Review Doctoral Dissertation by Anna Skalba, entitled *The processing of present perfect in French-English and Polish-English bilinguals: Behavioural, eye-tracking, and electrophysiological evidence*

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This doctoral dissertation includes an Introduction, a review chapter (Chapter 1), three empirical chapters (Chapters 2-4), and a General Discussion (Chapter 5). Summaries of the literature reviews and the stimulus materials are presented in Appendices A-L.

In my review, I will review each chapter separately, followed by questions that can serve as guidance for the PhD viva. At the end, I present my overall conclusion. In short, I think this is a high-quality doctoral dissertation and in my opinion PhD candidate Ms. Skalba can proceed to the final stages towards earning a PhD degree.

Introduction
The Introduction starts out with a discussion of different definitions of bilingualism and bilingual speakers that emphasized the level of proficiency in each of the languages or variability in language input. In the present thesis, bilingualism is defined as the regular use of two or more languages, following Grosjean (1982) and many others.

The Introduction then discusses a key question in bilingualism research, namely the representation and processing of syntax in the second language (L2), and outlines different linguistic structures that have been studied (morphosyntax, word order, phrase structure, filler-gap dependencies, voice, relative clauses, ditransitive verbs, possessives, ambiguity resolution, and grammatical tense) and methods that have been used (psycholinguistic and neurolinguistic). Ms. Skalba concludes that grammatical tense has received much less attention in the literature than other linguistic structures and no studies have examined the representation and processing of tense when used differently across a bilingual's two languages. This thesis addresses this gap in current knowledge by examining the production and comprehension of tense in French-English and Polish-English bilinguals, in particular the L2 English present perfect (e.g., "I have eaten"). The present perfect in English has a formal, but not functional equivalent in French and no counterpart in Polish.

Next, the Introduction presents comprehensive and impressive overview of theoretical models on bilingual/L2 syntactic representation and processing, including the shared/separate syntax account by Hartsuiker et al. (2004; and the follow-up, Bernolet & Hartsuiker (2018), De Bot's (1992) blueprint of a bilingual speaker, Ullman's (e.g., 2001) Declarative/Procedural model, the generative Full Transfer/Full Access model (Schwartz & Sprouse, 1996), Clahsen and Felser's (2006) Shallow Structure hypothesis, and MacWhinney's Unified competition Model (e.g., 2005). Where necessary the discussion of the bilingual/L2 models on syntactic representation and processing is augmented with foundational models on L1 processing (e.g., how De Bot's L2 model (1992) relates to Levelt's (1989) model, or bilingual lexical level processing (e.g., the function of language nodes in the BIA+ model by Dijkstra & Van Heuven (2002).

The section on theoretical models is followed by an excellent exposition of the form, origin, and functions of the present tense in English and related expressions in French, Welsh, and Polish, and how the principle of methodological triangulation is applied in this dissertation.

The Introduction concludes with the description of four coherent research questions that are each theoretically well-motivated and empirically well-justified.

Question:

1. The conclusion that fewer L2 processing studies examined grammatical tense (see page 2) is accurate when refering to studies that used behavioral (e.g., eye tracking) and ERP methodology. However, in neuroimaging studies (e.g., using fMRI), grammatical tense in L2 is more frequently studied (in particular L2 English regular and irregular tense inflection), also in the context where tense is expressed differently in the bilinguals' languages. In fact, on the basis of their review of neurocognitive research on morphological knowledge in L2, Biondo, Molinaro, and Mancini (2023, p. 127) conclude "*fMRI studies have predominantly focused on the regular vs. irregular past tense opposition and how it is handled across broadly defined typologically similar or dissimilar languages*". How can this fMRI work inform the available empirical knowledge on grammatical tense that used behavioral and ERP methodologies?

Chapter 1: Research Methodology and literature review

Chapter 1 opens with a comprehensive discussion of the syntactic priming paradigm, theoretical models that account for syntactic priming (residual activation (e.g., Pickering & Branigan, 1998) and implicit learning (e.g., Bock & Griffin, 2010) accounts), and different tasks that are used to measure syntactic priming effects (picture description, confederate scripting, sentence completion, sentence recall).

This chapter then continues with a detailed overview of empirical findings in this literature, organized on the basis of specific linguistic structures that have been examined, including dative constructions, active and passive voice, relative clauses, and possessive constructions. The review of the syntactic priming literature also reviews the empirical evidence in terms of factors that have been found to modulate the magnitude of the cross-linguistic syntactic priming effect, i.e., word order overlap and formal overlap across languages, L2 proficiency, and lexical effects --the cross-linguistic counterparts of the lexical boost effect: translation boost and cognate boost. Given the high number of studies on cross-linguistic syntactic priming, encompassing many different linguistic structures, languages, and tasks, reviewing this literature is a major undertaking, which makes this review all the more impressive.

Next, Chapter 1 focuses on eye-tracking methodology and measures that have been used in research on grammatical processing, followed by an extensive review of empirical work that used eye-tracking to examine bilinguals' processing of ambiguous structures (e.g., relative clause attachment), filler-gap dependencies (e.g., long-distance *wh*-dependencies), agreement, word order, and tense. This section also includes a description of factors that have modulated bilinguals' readings times, in particular L2 proficiency and lexical effects (e.g., cognate status of words in syntactic constructions or verb type). This section is, again, of high-quality and presents a comprehensive coverage of empirical work in this research domain.

Chapter 1 concludes with a third extensive review, this time focused on the methodology of EEG/ERP and how it has been applied to study grammatical processing in bilinguals, using the frequently used syntactic violation paradigm. This well-written section provides an in-depth review of ERP work on a range of syntactic structures, including phrase structure, word order, agreement (i.e., number, gender, and case agreement), and verbal morphology and tense. This review also includes a thorough discussion of factors that have been found to modulate ERP patterns, including cross-linguistic similarity of syntactic structures, the bilinguals' age of acquisition of the L2, and L2 proficiency.

To conclude, Chapter 1 presents three high-quality, extensive and comprehensive reviews on three quite different, yet coherent, topics. I think each of these reviews provides the foundational groundwork for a review chapter in a handbook or a review paper in a journal. I am very impressed by the depth and breadth of the three reviews; by making these thorough insights available Ms. Skalba will make a significant contribution to the literature and provide a great service to the research community. Finally, the appendices A-C that skillfully summarize each of the review are pieces of art!

Questions
2. Ms. Scalba correctly notes that cross-linguistic priming effects are typically larger in production tasks than in comprehension tasks (see page 20). Why? To what extent are the cognitive mechanisms underlying cross-linguistic priming in production different and/or similar from cross-linguistic priming in comprehension, in terms of the residual activation and the implicit learning account?

3. A frequently studied phenomenon that has been proposed to affect the magnitude of syntactic priming is the lexical boost effect, or translation equivalent boost effect and the cognate boost effect in cross-linguistic priming. How are the lexical boost, translation equivalent boost, and cognate boost effects explained in terms of the residual activation and implicit learning accounts?

Chapter 2: Behavioral studies
Chapter 2 reports a series of timely and well-designed studies that test the shared-syntax account using a manipulation that received little attention in the literature, syntactic structures that have formal, but not functional equivalents across the two languages (as reviewed in Chapter 1). More specifically, the present perfect in English differs in usage patterns from the passé compose in French. By using a novel task instead of the more frequently used picture description, confederate scripting, sentence completion or recall tasks, this chapter also makes a significant methodological contribution to the field. Specifically, French-English participants were first presented with a French prime sentence in passé composé or in passé simple (formally equivalent to past simple), after which they produced their own target sentence in English. If participants produce a higher number of present perfect constructions after the passé composé prime than after the passé simple, this signifies cross-linguistic priming and that cross-linguistic priming also emerges when a syntactic structure has a formal but no functional overlap across two languages.

Testing grammatical tense structures that have a formal but no functional overlap across languages is novel and requires a novel methodological approach. A significant strength of this chapter is that the methodology of the key syntactic priming experiment is informed by four preceding pilot studies (each with a relatively small number of participants but detailed quantitative and qualitative analysis of the participants' responses to stimuli and their task experience and strategies) and a full-fledged sentence translation study. In the latter study, French-English bilinguals' preference for different tense structures was assessed by requiring participants to translate L1 French passé composé sentences into English, which can be translated with two options in English: present perfect and past simple. Half the sentence stimuli included cognates with English. The results showed that participants had a clear preference from past simple and used present perfect less frequently; this effect was not affected by L2 English proficiency. This effect indicates that French-English bilinguals' translation performance was not guided by formal similarity of the structure across languages, and is more in line with the separate syntax account than with the shared syntax account.

The cross-linguistic syntactic priming study tested the priming of present tense by the passé composé structure. French-English bilinguals (n=40) first read a prime sentence in French with either a passé composé or a passé simple structure. They then orally produced a target sentence in English on the basis of two keywords, and were asked to describe an event which had already happened. A control group of L1 English speakers (n=40) conducted an equivalent within-language priming task and were primed with sentences in present perfect and past simple. In both the cross-linguistic (between-language) and the within-language experiments, participants demonstrated a strong preference for producing the past simple, irrespective of condition. So, no priming effects were obtained, in both the cross-linguistic (between-language) and within-language versions of the task.

The experiments reported in Chapter 2 are grounded in a solid theoretical and empirical foundation and the hypotheses are theory-driven. The reported experimentation is methodologically solid. For example, the cross-linguistic priming experiment was conducted alongside a within-language priming experiment to yield critical control priming data – this control experiment turned out to be critically important for the interpretation of the cross-linguistic priming effects. The data are analyzed using advanced analytic techniques (mixed-effects logistic regression model and Bayesian logistic regression model). The discussion presents a careful consideration, and then rejection, of methodological factors that may have driven the absence of a priming effect, followed by a theory-driven explanation for why priming effects were not observed with present perfect constructions, or may not be observed with tense constructions more generally (i.e., earlier priming studies used syntactic constructions representing combinatorial (non-obligatory) information, whereas tense belongs to (obligatory) featural information).

Questions:
4. In the translation experiment, half the passé composé sentences included cognates with English, enabling to test the cognate boost effect. However, this analysis was not reported. Was the observed effect of part tense dominance modulated by the cognate status of items?

5. Prior research has shown that syntactic priming is cumulative and accrues over the course of an experiment as speakers repeatedly encounter a given structure, an effect that tends to be particularly strong for low-frequency structures (e.g., Hartsuiker & Westenberg, 2000; Kaan & Chun, 2018). Did you observe cumulative adaptation effects in the within-language and cross-linguistic experiments?

Chapter 3: Eye-tracking study
The linguistic structure central in Chapter 3 is, again, perfect tense in L2 English, but this time the focus is on comprehension using eye-tracking methodology. French-English bilinguals, Polish-English bilinguals, and L1 English speakers read sentences in present perfect. The grammaticality of the sentences was manipulated by including a temporal expression that was used correctly or incorrectly rendering the sentence ungrammatical.

The theoretical and empirical foundation of the eye-tracking experiment is solid. The experimental design is appropriate the ask the experiment's key questions (cf. question 6 below) and the methodology and statistical analyses are state-of-the-art. Quite impressive that eye-tracking data were collected in three different countries! The figures depicting the data are also of high quality.

Some key findings of this study are that reading times of sentences with tense violations and their correct equivalents differed for Polish-English bilinguals and English L1 speakers, but not for the French-English bilinguals. These differences were not observed in the regression path durations. The results pattern of the Polish-English bilinguals is, convincingly, explained in terms of the absence of the Polish equivalent of the present perfect. Other explanations are the Polish-English bilinguals' high L2 English proficiency levels and their high level of metalinguistic awareness obtained through extensive English grammar training (see question 6 below regarding the absence of the structural factor in the hypothesized effects for Polish-English bilinguals). The explanation for the French-English bilingual data is also compelling. A further strength of the discussion is that the key results are connected to earlier empirical findings and theoretical models, in particular Hartsuiker et al.'s (2004) bilingual lexicalist model and MacWhinney's (2005) Unified Competition Model.

Question:
6. The Introduction preceding Chapter 1 described that the present perfect in English has a formal, but not functional equivalent in French and has no counterpart in Polish. This structural difference between the French and Polish languages, and how they differ from L2 English, should lead to differences in performance of French-English and Polish-English bilinguals according to several of the theoretical models discussed in the Introduction preceding Chapter 1. However, this is not reflected in the hypotheses of Chapter 3, in particular hypothesis 3 that is the only hypothesis that speaks about Polish-English bilinguals: *"Highly proficient Polish-English bilinguals will be less sensitive to present perfect violations than native speakers of English, but more than French-English bilinguals, due to very high proficiency in English and extensive metalinguistic awareness"* (p 130). Rather than predicting that structural differences between French and English vs. Polish and English will lead to differences in performance

between French-English and Polish-English bilinguals, hypothesis 3 exclusively focuses on L2 learner-related factors driving the hypothesized effect.

Chapter 4: Event-related potential study

Chapter 4 reports an ERP study on the processing of the present perfect in Polish-English bilinguals and Welsh-English bilinguals. The available literature on processing tense in L2 English has mainly tested L1 Chinese speakers whose native language does not have grammatical tense. Most studies testing L2 English tense processing in Chinese-English bilinguals report no sensitivity to tense violations in L2 English, which is typically attributed to the absence of tense in L1 Chinese. Testing Polish-English bilinguals on the L2 English present perfect structure is an excellent testbed to critically advance this literature, because although tense does exist in Polish, there is no functional nor formal equivalent of the present perfect in Polish. Performance of Polish-English bilinguals will be compared with Welsh-English bilinguals – both Welsh and English have present perfect.

The ERP experiment reported in Chapter 4 is well-thought-out and guided by theory-driven hypotheses. It creatively exploits cross-linguistic differences in tense between Polish and English, thereby creating an innovative testbed to test theories on bilingual processing. The materials of the eye-tracking experiment reported in Chapter 3 were used, slightly adapted for compatibility with the ERP study. The experimental methodology and statistical analyses are of high quality and accurately reported (see question 7 for a question about a methodological choice). The results showed an enhanced N400 for sentences with grammatical violations relative to correct counterparts in Welsh-English bilinguals, but not in Polish-English bilinguals; both groups showed no P600 effect (see question 8). The Discussion presents a thoughtful, and theoretically and empirically informed, interpretation of the result pattern and an insightful reflection on their theoretical implications.

Questions

7. Why were the sentences presented chunk-by-chunk rather than word-by-word? The latter presentation procedure seems more common in ERP sentence processing research. How was the size of a chunk determined, what was the guiding principle? Were the chunks small enough to read in a single fixation (to prevent unnecessary eye movement artefacts).

8. Another ERP component that has been found for morphosyntactic violations, including tense violations, is the LAN (left anterior negativity, that can also be bilateral; e.g., Caffarra, Mendoza, & Davidson, 2019). The LAN has the same time window as the N400 but its distribution is more anterior. As some have argued that the LAN can be a variant (or artefact) of the N400 (e.g., Tanner & Van Hell, 2014) –and although I find the semantic interpretation of the observed N400 effect in your Discussion compelling-- is there any reassurance that the N400 effect reported in Chapter 4 is not a LAN effect?

Chapter 5: General Discussion

This chapter presents an integrative discussion of the key findings of the behavioral, eye-tracking and ERP studies. Building on the extensive literature reviews in the Introduction

preceding Chapter 1 and in Chapter 1, Ms. Scalba thoroughly discusses her findings as they related to earlier empirical work and the implications for theoretical models. After elaborating on two factors that modulated observed patterns of bilinguals' processing, similarity of L1-L2 grammatical structures and L2 proficiency, Ms. Scalba discusses how the dissertation findings regarding the present perfect inform, advance, or challenge the theoretical models presented in the Introduction preceding Chapter 1. Chapter 5 also includes a thoughtful outline of the methodological insights the dissertation research provided, followed by limitations and avenues for future research.

Overall Conclusion

Notwithstanding the questions I outlined above, this doctoral dissertation is of high quality. It reports an impressive and coherent series of experiments that address novel questions, informed by an extensive review of theoretical models and the current empirical knowledge. The methodology and statistical analyses that are used throughout this dissertation are well thought-out and exemplary for this type of research. The theoretical explanation of the research findings is convincing, the argumentation is clear, and alternative explanations are considered as well. With respect to the written product, the writing is clear and will be accessible to others who don't work in this area of research. In all, the studies that are reported in this doctoral dissertation make an important contribution to the current knowledge on bilingual language processing. In all, this is a high-quality doctoral dissertation and in my opinion PhD candidate Ms. Skalba can proceed to the final stages towards earning a PhD degree.

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