A cognitive-translational approach to meaning
Visualizing semantic structure through translational corpora

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Research questions

• Can translation influence meaning structures?  
  *We think it could*

• How could we investigate such an influence?  
  *By visualizing and comparing translated with non-translated meaning structures*

• Why would we want to do so?  
  *In order to understand underlying mental schemata of translation as a cognitive task*
Methodological steps

1. Objectively generate original and translated semantic fields
   via an extension of Semantic Mirroring Technique

2. Analyze and compare the semantic field visualizations
   in order to detect similarities and differences

3. Apply an explanatory framework
   such as Gravitational Pull Hypothesis, Three-Store Hypothesis
Semantic Mirroring Technique (Dyvik, 1998; 2004)

“[…] if another language lexicalizes a word in two or more ways, there must be a conceptual motivation,”

papier

[Eng] paper, bond, sheet, document,

[Eng] [Eng] paper, sheet, document,

[Eng] bond;

[Eng] [Eng] leaf, tray, sheet, paper;

[Eng] document, paper;

[Eng] bond, debenture, document;

[Eng] [Eng] bond, debenture, document;

...
## ‘classical’ SEMANTIC MIRRORING

<table>
<thead>
<tr>
<th>IS TRANSLATED AS</th>
<th>paper</th>
<th>sheet</th>
<th>document</th>
<th>bond</th>
<th>OVERLAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>papier</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>4</td>
</tr>
<tr>
<td>blad</td>
<td>X</td>
<td>X</td>
<td>Ø</td>
<td>Ø</td>
<td>2</td>
</tr>
<tr>
<td>document</td>
<td>X</td>
<td>Ø</td>
<td>X</td>
<td>Ø</td>
<td>2</td>
</tr>
<tr>
<td>obligatie</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>X</td>
<td>1</td>
</tr>
</tbody>
</table>

## EXTENDED SEMANTIC MIRRORING

### Inverse T-image

<table>
<thead>
<tr>
<th>IS n TIMES A TRANSLATION OF</th>
<th>paper</th>
<th>sheet</th>
<th>document</th>
<th>bond</th>
</tr>
</thead>
<tbody>
<tr>
<td>papier</td>
<td>230</td>
<td>32</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>blad</td>
<td>121</td>
<td>37</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>document</td>
<td>5</td>
<td>7</td>
<td>98</td>
<td>0</td>
</tr>
<tr>
<td>obligatie</td>
<td>5</td>
<td>0</td>
<td>43</td>
<td>78</td>
</tr>
</tbody>
</table>

### Second T-image

<table>
<thead>
<tr>
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<th>paper</th>
<th>sheet</th>
<th>document</th>
<th>bond</th>
</tr>
</thead>
<tbody>
<tr>
<td>papier</td>
<td>231</td>
<td>45</td>
<td>61</td>
<td>9</td>
</tr>
<tr>
<td>blad</td>
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<td>37</td>
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<td>0</td>
</tr>
<tr>
<td>document</td>
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<td>0</td>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>obligatie</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>62</td>
</tr>
</tbody>
</table>
Hierarchical Cluster Analysis

[A] graphical representation of a matrix of distances […] where the objects are joined together in a hierarchical fashion from the closest, that is most similar, to the furthest apart, that is the most different (Greenacre, 2013).
Fictitious example of the semantic field of papier
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Case study: *beginnen* [to begin]

**Compare** non-translated, original Dutch semantic field of *beginnen*

**With** translated Dutch semantic field of *beginnen* (from French and from English)

**And** measure the influence of the respective source languages (French and English) on the semantic field

**Method** Extended Semantic Mirroring Technique
Dutch Parallel Corpus
Hierarchical Cluster Analysis for visualization
ORIGINAL / SOURCE LANGUAGE DUTCH: beginnen
TRANSLATED DUTCH (>FR) *beginnen*

- **REFERENCE CLUSTER / GENERAL ONSET**
- **VAGUE**
- **(SPECIFIC) ACTION**
- **ONSET (noun)**
- **ABSTRACT PROCESS / ACTION**

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A diagram showing the relationships between different lexical categories and morphological processes.

- **ACTION**
  - opzetten
  - oprichten
  - opstarten
  - starten
  - van start gaan

- **STATE AFTER ONSET**
  - beginnen
  - krijgen
  - komen
  - worden

- **ABSTRACT PROCESS / ACTION**
  - start
  - aanvang
  - begin
  - ontstaan
  - openen

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**Height**

**B=3000**
TRANSLATED DUTCH (>ENG) beginnen
Comparing TransDutch to OrigDutch

- Less meaning differentiation in TransDutch (less clusters)
- Peripheral and vague semantics expressions more prototypical in TransDutch
- Larger reference clusters in TransDutch

existence of some (very general) source text independent features of translation?
Measuring source language influence

**What?** Include the source language lexemes into the visualizations

**How?** Multiple Correspondence Analysis on the “Burt tables”

= a generalization of ordinary frequency tables with row and column categories which cross all categories as rows with all categories as columns
French source language influence on Translated Dutch
English source language influence on Translated Dutch
Measuring source language influence

The semantic structure of TransDutch from English seems to be influenced by the form resemblance between Dutch and English lexemes
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   such as Gravitational Pull Hypothesis, Three-Store Hypothesis
   a. Less meaning differentiation in TransDutch
   b. TransDutch (>eng) deviates more from OrigDutch
      than TransDutch (>fr)
Halverson (2003, 2007)
The specific structure of the activated semantic network is likely to influence the outcome of the Gravitational Pull (over- or underrepresentation).

**Less meaning differentiation?**

Overrepresentation of vague and peripheral expressions due to salience of patterns in target language (OrigDutch)

**TransDutch (>eng) more deviating than TransDutch (>fr)?**

Stronger network links could lead to overrepresentation and thus a more deviating overall semantic structure
Three-store Hypothesis: separate language systems, one common conceptual system
- translating via the conceptual system
- direct transcoding

Less meaning differentiation? TransDutch (>eng) more deviating than TransDutch (>fr)?

Translational (L2) ‘priming’ activates less L1 conceptual features Stong associative links for direct translations, cognates and loan words explain influence of form similarity
Conclusions

1. Visualization of meaning structures is possible via statistical techniques and based on translational data.

2. The more form-similar target and source language are, the more the translated semantic field structure is likely to deviate from the original semantic field structure.

3. Validation with other (more polysemous) initial lexeme, preferably with metaphorical meaning extensions.
More information?

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