

# **An ERP Study of Linguistic Preference and World Knowledge Plausibility in Pronoun Resolution**

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**Speakers: Carina Denise Krause & Malte Wöstmann**

# Linguistic preference in pronoun resolution

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**Tendency:** *The German personal (er, sie, es) and demonstrative (der, die, das) pronouns pick out different referents according to native Germans' judgements (also shown in corpus and sentence completion studies<sup>1</sup>).*

<sup>1</sup> Bosch, P., Katz, G., & Umbach, C. (2007). The Non-subject Bias of German Demonstrative Pronouns. In: Schwarz-Friesel, M., Consten, M., & Knees, M., (Eds.), *Anaphors in Text: Cognitive, formal and applied approaches to anaphoric reference* (pp.145–164).

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(*The greengrocer talks to the fishmonger about the patrons.*)



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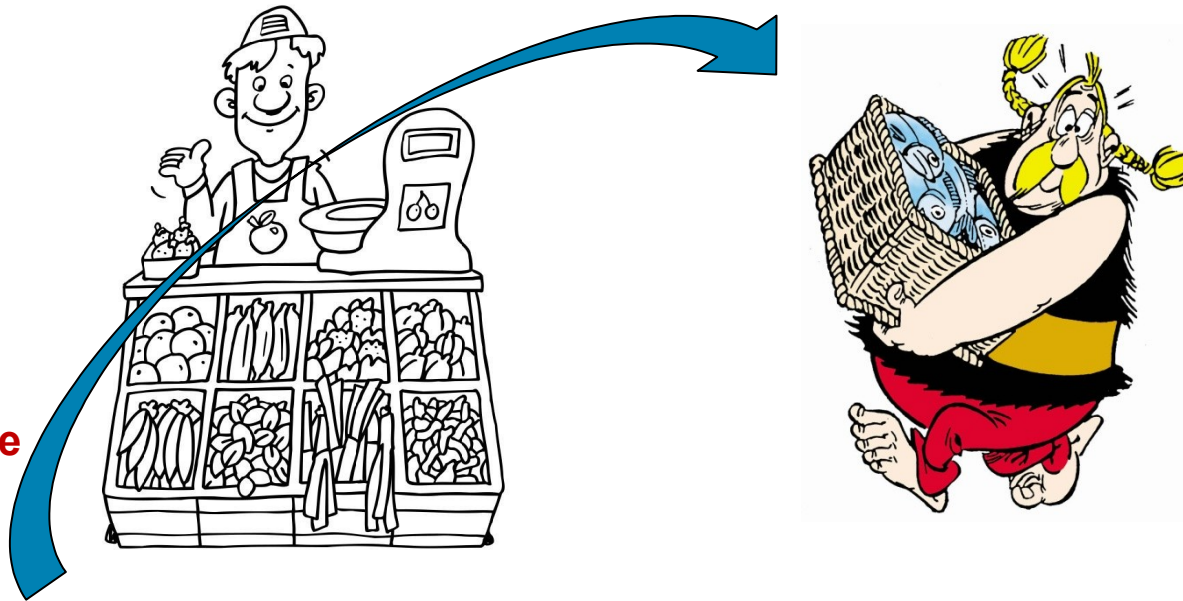
personal  
pronoun

Er verkauft hier die größten Tomaten und ist überall bekannt dafür.  
(*He {Ppro} sells the biggest tomatoes here and is well-known for that everywhere.*)

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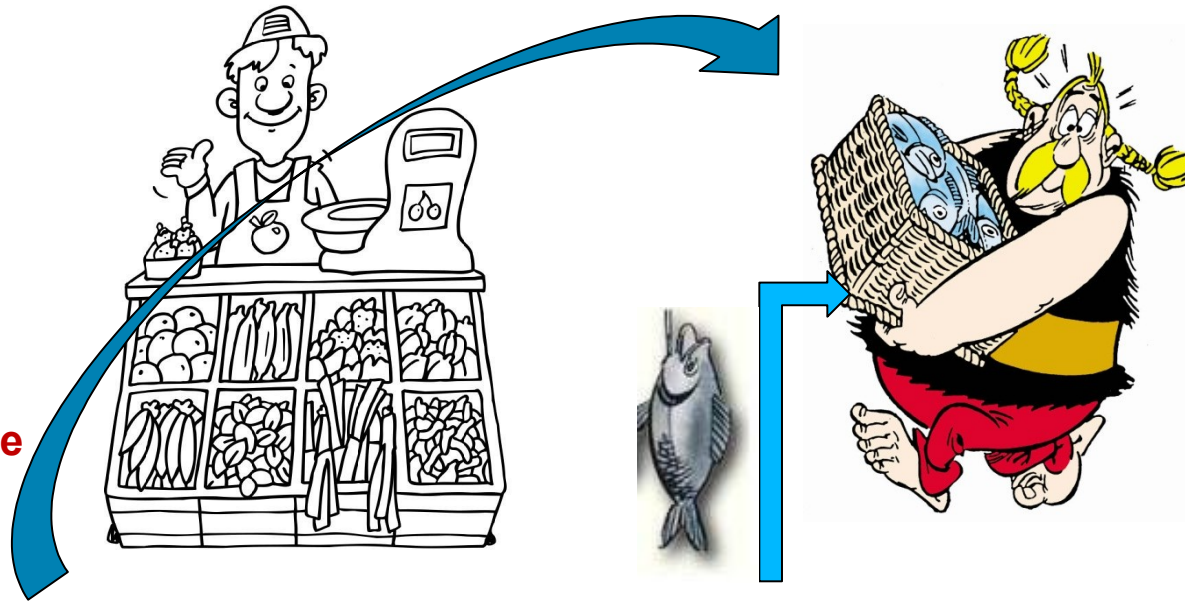
demonstrative  
pronoun

Der verkauft hier die größten Heringe und ist überall bekannt dafür.  
(He {*Dpro*} sells the biggest herrings here and is well-known for that everywhere.)

# World Knowledge

**Tendency:** *The German personal (er, sie, es) and demonstrative (der, die, das) pronouns pick out different referents according to native Germans' judgements.*

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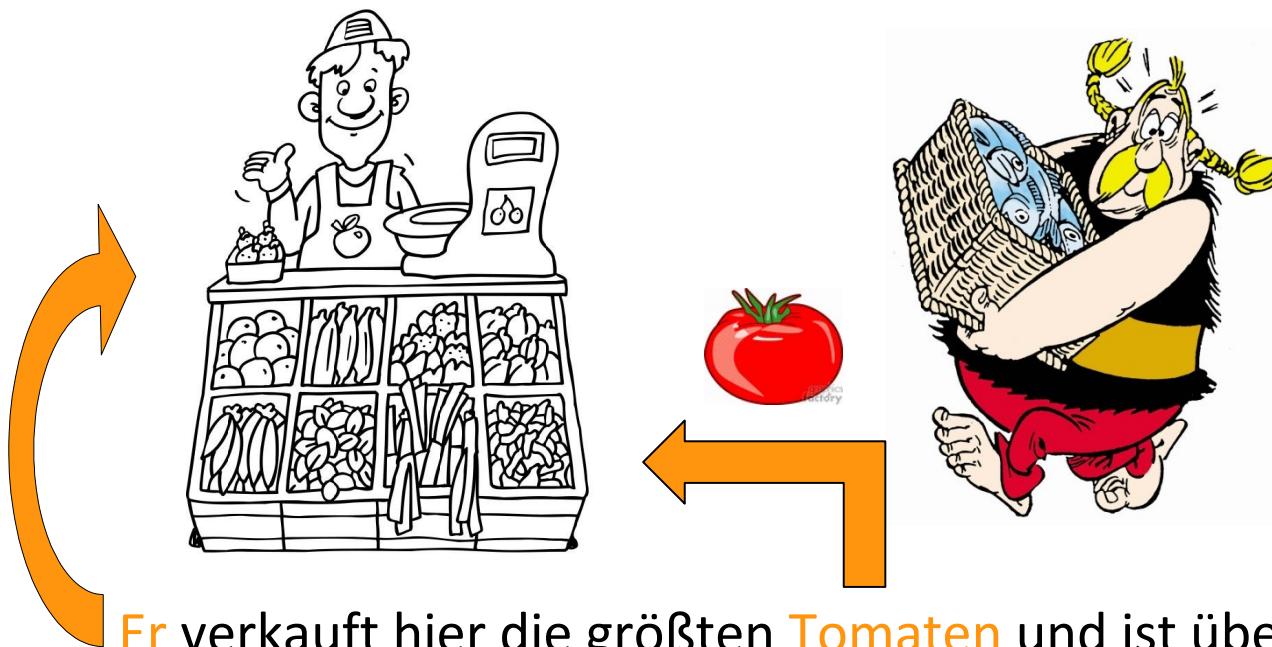


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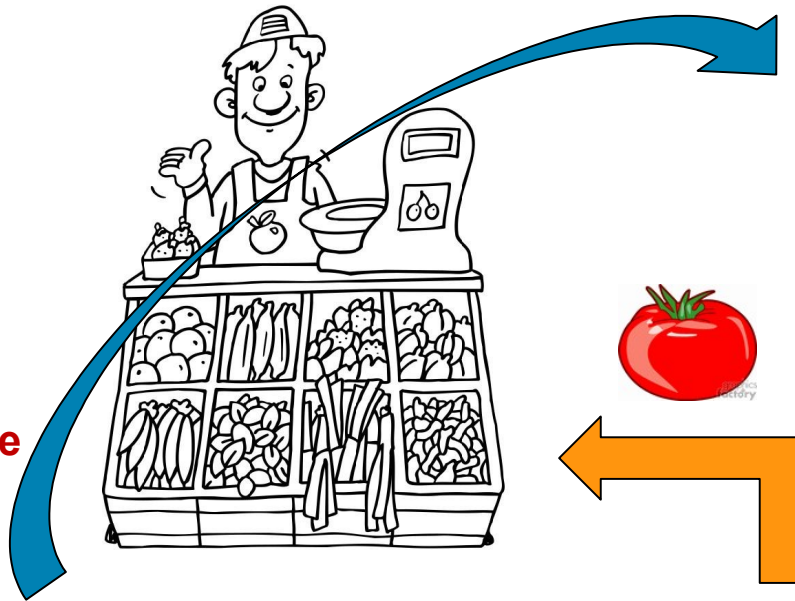


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# Pronoun Preference vs. World Knowledge

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pronoun preference  
vs.  
world knowledge

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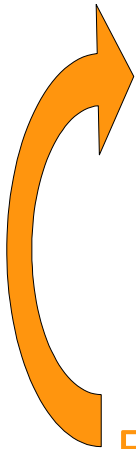
Der **Gemüsehändler** redet mit **dem Fischverkäufer** über die Stammkunden.  
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**pronoun preference  
vs.  
world knowledge**

**Er** verkauft hier die größten **Heringe** und ...  
(He {*Ppro*} sells the biggest **herrings** here and ...)

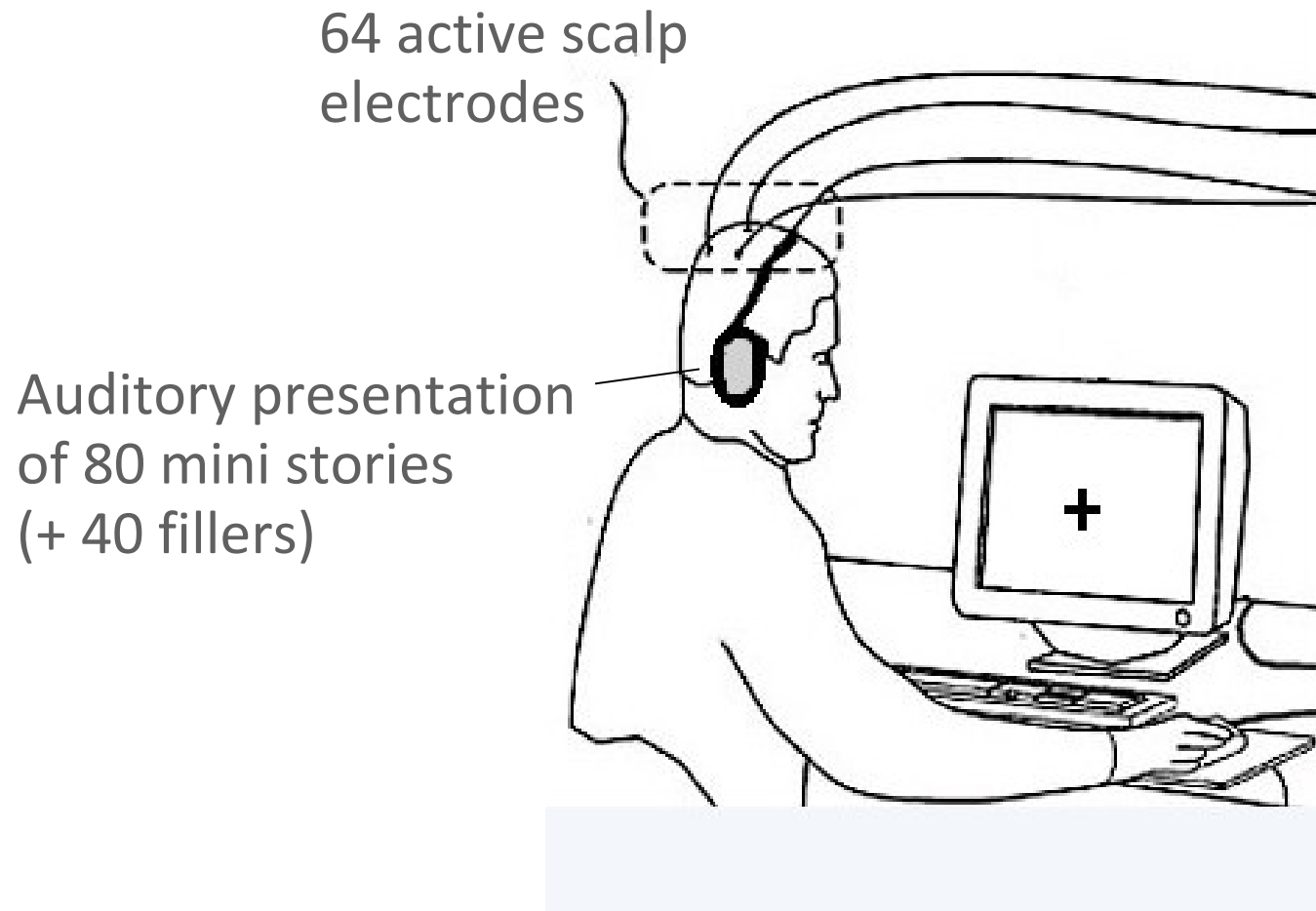
**personal  
pronoun**



# Methods









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→ 20 participants



Design:

**2** (pronoun: topic vs. focus) **x 2** (world knowledge: topic vs. focus)

Cond.	Description	Lead-In + Introduction	Target Sentence
<b>A</b>	<i>Pronoun bias:</i> <b>Focus</b> <i>Context Support:</i> <b>Focus</b>	Auf dem Wochenmarkt.  Der <b>Gemüsehändler</b>	 +  <b>Der</b> verkauft hier die besten <b>Heringe</b> und ist überall dafür bekannt.
<b>B</b>	<i>Pronoun bias:</i> <b>Topic</b> <i>Context Support:</i> <b>Topic</b>	redet mit dem  <b>Fischverkäufer</b> über  die Stammkunden.	 +  <b>Er</b> verkauft hier die besten <b>Tomaten</b> und...
<b>C</b>	<i>Pronoun bias:</i> <b>Focus</b> <i>Context Support:</i> <b>Topic</b>		 +  <b>Der</b> verkauft hier die besten <b>Tomaten</b> und..
<b>D</b>	<i>Pronoun bias:</i> <b>Topic</b> <i>Context Support:</i> <b>Focus</b>		 +  <b>Er</b> verkauft hier die besten <b>Heringe</b> und...

On the weekly market. *The greengrocer* talks to *the fishmonger* about the patrons.  
He {Ppro/Dpro} sells the biggest *tomatoes/herrings* here and is known for that everywhere.

# Linguistic preference in pronoun resolution

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## Hypotheses:

1. **Linguistic knowledge** and **world knowledge (WK)** are integrated during sentence processing.
2. This integration leads to a **processing conflict**, if pronoun and target word pick out **different protagonists**.
3. This conflict is reflected by an **increased N400** relative to the **onset of the target word**.

# Electrophysiological Results

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Der **Gemüsehändler** redet mit **dem Fischverkäufer** über die Stammkunden..

**Der/Er** verkauft hier die größten **Heringe/ Tomaten** und ...

*The greengrocer talks to the fishmonger about the patrons.*

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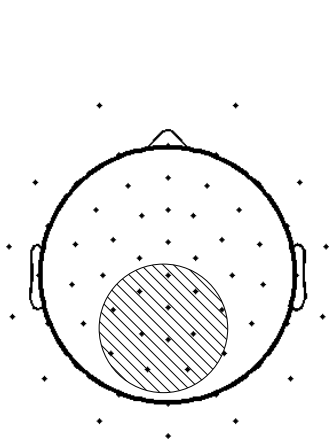
*He {Dpro/Ppro} sells the biggest herrings/ tomatoes here and ...*



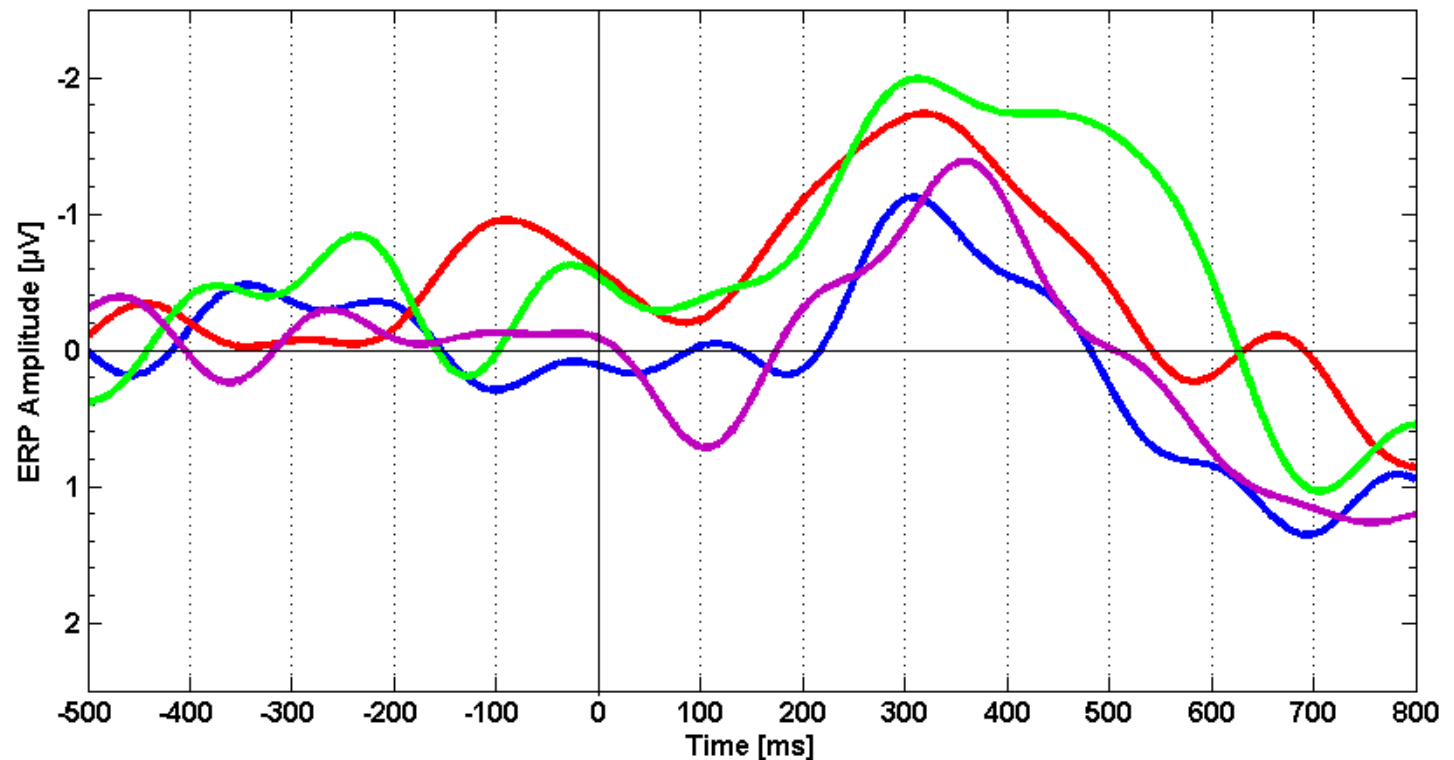
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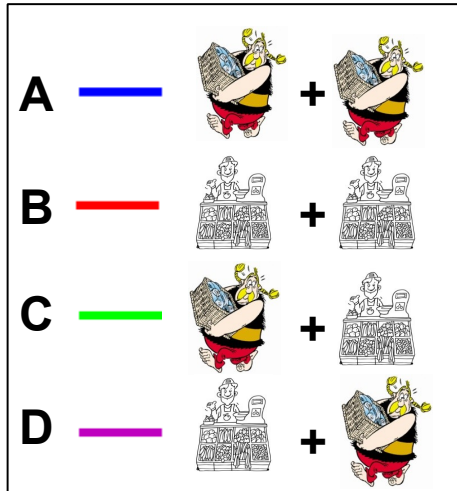
*The greengrocer talks to the fishmonger about the patrons.*  
*He {Dpro/Ppro} sells the biggest herrings/ tomatoes here and ...*



Grand-average ERPs



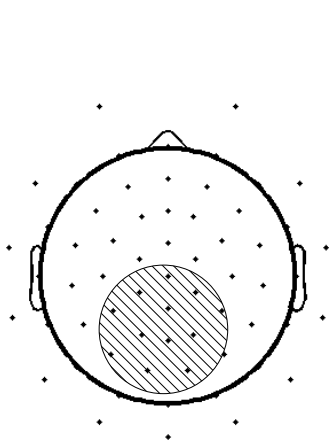
Pro WK



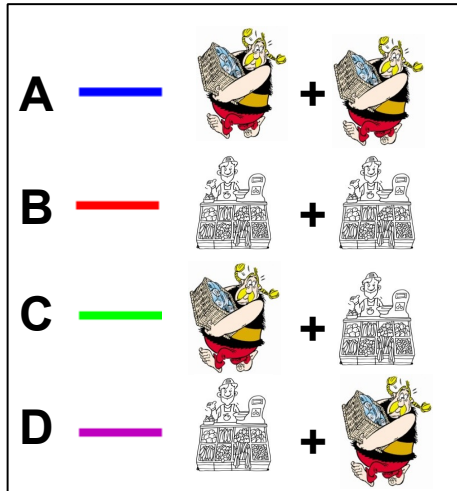
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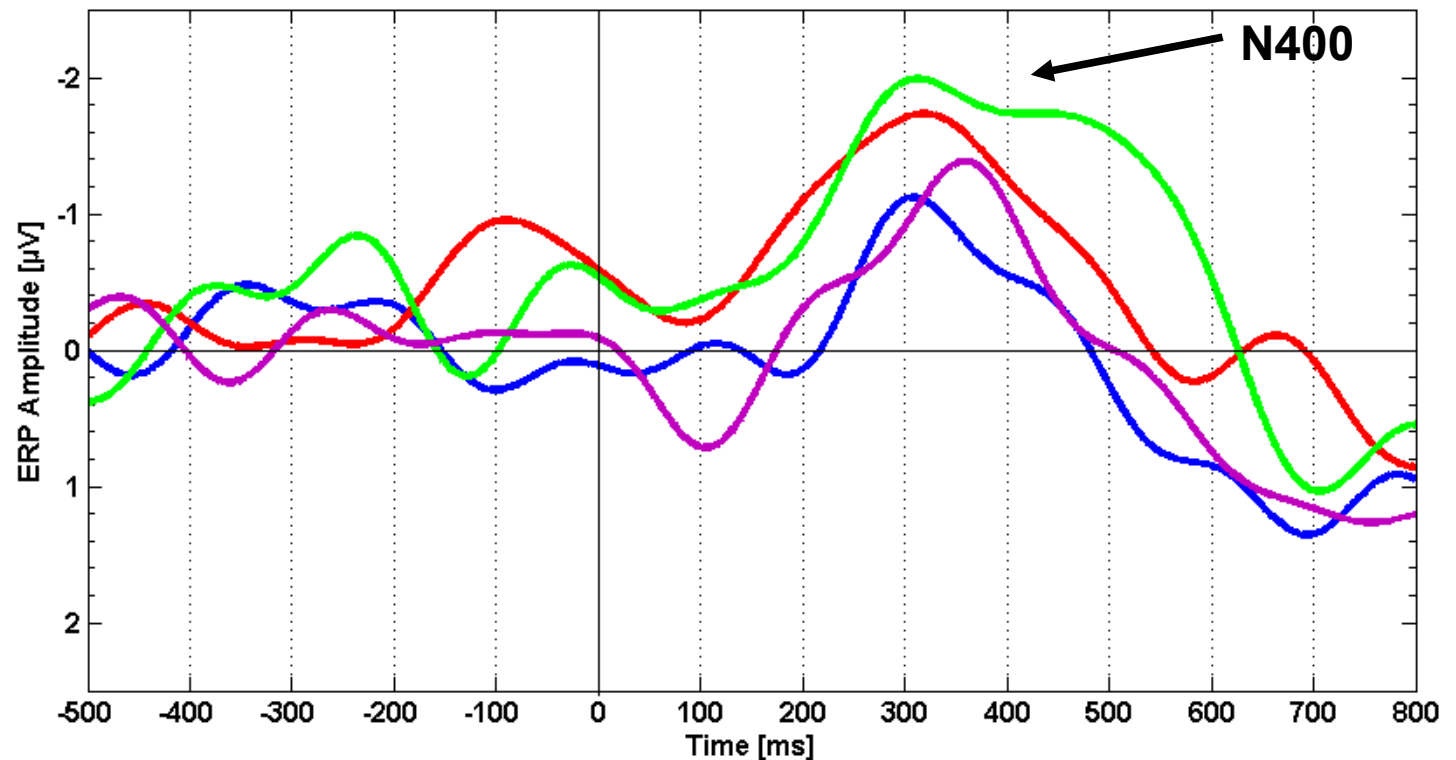
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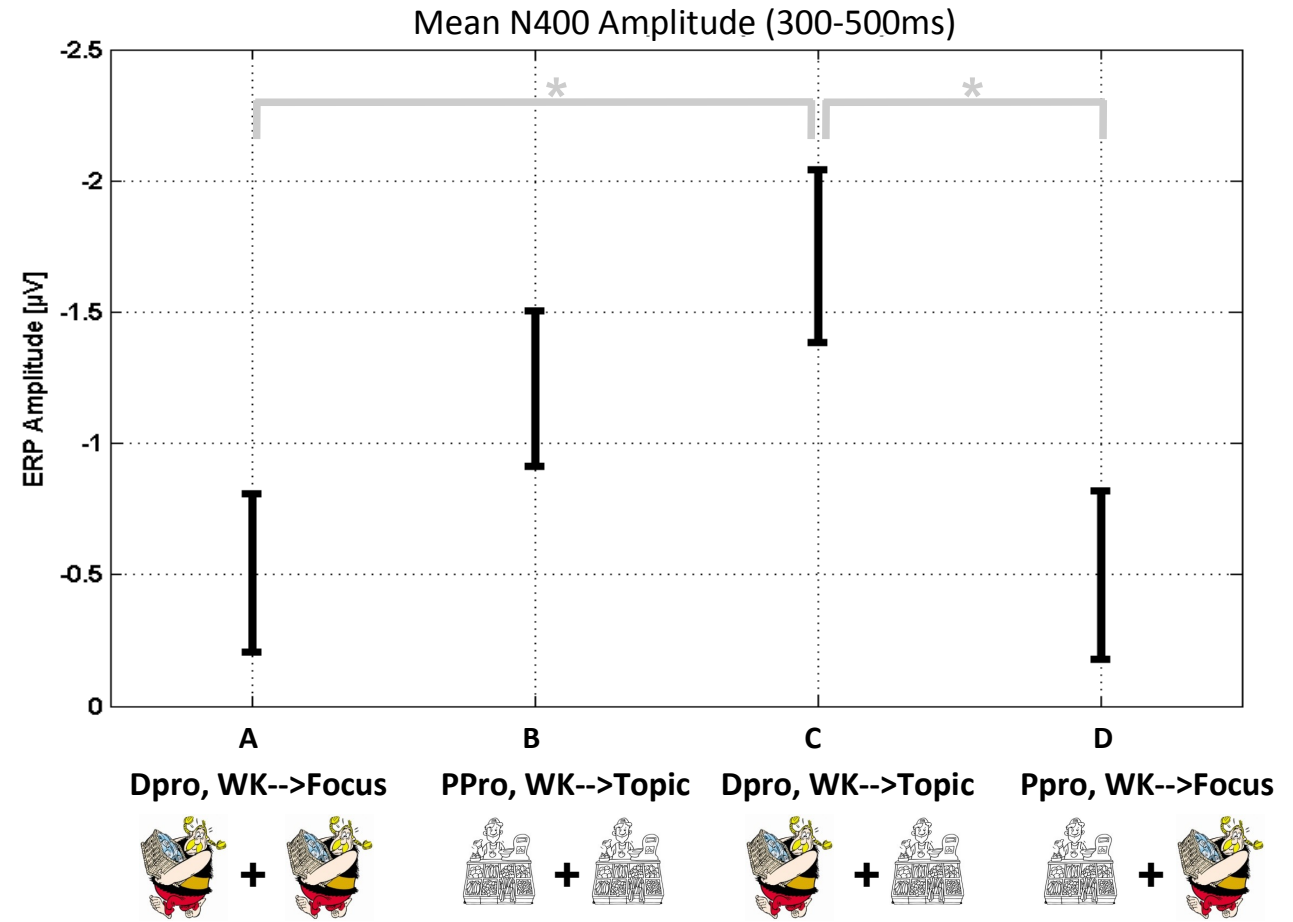
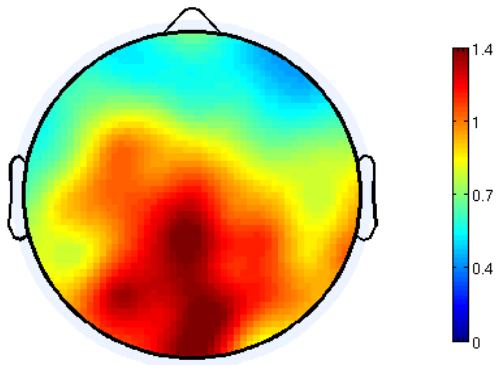
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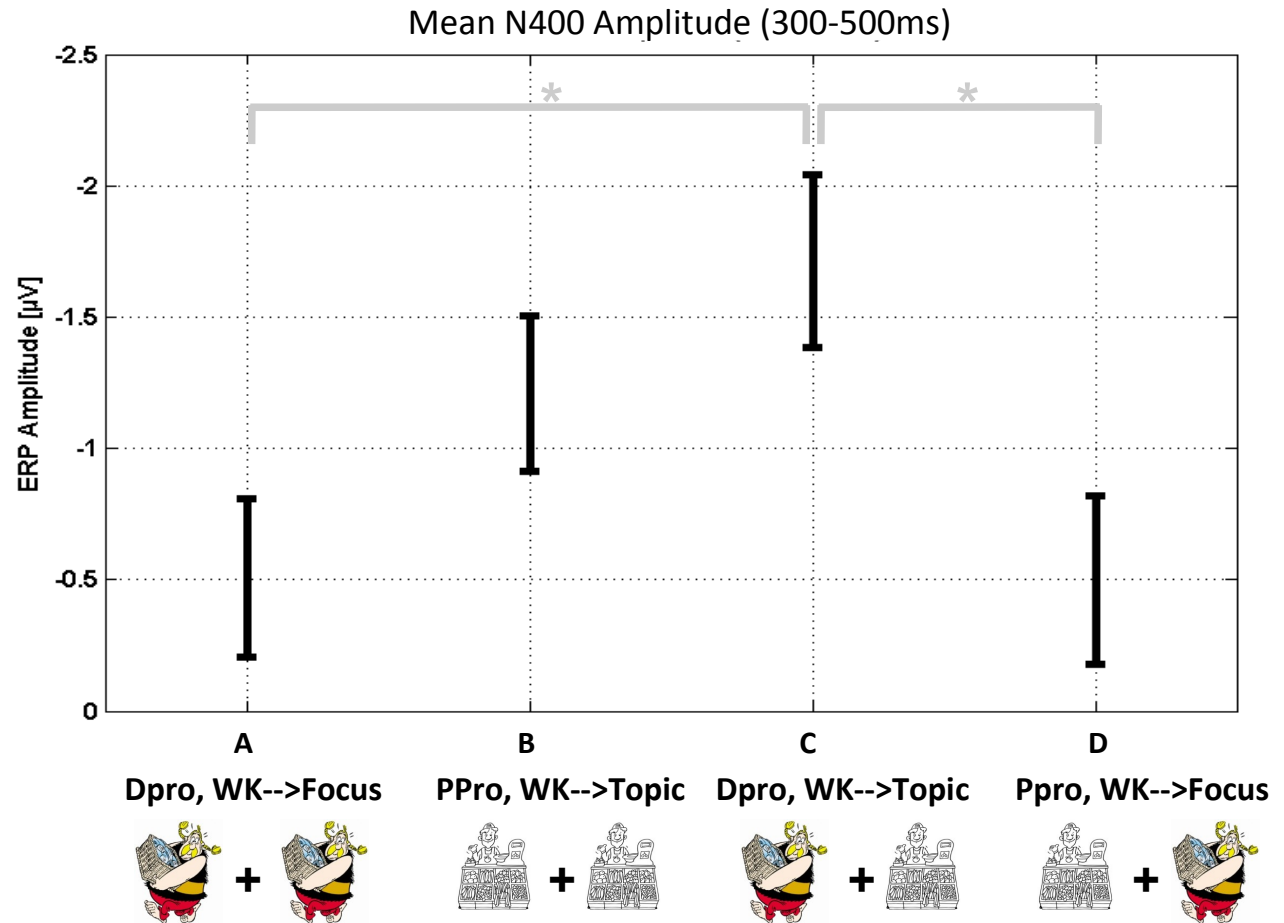
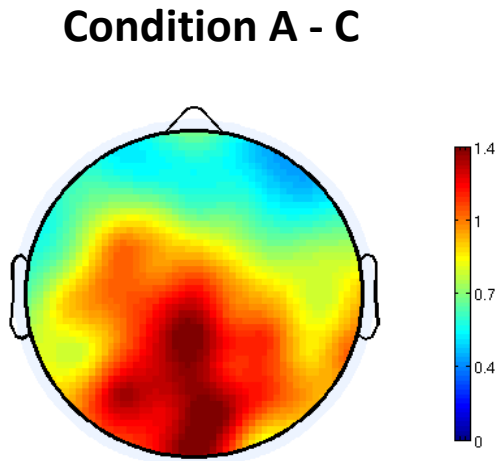
## The effect of referential preference

Condition A - C



# Electrophysiological Results

## The effect of referential preference



The large N400 in condition C indicates a processing conflict of a **target word matching the discourse topic** when the sentence starts with a **Dpro**

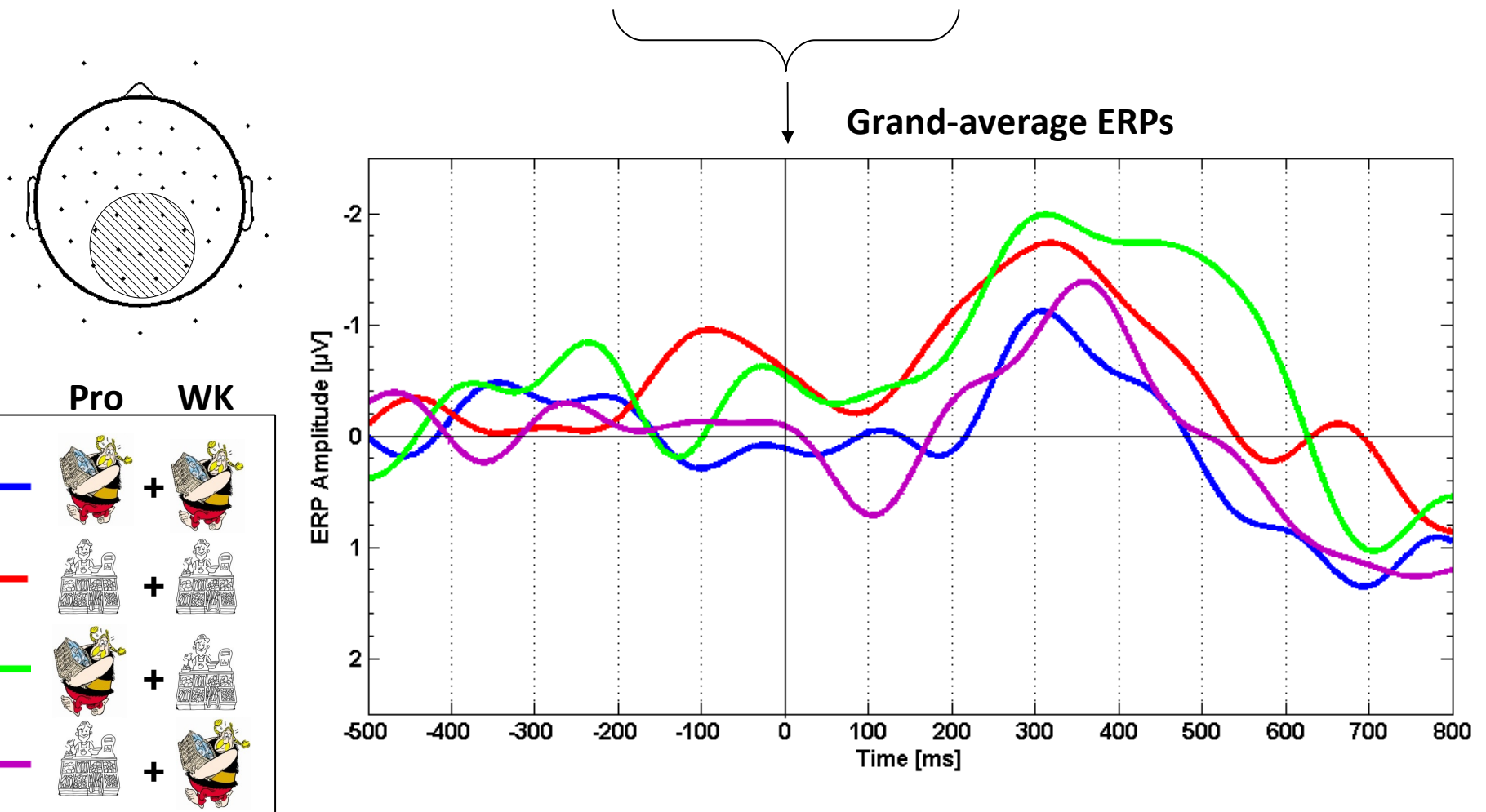
- The Dpro has a preference for the NP in focus position
- Pronoun preference and world knowledge interact during sentence processing

# Electrophysiological Results

## The effect of semantic priming

Der Gemüsehändler redet mit dem Fischverkäufer über die Stammkunden..  
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He {Dpro/Ppro} sells the biggest herrings/ tomatoes here and ...*



# Conclusion

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We found a **neurophysiological correlate (N400)** of the conflict between linguistic knowledge and world knowledge.

The hypothesis concerning the **preference of the German Dpro for the NP in focus position** is further supported.

Linguistic preference and world knowledge are **integrated fast and online**.

The role of **semantic priming** has to be further investigated in upcoming studies.

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## Acknowledgements

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We thank ...

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Suck