Assessing the impact of English language skills and education level on PubMed searches by Dutch-speaking users

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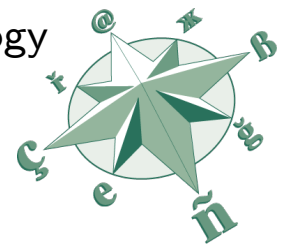

May 21, 2010

1 Background

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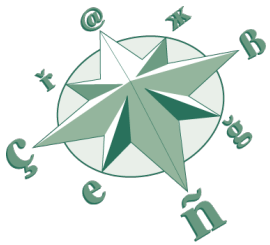
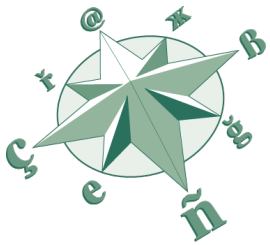
- **Instead**: development of a full scale English & Dutch termbase (i.e. also synonyms, grammatical & spelling information, pronunciation etc.)
- Translations made by students as a **master thesis**:
  - 35-50 MeSH terms
  - students team up with medical informants
  - terminological records



PhD

- Is it really useful to translate the Medical Subject Headings (MeSH)?



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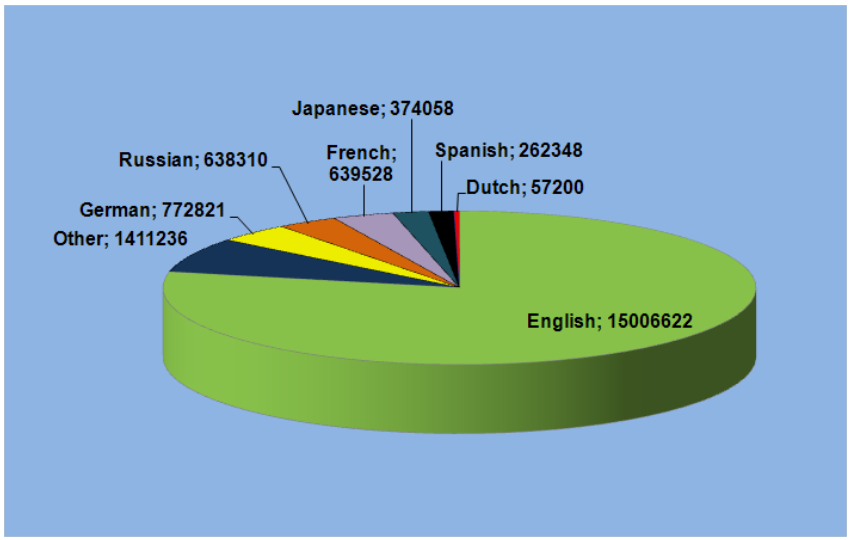

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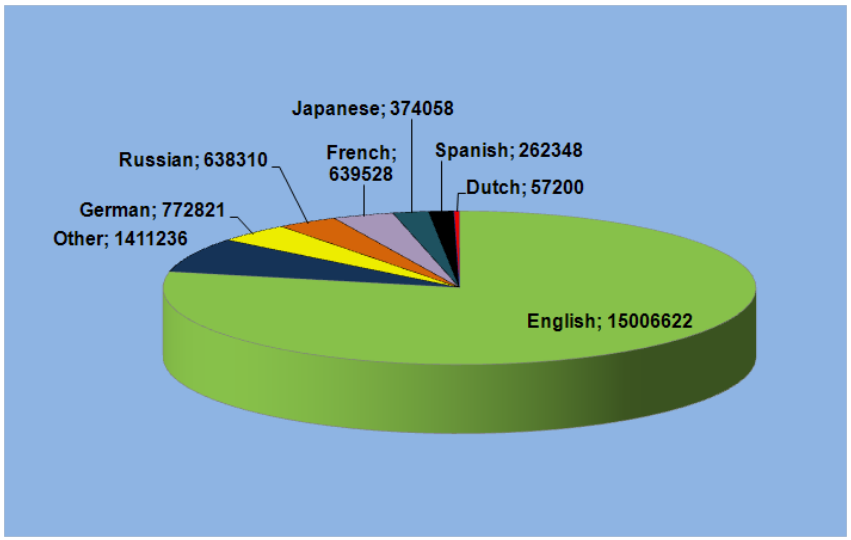

- Do they have other problems when using PubMed?

PhD

- Advantage of English as lingua franca of science: **terminological continuity**
- BUT:
  - difficult **medical terminology**
  - Lankamp (1989): **basic level** of English knowledge including linguistic items other than domain-specific terminology is needed to select relevant information
  - Mouillet (1999): several **sublanguages** needed for IR: informatics, documentation science, biomedical sciences

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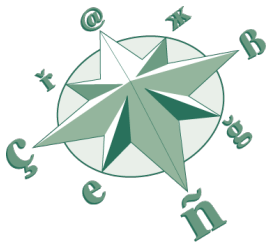
  $\Rightarrow$ extra dimension: Bachelor vs. Master students of Nursing



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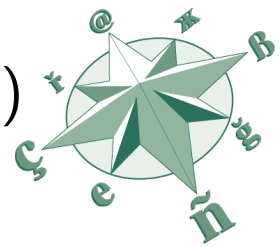
- Master students attended an **additional programme on scientific research** (literature searching, systematic view)



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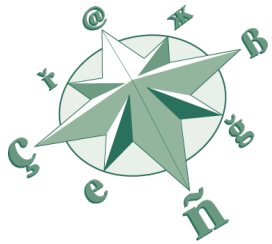

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- **satisfaction survey**
- **language test**: DIALANG

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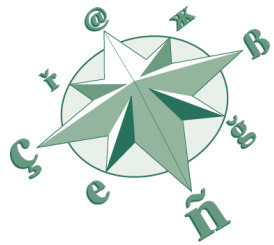
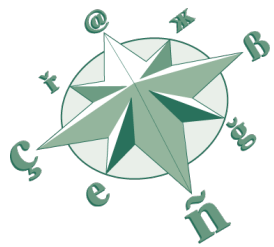


Search task

2 types of evaluation:

- **precision, recall and F-score**: list of selected articles - gold standard ("gold standard query" + "union of outputs" principle (Miller 1971))
- **qualitative analysis**: Morae: program to analyse user-computer interaction.
  * **tasks** (e.g. reading, searching, validation)
  * **markers** (e.g. search term formulation, MeSH term selection, PubMed search, article selection)



Search process

Marker scores:

- 0 = bad
  e.g. kinesitherapi
- 1 = medium
  e.g. resiential care, resident
- 2 = good
  e.g. elderly, nursing home

Language test

$\Rightarrow$ freely available language test: DIALANG (based on Common European Framework of Reference) $\Rightarrow$ vocabulary and reading test

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$\Rightarrow$ hypothesis: at least B2 or C1 level for reading and vocabulary

- **reading**:
  - B2: understand articles about contemporary issues;
  - C1: understand factual texts in specialized language.
- **vocabulary**:
  - B2: write reports and essays;
  - C1: write reports in specialized language.

Precision, recall, F-score

	avg prec	avg recall	avg F
Bachelor	37.6%	2.7%	4.9%
Master	30%	4.4%	7.2%

Table: Results in both test groups

$\Rightarrow$ partly due to limited time

$\Rightarrow$ No significant differences between both test groups

Language skills

		Bachelor	Master
		Count N%	Count N%
Score reading test	A1	3.2%	2.5%
	A2	9.7%	12.5%
	B1	35.5%	12,5%
	B2	38.7%	50.0%
	C1	9.7%	15.0%
	C2	3.2%	7.5%
Score vocabulary test	A1	0%	0%
	A2	3.2%	10.0%
	B1	12.9%	7.5%
	B2	67.7%	57.5%
	C1	9.7%	25.0%
	C2	6.5%	0%

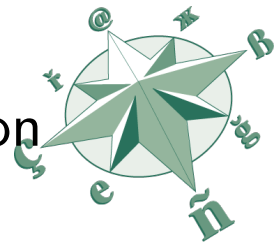
48.4% → 38.7% + 9.7%

65% ← 50.0% + 15.0%

77.4% → 67.7% + 9.7%

82.5% ← 57.5% + 25.0%

$\Rightarrow$ no significant relation between language skills and education level!



Language skills

		F-score
		Mean
Score reading test	A1	.0361
	A2	.0234
	B1	.0495
	B2	.0683
	C1	.0753
	C2	.1197
Score vocabulary test	A1	.
	A2	.0521
	B1	.0210
	B2	.0575
	C1	.0885
	C2	.1517

$\Rightarrow$ positive correlation between

- vocabulary test and F-score (r_s=0.258; n=71; p=0.0298)
- reading test and F-score (r_s=0.261; n=71; p=0.028)

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- no significant correlation with precision, recall, F-score

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- pre-test survey:
  - 100% of master students vs. 45% of bachelor students use **medical databases** to search for medical information
  - Master students use PubMed more often than bachelor students ("because they received a more elaborate introduction into the use of PubMed?")
  - Master students search for medical information in English more frequently than bachelor students

Education level

- Bachelor students found searching for medical info in **English more difficult** than master students.

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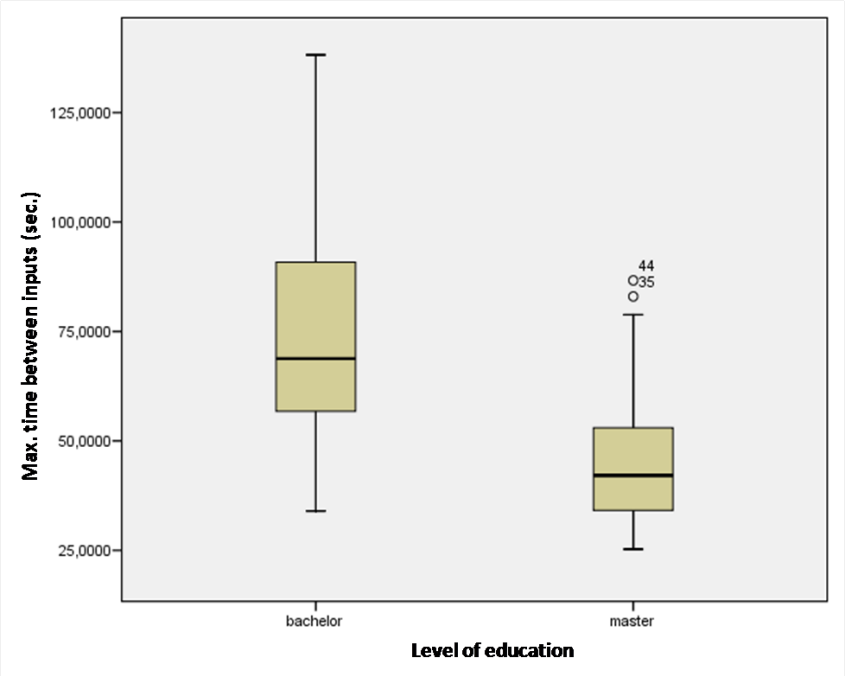
- Positive correlation between **maximum time between inputs** and level of education:



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- However, no effect on search performance.
  $\Rightarrow$ Students were asked to search with **MeSH terms** (controlled vocabulary)
- Number of **bad MeSH terms** has impact on F-scores

Conclusions

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Conclusions

- **English language skills** have an impact on results of the search task
- **No significant difference** between bachelor and master students in language skills and performance on the search task
- Master students are **more familiar** with the search system (PubMed) $\rightarrow$ reflected in the max. time between inputs
- Bachelor students tend to formulate **more bad search terms**, but no impact because of use of MeSH terms
  $\Rightarrow$ MeSH terms = language aid

Future work

- **Expert** in biomedical information retrieval + expert in field of accidental falls in elderly: perform search task

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- **Expert** in biomedical information retrieval + expert in field of accidental falls in elderly: perform search task
- **Same test** in UK $\Rightarrow$ control group
- Incorporation of **translated MeSH terms** in search system

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