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Gaps in initial RT clusters in Czech: accidental or systematic?

Evidence from dichotic listening

Formal Description of Slavic Languages

20-22 November 2024
Brno

Intro: dichotic listening

put
- pay in the left ear: **pay (L)**
- lay in the right ear: **lay (R)**

English natives will perceive
- play

this is called **dichotic fusion**:
- the percept combines items of two (incongruent) inputs that come in through two different channels
- here audio-audio
- but also audio-visio: McGurk effect

fusion rate
- fusion does not always succeed:
- about 35% (Cutting 1975)

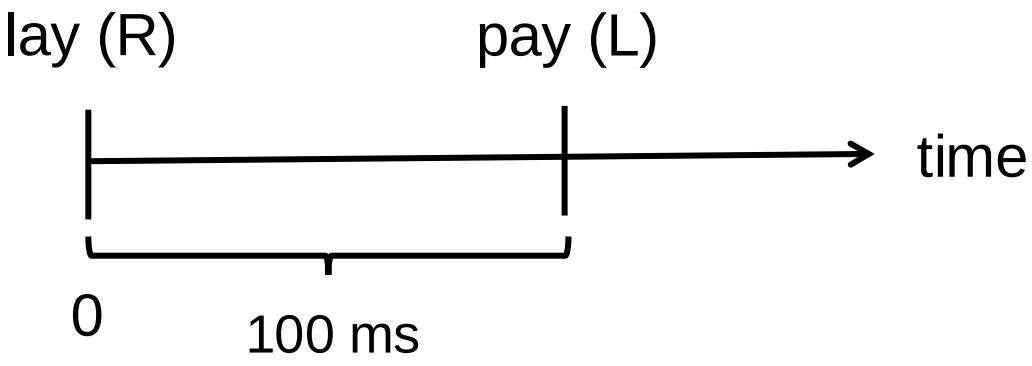
Day, R. S. 1969. Fusion in dichotic listening. Ph.D dissertation, Stanford University.
Cutting, James E. 1975. Aspects of Phonological Fusion. Journal of Experimental Psychology 104: 105-120.

Intro: dichotic listening

Day, R. S. 1969. Fusion in dichotic listening. Ph.D dissertation, Stanford University.
Cutting, James E. 1975. Aspects of Phonological Fusion. Journal of Experimental Psychology 104: 105-120.

put in a temporal lag

- first play **lay (R)**
- wait 100 ms
- then play **pay (L)**



English natives still perceive **play**

why?

- because **play** exists in the lexicon, but **lpay** does not. **lexical effect**
- because English phonology disallows #lp **phonological effect**

Intro: dichotic listening

lexical vs. phonological effect

- how can the phonological effect be isolated?
- by using nonce words
  - they don't exist in the lexicon
  - and therefore cannot influence perception

if we can isolate a phonological effect,

- it should depend on the phonology of the speaker

TR-only languages

- word-initially, only TR clusters occur: *#RT, *#RR, *#TT
- English, French, German etc.
- here the phonology should impose a TR-percept, since #RT is illegal

T = obstruent
R = sonorant

anything-goes languages

- word-initially, any sonority combination occurs: #TR, #RT, #RR, #TT
- (Modern) Greek, many Slavic languages: Russian, Polish, Czech, Ukrainian, etc.
- here the phonology is happy with non-TR percepts, which should therefore be produced

prediction #1

prediction #1

when **simultaneously** (no lag) confronted with #T in one ear and #R in the other,

TR-only languages:

- speakers will perceive #TR
- because their phonology does not tolerate any other combination of T and R.

anything-goes languages

- speakers will perceive either #TR or #RT at chance level
- because their phonology does not prefer or disprefer either
- and they have no evidence for going in one direction or the other

recall

- this supposes the elimination of a putative lexical effect:
- otherwise we are not sure what the driving force of the perception is.

Experiment #1

real vs. nonce words in French

experiment #1: French

plan

- in a TR-only language, French, try to isolate
  - the lexical and the
  - phonological effect.

- then see in an anything-goes language, Czech, whether speakers indeed perceive #TR / #RT at chance level, as predicted.

experiment #1: French

experimental settings

- terminology
  - source word = the two input words, e.g. **buder (R)** and **ruder (L)**
  - target word = the intended fusion of the source words, **bruder**

- alignV
  - in the doctored file that combines the two source words, e.g. **buder (R)** and **ruder (L)**,
  - the onset of the vowel following T in buder is aligned (= simultaneous) with the onset of the vowel following R in ruder.

experiment #1: French

experimental settings

- 50 participants
- 64 stimuli
  - 32 real words
  - 32 nonce words
- participants are exposed to the 64 stimuli once. Thus 1600 (real) + 1600 (nonce) = 3200 trials
- randomization of the order in which stimuli are presented
- randomization of left - right ear (to level out putative one-sided hearing deficiency)

experiment #1: French

experimental settings

- real words
  - the source words (**dainer**, **rainer**) do not exist (to avoid a bias in favour of existing items)
  - the target word exists: **drainer**

- nonce words
  - the source words (**buder**, **ruder**) do not exist
  - the target word does not exist either: **bruder**

experiment #1: French

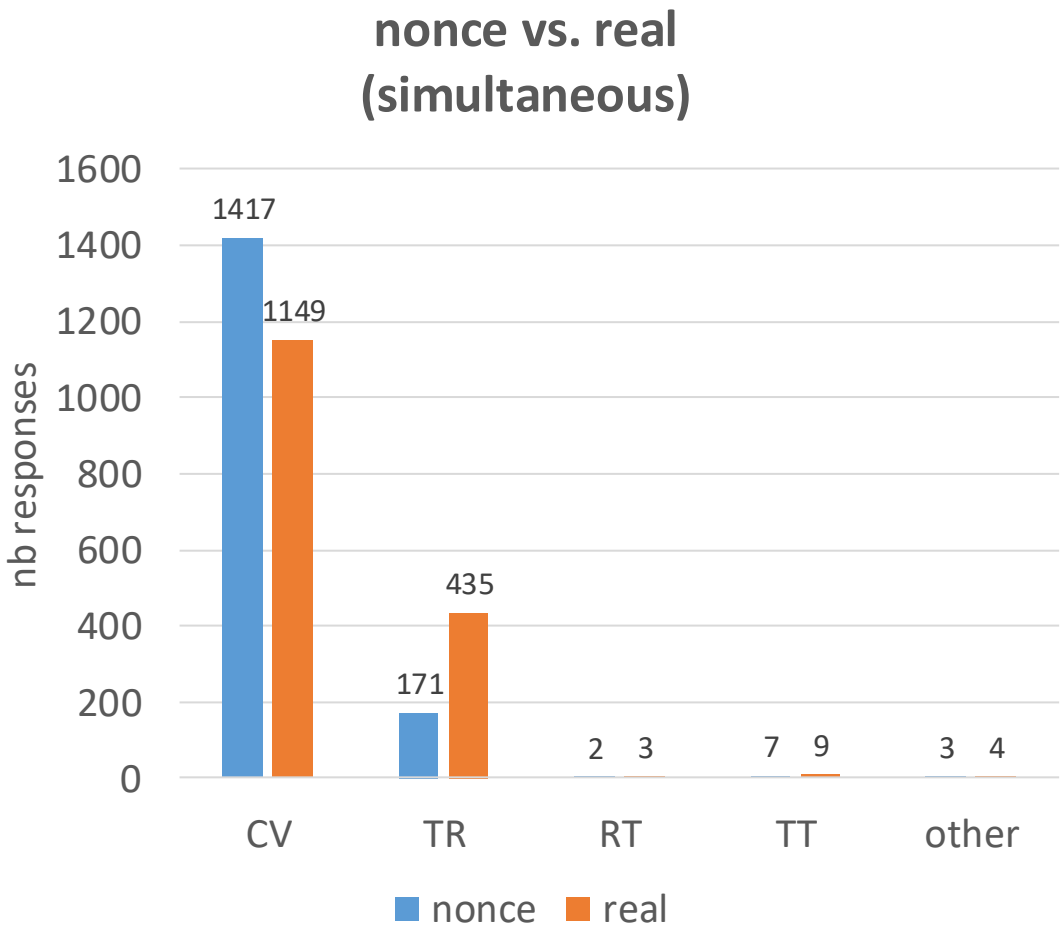
experimental settings

- free choice
  - participants hear the doctored stereo file three times in a row through a headset (750ms interval)
  - and are then asked to say what they have heard (keyboard input)

experiment #1: French

results (simultaneous R-L)

- CV: response **buder** or **ruder** for target **bruder**
- TR: response **bruder** for target **bruder**
- RT: response **rbuder** for target **bruder**
- TT: response **bduder** for target **bruder**
- other: blank, uninterpretable



experiment #1: French

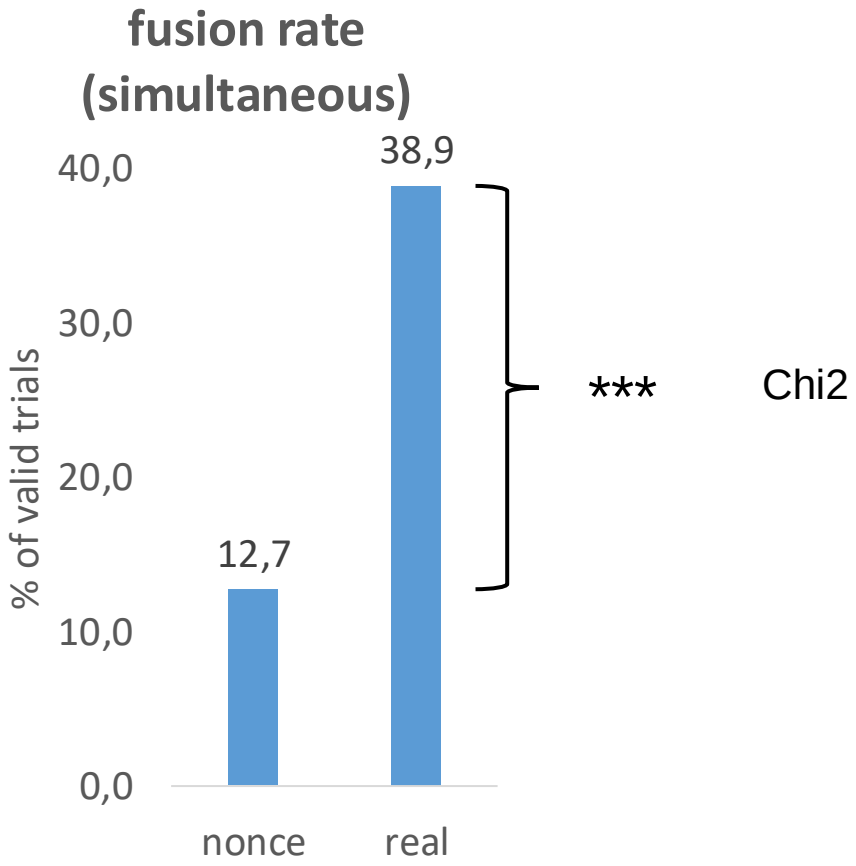
results

fusion rate

- the number of responses with a #CC of the total of valid trials (i.e. not counting in "other")

there is a lexical effect

- real (target) words fuse much better than nonce words

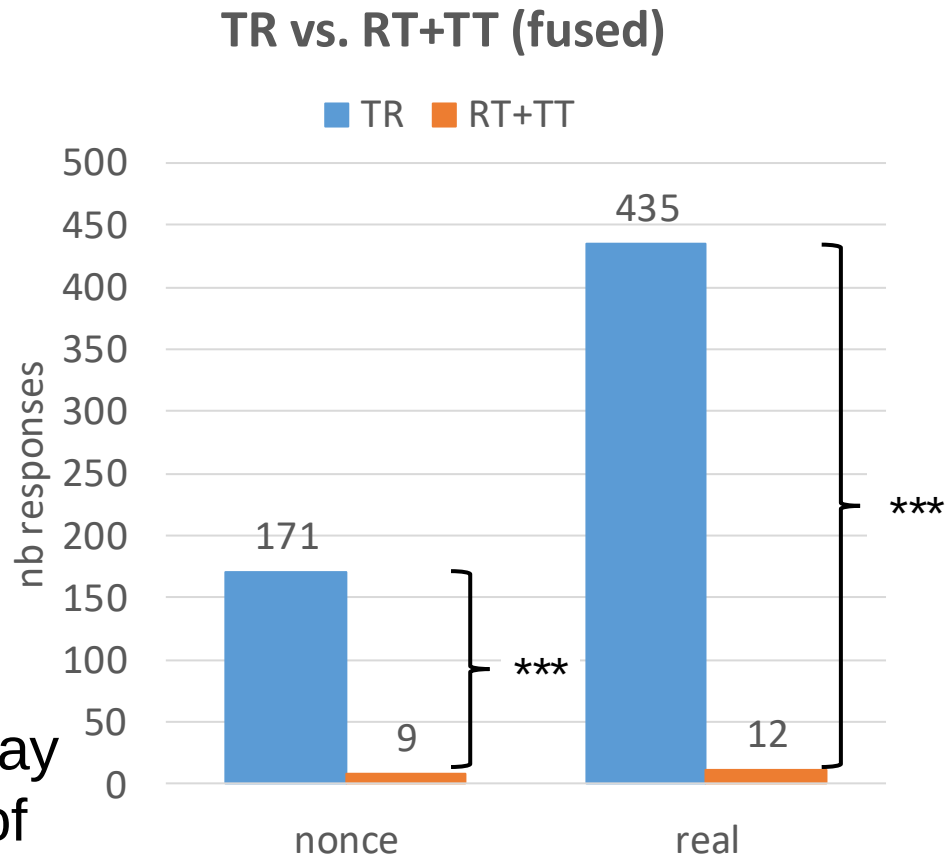


experiment #1: French

results + discussion

TR vs. RT+TT (fused)

- fused responses (presence of a #CC)
- close to 100% of percepts are TR
- RT percepts are at blunder level for real words (2,7%), a little more than that for nonce words (5%).



perception of TR vs. RT+TT should be chance

- since speakers have no evidence for going either way
- the difference between TR and RT+TT percepts is of course significant, both in nonce and real words.

thus there is a phonological effect

- both in nonce and real words
- ==> the TR-only grammar mandates a TR percept.

experiment #1: French

Cutting, James E. 1975. Aspects of Phonological Fusion. Journal of Experimental Psychology 104: 105-120.

discussion

- what's new (wrt Cutting 1975 and following)
  - there is a lexical effect
  - which is eliminated in nonce words
  - where only phonology can be responsible for the enforcement of the almost categorical TR percept.
  - Cutting (1975) was right: fusion is phonological (channelled by phonology). But he couldn't know he was since he didn't have the lexical effect on his radar.

Experiment #2

real vs. nonce words in Czech

plan

recall our plan

step 1 completed

- in a TR-only language like French, grammar enforces a TR percept

now step 2

- in an anything-goes language like Czech, it is predicted that speakers perceive TR vs. RT at chance level.
- grammar does not interfere: it is equally happy with TR and RT percepts.

experiment #2: Czech

experimental settings

- identical wrt to experiment #1 on French
  - alignV
  - 50 participants
  - 66 stimuli
    - 30 real words
    - 36 nonce words
  - participants are exposed to the 66 stimuli once. Thus 1500 (real) + 1800 (nonce) = 3300 trials
- randomization of the order in which stimuli are presented
- randomization of left - right ear (to level out putative one-sided hearing deficiency)

experiment #2: Czech

experimental settings

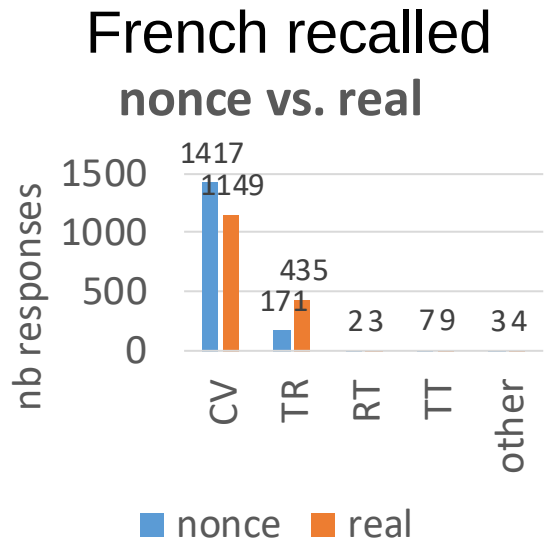
- identical wrt to experiment #1 on French
  - source words don't exist, targets of nonce words don't exist.
  - free choice
    - participants hear the doctored stereo file three times in a row through a headset (750ms interval)
    - and are then asked to say what they have heard (keyboard input)
- one difference:
  - in French, targets of existing words can only be TR
  - in Czech they could be TR or RT
  - in order to create identical conditions, in the Czech experiment all targets of existing words are TR.

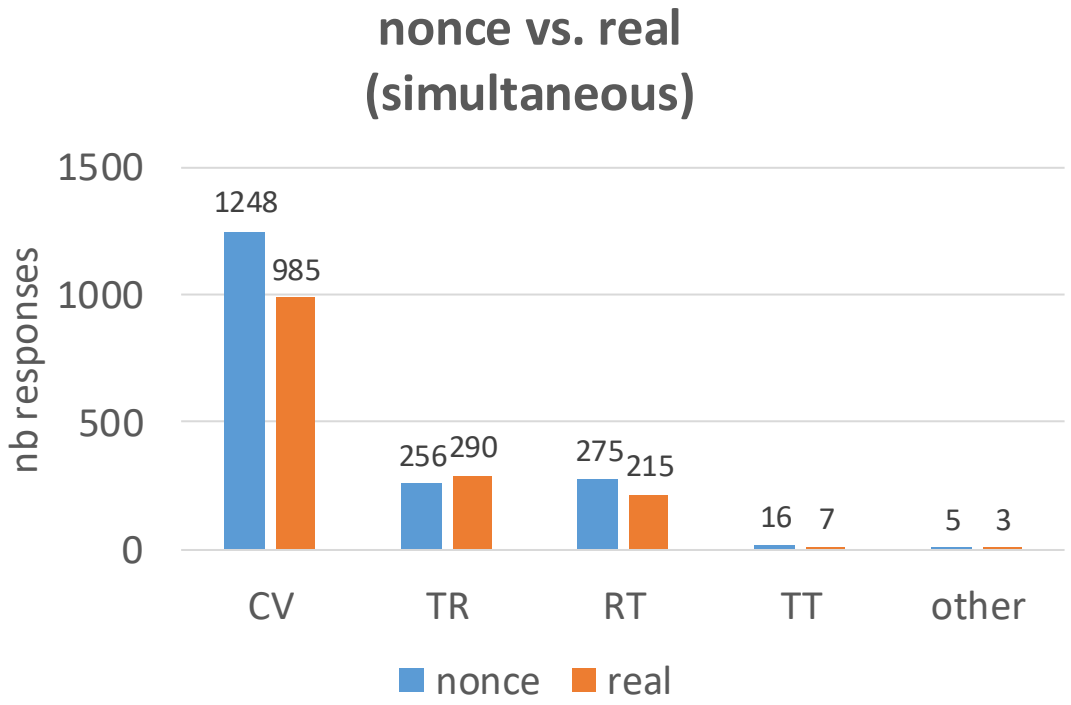
experiment #2: Czech

results

- what springs to the eye when comparing with French is the presence of significant RT responses (which were about absent in French) in both nonce and real words.

- the bars of TR and RT are about the same size, both for nonce and real.



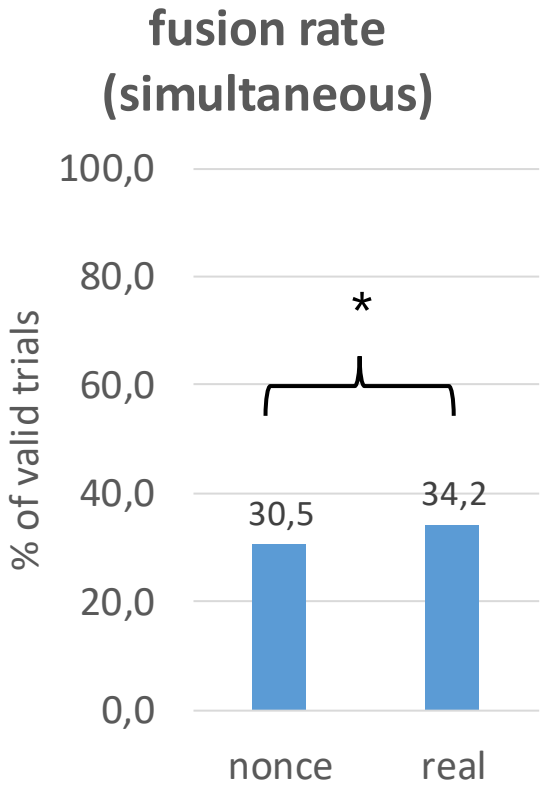


experiment #2: Czech

results

- there is a lexical effect in Czech
- p=.023 (Chi2)

- thus from now on (next slide and in experiment #3), like in French, we eliminate the lexical effect by using only nonce words.



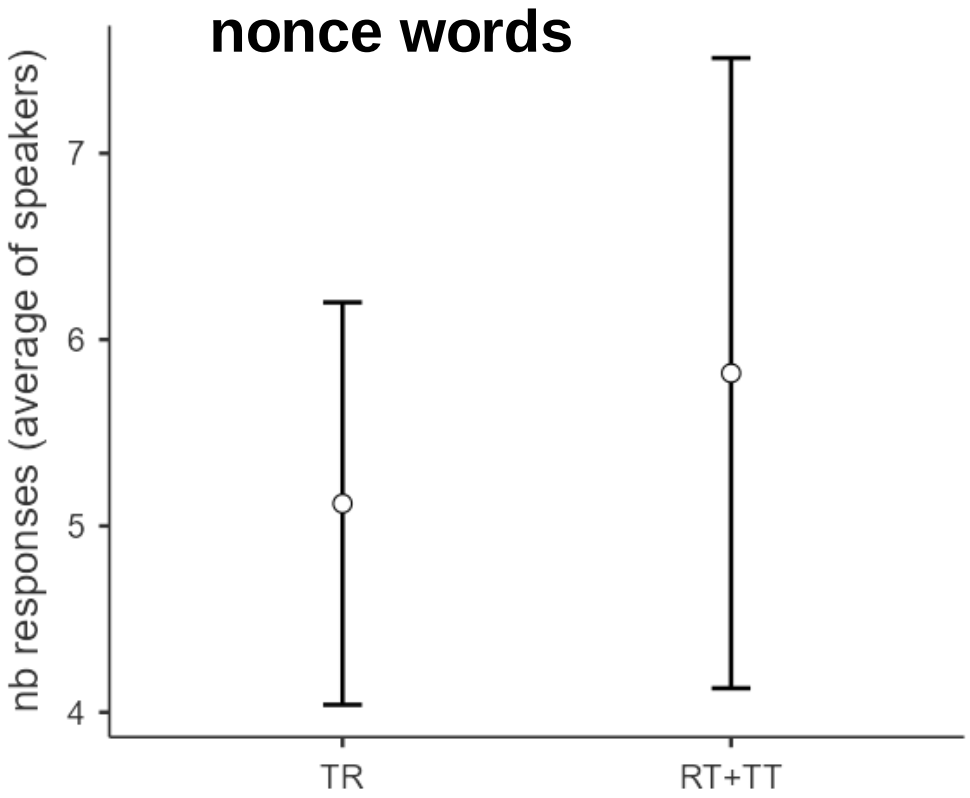
experiment #2: Czech

results

main result

- in nonce words, the difference between TR and RT+TT percepts is non-significant: p = .46.

- TR and RT+TT are statistically indistinguishable



RM Anova
F(1,49) = .555; **p = .46**; η2 = .005

Estimated Marginal Means

			95% Confidence Interval	
	Mean	SE	Lower	Upper
TR	5.12	0.537	4.04	6.2
RT+TT	5.82	0.842	4.13	7.51

experiment #2: Czech

discussion

- as predicted,
  - there is no phonological effect in Czech
  - whether speakers pick TR or RT+TT is chance.
  - when lacking evidence for going either way, Czech grammar does not interfere: it is just as happy to have TR perceived as it is to have RT/TT perceived.
- dichotic perception of initial CC clusters
  - depends on the grammar of speakers
  - TR-only languages mandate TR percepts
  - anything-goes languages do not care for what is perceived: in absence of evidence, the selection is chance.

the initial CV and gaps in #RT inventories

why is that interesting?

- we now have evidence that an anything-goes grammar is contributing no bias when speakers lack evidence for choosing between
  - #TR
  - #RT / #TT

- our ultimate goal is to see whether this is also the case when speakers need to choose between
  - existing #RTs
  - non-existing #RTs

this is the purpose of experiment #3

Gaps in

#RT inventories

TR-only vs. anything-goes languages

a closer look at anything-goes languages

TR-only languages

- instantiate ALL logically possible T+Liquid (TL) clusters (except #tl, #dl)

anything-goes languages

- #TL
  - also possess all logically possible TL clusters

- #RT
  - may also instantiate ALL logically possible #RTs: Moroccan Arabic, Berber

  - or may exhibit only a subset thereof: all Slavic languages in point, (Modern) Greek

#RT in Slavic

#RT in Slavic:
exhaustive record
Corpus:
http://sites.unice.fr/scheer/tobweb/classes.htm#sldata

(1) distribution of #RT clusters over Slavic languages

		West						South				East		
		Cz	Sk	USo	LSo	Po	Ka	Bu	Ma	BSC	Sn	Bru	Uk	R
jT	jd	+												
	jh	+												
	js	+												
rT	rb									+				
	rt͡s	+				+								
	rt͡ʃ	+												
	rk, řk	+												
	rd, rd͡z, rd͡ʒ	+				+				+				+
	rz	+								+				
	rʒ	+		+	+	+							+	+
	rt	+				+				+			+	+
	rv, řv	+				+				+			+	+
lT	lb	+				+								+
	lg, lh	+				+	+						+	+
	lʒ	+	+			+								
	lz	+		+		+								
	lk	+	+			+								
	lp	+	+											
	ls, lç	+	+			+								+
	lʃ	+											+	
	lv	+				+							+	+
mT	md	+	+			+								
	mg, mh	+				+	+						+	+
	mʒ	+				+							+	+
	mz	+	+	+		+							+	+
	mx					+								+
	mʃ	+	+	+		+	+						+	+
	mk	+				+	+							+
	mt͡ʃ												+	+
	ms, mç	+	+			+							+	+
	mt	+												
	Total: 31	28	8	4	1	20	4			5			12	16

Scheer, Tobias 2007. On the Status of Word-Initial Clusters in Slavic (And Elsewhere). Annual Workshop on Formal Approaches to Slavic Linguistics. The Toronto Meeting 2006, edited by Richard Compton, Magdalena Goledzinowska & Ulyana Savchenko, 346-364. Ann Arbor: Michigan Slavic Publications.

Scheer, Tobias 2012. Direct Interface and One-Channel Translation. A Non-Diacritic Theory of the Morphosyntax-Phonology Interface. Vol.2 of A Lateral Theory of phonology. Berlin: de Gruyter.

#RT in Slavic

within Slavic, the two languages with the biggest number of #RTs still only instantiate a small subset of possible #RTs.

Polish selection:
20 out of 126 possible #RTs
16%

Czech selection:
28 out of 108 possible #RTs
26%

choice among possible #RTs made by Czech and Polish

Polish

C_2 \ C_1	j	l	r	ɲ	n	m	
p							p
t			+				t
k		+				+	k
b		+					b
d			+			+	d
g		+				+	g
t͡s			+				t͡s
t͡ʃ							t͡ʃ
t͡ɕ							t͡ɕ
d͡z			+				d͡z
d͡ʒ							d͡ʒ
d͡ʑ							d͡ʑ
f							f
v		+	+				v
s		+				+	s
z		+				+	z
ʃ						+	ʃ
ʒ		+	+			+	ʒ
ɕ		+				+	ɕ
ʑ							ʑ
x						+	x
	j	l	r	ɲ	n	m	

Czech

C_2 \ C_1	j	l	r	ɲ	n	m	
p		+					p
t			+			+	t
k		+	+			+	k
b		+					b
d	+		+			+	d
g							g
t͡s			+				t͡s
t͡ʃ			+				t͡ʃ
c							c
ɟ							ɟ
f							f
v		+	+				v
s	+	+				+	s
z		+	+			+	z
ʃ						+	ʃ
ʒ		+	+			+	ʒ
x							x
h	+	+				+	h
	j	l	r	ɲ	n	m	

#RT in Slavic

#RT inventories: are the gaps

- systematic, i.e. enforced by grammar,

- or accidental ?

like in other cases where a distribution is non-arbitrary,

- the zero hypothesis is that the gaps are systematic, i.e. that

- grammar actively rules out non-existing #RTs

- just like it actively rules our #RT in TR-only languages.

The initial CV

predicts that gaps are accidental

Interface without diacritics

carriers of morpho-syntactic information in phonology

- are not diacritics (#, ω, φ etc.)

- but rather truly phonological items, i.e. pieces of the proprietary phonological vocabulary

- they bear on phonological computation by their mere presence, like all other phonological items.
- #, ω and the like only produce an effect when they are called on by some rule or constraint.

Lowenstamm, Jean 1999. The beginning of the word. Phonologica 1996, edited by John Rennison & Klaus Kühnhammer, 153-166. La Hague: Holland Academic Graphics. WEB.

Scheer, Tobias 2009. External sandhi: what the initial CV is initial of. Studi e Saggi Linguistici 47: 43-82. WEB.

Scheer, Tobias 2012. Direct Interface and One-Channel Translation. A Non-Diacritic Theory of the Morphosyntax-Phonology Interface. Vol.2 of A Lateral Theory of phonology. Berlin: de Gruyter.

Scheer, Tobias 2014. The initial CV: Herald of a non-diacritic interface theory. The Form of Structure, the Structure of Form. Essays in Honor of Jean Lowenstamm, edited by Sabrina Bendjaballah, Noam Faust, Mohamed Lahrouchi & Nicola Lampitelli, 315-330. Amsterdam: Benjamins.

Interface without diacritics

the initial CV

- the phonological identity of the beginning of the word is extra syllabic space

- depending on theoretical inclincation,
  - a mora
  - an x-slot
  - an empty CV unit

 # ↔ CV

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Interface without diacritics

Scheer (2004, 2009, 2012)

cross-linguistically stable effects of the beginning of the word

1. word-initial clusters
   - in some languages, initial clusters are restricted to #TR.
   - in others they have the same distribution as internal clusters.
   - but there is no language where they are restricted to #RT (#TT, #RR).

2. strength of word-initial consonants
   - in some languages, word-initial consonants are especially strong.
   - in others, they do not have any peculiar behaviour regarding strength.
   - but there is no language where they are especially weak.

3. deletion of the first vowel of the word
   - in some languages, the first vowel of words is unable to alternate with zero.
   - in others it does not show any peculiar behaviour when compared to vowels in other positions.
   - But there is no language where non-initial vowels are unable to alternate with zero, while initial vowels do.

Interface without diacritics

Scheer (2004, 2009, 2012)

the beginning of the word

- has stable effects across languages.
- for each of the three phenomena mentioned, there appear to be two and only two parametric options.
- whatever the phonological identity of the beginning of the word, it must be responsible for this parametric pattern.
- phonological identities that allow for anything and its reverse to happen are inaccurate.

Interface without diacritics

Scheer, Tobias 2009. External sandhi: what the initial CV is initial of. Studi e Saggi Linguistici 47: 43-82. WEB.

Scheer, Tobias 2012. Direct Interface and One-Channel Translation. A Non-Diacritic Theory of the Morphosyntax-Phonology Interface. Vol.2 of A Lateral Theory of phonology. Berlin: de Gruyter.

diacritics such as #, ω, φ

- are arbitrarily chosen (# is a typewriting symbol) and interchangeable
- have no intrinsic properties (phonological or other)
- therefore can produce any effect and its reverse

- # and ω could equally well mandate that
  - #CC be restricted to TR — attested
  - #CC be restricted to RT — not on record

- # and ω could equally well mandate that
  - the beginning of the word is strong — attested
  - the beginning of the word is weak — not on record

- language does not work like that
  - effects of the beginning of the word are not random
  - they are cross-linguistically stable

workings of the initial CV

let us look at the deletion of the first vowel of the word

language type A

- the first vowel of a word may alternate with zero
- Slavic: Russian, Czech, Polish
- Cz lev - lv-a "lion Nsg, Gpl"

language type B

- the first vowel of a word may not alternate with zero
- German, Belarusian
- German: all schwas can alternate with zero, except if they are initial
  - g[ə]halten, *g'halten "held"
- Belarusian
  - lew - i-lw-a "lion Nsg, Gsg"

Scheer, Tobias 2009. External sandhi: what the initial CV is initial of. Studi e Saggi Linguistici 47: 43-82. WEB.

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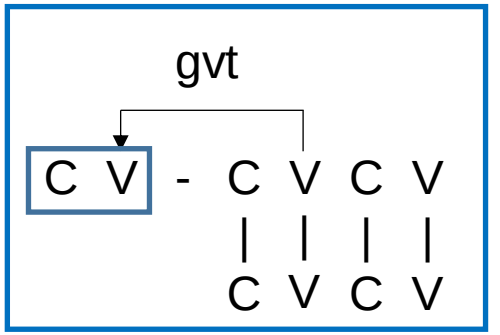
workings of the initial CV

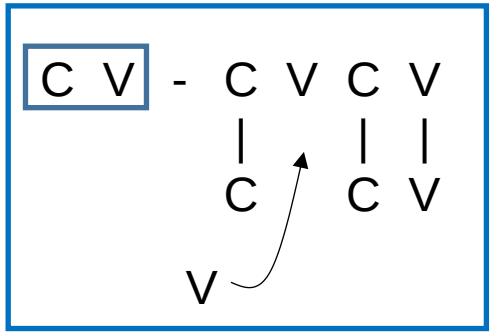
deletion of the first vowel of the word

settings

- the nucleus of the initial CV must be governed
- therefore the first nucleus of the root must be contentful: two empty nuclei in a row are ill-formed
- the box is well-formed as it stands
  - deletion will make the string ill-formed



- the box is ill-formed as it stands
  - inserting a V makes it well-formed



- this is why (in some languages) initial vowels (rather than other vowels) may not alternate with zero.
- the initial site is protected by the initial CV.

workings of the initial CV

Scheer (2009, 2012, 2014), Ségéral & Scheer (2008)

three birds with one stone

the initial CV and the lateral relations of Strict CV

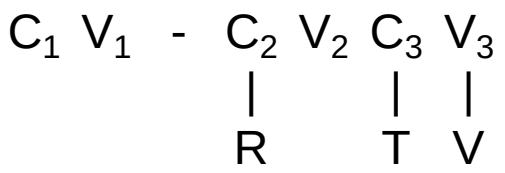
- predict all three cross-linguistically stable effects

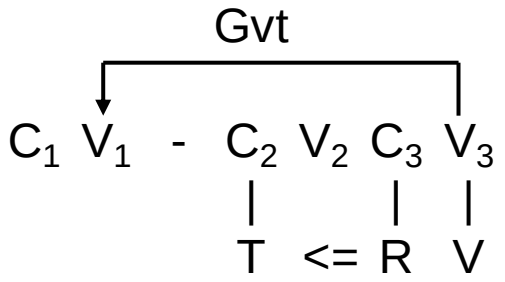
	initial CV present	initial CV absent
word-initial clusters	#TR only	#CCs unrestricted
word-initial consonants	strong	non-strong
first vowel of the word	may not alternate with zero	may alternate with zero

workings of the initial CV

let us now look at how the initial CV regulates initial clusters

language type A: presence of the initial CV



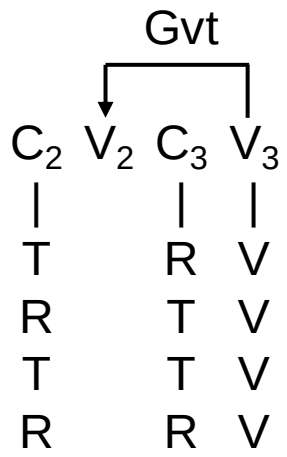


- RT-initial word
  - two empty nuclei in a row are ill-formed: V_3 cannot govern two empty nuclei at a time.
  - *#RT (same for #TT, #RR)
- TR-initial word
  - there are also two empty nuclei in a row, but V_2 is enclosed in a TR cluster, which (unlike other clusters) is solidary.
  - the solidarity of branching onsets is usually expressed by the fact that the onset branches. The Strict CV version of that is a relationship between T and R (Infrasegmental Government): <==
  - #TR is well-formed because all empty nuclei are taken care of:
    - the one enclosed in the TR by <==
    - the initial empty nucleus by government from V_3

workings of the initial CV

language type B: absence of the initial CV

- RT-initial word
  - there is only one empty nucleus to be taken care of, V_2: it is goverend by V_3.
- TR-initial word
  - same situation, also for TT and RR.
- the sonority configuration of the #CC does not matter:
  - anything goes because V_2 will always be governed.



workings of the initial CV

in sum

- the initial CV
  - puts additional burden on initial clusters
  - only solidary TR can survive
- typology
  - TR-only languages: initial CV present
  - anything-goes languages: initial CV absent

prediction

- there is no third possibility: the initial CV can only be present or absent
- there are only two types of languages in the world: those that have the initial CV, and those that don't. **The typology of initial clusters is strictly binary**.

thus in anything-goes languages, literally anything goes

- grammar does not impose any restrictions
- **gaps in initial clusters are accidental.**

Gaps in #RT inventories are accidental:

independent arguments

independent arguments

argument #1

- anarchic distribution
- neither occurring or non-occurring #RTs are natural classes in any sense
- people have tried a lot to find out what each set has in common and what opposes it to the other set – to no avail.
- especially in Poland this is a national sport.

Cyran, Eugeniusz & Edmund Gussmann 1999. Consonant clusters and governing relations: Polish initial consonant sequences. The syllable, Views and Facts, edited by Harry van der Hulst & Nancy Ritter, 219-248. Berlin, New York: de Gruyter.

Scheer, Tobias 2007. On the Status of Word-Initial Clusters in Slavic (And Elsewhere). Annual Workshop on Formal Approaches to Slavic Linguistics. The Toronto Meeting 2006, edited by Richard Compton, Magdalena Goledzinowska & Ulyana Savchenko, 346-364. Ann Arbor: Michigan Slavic Publications. WEB.

independent arguments

argument #2

- modern anything-goes languages are merely CS minus yers (plus eventual repairs):
- where C_1 and C_2 have random distribution in CS.
- ==> diachronically, non-TRs are lexical accident

#C_1-yer-C_2V… > #C_1C_2V…

why do Slavic languages have #mT, but not #nt?

- if anything, the unmarked #nT should occur.
- because there happened to be no lexical item #n-yer-TV… in CS.

Cyran, Eugeniusz & Edmund Gussmann 1999. Consonant clusters and governing relations: Polish initial consonant sequences. The syllable, Views and Facts, edited by Harry van der Hulst & Nancy Ritter, 219-248. Berlin, New York: de Gruyter.

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Experiment #3

Czech

existing vs. non-existing RTs

experiment #3: Czech existing vs. non-existing #RTs

goal

- in order to see whether the prediction that gaps in #RT inventories are accidental,
- dichotic listening may be used

predictions

- if gaps are accidental, speakers should select **existing vs. non-existing #RTs** at chance level if they are given no evidence going either way.

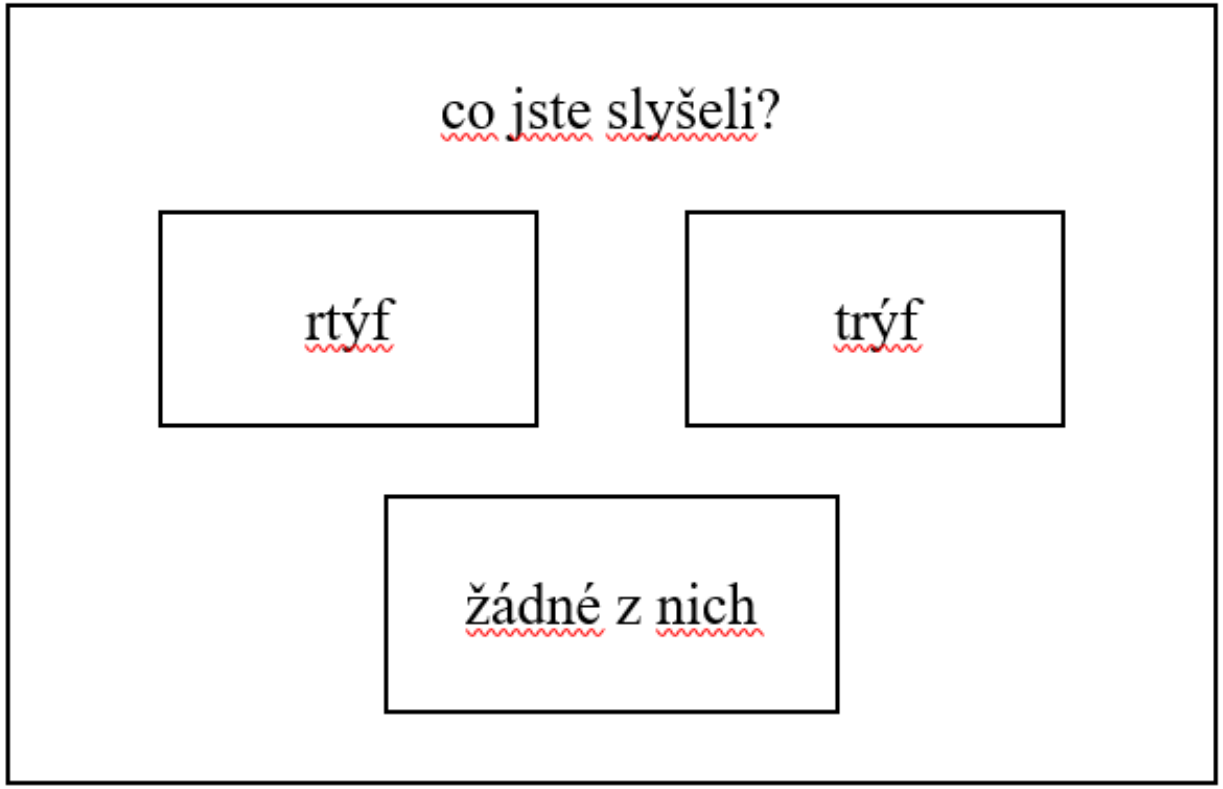
- if gaps are systematic, grammar should introduce a bias in favour of existing #RTs.

experiment #3: Czech existing vs. non-existing #RTs

how to test that

- probe an existing cluster: rt
- play simultaneous
  - týf (L)
  - rýf (R)
- ask participants what they have heard
- display three choices
  - TR trýf
  - RT rtýf
  - none of those

- then test a non-existing cluster: rb
- do the same procedure



prediction

- the number of #RT percepts will be the same for existing rt and non-existing rb.

experiment #3: Czech existing vs. non-existing #RTs

experimental settings

- alignV
- 50 participants
- 54 stimuli
  - only nonce words
  - source words don't exist
- participants are exposed to the 54 stimuli once. Thus 2700 trials.
- randomization of the order in which stimuli are presented
- randomization of left - right ear (to level out putative one-sided hearing deficiency)
- randomization of left / right location of TR / RT competitor on the screen

experiment #3: Czech existing vs. non-existing #RTs

clusters tested

- existing #RTs: rt, rd, lb
- non-existing #RTs: rb, rk

stimuli design

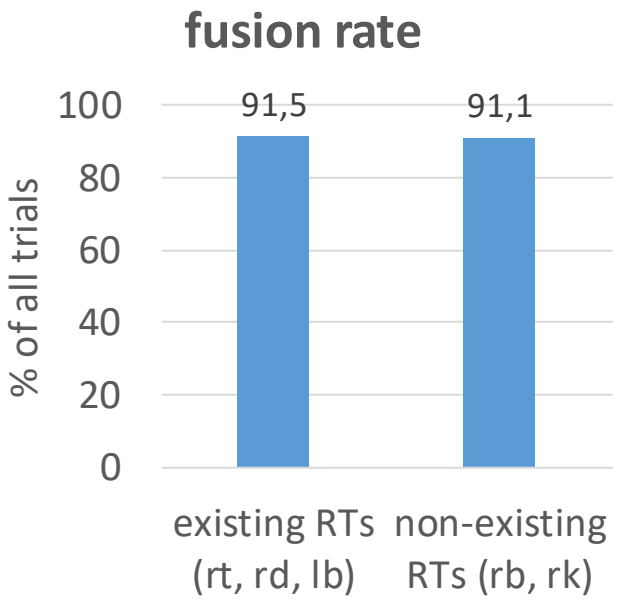
- only Liquid-Stop clusters are tested
- source words: C + long V + C lbéch, rdůj, rkýš, rbách, etc.

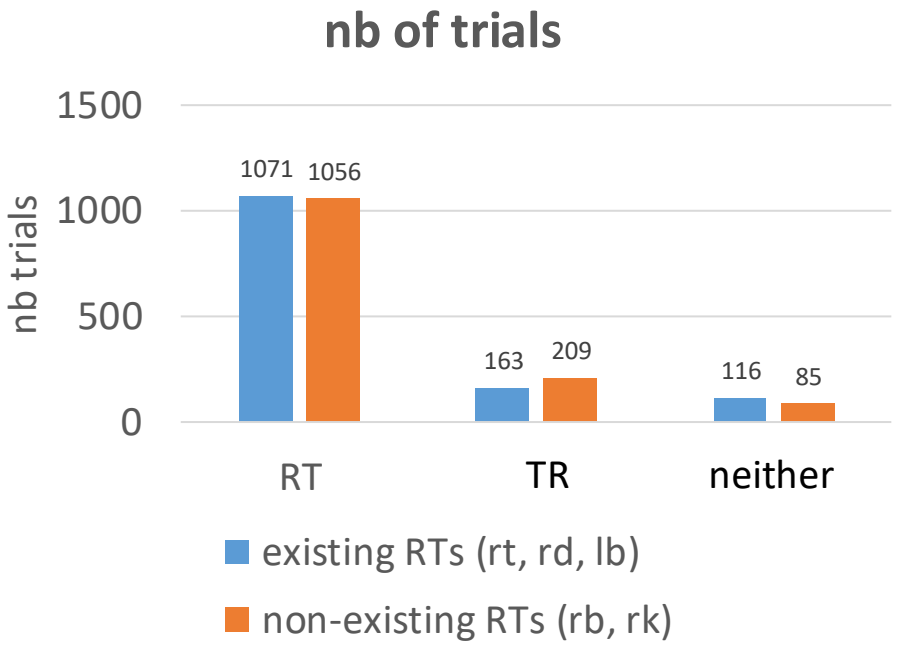
experiment #3: Czech

main test

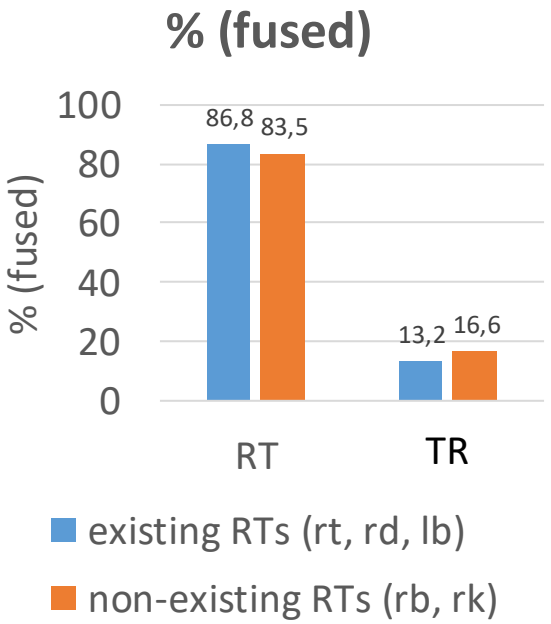
existing (rt, rd, lb) vs.
non-existing (rb, lk) RTs

descriptive statistics
- fusion rate
- nb of trials
- % (of fused)





discussion
- fusion rate is high due to forced choice.
- RT percepts are high
  - it is unclear why RT percepts are overwhelming: more than 80%.
  - we are far away from the 50-50 RT-TR of experiment #2.

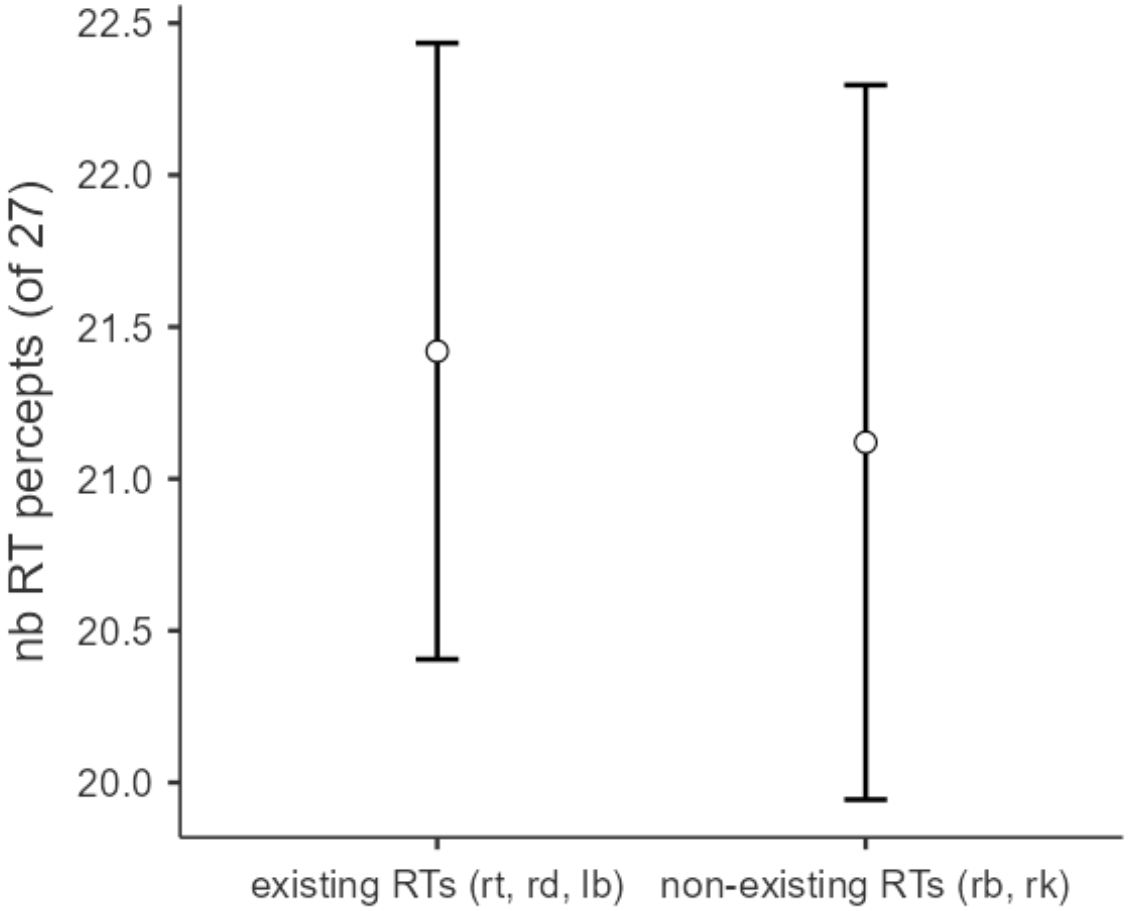


experiment #3: Czech

main test

the difference between existing (rt, rd, lb) and non-existing (rb, lk) RTs

- is non significant: p = .532 (RM Anova)
- = the two sets are statistically indistinguishable



Estimated Marginal Means

test	Mean	SE	95% Confidence Interval Lower	Upper
existing RTs (rt, rd, lb)	21.4	0.505	20.4	22.4
non-existing RTs (rb, rk)	21.1	0.585	19.9	22.3

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p	η²
test	2.25	1	2.25	0.396	0.532	0.002
Residual	278.25	49	5.68			

Note. Type 3 Sums of Squares

Conclusion

conclusion

evidence from dichotic listening suggests that

grammar

- in TR-only languages: actively mandates the perception of initial clusters
- in anything-goes languages: does not mandate or forbid anything, is happy with #TR and #RT alike.

French (exp.#1) vs. Czech (exp.#2)

#RT clusters in anything-goes languages

- are not restricted by grammar in any way
- literally anything goes (as far as grammar is concerned)
- gaps in RT inventories are accidental
- the binary typology of initial clusters predicted by the initial CV is borne out

Czech (exp.#3)

- these are the results for one anything-goes language, Czech
- other anything-goes languages will need to be tested…

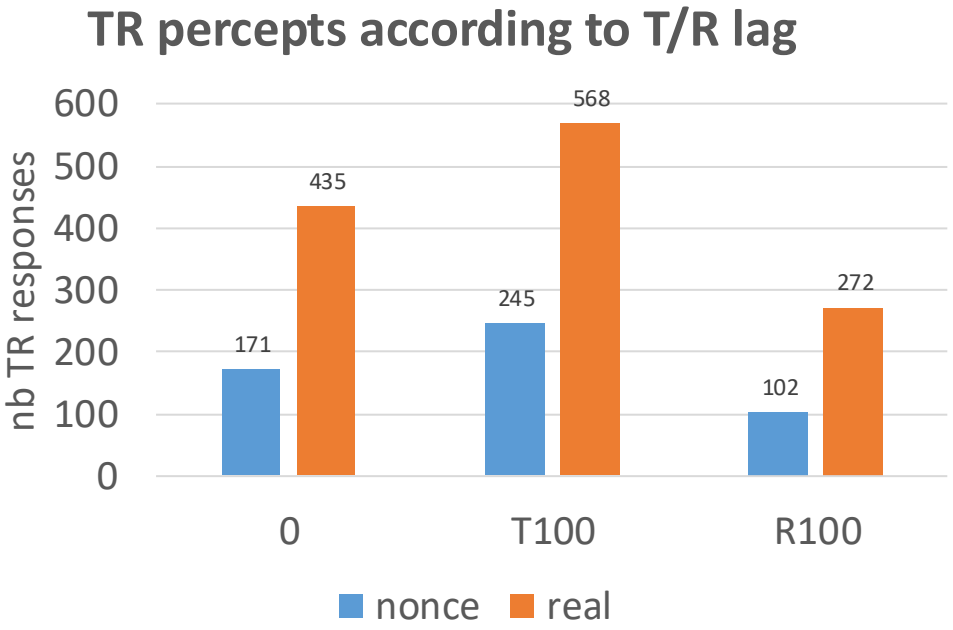
The End

Appendix

1. Results of T/R lag

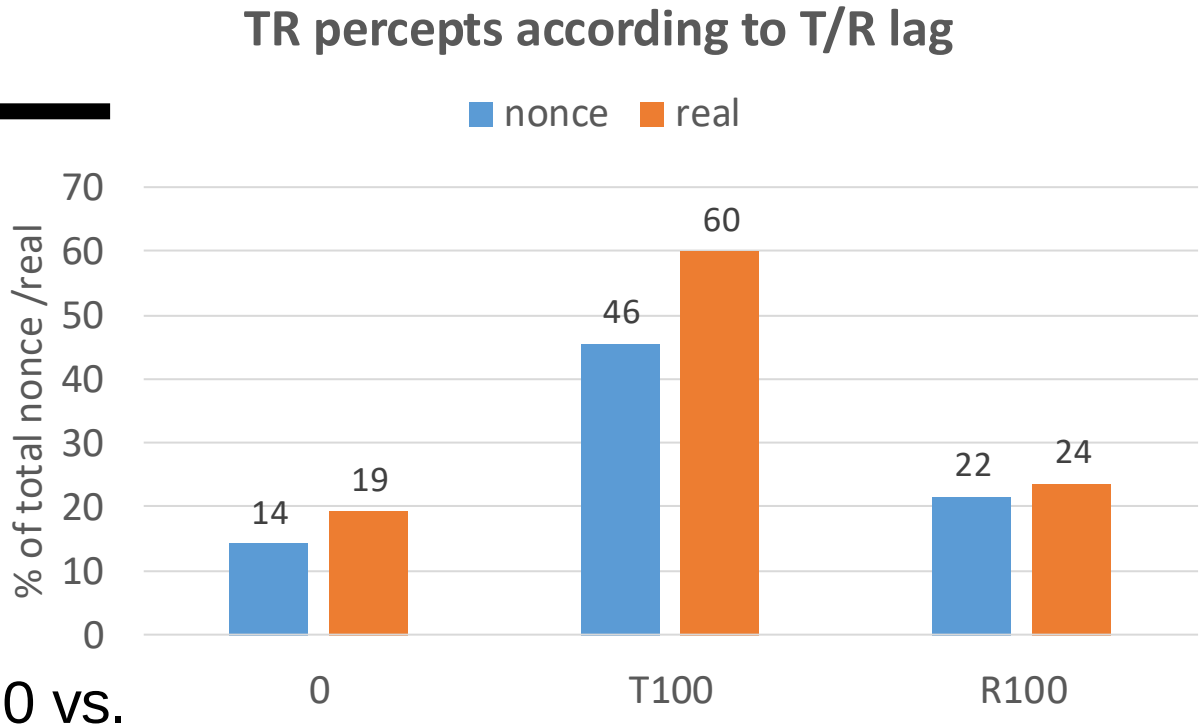
experiment #1: French

results



- **influence of T/R lag**
  - 0 = simultaneous T and R
  - T100 = T is played 100ms before R
  - R100 = R is played 100ms before T
- differences
  - within nonce words are significant, except 0 vs. T100 (T100 can't help TR to get any higher)
  - within real words are all significant.
- results are as predicted
  - advantaging T in T100 produces more TR percepts than when source words are administered simultaneously (zero).
  - advantaging R in R100 produces less TR percepts than when source words are administered simultaneously (zero).

experiment #2: Czech



results

influence of T/R lag

- 0 = simultaneous T and R
- T100 = T is played 100ms before R
- R100 = R is played 100ms before T

differences

- within nonce words are significant, except 0 vs. R100 (R100 can't help to get more RTs)
- within real words are significant.

effect of T100

- as predicted: advantaging T produces more TR percepts than when source words are administered simultaneously (zero).

effect of R100

- not as predicted: should advantage R, i.e. produce less TR percepts than when source words are administered simultaneously (zero). But it yields more TR percepts.

2. Lexical cluster effect

experiment #3: Czech existing vs. non-existing #RTs

possible lexical effect of clusters

lexical effect

- of word: when a word is present in the lexicon, a bias in its favour is introduced when compared to a word that is absent form the lexicon.
- of cluster: when a cluster is present in the lexicon, a bias in its favour is introduced when compared to a cluster that is absent form the lexicon.

controlling for the lexical cluster effect

- the word effect can be eliminated by using nonce words, but we cannot eliminate the clusters from our stimuli.
- the lexical cluster effect cannot be escaped, but it can be controlled for:
- by the lexical frequency of clusters

experiment #3: Czech existing vs. non-existing #RTs

possible lexical cluster effects

- in exp. #3, on each trial, an #RT cluster competes with a #TR cluster
- RT cluster effect
  - bias in favour of high frequency #RTs (as compared to low frequency #RTs)
  - low frq #lb will get less #RT responses than high frq #rt
- TR cluster effect
  - bias in favour of high frequency #TRs (as compared to low frequency #TRs)
  - when comparing non-existing rp and rb, their respective TRs have high (pr) or low (br) frq. Thus upon rp vs. pr, high frq pr may produce more TR percepts than low frq br upon the competition of rb vs. br.

existing #RTs

- may be subjected to both a lexical RT and a lexical TR effect.

non-existing #RTs

- have no lexical RT effect
- but may have a lexical TR effect.

experiment #3: Czech existing vs. non-existing #RTs

possible lexical cluster effect

lexical frequencies
(Czech National Corpus)

	RT	RT frq (token, in thousand)	compe-ting TR	TR frq (token, in million)
existing	rt	111.3	tr	23.3
	rd	12.1	dr	16.4
	lb	3.3	bl	6.7
non-existing	rp		pr	180.5
	rk		kr	23.0
	rb		br	11.7

experiment #3: Czech existing vs. non-existing #RTs

results

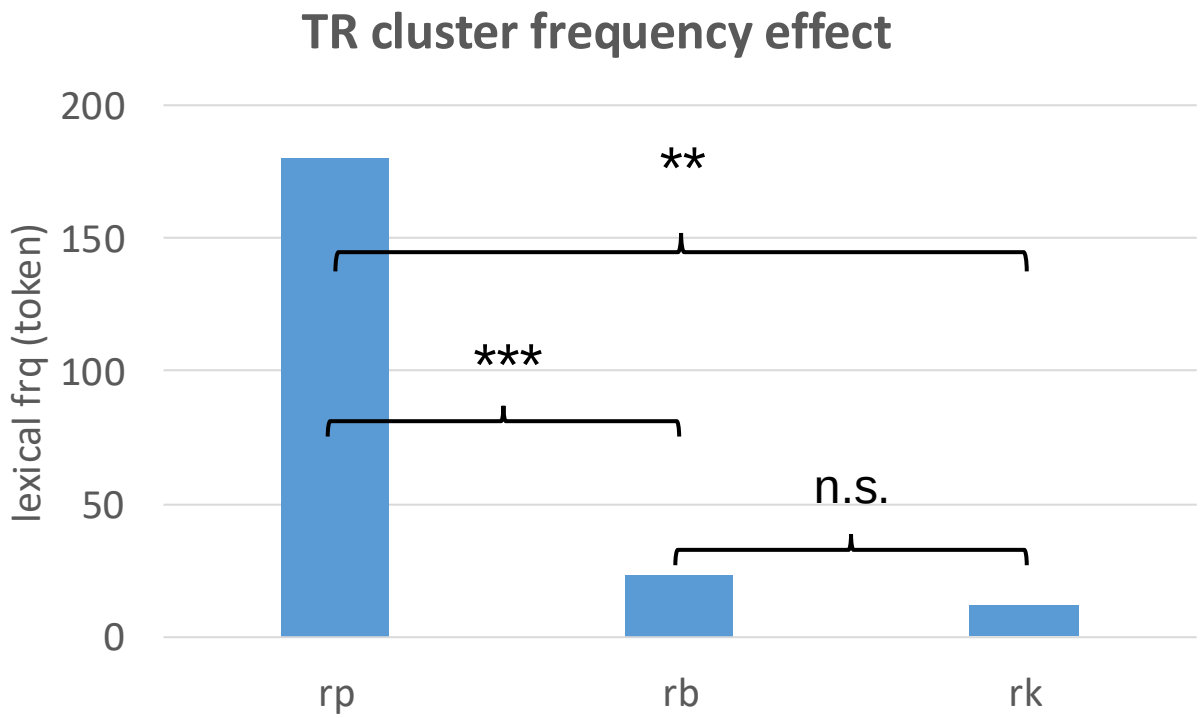
is there a TR cluster effect?

- yes
- comparison of the three non-existing RTs rp, rk, rb
- measure: RT responses
- comparison: RM Anova

discussion

- high TR frq
  - increases TR percepts
  - = lowers RT percepts

	RT	RT frq (token, in thousand)	competing TR	TR frq (token, in million)
existing	rt	111.3	tr	23.3
	rd	12.1	dr	16.4
	lb	3.3	bl	6.7
non-existing	rp		pr	180.5
	rk		kr	23.0
	rb		br	11.7



experiment #3: Czech existing vs. non-existing #RTs

results

is there an RT cluster effect?

- probably
- comparison of the three existing RTs rt, rd, lb
- measure: RT responses
- comparison: RM Anova

discussion

- the two upper frq RTs produce significantly more RT percepts than the low frq RT.
- this cannot be due to TR frq: if anything, high TR frq should increase TR percepts = lower RT percepts.
- it is unclear why the difference between rt and rd is non significant.

	RT	RT frq (token, in thousand)	compe-ting TR	TR frq (token, in million)
existing	rt	111.3	tr	23.3
	rd	12.1	dr	16.4
	lb	3.3	bl	6.7
non-existing	rp		pr	180.5
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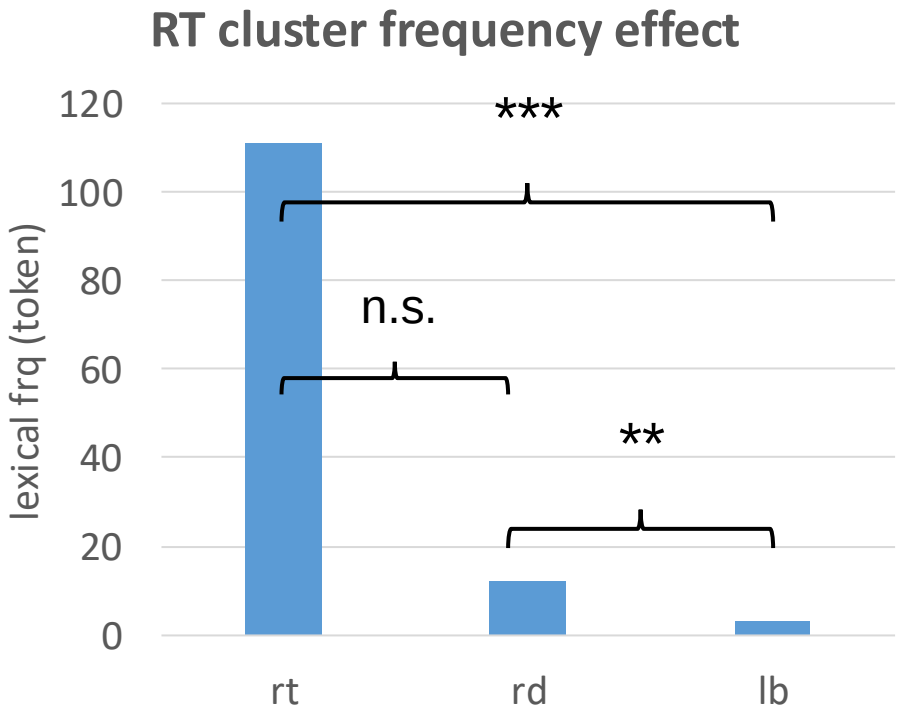

experiment #3: Czech existing vs. non-existing #RTs

minimizing the lexical cluster effect

TR cluster effect

- our goal is to minimize lexical cluster effects, so that the purely phonological effect emerges.

- non-existing RTs
  - the best item is the one with the lowest TR frequency, since it is closest to eliminating the documented TR cluster effect.
  - rp
    - high TR frq (180.5): will introduce a strong bias in favour if TR.
    - we don't take it in = don't use it in our main test.
  - rb, rk
    - low TR frq (11.7, 23.0): their bias in favour of TR will be small.
    - we take them in = use them in our main test.

experiment #3: Czech existing vs. non-existing #RTs

main test

- we compare existing vs. non-existing RTs

- existing RTs
  - rt, rd, lb
  - = all three clusters
  - knowing that there is probably an RT cluster effect that will produce a bias.

- non-existing RTs
  - rb, rk
  - but not the high TR frq item rp