Effects of referent lifetime knowledge on processing of verb morphology

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Background In the 'Perfect' Lifetime Effect, experiential readings of the English Present Perfect are felicitous with a living referent, but not dead referent (ex. 1; Klein, 1992; Meyer-Viol, 2011; Mittwoch, 2008). Such predicates in the Past Simple would be felicitous with the dead, but "odd" with the living if no completed past reference time is defined (ex. 1b; Partee, 1984). Meanwhile, processing of the English Present Perfect has been shown to be influenced by lexically defined time reference (Roberts & Liszka, 2013) as well as a visually depicted scene (Altmann & Kamide, 2007). In two experiments, we explored the processing of lifetime-tense congruence in the Present Perfect and Past Simple as well as the influence of the source of lifetime information by manipulating the presence of long-term knowledge of a referent.

Present Study We presented participants with lifetime context sentences defining the lifetime of referents who are well-known (Experiment 1; ex. 2) or unknown (Experiment 2; ex. 3), thereby manipulating the presence of long-term knowledge. This was followed by critical sentences describing an accomplishment of this person in the Present Perfect (ex. 3a) or the Past Simple (ex. 4b). Our stimuli contained two two-level factors (*tense*: Present Perfect (PP), Past Simple (PS); *lifetime congruence*: congruent, incongruent). The *congruent* conditions were *living-PP* and *dead-PS*, and *incongruent* conditions were *dead-PP* and *living-PS*.

Procedure Lifetime context sentences and critical sentences were presented to native British speakers (n = 160/experiment) in two cumulative self-paced reading experiments. Each trial was followed by a binary naturalness judgement task. Within each experiment, longer reading times and lower proportions of acceptances were expected for the *incongruent* conditions (dead-PP, living-PS), reflecting processing costs and awareness of the violations, with larger nested *lifetime congruence* effects expected for the Present Perfect than the Past Simple. If the presence of long-term knowledge in addition to contextually defined lifetime strengthens activation of the temporal (lifetime) constraints, then earlier and/or stronger effects of lifetime congruence would emerge in Experiment 1 compared to Experiment 2. Linear mixed models were fitted to reading-time data, and genearlised linear mixed models to binary response data. Self-paced reading time results were corrected for multiple comparisons (p-values multiplied by 5, the number of regions analysed per experiment).

Results In Experiment 1, a main effect of lifetime congruence emerged in naturalness responses (Fig. 1; z = -12.6, p < .001), total sentence reading times (Fig. 2; t = *7.2*, p < .001;), and self-paced reading times from the *verb+1* region (Fig. 3; **verb+1**: t = 2.9, p < .05; **verb+2**: t = 3.6, p < .01; **verb+3**: t = 4.6, p < .001; **verb+4**: t = 7.8, p <.001). An interaction effect of lifetime congruence and tense was found, with larger nested lifetime effects for the Present Perfect than Past Simple in total sentence reading times (**PP**: t = 7.5, p < .001; **PS**: t = 3.99, p < .001) and self-paced reading times from the verb+3 region, with significant nested effects in the Present Perfect only (**verb+3**: t = 5.0, p < .001; **verb+4**: t = 8.5, p < .001). In Experiment 2, a main effect of lifetime congruence was likewise found in naturalness responses (Fig. 1; z = -10.1, p < .001), total sentence reading times (Fig. 2; t = 6.5, p < .001), and self-paced reading times from the *verb*+3 onward (Fig. 3; **verb+3**: t = 3.6, p < .01; **verb+4**: t = 5.3, p < .001), with no interaction effects.

Conclusion The earlier emergence of main lifetime congruence effects in Experiment 1 compared to Experiment 2 suggests that the dual presence of both long-term and contextually defined lifetime information strengthened the activation of the temporal lifetime constraints. The additional finding of an interaction effect in Experiment 1 reading times, with a larger effect of lifetime congruence in the Present Perfect compared to Past Simple, implies a larger cost for integrating the Present Perfect in a completed past time frame than for integrating the Past Simple in an on-going time frame, similar to findings in Roberts and Liszka (2013). Taken together, these results suggest that temporal constraints on the English Present Perfect and Past Simple extend to referent lifetime during incremental processing, and that the source of lifetime information influences the temporal emergence of effects.

Example sentences

1a	Einstein visited/*has visited Princeton.	*dead*
1b	Chomsky ?visited/has visited Princeton.	*living*
2a	Beyoncé is an American performer. She lives in California.	*famous - living*
2b	Whitney Houston was an American performer. She died in California.	*famous - dead*
3a	Sophie Laverty is an American performer. She lives in California.	*unknown - living*
3b	Sophie Laverty was an American performer. She died in California.	*unknown - dead*
4a	She *has performed* in many arenas, according to Wikipedia.	*Present Perfect*
4b	She *performed* in many arenas, according to Wikipedia.	*Past Simple*

Figures

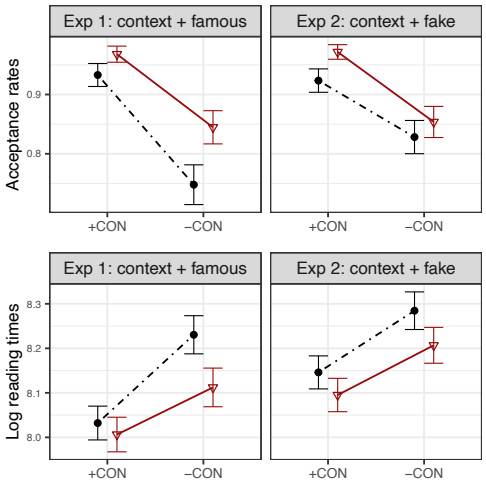

Figure 1 *(top row): naturalness acceptance rates for Experiments 1 and 2* (+CON = *congruent,* -CON = *inconguent*)
Figure 2 (bottom row): *mean total reading times for critical sentences; Figure 3 legend applies*

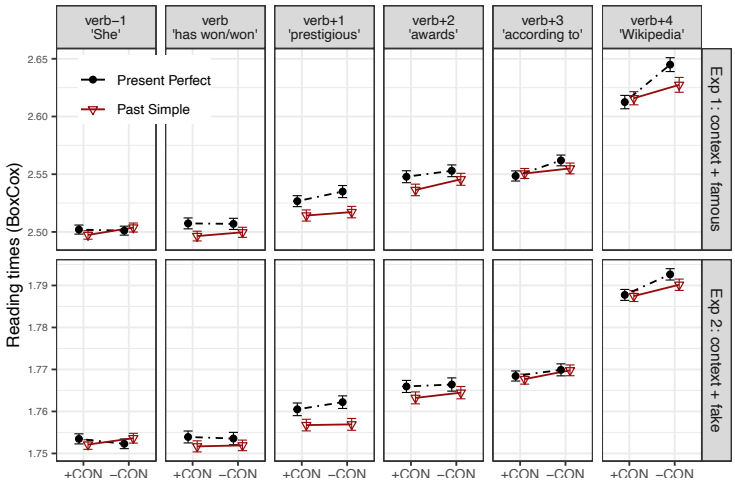

Figure 3*: BoxCox transformed reading times across sentence regions for Experiemnt 1 (top row) and Experiment 2 (bottom row); lifetime congruence is plotted on the x-axis* (+CON = *congruent,* -CON = *inconguent)*

References

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