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Interpreting: A window into bilingual processing

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Introduction

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Interpreting experience is an intense bilingual experience that may provide unique insights into mechanisms of bilingual processing. Many studies have examined bilingual processing but few from the perspective of interpreting. There are two major modes of interpreting that have been studied in the literature. Consecutive interpreting (CI) is a process whereby interpreters have to listen to and remember a relatively long segment of speech and produce the message in another language as quickly and accurately as possible. Simultaneous interpreting (SI) involves the interpreters listening to a segment of speech while almost simultaneously producing the segment of speech in another language. In either mode of interpreting, the interpreter is working under great time pressure (perhaps more so in SI), switching as efficiently as possible between comprehending one language and producing another language. This Special Issue provides an opportunity for researchers to present their latest findings and perspectives on the relationship between general bilingual processing and interpreting processing, and mechanisms underlying bilingual lexical access, language control, cognitive control and bilingual advantages.

Given the above context, this special issue showcases studies that address the relevant issues and debates from the perspective of interpreting, thereby providing a unique window into bilingual processing. The articles roughly fall into three groups. The first group includes two papers that are related to interpreting processes, specifically about prediction or anticipation in interpreting. Amos and Pickering (Amos & Pickering, 2020) proposed a model of prediction-by-production in SI and Lozano-Argüelles, Sagarra and Casilla (Lozano-Argüelles, Sagarra & Casilla, 2020) investigated the impact of interpreting experience on L2 morphological anticipation. The second group includes two papers that are related to cognitive load, with Mårtensson and colleagues (Mårtensson, Eriksson, Bodammer, Lindgren, Johansson, Nyberg and Lövdén, 2020) investigating the brain basis of foreign language learning aptitude in interpreters, and Tiselius and Sneed (Tiselius & Sneed, 2020) cognitive load as reflected in gaze and eye-movements in dialogue interpreting. The third group, the remaining four papers, are related to language control and cognitive control in interpreting, with Dong and Li (Dong & Li, 2020) proposing an overall account in their attentional control model, Hervais-Adelman and Babcock (Hervais-Adelman & Babcock, 2020) focusing on the neurobiology of SI, Nour et al. (Nour, Struys & Stengers, 2020) investigating the impact of interpreting experience on WM, and García et al. (García, Muñoz & Kogan, 2020) reviewing the impact of SI experience on cognitive control.

Prediction speeds up language comprehension, and it is thus particularly crucial to the task of SI which is extremely demanding in time pressure. In fact, simultaneous interpreters sometimes predictively produce the translation of a word in the target language before hearing it uttered in the source language. But the mechanism of prediction in SI is not clear. Amos and Pickering (Amos & Pickering, 2020) provide accounts of prediction during comprehension in monolinguals and bilinguals, and discusses how these accounts may be applied to SI. The authors then propose that predicting with the production mechanism allows comprehenders to make rapid predictions at the levels of semantics, syntax and phonology, and develops a theoretical framework for PREDICTION-BY-PRODUCTION in SI. As the two languages are concurrently used in SI, with one engaging the comprehension system and the other the production system, prediction by production in SI may be affected by a number of factors, including cognitive load, L2 proficiency, and so on. This theoretical framework has implications for empirical research on language processing for bilinguals and monolinguals.

It seems that the term "anticipation" is more often used than "prediction" in interpreting studies, especially when referring to one of the interpreting strategies (Bartłomiejczyk, 2006). Since anticipation is closely associated with interpreting processes, interpreting experience may facilitate anticipation, which remains a hypothesis without empirical research. To fill the gap, Lozano-Argüelles, Sagarra and Casilla (Lozano-Argüelles et al., 2020) investigated whether interpreting experience facilitates L2 morphological anticipation in spoken word recognition. Specifically, the authors first investigated whether Spanish monolinguals and advanced English learners of Spanish use suprasegmental and segmental information to anticipate word suffixes, and whether frequency of such information affects their anticipation. In addition, they studied whether increased anticipatory experience acquired via interpreting facilitates anticipation in non-interpreting L2 situations. With eye-tracking data from interpreting experience the

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authors found that both learner groups predicted later than monolinguals, but interpreters predicted at a faster rate than non-interpreters and monolinguals, suggesting that interpreting experience did facilitate anticipation in speed in some conditions. This study shows that future research has to separate L2 proficiency from anticipatory experience and has to measure when and how fast participants anticipate.

Aptitude for interpreting has been a favorite topic in interpreting studies, and it is hoped that research findings in this respect may be of some help to admission tests for interpreting programs. A large number of behavioral studies have been conducted, but few studies have investigated how brain structure may predict later language proficiency in interpreters. Mårtensson and colleagues (Mårtensson et al., 2020) used MRI to scan 14 conscript interpreters and 17 matched controls two times before and after training. Their results indicate that the two groups differed in WHITE MATTER MICROSTRUCTURE at baseline, and that roughly the same networks were predictive of later learning proficiency in the interpreters. However, no evidence was found for the hypothesis that white matter microstructure would change over time as an effect of training (unlike findings from the gray matter studies; see Li, Legault & Litcosfy, 2014). These findings illustrate the importance of research on how initial brain structure may influence and interact with learning outcomes.

Cognitive load is also a key topic in interpreting studies (Seeber & Kerzel, 2011), but no study has yet used the eye-tracking method to investigate cognitive load and cognitive effort in dialogue interpreting. Tiselius and Sneed (Tiselius & Sneed, 2020) report an exploratory eye-tracking study on how experienced and inexperienced interpreters may perform in a staged dialogue interpreting session (i.e., a simulated job-counseling consultation). Gaze patterns in relation to the interpreters' action (listening or speaking one or the other language) and translation direction were recorded. The results showed that there were differences in gaze patterns depending on the action and the language used. The major finding was that participants averted gaze (not looking at the speaker of either language) more when interpreting into the allophone language (spoken by the "immigrant" seeking for consultation, mostly the interpreters' L2), suggesting that interpreting into an L2 in a dialogue may involve more cognitive effort than interpreting into the L1.

What is it that makes the interpreting task so demanding? Dong and Li (Dong & Li, 2020) give an overall account from the perspective of language control and processing control. Efficient language control in interpreting ensures that the alternation between listening to a segment of speech in one language and producing the message in another language is smoothly executed, with potential interference from the input language overcome during production. Efficient processing control in interpreting ensures that all component tasks in interpreting are executed in concert under time pressure. These two types of control are made possible by ATTENTIONAL CONTROL with focused attention and distributed attention. The categorization of language control and processing control in this paper is thus made according to the unique features of the interpreting task (e.g., in switching and multitasking). Given this perspective, the authors suggest that inhibitory control is not essential to language control in interpreting and probably not so essential to language control in general bilingual processing (especially in genuine language use contexts).

Simultaneous interpreting has been considered special and unique, and the simultaneous execution of multiple processes including listening and speaking has made it a good test ground for tying language control to cognitive control. Hervais-Adelman and Babcock (Hervais-Adelman & Babcock, 2020) focus on the neurobiology of SI. Functional MRI studies have shown that SI engages a network of brain areas that are implicated in speech perception and production, language switching, self-monitoring and selection. Structural MRI studies of SI also indicate modifications to a similar set of structures. The authors propose an integrative model of simultaneous interpreting that connect the functional and structural imaging findings about SI with posited functions from the Adaptive Control Hypothesis (Green & Abutalebi, 2013) and further with the network outlined by Calabria, Costa, Green and Abutalebi (2018). In this model, the authors postulate that the two languages must be maintained accessible during SI, and that the pattern of brain activation during SI (executed by highly trained interpreters) is similar to that of dense code-switching. The model implies that language behavior depends upon a control network that is dedicated to domain-general functions rather than to language.

Expert-novice comparison has been a popular approach to research on interpreting, and has been used to investigate differences in cognitive control between people having different amount of interpreting experience. In this regard, Nour et al. (Nour et al., 2020) investigate how professional and student interpreters differ in working memory. Using a reading span task to test WM and a digit span task to test short-term memory (STM), they tested a group of interpreting students, a group of translation students, and a group of older professional interpreters (on average 30 years older than the students). The results show that the two student groups had enhanced WM but not in STM, whereas the professional interpreters showed better performance in both WM and STM than translation students (even though the latter groups may be at their prime time of cognitive control). The authors concluded that professional experience may have helped maintain one's working memory abilities.

The topic of interpreter advantage is somewhat parallel to the topic of bilingual advantage. García et al. (García et al., 2020) provide us a comprehensive review of the neurocognitive features of simultaneous interpreters. First, significant neurocognitive differences, including behavioral enhancements in verbal and executive domains, are observable after only one or two years of training. Second, only those cognitive control functions that are directly taxed in interpreting show significant enhancements. Third, some of the observed verbal and executive effects are independent of each other, and uninfluenced by other bilingual-experience-related factors (e.g., L2 competence). These patterns from research on the impact of SI shed light on the adaptability of cognitive systems in bilinguals, including the responsiveness of relevant cognitive systems to stringent conditions such as interpreting, demand-based domain-specificity in the expertise-related effects, and relative adaptive autonomy of linguistic and executive mechanisms in bilinguals.

In sum, this Special Issue presents a forum for us to understand bilingual processing using interpreting as a window, and has opened up new directions for research into issues in bilingual language processing, cognitive control, and the underlying neurocognitive bases. We hope that this Special Issue serves as a gateway to new exciting research and future findings regarding mechanisms of bilingualism and interpreting.

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