

Zürich University of Applied Sciences

**zhaw** School of Applied Linguistics  
IUED Institute of Translation and Interpreting

English **Sprache**  
Technik **Kommunikation**  
Français

Italiano

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## Cognitive ergonomics of computerized translation work

Peter Jud and Maureen Ehrensberger-Dow  
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*Ergonomics and technologized knowledge work: cognitive effort, creativity, and health issues*

## Overview



- Cognitive ergonomics of translation
- Evidence of ergonomic issues in the *CTP* corpus
  - focus on retrospective comments
- Indications from *ErgoTrans* workplace observations
  - focus on screen recordings
- Indications from *ErgoTrans* international survey
  - focus on tools and resources
- Assessing cognitive ergonomics in the lab
  - experimental design
  - focus on selected ET data
- Preliminary conclusions and further research

## Cognitive ergonomics of translation



Research questions of interest:

- What are the positive and negative aspects of the translation process with respect to cognitive ergonomics?
- What effect do disturbances to information flow and concentration levels have on the translation process?
- Which factors are related to disturbances and interruptions?
- How do professionals cope with disturbances and interruptions?
- Which features of language technology could be improved with respect to cognitive ergonomics?

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## Cognitive ergonomics of translation



*ErgoTrans* study design

Phase 1 (N=18)	Analysis of <i>Capturing Translation Processes (CTP)</i> corpus → screen recording, eye tracking, keylogging
Phase 2 (N=31)	Workplace observations (commercial, institutional, freelance) → screen and video recording, ergonomic assessments, interviews
Phase 3 (N=30)	Hypothesis testing in usability lab → screen recording, eye tracking, keylogging, commentaries, interviews
Phase 4 (N=1,850)	International comparison of workplace ergonomics → online survey of professional translators (de, en, es, fr, it, pt)
Phase 5 (N=19)	Validation of workplace findings → in-depth individual and group interviews

## Evidence of ergonomic issues in CTP corpus



- software issues: usability, stressors and distractors
  - inappropriate auto-correction (abbreviations, technical terms)
  - wrong language as default for spellcheck
  - “Invisible” cursor
  - non-mnemonic shortcuts (e.g. Ctrl-V for “paste”)
  - slow reactivity of tools

*“We’re quickly dissatisfied when it’s a bit slow, aren’t we?  
It’s okay but it is a bit slower than I’m used to.” (ProG8)*

*“We can turn off the pop-up feature of the mail program, but the  
screen still flickers when a message comes in.” (ProG1)*

(Ehrensberger-Dow & Massey 2014a, b)

## Evidence of ergonomic issues in CTP corpus



- retrospective comments about a process (ProE1\_workplace\_RVP)
 

*<incident type="consults" src="concordance" start="00:04:53" end="00:04:56"> here, i'm just doing a concordance search to see if there is any specific usual way that the client would want that term. and now i'm just considering the best way of, of putting <incident type="consults" src="concordance" start="00:05:10" end="00:05:14"> the term. <vocal>filler<&vocal> i've done a concordance search there, but the <incident type="consults" src="dict.cc" start="00:05:17" end="00:05:30"> the term that it came up with isn't suitable for the context. so i'm just having a look in an online dictionary to see if it comes up with anything different. which it didn't. <vocal>filler<&vocal> so i'm just having <incident type="consults" src="concordance" item="protokoll" start="00:05:38" end="00:05:50"> another look another concordance search with part of the word to see if there is any way it's been used in this context before. which it has. <vocal>filler<&vocal> so i'm going with one of the options which came up in the concordance search.*

**32 seconds**

## Evidence of ergonomic issues in CTP corpus



- influence of tools

*“The most recent [entry] appears at the top of the [concordance] list ... I think that we unconsciously let ourselves be influenced by this ... as well as the one-to-one matches that appear at the top.” (ProG1)*

- user interfaces

*“I would rather have more surface area to see my text and fewer ribbons and rulers and so on.”*

(ProG9; translated from German)

*“Of course you can pin the [translation] memory on top if you want to, but that disturbs the view of the rest of the Word screen. So you have to keep switching that off.” (ProE2)*

(Ehrensberger-Dow & Massey 2014a, b) 8

## ErgoTrans workplace observations



*Cognitive ergonomics* is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system.

International Ergonomics Association (IEA)

### Positive aspects

linguistic challenges

domain knowledge challenges

interruptions by people

### CAT tools


## ErgoTrans workplace observations



*Cognitive ergonomics* is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system.

International Ergonomics Association (IEA)

Positive aspects	Negative aspects
linguistic challenges	poor quality source texts
domain knowledge challenges	monotony
interruptions by people	<b>e-mail interruptions</b>
<b>CAT tools</b>	<b>irritating CAT features</b>
	crowded screens
	time pressure

## ErgoTrans international survey



1. General information (12 questions)
2. Workspace and working environment (15 questions)
3. Computer workstation (13 questions)
4. **Tools and resources (7-14 questions)**
5. Workflow and organization (6 questions)
6. Health and related issues (9 questions)
  - pilot-tested with commercial and freelance translators (Ehrensberger-Dow & O'Brien 2015)
  - revised and adapted to cover institutional translators
  - available online from Aug-Dec 2014 (de, en, es, fr, it, pt)
  - distribution through professional associations, conference attendees, companies, institutions, blogs, etc.

## ErgoTrans international survey



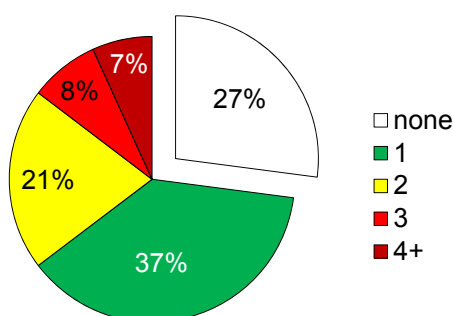
- **1,850** completed surveys from almost **50** countries
- mostly female (79%)
- freelancers (78%), institutional (13%), commercial (9%)
- **only about half of all translators are touch typists (52%)**
- **84% have a dedicated workspace**
- **82% of institutional and 75% of commercial translators use a desktop computer** vs. only **56% of freelancers**
- **most freelancers only use one computer screen (75%)** but **45% of institutional and 47% of commercial use two screens**

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## ErgoTrans international survey



**The internet connection is mostly or always good (96%).**  
**The communication tools are mostly or always good (97%).**  
**I rarely or never use software to manage my job assignments (69%).**  
 I work with the following number of CAT tools:



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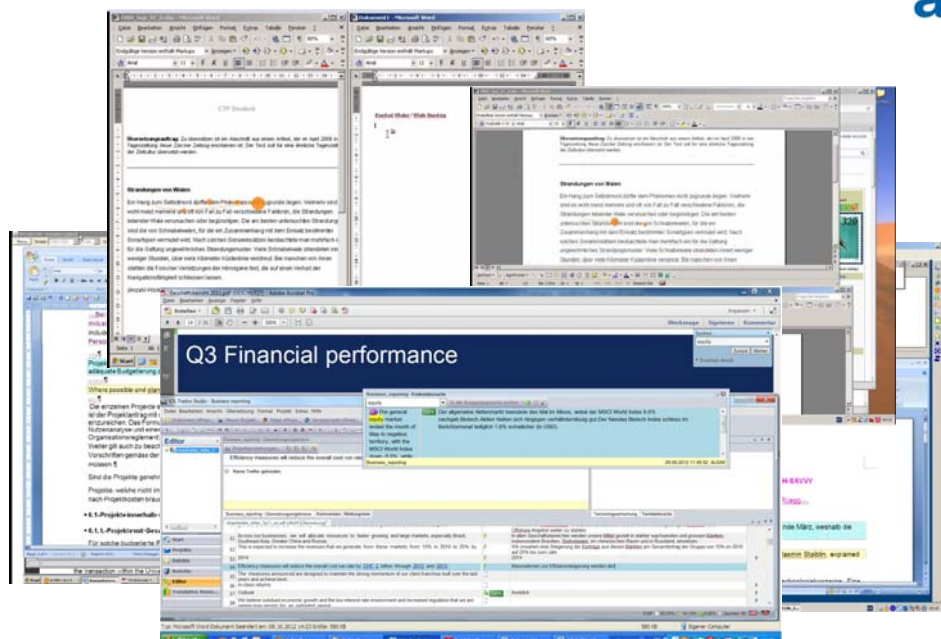
## ErgoTrans international survey

### CAT tool users

- 97% of CAT tool users say they are helpful
  - most users rarely or never switch between tools (64%)
  - just over half use the default settings (54%)
  - if they do not use the default settings, they customize:
    - the layout (82%)
    - the tag visibility (63%)
    - the colors (45%)
    - font type (63%)
    - other aspects (19%)
- 111 comments about the settings

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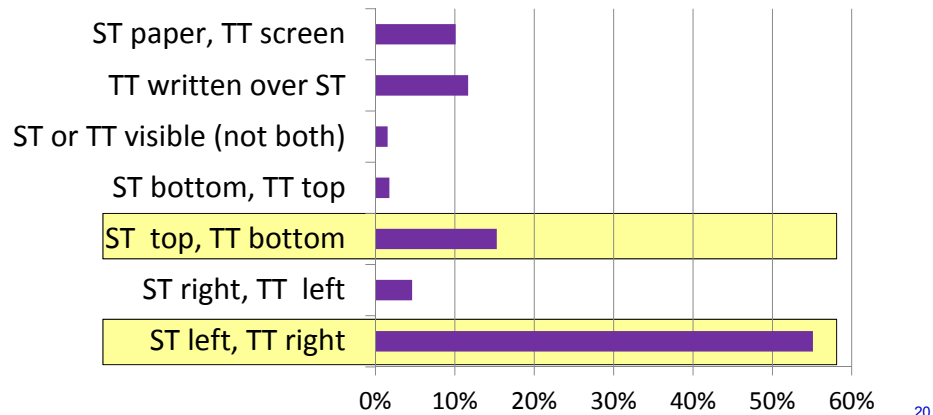
## ErgoTrans international survey



## ErgoTrans international survey



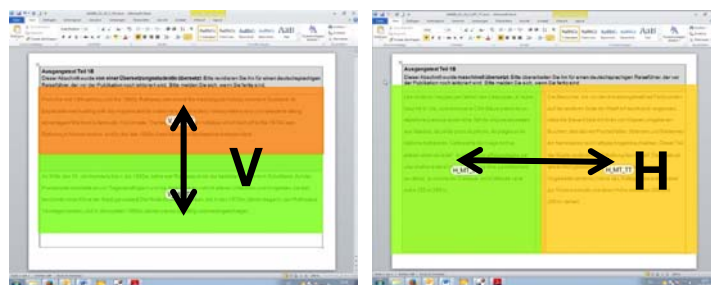
The source text (text-to-be-translated) is usually displayed relative to the target text (translation) on my computer screen as follows:



## Assessing cognitive ergonomics: design



Phase 3	Hypothesis testing in usability lab → screen recording, eye tracking (Tobii T60), keylogging, retrospective commentaries, interviews
MAs	STs: 2 related travel guide extracts (3 paragraphs each)
N=10/12	Task 1: revising designated MT output (MT) or design. human output (HU)
Pros	Task 2: revising designated human output or design. MT output
N=14/18	Task 3: translating from scratch (TR)
	Layout: Vertical (V) or horizontal (H) arrangement





## ET results: mean fixation duration



	<i>MA students</i>		Professionals	
	<i>Vertical</i>	<i>Horizontal</i>	<i>Vertical</i>	<i>Horizontal</i>
	↔		↔	
Mean fixation duration (ST)	0.34	<b>0.32</b>	0.23	<b>0.25</b>
Mean fixation duration (TT)	0.38	<b>0.37</b>	0.25	<b>0.31</b>
MT revision (TT)	0.36	<b>0.35</b>	0.25	<b>0.30</b>
HU revision (TT)	0.36	<b>0.37</b>	0.24	<b>0.30</b>
Translation (TT)	0.44	<b>0.41</b>	0.28	<b>0.35</b>

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## ET results: pupil dilation



	<i>MA students</i>		Professionals	
	<i>Vertical</i>	<i>Horizontal</i>	<i>Vertical</i>	<i>Horizontal</i>
	↔		↔	
Pupil dilation (TT)	3.07	<b>3.08</b>	2.81	<b>2.74</b>
MT revision (TT)	3.04	<b>3.06</b>	2.79	<b>2.73</b>
HU revision (TT)	3.04	<b>3.05</b>	2.84	<b>2.72</b>
Translation (TT)	3.14	<b>3.12</b>	2.79	<b>2.77</b>

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## Preliminary conclusions and further directions



- Eye-tracking data seems to be useful to assess some aspects of cognitive ergonomics of translation.
- Layout (and possibly other features of CAT tool systems) seems to have an effect on the cognitive ergonomics of translation, at least for professional translators.
- Translation seems to be cognitively more demanding than revision.
- These professionals reacted faster to pop-ups and recovered faster from interruptions than MA students did.
- Triangulation with other measures of effort (keylogging data, number of changes) might be revealing.

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## Preliminary conclusions and further directions



### **We need to take all levels / players / aspects into account:**

- physical aspects
- translator training
- translation teacher training
- software development
- research
- organizational aspects (e.g. workflows)
- clients / agencies

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### Participants:

Professional translators, students, translation teachers

### Research team:

Andrea Hunziker Heeb, Peter Jud, Annina Meyer, Kathrin Beyer,  
Martin Schuler, Martin Kappus, Isabel Damiano, Romina Schaub-  
Torsello, Silke Neumann, Michèle Gasser, Vera Aebischer  
Gary Massey, Heidrun Becker, Catherine Badras  
Maureen Ehrensberger-Dow (PI)