xi	Xui	Xei
Acc	Xam	Xum	Xem	Xum	Xem
V	Xa	Xe	X	Xus	Xes
Abl	Xa	Xo	Xe	Xu	Xe

Stem maximisation

- word form exponents correspond to the maximal rightmost strings that are common across patterns
- all the remaining variation as stem allomorphy
- all remaining elements that may be interpreted as morphemes (e.g. stem extensions, theme vowels) are not considered contentful anymore, but simply the exponents of a particular relation between stems

Stem maximisation

Theme vowels:

their meaning does not correspond to a morphosyntactic value, but to a purely morphological feature, i.e. the inflection pattern to which a particular verb belongs.

Stem maximisation

Theme vowels:

do not surface in all the forms of a paradigm; apart from cases of full ambiguity (ex. Italian ISg Pres Ind in [o], IPl in [jamo]), a lexeme's paradigm may also be signalled by a vowel variation

	Infinitive	ISg Impf Ind	ISg Fut Ind
‘wash’	lavare	lavavo	laverò
‘believe’	credere	credevo	crederò
‘sleep’	dormire	dormivo	dormirò

Stem maximisation

Theme vowels:

the inflection pattern of a lexeme may be inferred from a sequence which is not necessarily placed between the stem and the ending

	3Sg Pres Ind	IPl Pres Ind
‘weight’	pɛz	pəzɔ̄
‘seal’	sɛl	selɔ̄
‘smell’	fɛl	fɛlɔ̄

Stem maximisation

Theme vowels:

the inflection pattern of a lexeme may be inferred from a sequence which is not necessarily placed between the stem and the ending

	I Sg Impf Ind	I Pl Pres Ind
‘want’	volevo	vwɔle
‘move’	mwavevo	mwave
‘sit’	sedevo	sjede
‘ask’	kjedevø	kjede

Stem maximisation

Theme vowels:

the sequence that allows the inflectional model of a verb to be inferred may be something other than a single vowel, and even larger than a single phoneme (cf. Catalan [ɛʃ] and Italian [isk]/[iʃʃ] sequences)

The Stem Space

Although various attempts have been made to account for stem variation in paradigms on non-morphological grounds, it is quite commonly admitted today that the majority of the stem allomorphies found in Romance conjugation cannot receive a synchronic explanation, and should be interpreted as the outcome of a purely morphological distribution, i.e. as morphemes in Aronoff's (1994) terms.

The Stem Space

Stems are generally defined formally as the phonological material on which a word form is built.

Here, a definition which is both formal and distributional: a stem is the minimal common string of a set of forms in systematic covariation in a paradigm.

The Stem Space

“la notion du thème est postérieure aux formes concrètes composant le paradigme: on trouve le thème en dégageant les éléments communs à toutes les formes [...] du paradigme”

[Kuryłowicz 1949, cited in Blevins 2006: 536]

The Stem Space

Each lexeme possesses a collection of stems in its phonological representation, stems are indexed, and languages specify with which stem a specific cell in the paradigm should be filled.

The Stem Space

Each lexeme possesses a collection of stems in its phonological representation, stems are indexed, and languages specify with which stem a specific cell in the paradigm should be filled.

■■■→ Each lexeme possesses a Stem Space

Visually, Stem Spaces are represented as paradigmatic grids, in which each cell contains a stem index

The Stem Space

The Stem Space of Italian verbs

	Person					
	1	2	3	4	5	6
Fut Ind	S6	S6	S6	S6	S6	S6
Pres Cond	S6	S6	S6	S6	S6	S6
Pres Sbj	S2	S2	S2	S4	S4	S2
Pres Ind	S2	S3	S3	S4	S1	S2
Impf Ind	S1	S1	S1	S1	S1	S1
Impf Sbj	S1	S1	S1	S1	S1	S1
Pret Ind	S5	S1	S5	S1	S1	S5
Imperative		S3		S4	S4	
Pres Participle				S1		
Gerund				S1		
Past Participle				S7		
Infinitive				S8		

The Stem Space

The Stem Space of Italian verbs

- accounts for the inflection of all Italian verbs but 8 highly irregular ones
- represents the maximal complexity that an Italian verb may theoretically have
- in fact, no Italian verb displays this complexity; the most complex verbs contain up to 6 different stems

The Stem Space

- first level of simplification: in Italian 8 stems are sufficient to fill a 49-cell paradigm
- moreover, the distribution of stems within the paradigm is highly constrained; only 29 of all the possible combinations of 8 stems in a 49 cells paradigm are attested in actual Italian verbs

Stem relations

- the model proposed is agnostic as to lexical storage; it is not intended to give an indication on what *is* memorised in a speakers' brain, but on what *must* be memorised and on what *may* be memorised (or may not be)
- for the majority of verbs, which are entirely regular, knowing one stem is sufficient, all the others being inferrable by default relations
- saying that the memorisation of one stem is *sufficient* for the inflection of a lexeme does not necessarily imply that that particular lexeme is memorised in each speaker's lexicon *with one and only form*

Stem relations

- the relations connecting stems between them and the relations connecting a stem to the forms it constructs are equal in nature and may be expressed with the same formalism
- irregularity may be viewed as the breaking of a default relation, either between a stem and a form (form allomorphy), or between two stems (stem allomorphy)

Stem relations

Stem-to-stem relations for Italian verbs (Pres Ind)

	Person					
	1	2	3	4	5	6
Fut Ind	S6	S6	S6	S6	S6	S6
Pres Cond	S6	S6	S6	S6	S6	S6
Pres Sbj	S2	S2	S2	S4	S4	S2
Pres Ind	S2	S3	S3	S4	S1	S2
Impf Ind	S1	S1	S1	S1	S1	S1
Impf Sbj	S1	S1	S1	S1	S1	S1
Pret Ind	S5	S1	S5	S1	S1	S5
Imperative		S3		S4	S4	
Pres Participle				S1		
Gerund				S1		
Past Participle				S7		
Infinitive				S8		

Stem relations

Stem-to-stem relations for Italian verbs (Pres Ind)

	Person					
	1	2	3	4	5	6
Fut Ind	S6	S6	S6	S6	S6	S6
Pres Cond	S6	S6	S6	S6	S6	S6
Pres Sbj	S2	S2	S2	S4	S4	S2
Pres Ind	S2	S3	S3	S4	S1	S2
Impf Ind	S1	S1	S1	S1	S1	S1
Impf Sbj	S1	S1	S1	S1	S1	S1
Pret Ind	S5	S1	S5	S1	S1	S5
Imperative		S3		S4	S4	
Pres Participle				S1		
Gerund				S1		
Past Participle				S7		
Infinitive				S8		

Stem relations

Stem-to-stem relations for Italian verbs (Pres Ind)

SI–S2	SI–S3	SI–S4	S2–S3	S2–S4	S3–S4
Xa–Xi Xe–Xa	X–X	XV–X	Xi–Xa Xa–Xe	XV–X	XV–X
lava-lavi	lava-lava	lava-lav	lavi-lava	lavi-lav	lava-lav
krede-kreda	krede-krede	krede-kred	kreda-krede	kreda-kred	kredi-kred
tene-tenga	tene-tjene	tene-ten	tenga-tjene	tenga-ten	tjene-ten

Stem relations

Stem-to-stem relations for Italian verbs (Pres Ind)

SI–S2	SI–S3	SI–S4	S2–S3	S2–S4	S3–S4
Xa–Xi Xe–Xa	X–X	XV–X	Xi–Xa Xa–Xe	XV–X	XV–X
lava-lavi	lava-lava	lava-lav	lavi-lava	lavi-lav	lava-lav
krede-kreda	krede-krede	krede-kred	kreda-krede	kreda-kred	kredi-kred
tene≠tenga	tene≠tjene	tene-ten	tenga≠tjene	tenga≠ten	tjene≠ten

Stem relations

Stem-to-stem relations for Italian verbs (Pres Ind)

SI–S2	SI–S3	SI–S4	S2–S3	S2–S4	S3–S4
$x_2 - x_i$			$x_i - x_2$		

For a speaker of Italian it is sufficient to memorise one stem in order to inflect a verb like LAVARE in the present indicative, while for a verb like TENERE he/she must memorise at least three stems

tene-tenga tene-tjene tene-ten tenga-tjene tenga-ten tjene-ten

Stem relations

Stem-to-form relations for Italian verbs (Pres Ind)

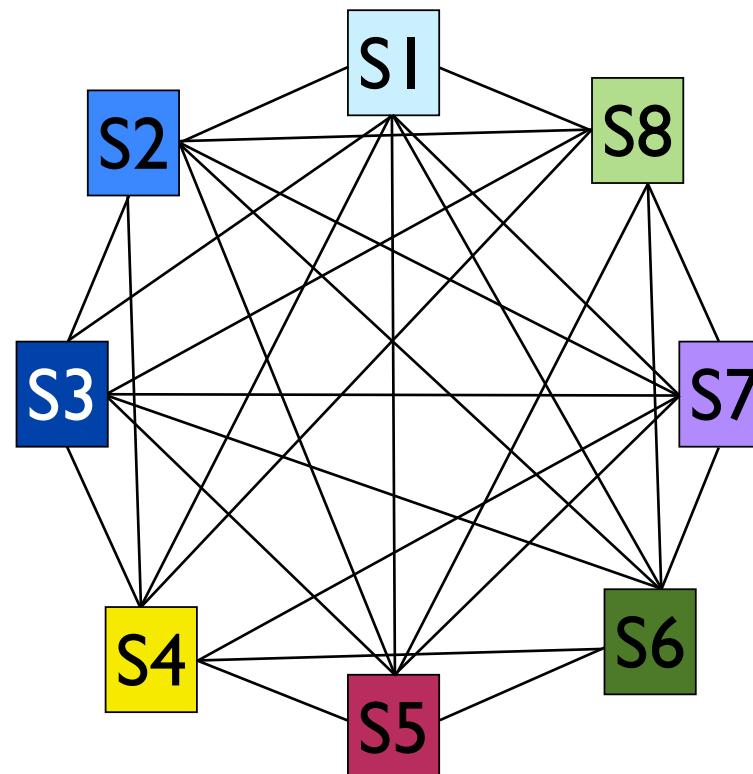
1Sg	2Sg	3Sg	1Pl	2Pl	3Pl
S2	S3	S3	S4	S1	S2
XV–Xo	XV–Xi	X–X	X–Xjamo	X–Xte	Xi–Xano Xa–Xono
'lavo	'lavi	'lava	la'vjamo	la'vete	'lavano
'kredo	'kredi	'krede	kre'djamo	kre'dete	'kredono
'tengo	'tjeni	'tjene	te'njamo	te'nete	'tengono

Stem relations

- the solution proposed for the PCFP is that individual cells are linked to one another indirectly, via stems that correspond to sets of cells in systematic covariation
- stems do not distribute randomly in paradigms, but according to recurrent patterns, allowing an important reduction of the range of possible paradigms

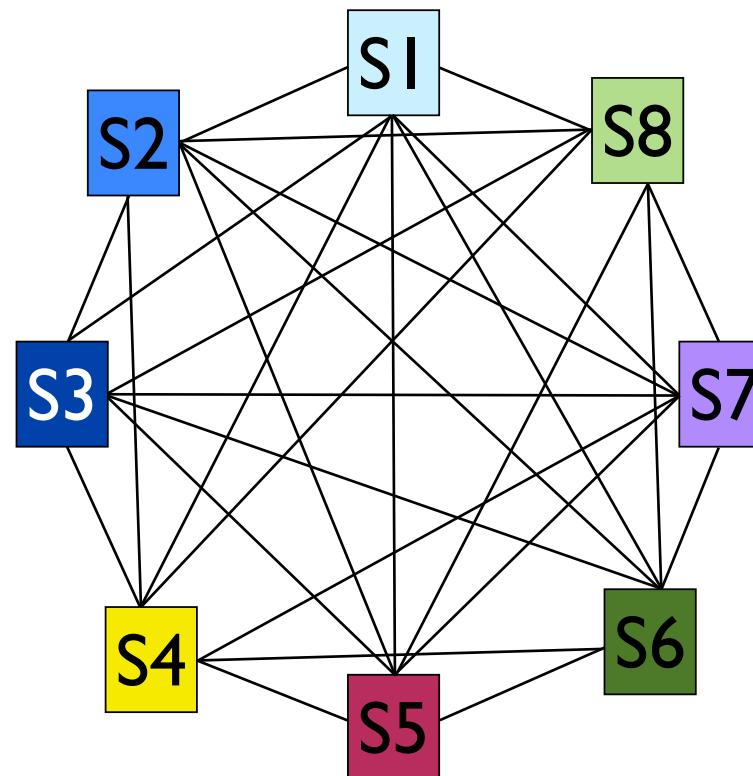
Stem relations

in theory, 28 relations are necessary in order to fill a 8-stem space



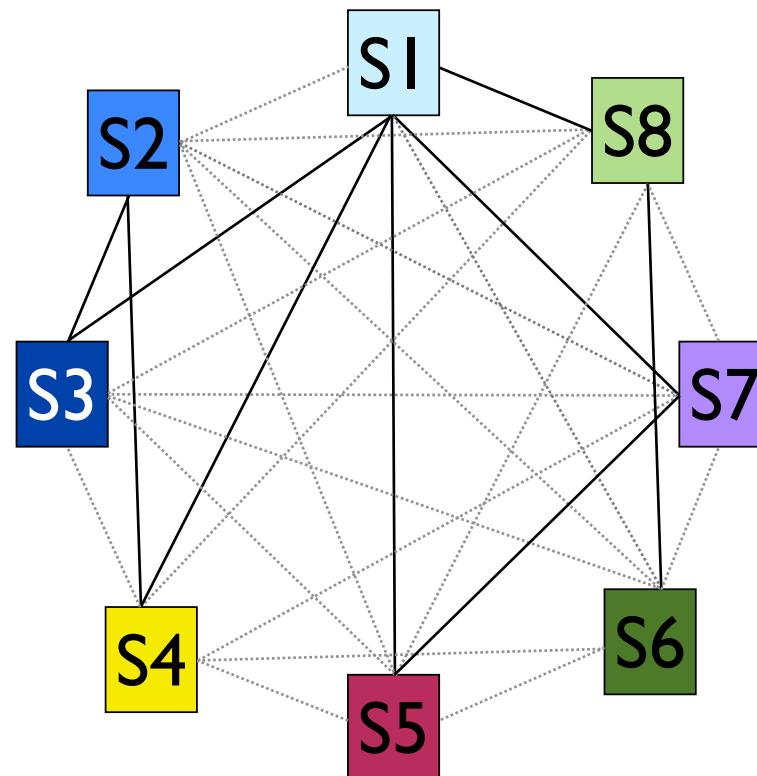
Stem relations

in practice, most of the relations are redundant, as they display little predictive value



Stem relations

in practice, most of the relations are redundant, as they display little predictive value



Stem relations

Relations between three Italian stems

	Person					
	1	2	3	4	5	6
Fut Ind	S6	S6	S6	S6	S6	S6
Pres Cond	S6	S6	S6	S6	S6	S6
Pres Sbj	S2	S2	S2	S4	S4	S2
Pres Ind	S2	S3	S3	S4	S1	S2
Impf Ind	S1	S1	S1	S1	S1	S1
Impf Sbj	S1	S1	S1	S1	S1	S1
Pret Ind	S5	S1	S5	S1	S1	S5
Imperative		S3		S4	S4	
Pres Participle				S1		
Gerund				S1		
Past Participle				S7		
Infinitive				S8		

Stem relations

Relations between three Italian stems

	Person					
	1	2	3	4	5	6
Fut Ind	S6	S6	S6	S6	S6	S6
Pres Cond	S6	S6	S6	S6	S6	S6
Pres Sbj	S2	S2	S2	S4	S4	S2
Pres Ind	S2	S3	S3	S4	S1	S2
Impf Ind	S1	S1	S1	S1	S1	S1
Impf Sbj	S1	S1	S1	S1	S1	S1
Pret Ind	S5	S1	S5	S1	S1	S5
Imperative		S3		S4	S4	
Pres Participle				S1		
Gerund				S1		
Past Participle				S7		
Infinitive				S8		

Stem relations

Relations between three Italian stems

S2–S3	S2–S7	S3–S7
$Xi-Xa$ $Xa-Xe$	$Xi-Xato$ $Xa-Xuto$	$X-Xto$ $Xe-Xuto$

Stem relations

Relations between three Italian stems

	S2	S3	S7
‘wash’	lavi	lava	lavato
‘know’	konoska	konosſe	konosſuto
‘bite’	mɔrda	mɔrde	mɔrso
‘be born’	naska	naſſe	nato
*	A	B	A

Stem relations

Relations between three Italian stems

	S2	S3	S7
‘wash’	lavi	lava	lavato
‘know’	konoska	konosſe	konosſuto
‘bite’	mɔrda	mɔrde	mɔrso
‘be born’	naska	naſſe	nato
*	A	B	A

Stem relations

- the S2–S3 and S3–S7 connections have a higher predictive value than the S2–S7 connection; these two stems are linked only indirectly, via S3
- second level of simplification: only 9 of the 28 possible connections for the 8 Italian stems appear to be predictive
➡ Stem Graph (Aurélie)

The question of classes

- 2,069 verbs from the LIP, a corpus of spoken Italian (8 highly irregular verbs and their derivates were excluded)
- stem maximisation procedure
- 75 different inflection patterns ('classes')

The question of classes

		S1	S2	S3	S4	S5	S6	S7	S8	
LAVARE	'wash'	Xa	Xi	Xa	X	Xa	Xer	Xato	Xare	1,504
FINIRE	'end'	Xi	Xiska	Xijſe	X	Xi	Xir	Xito	Xire	135
SENTIRE	'feel'	Xi	Xa	Xe	X	Xi	Xir	Xito	Xire	32
PRENDERE	'take'	Xnda	Xndi	Xnde	Xnd	Xze	Xnder	Xzo	Xndere	32
PIANGERE	'cry'	Xdʒe	Xga	Xdʒe	Xdʒ	Xse	Xdʒer	Xto	Xdʒere	30
RIDERE	'laugh'	Xde	Xda	Xde	Xd	Xze	Xder	Xzo	Xdere	29

The question of classes

‘Traditional’ Italian verb classes

		1Sg Pr Sbj	3Sg Pr Ind	Infinitive	in the LIP
1	‘wash’	'lavi	'lava	la'vere	1,504
2	‘fear’	'tema	'teme	te'mere	1
2a	‘beat’	'batta	'batte	'battere	25
3	‘feel’	'senta	'sente	'sentire	32
3a	‘end’	fi'niska	fi'nisse	fi'nire	135

The question of classes

- it is ‘normal’ for a verb to have a paroxytonic infinitive, but if this infinitive ends in -ere, it is more ‘normal’ for it to be proparoxytonic
- moreover, it is quite uncommon, for a verb in -ere, to display no stem variation in the paradigm; along with the 26 unvarying -ere verbs, 287 -ere verbs display some stem variations in the paradigm

The question of classes

- stem invariability (predictable stem variability) can only be considered as a property of regular verbs for Class I
- the only difference between subclasses 2 and 2a lies in the stress pattern of the infinitive form
- one could be tempted to consider TEMERE as more regular, since the stress pattern of its infinitive is more consistent with the most common stress pattern of infinitives for all classes, but it is isolated

The question of classes

- no serious theoretical argument for not considering that each of the 75 patterns identified has the same status
- these ‘classes’ differ quantitatively but not qualitatively
- however, the majority of these patterns are only exemplified by one or few verbs; 48 of them are exemplified by less than 10 verbs, and 21 of them by only one verb

Conclusion

- identify the exact connections of the morphemic stems that distribute throughout a paradigm
- indication of the exact number of forms (stems) that must be minimally associated with a lexeme in a speaker's memory
- each connection can be represented by one or more relations; relations can be mutually exclusive, complementary or hierarchically ordered, thus capturing the fact that the distinction of lexemes into classes and subclasses is more a quantitative than a qualitative matter

Conclusion

- reducing the number of connections that it necessary to manipulate in order to inflect a lexeme
 - first level: the 2,352 possible relations between the 49 cells of the paradigm of an Italian verb are reduced to a single relation between a form and the stem it is based on
 - second level: reducing the 28 possible connections between the 8 stems of an Italian verb to 9 on the basis of their mutual interpredictability

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