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A Longitudinal Perspective on Masked Morphological Priming in Children

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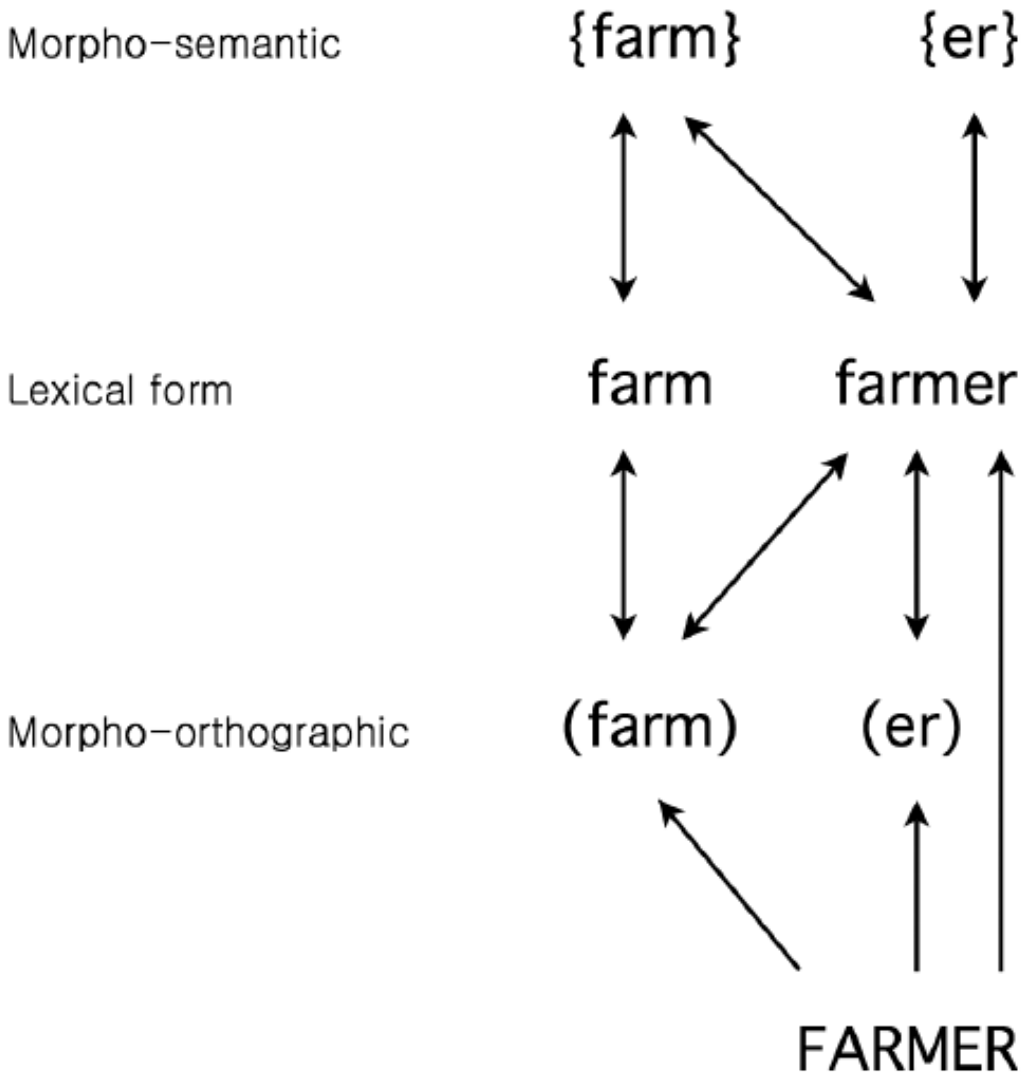
Theoretical Background



Diependaele et al. (2009)

Theoretical Background

- Inflection:
  - lese, liest, lesen, lest, lesest, leset, las, last, lasen, läse, läsest, läse, läsen, läset, lies…
  - Ⓟ correspond all to English „read“
- Derivation:
  - Prefixes: ablesen, anlesen, auflesen, auslesen…
  - Suffixes: lesbar, Leser, Lesung, leserlich…
  - Ⓟ can be combined freely: Ablesung, Aufleser, Lesbarkeit…
- Composition:
  - Lesebuch, Lesezeit, Lesestoff, Leseraum…
  - Gedankenlesen, Krimilesen, Frustlesen, …
  - Ⓟ can be created „on the fly“

Partnerlesegeschichten

Theoretical Background

- Masked Morphological Priming (e.g., Rastle et al., 2004)
  - **farmer** vs. control: morpho-semantic priming
  - **corner** vs. control: morpho-orthographic priming
  - **cashew** vs. control: orthographic priming
- Findings with adults (e.g., Rastle & Davis, 2008)
  - morpho-semantic <= morpho-orthographic < orthographic
- Findings with children inconsistent:
  - Quemart et al. (2011): morpho-semantic/orthographic priming
  - Beyersmann et al. (2012): only morpho-semantic priming

Theoretical Background

- Morphological Nonword Priming (Longtin & Meunier, 2005)
  - **farmer** vs. control: morpho-semantic priming
  - **farmation** vs. control: morpho-orthographic priming
  - **farmald** vs. control: orthographic priming

- Findings with adults (e.g., Morris et al., 2011)
  - As in standard paradigm, but also priming in the orthographic condition

- Findings with children (Beyersmann et al., 2015, Hasenäcker et al., 2016)
  - Priming in all conditions, stronger in morpho-semantic condition
  - Not moderated by grade (cross-sectional)

- Interindividual differences (Beyersmann et al., 2014, 2015)
  - Priming in orthographic condition increases with reading skill

Aims

1. Investigate changes in morphological priming during primary school using a longitudinal design.

2. Disentangle grade and reading skill effects.

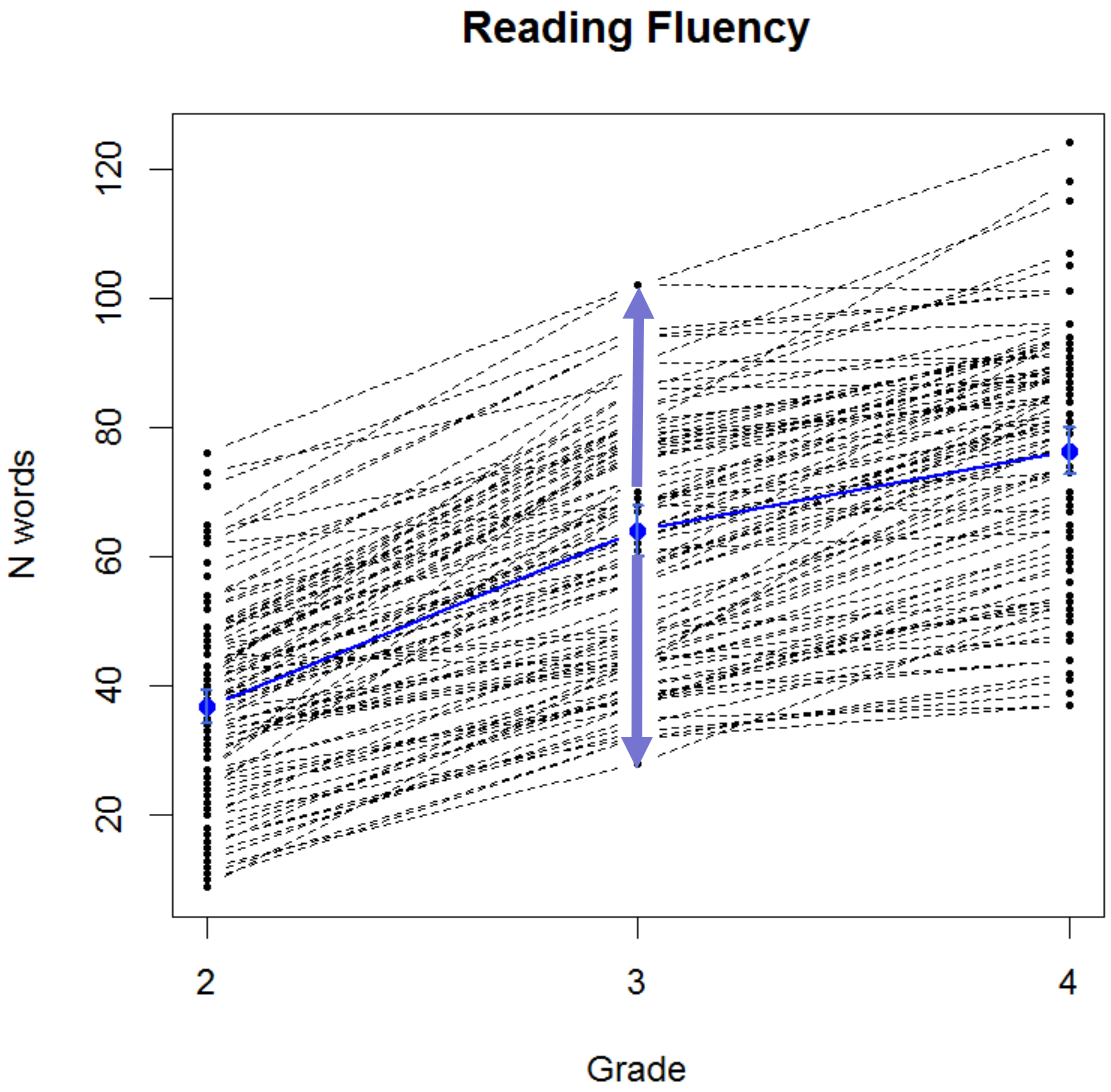
Methods

- *N* = 102 Participants:
  - Orthographic Processing in Reading Acquistion (OPeRA)
  - here: *N* = 90 (above chance performance/full data at all grades)
  - 50 girls, *M* = 6.8 (*SD* = 0.5) years at T1

- Longitudinal Design:
  - T1: Grade 2 (Nov/Dec 2014)
  - T2: Grade 3 (Nov/Dec 2015)
  - T3: Grade 4 (Nov/Dec 2016)

- Measures:
  - ...
  - Reading Fluency: SLRT II (one minute of reading test)
  - ...

Methods



Grade 2: *M*=36.8, *SD*=14.5, Grade 3: *M*=64.0, *SD*=21.1, Grade 4: *M*=76.4, *SD*=19.5

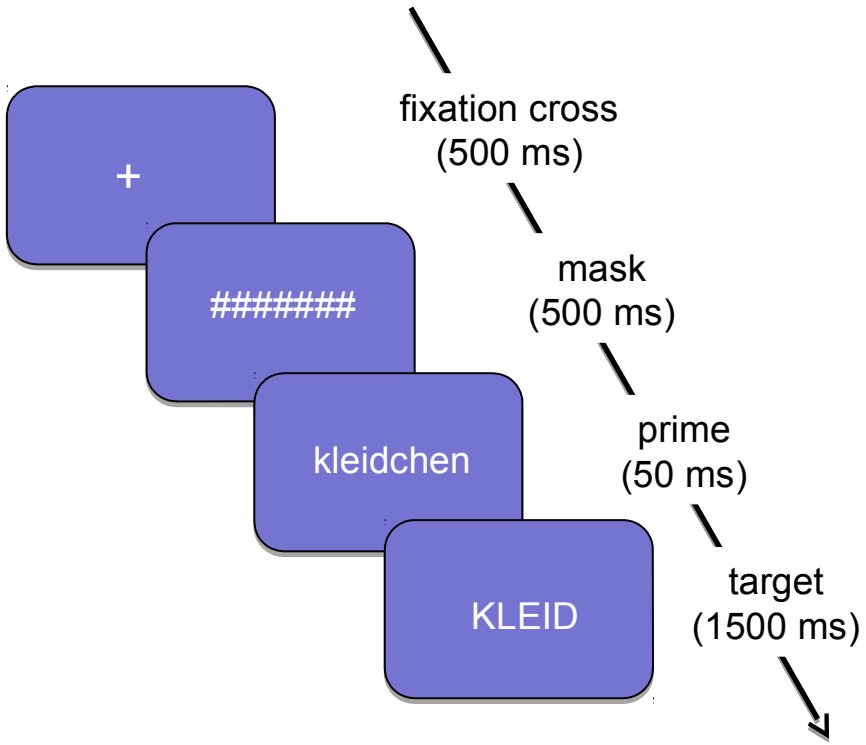
Methods

- Standard masked morphological nonword priming
- *n* = 50 words, *n* = 50 nonwords
- 4 prime conditions:

Condition	real suffixed	pseudo suffixed	non suffixed	control
Word	kleid-chen (farm-er)	kleid-tum (farm-ation)	kleid-ekt (farm-ald)	stern-chen (dream-er)
Nonword	golb-chen (gumb-er)	golb-tum (gumb-ation)	golb-ekt (gumb-ald)	sonk-chen (tolf-er)

- Lexical decision on target (KLEID/GOLB)
- Here: Only word responses (no effects for nonword data)

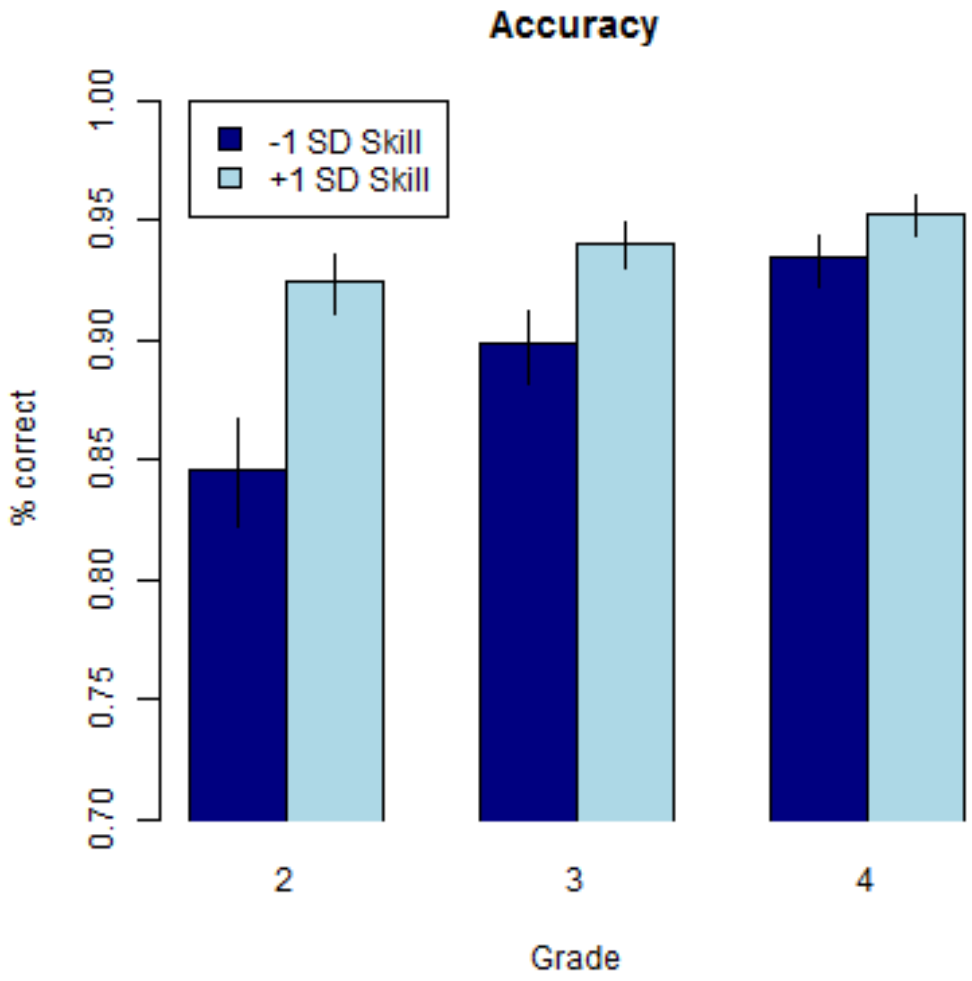
Methods


+
########
kleidchen
KLEID
fixation cross
(500 ms)
mask
(500 ms)
prime
(50 ms)
target
(1500 ms)

Accuracy

Variable	c^2	*df*	*p*
Intercept	256.5	1	< .001***
Grade	90.3	1	< .001***
Fluency	25.2	1	< .001***
Grade:Fluency	9.0	1	.003**
Condition	3.9	3	.27
Condition:Grade	2.0	3	.57
Condition:Fluency	6.6	3	.09
Condition:Grade:Fluency	3.1	3	.38

Accuracy


Accuracy
-1 SD Skill
+1 SD Skill
% correct
0.70
0.75
0.80
0.85
0.90
0.95
1.00
2
3
4
Grade

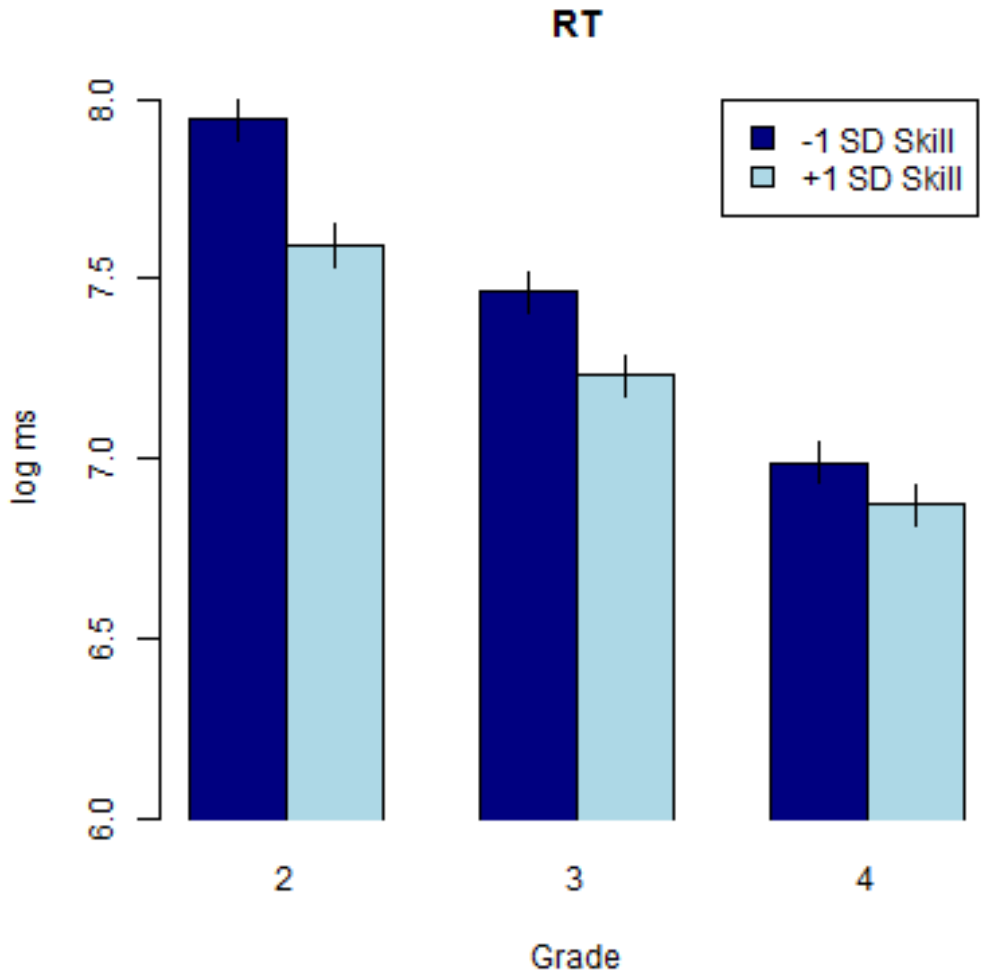
Accuracy

Variable	c^2	df	p
Intercept	256.5	1	< .001***
Grade	90.3	1	< .001***
Fluency	25.2	1	< .001***
Grade:Fluency	9.0	1	.003**
Condition	3.9	3	.27
Condition:Grade	2.0	3	.57
Condition:Fluency	6.6	3	.09
Condition:Grade:Fluency	3.1	3	.38

RT

Variable	c^2	df	p
Intercept	20370.7	1	< .001***
Grade	12403.5	1	< .001***
Fluency	142.3	1	< .001***
Grade:Fluency	158.0	1	< .001***
Condition	18.4	3	< .001***
Condition:Grade	9.7	3	0.21*
Condition:Fluency	11.9	3	.008**
Condition:Grade:Fluency	6.1	3	.11

RT



RT

Variable	c^2	df	p
Intercept	20370.7	1	< .001***
Grade	12403.5	1	< .001***
Fluency	142.3	1	< .001***
Grade:Fluency	158.0	1	< .001***
Condition	18.4	3	< .001***
Condition:Grade	9.7	3	0.21*
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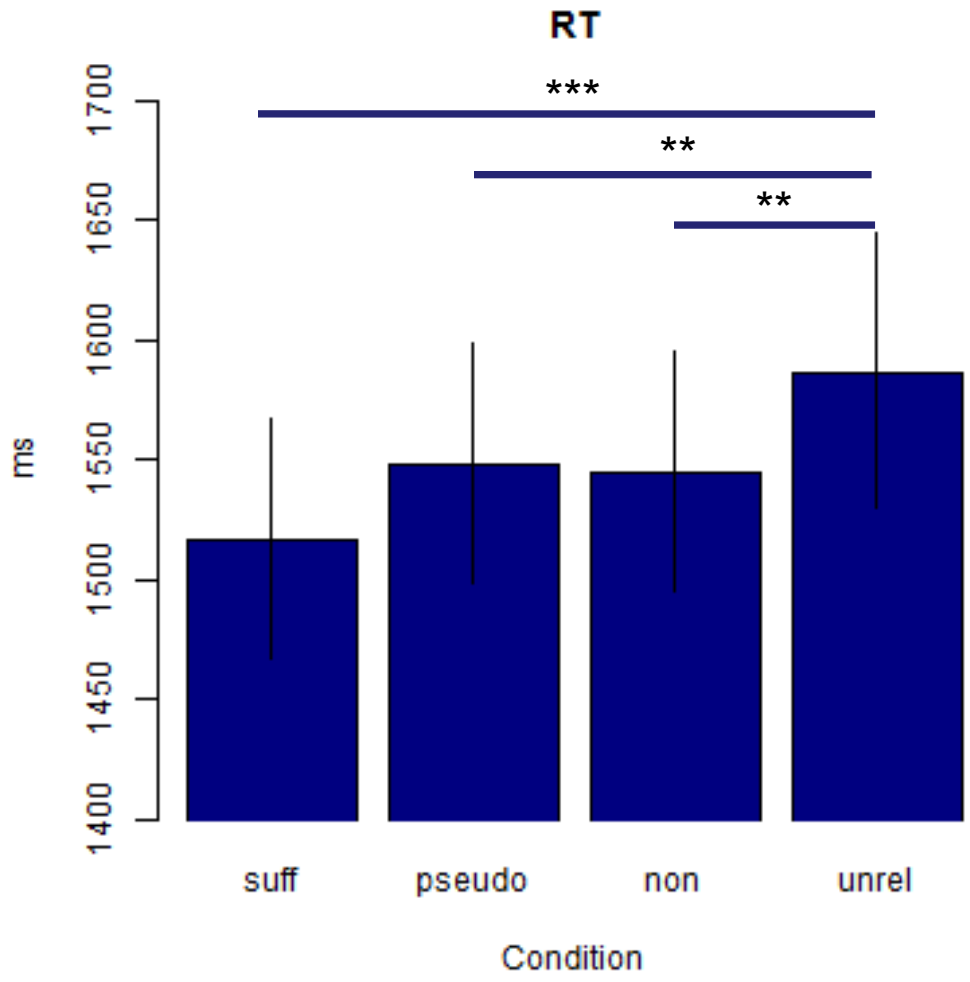
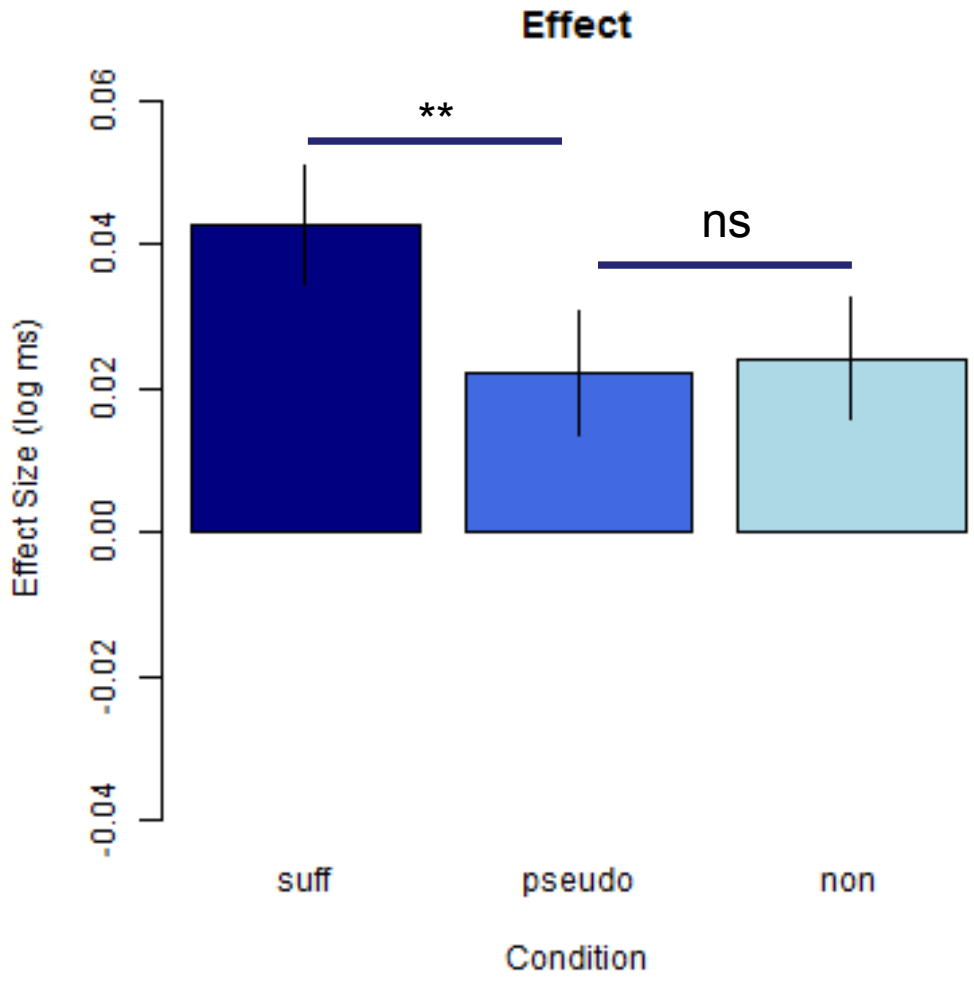
RT


RT
***
**
**
ms
1400
1450
1500
1550
1600
1650
1700
suff
pseudo
non
unrel
Condition

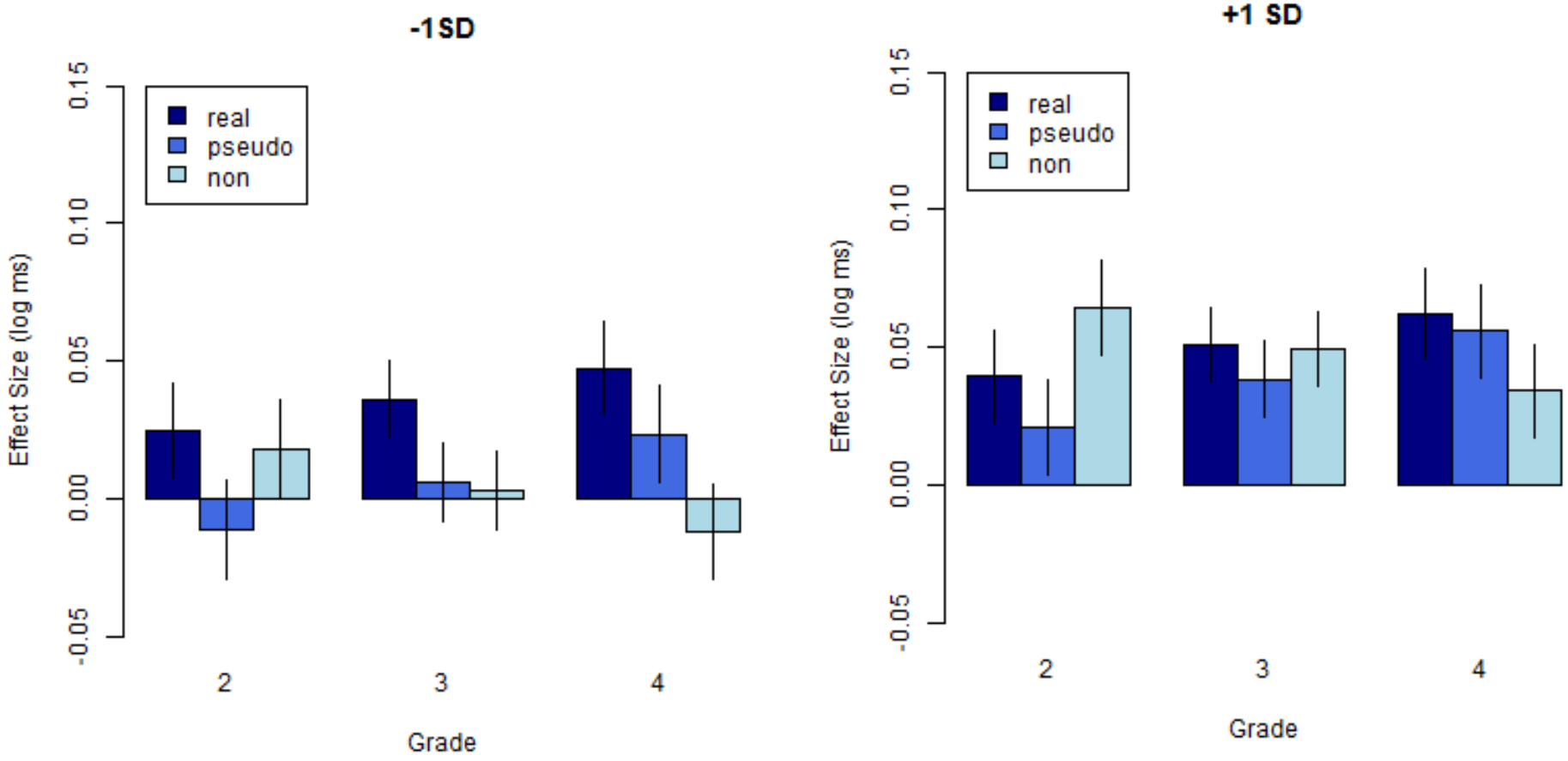
RT


Effect
**
ns
Effect Size (log ms)
0.06
0.04
0.02
0.00
-0.02
-0.04
suff
pseudo
non
Condition

RT

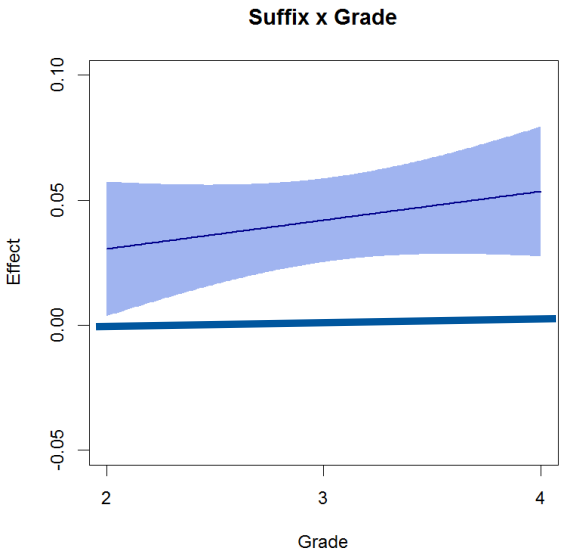
Variable	c^2	df	p
Intercept	20370.7	1	< .001***
Grade	12403.5	1	< .001***
Fluency	142.3	1	< .001***
Grade:Fluency	158.0	1	< .001***
Condition	18.4	3	< .001***
Condition:Grade	9.7	3	0.021*
Condition:Fluency	11.9	3	.008**
Condition:Grade:Fluency	6.1	3	.110

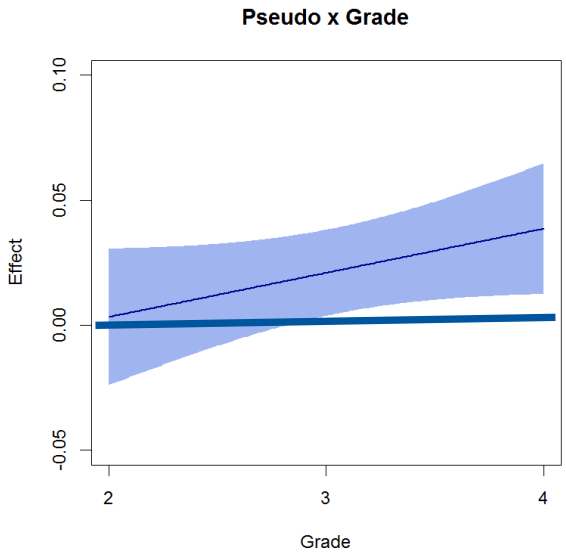
RT

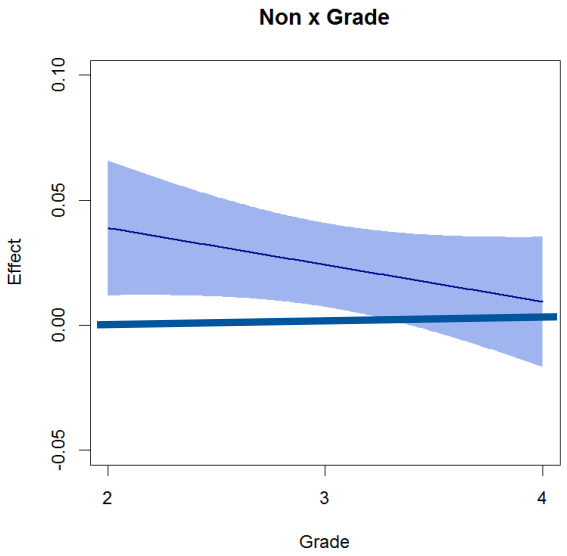

-1SD
real
pseudo
non
Effect Size (log ms)
0.15
0.10
0.05
0.00
-0.05
2
3
4
Grade

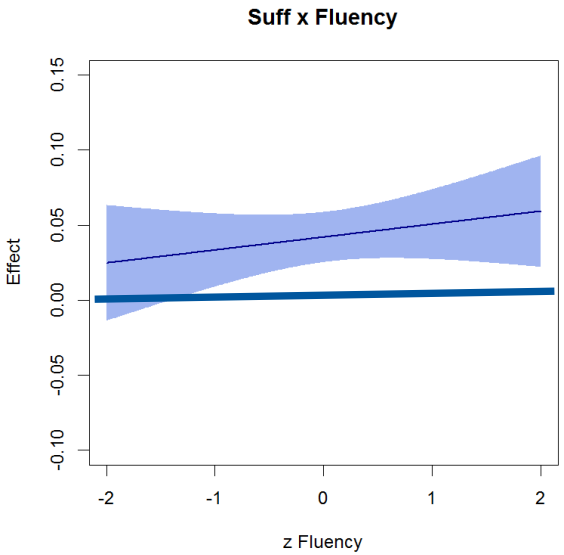
+1 SD
real
pseudo
non
Effect Size (log ms)
0.15
0.10
0.05
0.00
-0.05
2
3
4
Grade

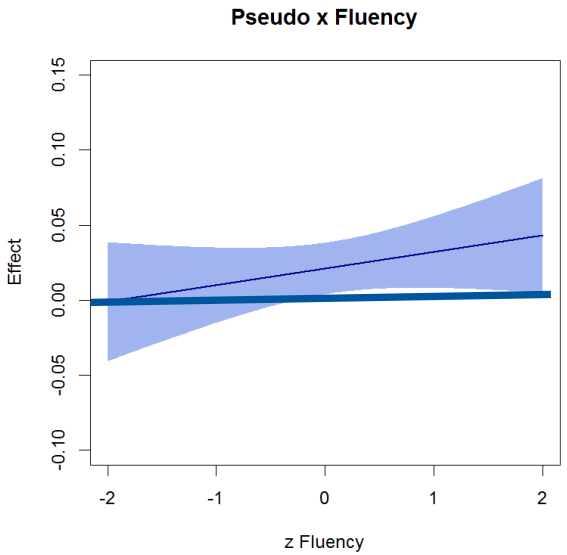
RT

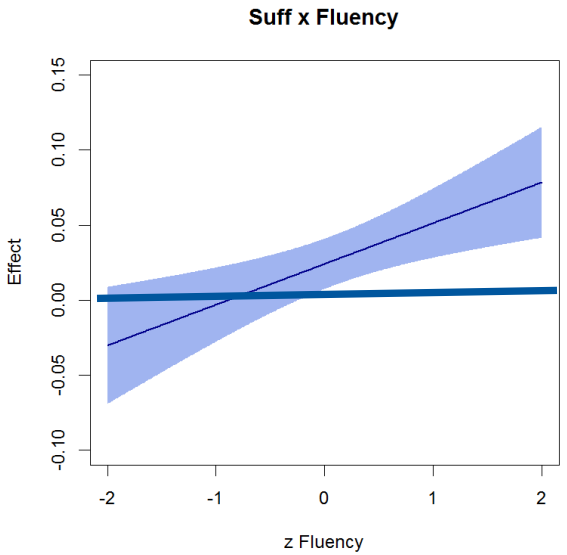

Suffix x Grade
Effect
0.10
0.05
0.00
-0.05
2
3
4
Grade


Pseudo x Grade
Effect
0.10
0.05
0.00
-0.05
2
3
4
Grade


Non x Grade
Effect
0.10
0.05
0.00
-0.05
2
3
4
Grade


Suff x Fluency
Effect
0.15
0.10
0.05
0.00
-0.05
-0.10
-2
-1
0
1
2
z Fluency


Pseudo x Fluency
Effect
0.15
0.10
0.05
0.00
-0.05
-0.10
-2
-1
0
1
2
z Fluency


Suff x Fluency
Effect
0.15
0.10
0.05
0.00
-0.05
-0.10
-2
-1
0
1
2
z Fluency

Summary

- The overall pattern of morphological priming effects in children is similar as in adults.
  Beyersmann et al. (2014, 2015), Hasenäcker et al., (2016)

- Morpho-semantic priming is found in all children, even in grade 2 and in poor readers. Beyersmann et al. (2012)

- Morpho-orthographic effects emerge slowly during reading development. Beyersmann et al. (2012)

- Priming in the orthographic condition is only found in good readers. Beyersmann et al. (2014/2015)

Discussion

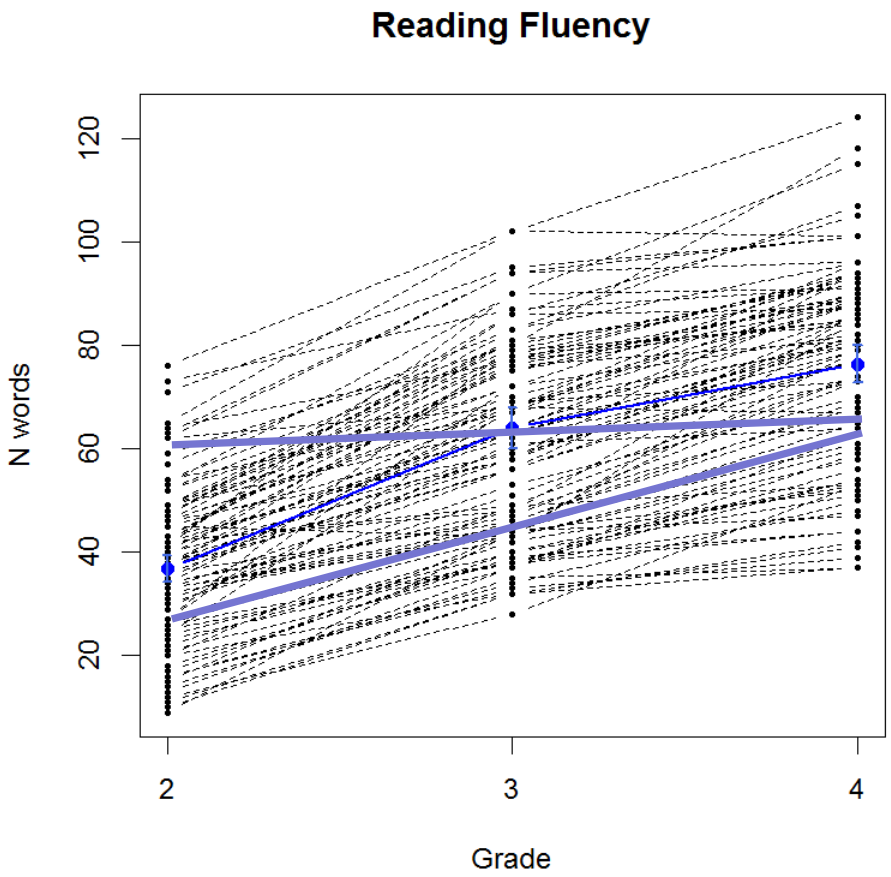
- Not one, but two developmental mechanisms!

- 1. Good readers are able to extract embedded stems directly and efficiently. Grainger & Beyersmann (2017)

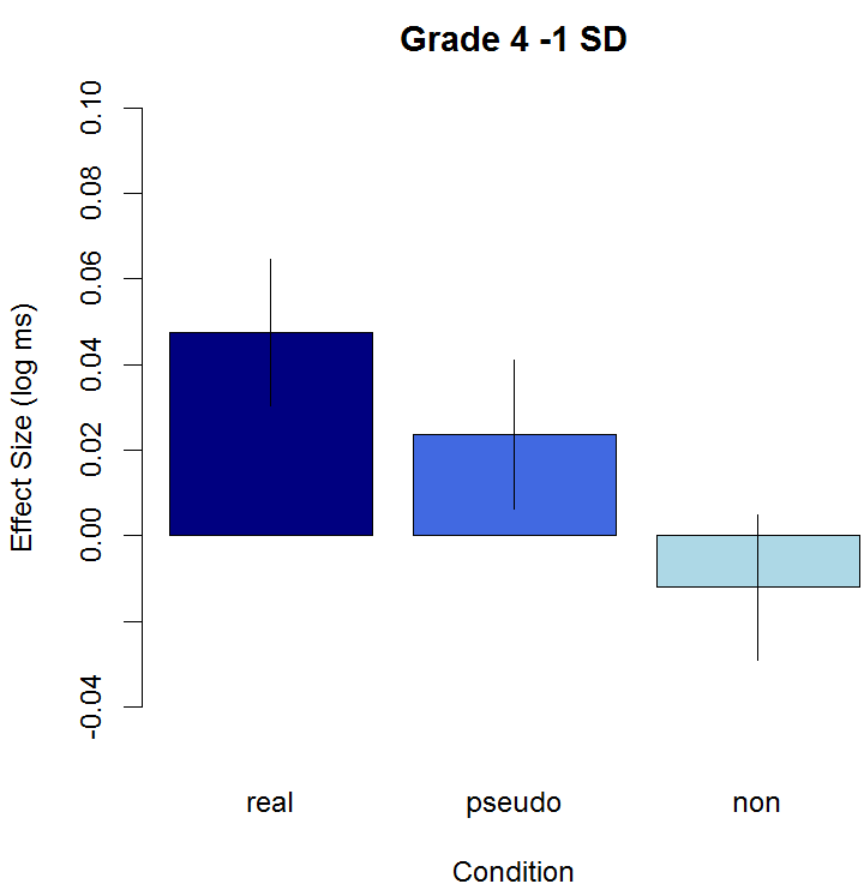
- 2. Poor readers rely on morphological decomposition
  - For beginning readers, morphological decomposition is only successful if semantics aids the decomposition process.
  - During primary school, morphological representation become more stable and morpho-orthographic decomposition is possible.

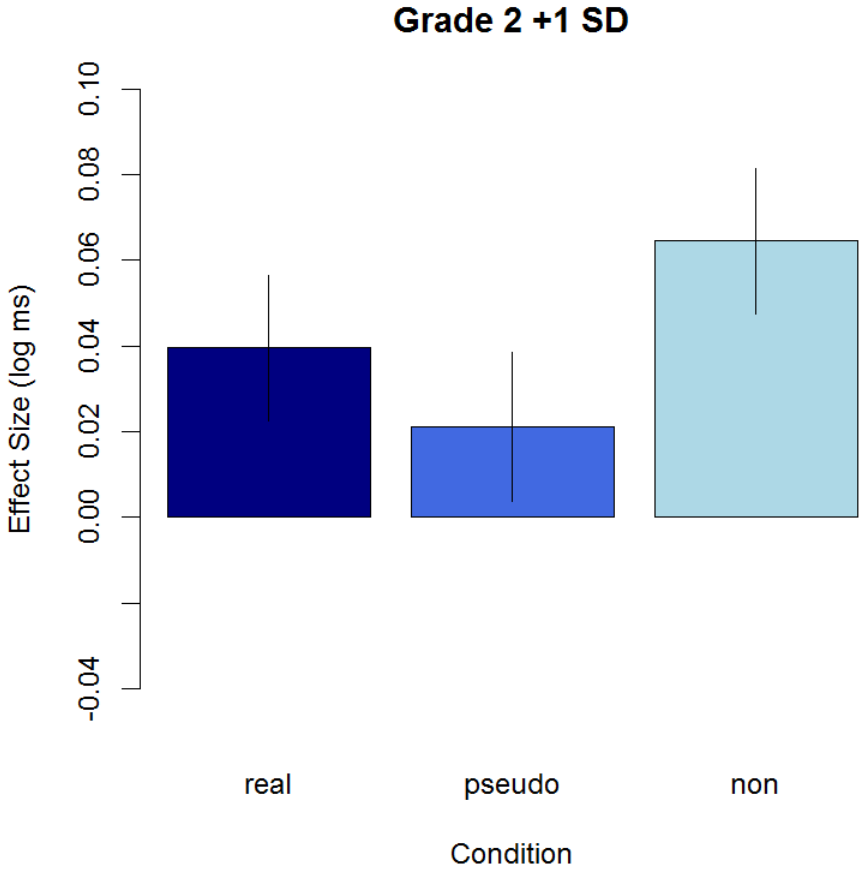
- Open issue: What is special about good readers?

Discussion



Discussion


Grade 4 -1 SD
Effect Size (log ms)
-0.04
0.00
0.02
0.04
0.06
0.08
0.10
real
pseudo
non
Condition


Grade 2 +1 SD
Effect Size (log ms)
-0.04
0.00
0.02
0.04
0.06
0.08
0.10
real
pseudo
non
Condition

Thank you!

Contact: sascha.schroeder@mpib-berlin.mpg.de