Individual differences suggest common semantic competition in sentence comprehension and production
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Many studies have shown that animate-head object relative clauses (ORCs) containing two animate nouns (e.g. the girl that the boy is kicking) are more difficult to comprehend, and rarer in production, compared to inanimate-head ORCs (e.g. the ball that the boy is kicking) [1]. Prior studies examining on-line processing suggest that both production and comprehension engage semantic competition. Comprehenders experience greater semantic competition at verb positions when determining who is acting on whom in animate-head than inanimate-head ORCs, leading to more comprehension difficulty. In production, due to competition in planning highly similar animate entities, speakers prefer to produce more passives to inhibit the RC agent to final position or even completely omit it (e.g. the girl being kicked (by the boy)), as compared to planning less similar nouns [1], [2] [3]. However, it remains unclear whether this competition is shared across production and comprehension, rather than separate for each process.

Using an individual differences approach, we reasoned that if shared semantic competition processes underpin both comprehension and production, an individual’s semantic competition resolution abilities should account for unique variance in both tasks. Specifically, key competition-related measures should interact with the animacy manipulation. 83 adults completed two picture-based tasks for comprehension and production (see figure 1), several standardized tests on vocabulary and executive control (e.g. motor inhibition), and a semantic competition resolution homograph-naming task. This measured the time it took participants to inhibit the already encountered dominant meaning of homographs (e.g., /wɪnd/ for wind) in favor of the subordinate one (/wʌɪnd/) when cued with a semantically related word (e.g., turn). Results were subjected to individual differences analyses with mixed-effects modeling (with vocabulary measure entered before other measures) to examine whether any executive control or semantic competition resolution skill explains unique variance in comprehension and production performance beyond the influence of vocabulary knowledge.

Consistent with previous findings, we found highly competitive animate-head phrases were more difficult to comprehend (longer RTs) and produce (longer utterance initiation time). Speaker also preferred more passives and omitted more agents when two animate nouns were involved. Critically, mixed-effects analyses revealed that over above vocabulary knowledge, semantic competition skills, as measured by the homograph-naming task, interacted with animacy and predicted comprehension RTs and structure choice in production (proportion of passives and agent omission rate). Participants with better semantic competition skills had faster comprehension RTs, produced fewer passives and omitted agent more often in the highly competitive condition (e.g. the girl being kicked), relative to the less competitive condition. Speakers with better semantic competition skills were also faster in initiating their utterances.

Together, these results imply a common semantic competition process in sentence comprehension and production.

Figure 1: Examples of pictures stimuli used in the comprehension and production tasks. Below the images, the text illustrates the heard stimuli in the comprehension task (comprehenders need to decide whether the heard sentence clearly describes the target character e.g. dog/car, man/teddy bear) and the most typical spoken answers provided in the production task when asked to describe the target character in each picture. In the actual experiment, the target character for each trial was briefly highlighted with a red square.