Form-specific preferences of proforms and demonstratives referring to events

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Referring expressions (REs) like proforms ("it") and demonstratives ("that") are at the center of discourse relationships, yet little is known about how people resolve reference to events, as opposed to reference to people and objects. Previous work suggests that factors influencing object reference resolution are 1.) **the form of the RE**: proforms prefer simple/easily accessible entities, while demonstratives prefer complex/less accessible entities ([1],[2],[4]); and 2.) **clause-level aspectual factors**: imperfective clauses facilitate access to the internal structure of an event and the entities involved, while perfective clauses focus attention on the result state of the event as a whole ([3],[5]). In this study, we report results from a novel experimental paradigm used to investigate reference resolution when both simple and complex events are available in the preceding discourse. We investigate event reference with nominal referring expressions ("it" & "that"; Exp1) and with adverbial REs ("so" & "thus"; Exp2).

We ask if the form of RE and/or the aspectual environment in which it occurs has an effect on the complexity of the event referent ultimately chosen for interpretation. On analogy with reference in the object domain, one could predict that event referents of "that" and "thus" will be more complex than those of "it" and "so". Conversely, if the behavior of nominal REs is affected by a preference for certain types of referents, with proforms preferring object referents and demonstratives preferring event referents, one could predict that event referents of "it" will be more complex than those of "that". If event reference is not sensitive to the form of RE, we expect to see no difference in complexity. Furthermore, on the assumption that referential access to the (less complex) sub-events of a complex event depends on aspectual factors, we predict that referents of REs embedded in perfective clauses will be more complex than those of imperfective clauses. If aspectual factors have no effect on access to sub-events, there should be no difference in complexity across clause types.

Methods: Exp1: We modified instructions from the internet (e.g., how to use an ATM) to include a subordinate clause containing the verb "do" in imperfective or perfective form, followed by either "it" or "that" (e.g., "after doing it") (Fig. 1). Two versions ("it" and "that") of 12 sets of instructions were created, half with perfective aspect, half with imperfective aspect. In 24 fillers, we used explicit verb phrases (e.g., "after folding the paper") in place of REs. Participants saw a set of instructions side by side with a Gantt chart representing the time course of the steps (Fig. 1). Each step of the instructions contained one event. Each chart contained 3-4 unfilled rows corresponding to underlined events (one critical item and 2-3 distractors), which participants were asked to fill in according to their understanding of *when* the underlined event occurred. A higher number of filled cells would indicate reference resolution to a more complex event, consisting of more sub-events. Each participant (N=50) saw all 36 instructions, pseudorandomized using a Latin square design. **Exp2:** Identical to Experiment 1, but with "it" and "that" replaced with "so" and "thus", respectively. N=120.

Experimental power: Participation in Exp1 was cut short by the outbreak of CoVid-19. An analysis of the data collected so far estimated 70-75% power with 50 participants. Though this is below the standard goal of 80%, we feel that it is enough to have confidence in our results.

Results: We constructed linear mixed-effects models with FORM and ASPECT as fixed effects and ITEM and SUBJECT as random effects. **Exp1:** We found a significant main effect of FORM ($p<.05$, $\beta=-.65$, $t=-2.39$), with referents of "it" being more complex than those of "that"; we found no effect of ASPECT and no interaction effect ($ps>.6$) (Fig. 2). **Exp2:** We found a significant main effect of FORM ($p<.001$, $\beta=.67$, $t=-3.04$), with referents of "thus" being more complex than those of "so"; we found no effect of ASPECT and no interaction effect ($ps>.1$) (Fig. 3).

Discussion: The results suggest that nominal RE preferences for event referents differ from that previously seen for object referents, and call into question any theory that couples referential complexity only with a proform/demonstrative distinction without taking into account the type of referent involved. These results furthermore suggest 1) that aspect has little to no effect on referent complexity, and 2) that our paradigm is sensitive enough to detect effects of theoretical interest, and may prove useful in future studies into events and event reference.
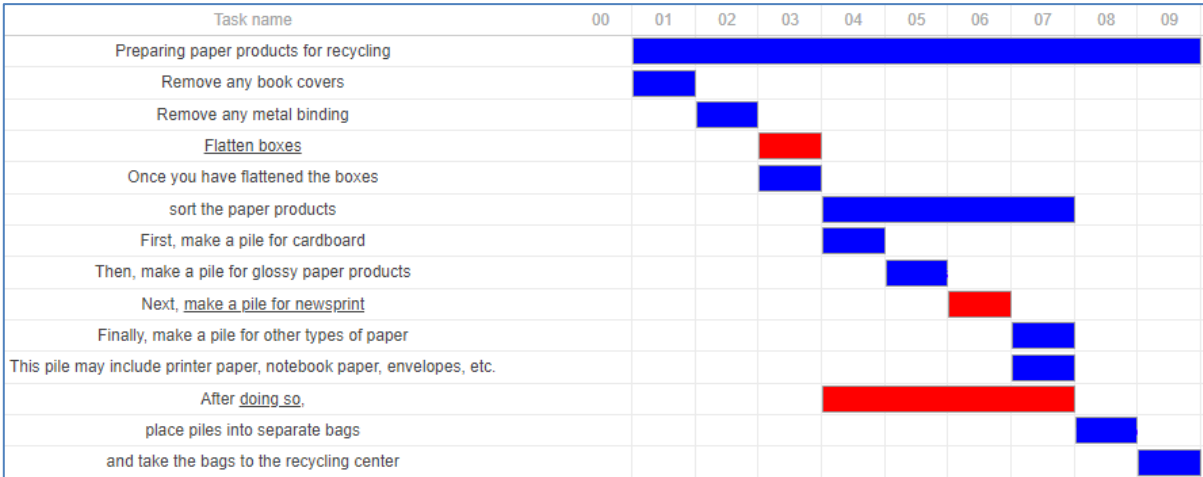
Figure 1: Example stimuli with instructions and Gantt chart. Red cells are those filled in by participants.
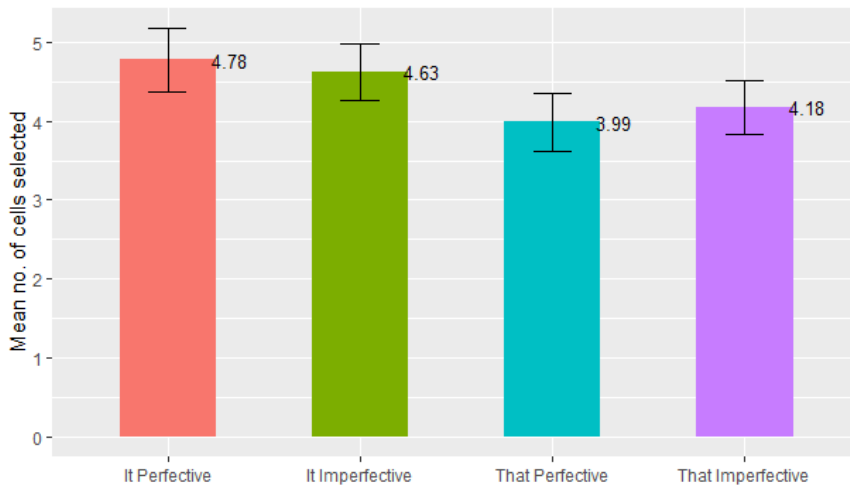

Figure 2: Experiment 1-Mean cells selected, by RE and aspect. Error bars represent standard error.
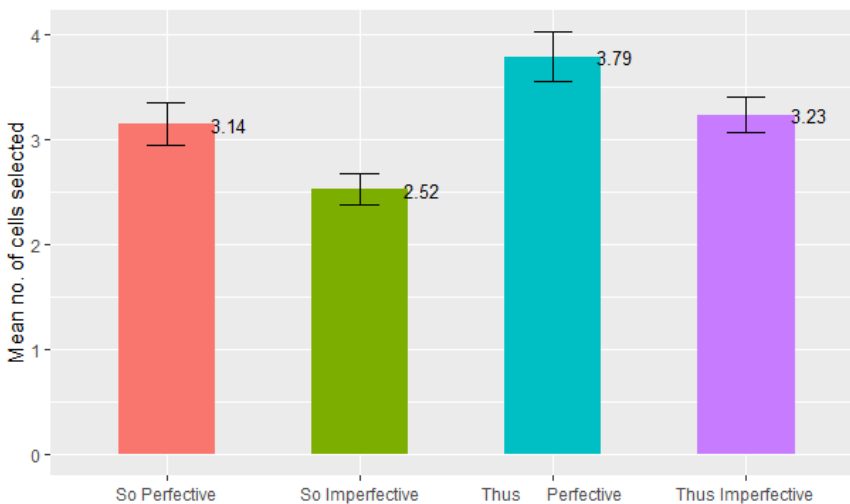

Figure 3: Experiment 2 - Mean cells selected, by RE and aspect. Error bars represent standard error.

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