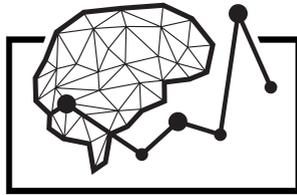


# ICTIC 2019

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# ICTIC 2019

## 2<sup>nd</sup> International Congress on Translation, Interpreting and Cognition

Interdisciplinarity: the Way out of the Box  
04 - 06 July 2019  
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Book of Abstracts

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# CONTENTS

List of Abstracts	4
Keynote Abstracts	12
Conference Abstracts	49
Book Presentations	333

# LIST OF ABSTRACTS

## Keynote Abstracts

<b>Carl</b>	<b>13</b>
Interactive, multi-modal, cloud- and crowd-based translation	
<b>García</b>	<b>20</b>
Networking within: connectivity approaches to the translating and interpreting brain	
<b>Halverson</b>	<b>25</b>
Metalinguistic awareness and task and situation construal in translation: theoretical and empirical issues	
<b>Hervais-Adelman</b>	<b>29</b>
The neurobiology of simultaneous interpreting - a window into extreme language control	
<b>Hvelplund</b>	<b>34</b>
Experimental translation process research: revisiting research practices	
<b>Specia</b>	<b>38</b>
Quality estimation and automatic post-editing in the neural machine translation era	
<b>Toral</b>	<b>43</b>
Post-editing novels and its effect on readers	

## Conference Abstracts

<b>Albi-Mikasa et al.</b> Introducing CLINT (cognitive load in interpreting and translation)	<b>50</b>
<b>Alvarez et al.</b> Comparing NMT and PBSMT for post-editing in-domain formal texts: a case study	<b>55</b>
<b>Alves et al.</b> Cognitive load of academic writing in L2 English vs. in L1 plus translation	<b>65</b>
<b>Angelone</b> The impact of screen recording as a diagnostic tool for process-guided assessment of translation products	<b>71</b>
<b>Anssari-Naim</b> An assessment of a working memory task and self-efficacy in simultaneous interpreting training	<b>77</b>
<b>Bruno et al.</b> An analysis of trainee translators' use of digital technologies based on keylogging	<b>83</b>
<b>Cifuentes-Férez &amp; Rojo</b> The role of self-esteem, affect and emotion on regulation on student translators' performance under time pressure	<b>88</b>
<b>Dewolf</b> Interpreting children's voice: a study of the emotional tone and communicative intent	<b>96</b>

<b>Díaz-Galaz</b>	<b>101</b>
Describing the interpretation task: a stimulated-recall study of interpreters and interpreting students	
<b>Dobkiewicz</b>	<b>107</b>
The effect of ideology on the production and perception of simultaneously interpreted political discourse	
<b>Dorer</b>	<b>114</b>
Advance translation as a means of improving source questionnaire translatability? Findings from a think-aloud study for French and German	
<b>Ferreira &amp; Schwieter</b>	<b>119</b>
Language dominance, directionality, and experience: mapping decision making processes	
<b>Fonseca &amp; Gonçalves</b>	<b>123</b>
Analyzing metacognitive knowledge and uncertainty management through TAPs	
<b>García Serrano</b>	<b>128</b>
Teaching, learning and translating Komposita (DE-ES)	
<b>Gieshoff</b>	<b>132</b>
The impact of audio-visual speech input on workload in simultaneous interpreting	
<b>Griebel</b>	<b>137</b>
How do legal translators and lawyers understand legal texts? A mixed methods study investigating reading comprehension patterns in expert and learner groups	

<b>Gros</b>	<b>145</b>
Using anaphoric pronouns to investigate the mental processing of reference chains in German Easy Language	
<b>Haro-Soler &amp; Singer</b>	<b>151</b>
Exploring the affective dimension in translator education: towards a multidisciplinary approach to trainees' self-perceptions	
<b>Haro-Soler</b>	<b>157</b>
Teachers' feedback, rubrics and translation students' self-efficacy beliefs	
<b>Heilmann</b>	<b>161</b>
The influence of experiential aspects of meaning on the translation process	
<b>Herbig et al.</b>	<b>166</b>
Multi-modal estimation of cognitive load in post-editing of machine translation	
<b>Hernández et al.</b>	<b>173</b>
Translation of words written in different types of scripts: the case of Japanese	
<b>Ho</b>	<b>178</b>
Expert behaviour in English-Chinese sight translation: an integrated eye-tracking study	
<b>Hoberg</b>	<b>183</b>
Evaluation of Microsoft's Skype Translator: A dialogue-oriented conception of an analysis model in the language pair Catalan-German	

<b>Hsu</b>	<b>190</b>
A proceeding analysis of working memory, cognitive load and processes in simultaneous interpreting	
<b>Kokanova et al.</b>	<b>195</b>
Eye-tracking in sight translation study	
<b>Korpal &amp; Jankowiak</b>	<b>200</b>
Interpreting affect-laden content: the role of directionality and valence	
<b>Li &amp; Lei</b>	<b>206</b>
Tracking where the professional conference interpreter looks: a case study in naturalistic settings	
<b>Lei et al.</b>	<b>211</b>
Can the “chunking” strategy help reduce cognitive load and enhance performance in simultaneous interpreting with text? Insights from an eye-tracking experiment	
<b>Marzouk</b>	<b>215</b>
Controlled Language – still a necessity or already obsolete?	
<b>Naranjo Sánchez</b>	<b>223</b>
'Mixed feelings' while translating with music	
<b>Nitzke</b>	<b>227</b>
Processing website contents in native and non-native language	
<b>Özkan et al.</b>	<b>232</b>
Predictive processing in trainee and professional interpreters	

<b>PACTE</b>	<b>240</b>
Wouldn't it be great to have a CEFR for translation competence levels? First results of the NACT Project	
<b>Płużyczka</b>	<b>241</b>
Tracking mental processes during translation. Neurobiological determinants of selected eye tracking parameters	
<b>Risku &amp; Meinx</b>	<b>249</b>
Emotion and social embeddedness of translation in the workplace	
<b>Ramos &amp; Rojo</b>	<b>255</b>
The psychophysiological impact of sex scenes with audio description	
<b>Santamaría Ciordia</b>	<b>260</b>
Language brokers' cognitive and emotional development: a retrospective analysis	
<b>Schaeffer et al.</b>	<b>267</b>
The TICQ: A comprehensive, validated tool for assessing translation and interpreting competence	
<b>Schaeffer et al.</b>	<b>274</b>
The effect of alignment units in a sentence context during translation: an ERP study	
<b>Schiffi</b>	<b>279</b>
Hierarchies in lexical complexity: Are there effects of word frequency, word length and repetition on the visual word processing of people with cognitive impairment?	

<b>Seubert</b>	<b>285</b>
Visual information in simultaneous interpretation: an eye tracking study	
<b>Shih</b>	<b>292</b>
The new roles of machine translation for cognitive learning purposes	
<b>Singer et al.</b>	<b>297</b>
Self-efficacy, self-identity and self-representation: towards the configuration of translator trainees' professional self-identity	
<b>Sommer</b>	<b>301</b>
A study of negation in German Easy Language – does typographic marking of negation words cause differences in processing negation?	
<b>Stanley</b>	<b>311</b>
Thinking outside of the box/looking into black boxes: Translator training in the 21st century and the need for interdisciplinary approaches to examine intuition and emotions in communication related cognition	
<b>Stasimioti &amp; Sosoni</b>	<b>317</b>
Investigating post-editing: A mixed-methods study with experienced and novice translators in the English-Greek language pair	
<b>Tardel et al.</b>	<b>326</b>
Automatization of subprocesses in subtitling	

Book Presentations

- Fantinuoli** **334**  
Interpreting and technology  
Language Science Press
- Fox** **335**  
Can integrated titles improve the viewing  
experience? Investigating the impact of subtitling on  
the reception and enjoyment of film using eye  
tracking and questionnaire data  
Language Science Press
- García** **337**  
The neurocognition of translation and interpreting  
John Benjamins
- Hansen-Schirra et al.** **338**  
Empirical modelling of translation and interpreting  
Language Science Press
- Nitzke** **340**  
Problem solving activities in post-editing and  
translation from scratch: A multi-method study  
Language Science Press

# KEYNOTE ABSTRACTS

# Interactive, multi-modal, cloud- and crowd-based translation

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Despite tremendous progress in machine translation (MT) technology, fully automatic, high quality MT is still inconceivable for many types of texts and in many contexts. Human-computer interaction in translation has therefore been an alternative to fully automatic MT and human from-scratch translation. This talk traces the development of *interactive* MT (IMT) and shows how the notion has changed with the ubiquitous availability of the internet and the possibilities of cloud computing and crowd sourcing. We argue that — due to their real-time and online learning ability — modern data-driven IMT are particularly suited to promoting the further industrialization and tailORIZATION of the translation profession to an unprecedented extent.

## Interactive translation

Bruderer (1978) suggests four ways in which MT systems may work:

1. *fully automatic MT* (FAMT), which is possible with limited quality for easy texts and restricted domains, but which will not be addressed in this chapter
2. *pre-editing*, mainly to reduce ambiguities and to simplify the source text for better MT results
3. *post-editing*, to amend grammar and style of the MT output
4. *interactive MT* (IMT) where the translator intervenes in dialogue with the MT system.

This talk focusses on IMT, following the argumentation in Carl and Planas (2019).

### **Current situation**

The current translation workflow is dominated by the use of computers and CAT tools. Modern translation workstations (TWS) for professional translators include term-bases and a database which stores whole sentences or phrases (called segments) and their translations. The translator can update the translation memory with his own new translations. Bowker (2002) uses the term *interactive translation* in the context of TWS when translators build the translation memory while working on a translation assignment. However, the first conception of interactive translation dates back much earlier.

### **First approaches**

The first conception of IMT may date back to Smirnov-Troyanskii (1933) who, according to Hutchins and Somers (1992: 5) suggested a multi-step MT system in which a human operator would first transform each source text (ST) word into its basic form, a machine would then translate the words into a basic target text (TT) forms and a reviser would generate the final translation. Since then, many ideas, techniques and computer programs have been suggested and developed that allow for some form of IMT.

### **Interactive RBMT**

Due to the imperfection of Rule-based MT (RBMT) systems, Bisbey and Kay (1973) developed the MIND system which enabled a "monolingual consultant to resolve ambiguities in the [machine] translation process". The aim was to help the computer produce better draft translations, which reduce the amount of successive post-editing. It was "hoped that interaction could be restricted to analysis ... [but] it was found that some interaction was also required in transfer" (Melby et

al. 1980: 424). Boitet et al. (1995) successively model the interaction in a dialogue-based pre-translation process on the source side in order to disambiguate the source linguistic analysis of the text to be translated.

### **Interactive SMT**

A new conception of IMT emerged with the advent of statistical MT (SMT) in the 1990. Unlike RBMT, SMT systems postpone (most) decisions to a later point in the processing pipeline where the actual target text is generated. It is in this final decision process that humans intervene during SMT-based IMT. Instead of helping the computer to find a better analysis of the ST, interaction takes place on the TT side, where humans select appropriate translations. TransType (Foster et al. 2002) was the first SMT-based IMT system where the interaction was modeled of the target text. The focus on the TT seemed to be more acceptable for a human translator and opened new possibilities for the design of interaction.

### **Cloud-based IMT**

With the ubiquitous availability of the internet and increasing complexity of the system set-up, computing power has been out-sourced to a server (the cloud) with which a client program interacts in real-time. With human corrections of erroneous MT output in a feedback loop, the MT system can be trained online and in real-time to produce better translation proposals for the remaining part of the sentence or text. Feed-back could be provided by some combinations of written or spoken language, key shortcuts, or maybe even through gazing patterns. Current technologies (MATECAT<sup>1</sup>), CASMACAT<sup>2</sup>) (Alabau et al. 2013), LILT<sup>3</sup>), etc) use a browser-based editor, which connects to a

<sup>1</sup>) <https://www.matecat.com/>

<sup>2</sup>) <http://www.casmacat.eu/>

<sup>3</sup>) <http://labs.lilt.com/>

translation engine on a remote server. The human translator iterates through the translation and the IMT system learns from the corrections.

### **Crowd-based IMT**

Online and real-time learning capacities of the IMT engine make it possible to store new translation solutions on the server and share them immediately with a crowd of collaborators, translating the same or similar documents at the same time. In order to maximize the expected learning effect of the remote system, an IMT system may re-order the source language segments to be translated or edited. Instead of presenting a text in its original consecutive order, the IMT system sorts the segments e.g. according to a degree of confidence, so that it can learn most quickly or efficiently from the human corrections. IMT thus supports a move from “content being rolled out in a static, sequential manner”, to content being “integrated into a dynamic system of ubiquitous delivery” (Cronin 2013: 498).

### **Interactive Machine Teaching**

As the IMT system accumulates expertise in a reusable form, more and more segments may be produced in perfect quality and only the worst need human revision and intervention. This allows the next projects to be completed faster, more efficient and with a higher quality. “Teams that use this technology all contribute to teaching the system, which re-pays them by assuring much better consistency: the translations quickly converge on consensual terminology and phrasing -- at the system's prodding” (Dillinger, 2018). In this setting, a translator thus becomes an *interactive machine translation teacher*.

## Conclusion

IMT technology allows for completely new ways of translation production which have the potential to change the translation process radically. But how does this development impact the translation job if IMT output becomes increasingly human-like (Yamada, 2019), how will it change the perception and production of texts, and the society in general?

While the *interactive machine teaching* allows for more flexible working times and adjustable working conditions, the technology is likely to disrupt the linearity of texts. Texts become short segments, possibly connected via hyperlinks, “without narrative progression”, and lead to novel kinds text perception and text production where “dialogue, not narrative, may become part of a new humanization” (Pym 2011: 7) Increased research into extended, embedded and situated cognition (e.g. Muñoz Martín, 2017), comes at the right time, as it will likely generate invaluable insights into the human conditions and feasibility of this newly emerging translation.

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# Networking within: connectivity approaches to the translating and interpreting brain

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Brain-based research on translation and interpreting has been accruing steadily over several decades, yielding valuable insights on the functional organization and dynamic properties of the cognitive systems involved (Muñoz et al., 2018). Pioneering works profited from the lesion model approach, identifying critical brain regions supporting diverse operations implicated in varied interlinguistic tasks (García, 2015). Despite their contributions, these works were limited in that they provided no real-time information on the actual neural activity patterns underlying outward performance. Fortunately, this shortcoming was overcome with the advent of neuroscientific methods, which offered the opportunity to study the neurobiology of translation and interpreting *in vivo* (García et al., 2016).

These techniques have been used repeatedly to assess both modalities in the last 25 years and they have informed several topics of importance to the field, even beyond the possibilities of non-neural approaches (García, 2019). However, most neuroscientific evidence on translation and interpreting has

been obtained through regional approaches, whereby conditions of particular variables (e.g., translation direction, type of source unit) are linked to activity changes in *individual* brain areas (García, 2013). However, though hugely informative, these univariate approximations face a major caveat, given that cognitive operations depend on the *interaction* of distributed neural hubs (Mišić & Sporns, 2016). Therefore, a need arises for novel approaches that extend this dominant trend with relevant methodological tools. In recent years, important steps in this direction have been taken thanks to the incorporation of connectivity analyses. The present talk aims to summarize, discuss, and highlight the contributions of this incipient empirical corpus.

First, I will discuss structural connectivity studies suggesting that experience in particular modalities is associated with anatomical changes in the fibers linking task-relevant areas. In particular, diffusion tensor imaging studies have revealed that professional and prospective simultaneous interpreters, relative to non-interpreter multilinguals, exhibit significant changes in pathways subserving sensory-motor coupling, cognitive control, and interhemispheric information transfer, among other functions (Elmer et al., 2011; Van de Putte et al., 2018). Notably, some of these changes seem to be triggered after only nine months of interpreting training (Van de Putte et al., 2018), indicating that this particular bilingual experience can induce fast neuroplastic adaptations.

Second, I will review functional connectivity evidence showing that specific patterns of inter-regional coupling are driven by both expertise and translation directionality. For example, using resting-state electroencephalographic recordings, Klein et al. (2018) have shown that interhemispheric connectivity between ventrolateral and dorsolateral portions of the prefrontal cortex (a key substrate of cognitive control functions) is greater for

simultaneous interpreters than control subjects. For their own part, García et al. (2016) have relied on intracranial recordings to show that L1-L2 translation, relative to L2-L1 translation, is characterized by greater coupling among frontal and temporal hubs. Taken together, these studies show that inter-areal information sharing is sensitive to both field-specific experience and task-related factors.

Third, moving beyond connectivity proper, I will introduce emergent results from time-frequency analyses, which reveal the distribution of transient functional webs exhibiting event-related synchronization or desynchronization. Specifically, a pioneering report by Grabner et al. (2007) showed that the lexical frequency of source-language items during translation modulates distributed oscillatory activity in the theta and alpha bands, mainly over parietal and frontal regions, respectively. In addition, new data from my own lab indicate that simultaneous interpreters, compared to non-interpreter bilinguals, are characterized by increased delta-theta synchronization across fronto-temporo-parietal regions during word translation, and that the intensity of these patterns correlates with their response times in their dominant translation direction (namely, L2-L1). Succinctly, these findings suggest that both source-unit and subject-related variables also modulate the dynamics of functional webs recruited during translation.

In short, the present talk aims to show how the neuroscience of translation and interpreting can reach important theoretical breakthroughs by complementing regional studies with insights from structural and functional connectivity research. Further work along these lines is bound to forge a promising avenue towards a co-constructive dialogue between neuroscience and cognitive translatology.

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# **Metalinguistic awareness and task and situation construal in translation: theoretical and empirical issues**

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Within Cognitive Translation and Interpreting Studies (CTIS) there is an increasing interest in issues related to metacognition and related constructs such as ‘self-concept’, ‘task awareness’, ‘metalinguistic awareness’. These notions are often linked to questions regarding translator competence and its development, translator training or proficiency (e.g. Ehrensberger-Dow and Perrin 2009; Ehrensberger-Dow and Massey 2013; Kiraly 1995, 2000; Mellinger 2019; Shreve 2009; Yanqun 2015), or translator expertise (Muñoz Martín 2014). The various constructs and their mutual relationships have been defined and conceptualized in different ways, and there is no consensus on the best theoretical model or empirical approach to this particular area of cognitive study. Nor have there been numerous studies in the area.

In this plenary talk, I will briefly sketch out some of the related approaches to grappling with how translators think about the task that they are engaged in and their own role in it, and what consequences such understanding might have for the translation process or its result. A brief look at some of the empirical studies done in this area will illustrate how the theoretical variation can lead to different analyses and interpretations of similar data. In the early development of CTIS these differences may not be considered overly problematic, as they merely illustrate that various perspectives can shed light on complex cognitive phenomena and that this is, indeed, a relevant and important area of study. In this talk, however, I will

suggest that the broadest definitions of ‘self-concept’ obscure several important distinctions that should be maintained in CTIS, and that distinctions between, for example, ‘self’, ‘task’, and ‘situation’ should be carefully maintained and situated relative to broader concepts of metacognition and metalinguistic awareness in theory and empirical investigations. I will also suggest that without such careful distinctions and a clearer model of the interactions between these elements it will not be possible to adequately model the translation process itself or the translator’s development over time. The account will share some elements of the model of translator expertise put forward in Muñoz Martín (2014), but with a fundamentally different objective. My objective is to consider the dynamic interaction of metalinguistic awareness, task construal and situation construal in a specific translational act/event, and to enable theorizing about how the interaction of these three can vary and change over time and across situations. The three main constructs will also be linked to the construct of ‘default translation’, as developed in Halverson (2015; forthcoming).

As a means of developing the necessary distinctions, the presentation will draw on the analysis of two data sets: 1) a set of 180 translation commentaries written by translator trainees after the completion of assigned translation tasks, and 2) a set of responses to open-ended questions regarding task construal and self-awareness written in connection with two keystroke logging sessions (pre-task and post-task questions). The investigation of this data, using a form of content analysis, aims to illuminate the interplay of metalinguistic awareness and task and situation construal. The terminological choice of ‘construal’ rather than ‘awareness’ will also be discussed.

The theoretical territory here is somewhat difficult to navigate, as it ranges from cognitive psychology, through education,

(psycho)linguistics, and second language acquisition to CTIS itself. The emphasis here will be on questions relevant for a general cognitive theory of translation, as opposed to those related to models of translator competence or translator training pedagogies. In spite of their obvious connections, the objectives are somewhat different.

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# **The neurobiology of simultaneous interpreting - a window into extreme language control**

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Simultaneous interpreting requires the concurrent execution of multiple processes: listening, comprehension, conversion of a message from one language to another, speech production, and self-monitoring. This requires the deployment of an impressive array of linguistic and cognitive control mechanisms that must coordinate the various brain systems implicated in handling these tasks. Indeed, we might argue that simultaneous interpreting is one of the most demanding linguistic tasks that there is. Given that we normally use only one language at a time, even if we engage in dense code-switching, using two at once (as is essential for successful simultaneous interpretation) is an extraordinary feat. How does the brain handle the challenge of juggling two languages? How is the extreme language control capacity required during interpreting implemented?

In a longitudinal series of experiments on trainee interpreters and multilingual controls, we used functional magnetic resonance imaging (fMRI) and structural MRI to examine the cerebral basis of interpretation, and the adaptations that arise functionally and structurally with the acquisition of expertise in interpreting. Fifty participants were recruited, all of whom spoke a minimum of three languages and were capable of executing a basic simultaneous interpretation task. Twenty-two participants were trainee simultaneous interpreters, enrolled in a 15-month master's program in conference interpreting in the faculty of translation and interpreting at the University of Geneva. The remaining 28 participants were matched to the

trainee interpreters and were engaged in post-graduate study in non-language related fields. A first experimental session took place at the start of the trainee interpreters' course. A number of participants (19 trainee interpreters and 16 control participants) returned for a follow-up after approximately 14 months (for the trainee interpreters, this was just prior to their final exams).

Participants were presented with sentences auditorily and were asked to perform three tasks: passively listening to sentences, shadowing (a monolingual control condition, in which they repeated sentences whilst they heard them) and simultaneous interpreting. Sentences were arranged in quartets which outlined brief stories, with the sentences of any quartet always presented in the same task condition. Participants executed 39 trials of each condition, over approximately 30 minutes of fMRI scanning. Sparse imaging (TA=2s, TR=7s) was used to enable presentation of sentences in quiet, and recording of overt participant responses in the absence of scanner gradient noise. Sentences were always presented in one of participants' L2 (source sentences were recorded in English and French, and participants were free to choose which they preferred), they were asked to interpret into their L1.

At baseline, we compared the brain networks implicated in listening, shadowing and interpreting. Contrasting shadowing with listening revealed a broad bilateral network of brain areas, notably auditory areas, sensorimotor and premotor cortices, and midline areas including the supplementary motor area and anterior cingulate cortex. This network is consistent with the requirements of shadowing, namely monitoring an auditory stream, producing speech, controlling and dividing attention between input and output streams and error-monitoring.

In order to establish the cerebral bases of interpreting we then contrasted brain responses to the interpreting task with those to the shadowing task. In this way, we isolated the cerebral components of the task that are related specifically to the demands of interpreting, absent the mechanical and lower-level demands of listening, monitoring, speaking, and thereby highlighting the bilingual control aspects of the task, as well as the cognitive load associated with the more demanding task of interpreting. This contrast revealed a primarily left-lateralised set of brain areas, namely the anterior aspect of the left inferior frontal gyrus, the pre-supplementary motor area, and anterior premotor cortex. In addition, there was recruitment of right cerebellum and bilateral caudate nuclei. The cortical structures implicated are consistent with tasks demanding advanced planning and complex motor control, while the recruitment of the caudate nuclei was particularly intriguing. The caudate nuclei are not typically associated with linguistic tasks, but rather with general behavioural control, notably action selection and inhibitory control (Hervais-Adelman, Moser-Mercer, Michel, & Golestani, 2015).

At follow-up, we asked participants to execute the same tasks, and evaluated whether brain responses had changed as a function of training. Increased expertise in interpreting lead to a decrease in recruitment of the caudate nuclei during interpreting, consistent with the notion that as interpreting becomes more automatic for the by-now trained interpretation students, the requirements to control their cognitive resources are diminished (Hervais-Adelman, Moser-Mercer, & Golestani, 2015).

We also examined the consequences of interpreting training for brain structure. In this study 34 trainee interpreters underwent structural MRI scanning prior to the start of their simultaneous interpreting training and approximately 14 months later at the

end of their training, before their final exams. Thirty-three matched control participants were scanned at a similar interval. We used an automated method to extract cortical thickness from anatomical MRI scans, and looked for changes in thickness that could be attributed to training (i.e. that were present only in the trainees). We found that cortical thickness was increased after simultaneous interpretation training in a number of brain areas, including left auditory regions and right parietal areas. We interpreted these findings as reflecting cortical adaptations to the broad linguistic and non-linguistic demands of simultaneous interpretation (Hervais-Adelman, Moser-Mercer, Murray, & Golestani, 2017), such as audio-motor integration, auditory processing, attentional control and working memory processes.

Taken together, the results of this series of studies demonstrate that simultaneous interpreting, as might be expected from such a demanding task, recruits a very broad array of brain areas, and that the intensive training in an ostensibly linguistic task results in functional and structural changes to brain areas that are not typically considered specialized for linguistic tasks. More specifically, it seems that the language management and control aspects of interpretation are handled by a system that is responsible for the cognitive control of behavior in the most general terms. Exploring the neural substrates of interpreting provides us with a means of conducting targeted investigations of extreme multilingual control, and the structural and functional consequences of expertise. One of the most intriguing results is the revelation that linguistic and executive control may share substrates, which may provide some evidence for how multilingualism and cognition might interact.

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# **Experimental translation process research: revisiting research practices**

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At its core, translation process research (TPR) concerns the cognitive processes associated with translation and thus TPR belongs to the cognitive sciences. To explore the translator's interaction with text, translation technologies and translation resources, TPR has used quantitative and experimental approaches for some years, albeit this experimental paradigm is still relatively new to our field. Inspired by research practices in other cognitive sciences, including in psychology, cognitive psychology and psycholinguistics, experimental methods such as keylogging and eye tracking have been central to the exploration of many aspects of human translation processing: translation reading, cognitive effort, coordination and distribution of efforts, directionality, translation expertise and competence and much more. The use of these methods involves specific challenges as well as careful planning concerning the choice of research design, statistical method and general experimental approach.

Current experimental TPR practices illustrate the exemplary adoption of research practices from neighbouring fields, as TPR studies diligently and expertly apply experimental methods to examine cognitive translation processes. The application of methods and the analysis of research results is often done differently, however. While different application and analysis procedures in itself may not be an issue to the isolated interpretation of data within a study, it can become problematic for other reasons, as it may complicate cross-study comparison and replicability (Alves et al. 2009, Hvelplund 2014). For

instance, different pause definitions, different fixation definitions and different expertise criteria can make comparison and replicability problematic and even impossible and lead to different conclusions and contradictory results. On top of that, terminological disagreement may lead to additional problems: for instance, the terms attention and cognition are often used interchangeably, but they actually concern different aspects of human cognition, and what is the difference between cognitive load and cognitive effort? Concerning the interpretation of eye movements as indicator of cognitive processing, the validity of the eye mind and immediacy assumptions (Just and Carpenter 1980) has not yet been systematically tested in a TPR context, so how certain can we be of eye movements as correlates of attention and cognitive processes in translation? In fact, there are of number of unanswered questions regarding eye tracking in TPR: for instance, are fixations and pupillary measures parallel indicators of cognitive processing? Can we assume that fixation and pupillary responses reflect only cognitive events, and how do we take into account non-cognitive events when we interpret eye movements? And how do we deal with the pupillary delay effect? As regards the preparation and execution of translation experiments, proper design protocols and rigidity at the very early stages of the data collection session may increase the chances of good quality translation process data: warm-up tasks, careful participant selection, uniform experimental conditions, randomising stimuli presentation, etc. (O'Brien 2009, Hvelplund 2014). These mitigatory steps aside, data quality may still be poor, so how do we best discriminate between good and poor translation process data? Concerning statistical analysis of TPR data, various approaches are seen: often descriptive statistics is complemented with inferential statistics, but sometimes only one statistical method is used. Which statistical method is better suited for a given research purpose?

What sample size is necessary to be able to make strong generalisations about translators' behaviours and processes? This talk will address the need to align procedures, definition and practices in (experimental) TPR. It will consider some of the practical challenges of experimental TPR and stress the importance of carefully considering thorough preparation and execution of experiments, proper data scrubbing procedures and applying relevant statistical approaches. While the ambition is not to present final conclusions, it is the hope that the talk will further the discussion on research practices in TPR, which may lead to the formulation of best practices in experimental TPR.

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# Quality estimation and automatic post-editing in the neural machine translation era

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Neural machine translation (NMT) has become the de facto automated translation technology for language pairs where enough parallel data is available to build translation models. The three last editions of WMT, the main open evaluation campaign in machine translation, have provided clear evidence of the supremacy of NMT when compared to previous approaches, namely rules-based and statistical machine translation (SMT) (Bojar et al., 2016; 2017; 2018). A number of studies have looked at specific linguistic aspects and have shown that NMT is consistently better than SMT in a number of them, such as word order and morphology (Toral and Sánchez-Cartagena, 2017; Bentivogli et al., 2016; 2018).

Focusing on metrics based on productivity, in (Specia et al, 2017) we compared NMT and SMT models trained on the same data settings in terms of various post-editing based metrics, including post-editing time, edit distance between post-edited, and keystrokes, for two language pairs: English-German and English-Latvian. While for English-German NMT proved better according to all metrics, for English-Latvian SMT was substantially better. This can perhaps be attributed to the fact that for Latvian SMT was a production-level system, while the NMT it was built from scratch, but overall it highlights the fact that many translations produced by NMT are of low quality.

Clearly, despite its superior performance and the significant amount of work in progress towards improving it in settings where it fails (e.g. resource-low language pairs), NMT is far

from perfect. Two related research areas thus become paramount in making NMT applicable in practical scenarios, such as human post-editing: (1) quality estimation; and (2) automatic post-editing.

Quality estimation (QE) (Specia et al., 2009; 2018) is the task of generating an estimate on the quality of a given machine translated text without access to a reference translation. If done at sentence level, this has a similar function to ‘fuzzy match’ score in translation memories: translations estimated to be good enough can be used in downstream tasks as well as in computer-aided translation settings (e.g. post-editing). NMT brought new challenges to the area: the dominant approach for predicting quality of SMT output was regression models that strongly relied on language model statistics as features. Given that language models are already used as core components in NMT, they become less effective as quality estimators for NMT output. State of the art neural QE approaches appear promising in very domain-specific datasets but it is still unclear how well they can perform in the general case.

Automatic post-editing (APE) (Bojar et al., 2015; Chatterjee et al., 2018) is the task of automatically correcting the output of MT. This is generally done by building a monolingual translation model to translate from incorrect to correct target language. Since the quality of NMT is generally higher than previous approaches, there are fewer errors to translate. For example, the average human post-editing distance for English-German NMT in (Specia et. al, 2017) was 8%, compared to 25% for SMT on the same source data. In addition, the errors tend to be harder to automatically correct, for example, it is common to observe NMT outputs where a single token is repeated various times. This makes current APE systems learn to over correct the MT output. In fact, as has been shown by the WMT18 shared task on APE (Chatterjee et al., 2018), the approach with

the largest gains over the original SMT system reaches 10 times the improvement obtained over the original NMT system.

In this presentation I will talk about current research in both QE and APE and the challenges of dealing with NMT output. While QE is arguably still very important, the need for APE is questionable. For QE, important questions that remain are on its real potential for use in production, whether the current technology is good enough for that and how to best use the predicted scores or show them to humans.

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# Post-editing novels and its effect on readers

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## Introduction

Machine translation (MT) is widely used nowadays for dissemination purposes by means of postediting (PE). PE has become a popular workflow in industry, because, as numerous research studies have shown (e.g. Plitt and Masselot, 2010), it results in notable increases in translation productivity compared to human translation from scratch (HT), while the quality of the resulting translation is equivalent to that of HT, or even better.

However, PE has been found to prime the translator, thus resulting in a final translation that is similar to that initially suggested by the MT system (Green et al., 2013). Because the MT approaches most widely used till recently in PE workflows—rule-based MT and, above all, phrase-based statistical MT (PBMT)—are known to lead to literal translations, post-edited translations are also perceived as being more literal than HTs (Martín and Serra, 2014). While this is acceptable for text types such as technical documents, as the main objective of the translation for these types of texts is to preserve the meaning of the original, it might not be the case for other text types of a more creative nature, such as literary texts, because in this case the objective of the translation is twofold: not only the meaning of the source text needs to be preserved but also its reading experience (Jones and Irvine, 2013).

Recently, neural machine translation (NMT) has emerged as a new paradigm in MT, and has been shown to considerably improve the translation quality achieved, regardless of the

language pair (Toral and Sánchez-Cartagena, 2017). In addition, the translations produced by NMT are much more fluent (Bentivogli et al., 2016) than those derived by PBMT, until recently the dominant paradigm in the field. In addition, relevant to this presentation, it has been claimed that NMT does not lead to literal translations<sup>1)</sup>, as is the case with PBMT and rule-based MT.

At this point, given (i) the maturity of PE, and (ii) the rise of a new MT paradigm (NMT) that results in more fluent and less literal translations than previous models, I deem it timely to assess the extent to which current MT technology can be useful in assisting with professional translations of literary text. Specifically, I will consider the translation of novels from English to Catalan.

This presentation consists of three parts, each one addressing a relevant element of the PE workflow, namely MT system, PE (linked to the human translator) and resulting translation (linked to the reader). In the following sections, further details are provided for each part together with relevant research questions (RQs).

## **Machine Translation**

RQ1. What level of translation quality can MT reach on novels? Thus MT without human intervention.

Literary-adapted MT systems under the PBMT and NMT paradigms were built and their performance was assessed on a set of twelve widely-known novels from the 20th and 21st

<sup>1)</sup> Neural network-based MT can, rather than do a literal translation, find the cultural equivalent in another language”, according to Alan Packer, Engineering Director at Facebook, in 2016, cf. <https://slator.com/technology/facebook-says-statistical-machine-translation-has-reached-end-of-life>

centuries (Toral and Way, 2018), including for example J. Joyce's *Ulysses* and J. K. Rowling's *Harry Potter and The Deathly Hallows*. Both automatic and human evaluations were conducted; in the first, commonly used automatic evaluation metrics were used, whereas in the second we asked native speakers of the target language to express their preference between PBMT, NMT and HT in a blind setting.

I will also comment on a practical application of this work; an ongoing project where our best MT system is used to translate copyright-free books that have not been translated to date, i.e. the use of MT to translate novels that would not be translated otherwise.

## **Post-Editing**

RQ2.1. Does PE reduce the translation effort for novels, compared to HT?

I will present the results of a recent experiment in which a chapter of the novel *Warbreaker* (Sanderson, 2009) was translated by six professional literary translators (Toral et al., 2018). Each subject translated fragments of ten contiguous segments under three randomly alternating translation conditions: HT, PE-PBMT and PE-NMT (the MT systems used are those introduced in Section 2). The time spent for each segment as well as the keystrokes used were recorded; this data was then used to analyse post-editing effort across three commonly studied dimensions (temporal, technical and cognitive) with linear mixed-effects models.

RQ2.2. What is the experience of professional literary translators post-editing novels?

The professional translators that took part in the PE experiment filled pre- and post-task questionnaires and also held an interview (Moorkens et al., 2018). Through these, we collected data about their perceived effort, perceived quality of PBMT and NMT output as a basis for PE, preferred translation method, etc.

## **Resulting Translation**

RQ3. Do post-edited translations affect the reading experience? This question is approximated as: are post-edited translations different than HTs?

As mentioned in the introduction, the quality of post-edited translations has been reported to be equal to that of HT, or even better. However, those studies measure translation quality merely as the number of errors (Koponen, 2016). I motivate that this results in a limited assessment of translation quality and I propose to study this phenomenon, additionally, in terms of translation universals and laws of translation (e.g. simplification, normalisation and interference) and report the results of an ongoing study where PEs and HTs are evaluated and compared against each other along these dimensions.

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# CONFERENCE ABSTRACTS

# **Introducing CLINT (Cognitive Load in Interpreting and Translation)**

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For native speakers of English, the language's current role as a widely-used lingua franca has allowed them to do business and publish internationally without having to worry about learning additional languages. For speakers of other languages, being active in international contexts may demand the additional effort of gaining adequate competence in understanding and producing English. Even in multilingual Switzerland, English is replacing the four Swiss languages not only in international but also in intra-national communication. However, this reliance on English as a lingua franca (ELF), which may appear to be a practical solution to facilitating international exchange, can come at a cost. Despite the obvious relevance, there has been very little research into the consequences for non-native speakers who have to work in English. The academic study of ELF has tended to focus on communicative success between non-native speakers and the linguistic and sociolinguistic aspects of the phenomenon (Jenkins et al. 2011). Far less attention has been paid to the more negative aspects of processing non-standard language input (Albl-Mikasa & Ehrensberger-Dow 2019). In particular, the cognitive load and stress associated with having to use a foreign language to conduct business, academic, and other professional communication have not been addressed. In addition, research into the implications of ELF for the traditional management of multilingualism, namely translation and interpreting, has been exceptionally rare (Albl-Mikasa 2017).

The CLINT project addresses these gaps by examining how translators and interpreters with different levels of expertise cope with ELF input compared with untrained multilinguals. Preliminary research suggests that the increasing number of ELF speakers at international gatherings impacts on professional interpreters' capacity management and that the growing number of source texts written by non-native speakers of English is forcing translators to expend more time and effort on processing these ELF texts (Albi-Mikasa 2017). Cognitive load seems to be the overriding issue for both groups of language experts, so the question logically arises as to whether untrained multilinguals also suffer cognitive (over)load when confronted with non-standard input in one of their non-native languages. A second major issue that the project examines are stress-related impacts of ELF on multilinguals' language processes and professionals' performance. Evidence from neuroscience suggests that cognitive load, negative emotions and stress – which have all been associated with the use of foreign languages – trigger an inhibitory mechanism that encourages avoidance.

CLINT is an interdisciplinary project that brings together researchers from the fields of ELF, interpreting, translation, and neuropsychology in order to gain a better understanding of the actual cognitive demands associated with ELF (as compared to Standard English) by describing and quantifying the influence of ELF on spoken and written language processing. A large number of multilingual participants will be recruited who have either no or various degrees of translation and interpreting experience in order to also evaluate whether there is a beneficial effect of language expertise on ELF processing. The mixed-method approach used in CLINT is based on good practice in cognitive T&I process as well as neuroscience research. The simulated workplace settings and use of authentic ELF texts ensure construct and concurrent validity.

The project design includes:

1. audio and video recordings  
eye-tracking and screen logging
2. physiological measurements (heart rate measurements)
3. stimulated-recall commentaries of processes in  
simulated workplace settings
4. psychophysiological measurements in a controlled lab  
setting (EEG)
5. product analyses
6. self-report through online surveys of members of the  
communities of professional practice (i.e. translators  
and interpreters).

The various disciplinary perspectives allow a rich description of challenges presented by ELF to experts and non-experts alike.

CLINT has received substantial funding from the Swiss National Science Foundation (SNSF). It falls under the SNSF Sinergia project category, which means that it is interdisciplinary and aimed at breakthrough research. As such, interpreting and translation researchers from ZHAW Zurich University of Applied Sciences have joined forces with neuropsychologists from the University of Zurich to explore the cognitive demands of ELF in language professionals and non-professionals. Interpreters and translators are, in fact, particularly interesting because they have the expertise and strategies to deal with non-standard input and to optimize communication (Reithofer 2010) that non-professionals might not have at their disposal. Moreover, they represent both the spoken and written dimensions of ELF processing. Just as ELF in non-interactive settings is very much under-researched, so has written ELF been put on the research agenda only very recently (Mauranen 2017). The findings are expected to have implications not only for methodology and model-building in all

of the disciplines concerned (i.e. ELF, translation and interpreting studies, neuropsychology), but also for language management and training in multilingual societies and international corporations. Insights into the relationships between expertise, cognitive load, and stress when dealing with ELF input could be incorporated into undergraduate, graduate, and professional development programs in a wide variety of disciplines to better prepare the citizens of the future for this global phenomenon.

The presentation of CLINT at the Germersheim 2<sup>nd</sup> International Congress on Translation, Interpreting and Cognition will be made by members of the ZHAW project team on various aspects of the project work undertaken to date, including our solutions to expected and unexpected challenges.

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# Comparing NMT and PBSMT for post-editing in-domain formal texts: a case study

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In the last years, post-editing of machine translation (PEMT) has become a very common practice in the translation industry. It has been included as part of the translation workflow because it increases productivity and reduces costs [Guerberof, 2009a]. A recent survey showed that more than half of the Language Service Providers (LSPs) offered PEMT as a service [Lommel and Depalma, 2016]. Post-editors “edit, modify and/or correct pre-translated text that has been processed by an MT system from a source language into (a) target language(s)” [Allen, 2003]. Yet, many professional translators state that after a few segments post-editing MT, they delete the remaining segments and translate everything from scratch if they consider that it will take them less time [Parra Escartin et al., 2017].

Effective post-editing, therefore, requires enough quality of the MT output. However, usual automatic metrics do not always correlate to post-editing effort [Koponen, 2016]. Even translators perceptions do not always match PE effort [Koponen, 2012, Moorkens et al., 2018]. Research in this field has mainly focused on measuring the post-editing effort related to MT output quality [Guerberof, 2009a, Guerberof, 2009b, Specia, 2011, Specia, 2010], productivity [O’Brien, 2011, Parra Escartín and Arcedillo, 2015, Plitt and Masselot, 2010, Sanchez-Torron and Koehn, 2016], translation usability [Castilho et al., 2014, Moorkens and O’Brien, 2013] and perceived post-editing effort [Moorkens et al., 2015].

All of the current research uses the division established by Krings regarding post-editing effort [Krings, 2001]: temporal effort (time spent post-editing), technical effort (number of edits, often measured using keystroke analysis with HTER [Snover et al., 2006]), and cognitive effort (usually measured with eye-tracking or think-aloud protocols). Even though no current measure includes all three dimensions, cognitive effort correlates with technical and temporal PE effort [Moorkens et al., 2015].

Statistical machine translation (SMT) has been well established as the dominant approach in machine translation for many years. However, in the last few years research has become more interested in Neural Machine Translation once the computational limitations have been solved [Bahdanau et al., 2014, Cho et al., 2014]. The first results obtained in terms of quality with automatic metrics have been very successful, for example in WMT 2016 [Bojar et al., 2016], WMT 2017 [Bojar et al., 2017], and WMT 2018 [Bojar et al., 2018]. These promising results have driven a technological shift from (phrase-based) statistical machine translation (SMT) to neural machine translation (NMT) in many translation industry scenarios. As this new approach to MT becomes more popular among LSPs and translators, it is essential to test what NMT can offer for post-editing in terms of quality compared to the results of PBSMT.

Recent research has studied if NMT yields better results than PBSMT using automatic and human metrics [Wu et al., 2016, Toral and Sánchez-Cartagena, 2017, Castilho et al., 2017a]. There have also been studies analyzing post-editing for different types of MT outputs [Bentivogli et al., 2016, Castilho et al., 2017b]. In general, there is an improvement in NMT quality, which leads to less post-editing effort. Castilho et al. (2017b) conclude NMT reduces word order errors and improves fluency

for a specific language pair, so fewer segments require post-editing, especially because there is a reduction in the number of morphological errors. However, they don't detect a decrease in PE effort nor a clear improvement in omission and mistranslation errors. When specific language combinations or narrow domains have been tested [Skadina and Pinnins, 2017, Dowling et al., 2018], with a small amount of data, SMT systems perform better than NMT.

Our ongoing research wants to continue in this direction focusing on in-domain formal documents, which are the ones usually post-edited by professional translators and have never been analyzed in depth in previous research. These documents have specific characteristics that present challenges for MT, such as the technical content and terminology, but tend to have more fixed syntactic structures. We will report the experiments carried out using human evaluations and automatic metrics for English to Spanish medical documents.

Our objectives with these experiments are threefold:

- Determine which MT method (PBSMT or NMT) yields better results for post-editing English to Spanish in-domain formal texts.
- Analyze the relation between human and automatic metrics for post-editing.
- Study translators' perception (both professionals and students) as a prospective measure of PE effort.

To carry out the experiments, we built PBSMT and NMT engines using ModernMT 2.4 with the default parameters and trained them with the same data. We include automatic metrics (BLEU, NIST, RIBES and WER using only one reference and HTER) and human evaluations (side-by-side ranking, rating for accuracy and fluency). We also record PE time and keylogging.

We have divided the case study into three different experiments with English-Spanish medical texts to assess human perception and evaluation of both PBSMT and NMT systems:

1. **Translation ranking:** In the first part, participants have to answer some questions about their previous experience in the translation industry. This survey is open both to students and professional translators as we are mainly interested in the perception of quality. In the second part of the survey, participants have to rank the translation for 40 segments (human professional translation, NMT and PBSMT). Segments have no context but have been chosen manually to increase variability. The order of the different outputs is presented randomized to participants in order to avoid bias.
2. **Fluency and Adequacy:** We present a survey with the same English segments as in the previous experiment. In the first part, participants (both students and professional translators) have to answer some questions about their previous experience in the translation industry. Afterwards, they have to evaluate the fluency and adequacy of a suggested translation on a four-point Likert scale. The translation is either PBSMT or NMT chosen randomly without any knowledge of the participants to avoid bias. The goal is to assess fluency and adequacy for in-domain formal texts.
3. **PE time and technical effort:** In this third experiment, 4-6 professional translators have to post-edit in context the translation of 29 segments from a 2018 medical paper. They have to carry out the task in PET [Aziz et al., 2012], a computer-assisted translation tool that supports post-editing. It logs both post-editing time and edits (keystrokes, insertions and deletions, that is, technical effort). Furthermore, we will obtain HTER

[Snover et al., 2006] calculating the minimum editing distance between the MT output and the postedited segment. Half of the translators are given NMT output and the other half PBSMT output. Translators have no knowledge of the MT engine.

The conclusion of the research is pending on the results of the experiments, which will be reported in the final version of the paper, but our working hypothesis is that, even though fluency improves while using NMT, as does the global quality of the output, post-editing time and technical effort do not improve so much.

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# **Cognitive load of academic writing in L2 English vs. in L1 plus translation**

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Social inclusion has become a moral imperative throughout Europe, and reducing inequalities is a priority goal worldwide. In this context, it runs counter to principles of equality and sustainability that inadequate proficiency in English might be silencing voices in parts of the world that do not have the resources for implementing language proficiency policies. Other issues also arise in this context, such as the extent to which academic disciplines function effectively when English is enforced as the working language regardless of researchers' proficiency levels in that language. Evidence from neuroscience suggests that cognitive load, negative emotions and stress – which have all been associated with the use of foreign languages – trigger an inhibitory mechanism that encourages avoidance. This can result, in turn, in exclusion from participation and decision-making. Academics with lower levels of proficiency in English may not achieve the recognition that their work deserves simply because they publish in other languages or they have trouble having their work accepted by

mainstream English-language journals (e.g. Carli & Ammon 2007; Drubin & Kellogg 2012). For example, well-respected scholars from Latin American countries sometimes find it difficult to achieve the level of academic English that the top-tier journals in their disciplines demand (see Fradkin 2017), and early-stage researchers often struggle to have their English-language submissions to international conferences accepted. Swiss researchers seem to find it easier to participate in scientific discourse in English, perhaps because of the longer tradition of English teaching in that country or the closer cultural proximity to English academic writing norms (see also Bennett 2014).

However, despite the wide relevance of the topic, there has been very little research into the consequences for non-native speakers who are required to publish in a second language (L2). In particular, the *cognitive-affective* load that is associated with having to write in L2 in order to participate in the academic discourse community is under-investigated. Professional translation, the traditional solution to overcoming such language barriers, may not be an option for young researchers on limited budgets and is definitely not a long-term solution for their career development.

Mastering the highest register of any language – as exemplified by tertiary-level academic writing – is an important part of the socialization process for young researchers in all domains but can be especially challenging to those in the natural and applied sciences and especially so in one's L2. Many healthcare-related disciplines, for example, attract researchers who might be interested in medicine, pharmacology, or physiology but might not have advanced skills in academic L2 writing. From the perspective of applied linguistics and translation studies, academic writing in English by such young researchers in Latin America is especially relevant because it

provides evidence of cross-linguistic conceptual transfer difficulties. Certain patterns of meaning production in Portuguese and Spanish are reportedly difficult to reconstrue in English, even for professional translators, due to the semantic specificities of the respective languages. From the perspective of research pragmatics, academic writing is an ideal task to determine the cognitive-affective load of having to write in an L2 because it is a socio-cognitive process that can be objectively observed and assessed on multiple dimensions.

To address these challenges, a team of researchers at UFMG in Brazil, INCYT-CONICET in Argentina, and ZHAW in Switzerland have started a joint project funded by the *Swiss Secretariat for Education, Research and Innovation SERI*. The project investigates the potential cognitive-affective load of L2 academic writing in English by drawing on a variety of methods from translation process research that have been used to tap into internal processes and decision-making (see Jääskeläinen & Lacruz 2018 for a review). For example, the effort associated with producing text has been evaluated by examining speed and flow, number of revisions, pausing behavior, and visual attention (e.g. Vieira 2014). Psychophysiological techniques provide more direct measures of cognitive load and stress (e.g. Haapalainen et al. 2010) and can be triangulated with behavioral measures from the writing processes.

In this project, *cognitive load* is approached from the perspective of temporal, technical, and attentional effort. Screen recording, keylogging, and eye tracking are used to monitor the academic text production processes to obtain data that we analyze for indicators of the three types of effort. *Affective load* or stress is assumed to be reflected in physiological changes during text production. Relevant measurements include heart rate (HR) and heart rate variability (HRV), which are often used as biomarkers of the autonomic

nervous system related to a variety of psychological factors including attention, working memory and emotion regulation (see Thayer & Lane 2009). The quantitative methods are complemented with qualitative methods, including stimulated-recall commentaries of the text production processes cued with the gaze paths from the eye tracking records, post-task interviews, self-report measures of cognitive load and stress as well as linguistic analyses of the text products. The same methods used with the PhD students producing texts in their L1 and L2 are also used with the translation students asked to produce English versions of the L1 texts (i.e. from Portuguese or Spanish). The various sources of data help delineate and explain the cognitive processes and coping mechanisms involved in high-register text production and translation. Taken together, they allow a rich description of cognitive-affective load from L2 academic writing at the interface with translation on the basis of both quantitative and qualitative data and triangulation from the different disciplinary perspectives (i.e. translation studies, linguistics, neuro-psychology).

We assume that investigating the academic writing of junior researchers in the healthcare domain is also interesting for theoretical, societal, and pragmatic reasons. Firstly, many of the topics dealt with in the healthcare disciplines are at the interface of social sciences and engineering. As such, they can be considered a good proxy for cross-disciplinary writing with respect to the expected content and linguistic features of texts. Learning more about cognitive aspects of disciplinary writing can point to productive ways of empowering young researchers. With respect to societal relevance, healthcare is universally recognized as a human right, and the healthcare disciplines in Latin America are directly engaged with one of the UN's global sustainable development goals, immediately after eliminating poverty and hunger. At a research-pragmatic level, many individuals in the healthcare disciplines in Latin

America have recognized the importance of more involvement in the international discourse community and have indicated an openness to participate in this type of research.

In our presentation, we focus on the project methodology and objectives as well as on some empirical evidence from preliminary results in the first phase of the project. The findings are anticipated to contribute to methodological advancements in mixed-methods research involving socio-cognitive processes such as writing and translation. Comparing measures of the cognitive-affective load of L2 processing in domain experts (i.e. PhD students) who are not trained linguists with those of translators who are not domain experts also has implications for understanding brain plasticity and executive control.

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# **The impact of screen recording as a diagnostic tool for process-guided assessment of translation products**

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Over the past three decades, translation process research has continued to provide a solid empirical foundation that has informed the approaches and methods used in process-oriented translator training, starting with Krings' seminal groundwork (1986). In recent years, technological advancement has contributed to enhancing the ecological validity and learner-centeredness of such training, as seen, for example, in the domains of problem recognition and problem-solving awareness. Screen recording, in particular, has emerged as a preferred tool and method of choice for a number of reasons that build on preserved ecological validity, including the heightened salience and relative simplicity of the data it renders (Angelone 2015; Shreve, Angelone, and Lacruz 2014), not to mention the fact that it is free. The case could be made that among the various methods consistently used in TPR research, such as keystroke logging and eye-tracking, both in a stand-alone and triangulated fashion, screen recording holds the most promise when it comes to transitioning from an experimental lab setting to a pedagogical one. When asked to make use of screen recording to reflect on some aspect of their performance, students, for all intents and purposes, are not required to do anything they would otherwise not be doing during the natural course of translation task completion. Furthermore, translation trainers do not need extensive training in its use and the learning curve is kept to a minimum.

To date, screen recording has been utilized by trainers and trainees in pedagogical contexts as a means for retrospectively identifying problems encountered, according to such attributes as textual level, locus (such as comprehension/transfer/production) (Angelone 2014), and phase (orienting/drafting/revision) (Yamada 2009) and information retrieval type (internal or external). Classification is facilitated through the presence of highly salient, directly observable problem indicators, including the location of extended pauses, information retrieval patterns, revisions, and general workflow routines (Pym 2009; Angelone 2019). Screen recording has also been used as a diagnostic tool for students to engage in self-revision and other-revision (Shreve, Angelone, and Lacruz 2014). In the context of these studies, it was found that screen recording was a more efficacious process protocol than Integrated Problem and Decision Reporting logs (cf. Gile 2004) for purposes of detecting and mitigating errors in one's own translation as well as those of others.

The 2014 Shreve, Angelone, Lacruz exploratory study can be seen as an initial attempt to utilize screen recording as a vehicle for process-oriented translation assessment and was one of the first of its kind to do so. More recently, Massey, Jud and Ehrensberger-Dow (2015) have found preliminary evidence that certain process measures captured in screen recording correlate with translation quality and, thereby, serve as a predictor of translator performance in the aggregate as rendered in a given translation task. Angelone (2019) found preliminary evidence of enhanced inter-rater consistency in an empirical study where undergraduate and graduate students of translation used screen recording as a diagnostic tool for reverse engineering errors in a translation product and classifying their nature according to linguistic level (grammar, lexis, syntax, style, mistranslation), phase (drafting or revision), and locus (comprehension, transfer, or production).

Motivated by this evidence of inter-rater consistency, a follow-up study, to be described in this paper, is currently underway to gauge the potential of screen recording as a diagnostic tool for enhancing such consistency when multiple graders assess the same translation product. We might expect such practices to be undertaken, for example, in the context of certification exams as well as in-take and exit exams for university translation programs.

In this small-scale pilot study, instructors of translation will be asked to grade translation products in the following two conditions: 1) when using screen recording as a diagnostic process protocol, and 2) when only having access to the translation product as such, with no corresponding process protocol. Instructors of Arabic-English and Spanish-English translation will be asked to use a modified version of the American Translators Association certification exam framework<sup>1)</sup> for marking up errors in two translation products. When marking up one of these two products, they will be asked to watch a screen recording of the task while doing so, i.e., they will make use of screen recording as a diagnostic process protocol. When marking up the second of these two products, they will engage in error assessment without using such a process protocol as a point of reference, i.e., assessment will be informed by the product alone. In both conditions, the instructors will mark up errors according to type and assign severity points to each, using the rubric found in Figure 1 and the ATA severity point flowchart<sup>2)</sup> as a guide. Operational definitions and detailed descriptions with examples for each error type will be provided and explained to the instructors in advance of the study.

<sup>1)</sup> American Translators Association Error Marking Framework:  
[http://atanet.org/certification/Framework\\_2017.pdf](http://atanet.org/certification/Framework_2017.pdf)

<sup>2)</sup> American Translators Association Severity Point Flowchart:  
[http://atanet.org/certification/aboutexams\\_flowchart.pdf](http://atanet.org/certification/aboutexams_flowchart.pdf)

## Error Marking Framework

*Adapted from the American Translators Association error marking framework ([https://www.atanet.org/certification/aboutexams\\_error.php](https://www.atanet.org/certification/aboutexams_error.php))*

					Student:	
1	2	4	8	16	Code	Error type
					A	Addition
					COH	Cohesion
					F	Freeness
					G	Grammar
					IND	Indecision
					L	Literalness
					MT	Mistranslation
					O	Omission
					OTH	Other errors
					P	Punctuation
					SP (or CH)	Spelling (or character errors)
					Syn	Syntax
					TI	Translation instructions
					TT	Text type
					WC	Word choice
0	0	0	0	0	<b>Totals</b>	

Figure 1. Modified version of the ATA Error Marking Framework

The study will collect empirical evidence to explore the following central research question:

Which of the two assessment conditions (with screen recording as a diagnostic process protocol vs. with no process protocol) will yield greater inter-rater consistency in terms of the same error being marked up by multiple instructors, and the same error type and severity point total being assigned to each?

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# **An assessment of a working memory task and self-efficacy in simultaneous interpreting training**

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## **Introduction**

Interpreting, and particularly the modality of simultaneous interpreting, has been reported as an activity with a special cognitive load for which specific psychological aptitudes or attitudes are required. Determining the importance of these factors is a reasonable objective, particularly when our purpose is to design interpreter-training activities.

## **Methodology**

Assuming this type of general objective, this study proposes a comparative evaluation of two components: on the one hand, a cognitive factor involved in language processing, namely, working memory, and on the other, an attitudinal factor, as is the case of self-efficacy. The objective is to establish the relative weight of these two components with regard to the academic performance of a group of students in a specific simultaneous interpreting activity. Methodological triangulation, as a criterion used in many of the studies collected in Muñoz (2014), is assumed here. The idea is to approach the same object of research, in this case, simultaneous interpreting, by offering more than one explanatory factor to determine their comparative relevance. With this methodological criterion, the aim is to contribute to the systemic vision required to investigate the cognitive processes involved in the interpretative activity, and also to establish planning guides in the training of interpreters.

## **Subjects**

The results of the study were obtained with 20 students of a French-Spanish interpreting training course. The age of our respondents ranged between 21 and 23 years, and 77% of them were females. On the basis of their curriculum, it was assumed that it is a homogeneous sample in terms of social, cultural and academic background. Furthermore, they all had a C1 level of the European Framework of Reference for Languages in French as a foreign language.

## **Tests used**

1) Evaluation of an interpreting activity: The activity under evaluation consists of simultaneous French-into-Spanish interpretation of a 4-minute video. The activity is evaluated with a previously established scoring protocol.

2) Psychometric working memory test. This test has been used as an exploratory instrument adapted from the ECCO subtest (López-Higes et alii, 2012; Daneman & Carpenter, 1981), in order to measure the listening span of the subjects. The test consisted of the reading out aloud of 10 sets of sentences. The subjects were required to memorize the last word of each sentence in each series, and write them down after listening to the sentences included in each one of the series. The series were structured in two blocks. The first block was made up of 5 series, which go from 4 sentences to 8 sentences, with the intention of increasing the difficulty of the task. Conversely, the second block was made up of 5 series, which go from 8 sentences down to 4 sentences, to reduce the difficulty of the task. The subtest was used in two versions, one in the mother tongue (Spanish) (EccoSP) and the other, in the foreign language (French) (EccoFR), with a clear equivalence of items, except for the cases of obvious interlinguistic differences.

3) Psychometric test of self-efficacy. This is a psychological scale to test out the subjective vision of the generic capacity to solve practical problems (Bandura, 1995). It has been used in some studies to evaluate the self-image of translators and interpreters with a certain degree of experience as a relevant dimension that correlates positively with an efficient practice of interpreting. (Jiménez Ivars, Pinazo Calatayud & Ruiz i Forés, 2014; Lee, 2014; and Bontempo & Napier,2011).

## Results

The variables analysed in this study are: Exam scores, French Ecco test results (EccoFR), Spanish Ecco test results (EccoSP) and self-efficacy test results (Self Eff.) All variables subject to correlation show a normal distribution with the Kolmogorov-Smirnov test. The values for the correlation coefficients between the variables under study are presented in the following table:

$r(x,y)$	Exam	EccoFR	EccoSP	Self Eff.
Exam	1	.617**	.396	-.602**
EccoFR	.617**	1	.798**	-.348
EccoSP	.396	.798**	1	-.387
Self Eff.	-.602**	-.348	-.387	1

*\*\* Significant correlation at 0.01*

It is noteworthy that variables EccoFR and EccoSP show a statistically significant difference between means ( $t(19) = 6.839$ ;  $p = .000$ ).

## Discussion and conclusions

Among the observed results, it is worth highlighting that academic performance shows a positive and significant correlation ( $r(x,y) = .617^{**}$ ) with the results of the EccoFR test.

This correlation remains positive, but does not reach statistical significance with the results of the EccoSP test ( $r(x,y) = .396$ ). This difference could be partially attributed to the direction of the demanded interpreting activity: from French into Spanish. EccoFR and EccoSP correlate significantly and very highly ( $r(x,y) = .798^{**}$ ), but also show significant mean differences ( $t(19) = 6.839$ ;  $p = .000$ ), in as much as EccoFR scores are uniformly and significantly lower than the EccoSP scores. Our study supports, in this sense, the hypothesis that the working memory should be evaluated differently on the basis of the type of tasks under examination. In this case, the differences between the foreign language and the mother tongue seem significant. Our results allow us to argue that the training of the working memory in the foreign language in order to reach the results obtained in the mother tongue could be a crucial factor in improving interpreting performance.

Contrary to what has been postulated in the studies cited above, the self-efficacy attitude scale correlates negatively and significantly ( $r(x,y) = -.602^{**}$ ) with the academic performance. In a previous study (Anssari, 2018), a negative although non-significant correlation was also observed between self-efficacy scale and the academic performance of students of translation and interpreting. Notwithstanding this, the negative correlation value was much higher for first-year students than for those in the fourth-year. It can be postulated that this attitudinal component becomes more relevant for interpreting performance with age increase, on the one hand, and with professional experience, on the other. New comparative and/or longitudinal studies are required to determine the relevance of a self-efficacy attitude in interpreting practice.

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# An analysis of trainee translators' use of digital technologies based on keylogging

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The research underpinning our case study derives from a master thesis in translation studies which main purposes have been to explore and describe the ways translation trainees use digital technologies in their natural learning context, during their initial training in technical translation (English>Spanish) at the Faculty of Languages, National University of Cordoba, Argentina. The subject matter of the study belongs to the field of translation process research and the other disciplines involved are computer-aided translation tools, translation training and cognition. Following the relevance of multi-methodological approaches assigned by other works revolving around the translation process (Alves, Pagano and da Silva, 2009; Hvelplund, 2011; Martín, 2017), our methodological design includes the integration of qualitative and quantitative components allowing us to explore the phenomenon through the translation process carried out in a natural learning context, and by complementing it with the analysis of the final product generated by research participants.

The data-gathering tool used was *ResearchLogger* (Estrella et al., 2017), an open-source keylogger that non-intrusively

records in real time every keyboard and mouse activity made by the trainee translator when using several computer programs either in Linux or Windows. Unlike other existing tools, *ResearchLogger* provides logs, screenshots, and a high level of data granularity coming from online digital resources, CAT tools and word processors. In this way, it is possible to reconstruct step by step the procedures carried out by the participants, identifying patterns when solving arising problems, levels of expertise at which they can use technologies (basic functions or advanced functions), work preferences (for example, always using the mouse instead of keyboard shortcuts), time length required for using one technology or another, or interleaving patterns between technologies used. The latest developments of the tool include the partial automation of results into a spreadsheet containing partial analysis of the logs. Figures 1 and 2 show graphs of the distribution of times by tool and resources for five subjects and the searches performed online. These examples are taken from (Grijaba et al., 2018), where *ResearchLogger* has been used to study the process during programming assignments done by computer science students; this also shows that this is a rather neutral and flexible tool.

We are interested in studying how trainee translators use digital technologies during the translation of technical texts with a low level of specialization with the support of a CAT tool. An experimental longitudinal design was used in which data was collected over an academic year and occurred during evaluations in which students translated a short text with an assisted translation tool. Preliminary results of this study were presented at the first edition of this conference (Bruno and Estrella, 2017). In this paper, we present final results obtained from the qualitative analysis of the samples randomly chosen, which showed evidence that participants could use the basic functions of the free CAT tool with which they were trained. This

indicates that trainee translators can carry out a complete translation process after undergoing a specific gradual training with specific technologies. Moreover, the majority of the participants conserved the layout or the visual aspect of the final product as in the source text. This decision taken can be interpreted as a decision that attempts to preserve the superstructure that corresponds to technical genres.

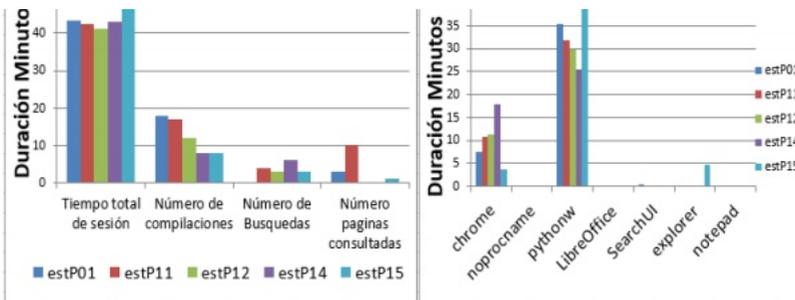


Figure 1. Automatically generated graphs showing distribution of times by tools used (left) and by resources consulted (right).

Filtrado de búsquedas	Paginas consultadas
manejo de strings en python	Trabajar con archivos de texto en Python
manejo de archivos en python	Trabajar con archivos de texto en Python
	String en Python - ChuWiki
	parsing - How do I parse a string to a float
	Leyendo linea especifica
	Leyendo linea especifica
	String en Python - ChuWiki
	Capítulo 11. Manejo de archivos (Algoritmo)

Figure 2. Automatically generated graphs showing distribution of times by tools used (left) and by resources consulted (right).

As for the results obtained from the quantitative analyses, it is possible to say that there were significant differences in the amount of time that participants spent when using different digital technologies during their translation process. The time

allocated to CAT tool use constituted half of the translation process duration, while the use of the word processor demanded the minimum amount of time. This can be attributed to the high amount of time that trainee translators dedicate to produce a target text with the quality of a final draft when using a CAT tool. Finally, the online resources consultation also showed time differences among participants, even though the amount of time allocated by the majority of the participants was lower than the one for CAT tool use.

In the light of what has been said, we conclude that although the research findings provide us with formal understanding of the phenomenon studied, beyond which innovative didactic solutions will be designed in order to improve the technology-mediated translation process in trainee translators, the combination of experimental techniques is our forward-looking research action.

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# **The role of self-esteem, affect and emotion on regulation on student translators' performance under time pressure**

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Translation process research has provided evidence for the importance of investigating translators and interpreters' individual differences and emotions in order to obtain a better understanding of translation and interpreting processes and to predict patterns of behaviour (cf. Lehr 2013; Muñoz 2016; Schwieter & Ferreira 2017; Hubscher-Davidson 2018).

The relation between emotions and personality traits, such as self-esteem has been attested in psychology, where existing studies have pointed to the affective nature of self-esteem (e.g., Brown & Marshall 2001, 2006). According to this affective view of self-esteem, this construct refers to one's feeling of affection toward the self instead of judgments and evaluative feedback which will determine one's self-esteem. Thus, in this model, self-esteem develops early in life and lays the foundation for either a high or a low self-esteem (Brown 1993). Self-esteem has been linked to an array of both positive and negative affective states: individuals with high self-esteem score high in positive affectivity whereas people with low self-esteem score high in negative affectivity (Brown, 2001). According to Epstein (1980, p.106), high self-esteem people “tend to have an optimistic view about life, and to be able to tolerate external stress without becoming excessively anxious”. Much in the same line, there is evidence that high self-esteem individuals deal with failure more adaptively, are less inclined to feel bad when they fail and more persistent in the face of failure because they appear to be more confident when dealing with

problems than low self-esteem individuals (Di Paula & Campbell 2002). Moreover, it seems that people with high self-esteem use better emotion regulation strategies than low self-esteem ones (Baumeister et al. 2003).

In the field of Translation Studies, there is already some recent evidence suggesting that self-esteem is an interesting construct to taken into account when investigating translators and interpreters' performance. In the field of interpreting, self-esteem has been found to emerge as a good predictor of interpreters' self-perceived competence and emotional stability (Bontempo et al. 2014), suggesting that high self-esteem interpreters seem to manage their emotions more efficiently than low self-esteem ones, who seem to have more problems when dealing with negative emotions, such as stress. In the field of translation, to our knowledge, there is no conclusive evidence for the role of self-esteem on the overall quality of the translation product (Cifuentes-Férez & Fenollar 2017), but it has been found that self-esteem is negatively correlated with translation performance in terms of formal aspects such as spelling and punctuation (Cifuentes-Férez & Meseguer 2018), indicating that feeling too confident about oneself may hinder performance on those *minutiae*.

The aim of the present study was to explore the impact that student translators' self-esteem, affect and emotional management skills may have on their translation performance under time pressure. Participants were students of the Degree on Translation and Interpreting at the University of Murcia. The sample was recruited from second-year students whose mother tongue was Spanish and their second language was English. Participation was completely voluntary; they were awarded 0,25 points in one of the modules they were taking in the final semester of the academic year 2018/2019.

The experiment was run in a quiet room at the Faculty of Arts at the University of Murcia in Spain. The researcher welcomed participants and explained the different stages of the study and the tasks they would have to perform during the experiment. First of all, participants read and signed the consent form. Then, they were asked to answer to the Spanish validated versions for the following questionnaires:

1. Rosenberg Self-Esteem Scale (Rosenberg 1965);
2. Emotional Self-Regulation Questionnaire (Gross & John 2003);
3. Affect Intensity Measure (Larsen 1984);
4. The State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs 1983); and
5. Positive and Negative Affect Schedule (PANAS) (Watson, Clark & Tellegen 1988).

Next, they were told to translate into Spanish three English literary texts of similar difficulty according to the Flesch-Kincaid readability test (easily understood by 10 to 11-year-olds) and number of words (around 150 words). Student translators were given either a laptop or a PC with Internet access and three Word documents, one for each of the three tasks. The design of this study is a within-subject and Task 1 served as a control. Participants had to translate the three texts within different time limits: Task 1 was easy to be completed as no task limit was imposed; Task 2 was a bit harder to be accomplished as student translators were just given 10 minutes, and Task 3 was impossible to be accomplished as it had the same length as Task 2 but only 5 minutes were given to perform this task. Once the time for the last task was over, they had to complete The State Anxiety Inventory (STAI-state), Positive and Negative Affect Schedule (PANAS) and a brief questionnaire on their Affect Schedule (PANAS) and a brief questionnaire on their perceptions and feelings about their performance. In

addition, five salivary cortisol samples were taken at different stages of the experiment session. Once the experiment was over, student translators were thanked and debriefed.

The translation tasks are being assessed following the evaluation sheet used in Rojo & Ramos (2016, 2018) and Cifuentes-Férez & Meseguer (2018) as far as the dimension of accuracy is concerned: transference of meaning, transference of pragmatic function, and correctness and fluidity of the target text. Statistical tests will be performed to test whether student translators' self-esteem, affect, and emotion regulation play a role in dealing with time pressure in translation performance.

Although we cannot provide results yet, this strand of research can contribute to understanding how student translators cope with time pressure and how the way they feel and think about themselves and about what they think they can achieve may affect their performance in ways that they never thought of. We anticipate that this study will provide interesting insights into the relations between personality, emotions and translation performance as well as into the pedagogical implications of this research as we consider that it would be extremely important to include emotional intelligence (in particular, emotion regulation strategies) in our translation and interpreting classes. Fostering student translators' self-awareness of their general self-esteem, affect and abilities in regulating their emotions will help them to recognize their strengths and weaknesses, which in turn may result in improving their translation and interpreting performance.

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# **Interpreting children's voice: a study of the emotional tone and communicative intent**

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## **Background**

Although collaborative research aimed at improving language interpretation for minors is underway and is receiving increasing attention, little is known or has been written in scientific literature about the interpreting process from the perspective of how children themselves are voicing their emotions and their verbal/nonverbal communication offer a rather unexplored research topic. This article analyses children's voices by focusing on one of its more problematic features, namely, nonverbal communication and silences.

Not surprisingly, the recent influx of immigrants has brought with it a growing demand for appropriate and effective interpreting services offering a growing and challenging field of activity for interpreters who have to cope with sensitive situation. This very specific setting needs to be investigated by sharing expertise in how to deal with a child-centered approach.

## **Aims**

In a first stage, we wish to concentrate on questioning children in asylum hearings and particularly, on those interviews that are interpreter-mediated: what do children say? How are their responses translated?

In a second stage, we will investigate the needs existing in medical settings in interpreter-mediated consultations, effective communication between young patients and healthcare

professionals is essential. When they do not share a common language or communication method, communication presents a challenge. The objective of this study is to explore interpreters' perceived strategies in the interaction in interpreter-mediated consultations between healthcare personnel and patients/families.

Yet, several studies based on discourse and statistical analysis (Angelelli 2004, Gumperz, 1982, Flores et al. 2003, Mizuno 2008) have illustrated the potential consequences of faulty translations and have shown that inadequate interpreting services can negatively affect access to and quality of healthcare and may lead to serious health consequences. Several aspects in the communication between young patients and doctors in medical settings and the voice of migrant and refugee children hearings will be discussed in various settings. In the way children express themselves, they are not always aware of the fact that they are voicing their feelings. This section sets out to show what a discourse-analytic approach may bring into play resources that are particularly valuable for interpreting with children. Hence, our emphasis here will be on adjusting the language to the child's level and ways of speaking, in hearing and interpreting children's utterances.

## **Methods**

This study draws on an exploratory approach based on discourse analysis and on testimonies recorded in a report written by a UNICEF Belgium team on experiences from 170 migrant and refugee children with their families or unaccompanied from 36 nationalities in Belgium. Children talk about their experiences in their country of origin and their new environment, the disaster they fled for, the trials they endured on the way, their joy and sorrow. What do we mean by 'the child's voice'? This not only refers to what children say directly,

but to many other aspects Children's words describe a traumatic experience and reflect sometimes violent stories, fleeing by boat or truck, tell about exile and dangerous journeys, being exposed to abuse, exploitation, war and insecurity, and these children are often faced with violence.

We will be looking at difficulties in interpreting whilst focusing on problematic questions about children's life experiences in their country of origin, their likes and dislikes, sensitive questions about what they miss, their hopes and fears. The violence of war is not the only type of violence children talk about, some children may deal with hunger, poverty, corruption, ill-treatment, feeling nostalgic about the country of origin missing friends and loved ones, suffering ... Some repress memories, narrowing their attention to a specific traumatic event.

Interpreters play a crucial role in many investigative interviews with child complainants of sexual abuse. One challenge is to stick to the terminology that children use to describe rape and female genital mutilation. The interpreter has to know all these words and interpret as literally -but mostly- as faithfully as possible. This is also one of the most stressed interviewers' expectations with regard to interpreters. The interpreter is responsible for the language transfer, but it is up to the interviewer to decide on how to interpret the child-specific language. Professional interpreters need to be able to and also serve the best interests of children.

## **Conclusions**

The provision of language interpretation services for children, unaccompanied minors in healthcare settings and in a refugee context deserves special attention and care. Interpreting for children is a sensitive undertaking for which specialized skills are needed.

This paper examines issues arising from the lack of understanding of the role of interpreters, which may have implications for health and migration proceedings. The findings indicate that in addition to interpreter training, the adoption of best practice guidelines drawing on the National Institute of Child Health and Human Development (NICHD) child interviewing protocol is highly recommended.

### **Practical implications**

With this study, we hope to contribute to the understanding of the interpreter-mediated consultations, strengthen interpreters' abilities to better express the voices of migrant and refugee children.

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# **Describing the interpretation task: a stimulated-recall study of interpreters and interpreting students**

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In this presentation, I will present the results of a mixed-methods study designed to identify the conscious operations involved in language interpreting (Fondecyt Research Grant project number 11150591). Interpreting has been defined as a complex cognitive task, that involves simultaneous operations of bilingual comprehension, translation and production (Pöchhacker 2016). Previous qualitative studies have focused on identification of problem triggers and problem-solving strategies (Chang and Shallert 2007; Hild 2011; Ivanova 1999; Tiselius and Jenet 2011; among others) or the description of the interpreters' skills (Albl-Mikasa 2013). In this study, participants performed three L2 listening tasks: L2 listening for summarization, L2 listening for consecutive interpretation, and L2 listening for simultaneous interpretation, followed by a stimulated-recall session. Retrospective protocols were analyzed to elicit data about the interpreters' representation of the interpreting task and the task purpose.

## **Methodology**

A video-stimulated recall technique was used to elicit the participants' memory for the controlled processes involved in the interpreting task. In this technique, participants execute a task and subsequently recall the thoughts they had while performing it (Ericsson and Simon 1984/1993). A vivid stimulus is used as a retrieval cue or prompt to elicit the recall of the cognitive processes in operation during the task (Díaz-Galaz & Delso, submitted).

*Participants.* Thirteen participants (7 professional conference interpreters and 6 advanced interpreting students). All participants have Spanish as L1 and English as L2.

*Materials.* For the listening tasks, a pool of 20 short descriptive entries from a visual encyclopedia, which described general knowledge concepts (the Moon, dinosaurs, Golf, Insects, Soccer, etc.) were analyzed with the Coh-Metrix tool (McNamara et al 2014) to measure texts' word count, paragraph count, sentence length, word frequency, lexical density, lexical diversity, among others. Nine texts comparable according to textual criteria were chosen and consequently oralized into 90-second speeches by adding reformulations, pauses, hesitations, and other features typical of the conference lecture genre (Ventola et al., 2002). Praat software (Boersma and Weenink 2017) was used to determine delivery features on nine texts, such as duration time, number of syllables, number of pauses, phonation time, speed of delivery, among other measures. The nine speeches were video-recorded by a female American English native speaker.

*Procedure.* Participants performed first a practice block of the three L2 listening tasks to become acquainted with the procedure. Then the three tasks were performed in two sets, separated by a 10-minute break. The order of presentation of the speeches was counterbalanced.

### **Data analysis**

Following guidelines by Ericsson and Simon (1984/1993) and Gass and Mackey (2013), a first revision was conducted to identify Level 3 verbalizations, hindsight reports, as well as interventions from the experimenter and the ensuing response from the participant. These verbalizations were excluded from the analysis in order to ensure the validity of data (Díaz-Galaz and Delso submitted).

*Coding.* Qualitative data analysis was conducted following guidelines from Grounded Theory methodology (Glaser and Strauss 1967) and Ericsson and Simon framework for protocol analysis (1984/1993). Three coders independently conducted a first round of open coding of the entire data set. In this stage, initial codes were assigned to designate phenomena associated to participants' conscious operations during the interpreting process. In a second round of axial coding, the three coders independently worked in finding preliminary patterns in the data. Finally, selected codes from the initial coding were further developed and described. At each stage, the coders worked independently, and after the first round of open coding, weekly sessions were conducted to share and agree on codes and categories. Discrepancies among coders were resolved by discussion with the aim of arriving at consensus or a majority decision.

## **Results**

The protocol analysis allowed for the description of the participants' task purpose and task schema when listening in the second language to present a monolingual summary in the L2 and to interpret into L1.

*Listening for summarizing.* The listening purpose is to present a general idea of the oral text.

*Task schema.* The L2 listening for summary task scheme can be described as a comprehension process aimed at producing a general idea of the source speech. No memory effort is devoted to retaining specific terms or figures. Attention is allocated to identify the text's main idea and to establish coherence and the global structure of the text. There is no evidence of audience projection.

*Listening for interpreting.* The task purpose is to produce an accurate and complete translation of the source speech.

*Task schema.* The L2 listening for interpreting task is a composite process that entails comprehension in one language, reformulation and production in another language. During comprehension, L2 lexical items trigger a search for a translation equivalent. If no translation equivalent is available, reformulation strategies are deployed to re-express the meaning by paraphrasing, synthesizing, or omitting the information, among other solutions. Some of the comprehension strategies applied are the use of prior knowledge to judge the plausibility of statements in the source speech, to find translation equivalents, or to determine the adequacy of translation equivalents; visualization is another strategy used to support comprehension. There is awareness of producing a target speech adequate to the communicative situation according to a projection of the audience's shared knowledge and communicative needs. The entire process is directed by metacognitive awareness of planning, monitoring and evaluation of performance against the task purpose.

These results provide an empirical basis for new research on the cognition of interpreters, for example, about the rules of procedure that guide the interpreters' reasoning; the role of mental imagery in supporting the process; the representation of the audience in the interpreters' mind, among others. The presentation will include excerpts from the protocol data to illustrate the categories.

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# **The effect of ideology on the production and perception of simultaneously interpreted political discourse**

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This project attempts to synergise two disciplines: Critical Discourse Studies (CDS), with a focus on right-wing populism, and Interpreting Studies. Its aim is to investigate the influence of ideologically loaded interpretation on the listener's perception of the original speaker, as well as the influence of interpreters' own political views on their interpretations of ideologically loaded texts. In this talk I would like to discuss the methodological principles of my research project, with the hope of fine-tuning the procedure consisting of three parts, described in detail later: a critical analysis of authentic recordings from the European Parliament, a discourse reception experiment, and an interpretation production experiment.

The European Parliament presents a unique context for analysing political discourse. During plenary sessions, Members of the European Parliament (MEPs) representing the citizens of member states of the European Union debate matters of international importance. They often do so in one of their native languages, certain that simultaneous interpreters will communicate their message to all of Europe. There can be no doubt that interpreters are crucial actors in this communicative act. These potentially imperfect interpretations may shape the perception of MEPs' arguments by their colleagues.

The traditional model of the interpreter as a conduit, a neutral machine that should not distort the source message in any way (e.g. Kaufert et al., 2009, p.238), is the ideal in such

institutional contexts. Interpreters' professionalism is measured by how precisely and impartially they pass on the speaker's message. The reality, however, may diverge from this ideal classic model. During their work, interpreters are constantly influenced by a variety of interrelated contexts: the immediate textual context of the speech, the context of the communicative event, and the broader socio-cultural context (Diriker, 2004, p. 13). These contexts can be expected to influence the linguistic decisions that interpreters make, especially considering that there is rarely one-to-one lexical or semantic correspondence between languages (Beaton-Thome, 2013, p.394). The resulting interpretation is unlikely to be "neutral"; it will always be, more or less consciously, negotiated between the ideology behind the source text, the demands of the social context and the interpreter's own views. Therefore, interpreters should be seen not only as those who help to communicate a message but also as actors who co-construct it. As active participants in discursive processes, interpreters may be expected to have an influence on the shape of political discourse. For instance, interpretation might play a role in the normalisation of right-wing populist discourse (Krzyżanowski and Ledin, 2017).

Critical Discourse Studies is an inherently interdisciplinary approach to language as a social phenomenon (Wodak and Meyer, 2009, p.2) concerned with pressing issues of social inequality that emerge in discursive practices (van Dijk 1993, p. 252). The discourse-historical approach (DHA), one of the methodologies within CDS, aims to "demystify' the hegemony of specific discourses by deciphering the ideologies that establish, perpetuate or fight dominance". In doing so it describes the self-contradictions and inconsistencies within texts and discourses, as well as the manipulative character of discursive events (Reisigl and Wodak, 2009, p.88). These approaches have been rarely applied to interpreting. Boyd and Monacelli (2010, p.57) express their surprise with this fact,

bearing in mind how much of interpreters' work involves political discourse, a frequent subject in CDS. Perhaps this is the result of the persistence of the conduit model in discourses on interpreting. Angelelli's (2004) detailed study of interpreters' roles revealed that the "theoretical professional mandate" of impartiality clashes with many interpreters' perception of having agency and being "visible" when interpreting. However, some participants of Angelelli's study (2004, pp.78-79) saw neutrality as a sine qua non of professional interpretation, reflecting the pervasiveness of the conduit model in interpreter training and in the meta-discourse of the profession.

The classic conduit model has been slowly but continuously contested by studies such as Angelelli's (2004) and Diriker's (2004), which focused on interpreters' position as professionals working within a broader socio-cultural context. Monacelli (2009) built on these studies by researching the face-threatening nature of conference interpreting which requires from interpreters a constant negotiation of their position. Face threats in interpreting were further studied by Bartłomiejczyk (2016), who took as her subject plenary debates in the European Parliament. Finally, Beaton-Thome (2007; 2013) pioneered the application of CDS to simultaneous interpreting in her analysis of interpreters' agency and the strengthening of EU's institutional hegemony through interpreting, and developed it in her study of interpreters' lexical negotiation during European Parliament plenary debates on the Guantanamo Bay camp.

My study follows these first steps in synthesising CDS and Interpreting Studies. In line with Beaton-Thome's (2013) results, it is hypothesised that interpreters will employ strategies of generalisation, for example by using a narrower range of generic lexical variants in the target text as compared with the large number of ideologically salient lexical variants in the source text.

In the initial stage of the study, authentic recordings of right-wing populist MEPs speaking in English and Polish, as well as the respective interpretations into Polish and English, will be transcribed and analysed for ideologically loaded lexis and linguistic strategies using the methods of DHA. A critical qualitative analysis of source texts and their interpretations using methods of the discourse-historical approach should reveal patterns of positive or negative bias in language use when discussing a controversial topic. The results of this analysis will lead to the construction of a heavily ideologically loaded text in Polish which will serve as a stimulus for the reception and production experiments which follow.

The second stage of the study will involve a discourse reception experiment. Its aim will be to investigate whether ideological differences in the interpretation of a political speech influence the listener's perception of the original speaker; and to correlate this perception with the listener's own political views, as measured with a self-designed questionnaire. The text resulting from stage one will be translated, using the lexis and techniques discovered in stage one, into three English versions: positively biased, neutral and negatively biased towards the topic being discussed. The experiment will involve participants listening to a recording of either the Polish original or one of the English translations simulated to sound like a simultaneous interpretation. Subsequently, the participants will be asked to assess the original speaker's communicative

intent. After the experiment, the participants will be asked to fill out self-designed questionnaires on their political views. The collected data will be analysed to examine differences in perception of the speaker depending on the interpreter's bias towards the topic. This will also be correlated with the participants' political views expressed in the post-experimental questionnaire.

In the final stage, a production experiment will be conducted. Polish-English interpreters with at least 3 years of professional experience will be asked to interpret a recording of the Polish source text used in stage two, assess the speaker's communicative intent, and fill out questionnaires on their political views. Their interpretations will be recorded, transcribed, and analysed for positive and negative bias similarly to the texts in stage one. The results of this analysis will be correlated with the results of the questionnaires on political views and the intent assessment.

Considering the scarcity of research on simultaneous interpreting in Critical Discourse Studies, this project would provide valuable insight into the discourse-constructing role of interpreters. While the few previous CDS studies on interpreting have been mostly concerned with analysing existing texts, this experimental study could offer a different perspective and a better understanding of the influence of interpreters' political beliefs on the lexical choices they make. It would also serve as a critical voice questioning the conduit model of interpreting which prevails in institutional guidelines and the profession's meta-discourse.

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# **Advance translation as a means of improving source questionnaire translatability? Findings from a think-aloud study for French and German**

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This research project is embedded in questionnaire translation in cross-cultural survey research. In large-scale multilingual surveys, the source questionnaire is known to be the cause of a number of translation problems and errors during the final translation phase. For minimising such problems, the European Social Survey (ESS) has carried out, since its 5<sup>th</sup> round in 2009, systematic ‘advance translations’ (AT) in order to detect such problems before finalising the source text. For doing so, national ESS translation teams, consisting of both translators and survey researchers, carry out translations of a pre-final version of the source questionnaire, with the purpose of spotting translation problems. These comments are considered when finalising the source questionnaire.

The problems pointed out include intercultural ‘adaptation’ issues, that is, factual or cultural elements that will not be fieldable in multiple target languages and countries in a comparative manner if not adapted to each culture; or, grammatical syntactical structures requiring complicated translations into a specific target language that may have a negative impact on the comparability between all resulting final translations when fielded.

Changes in the source text triggered by such ‘advance translations’ range from rephrasing source text elements to adding footnotes to explain ambiguous source text terms or providing guidance on how to deal with such intercultural adaptation needs.

Although advance translations have been implemented in the ESS and other cross-cultural surveys for almost ten years, there has been no empirical evidence of their usefulness for actually improving source questions’ translatability. For filling this gap, the author tested the usefulness of this method in a series of think-aloud tests: 12 experienced questionnaire translators translated 22 questionnaire items (or ‘questions’) – in their version before and after the advance translation – into French and German, 6 translators were French native speakers, 6 were German native speakers. For methodological reasons, the thinking-aloud was combined with targeted retrospective probes. The think-aloud sessions (about 48 hours in total) were video- and audio-recorded and transcribed, resulting in 264 think-aloud protocols.

These think-aloud protocols were analysed quantitatively and qualitatively by applying a mixed method approach: For the quantitative analysis, the author first coded the utterances in MaxQDA; she had developed a coding scheme for this particular research project, and this scheme was confirmed in an intercoder reliability check by a second coder. The codings were then analysed statistically by calculating a chi-squared statistic across all 22 items. The qualitative analysis consisted in summarizing and comparing the observations made by the author.

The overall result of the think-aloud study was positive: the main research hypothesis had been that advance translation makes source items of a cross-cultural survey easier to translate. This hypothesis was supported by the quantitative analysis of the think-aloud study as the chi-squared statistics calculated across all 22 questionnaire items showed a significant improvement of the source text's translatability in the version after advance translation compared to the version before advance translation.

There were two secondary research questions: (a) whether the type and number of comments made in the advance translation had an effect on the success of advance translation, and (b) whether the choice of language(s) of the advance translation and of the think-aloud sessions had an effect on the results. The qualitative analyses of the think-aloud study enabled these questions to be answered. While it could not be shown that the type or the number of comments made during advance translation had an effect on the success of advance translation, the choice of languages in both the AT and in the think-aloud study did have a clear effect: the advance translation comments had been made in Swiss-French and Polish (items originating from the 5<sup>th</sup> round of the ESS) and Czech, Turkish and German (items from the 6<sup>th</sup> round of the ESS), and the think-aloud study was carried out into German and French. It could be shown that the closer the languages of advance translation and think-aloud study were, the higher the success of thinking-aloud detecting similar problems as advance translation; in addition, it could be shown that the solutions implemented after advance translation in the final ESS source questionnaires that turned out to be successful in the thinking-aloud study had rather been triggered by similar or identical AT languages than from more distant ones; in this study, both French and German (that is, the languages of the thinking-aloud study) had been amongst the advance translation

languages in the ESS, while Czech, Polish and Turkish had not been languages of the thinking-aloud sessions. For the latter languages it could be shown that the changes made after advance translations in these languages were less likely to be found useful by the French and German thinking-aloud translators, and this effect was reinforced by an increasing distance of the cultural and social contexts from the thinking-aloud languages (with Turkish being most distant from French and German in cultural and social terms).

This think-aloud study showed the usefulness of advance translation only for one particular constellation: the questionnaire items in the source version resulted from two ESS rounds and were made in Polish and Swiss-French (ESS round 5) and in Czech, German and Turkish (ESS round 6); the thinking-aloud was carrying out while translating into French and German. Findings from thinking-aloud were on the one hand important for identical languages in advance translation and thinking-aloud for testing the replicability of comments made and the effectiveness of the solutions implemented after AT. On the other hand, where languages and cultures between advance translation and thinking-aloud are more distant, thinking-aloud is useful to assess whether the solutions found after advance translation had resolved issues also on a more general level, that is, for languages and cultures other than those of the advance translation.

Based on these findings, the following recommendations were deduced from this study: advance translation should be carried out in as many different languages and cultures (or at least language and culture groups) as possible in order to detect a maximum of issues. In addition, thinking-aloud should be carried out both in identical and distant cultures and languages compared to advance translation. This will not only allow to test (a) the replicability of advance translation comments and

whether the issues had in fact been tackled for the language in which they had been made (case of identical AT and thinking-aloud languages), but also (b) whether these solutions meant an improvement also for other target languages and/or cultures and were thus useful on a more general level for the multilingual survey project (case of distant AT and thinking-aloud languages).

The conclusions also consider whether thinking-aloud was a valid method to test the usefulness of advance translation for making the source questions easier to translate. Thinking-aloud, in combination with retrospective probing, was found to be an appropriate method for assessing the impact of advance translations in the European Social Survey (ESS). The possibility to quantitatively analyse the thinking-aloud data allowed to test the main research hypothesis, that is, whether advance translation had indeed enhanced the source items' translatability. The qualitative analysis of the relatively high amount of thinking-aloud data provided a detailed picture of the way in which the changes made after advance translation impacted the translatability of the source text and to address the secondary research questions.

The presentation will first describe the method of advance translations as applied in the ESS. Second, the think-aloud study (including elements such as selection and instruction of translators, technical equipment or the coding scheme), its analyses and results will be presented and discussed, and conclusions drawn, adding limitations of this research and an outlook on further research needed.

# **Language dominance, directionality, and experience: mapping decision making processes**

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## **Introduction**

In the past decade, there have been important advances in directionality in translation. There has been an increase in the number of studies dedicated to reviewing this previous “elephant in the room.” Not everyone recognizes the fact that inverse translation (translation into the second language of use, or weaker language, or secondary language) might not be the ideal direction of translation, however, it is practiced on a daily basis. In addition to review articles, some empirical data have been collected to analyze the variables that play different roles during the tasks (Ferreira, 2013; Ferreira et al., 2016, 2018; Whyatt & Kosciuczuk, 2013; Pavlovic, 2007, Hunziker Heeb, 2016). Some variables could potentially account for trends in the translation process. This paper aims at discussing results from an ongoing study that has been conducted with professional translators of English and Spanish working in their L1 and their L2.

## **Present Study**

Using eye-tracking technology and behavioral measures, we investigate certain variables that indicate more cognitive effort in a specific direction of translation, such as pupil dilation, saccades, mouse events and key press events among professional translators. Importantly, we take into account language dominance and experience as factors to enhance our understanding of language processing during translation.

Eleven ( $N = 11$ ) English native-speaker translators and eleven ( $N = 11$ ) Spanish native-speaker translators were recruited from an agency in Los Angeles, California. Both groups consisted of 8 females and 3 males and ranged in age from 29 to 81 years old ( $M = 51.7$ ). Participants were tested individually and reported no discomfort in the procedure. They were allowed to take breaks whenever they felt necessary. They first signed the consent form and filled in a demographics and a language questionnaire. After being informed about the procedure and becoming familiarized with the keyboard and the internet browser, the participants translated on a laptop one text from Spanish into English. Translog was used to register the keyboard movements and a remote eye-tracker device (Tobii Pro X2) was used for recording eye movements for fixation-based analyses. Both source texts (in Spanish and in English) were taken from Ferreira et al. (2016). The text in Spanish contained 189 words and was about the “electronic tongue,” a sensor device for artificial assessment of taste and flavor of coffee. The text in English contained 187 words and was about the behavior of crumpled sheets in which it explained how the size of the sheets changes in relation to the force they withstand. After translating each text, retrospective protocols were recorded by using the *Replay* function in Translog.

## Hypotheses

1. Time is an indicator of cognitive effort and IT takes longer than DT;
2. Mouse events, saccade index, and gaze index are indicators of cognitive effort and a mouse clicks, saccade, and gaze index are higher in IT; and
3. Individual experiences and language dominance/use impact effort exerted during DT and IT.

Results indicate that in DT, time was correlated to mouse events, the saccade index, and the gaze point index (translators who spent longer time also presented more mouse events and higher saccade and gaze point indices in DT). In the IT, time was correlated to gaze event duration, gaze point index, and mouse events. There were also correlations for saccade, fixation, and mouse events in IT.

Although previous studies (Ferreira et al., 2016, 2018) suggested that language direction might have an impact on time spent in DT and IT tasks, the present study demonstrates that individual differences related to language experience and dominance must be considered when analyzing translators' performance. Our sample is formed by a heterogeneous group in which professional translators' age and experience vary, which might impact our analyses. Results must be discussed in further detail.

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# Analyzing metacognitive knowledge and uncertainty management through TAPs

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Imported from the field of cognitive psychology, TAPs (Think-aloud Protocols) (Ericsson & Simon 1980; 1993) is a research method used to get a verbalized account of a participant's cognitive processes while s/he is performing a task. Thus, this method implies that a participant self-reports what is in his/her STM (short-term memory) (Ericsson & Simon 1993), which allows researchers to know how s/he makes sense of and solves problems as they arise. Therefore, TAPs have been used in translation process research to investigate what goes through translators' mind while they are translating.

By using TAP as a research method, this study analyzes data from 59 participants with some basic knowledge of post-editing and with different years of translation experience to investigate how TAP may provide an insight into these participants' cognitive processes while performing a monolingual post-editing task (Koehn 2010) of a machine-translated (Google Translate) text from English into Brazilian Portuguese in order to find evidence of metacognition (Flavell 1976; 1979). Based on Angelone's (2010) results, this study also investigates indicators of metacognitive activity associated to uncertainty management by checking patterns in behavior (problem recognition, solution proposal and solution evaluation). In our study, data was collected using Translog-II, Tobii T60 eye

tracker, free and guided written protocols, although the data collected through these methods will not be analyzed here.

According to Flavell (1976), metacognition is defined as “one’s knowledge concerning one’s own cognitive processes and products or anything related to them” (Flavell 1976, 232), i.e., in a process of self-monitoring. Based on this concept, Flavell (1979) proposes a model of metacognitive monitoring that includes four components: (a) metacognitive knowledge, (b) metacognitive experiences, (c) goals (or tasks) and (d) actions (or strategies).

Flavell (1979, 906) states that “Metacognitive knowledge is that segment of your (a child's, an adult's) stored world knowledge that has to do with people as cognitive creatures and with their diverse cognitive tasks, goals, actions, and experiences” (Flavell 1979, 906). It “consists primarily of knowledge or beliefs about what factors or variables act and interact in what ways to affect the course and outcome of cognitive enterprises” (Flavell 1979, 907), that is, it is what people know about their own and other people’s cognitive life. Metacognitive experiences “are any conscious cognitive or affective experiences that accompany and pertain to any intellectual enterprise” (Flavell 1979, 906). Goals (or tasks), in turn, “refer to the objectives of a cognitive enterprise. The actions (or strategies) refer to the cognitions or other behaviors employed to achieve them” (Flavell 1979, 906-907).

This investigation aims at analyzing participants’ transcribed TAPs and classifying the type of metacognitive knowledge among the instances identified in the transcript: knowledge of person variables, task variables, and strategy variables (Flavell 1979). When defining these categories, Flavell (1979, 907) affirms that “The person category encompasses everything that you could come to believe about the nature of yourself and

other people as cognitive processors”; it is the understanding that a person has about his own abilities. The task category “concerns the information available to you during a cognitive enterprise” and “is an understanding of what such variations imply for how the cognitive enterprise should best be managed and how successful you are likely to be in achieving its goal” (Flavell 1979, 907), that is, it is your perception of task difficulty (specificities, time to perform, kind of task) and how to manage successfully in order to finish it. Finally, the knowledge of strategy is the “knowledge that could be acquired concerning what strategies are likely to be effective in achieving what subgoals and goals in what sorts of cognitive undertakings” (Flavell 1979, 907).

In a process-oriented translation study, Angelone (2010) explores the concept of metacognition in uncertainty management by analyzing TAPs and screen recordings of a professional translator and three translation students who translated a fifty-word excerpt from a travel guide from German into English. Uncertainty, according to the author, is defined “as a cognitive state of indecision that may be marked by a distinct class of behaviors occurring during the translation process” (Angelone 2010, 18), being associated with an interruption in flow of translation, that is, a pause, due to a translation problem. Uncertainty management, in this case, is “the application of conscious, deliberate strategies for overcoming comprehension, transfer, or production indecision” (Angelone 2010, 19). To perform this analysis, the author verifies participants’ indicators of metacognitive activity associated to uncertainty management by checking patterns in participants’ metacognitive activity at the textual level (lexis, term, collocation, phrase, syntax, sentence, macro-level feature), at the behavioral level (problem recognition, solution proposal and solution evaluation) and at the locus of translation activity (comprehension, transfer, production). Angelone’s

(2010) results indicate that TAPs are useful to analyze metacognitive activity as it relates to uncertainty management processes. Angelone's (2010) results also indicate that expertise can influence uncertainty management and there can be differences in the way professional translators and translation students manage uncertainty.

The results of this study point to the importance of TAPs as a research method by showing evidence of participants' metacognition, that is, participants' knowledge of their own cognitive process. The transcribed TAPs demonstrate that the participants are aware of the effort spent to perform the task; they recognize the nature of the task they perform, and know how to deal with problems and when to adapt strategies to solve them. Furthermore, the results from this study corroborate Angelone's (2010) findings that expertise can influence uncertainty management and show that professional translators manage uncertainty differently from translation students and semiprofessionals. Finally, the results point to the pedagogical potential of using TAPs in translation classes by allowing the teachers to check students' metacognitive capacity, to help them improve it and thus contribute to the development of translation expertise.

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# Teaching, learning and translating *Komposita* (DE-ES)

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Our starting point is the reading or comprehension stage of the technical translation process. In translation, as in other disciplines, the reading or comprehension process is the first and most important step in the delivery of an accurate finished product. In the case of technical translation and in the German>Spanish language combination, one of the most frequent problems among non-German speakers would be the comprehension of plurilexematic compounds (*Komposita*). That is why in this investigation we are interested in understanding at what point in the reading process the comprehension phase of plurilexematic compounds would be affected. For this purpose, we have designed a questionnaire taking as reference the interpretative model (Hurtado Albir, 1990:71) who points out the following phases:

- 1) Decoding
- 2) Understanding
- 3) Reexpression

We begin with the fact that we understand the plurilexematic compound as a small textual unit in which information is condensed that must not only be decoded, but also understood and interpreted in a certain context. Therefore, our main objective is to identify the phase or phases that cause the most problems among students of translation studies during the process of reading plurilexematic compounds. In addition to the main objective, it is important to highlight the following secondary objectives:

- Understand how the students separate the plurilexematic compounds, bearing in mind that this separation would be focused on looking up separate items in dictionaries.
- Identify the types and characteristics of images that would help students understand the technical concept.
- Check whether the students in the last exercise (corresponding to the interpretation phase) would need visual or textual support in the target language in order to choose one or another option.

In order to test the hypothesis, a questionnaire has been designed that will be carried out between the months of March and June during the course of Scientific-Technical Translation (German-Spanish) at the University of Cordoba. On the other hand, and in terms of the number of subjects that will participate in the questionnaire, it will vary between 50 and 80 students. With regard to the methodology, it is of an empirical nature, by means of a multiple-choice questionnaire in which, using a quantitative and rigorous procedure, we intend to locate the most frequent problems among the students when facing these types of grammatical structures.

For the first part of the questionnaire we have taken Mendoza's model of the reading process as a reference; we will focus mainly on the first phase of decoding. In this decoding phase, the students will use their linguistic and phonological knowledge to try and recognize the words that appear on the paper; based on this knowledge, they will then break down the plurilexematic compound as if they were searching for it in a dictionary. As for the chosen terms, the plurilexematic compounds consist of between two and four units of meaning; this will help us to identify the types of plurilexematic compounds that are the most complicated for the students.

The first part will consist in the identification of the formants of ten plurilexematic compounds related to the field of wind energy. The students will receive four different alternatives of how the compounds can be separated, but only one of them will be suitable. Our objective in this first part of the questionnaire is to analyse how students separate the different formants from the plurilexematic compound. In this stage of the investigation we will check if, depending on the separation that has been made in the previous exercise, this would affect the subsequent exercises related to identifying the relationship between words-image and translation.

The second and third part of the questionnaire will be based on Monterde's scheme (Monterde, 2004: 67), namely on the representation of specialised knowledge. According on this scheme, we transmit knowledge to our receiver both by the concept or object to which that knowledge refers and by its corresponding linguistic or non-linguistic forms; that is, both the concept and the objects, the linguistic and non-linguistic forms interrelate and complement each other so that the receiver of the message can have a complete view of the knowledge to be transmitted. Based on this premise, using the questionnaire we intend to determine whether we would be right in affirming that non-linguistic forms help students in their understanding of the concept.

With regards to the structure of the second part of the questionnaire, this will be divided into two parts: the first part with the definitions of the formants; and the second one with images that refer to each one of the *Komposita*. With respect to the third part, the ten plurilexematic compounds will appear in the third part of the questionnaire in a contextualized sentence extracted from recent German studies in wind energy; the students will have to choose the *Kompositum* that they believe to be the most accurate, always taking into account the context

of the last exercise and the images and definitions of the previous one.

Finally, bearing in mind both the definition and the concept, the third exercise aims to check the understanding of the concept of the source language, which in this case, is German. Students should choose the one that best suits them from the four options available, taking into account both the concept defined in the previous exercise and the image to which the concept refers.

The data obtained will be analysed and contrasted with data collected in a previous questionnaire based on similar characteristics in order to delimit the problems more accurately and be able to provide a more accurate solution to them.

This research also opens up new horizons related to the didactics of plurilexemic compounds by helping the students to understand them better through the use of not only linguistic but also non-linguistic forms such as images, in order to aid understanding of the concept.

### **Keywords**

Komposita, image, didactics, comprehension, translation

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# **The impact of audio-visual speech input on work-load in simultaneous interpreting**

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Conference interpreters face various sources of visual input during their work: the speaker's facial movements or gestures, reactions from the audience, presentations, charts, notes, etc. But what is the role of visual input in simultaneous interpreting? Beyond providing clues to the meaning of what the speaker is saying, does visual input reduce work-load in simultaneous interpreting? Far from perceiving this additional visual information as increasing their work load, interpreters insist on having access to visual information and in particular visual contact to the speaker which is also part of the recommendations of the International Organization for Standardization . This is in line with psycholinguistic research suggesting that audio-visual speech facilitates speech comprehension by resolving the ambiguity in the auditory signal . Previous research on visual input in simultaneous interpreting, however, has failed to observe any facilitating effects on interpreting performance or physiological effects of visual input on simultaneous interpreting (or suggested only a very limited beneficial effect) possibly due to methodological issues. The aim of this study was to investigate the impact of visual input and in particular visible lip movements on simultaneous interpreting using a systematic and controlled approach. Based on previous research, I hypothesized that audio-visual speech should have a facilitating effect on speech comprehension and therefore should lower work-load in simultaneous interpreting. As I could not be sure whether audio-visual speech really has an impact on work-load in simultaneous interpreting or not, I introduced a second variable

known to affect work-load in simultaneous interpreting, namely white noise that is added to the source speech and makes it partially unintelligible. The experiment contrasted thus simultaneous interpreting from English to German in four conditions: audio-visual speech without background noise, audio-visual speech with background noise, auditory-only speech without background noise and auditory-only speech with background noise.

The main study ( $N=31$ , 17 listeners and 14 interpreters) was preceded by the pretest, a word recognition task, in order to determine the participants' individual signal-to-noise ratio where participants correctly identified 75% of the stimuli. Pupillary responses, response accuracy and response time during the pretest were statistically investigated. The signal-to-noise ratio that resulted from the pretest was then applied to the speeches during the main experiment. In the main experiment, participants orally translated four speeches. After each speech, participants estimated the speech duration, rated the video and sound quality, the text difficulty and the speech rate and finally answered five text-related questions. A control group of listeners matched for their level of English was included in order to control for possible task effects. The effects of audio-visual speech and white noise on pupil sizes, duration estimations, general ratings, text-related questions and (for interpreters only) fundamental voice frequency, silent pauses, translation accuracy and cognate translations were analyzed.

On the whole, the findings did not support the hypothesis that audio-visual speech input lowers work-load in simultaneous interpreting. No effect for audio-visual speech input was found when analyzing duration estimations, general ratings, text-related questions, translation accuracy and cognate translations. The analyses of general ratings, text-related questions, translation accuracy, however, showed an effect for

background noise added to the speech, suggesting that those indicators are in principle sensitive to increases in work-load. The only indicator that hinted towards a facilitating effect of audio-visual speech in simultaneous interpreting is silent pauses: long silent pauses were more frequent when no audio-visual speech input was provided. Their number increased even more when white noise deteriorated speech intelligibility. For fundamental voice frequency and pupil dilations even the opposite pattern was found. Fundamental voice frequency rose faster during simultaneous interpreting with audio-visual speech input. Pupil sizes decreased over the time-course of the speech. During simultaneous interpreting with audio-visual input, this decrease was less pronounced than in the auditory-only condition. Surprisingly, background noise did not affect pupil sizes. Comparing listeners and interpreters, an effect of task was found in participants' ratings, text-related questions and pupil dilations. Listeners rated speeches as being less difficult than interpreters and gave on the whole more correct answers to text-related questions than interpreters. Moreover, listening was associated with a larger decrease in pupil sizes than simultaneous interpreting.

The fact that audio-visual speech input had no or very little effect on performance or perceived difficulty in simultaneous interpreting as indicated by translation accuracy, cognate translations, recall accuracy or the participants' ratings of text difficulty may be explained by predictions. During simultaneous interpreting, interpreters draw on the available speech context and their world knowledge in order to anticipate the next speech segments. This is very different to word recognition where the target word cannot be predicted and where lip movements can provide crucial clues. Anticipation during simultaneous interpreting may explain why interpreters do not seem to benefit from the speaker's lip movements. This, however, does not necessarily mean that audio-visual speech

induces higher work-load in simultaneous interpreting. Increases in pupil dilation or fundamental voice frequency are associated with higher arousal and commonly interpreted as a work-load indicator, larger pupil dilations or higher voice frequency meaning higher work-load. In the present study, pupil sizes were larger during simultaneous interpreting with audio-visual speech, but not during simultaneous interpreting with background noise, a factor having been found to affect performance and participants' ratings. In the light of this pattern, the results may be interpreted in terms of general arousal without necessarily being linked to work-load. Interpreters may simply be aroused when the speaker's face is moving compared to a static face. One concept that might provide some explanation in this regard is the notion of *sense of presence* (for the notion of sense of presence, see Moser-Mercer, 2005): Seeing the speaker's face may help the interpreter to immerse in the situation and thereby increase her task engagement.

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# **How do legal translators and lawyers understand legal texts? A mixed methods study investigating reading comprehension patterns in expert and learner groups**

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## **1. Introduction**

The understanding of texts is driven by presuppositions developed before or at the start of the reading as well as by inferences during reading. Cognitive approaches distinguish between bridging inferences (necessary) and elaborative inferences (optional). Whilst the former ensure a coherent representation of the text, the latter are predictive and based on world knowledge and anticipation of the utterance's intended meaning (Dijk & Kintsch, 1983; Kintsch, 1988; Kintsch & van Dijk, 1978; Rickheit & Strohner, 2003). The successful construction of presuppositions and inferences allows the reader to build a holistic mental model of the text situation as well as the extra-textual (communication) situation (Rickheit & Strohner, 1999; Rickheit, Weiss, & Eikmeyer, 2010; Schwarz-Friesel, 2008; Wolfer, 2017).

Legal translators deal with texts that place particular demands on the reader owing to their legalized abstract content, as well as to their institutionalized, complex text structure. This applies even more when the text is written in a foreign language and originates from another legal order.

Presuppositions include expectations regarding typical structural and linguistic text features and regarding the communicative situation, the institutional function of the text, and the legal and real-world context. These presuppositions determine the extent

and the speed of inferences during the subsequent reading process. Within the translation process, the translator must first understand the legal source text in all its dimensions. Generally, legal translators are not legal experts, so we assume that they read legal texts with a different focus than lawyers. Moreover, we believe that reception processes develop with increasing competence and that experienced legal translators read more ‘through the lens of the lawyer’.

A mixed methods study including think aloud protocols (TAP) and eye tracking investigates the reading processes of professional legal translators, legal experts, students in translation and legal studies. In this paper, the topic is narrowed down to reading patterns providing insight into the construction of presuppositions and inferences. These main questions are addressed: Do legal translators build different presuppositions and inference processes from legal experts? Do they show different reading patterns? Does increasing legal (translation) competence have an impact on these processes?

## **2. Methodology and Text Material**

For the investigation, we opted for a convergent parallel mixed methods design (Creswell, 2015; Creswell & Plano Clark, 2011; Morgan, 2014) giving priority to the qualitative strand (think-aloud protocols) and less emphasis on the quantitative component (eye tracking data).

The 23 total participants included 4 legal experts, 5 professional legal translators, 5 law students, and 9 legal translation students (both student groups were master’s level). All participants were native German speakers with French in their language combination. In the experiment, they read four texts (approximately 300 words each): two judgements from the French High Court of Justice (Cour de cassation) and two extracts from French civil and commercial codes. The experiment comprised

two task settings: The first consisted in reading silently one judgement and one excerpt from the French Code civil and then summarising the content of each when the texts were displayed a second time. For the second task, another judgement and law excerpt were displayed only once and had to be summarised immediately, that is without a preceding reading process. The participants were asked to think aloud while they rendered the content. French was the texts' source language, and German was the language of the summaries and think-aloud-protocols.

During all the experimental phases, eye movements were recorded with an eye tracker (Tobii T120 and Tobii TX300), and the participants worked at their own pace without any time restriction or reminders to relaunch the TA process (Ericsson & Simon, 1993; Göpferich, 2008). After the experiment, they completed a questionnaire about their profile data and their knowledge in the experimental stimuli's respective fields of law.

### **3. Data Analysis**

A data analysis was performed according to the parallel mixed methods approach. Qualitative and quantitative data were collected concurrently and then analysed and interpreted separately for each strand before merging the results. The TAPs were transcribed using f4transkription software to register the precise time stamp of each utterance. For data analyses, the utterances were coded with QDA Miner. Because of technical or data quality issues, not all data sets could be fully exploited for analysis (21 TAPs and up to 23 eye tracking data sets, depending on the focus of analysis). The TAPs were analysed following the structured qualitative content analysis (Kuckartz, 2016). To identify presuppositions and inferences, the utterances were coded and categorised as metacomments, explicitations and translations. Hesitation phenomena, fillers, as well as intonation were coded to analyse patterns of comprehension

and content rendering (Corley und Stewart 2008; Defrancq und Plevoets 2017; Pfeiffer 2015). The categories were interpreted qualitatively with regard to the type and the elaborateness of the utterances. They were also quantified in order to determine the frequency of certain categories. Due to the low number of highly specialised participants, a quantitative analysis of the eye tracking data raises validity issues. Therefore, eye tracking data were subjected to a limited quantitative analysis and a qualitative analysis. A data analysis and a comparison were carried out for the subgroups of translators versus lawyers, students versus experts and on all four subgroups where appropriate.

#### **4. Exemplary results and summary**

The mixed methods approach appears to be relevant for the investigation of comprehension processes. Regarding TAP, the data sets confirm the restrictions mentioned in the literature (Ericsson & Simon, 1993; Göpferich, 2008), which is that the overlay of mental processes in experiments with TA during a cognitively demanding task consequently decreases metautterances about cognitive processes. Therefore, the coding and analysis of metacomments, of source text explicitations and of text translation elements has proved its worth in revealing presuppositions and inference processes. Results from the content analysis suggest that translators summarise more often on a language level than lawyers, particularly when text complexity is increasing and the task does not imply a preceding reading process. This applies, for example, for text structuring markers that are translated more often by translators than by lawyers. Nevertheless, in a more complex task these elements are translated more often in both groups, so they might serve as an ‘anchor’ in the comprehension process.

The total processing time per text and task suggests—and thereby seems to confirm the respective results from TA—that translators take longer with tasks whereas lawyers seem to work more according to the ‘good enough principle’. Regarding the judgement in the second task (summarising without preceding reading process), the lawyers finished their task an average of 4 minutes earlier than translators. Furthermore, the analysis of fixations on a structuring marker defined in an AOI indicates that presuppositions built by lawyers control the reading process differently than those constructed by translators. During the first silent reading of the first court judgement, lawyers seemed to fixate on a structuring marker introducing the operative part of the judgement very early in the reading process. This suggests that they search for the court decision before going back to the factual and legal considerations. By contrast, translators seem to proceed in a more linear way, fixating on this textual element later in the process. This result is also confirmed by the second judgement (reading process and summary within the same task). In a second step, results were compared between the syntactically and legally complex judgements (Grass, 2000) and the law texts, implying different patterns of syntactic and legal complexity (cf. Höfler, Uhlmann, & Boxler, 2017). Similar findings suggest that different presupposition and inference construction processes can be observed more between translators and lawyers and, to a lesser extent, between students and experts.

Identifying different comprehension processes of specialised translators and experts in the fields can offer valuable conclusions to enhance the training of translation experts. Because a very specific participant profile is required, future research should include more languages (to gain more participants) and supplemental investigation methods to get deeper insight in specialised text comprehension.

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# Using anaphoric pronouns to investigate the mental processing of reference chains in German Easy Language

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German Easy Language is a controlled variety of the German language. It can be seen as equivalent to the English concept of Easy-to-read. It was originally developed to increase participation for people with cognitive disabilities but is now used to help different kind of target groups that include people who – for various reasons – have difficulties to read and understand the standard German language. These include people with learning difficulties, cognitive disabilities, people with dementia or aphasia, people with prelingual hearing impairments or deafness, illiterates, and people learning German as an L2.

Since the ratification of the Convention on the Rights of Persons with Disabilities in 2006, German Easy language has a legal basis. Other legal regulations (Act on Equal Opportunities for Persons with Disabilities, Web Content Accessibility Guidelines 2.0) require the authorities to provide information in Easy Language (EL). This legal framework increased the visibility of the concept in Germany.

There are two ways of producing a text in EL: A text is either written in EL from the beginning, or, in most cases, existing information is translated into EL. As the source text and the target text address two different groups of recipients, translating from German standard language into EL classifies as intralingual translation in the sense of Jakobson (1959). In order to incorporate EL into the field of intralingual translation,

EL as a linguistic variety needs to be refined in a consistent, rule-based, and controlled way. For this purpose, guidelines were developed by different organizations in collaboration with the primary target group, people with cognitive disabilities. However, most of the guidelines lack a substantiated linguistic basis. Scientific exploration is still in its infancy and empirical research is rare.

The four existing main guidelines (Netzwerk Leichte Sprache 2014, Inclusion Europe 2009, BITV 2.0 2011, Forschungsstelle Leichte Sprache (Maaß 2015)) state rules concerning the general appearance and structure of the text but also different subcategories and specific elements of texts like references and anaphoric expressions. Guidelines regarding the text as a whole are very miscellaneous. For instance, the Federal Ministry of Labor and Social Affairs (German BMAS) contains rules on general references within and across a text that can be interpreted as referring to coherence establishment by intratextual references: Avoid references. Do not refer to other text segments. Do not refer to other texts (BMAS 2014: 50). In contrast, Maaß (2015) states that references within the text are not only allowed but essential (2015: 129). Also, the use of pronouns is regulated: Be careful when you use pronouns. [...] Make sure it is always clear who or what the pronoun is talking about. If it is not clear then use the proper name instead. (Inclusion Europe 2009 :15) or in Maaß (2015): Third person personal pronouns must be replaced by the noun they are referring to.

Facing those contradictions in the guidelines, it is necessary to systematically integrate findings from empirical research on text comprehensibility and speech reception processes into EL research. Coherence establishment and cohesion as a central element of communication play a large role on this account.

Reference and anaphoric expressions establish links on the linguistic surface of texts. The same is true for any means of cohesion. As a result, references in EL texts can be seen as a means of cohesion that help the reader to establish coherence. Here, the problem becomes obvious. Some guidelines forbid those means of cohesion (references, coreference chains and anaphoric pronouns) in an implicit or explicit way. This can impede the comprehensibility of the text. These coreferences and anaphoric pronouns are replaced by repeated items and names used in a redundant way. In communication theory, redundancy is defined as repeated mentioning of information. Redundancy makes it easier for the reader to memorize information and thus can increase comprehensibility of the text. However, it is not clear to what extent redundancy has a beneficial effect for the reader or, in other words, to what extent excessive redundancy impedes coherence establishment, as redundancy in EL texts comes along with avoidance of anaphoric pronouns and reference chains. Gordon et al. (1993) investigated the conditions under which a reference should rather be realized as a pronoun than a repeated name or item. They found that in a coherent discourse backward references are preferably realized as pronouns rather than repeated items or names. In the cases where a backward reference was realized with a repeated name or item, reading times of subjects increased. Pronouns are particularly suitable for the research on local coherence establishment, as they are interpreted in relation to recently presented information (antecedents) and therefore trigger natural coherence processes. The stronger local coherence is in consecutive statements, the higher the probability that readers are also able to establish global coherence by accessing recently processed information in their working memory. (cf. Schnotz & Dutke, 2004) It is not clear, whether this is also true for the primary target group or any other target group of EL.

In general, reading times decrease during reading as new material is being connected to prior material, that means coherence establishment is performed, which facilitates reception. Redundant items functioning as backward references cancel out this effect, as do sudden semantic or structural modifications in the text (cf. Haberlandt 1984). The readers interpret these modifications as a new text beginning, meaning that the reader has to establish coherence all over again, which increases reading time. Gordon et al. (1993) describe the increased reading times after usage of a redundant item or name as backward reference as repeated-name-penalty. The repeated-name-penalty serves as a basis for the following hypotheses.

As German Easy Language claims to be better comprehensible for everyone, the project will approach the problem from two sides.

Two groups of participants will hear a natural EL text. The first group consists of German as L2 learners who, according to the Common European Framework of Reference for Languages (CEFR), have a competence level below B1 (A1 or A2). The control group consists of German native speakers. Natural EL texts manipulated in terms of number of anaphoric pronouns and number of repeated items will be used in three conditions (only repeated items, no anaphoric pronouns – repeated items and anaphoric pronouns – repeated items, partial recurrences and anaphoric pronouns). AOs are nouns as antecedents, partial recurrences of the antecedents and respective pronouns. Stimuli will be controlled for frequency and distance between antecedent and pronoun. While hearing the text, EEG is recorded. Both groups will answer comprehension questions after the task.

I assume that the target group (L2 learners) benefits from the avoidance of reference chains and anaphoric pronouns only to a certain point. German Easy Language texts are 'oversimplified' for this target group. I also assume that repeated items and the concomitant unnatural syntax interfere with the subjects' processing of the text, which impedes coherence establishment. A repeated-name-penalty is expected for both groups, but more distinct for the control group.

The aim of the study is to identify neural correlates in connection with the repeated-name-penalty and to rethink some of the postulated rules for EL. It will serve as a first step to the empirical foundation of German Easy language rules. In the presentation, I will focus on the concept's state of the art, the existing empirical research in the field and the theoretical outline of the experiments.

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# **Exploring the affective dimension in translator education: towards a multidisciplinary approach to trainees' self-perceptions**

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The affective dimension in translation education seems to have been under-researched, probably due to the challenges that its incorporation into translator education programmes entails (Way, 2009). Even though there has been a growing interest in constructs related to the branch of Translation Studies known as Translation Psychology in the past few years, further research is required into this topic (Hubscher-Davidson, 2013), especially from an educational perspective (Haro-Soler, 2017). Similarly, learner attributes have been documented in the field of language teaching (Hall, 2017) and it has been suggested that their beliefs are crucial elements to foster meaningful and significant learning experiences. In this context, exploring translator trainees' beliefs, i.e. social representations (Moloney & Walker, 2012), could provide additional elements that could help develop translator competence as well as foster a meaningful learning experience.

This presentation aims to present some advances in the field of self-perceptions in translator education. With this aim, we will present two studies performed at undergraduate levels in two different settings: the University of Granada (Spain) and Universidad de Santiago de Chile (Chile).

The first of these studies (Haro-Soler, 2018) deals with translation students' self-efficacy beliefs. Its main aim is to identify teaching practices that may affect translation students'

confidence in their ability to translate (self-efficacy beliefs) and to analyse the type of influence (positive, negative or none) and the intensity of the influence that these practices can have on students' self-efficacy beliefs. To achieve this main aim, an empirical study was performed in two phases. In the first phase a qualitative study of focus groups was carried out to identify teaching practices which may have an impact on students' self-efficacy beliefs through the perceptions of the two agents involved in the teaching-learning process (teachers and students). More specifically, 6 teachers and 14 students participated in a total of 4 focus group sessions.

The second, quasi-experimental, phase of this study compares three groups of a subject in the Degree in Translating and Interpreting of the University of Granada: Specialised AB Translation (Spanish-English) (TEAB). It is a quasi-experimental field study as it is conducted in the translation classroom, despite the limitations and difficulties that this entails. This second phase uses mixed methodology through four research techniques: interviews, classroom observation, questionnaires and focus groups.

Firstly, semi-structured interviews were conducted with the teachers of each of the three groups in our study prior to the start of TEAB. These interviews allowed us to identify practices, amongst those that each teacher would use in the group that they each teach, that may impact on students' self-efficacy beliefs in line with the information gleaned from the literature review in the first part of the thesis and the results provided by the first phase of our empirical study. We also decided to register through classroom observation how these practices were implemented in the classroom and, as a result, verify that they corresponded to the information provided in the prior interviews.

Our survey, in the form of a questionnaire, was distributed at the start and end of TEAB to ascertain the development (or not) of the students' self-efficacy beliefs. Our questionnaire specifically included a section with the Translator's Self-efficacy Scale that was designed and validated as part of this research (Haro-Soler, 2018).

Lastly, after TEAB had finalised focus groups were organized for each of the three subject groups included in the quasi-experiment performed. The qualitative data collected here has allowed for the understanding and interpretation of the results collected (mainly quantitatively) in the questionnaires.

Triangulation of the results obtained through the four research techniques used in the second phase of our research has allowed us to perform a detailed study of the student participants' self-efficacy beliefs and of the impact (positive, negative or none) which different practices had on this development. Thus, this research will be able to offer translator trainers a set of guidelines as a basis for incorporating the development of students' self-efficacy beliefs explicitly and in a structured way during their training.

The second study is an attempt to examine the configuration of translators' professional identity in Chilean undergraduate students. The research will be carried out from a phenomenological perspective (Gallagher, 2009; Gallagher & Zahavi, 2012), placing a strong emphasis on each of the participants' experiences and their appropriation by analysing their narratives. In addition, data interpretation will be done from a post-modernist approach (Arciero & Bondolfi, 2009), highlighting the role of corporality, temporality, ipseity and selfhood, while also considering the basics of identity theory (Burke & Stets, 2009). The key issues that intends to be address are the point when trainees begin regarding

themselves – or rather feeling like – translators, and the role self-efficacy plays in such a process.

Consequently, a non-probabilistic, intentional sample of 9 participants of a translation training programme are followed during the last three years of their studies to determine the evolution of three dimensions: the professional translator, self-efficacy and potential development. Semi-structured interviews are conducted individually in Spanish at regular intervals during each academic year. Interviews are audio recorded, transcribed and later analysed using the constant comparative method.

Initial preliminary results of the first year of study suggest that learners start to gain more confidence and higher level of freedom as to their potential professional future as they intertwine theoretical and practical knowledge in addition to vicarious learning. However, there is a sense of uncertainty towards their own self-efficacy, which is present in the two data collection points. There appears to be a double anchorage: on the one hand, fear and duty trigger anxiety, while on the other, agency empowers them ask and engage with their studies actively, though with difficulty.

It is concluded that the information generated from the aforementioned research can be useful in two ways. The first one is the potential impact on improvement in translator training programmes, by providing additional input to plan learning outcomes, lessons and tasks. The second one is that provides critical information on trainees' mental health and allows prompt attention to their concerns and issues. Both perspectives could certainly improve the learning experience.

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# Teachers' feedback, rubrics and translation students' self-efficacy beliefs

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In this presentation we will share the results of an empirical-descriptive study which was performed with the following general aim: to identify methodological approaches, teaching practices and didactic resources that allow translation teachers to help their students develop realistic self-efficacy beliefs, in other words, to help them become aware of and trust their real ability as translators. To understand this general aim we must bear in mind that research on self-efficacy beliefs to translate is relatively recent in the field of Translation Studies and that several authors (Fraser 2000, Atkinson and Crezee 2014, among others) have underlined the need to empirically identify teaching practices that allow for the incorporation of self-efficacy beliefs in translator education programmes in a structured way. We must also take into account the effects that self-efficacy beliefs can bring for students according to the Social Cognitive Theory (Bandura 1997): they can increase motivation, facilitate decision-making, influence career choice and personal development, and allow for the control of emotional states, such as anxiety, which could prevent students from making the best use of their internal resources and thus hamper problem resolution.

Our general aim divides into the following specific objectives:

a) To analyse teachers' and students' perceptions of the impact that feedback from teachers can have on students' self-efficacy beliefs, and to understand the reasons of their perceptions.

b) To analyse the influence that rubrics can have on translation students' self-efficacy beliefs when they are used as a formative assessment instrument, as well as when they are used as a summative assessment instrument.

c) To compare the two situations described in objective b), and to analyse the reasons of the influence rubrics can have on students' self-efficacy beliefs depending on the way in which they are use (for summative or formative purposes).

To meet these aims a two-phase empirical study was performed. Firstly, a qualitative study of focus groups was organized to collect and analyse the perceptions of the two groups involved in the teaching-learning process (teachers and students) regarding the impact that teachers' feedback can have on students' self-efficacy beliefs. More particularly, four focus groups were organized, in which six teachers and fourteen students of the Faculty of Translation and Interpreting of the University of Granada participated.

Secondly, we performed an empirical study based on the comparison between two groups of a subject of the four-year undergraduate Degree in Translation and Interpreting of the University of Granada: Group 1 (G1) and Group 2 (G2) of the subject Introduction to Specialized Translation. This is a semester-long compulsory course taught in the third year of said degree. In G1 teachers used rubrics for formative purposes, whereas in G2 rubrics were used as a summative assessment instrument by teachers.

Different research techniques were implemented in this second phase of the study: classroom observation, the focus group, the interview and the survey. Before the beginning of the subject, interviews were made to the teachers responsible for the two groups in which our study would be performed. Moreover, we

recurred to classroom observation in order to specifically register how rubrics were used in each group (for instance, the frequency with which rubrics were used by teachers or the conditions in which they were delivered to students, etc.).

The survey materialized in two questionnaires: one distributed at the beginning of the subject and the other distributed at the end, in order to ascertain the development (or not) of the students' self-efficacy beliefs. Both questionnaires specifically included a section with the Translator's Self-efficacy Beliefs Scale designed and validated by Haro-Soler (2018). The questionnaire distributed at the end of the subject also included several questions on the students' perception of the type of influence that rubrics had had on their self-efficacy beliefs to translate (positive, negative or none), the intensity of this influence and the reasons why rubrics had affected or not their confidence as translators.

Furthermore, after the subject had finalised, focus groups were organized for each of the two subject groups involved in the study performed. The qualitative data collected here has allowed for the understanding and interpretation of the results collected (mainly quantitatively) through the questionnaires.

The results obtained show that, according to the teachers and students participating in this study, constructive feedback can positively influence students' self-efficacy beliefs, since students use information from feedback to self-regulate their learning, attain achievements (mastery experience, Bandura 1997) and thus develop the confidence they have in their abilities to translate. The results also show that when rubrics are used as formative assessment instruments they have a stronger positive influence in the students' self-efficacy beliefs than when they are used for summative purposes.

## **Keywords**

translator education, self-perceptions, self-efficacy beliefs, feedback, mixed methodological approach

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# The influence of experiential aspects of meaning on the translation process

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This presentation is concerned with the processing of language during the translation process and how translation behaviour is affected by lexical and supra-lexical linguistic features. The focus will be on the Systemic Functional Linguistic concept of participant role (Halliday & Matthiessen 2014). Participant roles have similarities to the categories of thematic roles in more other accounts of grammar (e.g. Fillmore 1968; Jackendoff 1992). Syntactic and morphological cues such as word order help with the thematic category assignment which in turn makes sentence comprehension possible. In translation, contrastive differences are a possible complication during the translation of participant roles because English allows a wider range of referents as agents in subject position than German does (Hawkins 1986) and there are other language specific preferences for participant roles and associated process for the description of the same state of affairs (Matthiessen 2001). Similar to Alves et al. (2010)'s, Silva and Pagano (2017)'s and Heilmann et al. (2018)'s work on grammatical metaphor this study thus investigates the impact of Systemic Functional concepts on the translation process and thus helps to find evidence for the psychological reality of these categories. Halliday assumes that experiential and logical meanings plays a foregrounded role in translation (Halliday 2001, 16). The underlying categories and functions such as participant roles can be hypothesized to feature prominently in the translation process. In order to do this, I annotated six source texts according to guidelines of the Cardiff Grammar (Fawcett

unpublished), a dialect of Systemic Functional Linguistics with a more cognitive linguistic perspective than Hallidayan SFL. The data for the analysis stems from the study SG12 in the CRITT Database (CRITT 2017). The behavioural measures of the study were collected with a remote eye-tracker (a Tobii TX300 with a sampling rate of 300hz) via Translog-II, which was also used for key stroke logging. Only data from translators with more than 2 years of professional experience were considered for analysis. I annotated three grammatical tiers: 1) grammatical functions (subject, complement, adjunct), 2) participant roles and 3) what kind of phrase or clause realized the subject. These parallel annotations are functioning as control variables in the later analyses. For example, the participant role of *phenomenon* in the Cardiff Grammar can be realized as a clause (I like *to eat ice cream*) or as a nominal group (I like *ice cream*). Thus, the effect of translating a nominal group vs a clause had to be controlled for statistically to avoid conflating their processing with that of a participant role. Table 1 shows a grammatical analysis of a clause using all three tiers of analysis discussed above.

<b>Source Tokens</b>	Killer   Nurse	receives	four   death   sentences
<b>Grammatical Function</b>	Subject	Fin. Main Verb	Complement
<b>Participant roles</b>	Affected-Carrier	Process	Possession
<b>Rank</b>	Nominal Group		Nominal Group

Table 1: Example of the three-tiered annotation structure used for analysis.

The syntactic analyses were conducted with the help of the UAM Corpus Tool (O'Donnell 2008). This tool allows a multi-layered analysis of linguistic data and the result can be exported in .xml or spreadsheet format. The exported annotations were post-processed with a Python script that

aligned the annotation from the UAM Corpus tool with the translation process data from SG12. Reading data and keystroke data for target and source tokens from the Translog-II files were aggregated to that of the area of interest i.e. participant roles (see Table 2).

<b>ST Annotation</b>	Affected-Carrier	
<b>Source Tokens</b>	Killer	nurse
<b>Reading Time Source Token</b>	182	9709
<b>Reading Time Area of Interest</b>	9891	

*Table 2: Example of the aggregation of word based process measures to the unit of interest*

In total 81 participant roles were identified in the source texts (only main clauses were annotated, no embedded or subordinated clauses). The three most frequent roles were Agent with 17 occurrences (21 %), Affected with 12 occurrences (14.81 %) and carrier with 10 occurrences (11.11 %). This shows a predominance of action-type processes (or material processes in traditional Systemic Functional terms). I compared reading measures (e.g. Total Fixation Duration and a number of Keystroke measures e.g. Duration, Pauses) for the participant roles found in the data. The hypothesis was that there are behavioural differences between the different participant roles, which could be indicative of different processing mechanisms for different participant roles. In addition to the control variables of rank and grammatical functions, lexical features such as word frequency and lexical density were controlled for to see if there is an effect of participant roles on behavioural measures that is independent of lexical features. I used (generalized) linear mixed effects modelling for the analyses because this statistical technique

allows a multivariate analysis of dependent measures. The analyses did not provide sufficient evidence to support the hypothesis that there are processing differences between different participant roles during the translation process. The lexical measures used as controls, did show significant effects that were consistent across most measures, and this may be an indication that translational effort is rather a characteristic of the features of lexical items rather than the relatively abstract structural- semantic characteristics of the clause such as participant roles.

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# Multi-modal estimation of cognitive load in post-editing of machine translation

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Even though machine translation (MT) systems are improving rapidly, the resulting translations currently still require manual post-editing (PE) to make them conform to their intended objective (e.g. for publishing). PE has the potential of inducing high cognitive load (CL) on the translator: it involves continuous scanning of texts, including source, the incrementally evolving final translation output and possible error-prone MT output for mistakes, (sub-)strings that can be reused, text that has already been translated, text that still needs to be translated, etc. Here, we see CL as “a variable that attempts to quantify the extent of demands placed by a task on the mental resources we have at our disposal to process information” (Chen et al., 2016). While CL and MT quality are interrelated, they cannot be considered equal: for example, the number of similar mistakes that have been corrected by the translator again and again in the past may impact perceived CL, while the MT quality remains the same. Therefore, it has been argued that CL is a more decisive indicator of the overall effort expended by post-editors (Vieira, 2016). Being able to robustly measure CL during PE would enable computer-aided translation (CAT) tools to intervene when high loads are detected, e.g. by suggesting breaks, or providing alternative translations, thereby avoiding overload of post-editors. The automatic capture of CL without interfering in the PE process would also enable the creation of large datasets of CL scores

for (source, MT, PE) tuples, that could be used to optimize MT systems to produce output inducing lower CL on the post-editors. Furthermore, translators could better balance jobs inducing different effort, or even be paid based not only on time or words, but also on CL.

To provide first steps towards these goals, we are concerned with the question of how to actually estimate CL during PE. For this, we analyze a wide range of sensor data, many of which have not previously been applied in the context of PE of MT: we use subjective measures, behavioral measures and physiological measures, in particular, eye-, heart-, and skin-based features. *Subjective measures* are based on the assumption that subjects can self-assess and report their cognitive processes after performing a task. For this, we adapted a CAT tool to ask for a subjective CL rating using the scale proposed by Paas and van Merriënboer (1994) after each segment. *Behavioral measures* can be extracted from user activity while performing a task. Especially interesting in the context of PE, where the translator does not move a lot, is focused on the screen, does not speak, etc., are mouse and keyboard input-based features. Therefore, our most basic sensor is a key logger storing all keyboard and mouse input during PE. The higher-level pause features Average Pause Ratio and Pause to Word Ratio by Lacruz et al. (2012), which were shown to correlate with PE effort, are automatically calculated from the keyboard events.

*Physiological measurements* assume that human cognitive processes can be observed in the human physiology. For *eye-based* features, we integrate a remote Tobii eye tracker 4C with the Pro SDK to record the raw gaze data, detect the amount of blinking (van Orden et al., 2001), and compute the average fixation amount and average saccade durations (Doherty et al., 2010; Moorkens et al., 2015), all of which have been shown to

be indicators of CL. Furthermore, we calculate the probability of visual search (Goldberg and Kotval, 1999), which was used to find user interface flaws, and last, we also capture the pupil diameter (O'Brien, 2006) and calculate higher level features like the frequency of rapid dilations (Demberg and Sayeed, 2016) on it, which is more robust to changes in illumination. We also integrate a web-cam that is used to calculate the eye aspect ratio indicating the openness of the lids (Soukupová and Cech, 2016). For *heart-based measures*, we integrate a Polar H7 heart belt and measure the heart rate, the RR interval and the two measures of heart rate variability (Rowe et al., 1998), namely the RMSSD and SDNN. Furthermore, we use the Garmin Forerunner 935 sports watch to be able to compare wrist-worn, and thereby more realistic measurements of cardiovascular measures to the more precise breast-worn heart belt. For the *skin-based measures*, we integrate the Microsoft Band v2, a small bracelet offering a variety of sensors, including a galvanic skin response (GSR) sensor. As described in detail in Chen et al. (2016), three features are calculated from the raw data: the accumulated and average GSR as well as the average in the frequency domain. Apart from these consumer-level wristbands, we also use the Empatica E4 wristband for heart- and skin-measurements, as it is approved for clinical trials and should therefore offer higher quality data, which we see as an early glimpse of the data quality achieved by future consumer smartwatches. We further add a webcam to record images at a fixed interval which we use to estimate basic emotions based on a trained neural network available through a Microsoft API. Furthermore, we use a Kinect v2 to capture the body posture, since for example the head pose has been shown to correlate with CL (Asteriadis et al., 2009).

Apart from the sensors, we need to generate translations for our experiments that contain realistic error types. For this, we used a neural MT system (Gehring et al., 2017) trained on

English-German parallel data and use a subset of the WMT 2017 news translation task. We establish a set of 30 sentences for our study by (a) using sentences of different TER intervals, (b), reducing this set based on manual error analysis, and (c) further shrinking the set based on subjective CL ratings from two translation master students. We then conducted an experiment with professional translators to see whether we can automatically determine the CL perceived during PE and whether our multi-modal approach facilitates the CL measurement process. For the study we use the 30 sentences in a counter-balanced order to avoid tiredness effects, and ask the participants again for subjective ratings. Overall 10 professional translators participated, 5 freelance and 5 in-house translators. We equip them with all the above sensors and calibrate the eye-tracker. As input possibilities, a standard keyboard and mouse are used, and a 24-inch monitor displays the SDL Trados Studio 2017 CAT environment.

We analyze the gathered data in two respects: first, we use the approach by Vieira (2016), who investigated correlations between eye, pause, and time features to understand how different measures of CL relate to each other. One should note here that we analyze a lot more features than Viera, so we aim to both reproduce and extend Viera's findings. In particular, we investigate the correlations between the same measure produced by different sensors, e.g. how similar is data captured by an actual heart belt compared to wrist-based cardiovascular measurements, that would be easily applicable in practice? We then also perform a principle component analysis to investigate how the different types of measurements cluster and thereby detect redundancies in the data. Second, we not only look at correlations and clusters, but instead try to estimate the subjective ratings of perceived CL based on a combination of the different measures of CL to investigate the feasibility of automatically gathering CL values for segments through

different sensors. For this, we use linear mixed effect models to also capture inter-translator differences.

Based on our initial data analysis we report how well the different measures correlate to each other and to subjectively perceived CL. Furthermore, we see that stacking up multiple modalities to estimate perceived CL improves the overall estimation, thereby showing that it is worth capturing data from multiple modalities simultaneously. However, further data analysis is needed to gain more detailed insights.

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# **Translation of words written in different types of scripts: the case of Japanese**

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The translation of Japanese into an Indo-European language implies particular linguistic difficulties at the lexical, grammatical and, above all, syntactic and textual levels (Enrich, 2010; Muñoz, 2014). While all these difficulties exist, to a lesser or greater degree, in the translation of any other language, Japanese presents a unique difficulty, which not even present in Chinese: its intricate writing system. Considering that the translation task has its origin in the decoding and recognition of words, which play a vital role in the transmission of meaning, it is important to delve into the cognitive aspects involved in reading Japanese. This is of greater interest when it is taken into consideration that Japanese, unlike Chinese, is a language whose orthographies uses simultaneous scripts that represent syllables (kanas) and morphemes (kanji) (Taylor & Taylor, 2014).

A highly debated issue, with very different positions and evidences, has to do with the linguistic nature of the kanji, their cognitive processing compared with the kanas (Matsunaga, 1996) and their role as semantic facilitators (Perfetti, 2003, Chen, 2007). Some studies (Vanness, 2005, Perfetti, 1992) argue that the role of phonology is key to the semantic access of words written in kanji and the processing of kanas. The difference would only lie in the moment in which the phonology is activated (Perfetti, 2003). This has led to the idea that the use of kanji does not represent any advantage in the facilitation of semantic access, as other studies have proposed

(Matsumoto, 2013, Chen, 2007; Osaka, 1990, Yamada, 1991). If this were the case, then we should not find any difference when translating words written in kana or kanji, because the semantic access would occur in an indistinct way, regardless of the script used.

The objective of this work is to determine if the use of one or the other script would facilitate the translation of Japanese. For that, we designed an experimental study in which we exposed a group of basic Japanese learners, who had studied the language for 4 semesters to new words exposed in each of the scripts. Then, a translation task was administered. Words written in kanji and kana were randomly presented on a screen and participants had to choose among four options the appropriate equivalent as quickly as possible by pressing a key. The stimuli were controlled in length, concreteness, imageability and frequency. The accuracy and the response time were measured. Tasks were created and presented using PsychoPy software. Each participant was tested individually during a single session lasting approximately 75 min. A variance analysis showed there was no significant difference between the participants. In addition, there was no statistical significant difference in the response time between the words presented in kanji and in kana, nor in the accuracy of the responses.

A translation task like the one performed in this study reveals some aspects of cognitive processing in reading and translation of words written in kanji versus kana. First, the null difference found in the response times could indicate that there was no facilitating effect from the words written in kanji, as has been argued. This is because the words written in kana were translated as quickly as those written in kanji, although these simply represent syllabic sounds, while the others assume meanings. A second aspect to consider is that the translation

was into Spanish, which presents a transparent writing system, i.e. a strong relationship between grapheme and phoneme. Several studies (Komori, 2007, Tamaoka, 1997, Chikamatsu, 1996, Koda, 1996, 1999) have concluded that the reading strategies of the L1 are used in reading the L2 regardless of the type of writing system involved. Therefore, it would have been expected that the words written in kanas would be recognized more quickly than those written in kanji. However, no such effect was observed. It is concluded that the findings of this study could have implications in the design of course units that hone reading skills in translator trainees as well as other experimental studies.

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# **Expert behaviour in English-Chinese sight translation: an integrated eye-tracking study**

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Sight translation (ST) is unique in that the interpreter relies solely on reading for information retrieval — and therefore more easily influenced by distinct linguistic structures of different languages — while under the pressure of instantaneously providing smooth oral rendition of the output (Chen, 2015). Unearthing the cognitive nature of ST will not only help to enrich our understanding of translation and interpreting as highly demanding communicative activities, but also has the potential of enlightening interpreter training, facilitating the development of ST skills. However, most ST studies to date, especially in the language pair of English and Chinese, are based on product analysis (for example, see Agrifoglio, 2004; Chang, 2008; Chiang, Kuo & Chen, 2009; Her, 1997; Lambert, 2004; Lee, 2012; Viezzi, 1989). While we have accumulated valuable data on the differences between the performance of interpreters at different levels, what happens in the process — how experience leads to distinct behaviour of the experts — remains largely unknown; being able to identify the nuances may provide insights into boosting the efficiency and effectiveness of training.

To complement product-based research, the current study used an eye tracker to examine English-Chinese ST. Through an integrated analysis of both the cognitive process and the final output, this study aimed to reveal the impacts of interpreting experience upon different stages of ST, including the behaviour of reading ahead and pausing and also how the output has been affected. Three texts of 175 words were adapted from

three speeches by the same speaker. Rewriting was kept to a minimum to maintain the authenticity and features of formal speeches in a diplomatic setting. Each participant was asked to perform three different tasks: silent reading (SR), reading aloud (RA), and ST. Two senior AICC interpreters were invited to rate the ST recordings of 17 experienced interpreters, all with more than 150 days of interpreting experience, and 18 interpreting students, who had undergone sight translation training within three years by the time of the experiment. In addition, six Chinese native speakers were recruited to listen to the recordings and mark observable pauses for further analysis.

Overall, this study partly corroborates previous research in that the reading purpose does affect reading behaviour, and ST requires significantly more fixations and time in total than SR and RA (cf. Göpferich, Jakobsen & Mees, 2008; Wang & He, 2018). However, some striking similarities between tasks were observed as well, including similar behaviour for SR and ST in the initial reading stage, comparability between RA and ST in later reading stages, and the same amount of rereading induced by SR and ST — the last of which seems counter-intuitive and contradictory to previous findings (cf. Shreve, Lacruz & Angelone, 2010). The results have shown that analysis of various stages of reading reveals more intricate nature of the cognitive tasks involved.

In terms of ST, experts showed significantly better quality than trainees — contributed by accuracy alone, not expression style (including fluency). On the other hand, the task time, total number of fixations, and the number of words uttered were statistically similar, as were the mean fixation duration for all stages of reading. This shows that a short period of ST training was already sufficient to bring many features of trainee's behaviour and output to the same level as those of the experts. Looking closer at the behavioural data, the two groups

remained on par in terms of the amount of reading ahead to acquire information before they started sight translating the text. Trainees strictly adhered to the principle of 'starting as soon as possible', while some of the experts were more relaxed and took more time, albeit not statistically significant, to skim the text. Still, the equally high score on expression style for the experts reflects that interpreting experience might have allowed the interpreters to better manage the audience's expectations and helped them to squeeze more time for preparation without turning it into awkward silence before they began.

However, once the participants opened their mouth, the two groups exhibited different — and statistically significant — patterns in every aspect covered in this study. Experts relied on fewer fixations and spent less time on information retrieval ahead of each utterance (defined as a Chinese character here); the number of observable pauses in the process were fewer, and the average length of each pause was shorter, along with fewer fixations therein. A separate analysis on certain selected participants further indicates that, while trainees showed a significant higher percentage of hesitation pauses than their juncture pauses, experts were able to limit their hesitations and finished the experiment with a similar percentage for both types of pauses.

In this study, interpreting experience exerted its influence on accuracy and the behaviour of reading ahead and pausing once sight translation began. Interestingly, experts were not more concise or more efficient in reading. Instead, the major difference seems to lie in language flexibility. Experts' flow of interpretation was rarely disrupted because they required significantly less time and information to keep reformulating the source content and reorganising their sentences for a smooth rendition.

## **Keywords**

sight translation, eye tracking, integrated analysis, expert behaviour, reading ahead, pause

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# **Evaluation of Microsoft's Skype Translator: A dialogue-oriented conception of an analysis model in the language pair Catalan-German**

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Automatic language processing, auto speech recognition and MT are seen as helpful innovations in daily life. At the same time, progress on this field is perceived critically. This makes the continuous evaluation of those systems necessary, but most evaluation models require human judgments.

Along this present PhD project, I will look into the fundamental question of what impact such technologies could have, using Microsoft's Skype Translator as case study.

The key questions can be subdivided into smaller units in the area of socio-linguistics and language technology:

- Are real-time translation services already capable today of transmitting conversations between two participants in an acceptable, almost functioning way?
- What does functioning conversation mean in this context?
- What consequences does it have for languages like the Catalan, if such technology is used?
- How do such technologies as the Skype Translator, based on the previous question, shape the notion of minority languages and their relationship to each other as well as to "larger" languages?

In addition to all these questions, there is always an unspoken general concern of the entire LSP industry to be no longer needed in a few years' time. This concern, whether justified or not, will also be taken into consideration during the investigation.

The dissertation project basically focuses on two research areas, which are related to each other within the elaboration. From a technological point of view, this is the Skype Translator, a free, real-time machine translation service implemented in Microsoft's Skype instant messaging and Internet communication software. Currently, it provides the real-time MT of voice (and video) calls within the language combinations Arabic (Levantine), Chinese (Mandarin), English, French, German, Hindi, Italian, Japanese, Portuguese (Brazil), Russian and Spanish. In addition, more than 50 languages are available for real-time MT in text chat. (Kannenbergh 2016)

According to Skype and Microsoft, the Skype Translator uses the API of the Microsoft Translator, which has been available for quite some time. It is used in Microsoft's search engine Bing and the user help Cortana in Windows. The Microsoft Translator - and thus also the Skype Translator – make both use of statistical and neural machine translation, whose training data feeds on the available user input. Thus, it can be assumed that the output and performance of the Skype Translator might improve over time. The translation of spoken language is also supported by in-house speech recognition and processing technology, which can be tested alongside the Skype Translator in a separate service ([www.translate.it](http://www.translate.it)).

The sociolinguistic area of investigation is the broad and sometimes not always unambiguously identifiable field of minority languages (Zabrocki 1970; Gerhards 2011). The autonomous region in northeastern Spain is recently trying

anew to achieve a secession from Spain, which lately seems to be an iconic phenomenon all over Europe: Catalonia and the Basque Country in Spain, Flanders in Belgium, South Tyrol in Italy, Scotland within the United Kingdom. The question of identity between the nation state and regional government arises everywhere, which is also reflected in the language policy and the status of the language within national politics (Naglo 2007).

The questions above are investigated on multiple levels. On top of the theoretical grounding in the field of language technology and sociolinguistics, the focus is set on a three-part practical design of the PhD project: an online survey on the general use of Skype, an eye tracking-based case study of the Skype Translator and the subsequent corpus-based evaluation of the language data collected along the way. The survey on the user experience has already been carried out in summer 2018. It was sent to several major universities (103) in Germany. Due to demographic individual indications, however, it can not be ruled out that individuals other than the student target group participated in this survey. The evaluation is still running and first results are in progress.

In the course of the eye tracking-based case study, a cohort of students at the University of Leipzig will then serve as subjects. There are two conditions to fit as participants: First, they must be German native speakers. Second, they should have no or only little knowledge of Catalan.

In a conversation via Skype and having the Skype Translator activated, these students contact a Catalan native speaker to ask her/him about the hypothetical scenario of finding accommodation in Barcelona (Spain) as part of an Erasmus stay. The Eye Tracker is used to determine the essential AOI (Lykke Jakobsen and Jensen 2008) of the two-column structure

with both original and translation in Skype. This situation is also accompanied by an introductory questionnaire, which is a slightly adapted version of the summer's survey, and a short final interview to assess the quality of the observation.

The conversational data, on the other hand, is transferred from Skype and saved into an flat-structured xml document to be compiled in a parallel corpus later on. Subsequently, it will be examined on the translation variance (Lapshinova-Koltunski 2017), turn-taking signals (Stivers u. a. 2009; Heilmann 2015) and overall conversational (Fišer and Beißwenger 2017) and MT quality (Fünfer 2013; Lommel u. a. 2015). By using the Skype Translator, German original texts, German MT texts, Catalan original texts and Catalan MT texts are available.

Of 329 persons who participated in the survey in summer 2018, 290 records are completely filled out. Despite the survey being no more than a snapshot with no representative claim, it depicts a general mood in the context of the user behavior of Skype.

80% of the participants say they use Skype, with 57% of all participants using Skype either daily (14%) or weekly (43%). At the same time, the parallel use of the various alternatives (WhatsApp, Telegram, etc.) in each functional area is emphasized. For example, 73% also use WhatsApp and about 52% claim the Facebook Messenger as preferred alternative for Skype's text chat. In terms of video and voice chat, WhatsApp is also preferred. 48% or 64% respectively of the participants say that they use the service for video or voice chats. On the basis of the data obtained from the survey, it can also be stated that the Skype Translator is hitherto completely unknown: only three of the survey's participants stated that they had any experience with the service.

Facing the case study mentioned above, a first introductive piloting session has already been conducted. The experiment setting has been tested on five students enrolled at the institute. Every single session took between 45 and 60 minutes, including briefing, calibrating, questionnaires and eye tracking-based text chat via Skype. The text chats took 15 minutes each, which has been time for mostly 10-15 turns. The participants left a positive feedback of the fluent conversations and gave first hints on possible fields of application, the corpus-based analysis of the collected conversational data still being in progress, though. First results are expected until April 2019.

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# **A proceeding analysis of working memory, cognitive load and processes in simultaneous interpreting**

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With the development of interpretation theory and translation activities, studies on interpreting have become increasing interdisciplinary. Among different aspects, in view of the importance of memory in interpretation, short-term memory in interpreting is always the main issue in the field of interpretation studies and interpreting activities as it involves complicated cognitive language switching and proceeding. Therefore, focused on the cognitive aspects, many studies conducted in different languages aim at revealing human information processing in the cognitive mechanisms and their inherent interactions. These cognitive mechanisms include perception, attention, memory, reasoning, strategies, problem solving, and so on. This is because, interpreting, from the perspective of cognitive psychology, is a systematic, strategic information processing process.

Among various types of conference interpreting, the performance of interpreter's cognition on languages switching does draw researchers' and scholars' attention since last century. More specifically, in simultaneous Interpreting, the interpreter sits in an interpreting booth, listening to the speaker through a headset and interpreting into microphone while listening. Also, an interpreter in a simultaneous conference interprets and conveys the meanings of a source language (SL) into a target language (TL), and an optimal segmentation of the source message is generally a phrase or clause; yet, the first rule for interpreter to speak is a simple or short sentence if

possible (Jones, 2007, p.70). In addition, one of the main characteristics of simultaneous interpretation for an interpreter is to deliver the SL within a couple of seconds for the delegates, who are in the conference room listening to the TL version through a headset (Gile, 2001, p.41). The truth is that the interpreter in the booth has to listen to the SL on the one hand and to translate into the TL on the other hand and both listening and speaking are expected to occur at the same time. The speaker in the conference room continues to deliver his or her speech without pauses while the interpreter, who is storing, retaining and subsequently recalling information from short-term memory, conveys the meaning in the TL simultaneously. Therefore, it is almost impossible for an interpreter to finish listening the entire sentence before carrying out the interpretation, so the segmentation of the SL is a phrase or a clause of between five to seven words or so. Thus, the interpreter's cognitive load, ability, and processes associated with different languages are worth exploring, particularly when the SL and the TL (i.e. Chinese and English) are significantly different regarding syntax, pragmatics, and semantics. For example, some studies identified that the syntax of an interpreted sentence might not always be correct in the TL, compared with the written translated text.

This study is an empirical report on the cognitive perspectives and perceptions of translation processes of simultaneous interpreters from Chinese into English. Eight speeches about the (Micro) LED display were delivered or given by different Chinese speakers in an international conference where Mandarin-English simultaneous interpretation was offered for an audience. This empirical study is based on the interpreter who offers a detailed account of interpretation including preparation, the process of simultaneous interpreting, and retrospection. For instance, how to prepare in advance for the simultaneous interpreting, how cognition proceeded while

interpreting different Chinese speaker's speech into English, and what problems the interpreter encountered and what strategies were adopted or employed in the simultaneous interpreting. Both the Chinese original speech and its English simultaneous interpretation were recorded respectively. Afterwards, while listening to the recording of simultaneous interpretation, the interpreter, applying the think-aloud method, recalled the interpreting strategies and the cognitive processes including the segmentation of interpreting, the syntax issue of the two different languages, problem solving in the simultaneous conference that the interpreter encountered and the strategies employed to solve the different problems, and producing understandable language for the target audience.

Apart from the cognitive process of interpreting from SL in to TL, this study also investigates whether or not the text or the information provided in the PowerPoint slides offered to the interpreter in advance would affect the translation activity or provide a high quality interpretation service. Although some studies or literature claimed interpreters who used the text may not have better performances than those who did not use it (Huang, 2013), it is true that most interpreters still wish to have or view the text in the Microsoft PowerPoint slide or Word file before the speaker delivers his or her speech at the conference. It is believed that interpreters, who can acquire text before processing the interpreting, will not only have a better idea of the speech and terminology, but also make the interpretation more successful. Thus, it will be discussed to what extent the interpreter benefits from or is influenced by having the text in advance. This will be discussed regarding cognitive awareness and the translation process as these aspects all affect the function of short-term memory.

According to Gile, the effort of interpretation is made by the three components, including comprehension, memory, and production. Furthermore,

translation involves at least some degree of non-trivial comprehension of the source-language discourse that is comprehension that goes beyond the simple recognition of words and linguistics structures. (1995, p. 75)

Therefore, by adopting the criteria assessment by Schjoldager (1996), this study evaluates and discusses the interpretation performance under four central indicators, including loyalty, coherence and plausibility, language, and comprehensibility and delivery. The findings of this study reveal that the impact of text on interpreter's performance is significant. This is because the text offered by the speaker could not only help the interpreter to prepare and select accurate terminology in the specific field (of LED display), but also to perform better in loyalty, comprehensibility, and coherence and plausibility. This is because the interpreter has the cognitive awareness of some terms, numbers, pictures and other items provided by the text or on the PowerPoint slides via the monitor in the booth, so the interpreter can translate or decode these (abbreviated or initial) terms, phrases, or numbers immediately. Most importantly, when the speaker makes a mistake accidentally in speech, the interpreter can convey the correct figures, numbers, or meaning automatically, based on the text.

Furthermore, through the comparison and analyses of the result between SL and TL in this study, the segmentation of the interpretation is clauses and/or a simple short sentence, not an entire or a completed sentence. Moreover, this study also finds that the higher the accuracy of the interpretation the better is the speaker's expression ability. In addition, performance in simultaneous interpretation was related to working memory in

both L1 and L2. In conclusion, the purpose of this study is to clarify positive and negative cognitive impacts on simultaneous interpretation. In a practical sense, such understanding is crucial for training future interpreters.

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# Eye-tracking in sight translation study

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The study of oculomotor activity during the reading process has been numerous and focused on various aspects (eye movement characteristics, eye movement control, perceptual span, etc.). The eye tracking studies have mostly focused on the readability and processing effort for the given text type and thus on empirical research in neurophysiology (Schnitzer, Kowler, 2006; Jakobsen, Jensen, 2009; Clifton et al, 2016). Eye tracking has proved to be a powerful tool in scientific research and starts to pave the way into applied linguistics and translation studies (Hansen-Schirra, Grucza, 2016). It allows identifying the objects of attention with high spatial accuracy and temporal precision. The participants try to fixate their gaze on highly informative elements but each person can choose a different strategy for investigation of a stimulus and can change it when presented the same stimulus for the second time. This explains numerous findings in fields such as translation memory, reading for translation, distribution of cognitive effort during translation, etc. (Hvelplund, 2014).

Sight translation is a form of transposing a written text in the source language into a text in the target language orally. The concept of sight translation is understood differently by researchers. One of the disputable issues concerns the status of this form of translation, whether it is considered as a separate form of interpreting or as a training exercise for other forms of interpreting. Most of the current research supports the idea that the key characteristic features of sight translation include the following:

- limited time for text comprehension,
- minimum time for finding the translation decisions,
- high speed of speaking,
- strict self-control (as self-corrections are not allowed) (Chmiel, Mazur, 2013; Kokanova, 2016).

In cognitive terms, sight translation is a complex set of brain operations including processing visual input in one language, creating the oral message in another language and control of the translation process at the same time. The actual application of sight translation takes place in a number of professional settings and, despite this fact, it seems to be rarely taught on its own. The research of the translation process with the use of the eye tracking method may be helpful to understand the difficulties of this form of transposing the message and help to make appropriate pedagogical conclusions (Thawabteh, 2015).

This study was conducted at Northern (Arctic) Federal University, Arkhangelsk, Russia. The participants of the research included both students and professional interpreters. The participants were asked to read and sight translate two texts from their B language (English) into their A language (Russian). The texts included such independent variables as abbreviations, position titles, references to historic and cultural events and phenomena as well as direct speech, epithets, metaphors. The dependent variables included measures assumed to indicate cognitive load of lexical units, such as fixation count and saccade count (Kokanova, Lyutyanskaya, Cherkasova, 2018).

Gaze behaviour of the participants was recorded on the basis of saccades and fixations in the infrared radiation spectrum. For the recording of eye tracking the system iView XTM RED (SMI, Germany) for non-contact measurement was used. The

collected data were analyzed by BeGaze software. The frequency of the system was 500 Hz; the viewing distance was 55-60 cm from the screen. The experiment was conducted in accordance with the ethical standards, represented in Declaration of Helsinki (DoH) and European Community directives (8/609 EC).

The research has shown that sight translation can cause difficulties for students because of the low level of “silent reading” skill. Even if it seems easy, silent reading is a complex operation which involves 17 brain regions. Presuming that saccades and fixation count represent higher cognitive load during reading than during sight translation itself, the research was aimed at finding specific features of reading for sight translation. The hypothesis is that most of the work of finding out difficult elements, context analysis, and search for equivalents should be done at the stage of silent reading.

The experiment showed that errors in translation in general and too literal translation in particular occurred as a result of a wrong strategy of reading for sight translation. The results allowed the authors to make some conclusions concerning the types of texts and elements in the texts that create the highest cognitive load, the time needed for efficient reading of the text before sight translation, the time given for sight translation, etc.

Reading research, both theoretical and applied, remains underexplored in translation studies (Washbourne, 2012). Empirical research using eye-tracking method can be helpful to understand the difficulties of this form of translation. In particular, the findings of eye tracking research may supply interpreting teachers with solutions in terms of text selection, determining text complexity and other text parameters. The results can also be used to work out recommendations for students on how to use the reading time efficiently, how not to

miss key elements in the text, to overcome “garden-path sentences”, or to overcome self-corrections and fear of mistakes in sight translation.

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# Interpreting affect-laden content: the role of directionality and valence

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## Introduction

In line with previous research on bilingualism, there is a psychological distance when processing the non-native relative to the native tongue, reflecting a decreased sensitivity to affect-laden stimuli in L2 compared to L1 (e.g., Pavlenko 2005; Caldwell-Harris 2014; Jankowiak & Korpala 2018). Interestingly, such an effect has been suggested to be more pronounced when processing negatively-valenced materials, which seem to evoke inhibitory mechanisms resulting in a more distanced processing (Wu & Thierry 2012; Jończyk et al. 2016). Yet, thus far only little attention has been devoted to investigating how interpreters process negatively- and positively-laden as compared to neutral stimuli when interpreting (Korpala & Jasielska 2018). Additionally, in the context of language processing in interpreting, previous studies have shown an interpreting asymmetry, pointing to more cognitively taxing operations engaged in interpreting in the L1-L2 than L2-L1 direction (e.g., Hyönä et al. 1995; de Bot 2000); however, it remains under-investigated whether emotion processing might be modulated by interpreting directionality and valence (processing positive vs. negative emotions).

## Method

The main aim of the two studies was therefore to examine the process of interpreting negatively and positively-laden content in the two directions (i.e., L2>L1 vs. L1>L2). To this end, in our pilot studies, five professional interpreters (3 women,  $M_{\text{age}} = 33.8$ ,  $SD = 9.42$ ) were asked to interpret negatively-valenced

(Study 1), positively-valenced (Study 2) as well as neutral sentences (Study 1 and 2), both from Polish (L1) into English (L2), and in the opposite direction. To measure emotion, in both studies, the skin conductance (SC) method was triangulated with a self-report measure (SUPIN S30, the Polish adaptation of the PANAS questionnaire, Positive and Negative Affect Schedule).

In each study, the materials used in the experiment included 30 Polish (L1) and 30 English (L2) sentences, which were divided into three categories: 15 negatively-valenced (Study 1; e.g., *He stole her wallet and ran away*), 15 positively-valenced (Study 2; e.g., *Susan is very happy about her new job*), and neutral sentences (Study 1 and 2; e.g., *Mary decided to go to Berlin by train*) in each language. The sentences did not include translation equivalents, so as to avoid the translation priming effect as a potential confounding variable. Polish sentences were read and recorded by a male native speaker of Polish, while English sentences were read and recorded by a male English native speaker.

Participants were instructed that their task would be to interpret the auditorily presented negative, positive, and neutral sentences in the interpreting direction of a specific block (i.e., L1-L2 or L2-L1 interpreting direction), right after hearing each sentence. The stimuli to be interpreted were delivered to participants through headphones with a pre-set volume, with a 5-second break after each sentence of a given block.

## **Results**

### *STUDY 1 on negative emotions*

#### *SUPIN S30*

The analysis performed on the self-ratings obtained from the SUPIN S30 questionnaires was based on values for all

negatively-valent adjectives ( $N = 15$ ), such as *przygnębiony* (Eng. sad), *zmartwiony* (Eng. upset), etc. The Negative Affect Score was calculated in line with the scoring instructions (Brzozowski, 2010). Once the scores were calculated, a 2 valence (negatively-valenced vs. neutral sentences)  $\times$  interpreting direction (L1-L2 vs. L2-L1) repeated measures ANOVA was conducted, which did not yield any statistically significant findings,  $p > .05$ .

## SKIN CONDUCTANCE

Skin conductance responses to the experimental stimuli were further analyzed by means of performing a 2 valence (negatively-valenced vs. neutral sentences)  $\times$  interpreting direction (L1-L2 vs. L2-L1) repeated measures ANOVA. The analysis revealed a main effect of valence,  $F(1, 4) = 24.67$ ,  $p = .008$ ,  $\eta_p^2 = .861$ . Skin conductance responses were more pronounced to negatively-valenced ( $M = 12.0$ ,  $SE = 3.28$ ) than neutral sentences ( $M = 9.5$ ,  $SE = 2.79$ ). There was no statistically significant effect of interpreting direction, and no interaction between the two variables ( $p > .05$ ).

## STUDY 2 on positive emotions

### SUPIN S30

In Study 2, the analysis performed on the self-ratings obtained from the SUPIN S30 questionnaires was based on values for all positively-valent adjectives ( $N = 15$ ), such as *zainspirowany* (Eng. inspired), *zainteresowany* (Eng. interested), etc. The Positive Affect Score was calculated in line with the scoring instructions (Brzozowski, 2010). Once the scores were calculated, a 2 valence (positively-valenced vs. neutral sentences)  $\times$  interpreting direction (L1-L2 vs. L2-L1) repeated measures ANOVA was conducted, which, however, did not yield any statistically significant findings,  $p > .05$ .

## SKIN CONDUCTANCE

Similarly, in Study 2, skin conductance responses to the experimental stimuli were analyzed by performing a 2 valence (positively-valenced vs. neutral sentences) × interpreting direction (L1-L2 vs. L2-L1) repeated measures ANOVA. The analysis showed an interaction between valence and interpreting direction  $F(1, 4) = 7.56, p = .051, \eta_p^2 = .654$ . Post-hoc paired sample t-tests further revealed that in the L1-L2 interpreting direction, positive utterances ( $M = 13.8, SE = 4.85$ ) evoked significantly more pronounced skin conductance responses than neutral sentences ( $M = 10.6, SE = 4.26$ ),  $p = .04$ . Additionally, the analysis revealed a marginally significant main effect of valence,  $F(1, 4) = 6.68, p = .061, \eta_p^2 = .626$ , with more robust skin conductance responses to positively-valenced ( $M = 13.5, SE = 5.08$ ) than neutral sentences ( $M = 11.4, SE = 4.54$ ). There was no statistically significant effect of interpreting direction ( $p > .05$ ).

## Conclusion

In line with what we had expected, we observed a greater number of galvanic skin responses in the process of interpreting negatively-valenced (Study 1) and positively-valenced (Study 2) compared to neutral stimuli. Such findings suggest that professional interpreters are affected by emotional content. On the other hand, we failed to observe the statistically significant effect of interpreting directionality on emotion processing. This may indicate that emotional responding in interpreting is modulated by output production. In other words, interpreters might not only be affected by the material presented to them in the source language, but also by their own production of affect-laden content in the target language.

Importantly, the effect of valence was found only in the SC measure, and not in the SUPIN S30 scores. This may point to potential limitations of using self-report measures in emotion

studies (Korpala & Jankowiak 2018). This notwithstanding, the studies may provide at least a tentative insight into emotional language processing in interpreting.

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# Tracking where the professional conference interpreter looks: a case study in naturalistic settings

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The study investigates the professional simultaneous interpreter's allocation of cognitive resources by tracking the interpreter's eye movements in real-world conference settings using mobile eye-tracking glasses, which collect unmoderated visual attention data.

It has been repeatedly stated that it is important for conference interpreters to have a good view of the conference setting as it provides cues conference interpreters use to assist with their interpreting. Jones (1998) points out that it is important to “sense the atmosphere of a meeting through the panes of glass” and pick up “non-verbal information” by watching the body language of the speaker (p. 66). Stressing the “crucial role” non-verbal communication plays in conference interpreting, Besson et al. (2004) explains what messages the speaker's body posture, gestures, facial expressions, which can be received by the interpreter through the visual system, may convey. In the modern conference setting, the PowerPoint presentation on the screen is also considered as an important source of information. The interpreter may also consult documents and glossary prepared in advance, Internet resources and dictionaries in the booth, and look at the proper names, numbers and technical terms written down by the boothmate to cope with online problems.

Ideas may sometimes be efficiently exchanged between the active interpreter and the passive interpreter with body language, and request for help from boothmate may be expressed “with a glance” (Gile 1995/2009).

According to Gile’s (1995/2009) Effort models of interpreting, simultaneous interpreting is “a process consisting of three core Efforts”: the Listening and Analysis Effort, the Short-term memory Effort and the Speech production Effort. Modes of interpreting involving visual input, namely sight interpreting and simultaneous interpreting with text, which require the Reading Effort, may demand higher processing capacity. (pp. 167-82) Results of our previous laboratory experiments using desktop eye trackers suggest that while certain types of visual inputs facilitate interpreting performance, others may be distractions (e.g. Lei & Li 2018, Li & Lei 2017, Li & Lei 2016). For example, it is evident that following both the vocal speech and the written text in simultaneous interpreting with text is essentially a professional behavior that ensures quality. However, it has been found that visual attention paid to the PowerPoint presentation undermines interpreting performance. And to what extent success in rendering problem triggers such as proper names, terminology and numbers is attributed to visual input during simultaneous interpreting still needs further investigation. This in-situ study of real-life conference interpreting is complementary to our previous studies.

Gaze data were collected with mobile eye-tracking glasses (sampling rate: 100 Hz) from a professional conference interpreter, an early trilingual with English, Mandarin and Cantonese as working languages, during a three-hour simultaneous interpreting session (between English and Cantonese) – a forum on tertiary education in Macao. The source speeches and the interpreter’s outputs were recorded and transcribed. Gaze data were analyzed in relation to the

interpreting outputs and post-hoc interview. The interview included questions like “Did you have a good view of the speaker(s)? Did you find it helpful? How was it helpful?” “Did you have a good view of the screen displaying the PowerPoint presentation? Did you find it helpful? How was it helpful?” “Were you given the script of the speech in advance? Did you find the script helpful? How was it helpful?” “Were you given the PowerPoint presentation in advance? Did you find it helpful? How was it helpful?” “Was your boothmate helpful? How did he/she help?” “Did you prepare a glossary? Was it helpful? How was it helpful?” “What other cues did you obtain from the conference setting that might have assisted with your interpreting?”

By observing the subject’s natural gaze behavior from a first-person perspective, the study seeks to find out how the professional interpreter makes use of cues in the conference setting, for example, the speaker’s body language, the speaker’s PowerPoint slides, interactions and dynamics in the room, the interpreter’s own glossary list and notes, scripts of speeches, tools available in the booth like Internet resources and dictionaries, and hints from the boothmate, to assist with her interpreting. Special attention is paid to the process of handling challenging items like technical terms, cultural specific items and numbers.

It is expected that the findings of the study will shed light on what cues students should be trained to focus on in real-world scenarios.

### **Keywords**

conference interpreting, simultaneous interpreting, eye tracking, cognitive resources allocation

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# **Can the “chunking” strategy help reduce cognitive load and enhance performance in simultaneous interpreting with text? Insights from an eye-tracking experiment**

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The eye-tracking study reported here aims at empirically testing out a strategy that has long been used by practitioners and recommended in the simultaneous interpreting classroom: viz. the strategy of dividing long complex sentences into chunks by drawing slashes to help the interpreter focus on smaller translation units, one at a time. The assumption is that this allows the interpreter to more efficiently re-clock his/her working memory and better avoid overloading the working memory system.

The experiment included 22 postgraduate students of translation studies with similar competence in their second language (English) and with similar educational background. Before the start of the experiment, they were all given a working memory test. After that, and without any regard to what might have been the result of the working memory test, participants were randomly divided into two experimental groups. The two groups were then given the same source text – an excerpt of approximately 150 English words from the written representation of an authentic, orally delivered public speech.

Members of both groups were allowed 10 minutes to study the source text in advance and were allowed to consult Internet resources and paper dictionaries although the researchers were aware of the reduction of control and increase in potentially confounding factors this decision involved.

Members of one group were instructed to divide complex sentences into chunks by inserting slashes as they read the text while members of the other group were not. The subjects were then placed in front of eye trackers to perform simultaneous interpreting (English to Chinese) with the source text displayed on the screen. For the members of the “chunking technique” group, the slashes they had inserted manually into the printed source text during preparation were transferred into the electronic text version by a research assistant so that they would be seeing the text of the speech with their individual slashes during their eye-tracking session. In both groups, most participants had added translations of words or phrases in the paper text during preparation. Such notes were taken away from all participants during the interpreting task. Only the individual slashes were transferred. The audio input for the interpreting experiment was the 150 word speech excerpt, spoken by an educated native speaker of English at approximately 125 words per minute to make it possible for participants to keep pace with the speaker.

The interpreting outputs were audio recorded, while the subjects’ eye movements across the text were tracked. After the simultaneous interpreting task with text had been completed, a post-hoc interview was conducted. The interview included questions like “Have you been taught the ‘chunking technique’?” “Were you using the ‘chunking technique’ as you performed the task?” “Did you find the ‘chunking technique’ useful?” “Would you find ‘slashes’ drawn by yourself helpful?” and “Would you find ‘slashes’ drawn by someone else useful?”

The quality of participants' performance was subsequently assessed independently by two professional interpreters on the basis of the audio recordings and without the raters knowing about participants' group membership in the experiment.

The data analysis undertaken in the study compared the two groups across an array of parameters generally taken to indicate or measure cognitive effort, including ear-eye span, ear-voice span, eye-voice span, fixation count, fixation duration, regressive gazes, total saccade distance, et al. Our report of findings shows the extent to which members of one group differed from the other group in the quality of their performance as a result of using or not using the chunking technique, including their relative success in continuing to interpret simultaneously (from the audio and/or the text) till the end. Inter-individual, within-group variation will also be reported as well as the amount of cognitive load experienced and invested as indicated by the various measures applied. Finally, we will report how the various measuring parameters for cognitive effort correlated with the participants' simultaneous interpreting performance and with their working memory capacity to be able to firmly establish, on an empirical basis if the slashing technique can be claimed to assist learners reduce the risk of working memory overload while learning to interpret simultaneously.

### **Keywords**

translation, simultaneous interpreting, simultaneous interpreting with text, eye-tracking, working memory, cognitive effort

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# Controlled Language - still a necessity or already obsolete?

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Unternehmen unterscheiden sich heute nicht mehr darin, ob sie eine Kontrollierte Sprache benutzen oder nicht, sondern nur noch darin, wie umfassend die Sammlung der Formulierungsregeln ist und wie streng sie eingehalten werden. (Göpferich 2007)

As early as 1974, the Controlled Language Caterpillar Fundamental English was specifically developed to improve the comprehensibility and translatability of technical documentation (Caterpillar Corporation 1974). The different restrictions imposed by the Controlled Language (CL) rules allows for reducing the sentence length, avoiding complex sentence structures, and eliminating ambiguous vocabulary and constructions (Lehrndorfer 1996, Drewer/Ziegler 2014). Accordingly, the main aim of the CL is to improve the readability, the (machine) translatability and the reusability of texts mainly through consistent and unambiguous writing (Nyberg et al 2003, Hujisen 1998). In the context of different Machine Translation (MT) approaches, many studies have shown that the application of CLs has a positive impact on the MT in terms of higher productivity (Kamprath et al. 1998), improved readability and translatability (Reuther 2003), higher accuracy (Nyberg/Mitamura 1996) as well as reduced translation costs and higher quality (Ferlein/Hartge 2008). Bernth and Gdaniec (2001) introduced 26 rules for English as a source language that address different text characteristics aimed to increase machine translatability. They tested these rules with various commercially available MT systems and claimed that they were generalizable to different MT systems

and language pairs. Most CL studies have investigated the impact of CL on the MT from a holistic perspective, i.e. the impact of comprehensive CL rule sets. The results of these investigations provide an overall picture of the CL effect, in which a positive effect of some rules may overshadow a negative effect of other rules, which leads to a biased end result. There has been a limited number of studies that focused on the analysis of the influence of individual CL rules. The results of these studies (Roturier et al. 2012, O'Brien 2006, Roturier 2006) showed that CL rules affected MT in various ways and to different degrees. All these studies were conducted on CL rules of the English language and in the context of statistical (SMT) or rule-based machine translation (RbMT). To the author's knowledge, the most recent MT approach, neural machine translation (NMT), has not yet been examined in the context of CL.

Given that the MT quality differs depending on the language pair, translation direction, domain, and the applied MT system, the impact of each CL rule on the MT output should vary along with these variables. As the impact of individual CL rules of the German language has rarely been analyzed, the following study addresses the language pair German > English. It focuses on the technical domain as the most common field of application of CL. The study kept the variables language pair, translation direction, and domain constant aiming to analyze and contrast the individual impact of nine CL rules on the MT output at different levels: rule- and system-independent (general impact), at rule level (system-independent), and at system level, at which the impact across five MT approaches was compared. The nine rules were taken from the *tekomp e. V.* guidelines for technical writing in the German language "Leitlinie – Regelbasiertes Schreiben – Deutsch für die Technische Kommunikation" (tekomp 2013) based on two main selection criteria: to be applicable at sentence level and

according to one fixed pattern. Accordingly, the following rules were analyzed: Rule 1 “Using straight quotes for interface texts”; Rule 2 “Avoiding light-verb construction (Funktionsverbgefüge)”; Rule 3 “Formulating conditions as ‘if’ sentences”; Rule 4 “Using unambiguous pronominal references”; Rule 5 “Avoiding participial constructions”; Rule 6 “Avoiding passives”; Rule 7 “Avoiding constructions with sein + zu + infinitive”; Rule 8 “Avoiding superfluous prefixes”; Rule 9 “Avoiding omitting parts of the words”.

To achieve the study’s goal, a German corpus-based test suite of technical texts was created and translated into English by five MT systems: an RbMT system (Lucy LT KWIK Translator), an SMT system (SDL Free Translation), two differently constructed hybrid systems (Bing and Systran), and an NMT system (Google Translate). For the analysis, a triphasic mixed-methods triangulation approach that includes error annotation, human evaluation, and automatic evaluation was applied. The error annotation covered a fine-grained error type analysis; the human evaluation extended over two quality levels; and the automatic evaluation was based on two metrics. The data was analyzed both qualitatively and quantitatively in terms of CL influence on the following parameters: number and type of MT errors, style quality ((SQ) covering idiomacy, appropriateness to the content intention as well as correctness and clarity of the orthographic presentation) and content quality ((CQ) covering accuracy and clarity), and scores from the two automatic evaluation metrics (AEMs) TERbase (Snover et al. 2006) and hLEPOR (Han et al. 2013). The results were triangulated at different levels.

In line with many previous studies, the results showed that CL application had in general, at a *rule- and system-independent level*, a significant positive impact on the MT output in terms of reducing the number of errors and increasing the style and content quality as well as the scores of two AEMs (TERbase and hLEPOR).

A closer analysis of the individual impact of the rules, at a *system-independent level*, revealed that only the rules “Using straight quotes for interface texts”, “Avoiding the construction sein + zu + infinitive”, “Formulating conditions as ‘if’ sentences”, and “Avoiding light-verb construction” positively affected the MT output (fewer errors and better SQ, CQ, and AEMs scores). These rules enabled better parsing, what in turn contributed to getting a more accurate, comprehensible, stylistic, and attention-grabbing translation. On the contrary, the rule “Avoiding passives” showed a significant negative impact on the SQ, CQ, and the AEMs scores. The human evaluators assessed the MT of the active voice to be less accurate and stylistically less adequate. In the rule “Avoiding participial constructions”, the AEMs scores and the SQ deteriorated significantly, as the MT of participial constructions was evaluated as more idiomatic. In the rule “Avoiding omitting parts of the words”, only the SQ and both AEMs scores decreased, which revealed that the MT sounded unnatural after the rule application. For the rules “Using unambiguous pronominal references” and “Avoiding superfluous prefixes”, no significant impact was found.

A more detailed examination of the impact of each rule at *MT system level* showed that when earlier MT approaches (RbMT, SMT, and hybrid systems) were applied, the impact of the individual rules varied to a large extent from one approach to the other. Since not all CL rules have a definite positive impact, identifying effective rules in each implementation context

(language pair, translation direction, domain, and MT approach) is necessary. Limiting the number of applied rules to the effective ones can be beneficial in avoiding drawbacks commonly associated with CL application (e.g. slowing down the authoring process and impacting it excessively (Drewer/Ziegler 2014, Nyberg et al. 2003, Lehrndorfer 1996)). Comparing the earlier MT approaches to the recent NMT approach, the results revealed that while earlier MT systems benefited in many cases from the CL rules in avoiding different MT errors and improving their output quality, the NMT system was able to translate most of the sentences before and after the application of all rules error-free (between 71% in the rules “Avoiding passives” and “Avoiding participial constructions” and 96% in the rule “Avoiding the construction sein + zu + infinitive”). Moreover, the NMT system recorded the highest style and content quality in both scenarios under all rules.

Referring back to Göpferich’s statement, due to its major role in text simplification and standardization, CL still remains an important tool for optimized reusability and readability. However, as far as machine translatability is concerned, the CL role has started to diminish with the development of the neural MT technology leaving the companies more room for flexibility to reduce CL application to a minimum without affecting the MT quality.

### **Keywords**

controlled language, machine translation evaluation, neural machine translation, translation quality

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# 'Mixed feelings' while translating with music

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Drawing on previous evidence about the potential benefits of emotionally congruent music in memory and verbal association tasks, together with recent experimental findings about the benefits of emotional music on translation performance, this work intends to examine the role of musical congruence and incongruence in translation quality and creativity.

Results obtained in previous research point to an enhancing effect of emotionally-congruent music in different cognitive tasks. Such effect has been especially related to improvement in memory and verbal association tasks. On the one hand, individuals seem to be more able to remember information of a given narrative when it is presented with congruent music (see Bolz, 2005, Tesoriero & Rickard, 2012). On the other hand, other scholars (de l'Etoile, 2002; Nguyen & Scharff, 2003; Costa, 2012) have found beneficial effects of musical congruence when participants were requested to provide semantically-related words, such as antonyms, for a given linguistic prime. This has been explained by arguing that codification of verbal and musical input may occur simultaneously when there is emotional congruence between both stimuli, facilitating recall afterwards.

Simultaneously, musical congruence has also been found to have a "persuasive power", by conditioning individuals' beliefs and values. This effect has been revealed in film soundtracks (Costabile & Terman, 2013) with viewers being able to identify more with the events and characters portrayed in the film, but also in verbal assessment tasks (Liebman et al., 2015) with

participants being more inclined to positively assess a list of emotion-related words when they listened to emotionally-congruent music.

In the field of Translation Studies, there is already some evidence pointing to a beneficial effect of music for creativity (Naranjo, 2018), which could have been mediated by the perceived emotional impact in translators caused by music. However, in this work we aim to determine whether it is emotional congruence between music and source texts that can lead to differences in translation performance.

For this purpose, an experiment was carried out in which participants translated two literary fragments which were representative of two contrary emotions: happiness and sadness. At the same time, they listened to congruent music, incongruent music or no music at all. We predicted that participants would translate better and more creatively in the congruent music condition, compared to the incongruent condition or silence.

Two different congruent and incongruent soundtracks were created for each text (H\_CON, H\_INCON, S\_CON, S\_INCON). Soundtracks contained 12 pieces of instrumental music each with approximately one hour of interrupted music.

Emotional representativeness and situational congruence between texts and music to attain a 'soundtrack effect' was ensured through automatic and non-automatic procedures, which also included a survey in which participants had to rate an initial selection of music according to how suitable they were for the scenes of the texts.

Within-group and across-group statistical analysis were run to compare translation scores under the three different sound

conditions (congruent, incongruent and no music). Results showed an increase in creativity scores in target texts produced in presence of sad congruent music compared to silence and the incongruent condition (happy music).

Further analysis together with self-reported measures provided some explanations to this phenomenon. Differences found in creativity scores under the sad music condition coincided with reported high levels of participants, which makes us think that musically-induced empathy is what could be altering translators' behavior. This finding could be explained by the alleged persuasive effect of music, because of which participants experimented higher levels of identification with the characters. Also, our results would back up the music-enhanced recall theories in verbal association tasks, according to which musical congruence helps lexical association. Translators may have been more creative because congruent music helped them come up with more emotionally-related words or expressions in the target language.

Considering the present and previous results, further research featuring emotional inducement in translation and, more specifically, the role of sadness and empathy seems promising and worth testing.

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# Processing website contents in native and non-native language

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Eyetracking has been used widely to research the translation process in the last decade. The focus has been on general translation behaviour (e.g. Jakobsen and Jensen 2008, Dragsted and Carl 2013), the use and integration of tools (e.g. O'Brien 2006, Läubli et al. 2013), the use of machine translation (Doherty et al. 2010) and its post-editing effort (e.g. Moorkens et al. 2015, Nitzke 2019), or modelling the translation process (Winther Balling and Carl 2014, Carl and Schaeffer 2017). The reception of text in multimedia environments has also been studied with the help of eyetracking, e.g. to check the usability of websites (Nielsen and Pernice 2010). However, subtitles have been the focus of most translation related studies with a multimedia context so far. Orrego-Carmona (2015), for example, contrasted the reception of professional and non-professional subtitles (both in Spanish) for an US sitcom by 52 participants who had different levels of English proficiency. The study showed amongst other results that the kind of subtitles did not influence the attention distribution. However, the fixation durations were shorter on professional subtitles. In another study, Fox (2018) challenged the traditional positioning of subtitles and tested where they should be placed best so that the participants do not spend too much time on reading the subtitles instead of enjoying the movie. The perception of text and its translations in multimedia is, however, not bound to screens. In museums, for example, the visitors use the information provided by written text, audio guides, or other digital aids to understand and find access to the exhibits. The texts used in a museum context often address native and

non-native reader to a similar amount. However, do we process information equally in our native and non-native language, assuming a very high language proficiency in the foreign language?

I will present a study in which I investigate the viewing behaviour and processing of information of museum materials by native and non-native speakers. The participants read extracts of two Digitalorials® (one in German, one in English) provided on the website of the Schirn Art Gallery in Frankfurt for free. The main purpose of the Digitalorials is to prepare the visitors before their visit to Schirn, support them during the visit, or let them reflect on the exhibition after the visit. Basically, they are very interactive websites that can be accessed via smartphone, tablet and desktop. The first focus of my presentation will be on technical challenges, because I had to modify the material to balance the viewing experience and effort for analysing the data. Therefore, I created PDF files with excerpts of the Digitalorials, because they are too interactive to be processed by the website recording function in the analysis software of our eyetracking system. The created PDF files are still visually very appealing, have, however lost their interactivity, which I considered acceptable so far for our research question in this study.

The participants (n=16) viewed excerpts of the Digitalorials for two exhibitions. The first dealt with the topic “wilderness” throughout the history of art, while the other introduced the Belgian painter René Magritte. Each participant had to read one excerpt in German and one in English. The participants were translation students who study English as their first or second foreign language. Further, they had been learning English on average for 10.34 years (sd= 2,06; min= 8, max= 13) so I could anticipate a high degree of language skills. They were all B.A. students in Germersheim (on average in the

2<sup>nd</sup> semester (sd= 1.39)). The participants' task was to prepare for a hypothetical test for a course in culture studies (which are part of the translation degrees in Germersheim). The questions of the test followed right after the participants had worked through the materials. The questions are in German, which was for most participants the native language (n=13) or the first foreign language (n=3); none of them was an English native speaker. Therefore, the chance that they had problems understanding the question was kept to a minimum. Afterwards they had to assess how difficult they found the questions and how confident they were answering the questions.

The first analysis showed that the time spent on reading the materials was not significantly different when the materials were read in German or English for both Digitorials (Wilderness:  $t=0.0406$ ,  $p=0.9695$ ; Mageritte:  $W=18$ ,  $p=0.1605$ ). Further, the participants did not spend more time answering the questions when they read the text in either language (Wilderness:  $t=-0.7297$ ,  $p=0.4843$ ; Mageritte:  $W=24$ ,  $p=0.4418$ ). When looking at the answers to the questions, eleven out of 15 participants had answered more questions correctly, when they had read the materials in German than in English. On average, the participants answered 74.2 % (sd=12.3) of the questions correctly if they read the materials in German, while they knew only the correct answers to 63.4% (sd=18.2) of the questions when they were read in English. The difference is statistically significant (paired t-test;  $t=-2.6692$ ,  $p=0.0183$ ). In the next step, I assessed the eyetracking data for the text parts that contained the answers to the questions. For question 4, for example, a linear regression showed that the total fixation duration was significantly higher when the participant answered the questions correctly ( $t=-2.483$ ,  $p=0.0274$ ), while the language in which the text was read had no influence ( $t=0.174$ ,  $p=0.8642$ ). The same was true for the fixation count (correct answer:  $t=-2.209$ ,  $p=0.0458$ ; language:  $t=0.196$ ,  $p=0.8474$ ).

More in depth analyses will be presented in the talk which will also include the analysis of the self-evaluation questions and fine-grained assessments of the eyetracking data. Further, I will discuss implications for translation studies and future research.

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# Predictive processing in trainee and professional interpreters

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This study takes an interdisciplinary approach applying psycholinguistic methods to an investigation of prediction in trainee and professional interpreters. Studies on prediction during language processing per se have found that language users can form predictions on different levels as an integral part of language comprehension. They can pre-activate the semantic/conceptual features (Federmeier & Kutas, 1999; Federmeier & Kutas, 2001) but also the morphosyntactic features (Van Berkum et al., 2005; Wicha et al., 2004) of a predicted concept. In addition, prediction has been found across modalities by establishing anticipatory eye movements on visually presented objects as a result of an interaction between semantic effects caused by the thematic roles (e.g. patient, agent, etc.) and morphosyntactic effects triggered by case markers assigned to objects, as arguments of the verb, presented auditorily (e.g., Altmann and Kamide, 1999; Huettig and Altmann, 2005; Mani and Huettig, 2012). Such effects are particularly evident in head-final languages, such as German and Japanese, where the verb occurs in sentence-final position preceded by its arguments (Kamide, Altmann and Haywood 2003; Kamide, Scheepers & Altmann, 2003).

Brouwer, Özkan, & Küntay (2019) applied the same method to an investigation of prediction in a fairly under-investigated head-final language in this context, Turkish, and found that Turkish-speaking adults, similar to Dutch-speaking adults, can predict the upcoming argument based on the verb semantics in verb-

medial sentences. Moreover, Özge, Küntay, & Snedeker (2019) recently showed that Turkish-speaking adults and 4-year-old children can predict the upcoming argument based on morphosyntactic cues (i.e., case markers) in both verb-medial and verb-final sentences. This finding implies that the case markers are interpreted incrementally and the thematic roles of the upcoming nouns can be assigned based on those case marker cues. Crucially, these processes could occur independent of the verb meaning (e.g., in verb-final sentences).

Although conference interpreting is considered an auditory processing task, due to the progress of audio-visual conference technologies, interpreters today have to switch their attention (Cowan 2000) between the speech they hear and the information presented to them in visual form in the source language, all the while producing the same content in the target language and continuously updating information in working memory (Gile, 2009). Studies using eye tracking methods have found no advantage of reading during interpreting with text over reading for interpreting (i.e. ahead of the task) (Kumcu, 2011). However, multimodal presentation of information has been found helpful when strategically scanning the visual input for specific information, such as high numbers, for example (Seeber, 2017).

In addition, interpreting studies using pupillometry as an eye tracking technique have found cognitive load to be higher (i.e. more dilated pupils) during simultaneous interpreting between asymmetrical (from verb-final German to verb-medial English) sentence structures than symmetrical ones (i.e. verb-medial German to verb-medial English). Crucially, they found that when the verb is predicted during simultaneous interpreting from verb-final German into verb-medial English there is no difference in cognitive load compared with simultaneous

interpreting from verb-medial German into verb-medial English (Seeber and Kerzel 2011; Seeber 2013). Therefore, in the specific context of simultaneous conference interpreting, prediction gains an additional strategic dimension, where words, ideas and messages are predicted as a way of circumventing the heavy cognitive load imposed by the multiplicity of (at least partially) overlapping efforts. Thus, prediction becomes crucial to a successful completion of the task at hand.

In the present study, we will use a visual-world eye tracking paradigm to investigate predictive eye movements based on an interaction of semantic and morphosyntactic cues in trainee and professional interpreters with Turkish as their A and English as their B language, controlling for their working memory spans. The participants will complete three tasks in the given order: a verb-based semantic prediction task, a morphosyntactic prediction task, and an operation span task. In the verb-based prediction task, we will present the participants with verb-medial sentences that contain semantically constraining verbs (e.g., “The boy will eat the cake”) or neutral verbs (e.g., “The boy will see the cake”). Paired with the same visual scene, significantly more looks to the CAKE object in the semantic condition than in the neutral condition before hearing the second noun in the sentence would reveal a semantic prediction effect. In the morphosyntactic prediction task, we will contrast the initial nouns in verb-final sentences that are marked either with the nominative case (a nominal marker for the subject/agent in Turkish, which is not overtly realized) as in (1), or with the accusative case (a nominal marker for the object/patient in Turkish) as in (2). Paired with the same visual scene, significantly more looks to the CAT object in the accusative condition than in the nominative condition before hearing the second noun in the sentence would reveal a morphosyntactic prediction effect.

(1) Fare-Ø	peynir-i	yiy-ecek. (nominative condition)
mouse-Nominative	cheese-Accusative	eat-Future
“The mouse will eat the cheese.”		
(2) Fare-y-i	kedi-Ø	yiy-ecek. (accusative condition)
mouse-Accusative	cat-Nominative	eat-Future
The cat will eat the mouse.”		

We expect to find a prediction effect in both prediction experiments for both groups, as indicated by previous research with Turkish-speaking adult participants (Brouwer et al., 2019; Özge et al., 2019). However, we hypothesize that there will be differences in the time course of the prediction effects between the trainee and the professional interpreters. Specifically, we conjecture that the professional interpreters will have a faster orientation to the referent of the upcoming word in the sentence before they hear it compared to the trainee group. We will further assess the participants’ working memory capacities for two reasons. First, there is evidence suggesting that working memory capacity is associated with prediction skills (Huettig & Janse, 2016). Second, interpreting research suggests some evidence that the working memory capacities of interpreters might be enhanced when compared with bilinguals (Christoffels et al. 2006) and when comparing professional with trainee interpreters (Padilla et al., 2005), although other studies have found no differences (Köpke & Nespoulos 2006; Liu et al. 2004). If the results reveal that the professional interpreters have better (e.g., faster) prediction skills and enhanced working memory capacities compared to the trainees, the differences in the prediction skills of the two groups may be explained by the variation in their working memory capacities. In fact, we found that the working memory skills of a small group of trainee interpreters were correlated with their prediction skills in a pilot study.

Given the general cross-modal nature of prediction and its specific dimension during interpreting, an investigation of prediction in interpreters can reveal some aspects of the mechanisms underlying predictive processing. Importantly, even though working memory is associated with prediction skill and has been found to be enhanced in interpreters, the relationship between the two has not been previously investigated in the context of interpreting studies, to our knowledge. Moreover, by exploring differences in working memory between trainee and professional interpreters, it will be possible to reveal some aspects of the nature of experience related effects on predictive processing. In this sense, the current work is exploratory and will contribute to both psycholinguistics and simultaneous conference interpreting research.

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# Wouldn't it be great to have a CEFR for translation competence levels? First results of the NACT Project

## PACTE

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The aim of our talk is to present the first results of the PACTE group's research project "Establishing Competence Levels in the Acquisition of Translation Competence in Written Translation" (NACT, based on the project's initials in Spanish) (MINECO FFI2013-42522-P).

Translation lacks a common description of competence levels, unlike other disciplines such as language teaching, for which the Common European Framework of Reference for Languages (CEFR) serves the purpose in question. The goal of NACT is thus to establish performance levels in translation, defining level descriptor scales for use in both professional translation and translator training in Europe, and on the basis of which progression can be determined.

We have produced a document entitled *Establishing competence levels in translation. Proposal 1 (revised) [19/6/2017]*, which includes level descriptors, a scale consisting of three levels and various sub-levels and five descriptive categories. The levels we have proposed are:

- Translation level C. Competences corresponding to each professional profile (legal translation, economic and financial translation, technical translation, scientific translation, literary translation, audiovisual translation, accessibility, and localization).
- Translation level B. Basic specialized translation competences.
- Translation level A. Basic translation competences.

The five categories for which we have defined level descriptors are language competence; cultural, world knowledge and thematic competence; instrumental competence; translation service provision competence; and translation problem solving competence.

The document also contains a *global scale*, which describes each level's essential characteristics, and three annexes, which provide examples of text genres liable to be translated at each level (Annex 1), of cultural and world knowledge (Annex 2), and of technological tools and functions (Annex 3).

In total, 23 translator training centres from 15 European countries have participated in the project.

Our proposal has been evaluated, via a questionnaire, by 99 experts from the academic and professional translation arenas from 16 countries, comprising 65 translation lecturers, representatives of 11 associations of professional translators, and 23 professional translators. The evaluation process was designed to assess the suitability of the proposed levels and categories, and of their names; correct the descriptors and obtain judgements on them; appraise the progression involved; and gauge the suitability of the annexes.

In our talk, we will present the project's objectives, methodology and main results.

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# **Tracking mental processes during translation. Neurobiological determinants of selected eye tracking parameters**

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The presentation will deal with two selected eye tracking parameters, i.e. spatial saccadic movements and the diameter of the pupil, and their relationship with the mental activity of the translator during sight translation performance. The author will present the results of the experiments conducted in recent years and show how we can detect particular mental processes involved in translation thanks to the analysis of specific saccadic movements. The author will also point out the advantages and limitations of the pupil dilation parameter in the measurement of the cognitive load level. Both eye tracking parameters, i.e. spatial saccadic movements and pupil diameter, will be analysed in relation to neurobiological determinants.

The first of the analysed parameters, specific saccadic movements reaching beyond the translated text and suggesting extratextual fixations were revealed by the analysis of scan paths generated for the test group that performed a sight translation in research experiments. These saccadic movements reaching beyond a text were named by the author “spatial saccadic movements” because they cover an undefined extratextual space.

So far, the role of saccades during eye movements was limited to transferring the most significant information to the central pit of the retina (fovea centralis). It is assumed that saccades are not related to the visual processing of information, i.e. the

visual perception of information, which is why they are sometimes called nonvisual eye movements. Spatial saccadic movements can be observed for persons who think about something or consider a response to a question. At first, it was assumed that turning away one's gaze from a stimulus helps us focus, i.e. it prevents distraction. However, this thesis was not confirmed by research. It turned out that persons who remain in a room on their own also perform the same lateral eye movements, even if they keep their eyes shut (H. Ehrlichman/ D. Micic/ A. Sousa/ J. Zhu 2007).

The first results obtained during the sight translation experiment (in the pilot tests) came as a surprise. The scan paths revealed that the participants avert their gaze from the text. Usually, these movements turned to the left and upwards. Initially the author checked the correlation of these results with neurolinguistic programming theories (right-hand eye movements when someone makes something up or lies, and left-hand movements related to retrieving information), however, the research showed no correlations in the comparative analysis of scan paths and the recordings of the sight translation (the correctness of the proposed equivalent).

Once the NLP theory was rejected and the recordings of the participants had been listened to, it turned out that spatial saccadic movements are performed when, generally speaking, participants deliberate over the proposal of an equivalent, which is why the author supports the hypothesis forwarded by H. Ehrlichman and collaborating academics that spatial saccadic movements are supposed to activate additional cognitive resources, irrespective of the direction they point to and that they are most likely related to scanning for information in the long-term memory. This hypothesis will be explained and supported by the results of the author's experiments.

H. Ehrlichman and D. Micic (2012), conclude, after describing the experiments they carried out, that one of the possible answers is that saccadic movements enable cognitive processes to some extent. In their opinion, spatial saccadic movements, i.e. averting one's gaze from a question or, generally speaking, from the stimulus, reduces cognitive load. The authors claim unanimously that spatial saccadic movements allow us to activate additional cognitive resources, thus relieving the stress on processes. Moreover, the discovered correlation between saccadic movements and memory may reflect the evolutionary history of the brain (H. Ehrlichman and D. Micic 2012). This assumption stemming from evolutionary thinking will be extended and clarified in the presentation.

The results of the above-described research confirm the involvement of long-term memory in the sight translation process, which was previously a contentious issue in translation studies. There was no memory effort in Gile's (1995) most popular effort model of interpreting, in the part related to mental modelling of sight translation. Only after M. Agrifoglio's research on sight translation (2004), which indicated that some kind of memory effort is also present in this translation type, Gile incorporated it in 2009 into the model of sight translation, although he added that it is a short-term memory effort and an effort that does not require an excessive mental load from the translator, as the original text is still available for inspection by the translator. Gile apparently overlooked the fact that the effort of memory - and definitely not short-term memory - is needed to find or choose equivalents in the target language. The results of the author's experiments clearly indicate the involvement of long-term memory in the described translation type, proving it in an empirical way, as well as confirming the difficulty of this translation type, i.e. the very high level of cognitive load related to it.

The author also presents interesting results related to another eye tracking parameter, namely pupil dilation. This indicator's values occurred to be reliable in the comparison of two processes – i.e. on the level of whole texts and whole tasks – and they indicate the process which demands a higher level of cognitive load. But it turned out to be unreliable in relation to smaller analysis units (e.g. on the level of paragraphs, sentences and on the word level). In other words, in the case of larger areas of interest (such as a whole text), a comparison of the two tasks in terms of this indicator reveals significant discrepancies. In such a case it will also be an indicator of cognitive load. But on the smaller units of analysis, when we want to detect which sentence was the most difficult in the whole text (in the whole translation task) or even if we want to detect such a paragraph, we fail. This results, as the author points out, from our neurobiological conditioning and from the nature of the nervous system.

An autonomous part of the nervous system, the sympathetic nervous system, steers the work of internal organs and the response of the organism without the participation of consciousness. It is responsible for reactions of the body in situations marked by danger, stress, emotional tension or during the solving of complicated tasks. It causes a rise in the body activity and triggers responses such as higher blood pressure, profuse sweating, an increased heart rate, the relaxation of bladder muscles, bronchodilation and pupil dilation (see P. Brodal 2004). The sympathetic nervous system reacts very quickly, which is why the above-mentioned responses occur very quickly. In comparison, the parasympathetic nervous system of the autonomous nervous system is responsible for the operation of organs and the body response when it returns to a state of rest, relaxation, sleep when the conditions favour vegetative processes. Usually, this system has an inhibiting effect on organs connected to the

nervous system, it causes the heart rate to slow down, the blood pressure to fall, makes the bronchi and the bladder muscles shrink and it is responsible for pupil contraction. It operates much slower than the sympathetic system. This means that our return to a state of calm after being agitated will take much longer than when we are stimulated to act after a moment of sedation. These characteristics of the nervous system will be linked to the results of the analysis of the pupil dilation on various size of the area of interests and to its unreliability on smaller units of analysis.

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# Emotion and social embeddedness of translation in the workplace

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Scholars in the fields of cognitive translation studies and translation process research have recently begun to emphasize “soft” factors such as translator personality (Hubscher-Davidson 2009) and translator well-being (Ehrensberger-Dow & Jääskeläinen 2018) as explanatory factors of translation processes from the psychological and ergonomics perspectives. At the same time, the role of emotions in translation has also become a legitimate topic in current translation process research. In our latest research project, we study the role of emotions in the field of translation and investigate how it feels to be a translator, what makes translators thrive or despair, how this affects their work processes and how they deal and cope emotionally with their work circumstances. In doing so, we aim to capture and explore the complexity of translation processes in terms of the translation networks, actors and environments that are involved, placing special emphasis thereby on the social embeddedness of emotion and cognition in translation.

To achieve this, we focus on three specific research questions:

1. Which factors trigger emotions in translators during a translation process and how do these relate to the social setting in which they work?
2. What effects do these emotions have on the subsequent translation process?

3. Are translators aware of these emotions and do they apply deliberate strategies to deal with emotional phenomena?

We use ethnographic methods to study the relevance of the social characteristics of translation work environments for emotions in translation processes. The data is collected through participatory observation and semi-structured expert interviews. While participatory observation at the actual location where translators are situated provides insights into the emotional content of translation processes and the interactions with various actors and artefacts, semi-structured interviews serve to reconstruct the translation process in its entirety from the (emotional) perspective of the translators.

The empirical setting selected for this case study is the translation department in an Austrian public sector institution, where we conducted observation sessions and seven interviews over a period of seventeen working days. Both the interview recordings and the field notes taken during the observation sessions were subsequently transcribed in line with the conventions suggested by Kuckartz et al. (2008). This was then followed by a software-assisted qualitative analysis of the interview and observation protocols using the qualitative content analysis method proposed by Gläser and Laudel (2009). As was also argued by Hubscher-Davidson (2011), we felt that a qualitative approach was the most suitable option to explore our research object and gain first insights into emotional aspects in the translation process in its social setting. While a number of previous studies have looked at emotional influence variables in the translation process – see, for example, Tirkkonen-Condit/Laukkanen (1996), Jääskeläinen (1996, 1999), Davou (2007), Rojo López/Ramos (2014, 2016), Hubscher-Davidson (2009, 2013b) or Lehr (2014) –, there are hardly any empirical findings that deal with the topic addressed

in our research, namely emotions in their social embeddedness in translation processes.

The results of our study reveal that a multitude of different emotions regarding the social network are triggered in the participating translators in the course of a translation process. These range from satisfaction, pride, relief and pleasure to interest, caution and the feeling of having to stand up for oneself and take sides (“ownership”). Other emotions triggered include demotivation, aversion or even reluctance, while stress and at times frustration and anger were also common. Another emotional phenomenon mentioned by almost all the translators studied is the feeling of impotence.

When we apply these findings to the question asked at the beginning of this article – what it feels like to be a translator – it appears that the baseline situation for all work done by translators is difficult per se: as the last link in the text production chain, in most cases language experts only receive the text and the request for proofreading or translation shortly before the defined publication date.

Regardless of this frequently stressful baseline situation, translators usually view their work as emotionally rewarding if it is appreciated by the client and their efforts are recognised. Constructive cooperation with the authors is also viewed as rewarding: both sides – the author and the translator – benefit from this and learn something new. Conversely, the translators find their work demotivating when it is not recognised by the client, when they are given no “pouvoir” or when they are not acknowledged as “experts”. The fact that this has clearly been the case in the past is illustrated in an emotional phenomenon that regularly characterises the translation department’s work – namely “ownership”.

Taken further, the emotions triggered in the translators can be described as “relevance detectors” (Scherer 2005:701) that point to key occurrences in the translation process. This perception of “emotions as information” assigns affective phenomena the function of signalling relevant stimuli or incidents that match or contradict – in our case – the translators’ interests, convictions and goals. If they contradict them, corresponding strategies come into play. Hubscher-Davidson (2013a:340) stresses that the adoption of strategies requires different social and emotional competences, noting that various fields of translation (such as technical translation, literary translations) and interpreting (such as conference interpreting, community interpreting) require “specific skills in the perception, processing, regulation, and utilization of emotional information that are unique to each activity” (ibid.). “Exploring emotion identification and emotion management abilities of translators and interpreters in these different contexts [...] therefore shed[s] light on their significance for task performance” (ibid.), which takes, without doubt, centre stage in our rapidly changing world.

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# **The psychophysiological impact of sex scenes with audio description**

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We live in an increasingly audiovisual world that, unfortunately, is not accessible to everyone. Just in Europe there are estimated to be over 30 million blind and partially sighted citizens who do not have access to the majority of audio visual content, despite the effort made to grant universal access to audio visual communication all over Europe (e.g., General Audiovisual Communication Law 7/2010, European Accessibility Act, 2018).

Audio description (hereinafter, AD) is a modality of Audiovisual Translation which translates into words the images of audiovisual texts (e.g., films, theatre, documentaries) in order to make them accessible to a blind audience. Within Translation Studies, research on AD has undergone an enormous development in the last decade, focusing mainly on the creation and analysis of guidelines (Rai et al., 2010) and the description of existing scripts (Jiménez et al., 2010). But experimental research on the processes involved in the creation and reception of AD is still scarce and has addressed almost exclusively the information selection stage, either through the analysis of the verbal descriptions made by sighted participants (Mazur and Kruger, 2012) or through the use of eye-trackers to identify where sighted viewers focus their visual attention (Orero and Vilaró, 2012).

Unfortunately, little attention has been devoted to the social, psychological and emotional factors influencing AD, one exception being the recent line of research that empirically

studies the emotional reception of AD (Ramos and Rojo, 2014; Ramos, 2015; Ramos, 2016) and the influence of psychological factors such as creativity in its production phase (Ramos and Rojo, in press). Results from these studies satisfactorily prove that audio described films are capable of evoking a similar emotional response to that elicited by their audiovisual counterparts, especially for scenes inducing disgust and fear. But it is still necessary to deepen our understanding of the emotional and cognitive process involved in the reception of different types of audio described texts. With that aim, the present study continues the work previously conducted on negative emotions (Ramos, 2015; Ramos, 2016), and focuses on Audio Description of sex movies. Our aim is to discover whether the audio described version of scenes with explicit sexual content is capable of offering its audience a similar experience to that provided by the original audiovisual scenes.

The industry around adult films is a global business receiving almost 100 billion dollars a year. According to the 2018 annual report by the Internet site Pornhub (2019), this site alone receives 33.5 million annual and 92 million daily average visits (average age= 35,5; 29% of women and 71% male). And as Snyder (2016), director of the audio description project at the American Council of the Blind puts it, “people who are blind have every right to access porn as they do classical Shakespeare or any other kind of video”. There are also good economic reasons for developing porn for the blind, since “(t)he blind community is large and has buying power” (Snyder, 2016). In the United States, some projects have been developed to make porn accessible for the blind. In 2006, the website Pornfortheblind.org was conceived as a library of MP3 files with descriptions of popular adult videos recorded by volunteers. The site managed to attract 150,000 visitors per month. Although this platform no longer exists, it highlighted the immense relevance and impact of the initiative. More recently,

in 2016, the giant Pornhub presented the initiative *Described Videos*, which presents a selection of their top performing films with added audio description for their visually impaired users.

In order to analyse the psychophysiological reception of audio described porn scenes, we have designed a study to measure the response in sighted and visually impaired women. Even if the experiment will be conducted during February 2019, the protocol has already been designed. Our sample consists of 50 young, heterosexual females whose ages range from 18 to 25 years. This specific age range is chosen because young audiences are usually more familiar with audiovisual products of the type used in the present experiment. Half of them are sighted and half of them are totally blind. Sighted participants will be recruited from the University of Murcia, whereas the blind participants will be contacted through the National Organisation for the Blind (ONCE) at its headquarters in the city of Murcia. ONCE has already granted permission to conduct the experiment and started to recruit volunteers among its visually impaired members. All participants will sign an informed consent form and will be told that they can leave the experiment at any point. Participants will be exposed to 2 film scenes with explicit sexual content that have been previously validated as effective sexual stimuli for heterosexual women (Gómez-Lugo et al., 2016). Each scene has a duration of 6 minutes. The audio description of the scenes has been commissioned to a professional audio describer, who has been explicitly instructed to follow guidelines recommending to avoid the subjective point of view. Moreover, although there are now studies suggesting that intonation plays a crucial role in the reception of AD (Iglesias, Martínez and Chica, 2011), the AD was recorded with a neutral intonation, following the actual trend in Spanish AD.

Participants' sexual response will be analysed by a combination of physiological activation indicators (heart-rate and heart-rate variability, cortisol in saliva) and subjective response questionnaires (STAI, Spielberger et al., 1970; PANAS, Watson et al., 1988). Before performing the experiment, subjects will fill in a questionnaire about their socio-economic background and other questions concerning factors that could influence their emotional response and should therefore be controlled, such as data on women's menstrual cycle (Chen et al. 2011) or participants' smoking behaviour (Keely and Driscoll 2013; Nesbitt 1973).

The experiment will take place in a quiet room isolated from external noise with a table and two comfortable chairs at the University of Murcia. The films will be played on a 15" MacBook Pro and through Sennheiser HD 219-S high-end headphones. Participants will be received individually and assisted to place the strap with a heart rate sensor below their chest in order to record information about their heart rate when taking part in the experiment. They will also be told that they will hear or watch some clips and will be informed of the need to answer a series of questions, but the specific purpose of the study will remain unknown to them. Two pre-questionnaires (socio-economic information and previous emotional state) will be then read aloud and filled in by one experimenter, who will stay in the room while the participants carry out the entire task. Then, the baseline levels of HR and cortisol in saliva will be measured. After these initial measurements, the experiment will begin. Participants will be asked to relax, and then presented with the stimuli as their HR is being recorded. Levels of cortisol in saliva and heart-rate will be measured along the exposure to the clips.

After the experiment, two post-task questionnaires will be filled in about their emotional response and the state (STAI Spielberger et al., 1970; PANAS, Watson et al., 1988). The approximate time to complete the whole experiment is 45 minutes.

**Keywords**

emotional response, arousal, audio description, reception. psychophysiology

# Language brokers' cognitive and emotional development: a retrospective analysis

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Language brokering, i.e. “the act of translating and interpreting by children and adolescents for their parents, other family members, and other adults” (Morales et al., 2012: 520), is an omnipresent phenomenon in immigrant families. Lazarevic (2017) estimates that over 90% of immigrant youth help their parents navigate the mainstream culture: although interpreters may be available sometimes, in many cases parents elect to use their children as ‘trusted mediators’ (Valdés, 2008).

The literature concerning the effects of language brokering on children well-being presents a pattern of mixed results which highlights the complexity of this phenomenon. While some studies have revealed a negative impact of LB, e.g. stress related to the assumption of adult-like roles (Katz 2014), frustration, anxiety, or even depression (Rainey et al. 2017), and deleterious effects on parents’ effectiveness (Martínez et al. 2009), others support potential positive effects of language brokering on socioemotional development, such as feelings of self-worth and self-confidence in social interactions (Weisskirch, 2013) or high levels of prosocial skills (Villanueva and Buriel, 2010), along with enhanced cognitive development, better sustained attention and problem-solving abilities (Zhou and Krott, 2018). In this latter context, the effects of language brokering on the interpreting procedure will be discussed through examples of “mediated manipulation” (Bauer, 2017) drawn from testimonies of former language brokers. The aim is to illustrate how, despite their limitations, involvement in more complex situations than a child would normally encounter

allows them to develop metalinguistic abilities and better decision-making strategies at an earlier stage, using their imagination and judgement to “negotiate” and achieve the communicative goals.

A multi-lens perspective is needed to shed light on the debate of whether language brokering has a positive or negative effect on children and their families. The author broadens the discussion by moving from a consideration of this activity as an individual psychological experience among children to one that emphasizes ethnic identity and family constellation and considers brokering as a dynamic interactional process.

A semi-structured, voluntary survey was designed to gather subjective data on the personal experience of participants and their perception of this activity as a burden or as a normal practice among family responsibilities, in order to evaluate the role of language brokering on their development and psychological well-being.

The author looks in greater depth at the concept of ethnicity and the different conceptions of identity or self, based on the fact that, when individuals define their identity in terms of their ingroup, such as family or local community, the latter will have a major influence on their conduct (Bierbrauer, 1992: 183). Thus, the starting hypothesis is that different kinds of effects of language brokering exists for members of different ethnic groups, and that feelings about language brokering differ between collectivistic and individualistic cultures. Compared to individuals from Western cultures, people from Arab, Asian, or African cultures would be more likely to emphasise relational interdependence, in which family and group goals supersede individual goals (Darwish and Huber 2003, Guan et al. 2015, among others), and have a higher sense of responsibility towards family than their counterparts from European or

American backgrounds. In Bauer's opinion (2017: 360), in these contexts, language brokering aligns with family values and may be compared "with other normal activities in which children contribute to their families, such as household and other family chores".

Commitment to one's ethnic identity appears to be associated with greater psychological well-being, self-esteem and life satisfaction (Chae and Larres, 2010, Smith and Silva, 2011, among others). Thus, it could be assumed that the risk of stress from language brokering would be lower in environments with close family bonds, and that family solidarity may prevent from the potentially detrimental effects of stressful experiences. This is of special relevance considering that elevated stress among children has been tied to lower cognitive skills later in development (Suor et al. 2015), as well as poorer psychological well-being. The results are also consistent with Shen's research (2018), which showed that "improving parent-child relationships may be one way to promote the well-being of young brokers".

The author considers stress as the consequence of a process of several interrelated factors. Firstly, some stressors arise directly from the language brokering experience, often as a result of the severity of the brokering situation (dealing with serious diseases, conflict situations/confrontation with authorities, embarrassing situations in medical consultations, etc.); other stressors arise outside of the brokering experience and can be divided into two interrelated categories: individual features (self-concept, personality) and environmental circumstances (ethnicity, family structure and level of acculturation). Examining the combination and intensity of these three types of potential stressors should help determine the individual's positive or negative approach to language brokering.

The corpus of analysis consists of approximately 8 hours of recorded interviews with 10 professional interpreters who have grown up interpreting and translating for their parents and other adults and shared their retrospective childhood experiences. The reasons for the chosen methodology was to gather focused, qualitative and descriptive data, allowing the participants to expand on their brokering experiences in their own words, as opposed to lead the interviewee toward preconceived choices. The group was divided into two categories, according to their country of origin: The collectivist culture sample included individuals from China, Mauritania, Marocco and Gambia, whereas the individualist culture group was composed of people from three Western countries: Poland, Bulgaria and Czech Republic.

Although the author avoids making generalizations that go beyond the data collected, noting that cultural values, beliefs and practices are neither stable nor homogenous, and people who share a national origin or ethnic affiliation may still differ in many ways due, for example, to the different levels of exposure to the mainstream culture, the analysis of the connections between emotional, cognitive and social functioning should help predict the impact of language brokering on children cognitive development, prosocial behaviour and psychological well-being.

Finally, the author encourages enriching professional training methodologies with a neuroeducational approach that promotes the integration of emotional intelligence in the educational curriculum of interpreting schools, in order to develop more effective coping strategies and be better able to manage the stressful situations that interpreters often have to deal with, which ultimately should promote professionals' wellness and enhance job performance.

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# **The TICQ: A comprehensive, validated tool for assessing translation and interpreting competence**

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Various empirical research fields look at professionals and students in the fields of translation and interpreting as key populations to test highly diverse hypotheses. However, measures of translation and interpreting competence in relevant experiments are either absent or based on non-validated ad hoc instruments (e.g., García et al., 2014; Henrard & Van Daele, 2017; Santilli et al., 2018; Van de Putte et al.,

2018; Yudes, Macizo, & Bajo, 2011). As is the case with other subject-level factors in the study of bilinguals (Hulstijn, 2012), such a scenario casts doubts on available findings and hinders comparability across studies. To address this problem, we introduce and validate the Translation and Interpreting Competence Questionnaire (TICQ), an online, customizable, multilingual tool to collect quantitative and qualitative data on numerous aspects of translation and interpreting skills.

Competence in translation and interpreting has been variously shown to affect performance in multiple cognitive tasks. Relative to other bilinguals, professionals and students in these areas constantly face differential cross-linguistic processing demands and manifest enhancements in various linguistic (e.g., García et al., 2014; Ibáñez, Macizo, & Bajo, 2010; Santilli et al., 2018) and executive (e.g., Babcock & Vallesi, 2017; Christoffels, De Groot, & Kroll, 2006; Morales, Padilla, Gomez-Ariza, & Bajo, 2015; Yudes et al., 2011) dimensions.

Of note, translation competence has been claimed to be independent from other subject-level factors, such as knowledge of and proficiency in the native and non-native language (L1 and L2, respectively) (PACTE, 2005). In fact, at least some cognitive effects linked to translation and/or interpreting experience remain significant even after controlling for variables such as L2 competence or age of L2 acquisition (Babcock & Vallesi, 2017; García et al., 2014; Ibáñez et al., 2010; Morales et al., 2015; Santilli et al., 2018). In short, then, competence in both translation and interpreting constitutes a major and direct modulator of multiple cognitive processes in bilinguals.

However, measures of these variables in translation and interpreting studies (TIS) and other fields have been mostly based on anecdotal or qualitative observations (e.g., Alves & Gonçalves, 2013; Dragsted, 2012; Fabbro, Gran, & Gran, 1991; Hervais-Adelman et al., 2015; Prior, Wintner, Macwhinney, & Lavie, 2011), if not missing altogether (e.g., Carl & Kay, 2011; Christoffels et al., 2006, 2013; Duyck & Brysbaert, 2004; Grabner, Brunner, Leeb, Neuper, & Pfurtscheller, 2007; Proverbio & Adorni, 2011; Sunderman & Kroll, 2006). Moreover, the few studies which do offer quantitative data on such factors rely on ad hoc instruments which present a very restricted scope and are devoid of either internal or external validation (e.g., Christoffels et al., 2006; Elmer et al., 2010, 2014; Ibáñez et al., 2010; Immonen, 2006; Lewis & Bates, 2013; O'Brien, 2007; PACTE, 2005; Schaeffer & Carl, 2013; Winther Balling, Hvelplund, & Sjørup, 2014).

Seeking to meet this challenge, here we introduce the TICQ, a flexible, systematic tool (already available in English, Spanish, and German) to collect quantitative and qualitative data on multiple dimensions of translation and interpreting skills. First, we characterize the instrument's construction protocol and overall structure. Second, we describe its online implementation and usability features. Third, we report results from two validation studies, one for the translation version and one for the interpreting version. Finally, we discuss the main attributes of the instrument, considering its current limitations and prospects for development. In brief, the TICQ aims to enhance research on these overlooked yet critical variables and strengthen the study of its target populations in TIS as well as other relevant fields.

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# The effect of alignment units in a sentence context during translation: an ERP study

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## Motivation & Introduction

Schaeffer et al (2017) carried out an eye tracking study which compared eye movements during reading for comprehension with reading for translation. Participants carried out two tasks: reading for comprehension and reading for subsequent translation. In this study, the number of target words likely to be used for the translation of a single source word was manipulated. Results showed a first fixation effect such that source words which were likely to be translated by more than one target word (one-to-many alignment) resulted in longer first fixation durations than words which were likely to be translated by just one target word (one-to-one alignment) – when the reading purpose was translation. The results are interpreted in terms of co-activation of the two linguistic systems during translation, and in terms of the horizontal / vertical model of translation as proposed by Schaeffer and Carl (2013), in addition to findings from corpus based studies (Tirkkonen-Condit, 2004). Schaeffer and Carl (2013: 185) argue that translation is both an early and a late process: “Early during source text reading, shared representations are activated which then serve as a basis for regeneration in the target language...” Schaeffer and Carl (2013: 185) further argue that “...the horizontal process is an early process while the vertical processes depend on context which becomes available later, as processing advances in the chunk or text.”

The existing study (Schaeffer et al. 2017) supports the early effects hypothesised by Schaeffer and Carl (2013): aspects of how source and target relate to each other has an early effect on eye movements during reading for translation. The observed first fixation effect was relatively large at 23ms, suggesting that when source and target are more similar, as is the case for one-to-one alignments, lexical access during reading for translation is less effortful than when co-activation of a one-to-many alignment leads to more effortful lexical access during reading for translation. It is possible to interpret these findings in terms of the Distributed Conceptual Features Model (de Groot, 1992). De Groot (1992: 1002) argues that “Depending on the degree of meaning overlap between words and their translations, larger or smaller numbers of these nodes would be shared by translation pairs.” In other words, the degree of overlap between items in the two languages predicts how effortful the access to the representation of this item is – the larger the overlap, the less effort is required to access the particular representation and the smaller the overlap in terms of conceptual shared representations, the more effort is required to retrieve this representation. It is possible to argue that the stimuli presented in the study by Schaeffer et al (2017) differ regarding the degree of overlap of shared conceptual representations. Figure 2 below exemplifies this – [Sorgen] is a plural noun which can be translated as worries. However, the verb [worry] requires at least three tokens in German [sich Sorgen machen (yourself worries make)]. Only the plural noun can be argued to be directly related to the source item [worry], while the remaining tokens carry meaning which is arguably only implicitly present in the source – to some degree. There may therefore be a relatively strong overlap between [worry] and [Sorgen], but [sich] and [machen] is only faintly related to the source while necessary in the context as shown in Figure 1 below.

Many	of	the	fishermen	will	laugh	...
Viele	von	den	Fischern	werden	lachen	...

Many	of	the	fishermen	will	worry	...		
Viele	von	den	Fischern	werden	sich	Sorgen	machen	...

Figure 1: Sentence from the stimuli used in Schaeffer et al (2017) and in the current study.

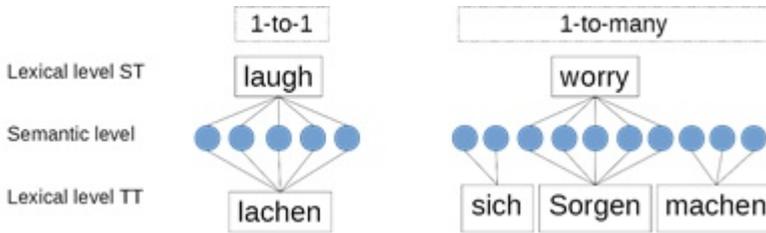


Figure 2: Strong (in the case of the 1-to-1 alignment for [laugh]) and weak (in the case of the 1-to-many alignment for [worry]) conceptual overlap.

The explanations above are, however, mainly based on theoretical assumptions. To further investigate mental causes of the effect observed by Schaeffer et al. (2017), we will perform an event-related potential study. This method will allow us to look deeper into the different processes involved during the early stages of the reading process.

We expect, on the basis of the previous behavioural study, to find that 1-to-many items are more effortful to process than 1-to-1 items and will test to what extent this experimental manipulation has an effect on event-related potential components.

## Method

Participants: Translation students, L1=German, L2=English

Material: 120 sentences, 60 per condition (1-1-alignments, 1-n-alignments). Sentences were taken from the novel *The Old Man And The Sea* (Hemingway, 1952) and manipulated for the critical word. Two groups of 10 translation students translated

the sentences in order to verify the alignment-classification. A sentence was accepted for the main study if at least 50 % of the translations were in line with the initial alignment-predictions.

Critical words were further controlled for frequency in English, word length in letters and concreteness. Sentences were divided into two groups. Each group contained only one version of each sentence and contained the same number of 1-to-1 and 1-to-many sentences. Every participant will thus be presented with 30 sentences for each condition.

Stimuli will be presented in a self-paced reading task. Every sentence will be preceded by a fixation cross and the participants will have to press the space key on a keyboard to get from one word to the next. After each sentence, participants will see a prompt which asks them to speak the translation of the sentence they just read. The stimuli will be presented with psychopy, the EEG will be recorded on 64 electrodes with the Synamps2-system of Neuroscan. The oral translation of the sentences will be recorded with audacity. Data processing was done in eeglab and statistics were computed in R.

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# **Hierarchies in lexical complexity: Are there effects of word frequency, word length and repetition on the visual word processing of people with cognitive impairment?**

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The research project is concerned with intralingual translation and language processing as it examines the language processing skills of people with cognitive impairment (or 'mental retardation') in regard to the German concept 'Easy Language' (German: 'Leichte Sprache'). The aim is to define the primary target group of Easy Language more closely in terms of their ability to process written language and thus to contribute to the progressive development and empirical validation of the consisting guidelines for the concept. An eye-tracking-experiment is designed to evaluate effects of word frequency, word length and repetition on visual word processing of the cognitive impaired target group within sentence processing. Besides the direct effects of local and global word frequency and word length, the project also aims to study possible learning effects that might result from the frequent repetition of unfamiliar words within texts in Easy Language.

## **Introduction**

The guidelines for Simple Language demand the use of 'simple' and 'short' words (see Netzwerk Leichte Sprache 2013: 22, 26) when translating a German standard text into Simple Language for making it suitable for the heterogeneous target group of the concept. Yet we currently do not know what kind of linguistic factors make a word easy to process for people with cognitive impairment. There are several well-studied influences

that make an impact on the visual word processing in healthy grown-ups and children though. The focus of the current examination will be on the word frequency effect (Just/Carpenter 1980, Tiffin-Richards/Schroeder 2015), the word length effect (Just/Carpenter 1980, Kliegl et al. 2004), the repetition effect (Raney/Rayner 1995, Kamienskowski et al. 2017) and long-term learning effects for infrequent words (Just/Carpenter 1980). The research question is to what extent the primary target group can take advantage of the same effects on visual word processing as healthy people. It seems possible that cognitive impaired people who often do not have comparable reading experience as healthy adults and who presumably live in very different environments compared to healthy people (e.g. working in sheltered workshops, living in residential homes) do not show the discussed effects on visual word processing in the same way. Results of this study will make it possible to reevaluate the existing guidelines for Easy Language by determining factors that facilitate word processing in people with cognitive impairment.

### **Scientific Problem and First Hypotheses**

As described above, the study will focus on four main research questions:

Question 1: Does the well-documented frequency effect for visual processing times of frequent and infrequent words appear in people with cognitive impairment in the same way as it does in healthy individuals?

Hypotheses 1: Due to less experience in reading and writing, the target group of Easy Language – people with cognitive impairment – does not show the word frequency effect in the same way healthy adults do. People with cognitive impairment do not profit from frequent words as much as experienced readers do. This will show (besides others) in a smaller difference in fixation times of frequent and infrequent words.

Question 2: Does the well-documented word length effect for visual processing times of long and short words appear in people with cognitive impairment in the same way as it does in healthy individuals?

Hypotheses 2: Due to less experience in reading and writing, the target group of Easy Language – people with cognitive impairment – does not show the word length effect in the same way healthy grownups do. People with cognitive impairment mainly read by using the sublexical reading route (see *Dual Route cascaded model*: Coltheart et al. 2001) and decode the phonological word form by using grapheme-phoneme-correspondence rules. They therefore profit from short words even more than healthy adults do. This will show (besides others) in a larger difference in fixation times for long and short words.

Question 3: How does the repetition of unfamiliar words influence the visual word processing speed in people with cognitive impairment?

Hypotheses 3: The repeated decoding (by grapheme-phoneme-correspondence rules) of the infrequent words will transfer the visual word form of those words into the mental lexicon (Share 1995) and make the lexical reading route (Coltheart et al. 2001) accessible for those words. The words can then be read more quickly. This will show (besides others) in shorter fixation times for the repeated reading compared to the first reading of the word.

Question 4: Are there any long-term learning effects for repeated infrequent words in people with cognitive impairment?

Hypotheses 4: The repeatedly read infrequent words are available in the mental lexicon and are mapped with the memorized phonological form so that access is facilitated in the long-term. This will show (besides others) in shorter fixation

times for the infrequent words during the follow-up-study, compared to the first time reading of the same word.

## **Methods and Procedure**

The target group will consist of at least 40 people with cognitive impairment who work in sheltered workshops. Besides the target group there will be a healthy control group matched in terms of age and gender. All subjects will be German native speakers. Subjects will be between 18 and 60 years. The target group will be defined more closely in terms of reading ability (two pre-tests will be run), verbal intelligence as well as attention, memory and visual processing skills (four more pretests).

An eye-tracking-experiment will be conducted to collect data on gaze behavior both for the target and control group. The reading material for the eye-tracking-study will consist of sentences containing one target word each. Target words are prepared in terms of length and frequency for analyzing the word length and the word frequency effect. Four paradigms are designed: words that are short and frequent, short and infrequent, long and frequent or long and infrequent. To furthermore analyze the effect of repetition, half of the infrequent target words will be repeated in different sentences. In addition, there will be one follow-up test to evaluate the long-term learning effect for those infrequent target words. The eye-tracking-data will be examined with regard to the above discussed research questions. Besides other metrics, the following parameters will be analyzed: first fixation duration, number of refixations, total gaze duration, number and location of reading cancellations, number of regressions and saccades and average reading times. Besides filing gaze behavior data for the critical categories (word frequency, word length, repetition) we will also try to analyze effect sizes for each criterion to determine from which effect the target group

benefits most. The sentences containing the target word are controlled for length and position of the target word as well as length and frequency of pre- and post-target. In addition, the sentences are rated by a healthy control-group (25 college students) in terms of the abstractness and familiarity of the target words and in terms of naturalness and comprehensibility of the whole sentences.

In my presentation, I will present details on the theoretical outlines of language processing on word level within the target group of Easy Language in German besides introducing first results of the project.

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# Visual information in simultaneous interpretation: an eye tracking study

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To date, Interpreting Studies scholars have rarely utilised eye tracking when examining the interpreting process. With regard to simultaneous interpretation, the five most notable exceptions are Tommola & Niemi (1985), Hyöna, Tommola & Alaja (1995), Seeber & Kerzel (2011), Seeber (2012), and Gieshoff (2018). In laboratory settings, these authors predominantly employ pupillometry to measure cognitive load. Seeber (2012) analyses gaze movement data in the context of processing figures based on auditory as well as visual input (through gestures and graphics). With the exceptions of Seeber & Kerzel (2011) and Seeber (2012), study participants were students.

This present study drew on attention allocation research, and in particular Nillie Lavie's perceptual load theory (Lavie et al. 2014) as the most relevant theoretical foundation. It postulates that the selection of task-relevant perceptual stimuli is determined less by factors of chronology (early / late selection) but rather by quantitative considerations (perceptual load), which in turn hinge upon the difficulty of the task, i.e. the cognitive effort. In such cases where perceptual (visual and auditory) load is high, Lavie argues that cognitive resources are exhausted more quickly. Lower perceptual and cognitive load, in turn, increase the perception of stimuli which then have to be evaluated as to their task relevance. This evaluation, again, increases cognitive load. If cognitive load is too high, this can lead to perceptual blindness. Thus, Lavie argues that distractors, too, are typically perceived, but that the attention allocated to them decreases with increasing task difficulty.

The relevance of this theoretical approach for simultaneous interpreting emerges from the fact that the limited attentional resources must be allocated concurrently both to the processing of multimodal stimuli and to the sub-processes of interpretation, i.e. comprehension, language transfer, production, and monitoring, and that these sub-processes are determined to a very large degree by the pace set by the speaker. The study aimed to ascertain the role of visual input in simultaneous interpretation and to investigate whether such input reduces or rather increases cognitive load. To that end, the following questions were explored: Might simultaneous interpretation of a passage with challenging language or content feasibly lead to non-processing or non-perception of visual stimuli? Based on the gaze data, is it possible to ascertain whether all potential distractors are, indeed, perceived and possibly evaluated as to their relevance, as they would be under Lavie's theory? Or does the data show that some visual information is consciously avoided, and if so, when? Is it possible to determine whether the function of visual information varies depending on the interpreting sub-processes, and to identify a conscious search for helpful visual information? Is there a risk of visual overload in present-day multimodal conference settings? In addition, the study aimed at empirically validating Moser's (2002) hypothesis, according to which the interpreter's gaze direction is determined by the mental representation of the respective auditory cue – a theory which she uses to explain the necessity of the interpreter's presence in the conference room.

Answering the calls of Translation Studies scholars (see, for instance, Risku 2013, Risku 2017: 291), the experiment was conducted in a near-realistic setting – in full awareness of the consequential drawbacks – rather than as a laboratory study. Hence, it was situated within the cognitive science framework of situated, embodied cognition (see Risku 2010; Muñoz Martín

2010; Muñoz Martín 2017; Shlesinger 2000: 6). The study participants were 13 professional conference interpreters with German as their A language and French as their B language. They were asked to interpret a live speech which was accompanied by a PowerPoint presentation. The conference room had two screens to the right and left of the speaker, of which the one on the right showed the presentation, while the one on the left showed the speaker, at times enlarged or recorded from an unusual camera angle. In addition to the speaker, the conference set-up included the conference chair as well as two rows of seats for the audience, arranged to the left and right of the room, respectively. Both the original speech and the respective interpretations were recorded, and both audio tracks were subsequently combined with the gaze data gathered via a Tobii TX300. In addition, the subjects were filmed with a web cam to facilitate determining the causes of potential track losses in the gaze data (closed eyes, averted gaze).

The PowerPoint slides encompassed a variety of design elements. Some were meant to complement the auditory input in order to lower cognitive load, while others were less informative or even hindered comprehension, e.g. a difficult literary quote requiring unprepared sight translation. Since figures are generally regarded as problem triggers in interpreting (see Frittella 2017), they, too, were incorporated into the speech in varying degrees of difficulty, as were technical terms and dense passages, again creating high cognitive load. In addition, the conference room offered several potential distractors (audience behaviour as an uncontrolled variable, as well as another distractor purposefully introduced as part of the experimental setup).

The gaze data thus gathered provides insights into the visual field of the interpreters, which expands or shrinks depending on cognitive load. The divergent cognitive load triggers variances in gaze behaviour. Evidently, segments of the presentation that are easily interpreted, as well as pauses in the presentation, release cognitive resources that are then used to perceive and process more visual input. The study verifies the link between the different functions of visual information and the individual sub-processes of simultaneous interpretation, and thus provides an entry point for further research. It also cautiously suggests a link between cognitive load and fixation duration. The primary focus was on the speaker, the secondary focus on the PowerPoint presentation; the intensity of these foci underlines the significance of both information media. Closed eyes or an averted gaze to avoid further perceptual stress could indicate visual overload, as might the fact that hardly any interpreter visually referenced the enlarged image of the speaker projected onto the screen.

The presentation thus examines the different roles of visual information as related to the distinct sub-processes of simultaneous interpretation. Eye tracking has yielded new insights regarding simultaneous interpretation as a whole, and the significance of visual information for this process in particular, and has opened up new potential avenues for studies in interpreting process research.

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# The new roles of machine translation for cognitive learning purposes

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Over the past two years, machine translations (MT) created by a neural MT system (NMT) have greatly improved in quality, so it is now the right time to explore MT's new roles. A huge body of existing literature on MT addresses its economic and linguistic benefits, but there is room for further studies. A huge body of existing literature on MT addresses its economic and linguistic benefits (Depalma, 2013; Doherty & Gaspari, 2013; Koehn, 2012; Läubli et al. 2013; Plitt & Masselot, 2010, Zhechev, 2012), but there should be an additional place for MT in light of its overall high level of comprehensibility with high reduction of lexical, syntactic and grammatical errors. The author applied MT to her academic writing practice and her teaching of post-editing (PE) and cultural translation. In view of the positive and practical experiences, she wants to re-identify the roles of MT and looks for its new place in the disciplines of language and translator education. With this intention, the main thrust of the present article justifies how MT can be used as a cognitive-intervention vehicle to help writers improve L2 writing, enabling translation learners to infer PE strategies and enhance their cross-cultural sense. The new roles of MT can be identified as a writing checker, a PE-learning facilitator and a bicultural-sense booster, not merely a mediating tool of writing and translation. To frame the discussion, the author raised two research questions: (1) How can we justify MT's new roles for cognitive learning purposes using the framework of cognitive theory of insight learning? (2) What are the implications for re-identifying MT roles in this research? Wolfgang Köhler's (1921,

1925) theory of insight learning was used as the theoretical framework for this research, as the MT-aided learning tasks were designed to make each participant engage in the process of checking, differentiating, inferring and gaining insights for problem solution. Köhler's theoretical concepts of a well-structured learning situation, a survey and goal-specific trials and moves fitted with the present research because the author's three-phase approach of checking, revising and confirming was similar to the chimpanzees' learning pattern that proceeded from checking/survey, trials, gaining insights for attaining the objective.

The method used to verify the above functions of MT was analysis of the author's own MT-aided writing experience and student participants' retrospective journals that noted down their learning process and reflections. The MT-aided learning tasks were completed in class, but the journal was written at home. The process of using MT to improve writing in L2 was built on the author's personal experience, but it similarly went through three phases, starting with the writer's checking of her English writing using its Chinese MT, and then moving to the revision of original English writing, and further to the confirmation of the revision using its Chinese MT again. If the result was not satisfying, the writer returned to modify the revision and confirm the presentational and organizational accuracy of the revision with an MT test again. The writer did not stop until the best revision was done. With regard to MT use for inferring PE strategies, the students followed the process that proceeded from the checking of the differences between MT and its corresponding human translation (HT) to a proposal of some inferential PE strategies, and further to the confirmation of post-edits with MT tests. In a similar manner, if a satisfying result was not achieved, student learners returned to modify the post-edits and seek confirmation using MT tests again. Furthermore, the process of MT use for learning cultural

translation moved from the identification of inappropriate literal cultural translations using an MT-vs.-HT comparison to the paraphrasing of cultural references and further to the confirmation of correct cultural translation with MT tests. All unsatisfying results led to further revision and confirmation with MT tests.

The findings showed that each problem of informative inadequacy or organizational illogicality disclosed through MT tests made the writer take a step further and finally she gained insights for revising sentences with a satisfying confirmation. On the other hand, students' retrospective journals showed that checking the differences between MT and HT helped them identify MT errors more easily than checking MT alone. To fix the errors, students cognitively engaged in reasoning, and figured out some PE strategies. Unsatisfying MT results of post-edits pushed them to consider how to revise the post-edit again until it could present the most similar message to the source text. Re-editing and retests of MT contributed to their insight learning. In addition, students argued that a comparison of MT and HT, and paraphrasing cultural references made them notice cultural differences between Taiwan and India. The entire learning process as demonstrated in the preceding MT-aided learning tasks concurs with Köhler's (1921, 1925, 1951) insight learning theory that solution is not blindly gained; rather it is established on one continuous, smooth action which comprises several moves relevant to achieving the objective (Demiguin, no date). Despite an empirical case study, this research calls people's attention to alternative MT roles that provide a cognitive intervention function to enable users to gain insights for improving their writing in L2 and learn how to use PE strategies and make accurate cultural translations. The expectation is that this pilot study will open up a new way to access MT and reveals its practical implications with the epistemological value of an interdisciplinary study by seeking

an integration of MT, language and translation learning, and behavior psychology. The educational value is also emphasized that MT can be used as a tool for advanced learners' self-learning of writing in L2, post-editing strategies, and cultural translation.

### **Keywords**

machine translation, writing checker, post-editing-strategies facilitator, bicultural-awareness booster, three-phase approach

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# **Self-efficacy, self-identity and self-representation: towards the configuration of translator trainees' professional self-identity**

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In recent years, little has been written about translator's affective cognitive dimension. The notion of how competent translator trainees feel when they are translating, i.e. their self-efficacy (Haro-Soler, 2017, 2018), has only very recently been studied in the translation studies literature. Similarly, the role emotions play in the process of translation has also been reported by Hubster-Davidson (2018) and is currently being discussed in the field. However, until this date, there has been no systematic research on the configuration of translators' professional self-identity. Although this concept has extensively been documented in areas such as nursery and education, the cognitive development whereby translators conclude their undergraduate studies identifying themselves as – or rather *feeling* – translators has not been addressed in the literature yet. Thus, questions regarding when exactly translator trainees identify themselves as professional translators remains unaddressed.

Consequently, a new potential research project has been developed in the Department of Linguistics and Literature of Universidad de Santiago de Chile to explore the configuration of professional self-identity in translation undergraduate students in Chile during the last three years of their five-year programme. This implies exploring how they conceive experiences through the study of the analysis of their narratives and the role of self-efficacy this process. To do this, a longitudinal study will be divided into three stages: anchorage,

development and reflection. The first one refers to the initial narratives participants have towards the profession as well as their education before engaging in translation course units in the programme, while the second and third ones are analysed as trainees advance in their undergraduate education. Thus, this presentation aims to provide the initial results from the anchorage stage.

As conceptual framework, this study is based on a phenomenological approach to identity (Gallaher and Zahavi, 2012), which conceives people's *situatedness*, i.e. the idea that individuals are pragmatically contextualised in the world (Gallagher, 2009), as fundamental principle. This supposes that individuals experience life in unique and unrepeatable ways in a moment-by-moment fashion, i.e. ipseity. In addition, individuals make sense of who they are by having sense of a temporal continuum that allows them to verbalise who they have been, are and will be. This sense of continuity, or sameness, provides individuals with a sense of identity as they live their lives, which empowers them to recognise themselves and experiences as theirs.

Thus, from a phenomenological perspective, identity is exercised on a moment-by-moment basis with pre-reflective and reflective experiences, in which individuals are able to recognise themselves or not. This exercise is possible due to 1) individuals' corporeity that enables them to interact with the world, 2) temporality that provides an abstract-concrete psychological orientation, and 3) a dialectic relation between ipseity and sameness, i.e. what is lived every moment and who individuals have been. These are crucial principles that underlie identity configuration in individuals' narratives, which are understood as individuals' final internalised story that provide sense of unity and coherence. This study, therefore, aims to understand how students configure their professional

self-identity in their undergraduate translation programme and how the concepts above provide an explanation to such a process.

As to the methodology, a sample of 9 undergraduate participants of a Chilean translation studies programme were selected according to the following criteria: 1) be between 20 and 25 years old, 2) be fairly proficient in English as a B language, i.e. B2 of the CEFR, at the moment of the interview 3) not have any serious visual or hearing impairment. Participants' narratives were obtained by conducting individual semi-structured interviews, which were conducted in Spanish by the research team. These interviews included two dimensions: self-description and professional self-identity. Data was recorded and transcribed. It was later cross-referenced using the constant comparative method to identify major trends in participants' discourse.

Results show an emotional double anchorage in which there is tension between fear to alterity and duty to exercise agency to fulfil academic and personal demands. Indeed, students seem to find it difficult to define themselves as individuals, yet they are able to configure a collective identity as part of the programme in which they are enrolled. This provides shelter for alterity and ipseity that could enable them to engage in a more active role in their training. In this sense, the notion of professional translator is idealised, which challenges trainees' current positioning. It is concluded that, although participants recognise who they want to be as professionals, they live their present from an emotional position where agency towards the role they wish to achieve is not currently available.

These findings can be useful in the translation class methodologies that account for these phenomena. By providing meaningful classroom experiences that empower translator

trainees to become agents, their translator identity can be reinforced. Future research will consider the next four data collection points to present the longitudinal development of translator professional self-identity in these students.

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# A study of negation in German Easy Language – does typographic marking of negation words cause differences in processing negation?

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## Theoretical Background

Easy Language is a variety in German that is mainly conceptualized for written modality. It has been developed through practical application since 2001. Working together with people with cognitive disabilities, members of the organizations “People first” and “Netzwerk Leichte Sprache e.V.” set the goal to eliminate communication barriers for their clients. Therefore they registered first rules to reduce the complexity of the German Language. Meanwhile, providing texts in Easy Language has been legally defined in BITV 2.0 since 2011 (c. f. Bredel & Maaß 2016). Easy Language is designed for a target group. That is why professional translators transform texts from standard German into Easy Language material. Consequently, Easy Language can be regarded as a form of intralingual translation. During the past years, linguists developed linguistically based rules for this transformation. The two most important works are *Leichte Sprache. Das Regelbuch* by Maaß (2015) and *Leichte Sprache. Theoretische Grundlagen für die Praxis* by Bredel and Maaß (2016). Yet, the theoretically based rules mostly lack empirical evidence for processing efficacy, readability and comprehensibility. The proposed experimental study is designed to close this gap collecting EEG and behavioral data.

The study deals with negation in German Easy Language. Negation is a complex phenomenon in German. It disproves assumptions, changes the truth-value of a proposition, and

expresses the non-existence of objects and circumstances. (c. f. Wöllstein 2016, Glück & Rödel 2013, Zifonun 1997, Zifonun 1977, Köller 2016, Eisenberg 2013, Margolin 2013). Numerous behavioral studies report higher processing costs of sentences containing negation compared to affirmative sentences. The results of these are longer reading and reaction times as well as higher error rates in matching tasks (c. f. Fischler et al. 1983; McDonald & Just 1989; Kaup 2001; Orenes & Santamaria, 2014). EEG-ERP-studies on negation contain diverse outcomes, which result from differing research goals. However, a general processing hierarchy in favor of true affirmative sentences compared to true negated sentences and false affirmative sentences can be observed (c. f. Kaup 2001, Kaup et al. 2007, Lüdtke et al. 2008, Staab et al. 2009). The Two-Steps-Simulation-Hypothesis (Lüdtke et al. 2006) models the temporal processing and delayed integration of negated propositions within a sentence. As a result of this, Easy Language rules recommend avoiding negation or preferring analytical negation with “not” (“*nicht*”) to synthetic negation with “no” (“*kein*”), the latter being easily overread. Furthermore, negation words are supposed to be printed in bold typeface (Bredel & Maaß 2016: 467, Maaß 2015: 101, 126ff.).

With regard to typographic marking, Lotze et al. (2012) found a significant attenuation of N400 after unexpected words when printed in uppercase, but no effect of a semantic illusion. This implies that typographic marking can serve as an effective means of emphasis. Lonsdale (2014) summarizes the potential of bold print in a review article. “Because bold type draws attention, this variant is best used for specific situations that require emphasis. So, for example, it can be used to distinguish words (e.g. ‘not’, ‘NB’) or headlines, rather than whole sentences” (Lonsdale 2014: 36).

## Experiment

It will be investigated whether the typographic marking of negation words leads to lower processing costs in reading sentences with negation. Four research questions and their hypotheses are formulated:

[1] Does typographic marking of negation words lead to processing advantages of negated sentences compared to negated sentences without typographic marking? According to Lotze et al. (2012) the typographic marking can evoke a focus on negation words. The semantic integration of negated propositions, compared to normally printed negation can be enhanced. This results in shorter reading times, shorter reaction times and higher accuracy rates.

[2] Is the reading advantage for “*nicht*”-negation sentences similar to “*kein*”-negation? Since more grammatical information is lying on “*kein*” than on “*nicht*”, processing advantages could be higher. However, there is no former research to base the hypothesis on.

[3] Can direct processing differences be measured between affirmative and negative sentences? According to Lüdtkke et al. (2008), sentences with constituent negation with “*kein*” could evoke significantly more positive deflections in EEG between 50ms and 350ms after the negation word than the affirmative counterpart “*ein*”. Since there has not been any replication of this result, the hypothesis needs to be validated.

[4] Does typographic marking of negation words lead to integration advantages of the truth-value of negated sentences compared to negated sentences without typographic marking? Assuming that typographic marking results in enhanced integration of truth-values, typographically marked negated sentences result in faster reaction times and higher accuracy rates in a truth-value-verification task. ERPs, esp. negative deflections associated with critical words (i.e. negation word, negated object after a typographically marked negation word)

should be attenuated. That means negative deflections in EEG should be shorter and less pronounced after a typographically marked negation word than after an unmarked negation word. The semantic integration of truth values should therefore be enhanced.

## **Subjects**

The experimental group (N=40) will consist of adult subjects with German mother tongue, who are right handed and who do not have any language or communication disorders, psychiatric or neurological illnesses. Neuropsychological pretests for verbal IQ and working memory such as VLMT and TMT will be conducted.

## **Material**

Two sets of stimuli are tested. The first task consists of a 3 (type-manipulation: normal print, bold print, upper case) x 2 (polarity: affirmative, negative) x 2 (negation type: analytical negation, synthetical negation) design resulting in a set of 84 target sentences with 14 target sentences per condition (e.g. The woman is reading the book. vs. The woman is reading no book. vs. The woman is not reading the book. vs. The woman is gladly reading the book.). The sentences consist of parallelized SVO structures with high frequency verbs and nouns. The second set of stimuli consists of a 3 (type-manipulation: normal print, bold print, upper case) x 2 (polarity: affirmative, negative) x 2 (truth value: true, false) design resulting in a set of 144 target sentences with 12 target sentences per condition. Half of the material is consistent with world knowledge (e.g. A salmon is a fish. / A salmon is an animal), half of the sentences is inconsistent with general world knowledge (e.g. A salmon is no fish. / A salmon is no animal.).

## **Procedure**

Two experimental tasks are planned. The first task is a self-paced reading test with a semantic probe task. The first set of target sentences will be presented; reading times and reaction times to the probe task as well as accuracy rates will be measured. In the second task, EEG data will be collected. Subjects read the second set of target sentences (RSVP) and are asked to detect the truth value of the sentences. ERPs associated with the negation word and with the objects following the negation words will be collected and analyzed. EEG-data will be recorded via *Brainvision Recorder* by *Brainproducts* and analyzed via *eeglab*. The material will be visually presented via *Presentation*.

## **Analysis**

Reading times, reaction times and accuracy rates of the probe task will be analyzed. The results of each condition will be measured and averaged across subjects. The conditions will be compared and interactions between the conditions will be determined. For the second experiment, the reaction times of the truth value evaluation will be measured and averaged across subjects. ERPs of the time windows 0-400ms, 400-600ms, 600-1000ms and 1000-1400ms onset negation word (or article) will be analyzed. The ERPs in the three conditions type-manipulation, polarity and truth-value will be averaged separately and examined for interactions.

## **Perspectives**

The present study shall give insights on processing changes that are possibly evoked by the bold print of negation markers. The rule for negation in Easy Language is examined on its efficacy by a range of experiments, including lower level and higher level processing of negation. The examination of processing differences between analytical and synthetical negation forms may reveal, whether the bold print of negation

markers is useful for certain negation structures. Further studies could investigate whether the bold print of important information changes such as contrasts or counterfactuals could be utilized. Moreover, the processing advantages of bold typefaced words in the target group of Easy Language need to be confirmed.

At the conference, I would like to present a poster on theoretical and experimental framework and possibly preliminary results of the study.

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# **Thinking outside of the box/looking into black boxes: Translator training in the 21st century and the need for interdisciplinary approaches to examine intuition and emotions in communication related cognition**

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The recent, rapid developments in machine translation (MT) are radically changing the translator profession. Massey and Ehrensberger-Dow (2017) make the well-justified prediction that deep learning (DL) and neural machine translation (NMT) will most likely lead to MT taking over all translation tasks “in those segments where the work requires little more than routine cognitive activities,” leading to the assumption that the future of translation lies in those areas in which the “added values of intuition, creativity and ethical judgement” (Massey/Ehrensberger-Dow 2017: 303) are needed.

As Krings noted, affective factors influence the translation process, but these factors have seldom been the subject of investigation (Krings 2005: 346). This deficit is due to a historically developed prejudice in translation studies (TS), i.e., that translation is based on rational cognition and is conceptual in nature. The spectrum of tasks translators will face in the future challenges this prejudice – and pushes TS towards hermeneutics, a field in which translation is seen as mediating meaning (in a sense that will be defined in the talk) between persons in different cultural and linguistic environments. In post-Husserlian hermeneutics, cognition is seen as intrinsically integrated with affective elements and volition; it follows that in the hermeneutic model of translation, the role of intuition and emotions in all forms of communication is highlighted. The

basic assumption is that a translator is always immersed in a “concrete situation” in “specific cultural context” (Nord 1997: 23), is always faced with pragmatic issues (Gadamer 1960: 312ff), and that this intrinsic link to a specific context and to pragmatics is what binds translators’ cognition to affective elements and volition. Thus, a hermeneutic approach to translation **should** ensure that the translator would most likely have the necessary “intuition, creativity and ethical judgement” (Massey/Ehrensberger-Dow 2017: 303). The question remains: How can translator training be designed in accordance with this hermeneutical understanding of human cognition such that up-coming translators are equipped for the translation tasks of the 21<sup>st</sup> century?

In order to address this question, we first need to have a general description of students’ current intellectual disposition. To this end, I have done a series of case studies involving students in either a Master’s program in specialized translation or on bachelor students taking translation classes at the Technische Hochschule Köln (TH Köln). While attesting to a high proficiency dealing with digital media, these case studies point to four main problem areas. The first area has to do with the general approach taken by master and bachelor students alike to producing the target text. Little or no effort is done to understand the source text; rather digital media (e.g. online dictionaries and parallel texts) are relied upon to provide the student with they perceive to be adequate “token strings.” The second kind of problem is one found most often with BA students: They frequently produce translations that strongly mirror the conceptual structures and syntax of the source text and ignore differences in register or linguistic conventions common to the genre in the target language. The third kind of problem – found more frequently with students in the master’s program – is an inability to apply their growing conceptual awareness of the differences in register and linguistic

structures between the source and target languages in practice. The last issue has to do with self-confidence. When discussing errors in translations, sometimes students – especially when post-editing – explain that he or she had “hunch” or “intuition” that a certain term or grammatical structure was not really the best choice, but decided not to follow that intuition.

These four general areas can be – it seems to me – generalized into two different categories. Problem areas two and three have more of a linguistic nature: they have to do with an awareness of and the ability to overcome differences in e.g. register or syntactical structures. The second category – problem areas one and four – has more of a psychological nature: Students misunderstand how to approach the translation cognitively: they either ignore the issue of understanding the source text and the presumed target context and language, or they do not trust their “hunches” because they cannot provide – at this initial stage – discursive arguments for their misgivings – i.e., discursive argumentation is seen as proper foundation for decision making.

In the light of these case studies, a somewhat different approach to teaching translation classes will be briefly presented. This will include a discussion of what the process of “understanding” entails and how it can be made relevant for a translator. In the course of this elucidation, the terms “meaning,” “sense,” “interpretation,” and “intuition” will be defined and explicated in light of (slightly) revamping translator training.

Certainly, there are recent approaches – like that from Hanna Risku (cf. 2004) – which embrace a kind of “embodied cognition” not unlike that proposed here; similarly, there are scholars – such as Susanne Göpferich (2008: 165) – who have

stressed in recent research that translators rely on intuition much more profoundly than assumed in the early years of TS in Germany. However, all of these models and suggestions about how we “really translate” remain speculation without a well-founded, empirically tested understanding of the human cognition involved in communication.

Solving this issue requires that we gain a better glimpse into the “black box” of cognition. In order to supplement recent research in the area of translational cognition, I have been following an interdisciplinary approach now for years that I would like to present. Following the idea first postulated by Nisbett – i.e., that subjects could be trained in introspective methods (Nisbett 1977: 246), I have offered a series of workshops geared towards developing, teaching and testing two distinct but historically related introspective methods. The first method is the phenomenological method, a method developed by Edmund Husserl. This method is designed to enable subjects to observe their own acts of consciousness (cognition), analyze their observations and provide accounts (verbal or written) of the essential structures involved in those acts of consciousness. The phenomenological method is designed to describe primary acts of consciousness – such as perception, remembering, volition, etc. The second method we are experimenting with is the hermeneutical method. This method is designed to offer an account of acts of interpretation, i.e., secondary acts of cognition in which discrete units of meaning are fused into a sense aggregate. Since primary and secondary cognition is almost always intertwined, both methods are needed.

The series of workshops began in 2011 and have included students from the TH Köln, from the Adam Mickiewicz University (Poznań, Poland) and from the Alanus Hochschule in Bonn. We have examined the issues of cognitive overload and

of possible influences that these methods might have on cognition itself. We have juxtaposed these methods with think aloud and IPDR (Integrated Problem and Decision Reporting – cf. Gile 2004), and we have compared the results rendered by subjects trained in these methods with those who had no prior training. While we have used qualitative methods to do some of the testing, we have relied heavily on quantitative methods to test the veracity of these methods – the last group of experiments involved eye-tracking and was done with the support of Silvia Hansen-Schirra, Moritz Schaeffer and their team.

We are still a good way from reliable methods that can be applied directly to research in translation studies, but the data so far is promising. If these methods can be further developed and prove to be reliable, not only will they serve to prove or disprove my guiding assumption that cognition in acts of communication is intrinsically bound to affective elements and volition. The hope is rather that these methods could contribute not only to the development of better pedagogical methods in general but – even more importantly – provide students with a means to foster self-reflection such that they can develop strategies to deal with changes in the translator profession that we cannot yet even imagine.

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# **Investigating post-editing: A mixed-methods study with experienced and novice translators in the English-Greek language pair**

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In recent years, the translation industry has seen a growth in the amount of content to be translated and has received pressure to increase productivity and speed at reduced costs. To respond to these challenges, it has turned to Machine Translation (MT) “which appears to be moving from the peripheries of the translation field closer to the centre” (Koponen 2016a: 131). The most common and widely expanding scenario –especially for certain language pairs and domains– involves the use of MT output to be then post-edited by professional translators (Koponen 2016b). This practice is generally termed post-editing of machine translation (PEMT) or simply post-editing (PE) and is subcategorized into two types according to the required quality: full post-editing, which is expected to improve the final product to near-publishable quality, and light/rapid post-editing, which aims to correct the text for accuracy, but not style and fluency (Allen 2003).

PE has been increasingly gaining ground (O’Brien et al 2014; O’Brien and Simard 2014; Lommel and DePalma 2016; Vieira et al 2019), especially following the advent of Neural Machine Translation (NMT) models which have been proven to consistently outperform Statistical Machine Translation (SMT) models in shared tasks, as well as in various project outcomes (Bojar et al. 2016, Toral and Sánchez-Cartagena 2017, Castilho et al 2017a and 2017b and Popović 2017). In fact, NMT has been widely hailed as a significant development in the improvement of the quality of MT, especially at the level of

fluency (Castilho et al 2017a and 2017b), and the PE of NMT output has been found to be faster than translation from scratch (Jia et al 2019).

However, translators still approach PE with caution and skepticism and question its real benefits (Gaspari et al 2014; Koponen 2012; Moorkens 2018). Their skepticism is directly related to the nature of PE which involves “working by correction rather than creation” (Wagner 1985: 2), the perception that PE is slower than translating from scratch and the perception of MT as a threat to their profession (Moorkens 2018: 58). Several studies were also carried out aiming at identifying the extent to which attitudes to MT and PE affect PE effort. A positive attitude to MT has been found to be a factor in PE performance (de Almeida 2013; Mitchell 2015). Experienced translators have been found to exhibit rather negative attitudes to PE as opposed to novice translators (Moorkens and O’Brien 2015) and to be rather reluctant to take on PE jobs, while novice translators appear to be more positive towards MT and PE and more suited for PE jobs (Garcia 2010, Yamada 2015). Previous research has shown that professional translators and novices generally exhibit different translation behaviour (e.g. Jensen 2000, Dragsted 2004, Jakobsen and Jensen 2008, Pavlovic and Jensen 2009, Carl and Buch-Kromman 2010, Hvelplund 2011), while cognitive effort has been found to be greater for novice than for professional translators (Göpferich et al. 2011), but there is still a lack of empirical studies about post-editing by different profiles (Mesa Lao 2014).

Under the light of the above, the aim of this study is threefold: it seeks to investigate the perception of both experienced and novice translators vis-à-vis PE; it aims to compare the technical, temporal and cognitive effort (Krings 2001) expended by experienced translators for the full PE of NMT output with

the effort expended by novice translators, focusing on the English-Greek language pair; finally, it aims to explore potential differences in the quality of the post-edited texts.

In particular, the study adopts a mixed-methods approach and triangulates findings from different methods. Pre-assignment questionnaires are used in order to capture the participants' perception vis-à-vis PE. Eye-tracking and keystroke logging data are used to measure the temporal, technical and cognitive effort expended by translators during the PE of NMT output, while post-assignment questionnaires are used to compare the actual effort against the users' perception of the PE effort required. Finally, a manual error analysis based on the DQF-MQM error typology is carried out to evaluate the quality of the post-edited texts.

More specifically, twenty translators –ten experienced translators and ten novice translators– participated in the series of PE experiments that were carried out in March 2018. The experiment consisted of one session for each participant. Before the sessions, the participants were informed by email about the nature of the experiments, the task requirements and the general as well as task-specific guidelines they had to follow. The session started with the pre-assignment questionnaire; a warm-up PE task followed to familiarise each participant with the procedure. The actual experimental task involved the full PE of the NMT output of two semi-specialised texts. The texts used in this study were short (142- to 161-word long excerpts) educational texts selected from OER Commons –a public digital library of open educational resources– and were chosen with the following criteria in mind: they had to be semi-specialised and easy for the participants to post-edit without access to online or offline translation aids –given that such aids could lead to a reduction in the amount of recorded eye-tracking data–, and they had to be of comparable

complexity. The texts chosen had comparable Lexile® scores (1300L and 1400L) and all were suitable for 11th/12th graders. The NMT-core engine used to produce the raw MT output was Google Translate (output obtained March 24, 2018). Participants were asked to carry out the task at the speed at which they would normally work in their everyday work as translators; therefore, no time constraint was imposed. A Tobii TX-300 eye-tracker and the Translog-II software (Carl 2012) were used to register the participants' eye movements, keystrokes and PE time.

Although the sample is small, taking into account the length of the texts and the number of participants, our study confirms the findings of previous studies on the more positive attitude of novice translators vis-à-vis PE, and indicates that novice translators expend more time and more cognitive effort during PE as opposed to experienced translators. On the other hand, the technical effort is found to be decreased in the case of novice translators. This might be due to the fact that they do not sufficiently rephrase the MT raw output as they are reluctant to change the word order and the syntax of the MT output and are not adequately critical of the content, thus leaving mistranslations and terminology errors in the edited text. This finding seems to be in line with Depraetere's (2010) observation that during PE students follow the instructions given and do not rephrase the text if the meaning is clear, but do "not feel the urge to rewrite it" (ibid:4), thus leaving errors that should be corrected according to the instructions. Depraetere points out that this indicates a "striking difference in the mindset between translation trainees and professionals" (ibid: 6). In addition, as Yamada (2019) observed, a low error correction rate during PE the NMT output may be due the fact that NMT systems produce human-like errors, which make it more difficult for novice translators to post-edit.

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# **Automatization of subprocesses in subtitling**

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Recently there has been a noticeable growth in the use of both intralingual and interlingual subtitling due to technological advances and digitalization, accessibility legislation and globalization. Even traditional dubbing countries now see an increase in movies offered with subtitles both for the deaf and hard of hearing and for foreign movies on TV, in movie theatres and online streaming platforms (Georgakopoulou 2012; Reinart 2018). The reception of subtitles with a focus on the various target groups has been the subject of various eyetracking studies ranging from the reception and processing of native and foreign subtitles, to the comparison of different style guides and even integrated titles (e.g. Bisson et al. 2014; Kruger et al. 2014; Szarkowska et al. 2016; Fox, 2018). The process of subtitling, however, has mainly been neglected by research and has yet to be thoroughly investigated with empirical methods. Hvelplund (2017), who investigated attention distribution and cognitive effort involved in the translation of audiovisual content for dubbing, and also Orrego-Carmona & Dutka (2018) were the first to apply the mixed-method approach of keylogging and eyetracking, already established methods in translation process research, to the task of interlingual subtitling which can be understood as a form of specialized translation. In two studies, they compared groups of student and professional subtitlers and the use of different kinds of subtitling software by looking at the temporal, cognitive and production effort.

Given that subtitling, the task of transcribing the audio, condensing and fitting it into subtitle format and spotting the subtitles, is a more complex task than translation, can be quite complicated to interpret keylogging and eyetracking data in the overall process. Additionally, subtitling takes time – for the intralingual subtitling of an average 5-minute video the rule of thumb is one hour and for interlingual subtitling even more. Therefore, it is rather difficult to investigate the complete subtitling process with elaborate methods such as eyetracking. Taking all this into consideration, it seems plausible to take a first step in this direction by observing more closely the subprocesses involved in subtitling such as the transcription and translation of movie dialogue, disregarding the condensing and timing of subtitles, for now. With advancements in automatic speech recognition (ASR) and neural machine translation (NMT) finding their way into the subtitling processes, just like CAT tools and post-editing has already been successfully integrated in the translation process in many translation fields, research in this special field of translation becomes even more essential in order to find meaningful ways of making current subtitling processes more efficient and also informing subtitling training. ASR is already applied in live-subtitling processes via respeaking, but how this impacts the process when the film audio is directly entered into an ASR system to be then post-edited by the subtitler is an open question. This is what we already see in in new subtitling platforms popping up on the market.

The subtitling industry is confronted with an increasing workload as more and more films and TV programs need to be subtitled in shorter turnaround times while quality is to remain at a high level. Especially smaller film productions can't always have afford the subtitling into a variety of languages as the process is rather time consuming, highly specialized and thus costly. Subtitling requires technical and cultural knowledge and

not all language combinations can be covered by the relatively small number of professional subtitlers. Following an action by the European Commission on Subtitling Including Crowdsourcing to Increase the Circulation of European Works, this development is also the focus of CompAsS (Computer-Assisted Subtitling), a project that aims at evaluating and developing an innovative platform for efficient subtitling by integrating language technology such as ASR and NMT into the subtitling processes. CompAsS is a project managed by ZDF Digital (development) and Johannes Gutenberg-Universität Mainz (research) and funded by the European Commission.

Within CompAsS an exploratory study was carried out where we recorded the transcription and translation processes of professional subtitlers and translation students. In the study 13 advanced translation students and 13 professional subtitlers performed 8 intralingual and interlingual transcription tasks: two intralingual transcription tasks (German-German), three interlingual transcription tasks (English-German) and three post-editing tasks (Swedish-English-German). In this analysis we are presenting the results of the first two parts of the study that investigates the impact of ASR on the processes. We deliberately decided to focus on subprocesses of subtitling, i.e. transcribing and translating dialogue from selected TV series scenes, instead of directly introducing ASR into this complex process of subtitling as it would be hard to control all the variables: tool usability and familiarity, ASR quality, aspects that impact text condensing or subtitle timing.

In the intralingual tasks, participants transcribed two 2-minute video snippets from a German crime TV series into German. In the first task, they transcribed the video from scratch and in the second they had an automatically generated transcript of the audio and were able to decide whether to use it or not. In the interlingual task participants translated three 2-minute video

snippets from a British TV series from English into German. Again, they first transcribed and translated a snippet from scratch, then with the help of an English ASR script and finally they had the support of a correct English transcript. The video snippets were controlled for length and dialogue content and were alternated among participants in order to avoid order effects. ASR was produced by Google Cloud Speech-to-Text and manipulated to include speaker recognition. For all 5 tasks, participants had the same translation brief to produce high quality transcripts of the dialogue in the videos indicating only the change in speaker. There was no time limit and participants were able to research online, but they were asked to work at a relatively fast pace and not to dwell on problems for too long and to aim for relatively quick decisions for identified problems.

The tasks were performed in the keylogging tool Translog-II (Carl 2012) with a plugin for the eyetracking device SMI REDmobile 250. Translog-II has been widely used for investigating reading and translation behavior and allows for a fine-grained analysis of typing activities, such as insertions, deletions, revisions and pauses, as well as source text and target text reading. In combination with screen recording and eyetracking it is possible to observe when and where participants look in the video and in the text, while they produce the transcripts. Triangulating the data with questionnaire ratings, we observe the impact of ASR on these processes regarding attention distribution, cognitive effort and efficiency with regard to temporal effort and target text quality. The results in terms of time and quality guide the conception of the new subtitling tool.

For the analysis of cognitive and production effort, we use established measures based on gaze and typing data, i.e. fixation duration and count, pauses, editing time, and subjective ratings (de Sousa, Aziz & Specia, 2011; Vieira, 2016). Quality

evaluation is based on the Multidimensional Quality Metrics (MQM) framework (Lommel, Uszkoreit & Burchardt, 2014).

Our hypotheses were that both ASR transcripts and human transcripts speed up the process and help both groups to produce better transcripts and translations. Having a transcript – either ASR or human-generated - reduces the time spent replaying the video and frees up cognitive resources for the translation task. Regarding cognitive effort, professional subtitlers are expected to handle the attention distribution of audio-visual content better than translation students and therefore rather ignore the ASR. The results, however, show that ASR, especially in the German transcription task is so poor that it is rather ignored completely or distracts from listening to the audio and extracting information from the video. In the translation task, it helped participants in decoding the audio as they were listening in the foreign language and having a script was closer to a written translation task. As the English ASR script, however, was not editable, the behavior did not differ much from the translation from scratch condition. The results will be presented with statistical analyses per participant group and condition and combined in linear mixed-effects models.

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# BOOK PRESENTATIONS

# **Interpreting and technology**

**Language Science Press: Series “Translation and Multilingual Natural Language Processing”**

**Claudio Fantinuoli**

Unlike other professions, the impact of information and communication technology on interpreting has been moderate so far. However, recent advances in the areas of remote, computer-assisted, and, most recently, machine interpreting, are gaining the interest of both researchers and practitioners. This volume aims at exploring key issues, approaches and challenges to the interplay of interpreting and technology, an area that is still underrepresented in the field of Interpreting Studies. The contributions to this volume cover topics in the area of computer-assisted and remote interpreting, both in the conference as well as in the court setting, and report on experimental studies.

Online available: <http://langsci-press.org/catalog/book/209>

# **Can integrated titles improve the viewing experience? Investigating the impact of subtitling on the reception and enjoyment of film using eye tracking and questionnaire data**

**Language Science Press: Series “Translation and Multilingual Natural Language Processing”**

**Wendy Fox**

Historically a dubbing country, Germany is not well-known for subtitled productions. But while dubbing is predominant in Germany, more and more German viewers prefer original and subtitled versions of their favourite shows and films. Conventional subtitling, however, can be seen as a strong intrusion into the original image that can not only disrupt but also destroy the director’s intended shot composition and focus points. Long eye movements between focus points and subtitles decrease the viewer’s information intake, and especially German audiences, who are often not used to subtitles, seem to prefer to wait for the next subtitle instead of looking back up again. Furthermore, not only the placement, but also the overall design of conventional subtitles can disturb the image composition – for instance titles with a weak contrast, inappropriate typeface or irritating colour system.

So should it not, despite the translation process, be possible to preserve both image and sound as far as possible? Especially given today’s numerous artistic and technical possibilities and the huge amount of work that goes into the visual aspects of a film, taking into account not only special effects, but also typefaces, opening credits and text-image compositions.

A further development of existing subtitling guidelines would not only express respect towards the original film version but also the translator's work.

The presented study shows how integrated titles can increase information intake while maintaining the intended image composition and focus points as well as the aesthetics of the shot compositions. During a three-stage experiment, the specifically for this purpose created integrated titles in the documentary *Joining the Dots* by director Pablo Romero-Fresco were analysed with the help of eye movement data from more than 45 participants. Titles were placed based on the gaze behaviour of English native speakers and then rated by German viewers dependant on a German translation.

The results show that a reduction of the distance between intended focus points and titles allow the viewers more time to explore the image and connect the titles to the plot. The integrated titles were rated as more aesthetically pleasing and reading durations were shorter than with conventional subtitles. Based on the analysis of graphic design and filmmaking rules as well as conventional subtitling standards, a first workflow and set of placement strategies for integrated titles were created in order to allow a more respectful handling of film material as well as the preservation of the original image composition and typographic film identity.

Online available: <http://langsci-press.org/catalog/book/187>

# **The neurocognition of translation and interpreting**

**Amsterdam: John Benjamins, forthcoming**

**Adolfo M. García**

In this presentation I will discuss the motivation, general context, and main contents of my latest book, titled *The Neurocognition of Translation and Interpreting*. The volume offers a comprehensive account of brain-based research on translation and interpreting. First, it introduces the methodological and conceptual pillars of psychobiological approaches vis-à-vis those of other cognitive frameworks. Next, it systematizes neuropsychological, neuroscientific, and behavioral evidence on key topics, including the lateralization of networks subserving cross-linguistic processes; their relation with other linguistic mechanisms; the functional organization and temporal dynamics of the circuits engaged by different translation directions, processing levels, and source-language units; the system's susceptibility to training-induced plasticity; and the outward correlates of its main operations. Lastly, the book discusses the field's accomplishments, strengths, weaknesses, and requirements. Succinctly, this piece seeks to afford a much-needed platform for translation and interpreting studies to fruitfully interact with cognitive neuroscience.

# **Empirical modelling of translation and interpreting**

**Language Science Press: Series “Translation and Multilingual Natural Language Processing”**

**Silvia Hansen-Schirra, Oliver Czulo & Sascha Hofmann**

Empirical research is carried out in a cyclic way: approaching a research area bottom-up, data lead to interpretations and ideally to the abstraction of laws, on the basis of which a theory can be derived. Deductive research is based on a theory, on the basis of which hypotheses can be formulated and tested against the background of empirical data. Looking at the state-of-the-art in translation studies, either theories as well as models are designed or empirical data are collected and interpreted. However, the final step is still lacking: so far, empirical data has not lead to the formulation of theories or models, whereas existing theories and models have not yet been comprehensively tested with empirical methods.

This publication addresses these issues from several perspectives: multi-method product- as well as process-based research may gain insights into translation as well as interpreting phenomena. These phenomena may include cognitive and organizational processes, procedures and strategies, competence and performance, translation properties and universals, etc. Empirical findings about the deeper structures of translation and interpreting will reduce the gap between translation and interpreting practice and model and theory building.

Furthermore, the availability of more large-scale empirical testing triggers the development of models and theories concerning translation and interpreting phenomena and behavior based on quantifiable, replicable and transparent data.

Online available: <http://langsci-press.org/catalog/book/132>

# **Problem solving activities in post-editing and translation from scratch: A multi-method study**

**Language Science Press: Series “Translation and Multilingual Natural Language Processing”**

**Jean Nitzke**

Companies and organisations are increasingly using machine translation to improve efficiency and cost-effectiveness, and then edit the machine translated output to create a fluent text that adheres to given text conventions. This procedure is known as post-editing.

Translation and post-editing can often be categorised as problem-solving activities. When the translation of a source text unit is not immediately obvious to the translator, or in other words, if there is a hurdle between the source item and the target item, the translation process can be considered problematic. Conversely, if there is no hurdle between the source and target texts, the translation process can be considered a task-solving activity and not a problem-solving activity.

This study investigates whether machine translated output influences problem-solving effort in internet research, syntax, and other problem indicators and whether the effort can be linked to expertise. A total of 24 translators (twelve professionals and twelve semi-professionals) produced translations from scratch from English into German, and (monolingually) post-edited machine translation output for this study. The study is part of the CRITT TPR-DB database. The translation and (monolingual) post-editing sessions were

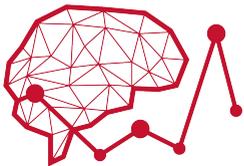
recorded with an eye-tracker and a keylogging program. The participants were all given the same six texts (two texts per task).

Different approaches were used to identify problematic translation units. First, internet research behaviour was considered as research is a distinct indicator of problematic translation units. Then, the focus was placed on syntactical structures in the MT output that do not adhere to the rules of the target language, as I assumed that they would cause problems in the (monolingual) post-editing tasks that would not occur in the translation from scratch task. Finally, problem indicators were identified via different parameters like Munit, which indicates how often the participants created and modified one translation unit, or the inefficiency (InEff) value of translation units, i.e. the number of produced and deleted tokens divided by the final length of the translation. Finally, the study highlights how these parameters can be used to identify problems in the translation process data using mere keylogging data.

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