A new paradigm for inducing verb tense errors

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Much of our knowledge about language production has been gained through the study of speech errors [1]. Over 40 years of research on agreement attraction [2] has revealed valuable insights about the timing of language production [3], what sources of information affect verb agreement [4], and how a language's characteristics affect the errors speakers make [5].

While errors in verb agreement have been well-studied, there has been much less work on errors in verb tense, especially in non-impaired populations. However, verb tense errors still have potential to reveal important insights into the nature of grammatical production.

Verb tense errors are probably less common than errors in verb agreement, but they are still observable. We identified 32 errors from the Fromkin Speech Error Database [6], including "I didn't MADE it", and "she'll DOES it every time", and we designed a sentence completion paradigm in English to elicit errors, manipulating verb tense (present vs. past) and verb regularity (regular vs. irregular). We also manipulated the connectedness (i.e., collocation frequency) between the past tense forms and the objects that followed them (e.g., "scrambled eggs" vs. "scrambled images") to look for evidence of verb forms being activated by other words in the sentence. We used matrix/embedded sentences because our corpus analysis, as well as our own naturalistic error collection, revealed that verb tense errors often occur in sentences that contain both tensed and nonfinite verb forms.

In our sentence completion task, participants (N=66) heard statements in either present or past tense. Then, participants saw a "sentence starter", which was a matrix sentence frame, designed to elicit either a finite or nonfinite verb in the embedded sentence using either he/she or her/him pronouns [see example sentences]. Participants were instructed to use that sentence starter to tell us how someone might know about the original statement that they heard.

For the finite sentence starters, verb errors were rare, and there were only 4 errors out of 792 items in which participants used a nonfinite verb when a finite one is required, (e.g. "He sees she PAINT nails for high-end customers"). Errors for nonfinite sentence starters were much more common (41 out of 792 possible items), so we ran mixed-effects models on the nonfinite items. Results showed that errors were more likely for irregular verbs ($p<.01$) and for past-tense statements ($p<.001$). There was also an interaction between verb tense and verb regularity ($p<.05$), with more errors for past-tense statements with irregular verbs (e.g., "He saw him SWEPT floors with his brothers") [see Figure 1]. Post-hoc analyses on the subset of past-tense items, comparing the connected (e.g., "painted nails") vs. unconnected (e.g., "painted fences") objects revealed no significant differences.

These results raise interesting questions about the processes underlying verb tense assignment. Specifically – is the tendency to produce more past-tense verbs, compared to present-tense forms, driven by semantic effects, similar to the semantic effects on verb agreement [7]? In that case, we might expect a past tense form to be more "marked" semantically than a present-tense form. The observed pattern of errors also raises the question of what is driving the asymmetry between regular and irregular verb forms: Is it due to activation from phonology of irregular verbs, or does this asymmetry inform the debate about whether regular & irregular verbs are produced by shared vs. separate mechanisms [8]? The lack of a difference in error rates between connected vs. unconnected objects suggests that the verb form errors are not being driven primarily from co-activation with other sentential elements (i.e., direct object nouns), but the question about whether interactive activation from other sentential elements can impact verb form production could be explored further.

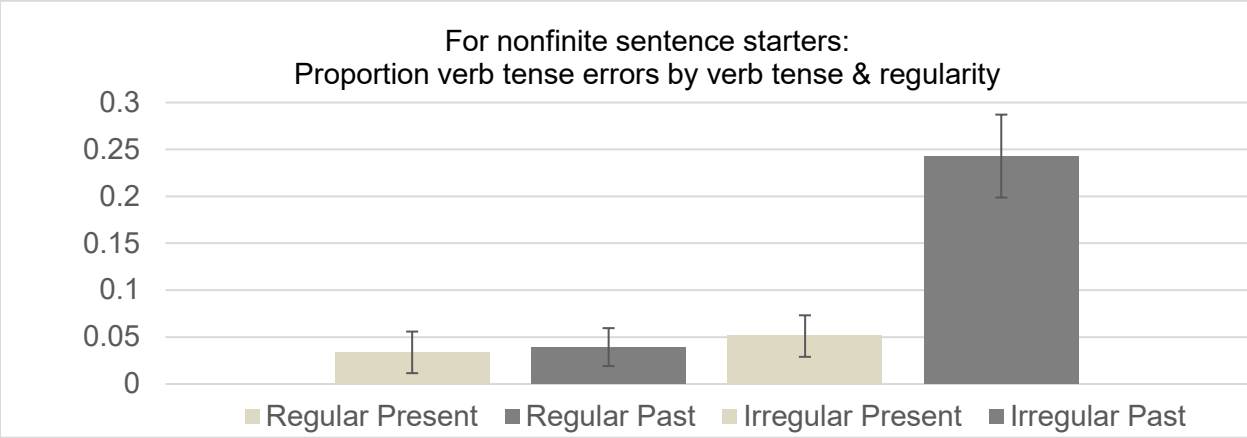
In all, this paradigm provides a new way of investigating the processes of verb tense formation. We hope this will be applied in languages with more complex verb tense morphology to provide further information about the mechanisms involved in grammatical production.

Example experimental sentences

Statement: “The artist (paints/painted) (nails/fences) for high-end customers”

	Nonfinite sentence starter	Finite sentence starter
Present tense prompt	**He sees her**… “He sees her *paint* (nails/fences) for high-end customers.”	**He sees she…** “He sees she *paints* (nails/fences) for high-end customers.”
Past tense prompt	**He saw her…** “He saw her *paint* (nails/fences) for high-end customers.”	**He saw she…** “He saw she *painted* (nails/fences) for high-end customers.”

Figure 1



[1] Dell et al., 1999, Cognitive Science; [2] Bock & Miller, 1991, Cognitive Psychology; [3] Veenstra et al., 2015, Acta Psychologia; [4] Franck et al., 2020, Glossa; [5] Slioussar, 2018, JML; [6] https://www.mpi.nl/dbmpi/sedb/sperco_form4.pl; [7] Brehm & Bock, 2013, Cognition; [8] Harris & Humphreys, 2014, Aphasiology