Referential efficiency across adulthood: communicative strategies and cognitive control

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Traditional theories in pragmatics characterize an efficient speaker as one who avoids redundancy (i.e. make your contribution as informative as is required *but not more*) [1,2]. Recent work, however, calls into question this view, characterizing an efficient speaker as one whose referential choices facilitate a listener's identification of referents [3]. A prediction follows from this recent account: specific contexts will lend themselves to redundancy, but an efficient speaker should only be redundant when it is helpful to the listener. Efficiency would therefore require the ability to track contextual information and change strategy when necessary, likely relying on attention and working memory (WM). To test this hypothesis, we recruited adults of all ages (where there's considerable variability in referential choice, cognitive control, and WM [4-6]) to investigate individual differences in referential efficiency.

Exp 1 assessed referential efficiency by manipulating the visual context (monochrome vs. polychrome conditions, Fig 1). Participants (N=100, ages 19-82) named targets in 4-object displays so an in-person listener could identify the referent [3]. Previous work shows that color adjectives speed object identification in polychrome displays but delay object identification in monochrome displays [7]. Thus, when presented with both types of displays, a highly efficient speaker should only add color modification on polychrome displays. In this way, being efficient involves responding to changes in the visual environment by actively shifting communicative strategies in a manner that benefits the listener. We therefore hypothesized that efficiency would be predicted by attention switching skills (i.e. the ability to rapidly shift between modification strategies during utterance planning), measured via the Test of Everyday Attention [8]. We also manipulated communicative pressure: participants were administered one of two trial-block orders: polychrome followed by monochrome or vice-versa. In the Poly-Mono order, there's greater pressure to switch strategies as color becomes inefficient in block 2. In the Mono-Poly order, modification in block 2 is helpful, but an unmodified noun would also suffice, yielding less pressure to switch. We thus expected modification to vary with the visual context, order and switching capacity. Our LMER model of color modification (Condition, Order, Switching, Age as FE, maximal RE structure) showed the predicted Condition x Order x Switching interaction (p<.05): in Poly-Mono, better switching appropriately led to less modification in block 2 (Fig 2). Notably, age did not influence this: good switchers *of all ages* flexibly adapted to communicative pressures. Other significant results follow from this view of efficiency (Poly-Mono yields more color over-specification and is more sensitive to switching) and from age (older adults over-modify more [4] but less so with better switching skills).

Exp 2 assessed whether referential choices in narrative (where there is less pressure for efficiency but greater necessity to track and recall discourse referents) reflected individual differences in WM (measured via an automated reading span test [9,10]). We manipulated communicative pressure for appropriate referential forms by varying the number of characters in the scenes [11]. The same participants from Exp 1 saw two-panel vignettes in random order (Fig 3). For each pair of panels, the participant heard a sentence about panel 1 and repeated it, then saw panel 2 (with the subject referent from panel 1 depicted as the main character) and constructed a story continuation. We assessed referential choice in each condition: 1 character or 2 different sex/gender characters. In the 1-character condition, a pronoun is more appropriate as there is no ambiguity and a repeated name risks inefficiency. In the 2-character condition, either form is unambiguous, but a pronoun is more efficient. We built an LMER model of pronoun use (Condition, WM, Age as FE and maximal RE structure). We replicated effects of condition [11]: more pronouns for 1-character scenes (p<.001), and age [12]: more pronouns from older adults (p<.01). Importantly, pronoun use varied with WM, mediated by age: more pronoun use for greater WM (p<.01), driven by young adults (p<.05) (Fig 4).

These results reveal that age-related differences in referential efficiency depend on both contextual demands and cognitive abilities, highlighting the role of individual differences in reference development across the lifespan. Moreover, those with better cognitive skills were redundant in efficient ways, supporting the view that speakers' referential choices are driven by a pressure to facilitate the listener's identification of the referent, rather than by brevity.

Fig 1. Sample Poly & Mono displays

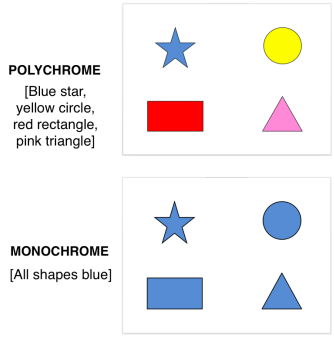


Fig 2. Order x Condition x Switching interaction

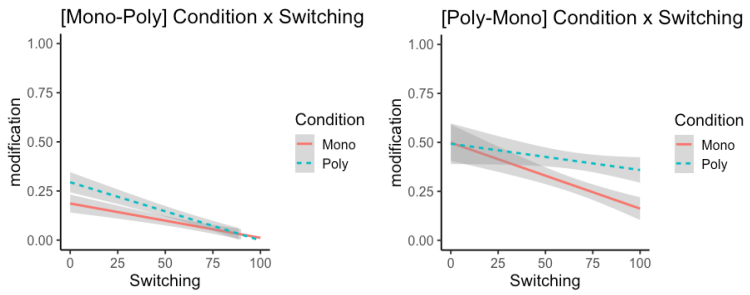
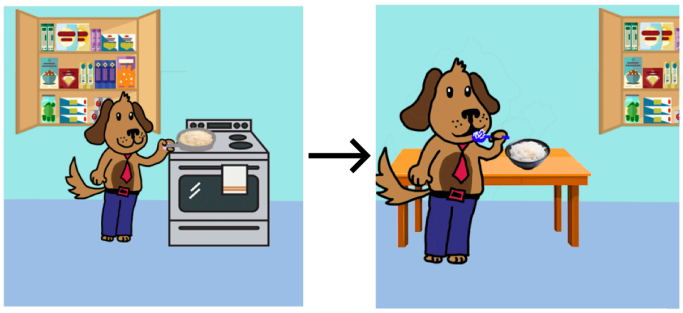
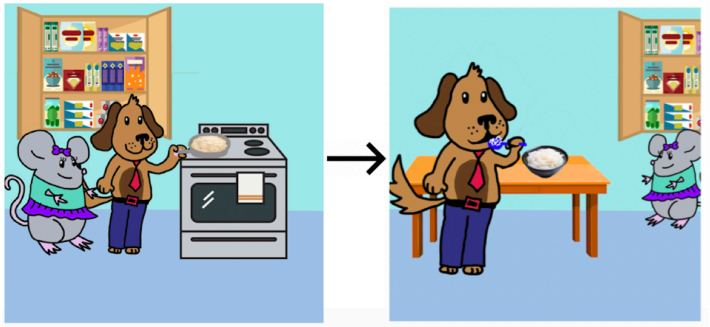


Fig 3. Sample 1- and 2-character vignettes



Panel 1: "Doggie (M) cooked rice for dinner."



Panel 1: "Doggie (M) cooked rice with Mousey (F) for dinner."

Fig 4. VWM x Age interaction

(Median split: OA=older adults, YA=younger adults)

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References:

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