MORPHOLOGICAL DECOMPOSITION AND REPRESENTATION OF FRENCH VERBS

Gustavo Lopez ESTIVALET

Fanny MEUNIER

Potsdam,
24 April 2013

PAST

PRESENT

FUTURE

1ST STUDY: VERBAL MORPHOLOGICAL DECOMPOSITION

- **Objective:** Examine the role that the characteristics of French verbs have in their access and processing in the lexicon.

REGULAR *parl*-ons, *parl*-es

MORPHO *jet*-ons, *jett*-es

IRREGULAR *buv*-ons, *boi*-s

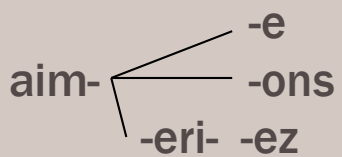
surface frequency (SF)
aime=52/10^6

cumulative frequency (CF)
aime+aimez+...=795/10^6

List of words
(Manelis & Tharp, 1977; Butterworth, 1983)

aime
aimons
aimeriez

Morphemes
(Halle, 1973; Taft & Foster, 1975)



Manelis, L., & Tharp, D. A. (1977). The processing of affixed words.
Butterworth, B. (1983). Lexical representation.
Halle, M. (1973). Prolegomena to a theory of word formation.
Taft, M., & Forster, K. I. (1975). Lexical storage and retrieval of prefixed words.

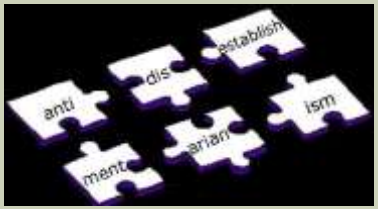
PAST

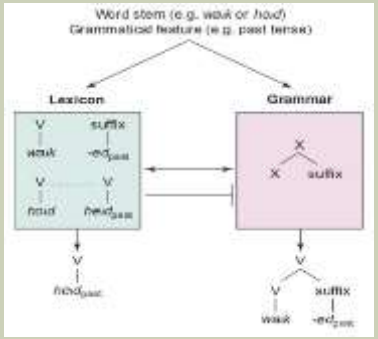
PRESENT

FUTURE

STORAGE AND PROCESSING MODELS

- **Obligatory Decomposition:** polymorphemic words are represented in the morphemic and lexical levels (Taft, 1979).
- **Augmented Address Morphology:** known words are recognized by a whole-word representation (Burani, Salmaso & Caramazza, 1984).
- **Race Model:** activation of the whole-word and morphemes in a parallel dual-route (Baayen, Dijkstra & Schreuder, 1997).
- **Words and Rules:** regular and irregular words are accessed by the declarative/procedural systems (Pinker & Ullman, 2002).





Taft, M. (1979). Recognition of affixed words and the word frequency effect.
Burani, C., Salmaso, D., & Caramazza, A. (1984). Morphological structure and lexical access.
Baayen, R. H., Dijkstra, T., & Schreuder, R. (1997). Singulars and plurals in Dutch: evidence for a parallel dual-route.
Pinker, S., & Ullman, M. T. (2002). The past and future of the past tense.

PAST

PRESENT

FUTURE

EXPERIMENT 1: SURFACE AND CUMULATIVE FREQUENCIES

- **Subjects:** 35 subjects, 24 women, mean age 21, right hand, French as L1
- **Task:** visual lexical decision
- **Study:** 3 experimental conditions:

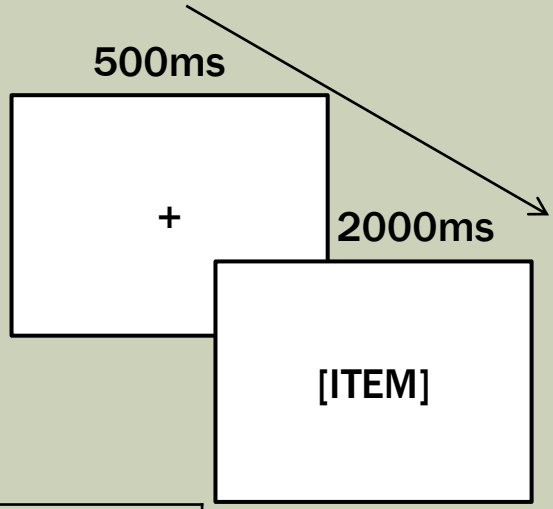
-*regulars:* 15 pairs of verbs

-*morphophonological [e], [ɛ]:* 15 verbs

-*irregulars:* 15 verbs

- **Variables:** 4 conditions:

SF+/CF+, SF+/CF-,
SF-/CF+, SF-/CF-



	CF-		CF+	
	SF-	SF+	SF-	SF+
Regular	chant-iez	chant-e	entr-iez	entr-ait
Morpho.	répèt-es	répèt-e	répét-ions	répét-a
Irregular	boiv-es	boiv-ent	buv-iez	buv-aient

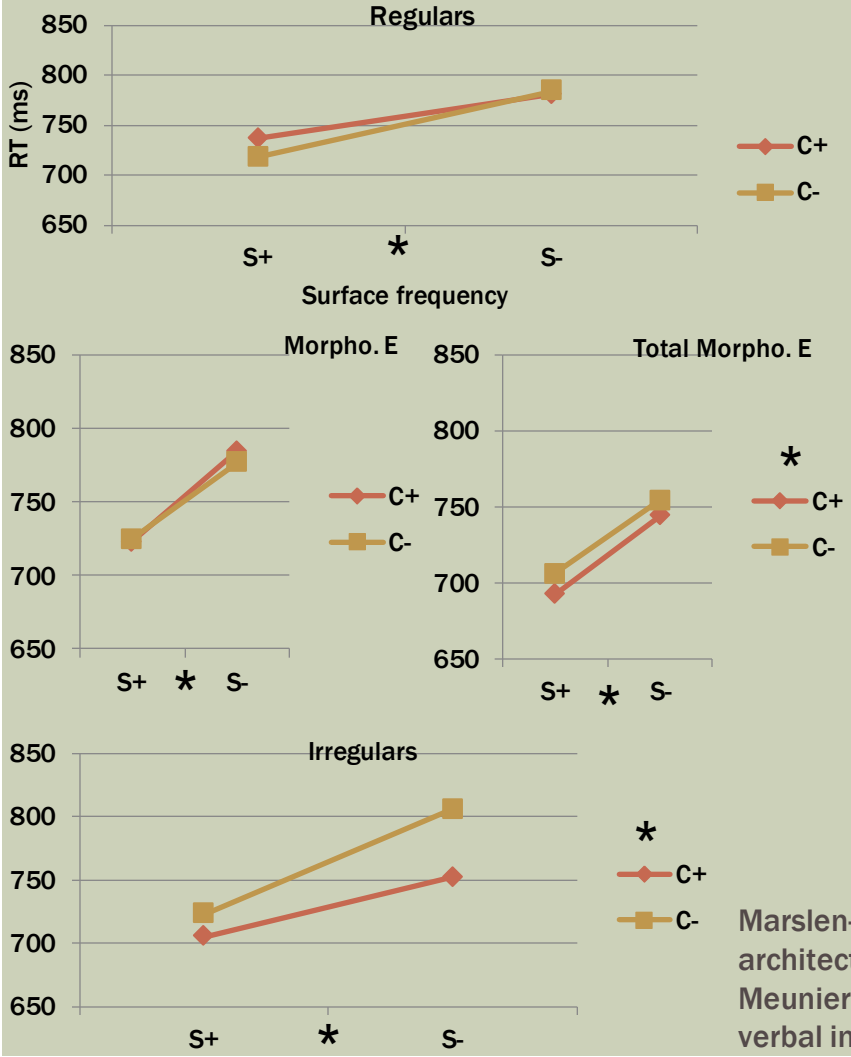
Meunier, F., Fabre, D., & Alario, F.-X. (not published) Role of regularity and decomposability for inflected word processing and representation

PAST

PRESENT

FUTURE

EXPERIMENT 1: RESULTS



- *SF = access to the whole-word or the recombination process between the base and the suffix (Taft, 1979).
- The lack of the CF effect could mean the whole-word access, but it seemed that no controlled variables affected the results.
- The lack of the CF effect between the allomorphs, and the *TCF effect suggest that the surface allomorphs activate an unspecified abstract base (Marslen-Wilson & Zhou, 1999).
- *CF = the allomorphs of irregular verbs have different representations in the lexicon (Meunier & Marslen-Wilson, 2004).

Marslen-Wilson, W., & Zhou, X. (1999). Abstractness, allomorphy and lexical architecture.

Meunier, F., & Marslen-Wilson, W. D. (2004). Regularity and irregularity in French verbal inflection.

PAST

PRESENT

FUTURE

EXPERIMENT 2: MORPHOLOGICAL SPECIFICITIES

homonymes

word length

corpus

operation

- **Subjects:** 32 subjects, 16 women, mean age 20, right hand, French as L1
- **Task:** visual lexical decision
- **Study:** 5 experimental conditions:

-*regulars:* 20 pairs of verbs

-*morphophonological [e], [ɛ]:* 20 verbs

-*morphophonological [o], [ɔ]:* 20 verbs

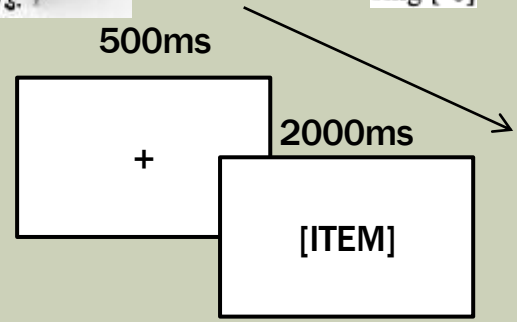
-*irregulars:* 20 verbs

-*operations:* 20 verbs

- **Variables:** 4 conditions:

SF+/CF+, SF+/CF-, SF-/CF+, SF-/CF-

O+/O-



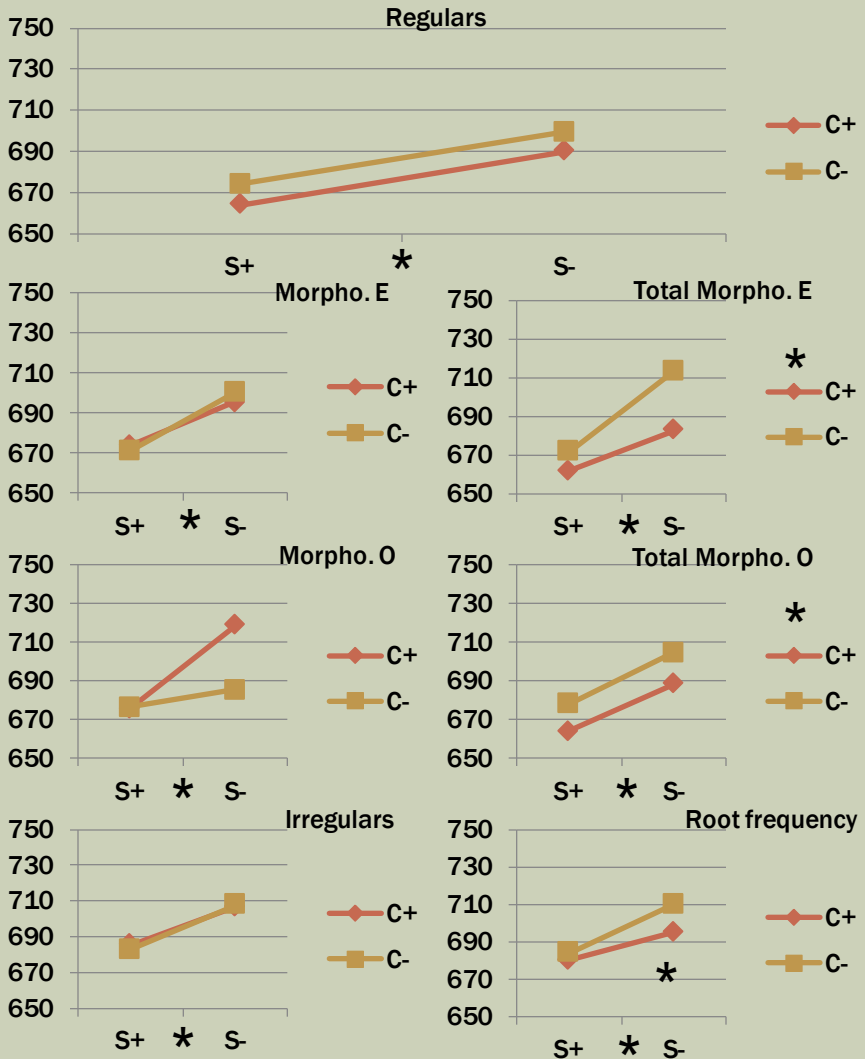
	SF-		SF+	
	CF-	CF+	CF-	CF+
Regulars	chant-ez	entr-ez	chant-e	entr-ai-t
Morpho. Ee	répèt-es	répét-i-ons	répèt-e	répét-ai-t
Morpho. Oo	ador-es	ador-i-ez	ador-ent	ador-ai-s
Irregulars	boiv-es	buv-i-ez	boiv-ent	buv-ai-ent
	O-	O+	O-	O+
Operations	ajout-ons	ajout-er-a	ajout-ent	ajout-ai-s

PAST

PRESENT

FUTURE

EXPERIMENT 2: RESULTS



- *SF = access to the whole-word or the recombination process between the base and the suffix (Taft, 1979).
- There is a difference of 11ms in the CF, but it is not significant.
- The lack of the CF effect between the allomorphs, and the *TCF effect suggest that the surface allomorphs activate an unspecified abstract base (Marslen-Wilson & Zhou, 1999).
- The lack of the CF effect could mean the whole-word access of the prefixed words (Colé, Beauvillain & Segui, 1989). But we suggest a different hypotheses (Marslen-Wilson, Tyler, Waksler, & Older, 1994).

Colé, P., Beauvillain, C., & Segui, J. (1989). On the representation and processing of prefixed and suffixed derived words: a differential frequency effect.

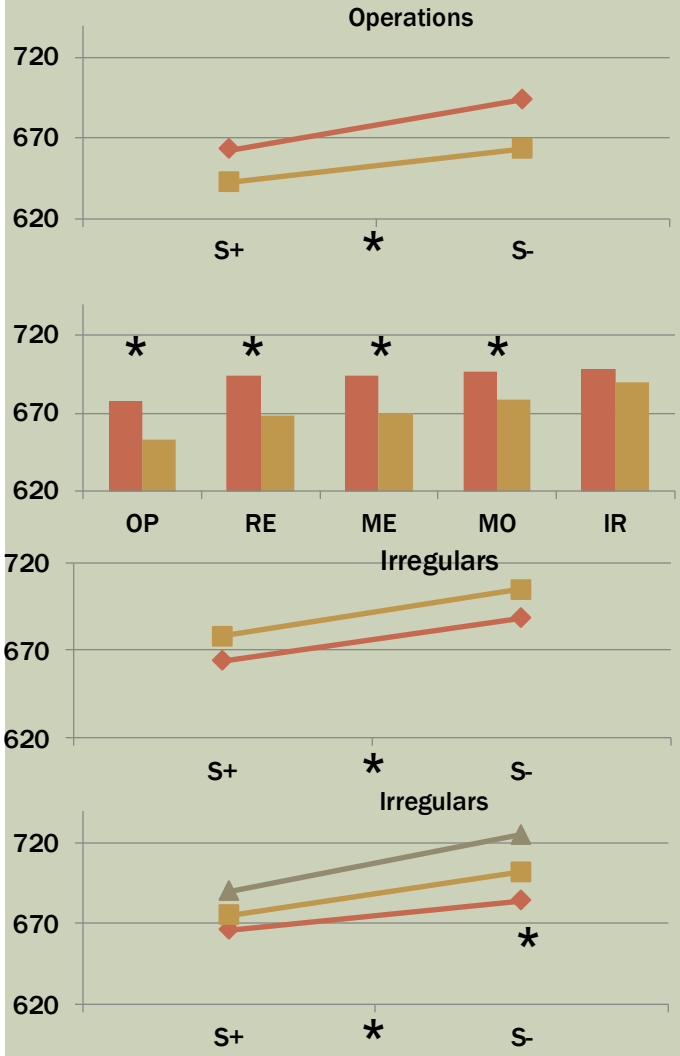
Marslen-Wilson, W. D., Tyler, L. K., Waksler, R., & Older, L. (1994). Morphology and meaning in the English mental lexicon.

PAST

PRESENT

FUTURE

EXPERIMENT 2: OPERATIONS



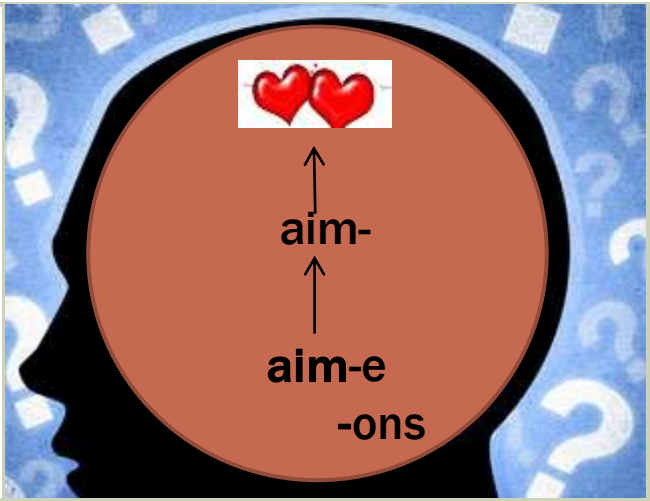
- *O = suggests a decomposition and morphological operation in one or two suffixes (Vega, Urrutia & Dominguez, 2010).
- RE = *SF, *CF, *O ME = *SF, *TCF, *O
  IR = *SF, *CF MO = *SF, *TCF, *O
- If we remove 5 IR prefixed verbs (*re-joindre, re-prendre, re-tenir, pré-venir, par-venir*), we have a *CF and *O effect which means different representations of the allomorphs.
- If we rearrange the irregulars considering the prefix as an operation, we can suggest that the morphological operations have a role in the decomposition and RT (Taft & Ardasinski, 2006).

Vega, M. d., Urrutia, M., & Dominguez, A. (2010). Tracking lexical and syntactic processes of verb morphology with ERP.

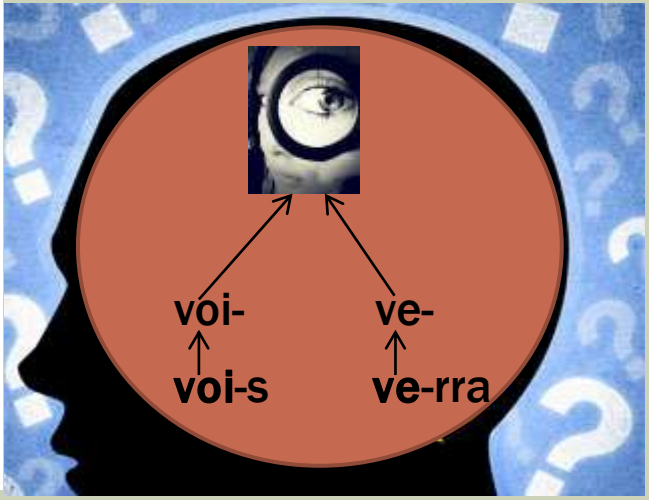
Taft, M. & Ardasinski (2006). Obligatory decomposition in reading prefixed words.

MORPHOLOGICAL DECOMPOSITION

REGULARS

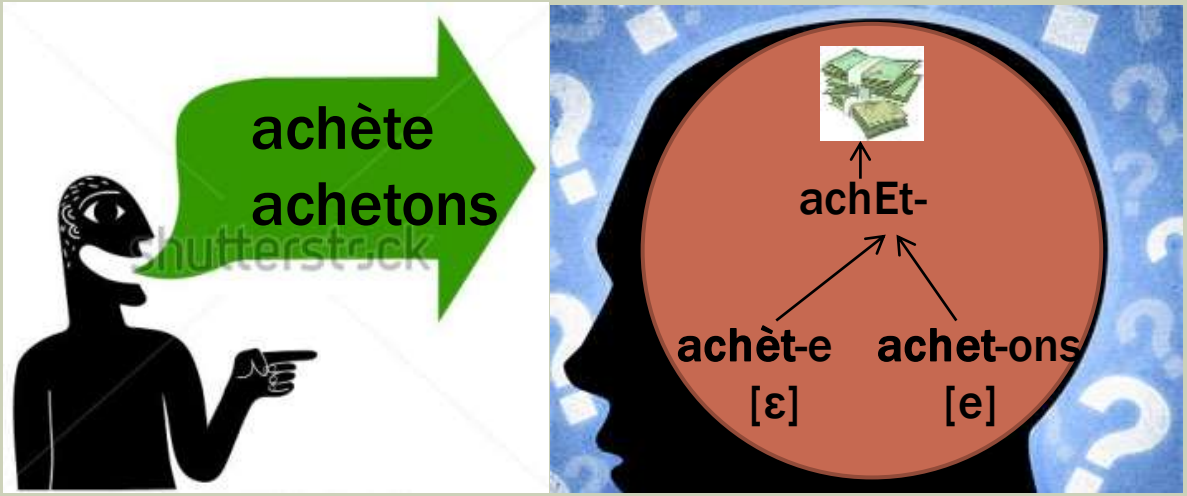


IRREGULARS

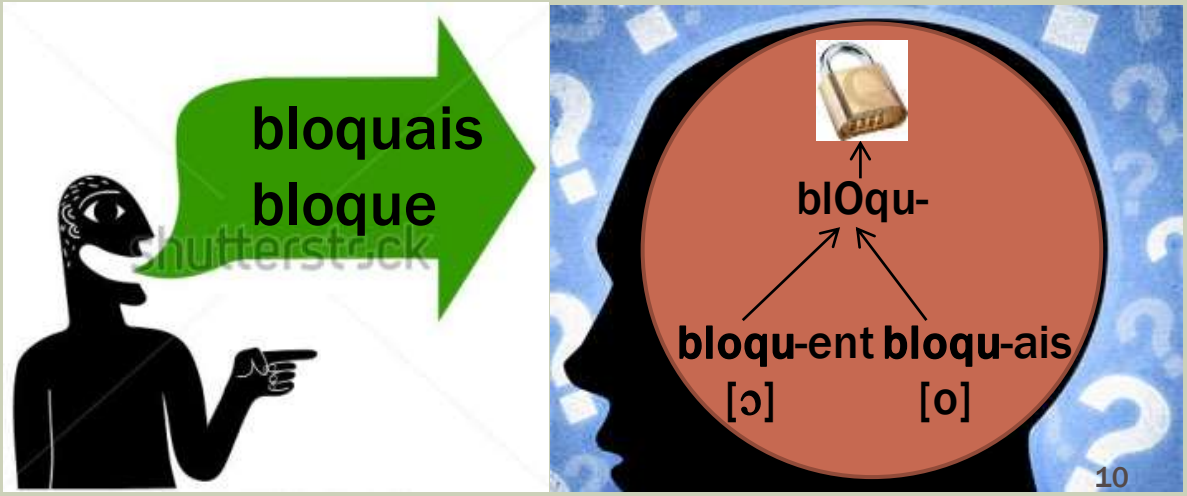


MORPHOLOGICAL DECOMPOSITION

MORPHO. [e], [ɛ]

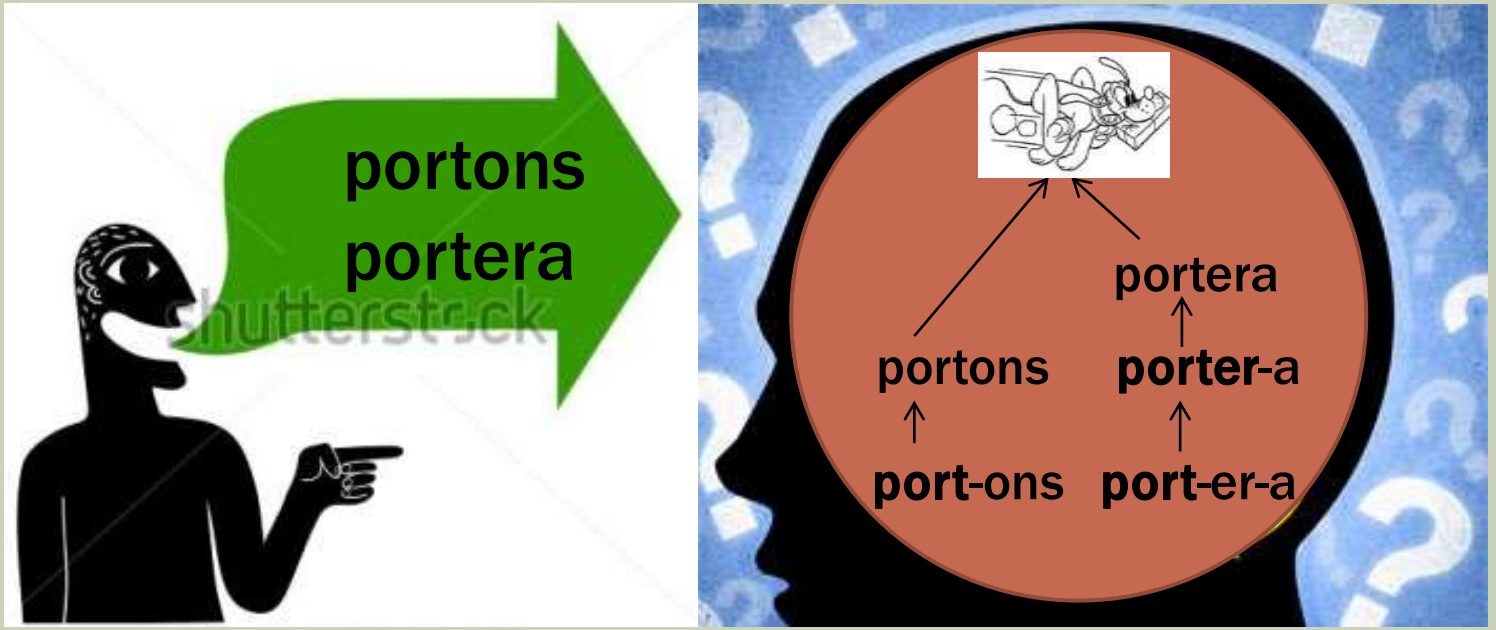


MORPHO. [o], [ɔ]



MORPHOLOGICAL OPERATION

OPERATION



PAST

PRESENT

FUTURE

CONCLUSIONS

- SF is always significant and interfere in the lexical recognition time. The other effects are greater in SF- than in SF+.
- All French verbs can be decomposed since they have regular affixes. But it seems that +SF verbs are accessed as a whole-word (Clahsen, 2006).
- Bases and affixes are represented in the lexicon. Morphophonological verbs have abstract stem representations and irregular ones have different stem representations.
- The number of morphological operations, prefixes or suffixes, seems to be significant in the RT responses.

PAST

PRESENT

FUTURE

EXPERIMENT 3: MORPHOLOGICAL OPERATIONS

- **Objective:** examine the influence of the different morphological operations in the French verbs.

- **Morphological operations:**

-prefix: *re-prend, sou-viens*

-suffix: *buv-ai-s, tiend-r-ez*

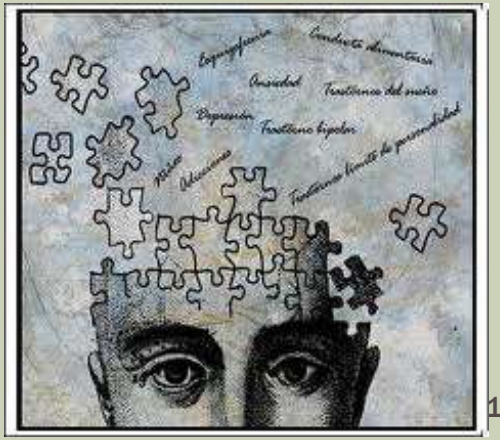
boi-Ø-s, ten-Ø-ons

-phonology: *moquons, moquent*

-orthography: *jetons, jette*

- **Variables involved:** surface, cumulative, stem and base frequencies, morphological operations, word length.

- **Prediction:** if there is an effect in the RT through the different operations, we can argue in favor of the Obligatory Decomposition Model (Taft, 1979), or the dual-route Race Model (Baayen et al., 1997).



PAST

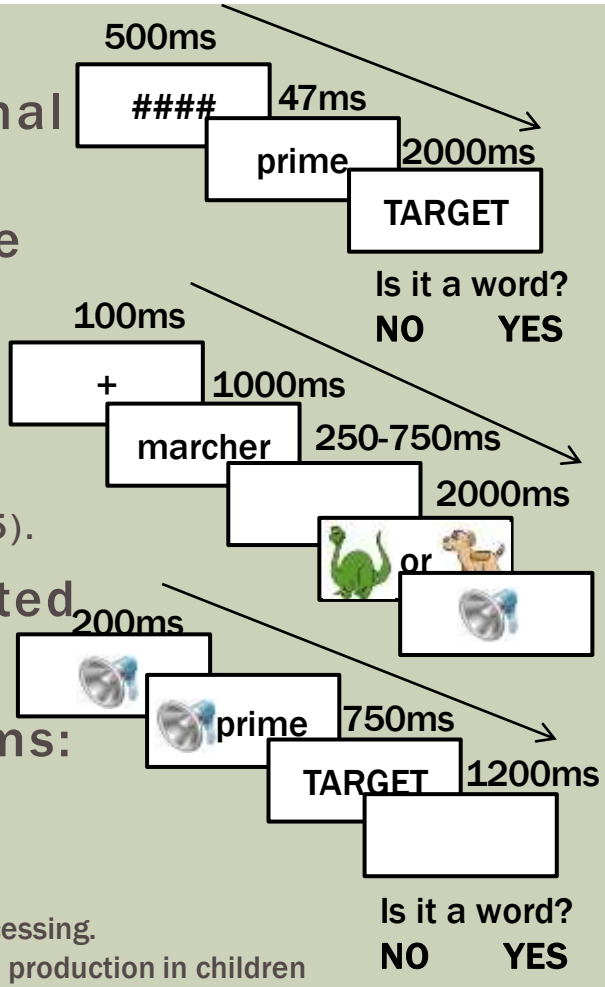
PRESENT

FUTURE

2ND STUDY: WORD STRUCTURE IN BILINGUALS

- **Objective:** examine the differences in the lexicon access in derivational and inflectional morphology in German/French, German/Portuguese and French/Portuguese bilinguals.

- **Experiment 1:** masked priming and derivational morphology (Longtin & Meunier, 2005).
- **Experiment 2:** ERP and production of inflected words (Budd, Paulmann, Barry, & Clahsen, 2013).
- **Experiment 3:** lexical representation of stems: priming study (Verissimo & Clahsen, 2009).

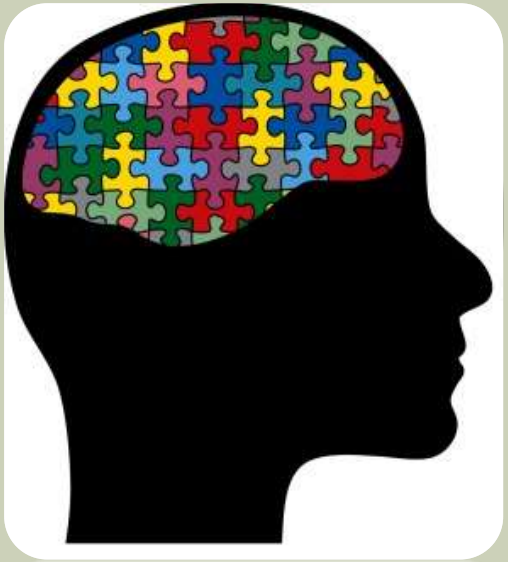


Longtin, C.-M., & Meunier, F. (2005). Morphological decomposition in early visual word processing.

Budd, M.-J., Paulmann, S., Barry, C., & Clahsen, H. (2013). Brain potentials during language production in children and adults: an ERP study of English past tense.

Veríssimo, J., & Clahsen, H. (2009). Morphological priming by itself: a study of Portuguese conjugations.

Thank you!



REFERENCES

- Baayen, R. H., Dijkstra, T., & Schreuder, R. (1997) Singulars and plurals in Dutch: Evidence for a parallel dual route model. *Journal of Memory and Language 37*, 94–117.
- Budd, M.-J., Paulmann, S., Barry, C., & Clahsen, H. (2013). Brain potentials during language production in children and adults: an ERP study of English past tense. *Brain and Language, (in press)*.
- Burani, C., Salmaso, D., & Caramazza, A. (1984) Morphological structure and lexical access. *Visible Language, 18(4),* 342-352.
- Butterworth, B. (1983). Lexical representation. Dans B. Butterworth (Ed.), *Language production*, London : Academic Press, 257-294.
- Clahsen, H., Balkhair, L., Schutter, J.-S., & Cunnings, I. (2013). The time course of morphological processing in second language. *Second Language Research, 29*, 7-31.
- Colé, P., Beauvillain, C., & Segui, J. (1989). On the representation and processing of prefixed and suffixed derived words: a differential frequency effect. *Journal of Memory and Language, 28*, 1-13.
- Halle, M. (1973). Prolegomena to a theory of word formation. *Linguistic Inquiry, 4*(1), 3-16.
- Longtin, C.-M., & Meunier, F. (2005). Morphological decomposition in early visual word processing. *Journal of Memory and Language, 53*, 26-41.
- Manelis, L., et Tharp, D. (1977). The processing of affixed words. *Memory & Cognition, 5,* 690-695.

REFERENCES

- Marslen-Wilson, W. D., Tyler, L. K., Waksler, R., & Older, L. (1994). Morphology and meaning in the English mental lexicon. *Psychological Review, 101*(1), 3-33.
- Marslen-Wilson, W., & Zhou, X. (1999). Abstractness, allomorphy and lexical architecture. *Language and Cognitive Processes, 14 (4),* 321-352.
- Meunier, F., & Marslen-Wilson, W. D. (2004). Regularity and irregularity in French verbal inflection. *Language and Cognitive processes, 19*(4), 561-580.
- New, B., Pallier, C., Brysbaert, M., & Ferrand, L. (2004). Lexique 2 : A New French Lexical Database. *Behavior Research Methods, Instruments, & Computers, 36 (3),* 516-524.
- Pinker, S., & Ullman, M. T. (2002). The past and future of the past tense. *TRENDS in Cognitive Sciences, 6*(11), 456-463.
- Taft, M. (1979). Recognition of affixed words and the word frequency effect. *Memory & Cognition, 7(4)*, 263-272.
- Taft, M., et Forster, K. I. (1975). Lexical storage and retrieval of prefixed words. *Journal of Verbal Learning and Verbal Behavior, 14,* 638-647.
- Taft, M. & Ardasinski (2006). Obligatory decomposition in reading prefixed words. *The Mental Lexicon, 1,* 183-199.
- Vega, M. d., Urrutia, M., & Dominguez, A. (2010). Tracking lexical and syntactic processes of verb morphology with ERP. *Journal of Neurolinguistics, 23*, 400-415.
- Veríssimo, J., & Clahsen, H. (2009). Morphological priming by itself: a study of Portuguese conjugations. *Cognition, 112*, 187-194.

EXPERIMENT 2: REGULARS

	C+		C-	
pair	**S+**	**S-**	**S+**	**S-**
aimer/figurer	aimions	aimeront	figurez	figurera
avancer/briller	avancent	avancera	brillent	brillais
chercher/baigner	cherchez	cherchiez	baignait	baignons
donner/reculer	donnerai	donneriez	reculons	reculera
entrer/détacher	entrent	entriez	détache	détachez
essayer/inspirer	essayez	essayes	inspire	inspires
fermer/utiliser	fermaient	fermera	utilisait	utilisons
frapper/trembler	frappent	frappons	tremblent	trembliez
garder/discuter	gardais	garderas	discute	discutes
laisser/pardonner	laisserai	laisseras	pardonnez	pardonnes
marcher/insister	marchais	marcheras	insistait	insistons
occuper/habiller	occupent	occupiez	habille	habillez
oser/agiter	oserait	oserons	agitent	agitera
oublier/accuser	oublierai	oubliiez	accusait	accusons
pleurer/désirer	pleurais	pleurera	désirais	désireras
refuser/organiser	refusais	refuseras	organise	organisez
regarder/dépasser	regardes	regardiez	dépassent	dépassais
rouler/examiner	roulent	roulera	examine	examines
serrer/attaquer	serraient	serrerons	attaquait	attaquez
toucher/admirer	touchent	touchons	admirais	admires

Lexique 2 (New et al., 2004)

EXPERIMENT 2: MORPHO E

	C+		C-	
infinitive	**S+**	**S-**	**S+**	**S-**
acheter	achetaient	achetions	achèterai	achètera
achever	achevait	achevais	achève	achèvera
amener	amenez	amenais	amènerait	amèneras
appeler	appelez	appeliez	appelles	appellerez
crever	crevait	crevions	crèvent	crèvera
élever	élevaient	élevais	élèvent	élèvera
emmener	emmenez	emmeniez	emmènerai	emmènerez
enlever	enlevez	enlevais	enlèvent	enlèverai
feuilleter	feuilletait	feuilletez	feuillette	feuillettes
jeter	jetais	jetons	jetterait	jetterez
lever	levons	leviez	lèvera	lèveras
mener	menaient	menions	mènent	mèneras
peser	pesaient	pesions	pèsent	pèsera
projeter	projetait	projetais	projette	projettes
ramener	ramenaient	rameniez	ramènerait	ramèneras
rappeler	rappelez	rappelons	rappelles	rappellerez
rejeter	rejetait	rejetez	rejette	rejettes
relever	relevaient	relevais	relèvent	relèves
renouveler	renouvelait	renouvelez	renouvelle	renouvelles
semer	semait	semaient	sèment	sèmera

EXPERIMENT 2: MORPHO 0

	C+		C-	
infinitive	**S+**	**S-**	**S+**	**S-**
accrocher	accrochais	accrochiez	accrochent	accrochera
adorer	adorais	adoriez	adorent	adores
affoler	affolait	affoliez	affole	affolera
approcher	approchez	approchiez	approchent	approches
bloquer	bloquait	bloquais	bloque	bloquent
coller	collaient	collais	collent	collerez
dévorer	dévorait	dévorons	dévore	dévores
envoler	envolait	envolons	envolent	envoles
étonner	étonnais	étonnons	étonnerait	étonnerai
évoquer	évoquais	évoquez	évoquent	évoquerez
flotter	flottaient	flottions	flottent	flotteras
frotter	frottait	frottiez	frotte	frottes
ignorer	ignorons	ignoriez	ignores	ignorera
interroger	interrogeait	interrogions	interroge	interroges
moquer	moquez	moquons	moquent	moquerez
nommer	nommait	nommais	nomment	nommes
rapprocher	rapprochait	rapprochais	rapproche	rapprochera
sonner	sonnent	sonnais	sonnerait	sonneras
téléphoner	téléphonez	téléphonais	téléphonerai	téléphonent
voler	volaient	volons	volent	volerez

EXPERIMENT 2: IRREGULARS

IRREGULARS	C+		C-	
infinitive	S+	S-	S+	S-
apercevoir	apercevait	apercevrai	aperçoit	aperçoives
apprendre	apprendra	apprendrez	apprenais	apprenons
boire	boirai	boiras	buvions	buviez
connaître	connaissiez	connaisses	connaîtrait	connaîtrez
craindre	craignait	craignes	crains	craindra
devenir	devenais	deveniez	deviendrait	deviendras
envoyer	envoyaient	envoyions	enverrai	enverras
mourir	mourait	mouriez	meurent	meures
obtenir	obtenait	obtenons	obtient	obtiendra
parvenir	parvenais	parveniez	parviens	parviendra
prévenir	prévenait	prévenais	prévient	préviendra
recevoir	recevaient	recevions	reçoivent	reçoives
rejoindre	rejoignent	rejoignais	rejoins	rejointes
reprendre	reprends	reprendras	reprenaient	reprenions
retenir	retenait	retenions	retient	retiendra
revoir	revoyais	reverront	reverrai	revoyons
souvenir	souvenaient	souvenions	souvienne	souviennes
surprendre	surprend	surprenons	surprenait	surprendra
tenir	tenions	teniez	tiendra	tiendrez
valoir	valaient	valais	vaille	vaillent

EXPERIMENT 2: OPERATIONS

			O-	O+	O-	O+
		pair	**S+**	**S+**	**S-**	**S-**
C+	traverser	traverser/adresser	traversons	traversais	traversez	traversera
C+	tourner	tourner/dépêcher	tournons	tournais	tournes	tournera
C+	raconter	raconter/dîner	racontez	racontais	racontons	racontiez
C+	poser	poser/estimer	posent	posais	posons	posiez
C+	expliquer	expliquer/fatiguer	expliquent	expliquera	expliquons	expliquiez
C+	montrer	montrer/presser	montrez	montrais	montrons	montriez
C+	décider	décider/risquer	décident	décidera	décidez	décidiez
C+	coucher	coucher/sauver	couchent	couchais	couchons	couchiez
C+	changer	changer/supposer	changent	changera	changeons	changions
C+	ajouter	ajouter/tromper	ajoutent	ajoutais	ajoutes	ajoutera
			O-	**O+**	**O-**	**O+**
	infinitive	**pair**	**S+**	**S+**	**S-**	**S-**
C-	adresser	traverser/adresser	adressent	adressais	adressons	adressera
C-	dépêcher	tourner/dépêcher	dépêchons	dépêchait	dépêchent	dépêchais
C-	dîner	raconter/dîner	dînons	dînait	dînent	dîniez
C-	estimer	poser/estimer	estiment	estimais	estimons	estimiez
C-	fatiguer	expliquer/fatiguer	fatiguent	fatiguait	fatiguons	fatiguera
C-	presser	montrer/presser	pressons	pressais	pressent	pressera
C-	risquer	décider/risquer	risquent	risquais	risquons	risquiez
C-	sauver	coucher/sauver	sauvent	sauvera	sauvons	sauvais
C-	supposer	changer/supposer	supposons	supposais	supposent	supposiez
C-	tromper	ajouter/tromper	trompent	trompais	trompons	trompiez

FRENCH VERBAL SYSTEM

REGULIERS																				
MODO	INDICATIF												CONDITIONEL			SUBJONCTIF				
TEMPS	PRESENT			PASSE SIMPLE			IMPARFAIT			FUTURE SIMPLE			PRESENT			PRESENT			IMPARFAIT		
DES.	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT
JE	0	e	1	0	ai	2	ai	s	3	er	ai	4	erai	s	5	0	e	1	ass	e	4
TU	0	es	2	0	as	2	ai	s	3	er	as	4	erai	s	5	0	es	2	ass	es	5
IL	0	e	1	0	a	1	ai	t	3	er	a	3	erai	t	5	0	e	3	â	t	2
NOUS	0	ons	3	0	âmes	4	i	ons	4	er	ons	5	eri	ons	6	i	ons	4	assi	ons	7
VOUS	0	ez	2	0	âtes	4	i	ez	3	er	ez	4	eri	ez	5	i	ez	3	assi	ez	6
ILS	0	ent	3	èr	ent	5	ai	ent	5	er	ont	5	erai	ent	7	0	ent	3	ass	ent	6

IRREGULIERS																				
MODO	INDICATIF												CONDITIONEL			SUBJONCTIF			SUBJONCTIF		
TEMPS	PRESENT			PASSE SIMPLE			IMPARFAIT			FUTURE SIMPLE			PRESENT			PRESENT			PRESENT		
DES.	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT	DMT	DNP	LT
JE	0	s/x	1	0	is/us/ins	2/3	ai	s	3	r/rr	ai	3/4	rai/rrai	s	4/5	0	e	1	iss/uss/inss	e	4/5
TU	0	s/x	1	0	is/us/ins	2/3	ai	s	3	r/rr	as	3/4	rai/rrai	s	4/5	0	es	2	iss/uss/inss	es	5/6
IL	0	t/0	1/0	0	it/ut/int	2/3	ai	t	3	r/rr	a	2/3	rai/rrai	t	4/5	0	e	3	î/û/în	t	2/3
NOUS	0	ons	3	0	îmes/ûmes/înmes	4/5	i	ons	4	r/rr	ons	4/5	ri/rri	ons	5/6	i	ons	4	issi/ussi/inssi	ons	7/8
VOUS	0	ez	2	0	îtes/ûtes/întes	4/5	i	ez	3	r/rr	ez	3/4	ri/rri	ez	4/5	i	ez	3	issi/ussi/inssi	ez	6/7
ILS	0	ent	3	ir/ur/inr	ent	5/6	ai	ent	5	r/rr	ont	4/5	rai/rrai	ent	6/7	0	ent	3	iss/uss/inss	ent	6/7