

# Cognitive insights into analysis of translationese combining product and process data

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# Overview

1 Introduction: Translationese

2 Methodology

3 Analyses

- Discourse connectives
- (Compound) nouns

4 Conclusion and Discussion

# INTRODUCTION: TRANSLATIONESE

# Translationese

- **Typical linguistic features** of translation (or interpreting) output compared to original written (or spoken) productions [Baker, 1993, Toury, 1995, Halverson, 2003, Teich, 2003]
- Related to
  - the **process of translation** from a source language expression to a target language expression and
  - to the **translation product** when compared to originals in the same language as the target language [Chesterman, 2004]

# Translationese Variation

- Register-, producer-, method- and mode-dependent  
[Neumann, 2013, Lapshinova-Koltunski, 2022]
- e.g. differences across **translation and interpreting**  
[Shlesinger and Ordan, 2012, Przybyl et al., 2022a, Kunilovskaya et al., 2023]:
  - Interpreting reinforces features of oral production (parataxis, general words, low surprisal verbs)
  - Translation reinforces features of written production (nominal categories and prepositions)
  - Less variation in interpreting regarding the word choice  
[Yung et al., 2023, Przybyl et al., 2022a]
- Interpreting is an **extremely cognitively demanding** process
- Interpreting tends to exhibit **less explicitation and more simplification** effects

# Explicitation and simplification

## Explicitation/ Implication

According to [Klaudy and Károly, 2005] observed when

- a source language unit with a more general meaning is replaced by a translation unit with a more specific meaning
- a source text unit is unpacked and rendered as several units or
- the translator adds new meaningful elements into the target

## Simplification

translations appearing linguistically simpler compared to original target language products, e.g. lower type-token ratio (less varied lexically), simpler syntax, etc. [Blum-Kulka and Levenston, 1983, Laviosa, 1998]

# Translation vs. Interpreting

*Aber* → *However* = **explicitation**

## DE: Original

**Aber** ich glaube, in einer Hinsicht gibt es Einigkeit: Der Reformelan in der Türkei scheint erlahmt zu sein...

## EN: Translation

**However**, I believe that in one respect there is consensus: the pace of reform in Turkey seems to have slackened;

*Aber* → *but* ≠ **explicitation**

## DE: Original

**aber** ich glaube in einer Hinsicht gibt Einigkeit der Reformelan in der Türkei scheint erlahmt zu sein...

## EN: Interpreting

**but** euh one thing we agree on it seems that euh the impetus has gone out of Turkish reform processes

⇒ **Interpreting/translation vs. source language originals**



# Explicitation and Implication

**EN:** *Some of the most vulnerable countries of the world have contributed the least to climate change, **but** are bearing the brunt of it.*

**DE:** *Einige der Länder, die weltweit am wenigsten zum Klimawandel beigetragen, tragen **jedoch** die Hauptlast.*  
"Some of the countries that have contributed the least to climate change worldwide are **however** bearing the brunt."

Explicitation

# Explicitation and Implication

**EN:** *Some of the most vulnerable countries of the world have contributed the least to climate change, **but** are bearing the brunt of it.*

**DE:** *Einige der Länder, die weltweit am wenigsten zum Klimawandel beigetragen, tragen **jedoch** die Hauptlast.*  
 "Some of the countries that have contributed the least to climate change worldwide are **however** bearing the brunt."

Explicitation

**DE:** *Einige der am meisten gefährdeten Länder der Welt haben am wenigsten zum Klimawandel beigetragen, leiden **aber** dessen Folgen.* "Some of the world's most vulnerable countries have contributed the least to climate change, **but** are suffering its consequences."

Equivalence

# Explicitation and Implication

**EN:** *Some of the most vulnerable countries of the world have contributed the least to climate change, **but** are bearing the brunt of it.*

**DE:** *Einige der Länder, die weltweit am wenigsten zum Klimawandel beigetragen, tragen **jedoch** die Hauptlast.*  
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Explicitation

**DE:** *Einige der am meisten gefährdeten Länder der Welt haben am wenigsten zum Klimawandel beigetragen, leiden **aber** dessen Folgen.*  
 "Some of the world's most vulnerable countries have contributed the least to climate change, **but** are suffering its consequences."

Equivalence

**DE:** *Einige der Länder, die den Klimawandel am härtesten zu spüren bekommen, haben nur sehr wenig dazu beigetragen.*  
 "Some of the countries that are feeling the effects of climate change the hardest **⊗** have contributed very little."

Implication

# Explicitation and Simplification

Preference for **general over more specific** words

## EN: Interpreting

we wanted to look at micro entities and that means **entities** which are really **very small** with very few **people** working for them minimum turnover EUH minimum profit **amount** which **are** very locally **active** ...

## EN: Translation

We wanted to free micro-entities – and here we are talking about **companies** that are **particularly small**, with few **employees**, minimum turnover and profit **figures** and which effectively only **operate** in a regional, local area...

# Explicitation and Simplification

Preference for **general over more specific** words

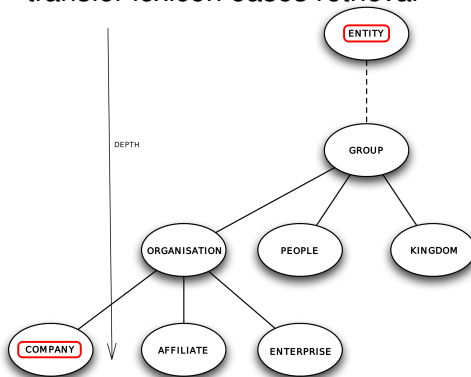
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A smaller and more general transfer lexicon eases retrieval



# Explicitation and Simplification

## Example: Compound translation

**EN:** *Epilepsy syndrome*

**DE:** *Syndrom, Epilepsiesyndrom, Syndrom mit epileptischen Anfällen*

- **Implicitation:** *Syndrom* – "syndrome"
- **Equivalence:** *Epilepsiesyndrom* – "epilepsy syndrome"
- **Explicitation:** *Syndrom mit epileptischen Anfällen* – "syndrome with epileptic seizures"

# Research Agenda

- Account of **translationese effects** in various translation products
- Discover **driving forces** behind these translationese effects

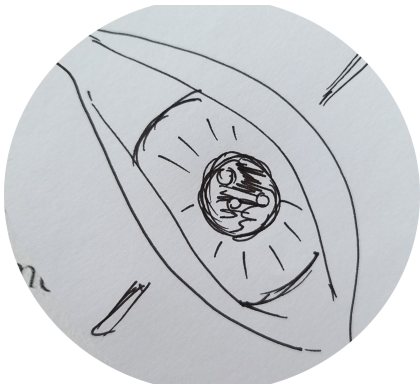
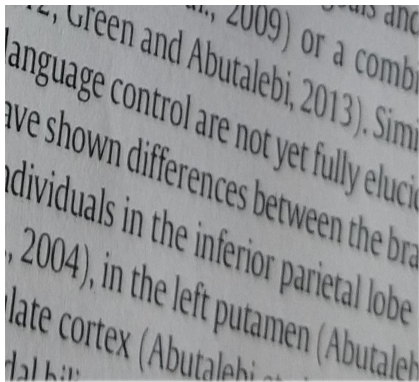
## Hypotheses/Assumptions:

- 1 **Explicitation** is a strategy of audience design as it helps to shape the content for the recipient and thus facilitates rational communication
- 2 **Implicitation** and **Equivalence** also facilitate rational communication but for the sake of the producer (translator or interpreter) as they may reduce the effort on the translator's side
- 3 We expect differences in translationese effects across translation products (translation, interpreting) because of the differences in **producer conditions** (interpreting is cognitively extremely demanding) and also depending on the **target audience**

# METHODOLOGY



# Methods of Analysis



# Corpus-based Analysis

Analyse **actual translation relation** to explain translationese effects

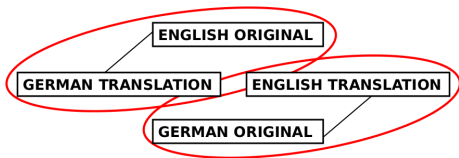
## Comparable corpora

- General translationese effects
- Link between translationese and efficient language use



## Parallel corpora

- Source language triggers
- Source-language dependent vs. -independent translationese



# Comparable and Parallel Corpora



## Europarl-UdS

[Karakanta et al., 2018]

TR	EN-DE	3,994,453
	DE-EN	6,260,869
	ES-EN	3,162,915
ORG	DE	8,954,825
	EN	8,693,135
	ES	6,140,211

## EPIC-UdS

[Przybyl et al., 2022b]

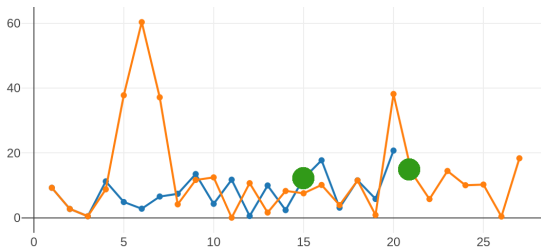
SI	EN-DE	57,622
	DE-EN	56,789
	ES-EN	52,737
ORG	DE	56,251
	EN	66,226
	ES	54,336





# Corpora: Probabilistic Measures

- 1 *Some of the countries that have contributed the least to climate change worldwide are **however** bearing the brunt.*
- 2 *Some of the world's most vulnerable countries have contributed the least to climate change, **but** are suffering its consequences.*



# Corpora: Probabilistic Measures

## May help to explain Simplification effects

- Interpreters tend to produce more expected (low surprisal) lexical verbs and nouns than comparable original speakers [Przybyl et al., 2023]
- For the same information content (measured in surprisal) in the source, interpreters produce lower surprisal output than translators [Kunilovskaya et al., 2023]

## May help to explain Explicitation effects

[Pollkläsener et al., 2024] [Yung et al., 2023]  
[Lapshinova-Koltunski et al., 2022]

# Translation Process Analysis

Analyse translation process data to explain translationese effects in terms of cognitive effort:

- Typing **pauses** preceding the production of a translation (i.e., lag of time between last keystroke of preceding word and first keystroke of the current TL word)
- Total **reading time** of the translation unit – the sum total of all fixation durations on a particular area of interest (e.g., token) irrespective of when these occurred during the session:
  - Total reading time in the source
  - Total reading time in the target
- **logDur**: Time needed to type the translation – time from the first to the last keystroke).

# Translation Process Data

\* Multilingual database CRITT TPR-DB [Carl et al., 2016]

- Recorded with Translog [Carl et al., 2015]
- English-German study [Nitzke, 2018]:
  - 6 EN sources
  - 24 translators (professional and students)
  - no participant worked with the same text sequence
  - no time/resource restrictions

Part	STseg	SToken	Lemma	SGid	SGroup	SGx	SGrtr	STime	Cur	Ins	Del	Pause	Dur	Sdur	Prob1	Prob2	PoS	UPoS	TGroup	TC
P01	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	:
P02	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	
P03	6	Because	--	97	Because	1	1	0	561	38	29	25801	10749	0	-3.1711	-7.7901	IN	SCONJ	Aufgrund	
P04	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	1
P05	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	1
P06	6	Because	--	97	Because	1	1	0	561	3	0	3541	578	0	-3.1711	-7.7901	IN	SCONJ	Da	
P07	6	Because	--	97	Because	1	1	0	561	0	35	4649	1575	0	-3.1711	-7.7901	IN	SCONJ	Wei	
P08	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	1
P09	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	1
P10	6	Because	--	97	Because	0	1	0	561	0	0	0	0	0	-3.1711	-7.7901	IN	SCONJ	Wei	
P11	6	Because	--	97	Because	1	1	0	561	6	0	535	858	0	-3.1711	-7.7901	IN	SCONJ	Wegen	

[Nitzke, 2018, p. 103]

\* Additional experiments with student translators

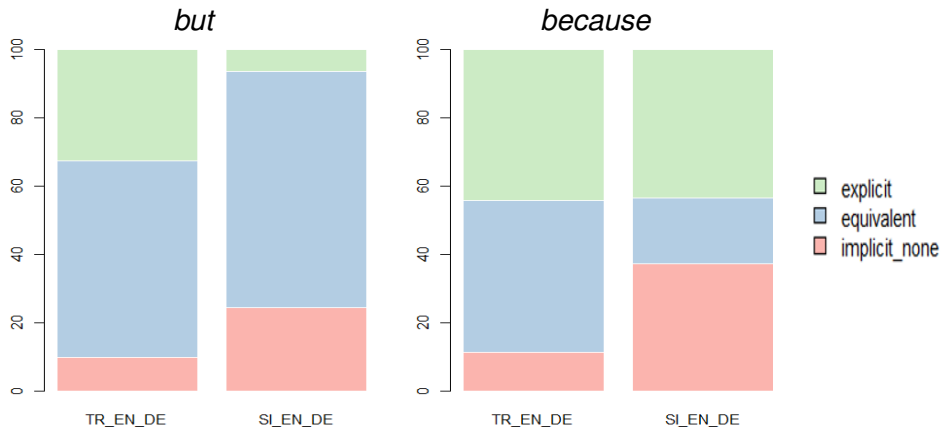


# ANALYSES

# DISCOURSE CONNECTIVES

# Parallel Corpora

Translation patterns: **explicitation**, **equivalence**, **implicitation**



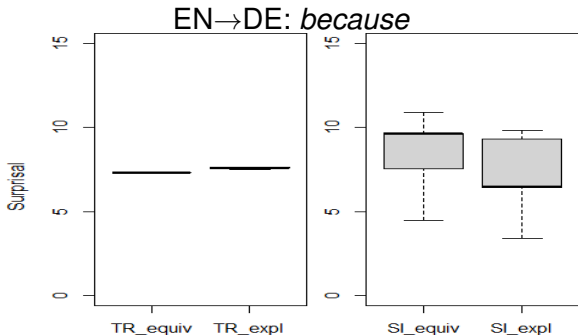
- While equivalence and implicitation prevail in interpreting,
- we do observe explicitation for some connectives

[Lapshinova-Koltunski et al., 2022]

# Comparable Corpora

Surprisal from comparable corpora explains explicitation effects

Explicitation provides a bonus in cognitive processing effort for the recipient for certain connectives



[Lapshinova-Koltunski et al., 2022]

# Translation Process Data

## Total reading time from translation process data

shows that explicitation costs more cognitive processing effort for the producer (translator)

### Translation of connective *but* into DE in CRITT TPR-DB



Trt = sum of all fixation durations on a particular connective in the source (TrtS) or the target (TrtT)

[Lapshinova-Koltunski and Carl, 2022]

# Parallel Corpora

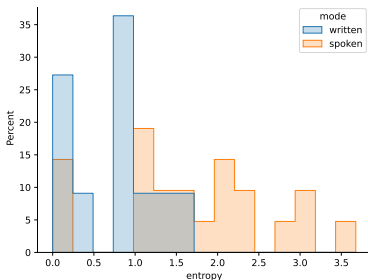
Translation entropy from parallel corpora helps to understand differences in explicitation strategies in translation and interpreting: interpreters use a smaller range of connectives to translate a wide range of source connectives than translators, especially in case of cognitively harder relations such as comparison

	spoken	written
<i>and</i>	2.74	1.49
<i>so</i>	2.82	3.39
<i>therefore</i>	2.47	2.37
<i>however</i>	1.30	2.24
<i>but</i>	1.77	2.32
<i>because</i>	2.92	1.61
<i>also</i>	1.58	1.86
<i>if</i>	1.79	1.99
<i>as</i>	1.28	2.64
<i>yet</i>	1.88	2.61

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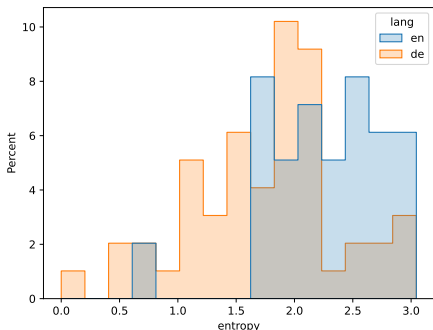
⇒ Interpreters reduce translation entropy

[Pollkläsener et al., 2024]

# Parallel Corpora

Translation entropy from parallel corpora helps to detect cross-lingual differences in explicitation: English connectives correspond to a wider range of German ones, while German connectives more often have one dominating English translation

Entropy of the distribution of alignments of each connective in source:



- normal distribution for DE: some DE connective have more correspondences in EN, some less
- more varied for EN: correspond to a wide range of DE connectives

[Yung et al., 2023]



# Summary on Connectives

## Back to Hypotheses/Assumptions

- 1 **Explicitation** is a strategy of audience design as it helps to shape the content for the recipient and thus facilitates rational communication:
  - ✓ but for certain connectives (relations) only
    - requires the highest cognitive effort on the producer's side
- 2 **Implicitation** and **Equivalence** also facilitate rational communication but for the sake of the producer (translator or interpreter) as they may reduce the effort on the translator's side:
  - ✓ especially equivalence
- 3 We expect differences in translationese effects across translation products (translation, interpreting) because of the differences in **producer conditions** (interpreting is cognitively extremely demanding) and also depending on the **target audience**
  - ✓ interpreters reduce translation entropy by using a limited range of connective equivalents

# (COMPOUND) NOUNS

# Explicitation and Implication

Preference for **general over more specific** words

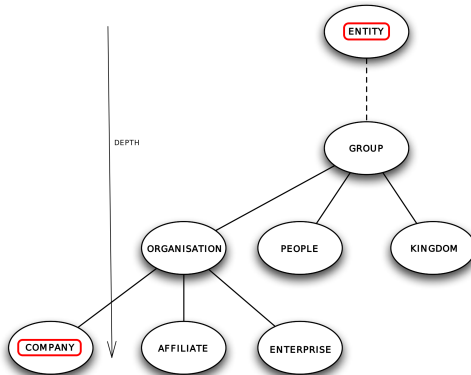
## EN: Interpreting

we wanted to look at micro entities and that means **entities** which are really **very small** with very few **people** working for them minimum turnover EUH minimum profit **amount** which **are** very locally **active** ...

## EN: Translation

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# Comparable Corpora

Preference for **general over more specific** words

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WordNet depth for 100 most frequent nouns in EN:

Spoken ORG	5.18
Interpreting	5.12
Written ORG	5.33
Translation	5.32

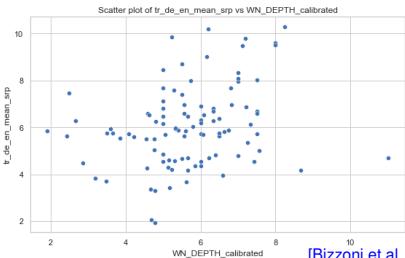
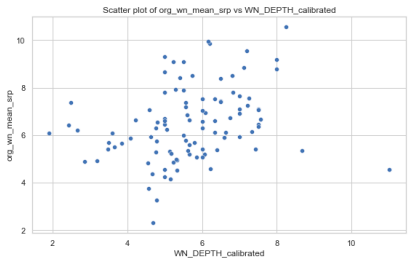
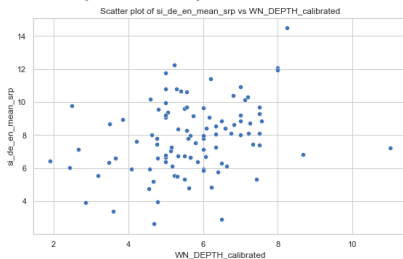
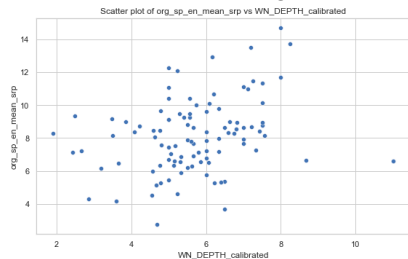
- Higher WordNet depth score in written than spoken
- Written originals and translation employ more specific nouns

⇒ **Explicitation**

[Bizzoni et al., subm]

# Comparable Corpora

Surprisal of words correlates with WordNet dept: the higher the score, the more cognitive effort is required to process



# Comparable Corpora

Combined measure of surprisal and WordNet depth confirms

observations on translationese: while written translation exaggerates features of written language production, interpreting exaggerates features of spoken language production in terms of semantic and contextual specificity

	SP	$\ln(\text{SP})$
Spoken ORG	1 317	7.18
Interpreting	7	2.08
Written ORG	53 642	10.89
Translation	92 455	11.43

SP: multiply of the WordNet average depth and surprisal

- Higher level of specificity for written (compared to spoken)
- Highest level of specificity for translation
- Lowest level of specificity for interpreting

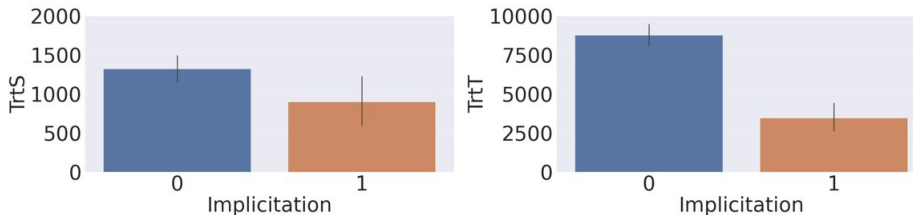
[Bizzoni et al., *subm*]

# Translation Process

## Total reading time from translation process data

shows that impicitation provides a bonus in processing for the producer (translator)

### Compound translation EN → DE



Example: *Epilepsy syndrome*

**1. Implicitation:** *Syndrom* (syndrome)

**0. Equivalence:** *Epilepsiesyndrom* (epilepsy syndrome)

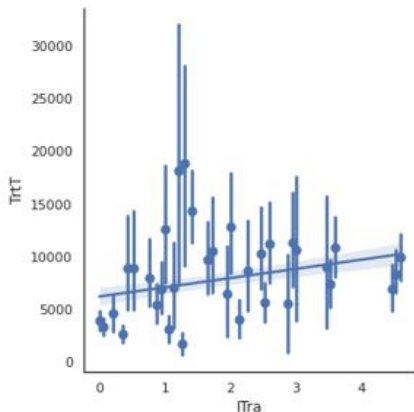
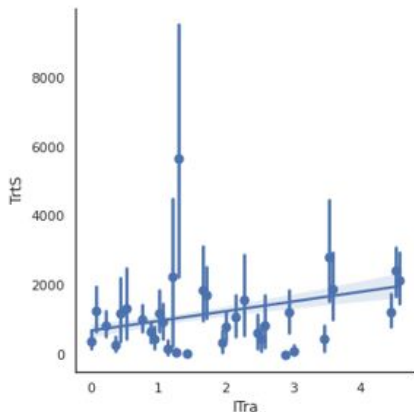
**0. Explicitation:** *Syndrom mit epileptischen Anfällen*  
(syndrome with epileptic seizures)

[Deilen et al., 2023]



# Translation Process

Total reading time (also further measures) correlates with word translation information: the higher the score, the more cognitive effort is required to process

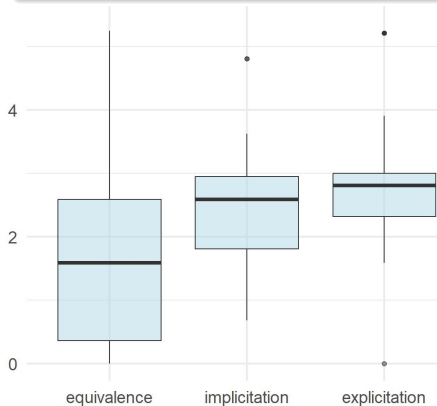


[Deilen et al., 2023]

# Translation Process

Word translation information indicates

that equivalence provides a processing bonus for the translator



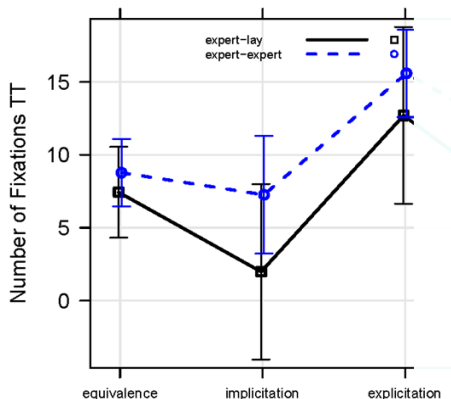
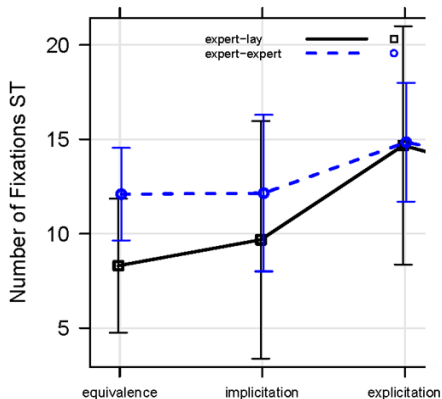
- Equivalence: lowest translation entropy
- Explicitation: highest translation entropy

[Deilen et al., prep]

# Translation Process

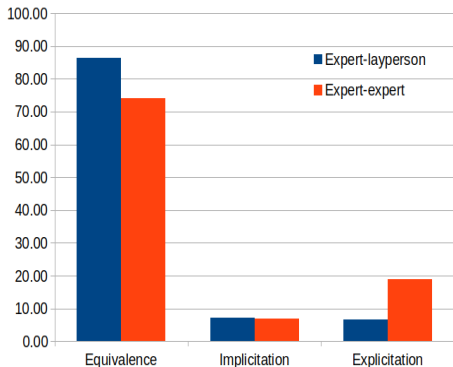
Total reading time indicates

that explicitation causes a higher processing effort, however, depending on the target audience of the text



# Translation Process

Nevertheless explicitation occurs more frequently in translation of expert-to-expert texts



- Equivalence: more in expert-to-layperson than in expert-to-expert communication
- Explicitation: more in expert-to-expert than in expert-to-layperson communication

[Deilen et al., prep]

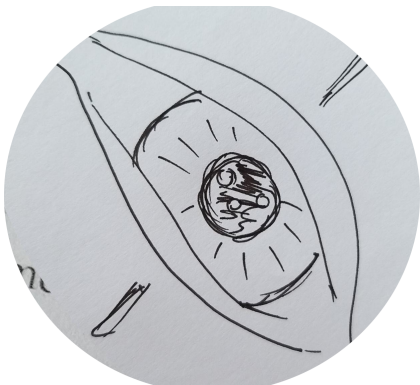
# Summary on (Compound) Nouns

## Back to Hypotheses/Assumptions

- 1 **Explicitation** is a strategy of audience design as it helps to shape the content for the recipient and thus facilitates rational communication:
  - ✓ however depending on the target audience
    - still requires high cognitive effort on the translator's side
- 2 **Implicitation** and **Equivalence** also facilitate rational communication but for the sake of the producer (translator or interpreter) as they may reduce the effort on the translator's side:
  - ✓ especially equivalence
- 3 We expect differences in translationese effects across translation products (translation, interpreting) because of the differences in **producer conditions** (interpreting is cognitively extremely demanding) and also depending on the **target audience**
  - ✓ implicitation is most evident in interpreting
  - ✓ explicitation depends on target audience too

# Conclusion and Discussion

... (Green and Abutalebi, 2009) or a combination of these (Green and Abutalebi, 2013). Similar results have been shown in other studies. For example, Green and Abutalebi (2009) have shown differences between the brain activity of monolingual and bilingual individuals in the inferior parietal lobe (Green and Abutalebi, 2004), in the left putamen (Abutalebi and Green, 2007), and in the pre-supplementary motor cortex (Abutalebi and Green, 2007).



Thank you!



**Baker, M. (1993).**

**Corpus linguistics and translation studies: Implications and applications.**

In Baker, M., Francis, G., and Tognini-Bonelli, E., editors, *Text and Technology: In honour of John Sinclair*, pages 233–250. John Benjamins, Amsterdam.



**Bizzoni, Y., Fischer, S., Lapshinova-Koltunski, E., Polkläsener, C., Przybyl, H., and Teich, E. (subm.).**

**Hierarchical semantic relations in translation and simultaneous interpreting.**

*Linguistics: An Interdisciplinary Journal of the Language Sciences.*

Empirical Approaches to Effects of Context on Language Production and Comprehension.



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