French Stems in Verbal Inflection:
Structure, Rules, and Allomorphy

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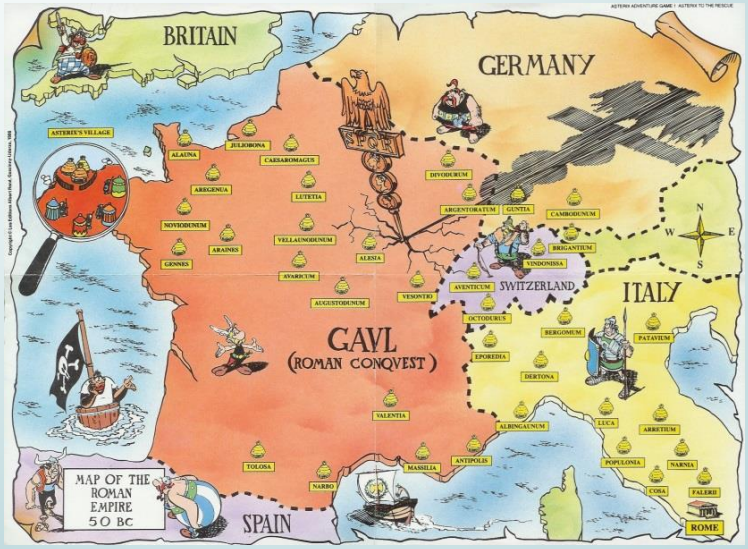
Verbal Morphological Structure

Romance languages

verbal system inherited from Latin (Dubois, 1967)



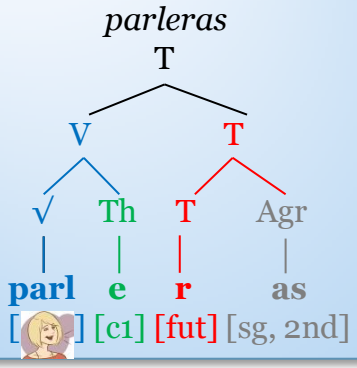
Stem: form after inflectional suffix stripping (Aronoff, 1994)

Theme vowel (Th): conjugational (class, group) vowel merged with the root in theme (stem) formation

Theme: root + Th (Spencer, 1991)

Latin: a, e, i

Structure



Language	ā	ĕ	ē	ī
Latin	*am**āre***	*prend**ĕre***	*vid**ēre***	*aud**īre***
Spanish	amar	prender	ver	oír
Portuguese	amar	prender	ver	ouvir
Italian	amare	prendere	vedere	udire
Catalan	amar	prendre	veure	sentir
French	aim**er**	prend**re**	v**oir**	ou**ïr**

French Verbal System

Source	1st [-er]	2nd [-ir]	3rd	Total
@Lexique 3(2015)	4633	236	351	5220
Bescherelle (2012)	8202	306	372	8880
Kilani-Schoch & Dressler (2005)	4 mc	1 mc	28 mc	33 mc 21 ip

mc: micro class
ip: independent paradigm

Count of Verbs Used by French Nursery School Children During Play

Conjugation Class	*Number of Uses*	*Number of Verbs*
First (*chanter*)	1060 (36.2%)	124 (76.0%)
Second (*finir*)	173 (6.0%)	10 (6.1%)
Third (*vendre*)	1706 (57.8%)	29 (17.9%)

From Guillaume (1927/1973).

Source: Bybee (1995)

Which units in storage and processing?

	1st Class		2nd Class (Bonami et al. 2008)		3rd Class	
Person	**Present**	**Simple Past**	**Present**	**Simple Past**	**Present**	**Simple Past**
1st sg	parl-e	parl-ai	fin(i)-s	fin(i)-s	join-s	joign-i-s
2nd sg	parl-e-s	parl-as	fin(i)-s	fin(i)-s	join-s	joign-i-s
3th sg	parl-e	parl-a	fin(i)-t	fin(i)-t	join-t	joign-i-t
1st pl	parl-ons	parl-â-mes	fin(i)-ss-ons	fin(î)-mes	joign-ons	joign-î-mes
2nd pl	parl-ez	parl-â-tes	fin(i)-ss-ez	fin(î)-tes	joign-ez	joign-î-tes
3th pl	parl-ent	parl-è-r-ent	fin(i)-ss-ent	fin(i)-r-ent	joign-ent	joign-î-r-ent

Questions!

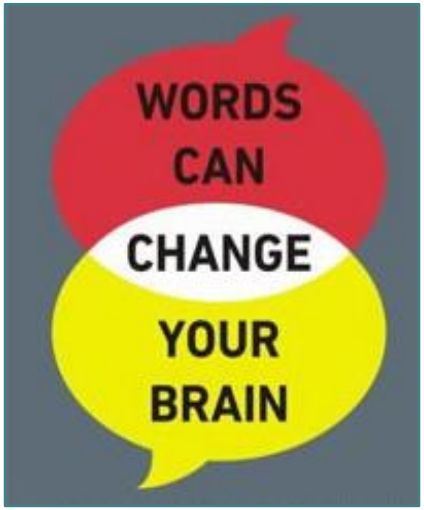
- Is there a Th morpheme representation in French? Root? Theme? Stem?
- How stems from the 1st and 3rd verbal classes are represented and processed in French?
- How specific subgroups are processed:
  a) [-er]/eE,
  b) [-ir]/[-dre]/[-ire]/[-indre] (80%)
- How the phonological/prosodic system interacts with verbal morphology in French?

Main Objective

- Investigate if the Th is represented in the French mental lexicon

Secondary Objectives

- Explore which structures, nodes, and morphemes are stored in the French mental lexicon
- Study how verbal morphological is influenced by the phonological/prosodic systems



Verbal Inflection Review

Language	Reference	Results and Model
English	Stanners et al. , 1979 Pinker, 1999	Regulars = morphemic representation, irregulars = independent representations (W&R)
German	Clahsen, 1999	Regulars = morphemic representation, idiosyncratic verbs = structured represented (MM)
Spanish	Dominguez et al., 2000 Bermúdez-Otero, 2013	1st class = fully-combinatorial, 2nd/3rd classes = lexically represented (AAM), but Arregi (2000) (DM)
Catalan	Rodriguez-Fornells et al., 2001	Lexical and combinatorial access by different morphological structures (Dual-mechanism), but Oltra-Massuet (1999) (DM)
Italian	Orsolini, & Marslen-Wilson, 1997	Productivity and lexical specificity (Full-decomposition), but Say, & Clahsen (2002) (W&R)
Portuguese	Verissimo, & Clahsen, 2009	1st class = structured root-based, 3rd class/vowel change = unstructured stem-based (Dual-mechanism), but Bassani, & Lunguinho (2011) (DM)
French	Meunier, & Marlen-Wilson, 2004 Kilani-Schoch, & Dressler, 2005 Bonami et al., 2008	1st class = fully-regular, 2nd class = fully-regular, 3rd class = allomorphy is structured stem-based, fully-idiosyncrasy is lexically stored (MM)

Method

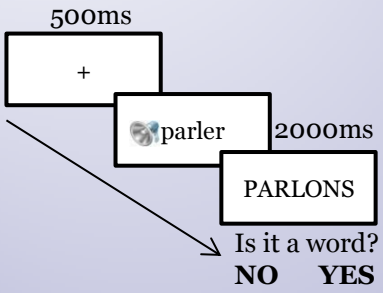
Target: 1st plural present inflected form [-ons]

Prime predictions:
-Identity = same target (full priming)
-Control = different infinitive (no priming)
-Test = target infinitive (?)

Stimuli:
-6 verb types, 3 conditions
-Experimental: 126 pair of verbs
(21 per verb type)
-Fillers: 294 pairs
(84 w-w, 210 w-p (84 phono., 126 unrel.))

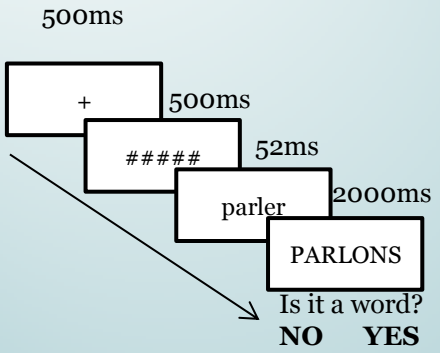
Experiment1: cross-modal priming

Subjects: N=54, 27 women, mean age 21.82, French as L1



Experiment2: masked priming

Subjects: N=54, 27 women, mean age 22.51, French as L1



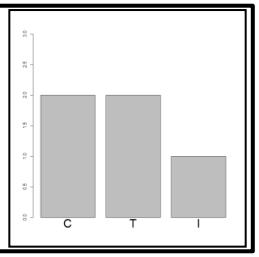
Verb Type	Control	Test	Identity	Target
a) 1st e/E	peser	lever	lèvent	LEVENT
b) 1st [-er]	aimer	parler	parlons	PARLONS
c) 3rd [-ir]	ouvrir	dormir	dormons	DORMONS
d) 3rd [-dre]	prendre	vendre	vendons	VENDONS
e) 3rd [-ire]	construire	écrire	écrivons	ECRIVONS
f) 3rd [-indre]	paindre	joindre	joignons	JOIGNONS
g) Control(MP)	brûler	apprécier(S)	administe(O)	ADMIRONS

Verissimo, & Clahsen, 2009

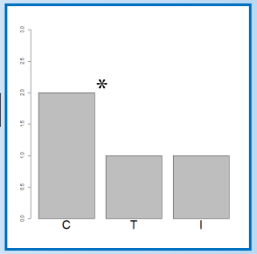
Hypothesis

Predictions on Prime Types (conditions):
-Full priming: Identity = same representation
-No priming: Control = different representation
-Partial priming = different but linked representations

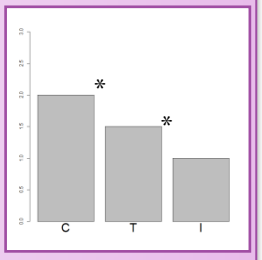
H0: no priming in Test Condition:
a) verb not decomposed: [word]
b) whole-word representation



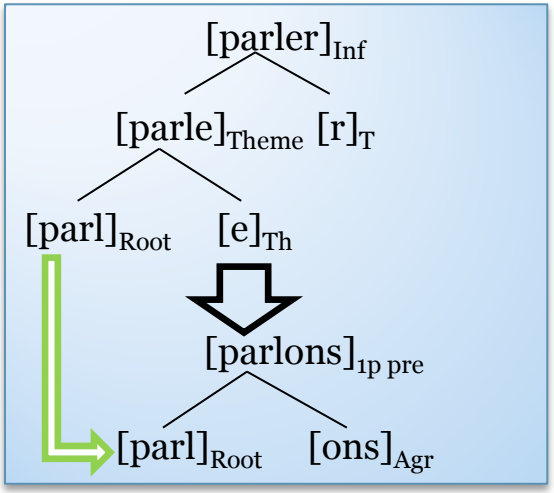
H1: full priming in Test Condition:
a) verb completely decomposed: [[[√][Th]][[T][Agr]]]
b) rule-based stem
c) phonological abstract representation e/E



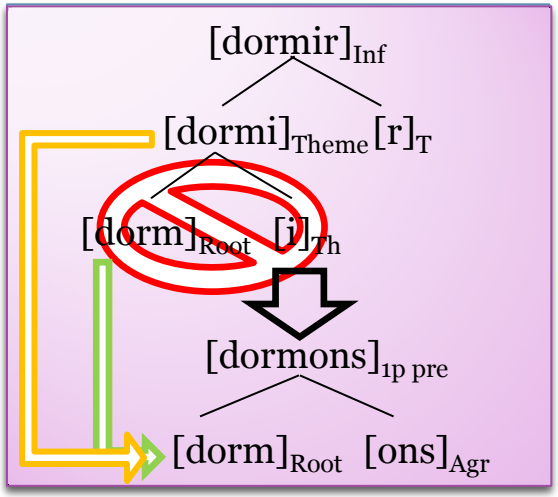
H2: partial priming in Test Condition:
a) verb partially decomposed [[Stem][[T][Agr]]]
b) stem allomorphic storage
c) phonological representation e/E



Prime | Target

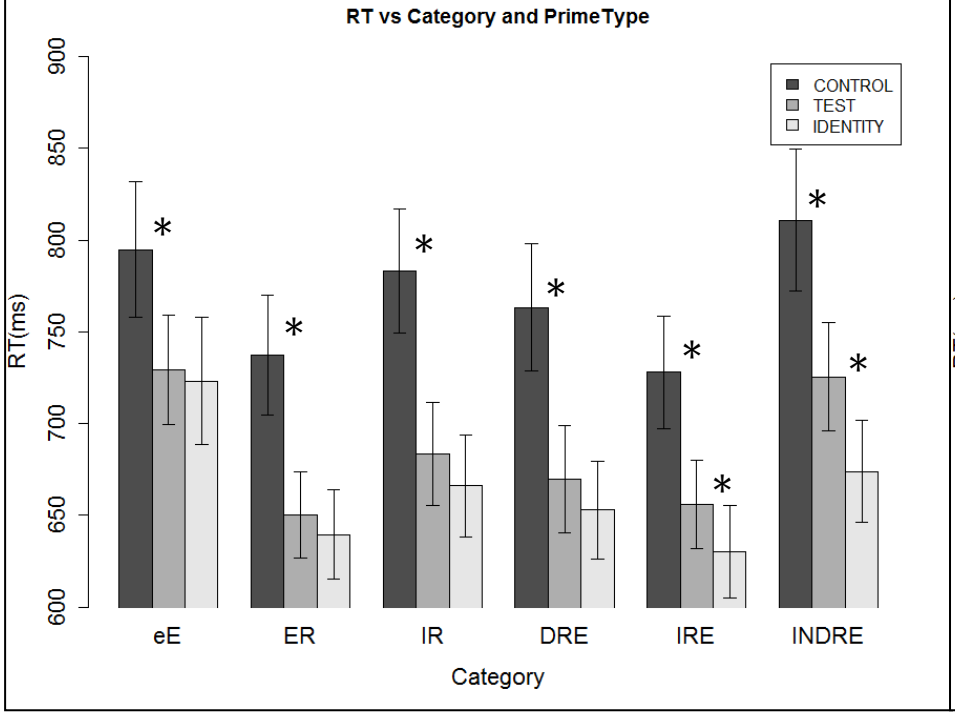


Prime Target

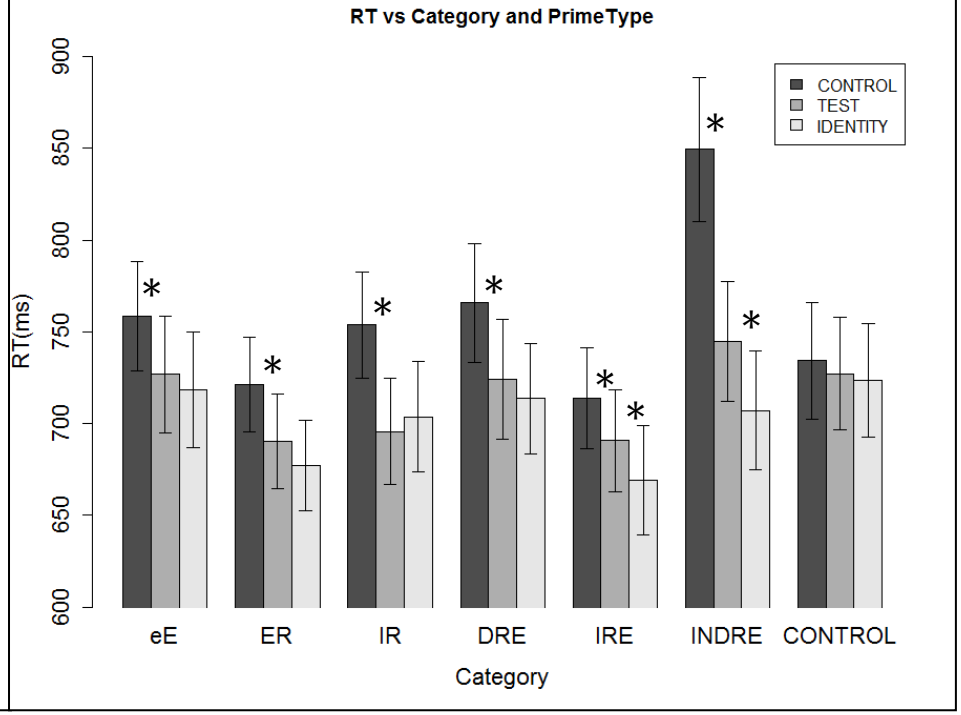


Results - RT

Exp.1 – Cross-modal



Exp.2 - Masked



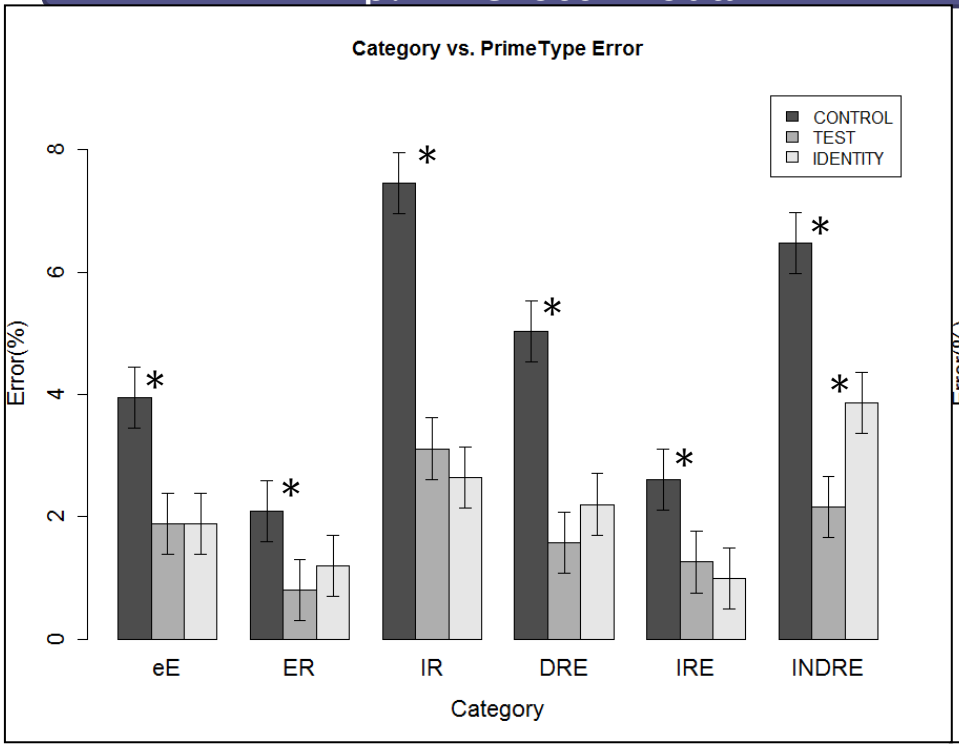
Full priming = -ER, -IR, -DRE, e/E
[-er]/[-ir]: Th representation; same morphological structure
[-dre]: no Th representation
e/E: abstract phonological representation (Marslen-Wilson, & Zhou, 1999)
Completely decomposed
Differences in mc productivity

Partial priming = -IRE, -INDRE
Different stem representations or morphological operations

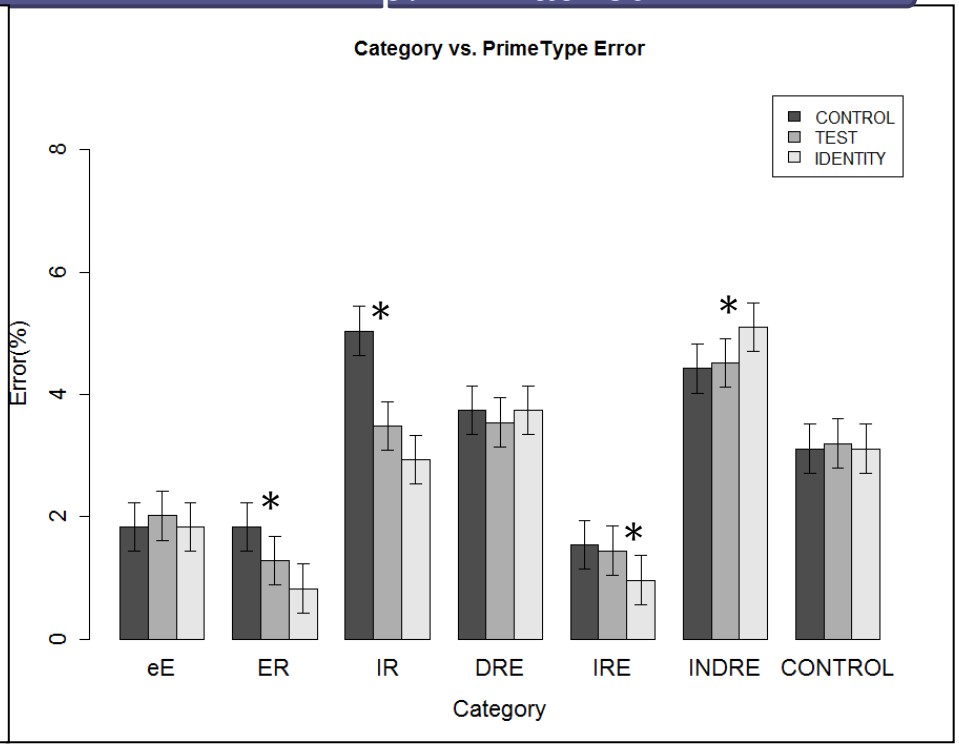
No priming = CONTROL(MP)

Results - ACC

Exp.1 – Cross-modal



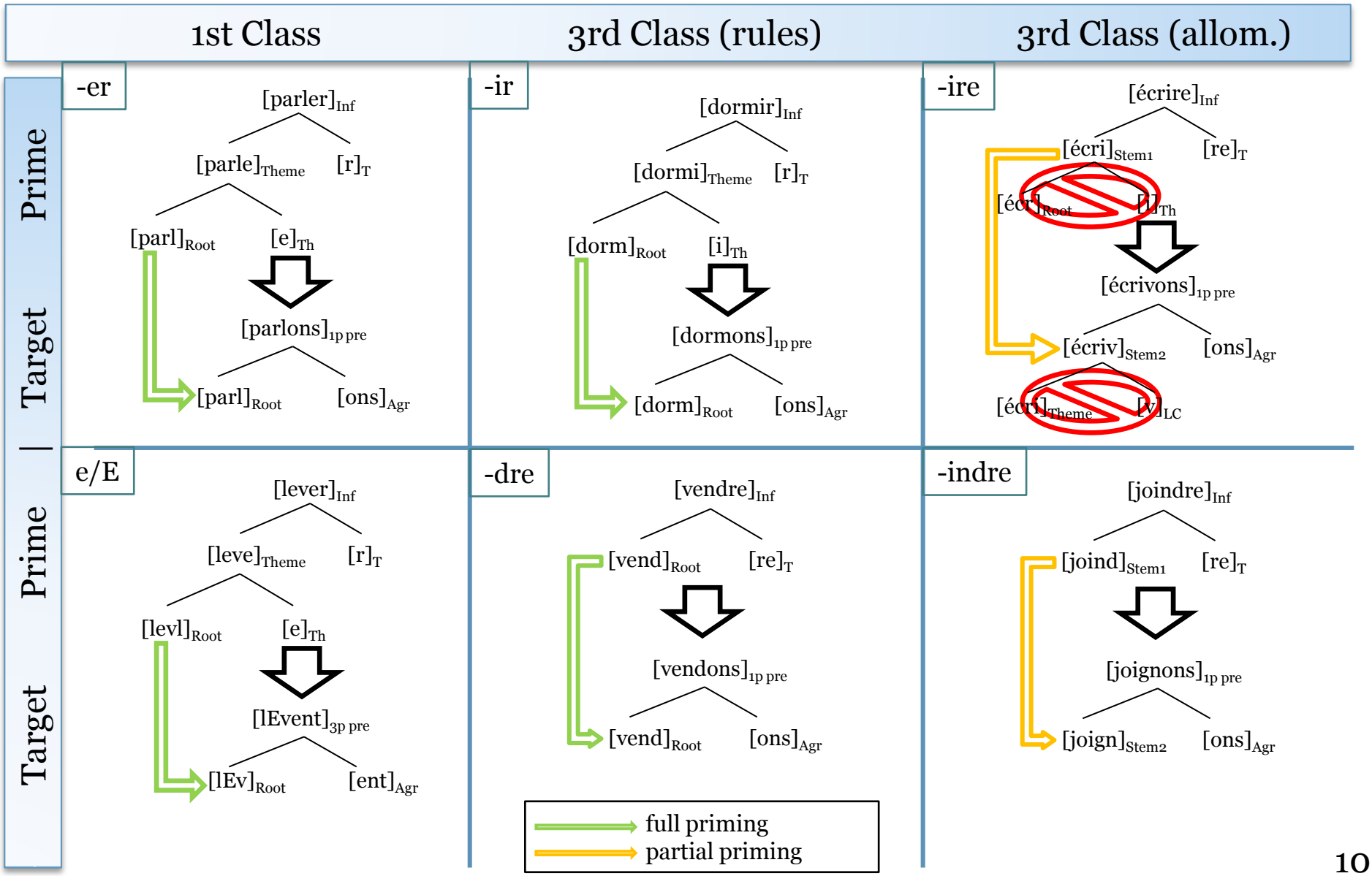
Exp.2 - Masked



Cross-modal
Full priming = -ER, -IR, -DRE, -IRE, e/E
Partial priming = -INDRE

Masked
Full priming = -ER, -IR
No priming = -IRE vs. -INDRE

Root, Stem and Thematic Vowel Representation



Root, Stem and Thematic Vowel Representation

Stem Representation

parl-	lEv-
dorm-	vend-
écri-	écriv-
joind-	joign-

Aronoff, 2012

Morphological Operation

écrire -> écrivons

joindre -> joignons

x -> y / _ z

Halle, & Marantz, 1993

Morphological Stem Processes

Metrical Phonology

Halle, & Idsardi, 1996

e/E

*	*	*
	* *)	* *)
* *)	*) * *)	* *) * *)
relèves	relevons	relèverons

[-ire]

*	*
	* *)
* *)	*) * *)
écris	écrivons

[-indre]

*	*
	* *)
* *)	*) * *)
rejoins	rejoignons

Morphological Stem Processes

[-er]

man**g**er -> man**ge**ons
pla**c**er -> pla**ç**ons

√<g> -> √<ge> / _ $V_{[stress]}$
√<c> -> √<ç> / _ $V_{[stress]}$

[-ir]

dor**m**ir -> dor**m**ons
dor**m**ir -> dort

√C -> Ø / _ $C_{[suffix]}$

[-ire]

rire -> rions
dire -> di**s**ons
écrire -> écri**v**ons

√ -> √<s> / _ $V_{[stress]}$
√ -> √<v> / _ $V_{[stress]}$

e/E

j**et**er -> j**Ett**ent
app**el**er -> app**Ell**ent
l**e**ver -> l**E**vent

√/e/ -> √/E/ / $_{[stress]}$

[-dre]

ven**d**re -> ven**d**ons
pren**d**re -> prenons

√C -> √Ø / _ $V_{[stress]}$

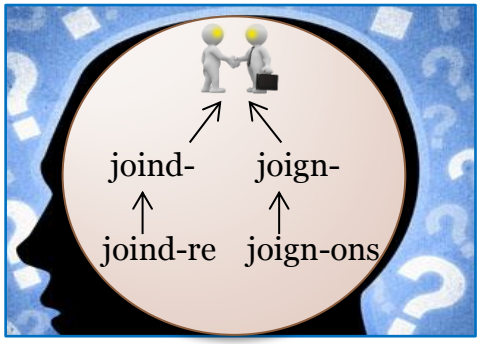
[-indre]

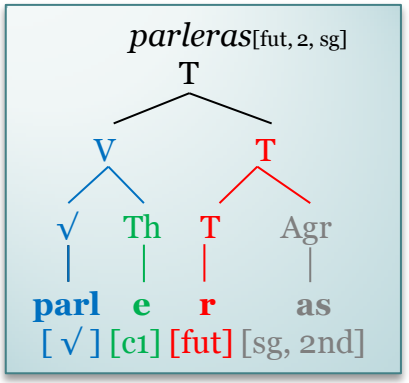
joi**nd**re -> joi**gn**ons

√<nd> -> √<gn>/ _$V_{[stress]}$

Conclusions

- All 3 verb classes are decomposed in French.
- Unlike other Romance languages (Spanish, Catalan, Italian, and Portuguese), French verbal inflection can be supported by a single combinatorial mechanism in 1st (Meunier, & Marslen-Wilson, 2004), 2nd (Bonami et al., 2008), and 3rd classes (here!).
- Our results suggest Th representation, and consequently, root and structure representations in stem formation.
- In less regular verbs, our results suggest allomorphic stem representations, or alternatively, morphological operations in stem allomorphy (Estivalet, & Meunier, 2015).
- French verbs are first decomposed in stem and inflectional suffixes; and after, the stem is decomposed in root and Th, with minimal morphemic activation.
- Stems are defined by allomorphy and morphophonological rules driven by suffixal morphemes, phonology, and prosody.





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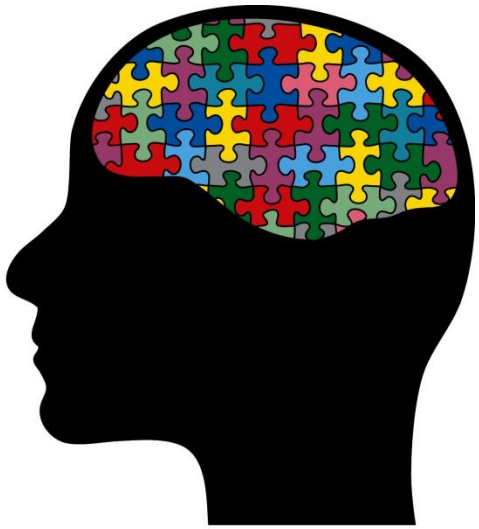
ALP

Auditory Language Processing

Thank you for the attention!



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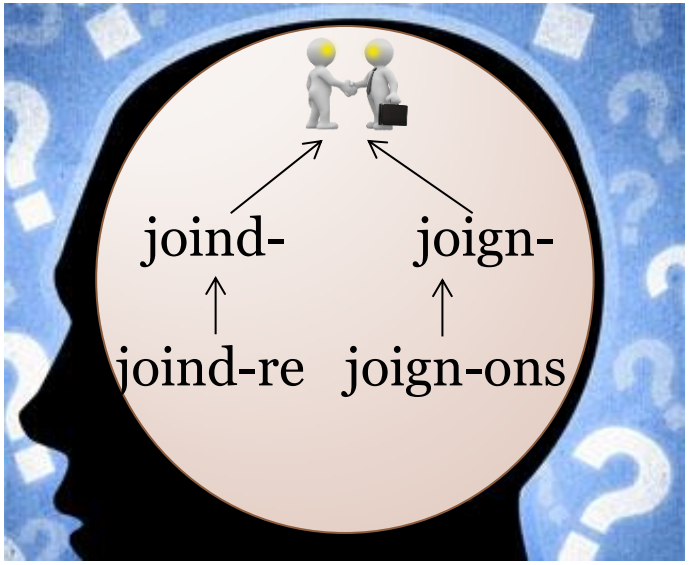
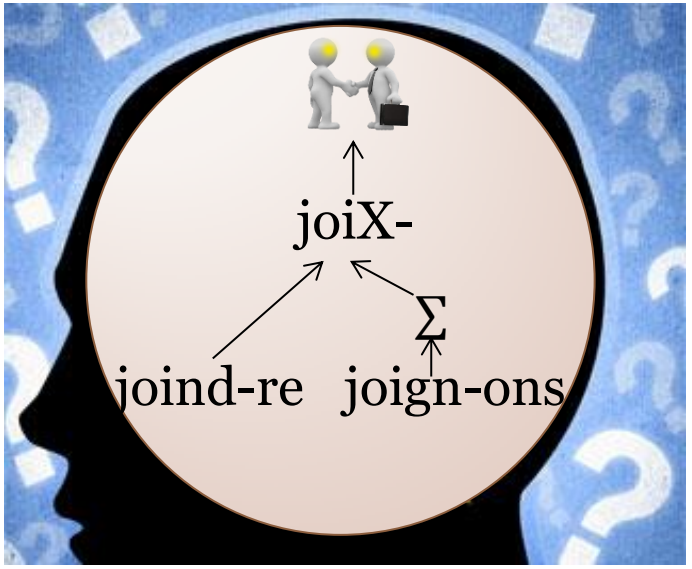
Paradigm Vs. Process

Paradigm



Process



Food for thought!

"Chomski, whose work, of course, post-dates Hockett's 'Two models', seems himself to operate more or less in morpheme based IP terms with transformations as the major class of Processes; but it would appear equally possible and fruitful to apply transformational procedures to a word based syntactic frame."

Robins, R. H. (1959). In Defence of WP. *Transactions of the Philological Society, 58*(1), 116–144.