Research group

“Simply complex!
A multimodal and interdisciplinary approach to examine linguistic complexity within Easy Language“

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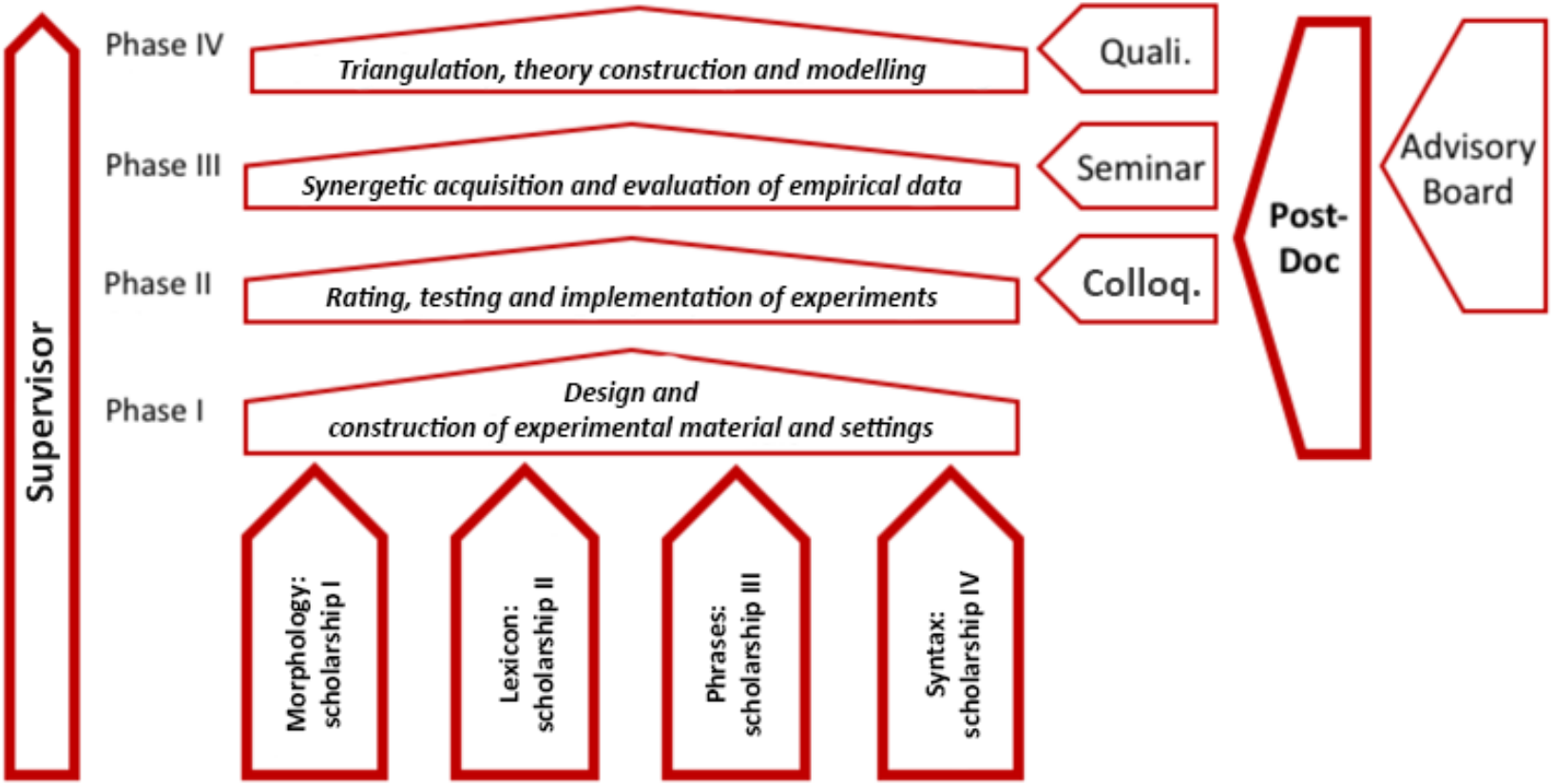
Research group "Simply complex! A multimodal and interdisciplinary approach to examine linguistic complexity within Easy Language"

- Easy Language: variety with reduced complexity for target groups with special communication needs
- Perspective of intralingual translation
- No empirical validation of controlled language rules from a neuroscientific perspective
- No empirical evidence of cognitive effort
- Trade-off between linguistic complexity levels (e.g. "taxi driver" vs. "driver of the taxi")

Research group "Simply complex! A multimodal and interdisciplinary approach to examine linguistic complexity within Easy Language"



Research group “Simply complex! A multimodal and interdisciplinary approach to examine linguistic complexity within Easy Language“

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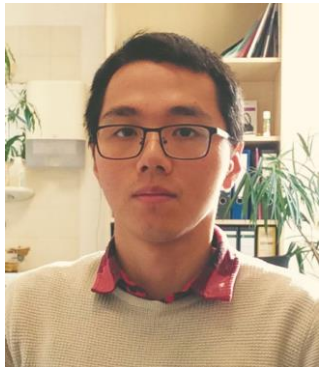

Dr. Yifei He

Liv Borghardt

Silvana Deilen

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Multi-method approach

Independent variables:

- standard language
- easy language
- plain language

Control variables:

- meta data
- test for verbal fluency,
- test for working memory
- etc.

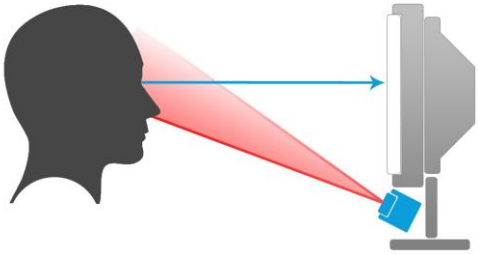
Dependend variables:

- eyetracking
- EEG
- fMRT

In combination with

- comprehensibility rating
- comprehensibility test
- recall task

Eye Tracking Study on the Visual Segmentation of Compounds in Easy Language



Silvana Deilen

Research Background

Rindfleisch
Rindfleischetikettierung
Rindfleischetikettierungsüberwachung
Rindfleischetikettierungsüberwachungsaufgabe
Rindfleischetikettierungsüberwachungsaufgabenübertragung
Rindfleischetikettierungsüberwachungsaufgabenübertragungsgesetz

- Segmentation of compounds to facilitate lexical access
  - Rind-Fleisch-Etikettierung ✗
  - Rind·fleisch·etikettierung ✓
- Lack of empirical evidence

Hypothesis and Method

Compounds structured with an interpunct are processed faster than compounds structured with a hyphen

The insertion of an interpunct facilitates processing of transparent compounds (1), but hinders processing of non-transparent compounds (2)

(1) Apfel·baum < Apfel-Baum < Apfelbaum

(2) Löwenzahn < Löwen·zahn < Löwen-Zahn

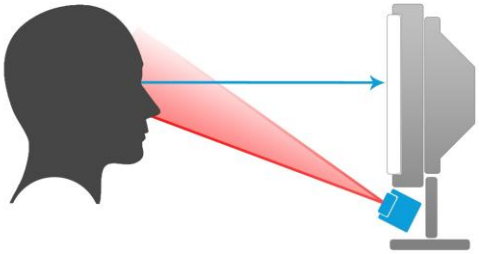
Method

- Experiments on word level (word-picture-matching-test) and sentence level
- **Independent variables:**
  - Visual structuring sign
  - Number of morphemes
  - Semantic transparency

Hypothesis and Method

Method

- **Recording of eye movements:**
  - Number of fixations
  - First fixation duration
  - Total reading time
  - Regressions



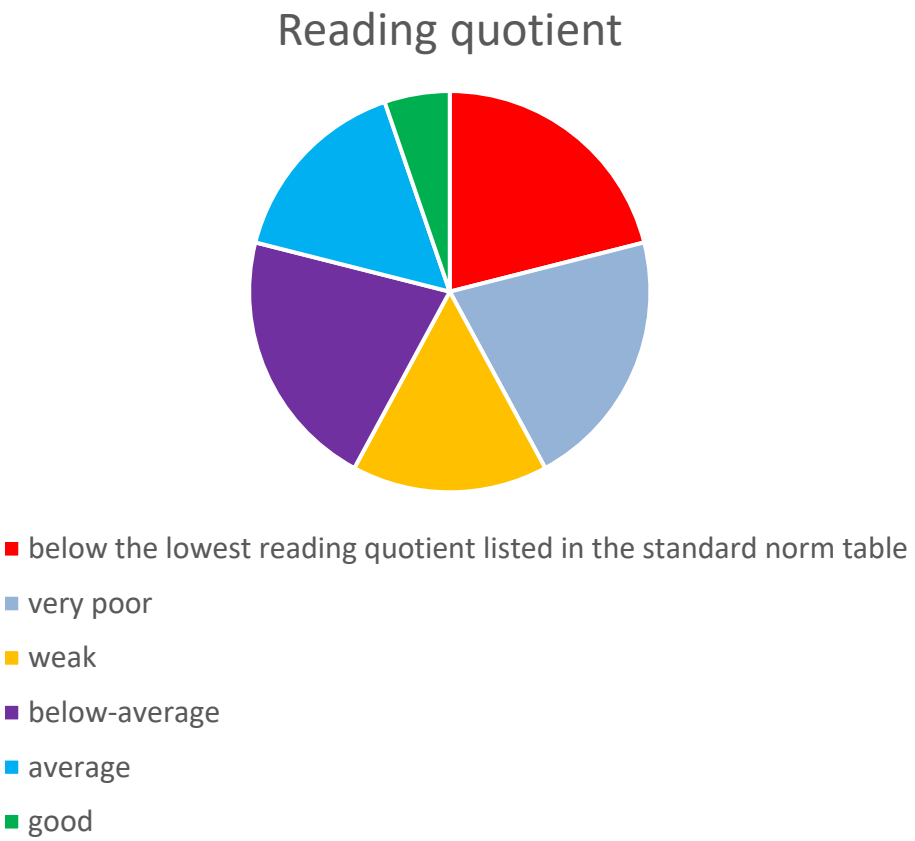
- **Participants:**
  - neurologically unimpaired speakers
  - students with prelingual hearing impairments/deafness

- **Background assessments:**
  - Reading test (reading quotient ≈ intelligence quotient)
  - Psycholinguistic test battery
    - Cognitive flexibility
    - Working memory capacity
    - Verbal intelligence

Löwen-Zahn (*dandelion*)

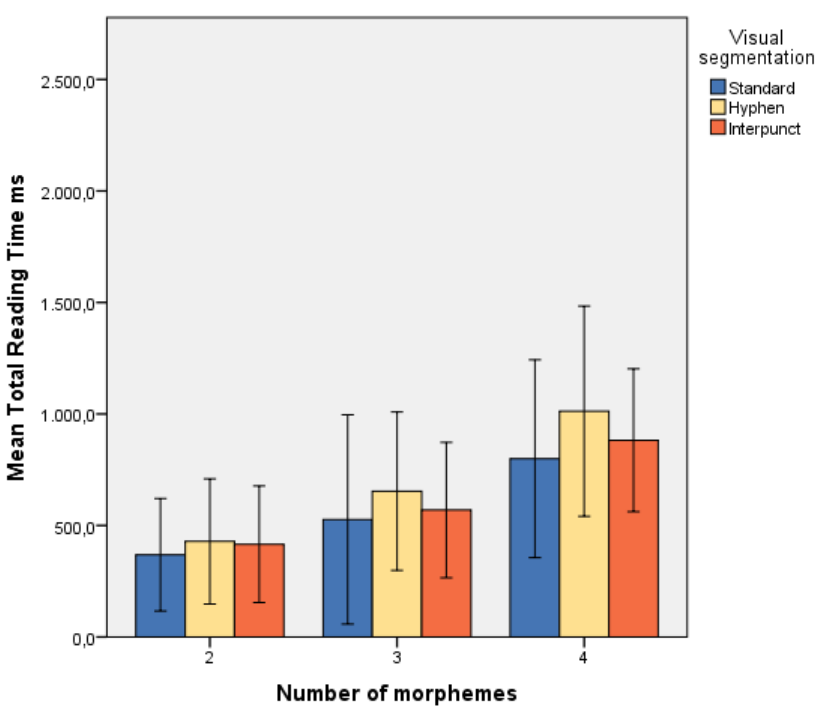



Results: Reading test

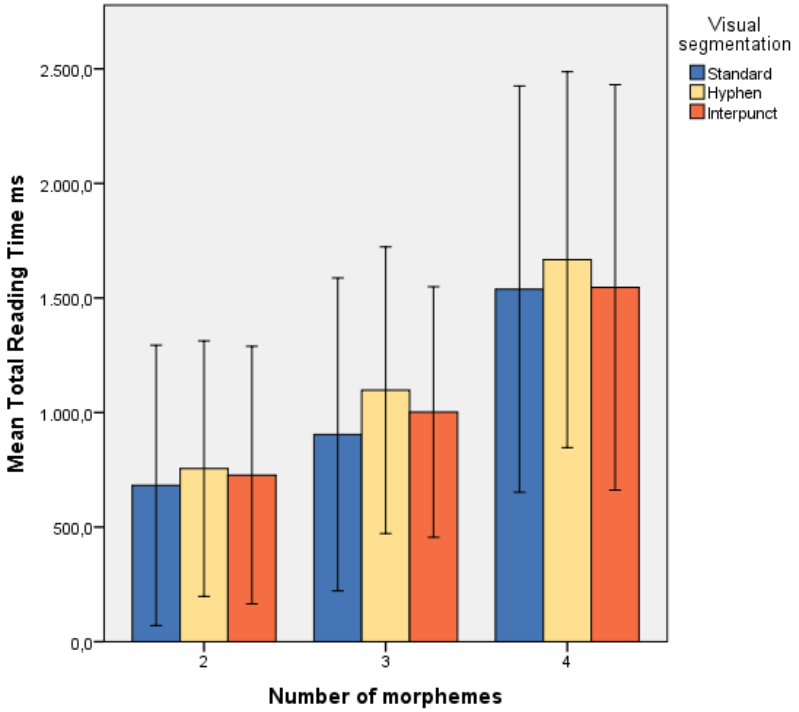


- Significant correlation between reading quotient and test battery scores
- 2 subgroups (median split)

First Results: Number of morphemes

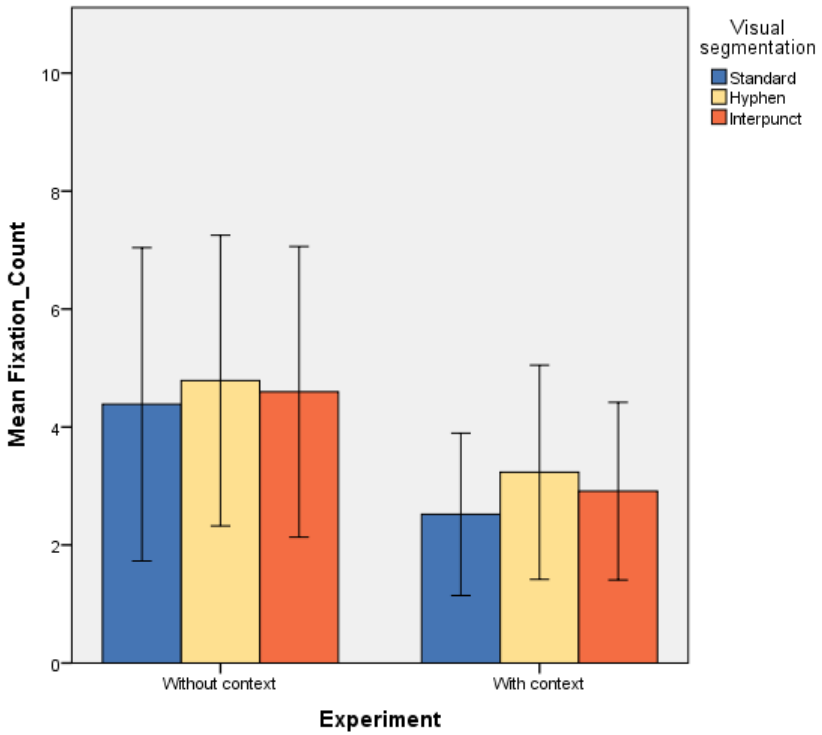


Unimpaired speakers

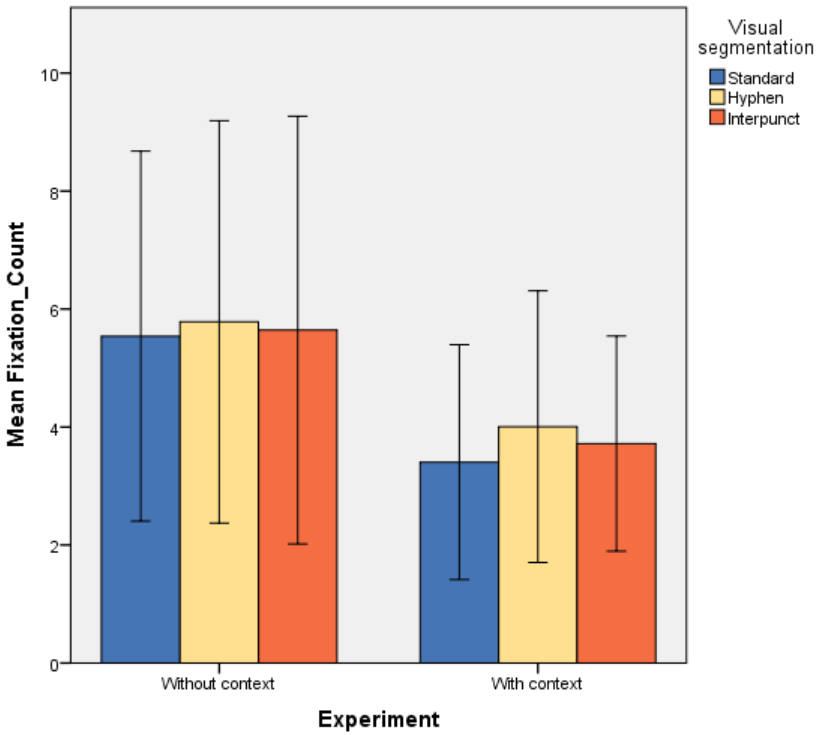


Target group

First Results: Context (number of morphemes)

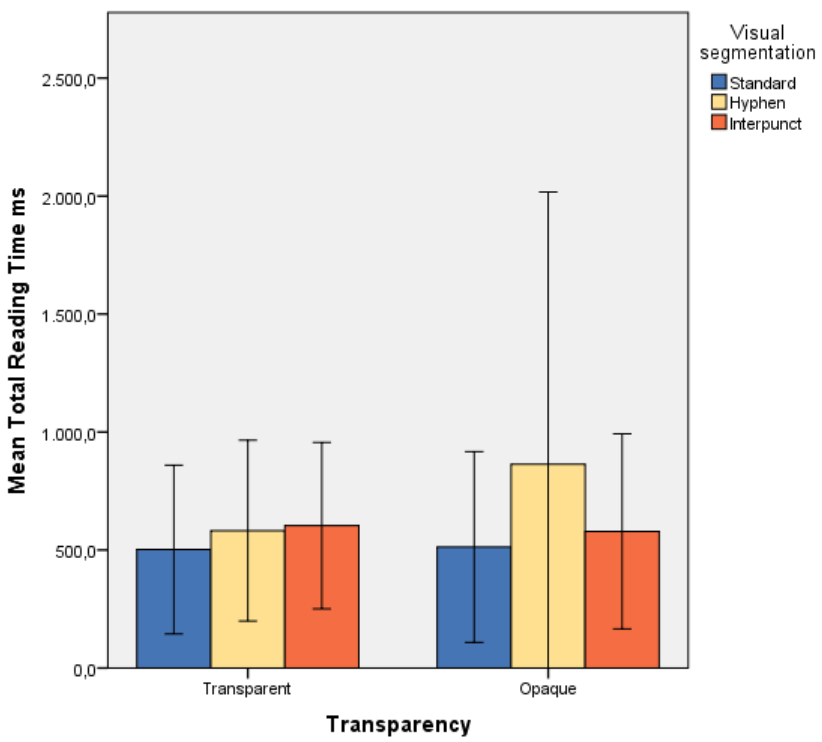


Unimpaired speakers

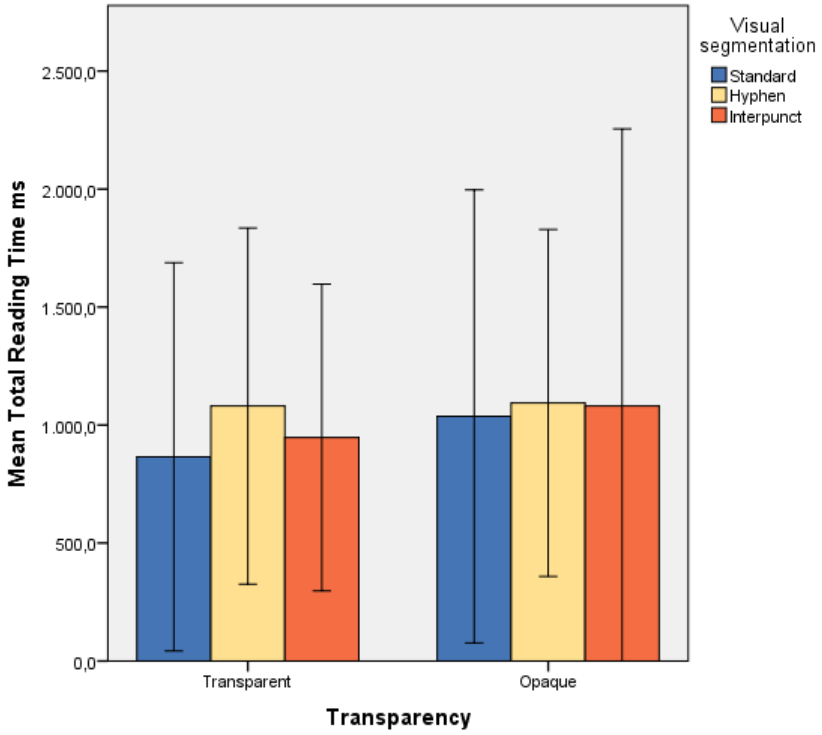


Target group

First Results: Transparency

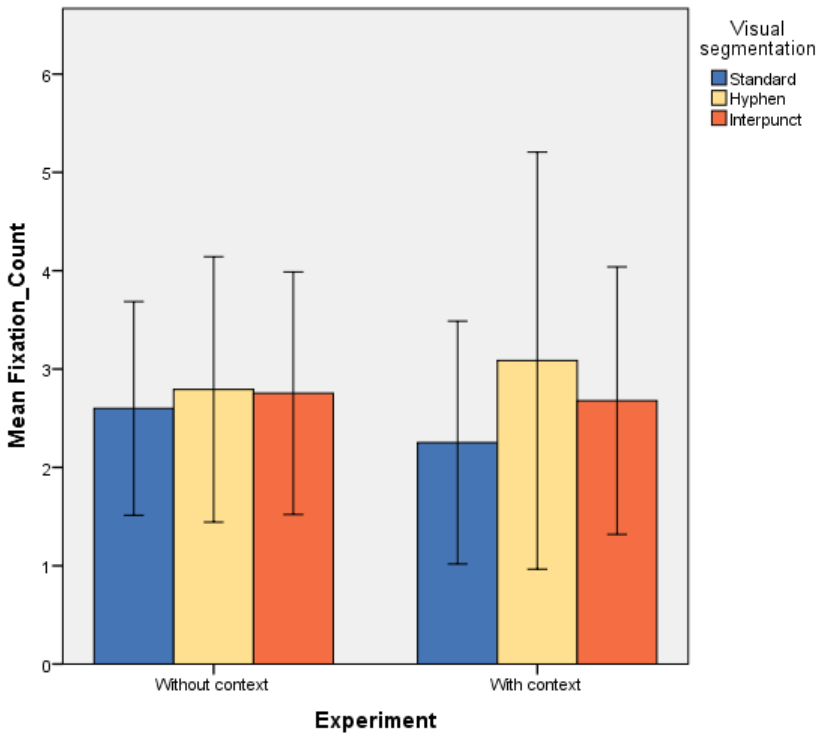


Unimpaired speakers

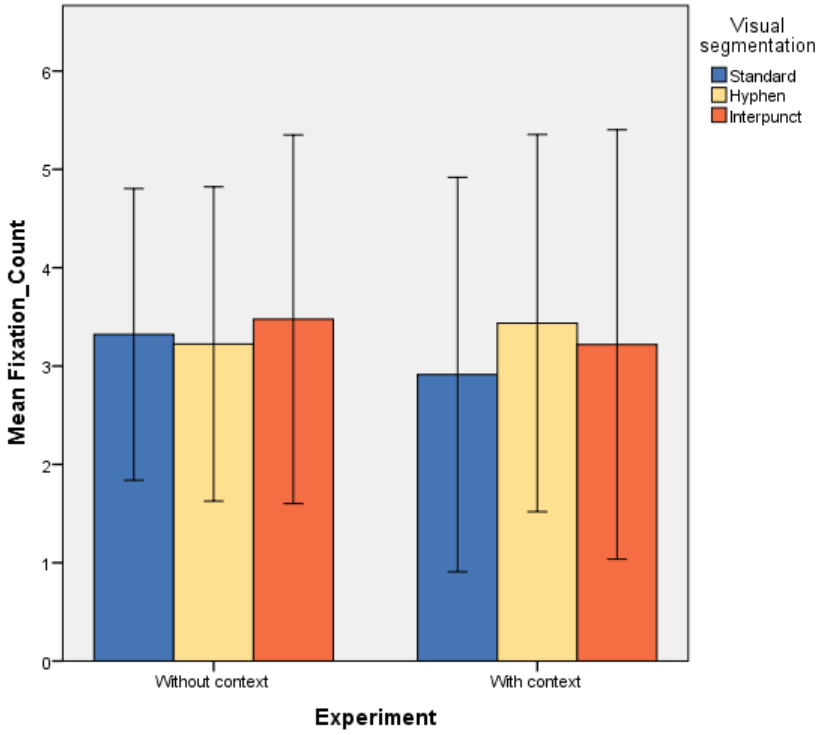


Target group

First Results: Context (semantic transparency)

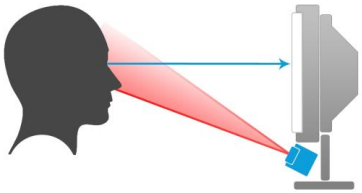


Unimpaired speakers



Target group

Effects of frequency, length and repetition on the visual word processing of people with cognitive impairment



Laura Schiffl

Hypothesis and Method

Do people with cognitive impairment show the same effects on visual word processing as unimpaired adults?

word length – word frequency – word repetition – learning from repeated reading

→ emerge mainly from reading experience

Participants

- **Target group**: Adults with cognitive impairment of all etiologies and varying level of retardation
- **Control group**: Gender and age matched adults without impairment

Method

Evaluation of

- Meta data (age, gender, amount of media consumption)
- Neuropsychological ability (working memory, verbal fluency etc.)
- Reading ability (word and sentence level)
- Answer accuracy (follow-up questions in ET-experiment)

- **Eye-tracking-experiments** on single sentence level containing one target word each
- Independent variables:
  - Word length (short vs. long)
  - Word frequency (high vs. low)
  - Number of repetitions

→

- Recording of eye-movements:
  - Number of fixations & fixation duration
  - Total reading time
  - Regressions

Hypothesis and Method

Main experiment

- Eye-Tracking: Presentation of 48 sentences followed by comprehension question aiming at target word

Follow-Up experiment

- Eye-Tracking: Presentation of 16 sentences (all target words that had been presented repeatedly in main experiment)

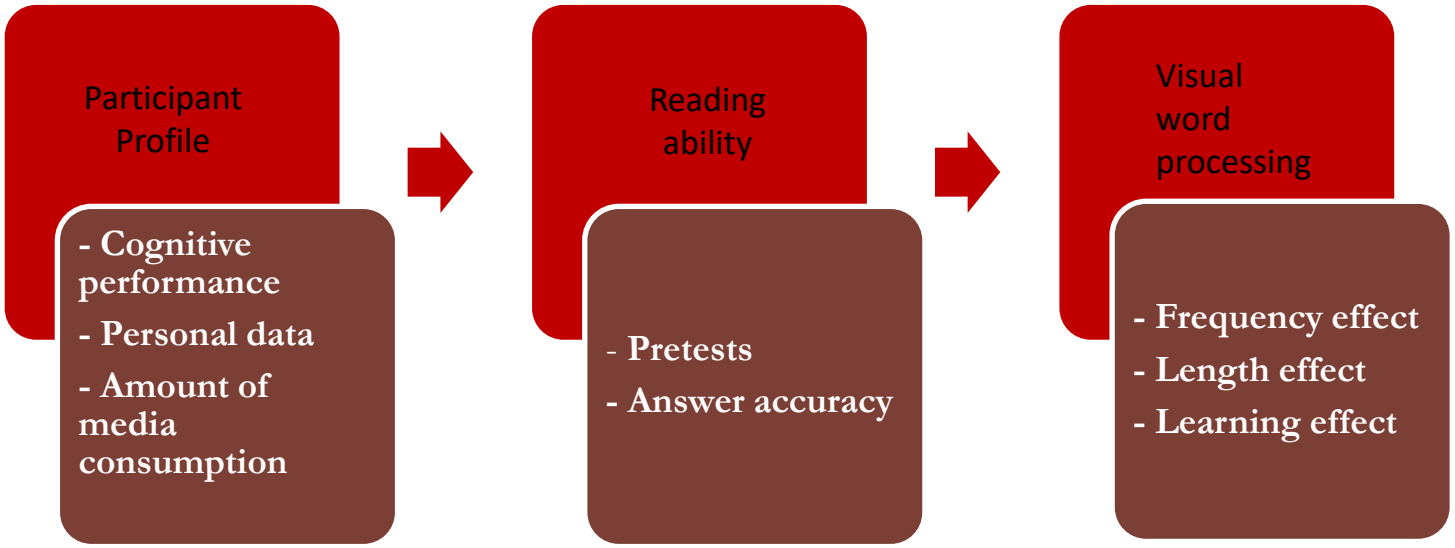
Second experiment

- Behavioral Task:

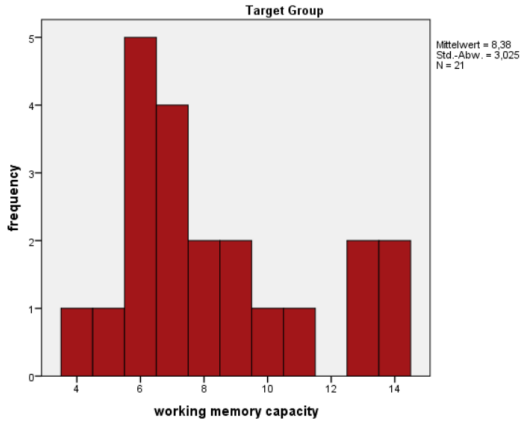
  Rating of aurally presented word- and sentence material by target group with insufficient reading ability

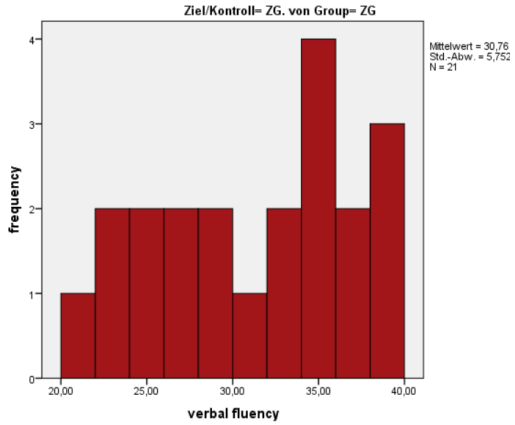
  Word level: familiarity
  Sentence level: comprehensibility
  (Likert Scale 1-4)

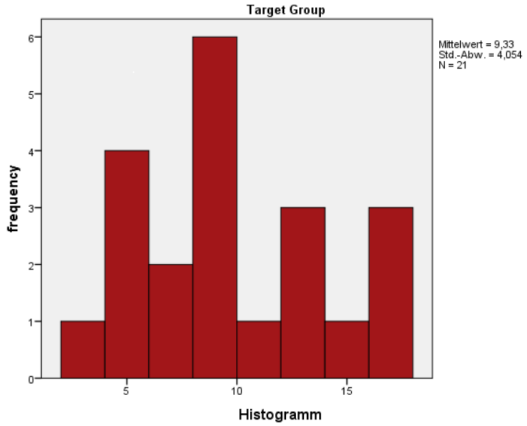
Analysis


Participant Profile
- Cognitive performance
- Personal data
- Amount of media consumption
Reading ability
- Pretests
- Answer accuracy
Visual word processing
- Frequency effect
- Length effect
- Learning effect

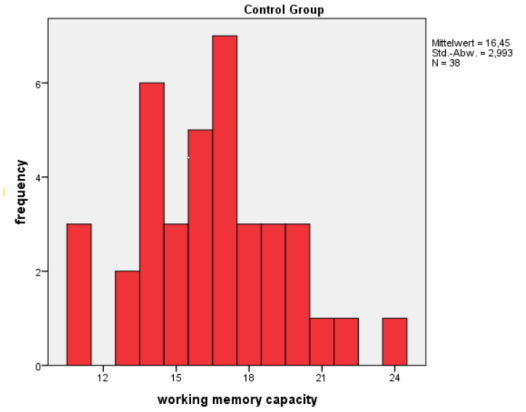
Cognitive Profiles

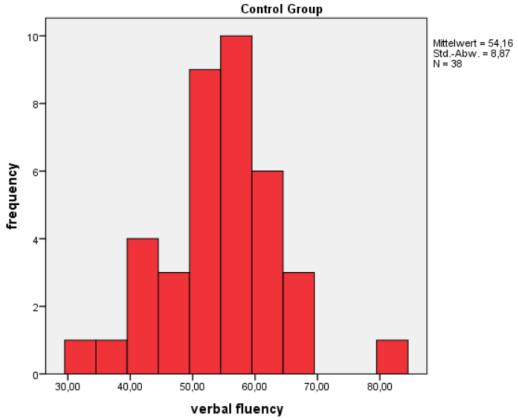


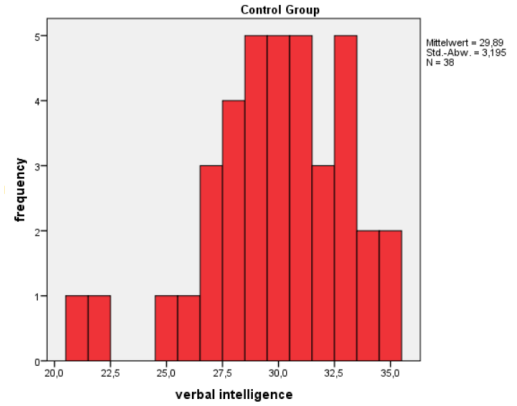




Target Group



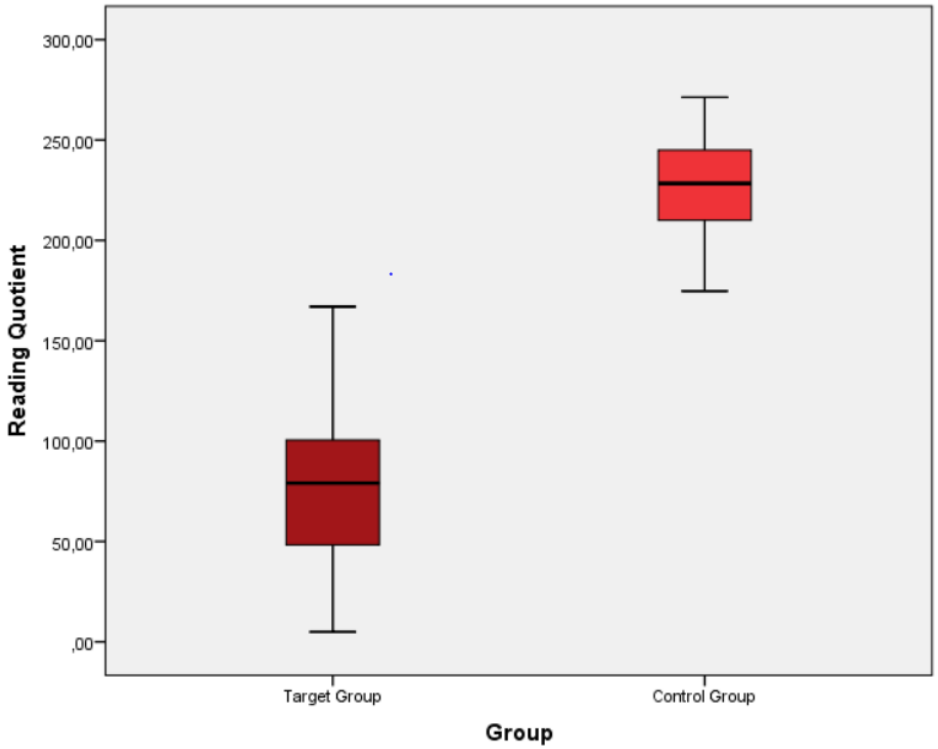




Control Group

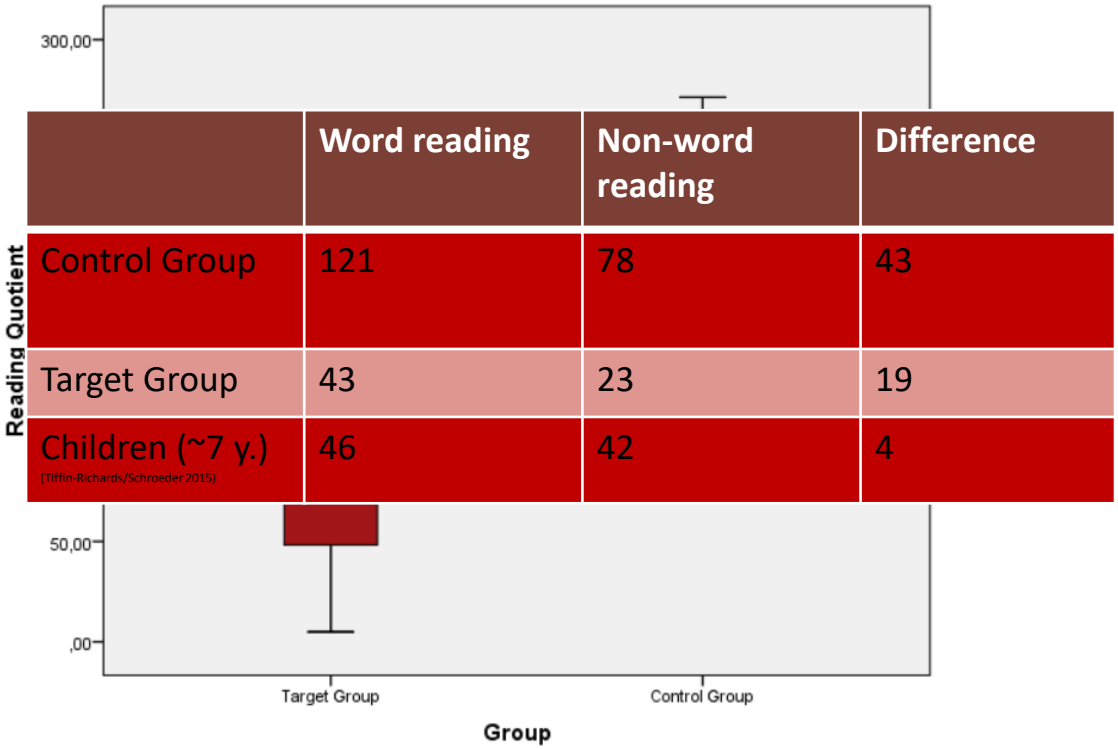
First Results

Reading quotient = $\dfrac{\text{words read correctly} + \text{nonwords read correctly} + \text{sentences rated correctly}}{3}$



First Results

Reading quotient = $\dfrac{\text{words read correctly} + \text{nonwords read correctly} + \text{sentences rated correctly}}{3}$

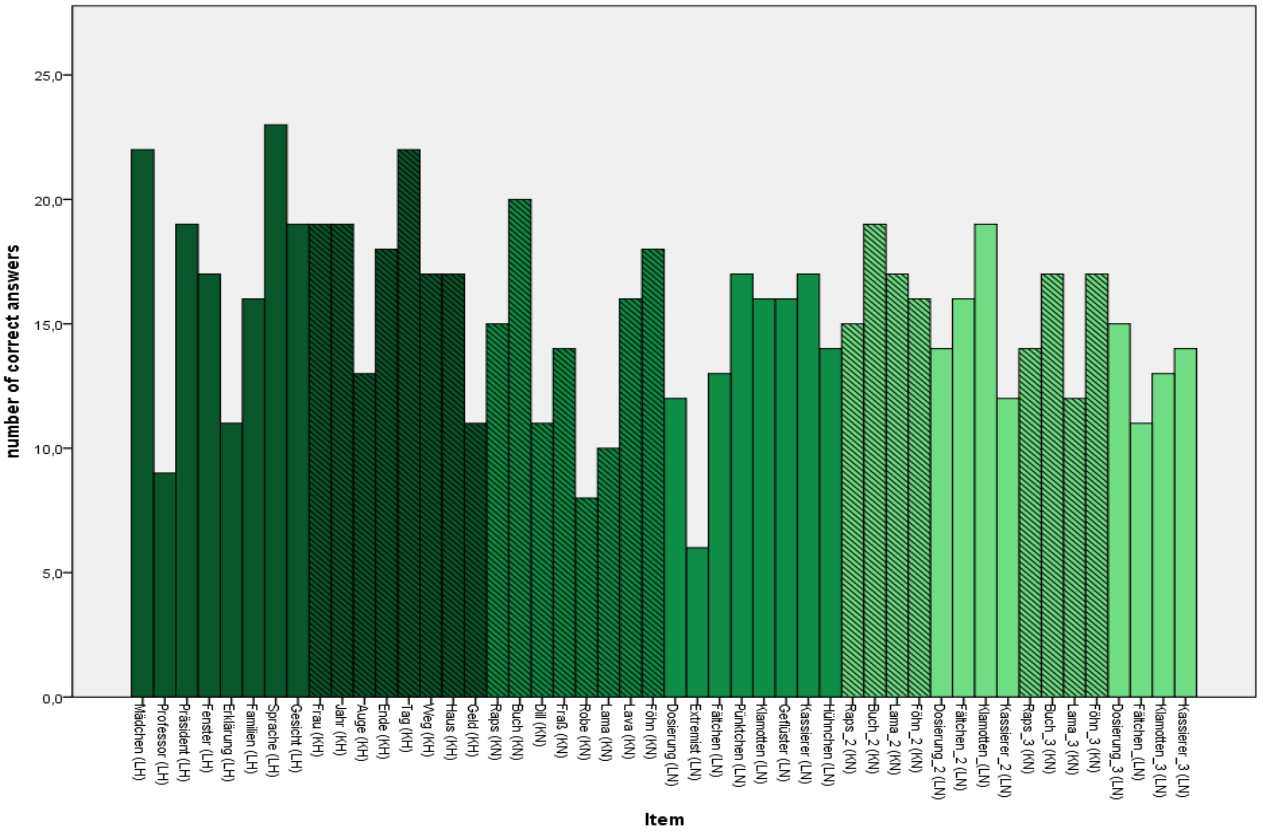


	Word reading	Non-word reading	Difference
Control Group	121	78	43
Target Group	43	23	19
Children (~7 y.) (Tiffin-Richards/Schroeder 2015)	46	42	4

First Results

Answer accuracy

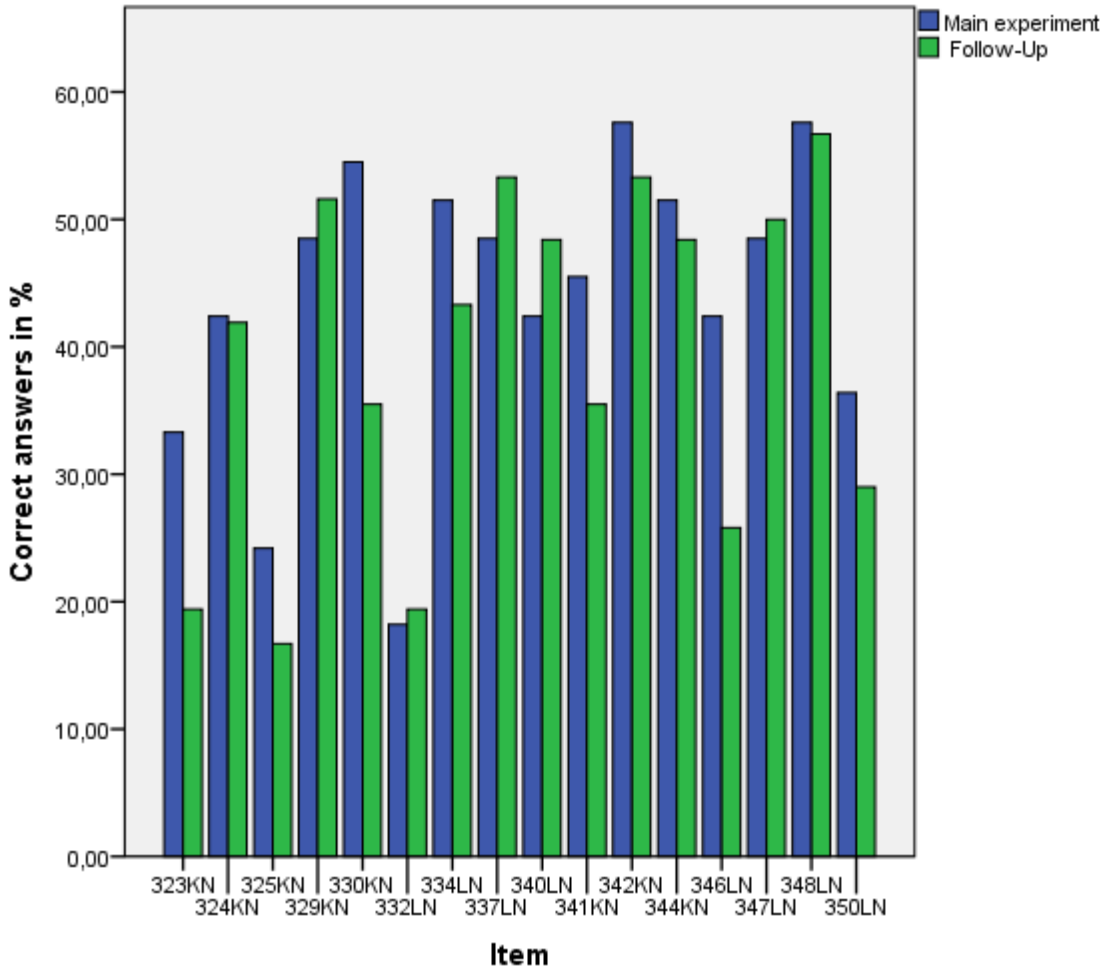
- Significant difference between control and target group ✓
- Overall better results for frequent and short words in target group? **x**



First Results

Answer accuracy

- Significant difference between control and target group ✓
- Overall better results for frequent and short words in target group? **x**
- Improvements in Follow-Up evaluation? **x**



First Results

Answer accuracy

- Significant difference between control and target group ✓
- Overall better results for frequent and short words in target group? **x**
- Improvements in Follow-Up evaluation? **x**

- Correlation media consumption and reading ability **x**

Work in progress:

Total Reading Time

- Shorter times for frequent and short words?
- Consistency in participant results?
- Improvements in Follow-Up evaluation?

Fixations and Regressions

- Shorter fixations and less regressions for short words compared to long words?
- Shorter fixations and less regressions for frequent words compared to infrequent words?
- Shorter fixations and less regressions for repeated words?
- Improvements in Follow-Up evaluation?

- Influence of reading quotient on visual word processing?

Challenges & Outlook

Challenges

Difficulties in calibrating the eye-tracking-system

- Low data quality
  - Eye deformity
  - Nystagmus
  - Squint
  - Body and head movement
- Difficulties in following and remembering instructions
- Organisation of participation (e.g. arrangements, legal guardians)
- Self-evaluation of reading abilities

Expected Outcome

- Find hierarchies in lexical complexity: which Easy Language on lexis rule should weigh more?
- Find predictors for reading impairment in target group
- Insight into cognitive processing of varying complexity levels

Negation in Easy Language in German

Does typographic emphasis of negation words enhance negation processing?

Johanna Sommer

Hypothesis and Research Questions

Higher negativity after negation in N4-P6 timewindow (Lüdtke et al. (2006) (1)

Meaningful typographic changes to uppercase lead to lower semantic integration costs

→ reduced N400 (Lotze et al. (2011) (2)

1. Does bold typeface lead to similar effects as uppercase changes?
2. Does typographic marking lead to processing differences in following words?
3. Is negation processing effected by typographic marking?
4. Are there processing differences between different forms of negation (Object-category relevance vs. Verb-object relation)?

→ Uppercase more pronounced effects

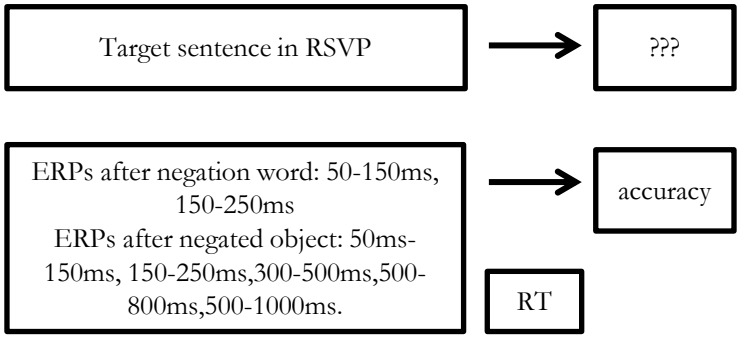
→ Exploratory effects for integration of following words

Method (I)

360 sentences (30 items / condition)

Truth-value evaluation

2 (Truth value) x 2 (Polarity) x 3 (Typography) x



Categorial matching of subjects to their categories

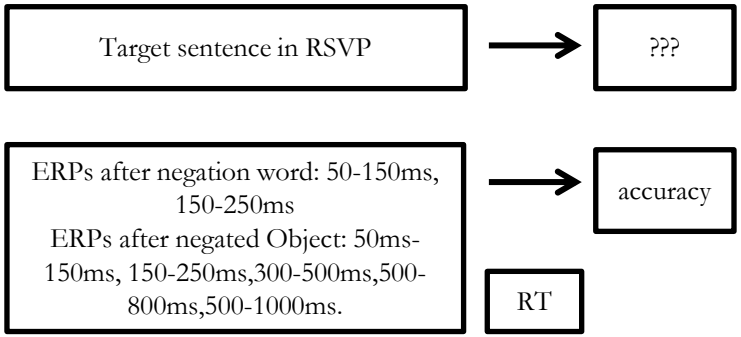
Bold Typeface	UPPERCASE	Normal case
Affirmation true (TAF) A rose is **a** flower. (Eine Rose ist eine Blume)	TAU A rose is A flower.	TAN A rose is a flower.
Affirmation false (FAF) A rose is **a** vehicle. (Eine Rose ist ein Fahrzeug)	FAU A rose is A vehicle.	FAN A rose is a vehicle.
Negation true (TNF) A rose is **no** vehicle. (Eine Rose ist kein Fahrzeug)	TNU A rose is NO vehicle.	TNN A rose is no vehicle.
Negation false (FNF) A rose is **no** flower. (Eine Rose ist keine Blume)	FNU A rose is NO flower.	FNN A rose is **no** flower.

Method (II)

360 sentences (30 items / condition)

Truth-value evaluation

2 (Congruency) x 2 (Polarity) x 3 (Typography) x



Semantic congruency between verb and object

Bold Typeface	UPPERCASE	Normal case
Affirmation true (CAF) The woman reads **a** newspaper. (Die Frau liest eine Zeitung)	CAU The woman reads A newspaper.	CAN The woman reads a newspaper.
Affirmation false (IAF) The woman reads **a** bicycle. (Die Frau liest ein Fahrrad)	IAU The woman reads A bicycle.	*I*AN The woman reads a bicycle.
Negation true (CNF) The woman reads **no** newspaper. (Die Frau liest keine Zeitung)	CNU The woman reads NO newspaper.	CNN The woman reads no newspaper.
Negation false (INF) The woman reads **no** bicycle. (Die Frau liest kein Fahrrad)	INU The woman reads NO bicycle.	INN The woman reads no bicycle.

Procedure

- n=21 (11=m)
- Age *M*=24,0 years (range=20-37)
- Inclusion criteria for EEG experiments (right-handed, native speakers German, no neurological, physical, speech, hearing or visual impairments), neuropsychological tests: no salience
- EEG recording with international 10/20 electrode system, 25 scalp electrodes, referencing via right mastoid electrode, re-referencing via left mastoid electrode, ground: AFz, 4 eye electrodes
- Impedance set lower 10kΩ, sampling rate 250Hz
- 4 lists à 720 sentences in 6 blocks
- RSVP (* / 300ms Word / 200ms ISI / 500ms bs / ??? → button press as fast as possible / 1000ms ITI),
- Accuracy , RTs for truth value / senseness evaluation, 11 subjects: left button as "true / makes sense"
- ("Please decide whether the sentence makes sense or not as fast as possible.")

Behavioral Results

Accuracy:

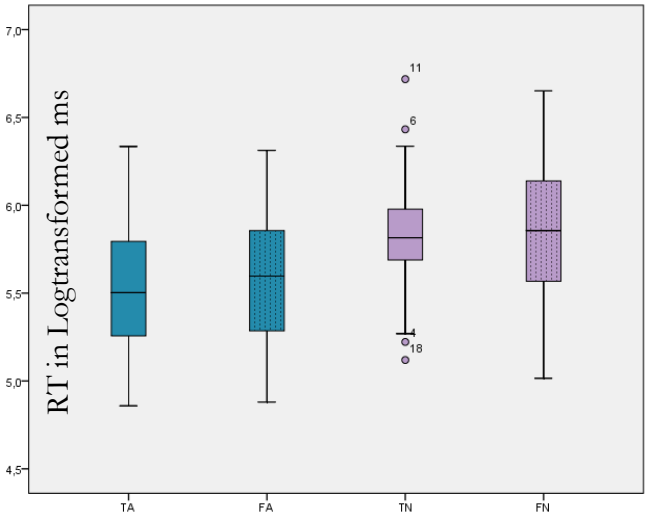
→ Aff > Neg

RTs:

1. Aff < Neg (F(1,19) = 72,586 ,p<0,01)

Truth x Polarity x Typography (F(1,19) = 9,377,p<0,01)

→ In TA, FA, TN uppercase (U) the slowest



2. Aff < Neg (F (1,19) = 36,122, p< 0,01),

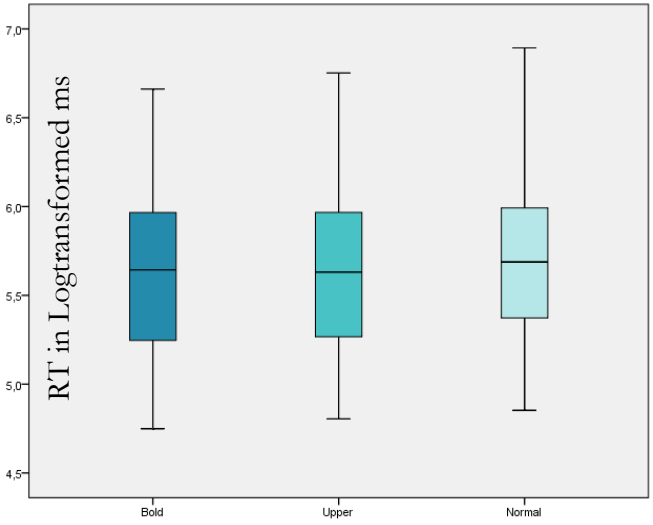
Typography (F(1,19)=6,645, p<0,05) → normal case significantly slowest

Congruency x Polarity x Typography (F(1,19) = 15,151, p<0,01)

General advantage by U

CA and IN: F<U<N

IA and CN: U<N<F



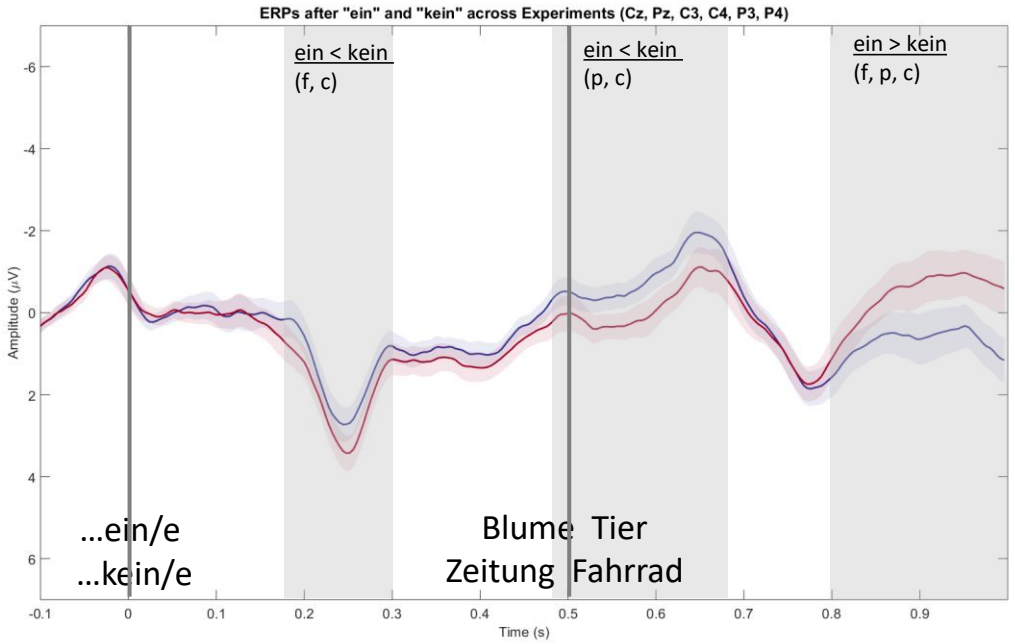
ERPs

- General replication of negativity after negated concepts
- Visual integration of negation word more prominent than affirmative article
- Only in affirmatives: U more pronounces effects
- Only in object category items: bold typeface leads to less negativity after negation word

→ no clear interaction between typographic marking and meaning integration

→ negation processing differences between Stimulus sets

General Negation Processing – ERPs after Negation Words

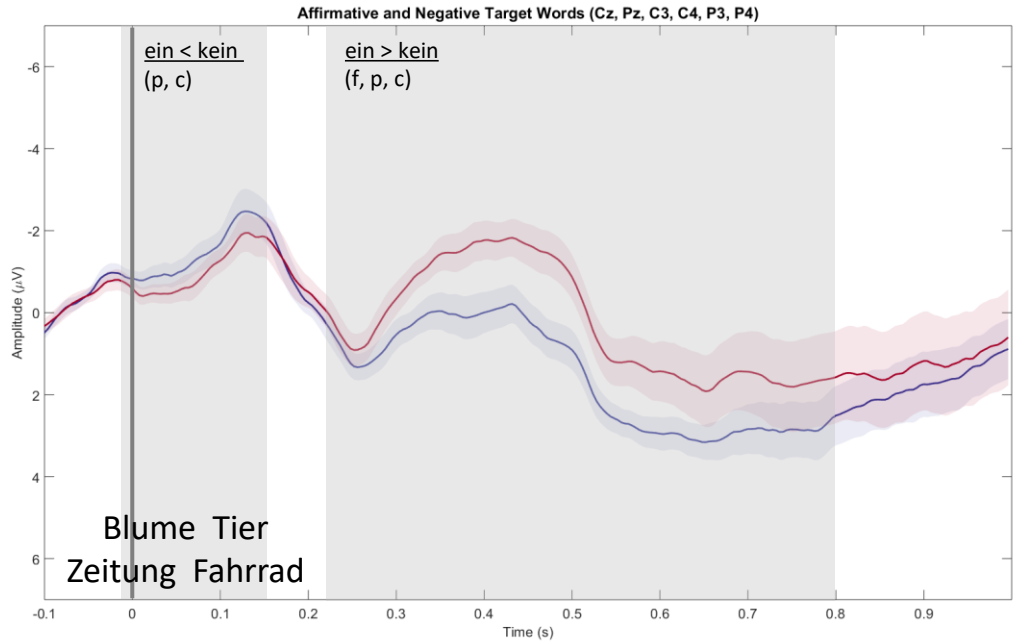


- Visual integration of negation word more prominent than affirmative article
- Only in affirmatives: U > N

*AFF: … **a** flower. / … **an** animal.*
*… **a** newspaper. / … **a** bicycle.*
(Eine Rose ist eine Blume. / Die Frau liest eine Zeitung.)

*NEG: … **no** flower. / … **no** animal.*
*… **no** newspaper. / … **no** bicycle.*
(Eine Rose ist keine Blume. / Die Frau liest keine Zeitung.)

General Negation Processing – ERPs after Target Words



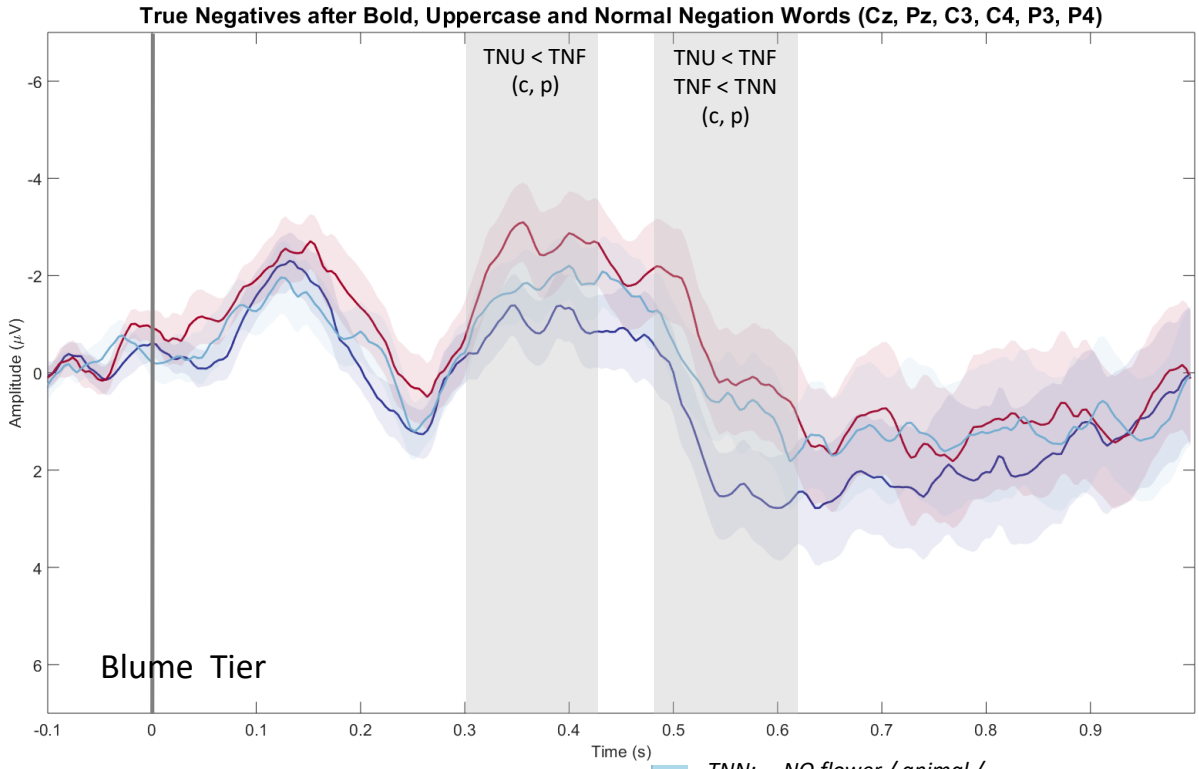
- General replication of negativity after negated concepts
- Only in affirmatives: U < N
- Bold case < N

*AFF: A rose is **a** flower. / **an** animal.*
*The woman reads **a** newspaper. / **a** bicycle.*
(Eine Rose ist eine Blume. / Die Frau liest eine Zeitung.)

*NEG: A rose is **no** flower. / **no** animal.*
*The woman reads **no** newspaper. / **no** bicycle.*
(Eine Rose ist keine Blume. / Die Frau liest keine Zeitung.)

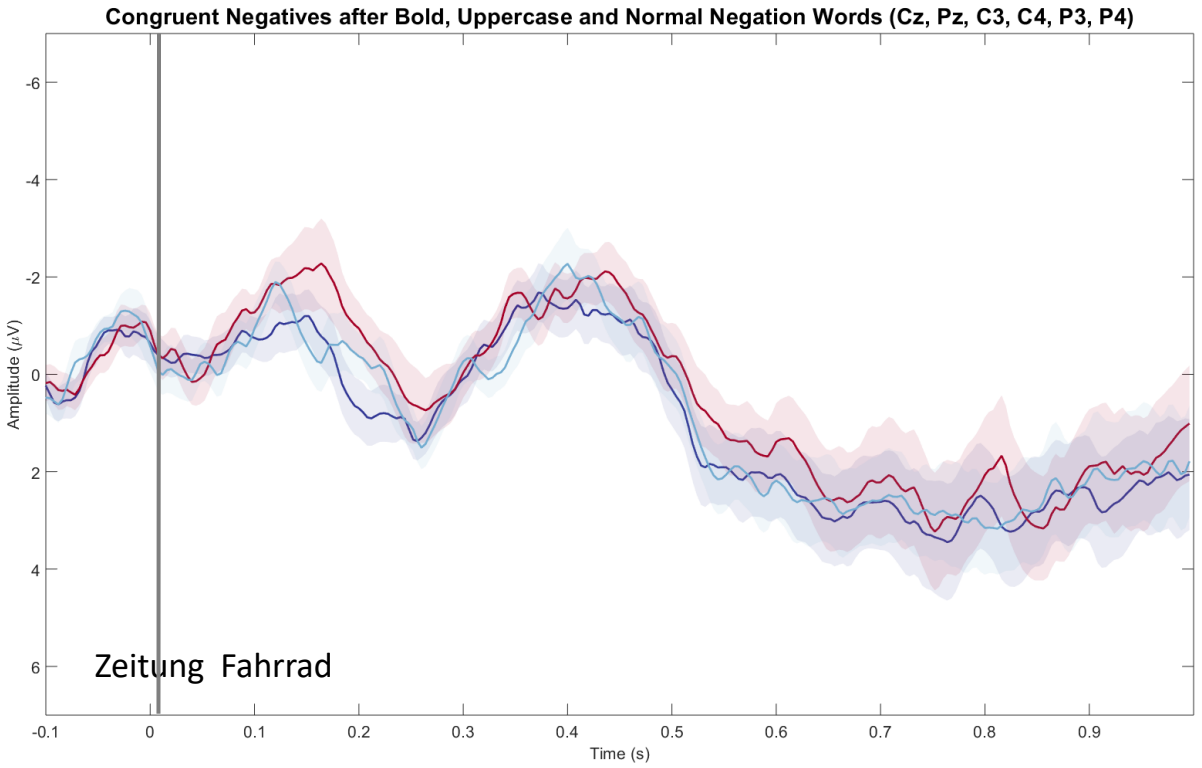
General Negation Processing – ERPs after Target Words (I)

Effects of typographic emphasis on meaning integration



General Negation Processing – ERPs after Target Words (II)

Effects of
typographic emphasis
on meaning integration



Summary

1. → It remains complicated! ☺
2. Does bold typeface lead to similar effects as uppercase changes?

→ No, uppercase conditions more pronounced effects

2. Does typographic marking lead to processing differences in following words?

→ Dependent on polarity, N1-P2-complex only in affirmative conditions effected (unusual pronunciation?)

3. Is negation processing effected by typographic marking?

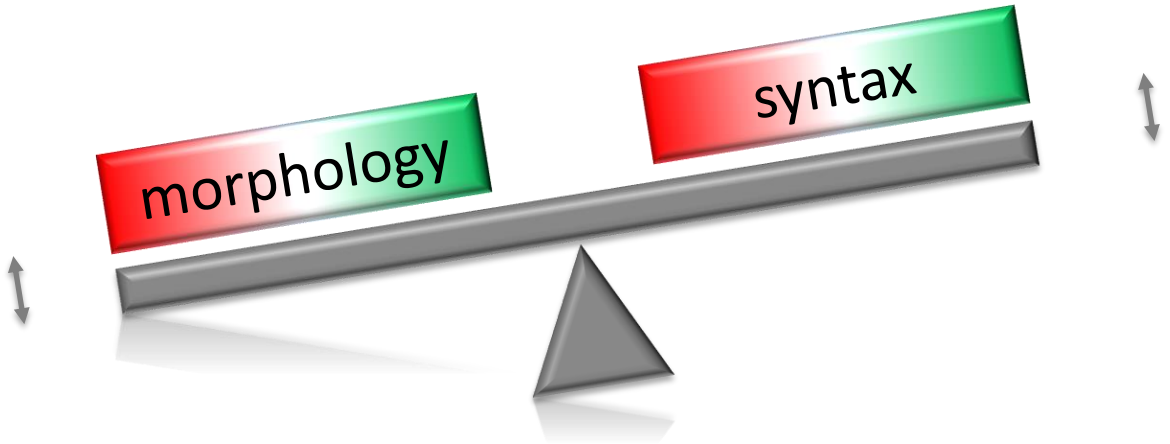
→ Not consistently

4. Are there processing differences between different forms of negation (object-category relevance vs. verb-object relation)?

→ Yes, sentences with content verbs generally more negative than subject-object-relations

Conclusion

- Empirical validation of Easy Language rules
- Reformulation + refinement of Easy Language rules
- Methodological proof of concept concerning target groups
- Insight into cognitive processing of linguistic complexity levels



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