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Erik Angelone et Gregory M. Shreve

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s'y orienter et de mieux saisir les aspects théoriques sous-jacents et les diverses orientations qui conditionnent certaines prises de position. C'est un premier guide pour enseignants, chercheurs et étudiants. Bien entendu, rien n'est complet ni immuable et, au hasard des lectures de revues de traductologie, on relèvera des termes comme « critical discourse analysis, cross-cultural encounters, ideational dimension of language, ideology biases, ideology patterns, metaphors, metaphors as markers of ideology, objectivity, overinterpretation » et certainement bien d'autres qui manquent, mais que l'auteur ajoutera sans nul doute dans une deuxième édition.

Dans un même ordre d'idées et en guise de conclusion, j'aimerais également profiter de l'occasion pour signaler l'excellent ouvrage de Hatim et Munday (2004) intitulé *Translation. An Advanced Resource Book* qui reprend de nombreux termes de traductologie par sections spécifiques. Ainsi la section A introduit les concepts principaux et incite à la réflexion théorique, la section B illustre le centre d'intérêt présenté par des lectures complémentaires tout en développant le goût pour une recherche plus personnelle et la section C qui développe la matière présentée et encourage une exploration plus personnelle du domaine. Une magnifique illustration de la recherche traductologique littéraire est présentée, en allemand, dans l'ouvrage de Peter Utz (2007) : *Anders gesagt – autrement dit – in other words* qui explore les diverses traductions de Hoffman (*Sandmann*), de Fontanes (*Effi Briest*), de Kafka (*Process*) et de Musil (*Mann ohne Eigenschaft*) en français et en anglais.

ANDRÉ CLAS

Université de Montréal, Montréal, Canada

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- Looking at Eyes* is the first of two volumes in a Copenhagen Studies in Language series dedicated to the empirical exploration of cognitive processes in reading and translation. The second volume, *Behind the Mind*, appeared in 2009. In this volume the focus is on the applications, advantages, and

limitations of eye-tracking as a research methodology, used alone or in conjunction with other methods such as keystroke and pause logging. Many of the book's contributions report on studies conducted as part of the Eye-to-IT collaborative project (2006-2009). The project brought together researchers from across Europe to map out interdisciplinary approaches using eye-tracking methods and to conceptualize new computer assisted translation tools employing gaze data. Over ten chapters, the reader is presented with innovative research methodologies and intriguing empirical evidence to both support and question long-held notions of what reading for translation implies. In the field of Translation Studies, eye-tracking research is still more or less in its infancy, reflected in the fact that many of the chapters report on the findings of pilot studies; yet each holds great promise in shaping the directions of process research in the years to come.

The first five chapters of the volume address key issues relating to the coordination of cognitive effort when reading for translation. Dragsted and Hansen (p. 9-29) use a combination of eye-tracking and keystroke logging to document patterns in the way translators coordinate comprehension and production activity, focusing on the way they segment the translation into processing units as they do so. Their findings challenge the commonly-held notion that such segmenting is primarily linear, with either exclusive source text comprehension or target text production behavior, bracketed by pauses, constituting a cognitive segment. Indeed, based on patterns of saccade sequences and gaze fixation distributions, the majority of translation segments analyzed in the study suggest that comprehension and production activity co-occur and overlap within a segment. Moreover, the authors found that coordination of comprehension and production occurs across segments. The authors propose that pauses, rather than demarcating translation segments, instead signal peaks of coordination effort.

Sharmin, Špakov *et al.* (p. 31-51) explore how eye movements within and between the source text and target text are impacted by two paramount variables, time pressure and text complexity. Gaze plots and heat maps were used to document where translators fixed their gaze on the screen (fixation count) and for how long (fixation duration). As time pressure increased, fixation durations decreased on the source text, yet practically remained the same on the target text. This suggests a tendency for translators to adapt and "speed up" reading comprehension processes to accommodate more restrictive time constraints, while being less willing to modify production processes such as source text monitoring. The authors draw a

parallel between their findings and those of earlier translation and reading studies indicating greater flexibility in processing behavior when reading a source text (another's text) and greater rigidity when reading a target text (one's own translation).

Sjørup (p. 53-77) uses eye-tracking to assess cognitive effort in the reading of metaphorical vs. non-metaphorical language. The assumption is that when a metaphor is encountered during translation, it will need to be decoded into its context-appropriate conceptual meaning and then transferred via several possible strategies into the target language. This multi-stage process, coupled with the need for contextual scanning, should require greater cognitive effort and consequently more processing time than what is needed for non-metaphorical language translation. In her comparison of gaze durations within the two conditions, Sjørup obtained empirical evidence that metaphors do in fact take longer for the translator to read than non-metaphorical text. However, as is so often the case in process research, she encountered a significant variation in gaze duration times from one metaphor to the next. The variation was attributed to a number of confounding variables to be addressed in future studies.

In Chapter 4, O'Brien (p. 79-102) presents the results of an eye-tracking study examining the cognitive processing of fuzzy matches in a translation memory system. She found, as one might predict, that as fuzzy match values decreased processing speed (as an indicator of cognitive effort) also decreased. However, pupillometric data and survey-based translator observations suggest that cognitive effort is not necessarily in strict linear correlation with fuzzy match value. A steady increase in pupil dilation, correlating with increasing cognitive effort, is found down to the 60% fuzzy match value, followed by an unexpected decrease in pupil dilation for fuzzy matches under 60%, suggesting a cognitive effort fall-off. Both processing speed and pupil dilation data seem to indicate a plateau effect, perhaps signaling the translator's tendency to start from scratch rather than invest continued cognitive effort into resolving a proposed fuzzy match whose value is below 60%. An interesting result of the study revealed by fixation distributions suggests that translators often do not even look at the fuzzy matches proposed by the TM. This raises real questions about the utility of fuzzy match information. Are translators even using it, or is it merely distracting visual noise readily "tuned out?" O'Brien's research certainly points to a potentially important role for eye-tracking methods in examining the usability of TM and CAT software.

Jakobsen and Jensen (p. 103-124) examine variation in eye-tracking data from novice and

professional translators across four translation-oriented tasks: 1) reading for comprehension, 2) reading in preparation for translation, 3) sight translation, and 4) written translation. For all participants, fixation counts increased as soon as the given text was framed as translation-oriented (task 2), suggesting a conscious "slowing down" associated with more deliberate reading. The written task yielded the highest pause frequency, which the authors attribute to expectations of higher quality output and the implicit allowance of the task conditions for greater time intervals between comprehension and production. In terms of gaze duration, professionals devoted considerably longer visual attention to the emerging target text than to the source text, while students did the exact opposite. Jakobsen and Jensen suggest this pattern may be the result of professionals spending more time on revisions of their translations and students being held back to a greater extent by source text comprehension difficulties.

Chapters six and seven report on studies involving subtitled anime television shows and food labels respectively. In Chapter 6, Caffrey (p. 125-144) explains how pupillometric and fixation data indicate the processing effort involved when viewing an anime television show containing both subtitles and pop-up glosses. As in O'Brien's study, measured effort and perceived effort are both assessed. Pop-up glosses can be regarded as a form of target text explicitation, providing the viewer with explanations for culturally-relevant items in the anime. Survey results indicate that viewers feel that subtitles appear on the screen for a shorter duration when they co-occur with pop-up glosses than when they appear alone. Allocation of visual attention to two sources appearing simultaneously on the screen, as one might expect, creates a greater cognitive load. Gaze duration in the subtitled area of the screen was significantly lower when pop-up glosses co-appear on the screen than when subtitles occur in isolation. The challenge facing subtitlers, as Caffrey points out, involves avoiding semiotic redundancy and cognitive overload when working with the two modes of textual display.

Clement and Sørensen's (p. 145-155) contribution in Chapter 7 also focuses on viewer behavior in the context of multimodal texts, namely the visual attention of consumers when reading food labels. Their study sets out to determine how the interplay of textual and graphic design impacts visual attention and perception, in turn influencing consumer beliefs and buying decisions. Attention (heat) maps illustrate which of the following areas of interest attract the buyer most: 1) product-related food information, 2) claims (product, health, and quality-related), and 3) pictures. Of these, pictures attracted the

most visual attention, regardless of whether they were related to the involved food product or not. The participants hardly paid any attention to lists of ingredients or eco-labels. As the authors mention, these initial findings have strong bearings on federal initiatives for promoting good health and industry regulations. The authors outline a series of promising extensions to their study, including analyses of whether or not pictures distort the text, thereby potentially misleading consumers.

The volume closes with three chapters dealing with methodological issues of eye-tracking research. The chapters highlight potential problems with the methodology and suggest ways to overcome them. In Chapter 8, Jensen (157-174) presents the results of a study that puts eye-tracking accuracy to the test, comparing fixation detection problems in a linear reading task with detection problems in a reading for translation (non-linear) task. One of the primary objectives of the Eye-to-IT project was the development of a Gaze-to-Word Mapping (GWM) tool, where fixation and gaze data are used to pinpoint in relatively precise fashion which word the translator/reader is focusing on at any given time. If implemented in a CAT tool, GWM could provide the translator with a series of target language equivalents (prompts) whenever certain diagnostic eye movement patterns indicated cognitive difficulty with a word in the source text. Jensen points out that GWM algorithms are mostly based on an assumption of linear reading patterns. Translation tasks, however, also may involve significant non-linear (vertical) reading, as exhibited when the translator shifts back and forth between the source text and target text, re-reads text found on previous lines, scans upcoming lines for context, etc. The question is whether or not the accuracy of gaze-to-word-mapping holds up in the translation situation. In this study, the eye-tracker's word fixation accuracy in linear and non-linear (masked-unmasked) tasks was analyzed, and it was found that accuracy did not decline in the translation task. Interestingly, a higher detection failure rate was found for fixations on longer words, suggesting less precision in horizontal fixation detection than vertical fixation detection. Jensen's study determined that at least 20% of all fixations occurring during a translation task go unnoticed by the gaze-to-word mapping tool, highlighting the need for further research into the optimization of fixation recognition algorithms.

In Chapter 9, Balling (p. 175-192) discusses the advantages of regression experimental design and mixed-effects modeling over strictly factorial designs when exploring aspects of naturalistic tasks, such as translation, which are impacted by multiple graded variables. Psycholinguistic

research, and indeed much of the experimental research in translation to date, has tended to be factorial, where the researcher attempts to establish complete control over all variables except for one, the dependent variable. As the author points out, strict control often results in two potential problems: 1) it creates tasks which no longer resemble the behaviors being studied and 2) it places limitation on the number of items (or participants) included in the study. Factorial experimental design limitations potentially have a negative impact on the generalizability of findings and thus are often statistically less powerful. Balling outlines several advantages of multiple regression experimental designs, including the opportunity to statistically "control" variables that cannot otherwise be controlled experimentally. This allows for the investigation of multiple correlations among central and control-oriented independent variables.

In the volume's concluding chapter, Carl (p. 193-202), like Jensen, examines the intricacies of gaze-to-word-mapping. The great difficulty of GWM involves mapping fixations, derived from pixel locations (X/Y coordinates) on a computer display, with textual objects appearing on the screen. The textual objects in this case are sequences of characters separated by blanks, e.g., "words." Carl presents a model rooted in object-fixation probability as a potential improvement over current GWM algorithms. The model takes inherent horizontal and vertical inaccuracies as well as calibration drift into account when analyzing gaze behavior. A series of intricate algorithms, along with detailed explanations, reveal the promise Carl's model holds for obtaining more reliable translation process data when using eye-tracking.

This unique volume, particularly when read as the first of a two-part series on the state of the art of empirical translation process research, provides the research community with valuable insight into what eye-tracking has to offer. The volume's interdisciplinary focus and wide range of topics will appeal to researchers of cognitive processes in translation, translation trainers dedicated to enhancing the process awareness of their students, and, potentially, the translation industry as a whole.

ERIK ANGELONE AND GREGORY M. SHREVE  
*Kent State University, Kent, USA*

#### NOTES

For additional information on the Eye-to-IT project, see <<http://cogs.nbu.bg/eye-to-it/>>, visited on 9 October 2011.