Processing Relative *vs.* Absolute Adjectives: a Visual World Study

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Introduction

In a Visual World Study, Sedivy et al. [1] report an effect of referential contrast for gradable **Relative Adjectives** (RAs) like '*tall*' used as restrictive modifiers when the visual context provides a Comparison Class (CC). An open question is whether this context-sensitivity is driven by pragmatic reasoning about referential contrast [2-3], or whether it arises from the lexical semantics of the predicate itself [1,4,5]. In this study we address this question by replicating Sedivy et al.'s design and extend it to **Absolute Adjectives** (AAs), a class of adjectives that is also gradable but does not default to fixing a CC. Our results suggest that while AAs show pragmatic sensitivity to context, only RAs show lexical context-sensitivity resulting from the need of resolving an appropriate CC.

Research Question

☞ **Is contextual information integrated differently in the processing of relative *vs.* absolute adjectives?**

Gradable Adjectives and Comparison Classes

- Only RAs, but not AAs, default to fixing a CC. RA's can take contextually specified CCs introduced by *for*-phrases or *compared-to*-phrases (Cf. [6-7] for a different view):

1. For-phrases:
a. Mary is tall for a 6 year old.
b. ??This door is closed for a safe door.

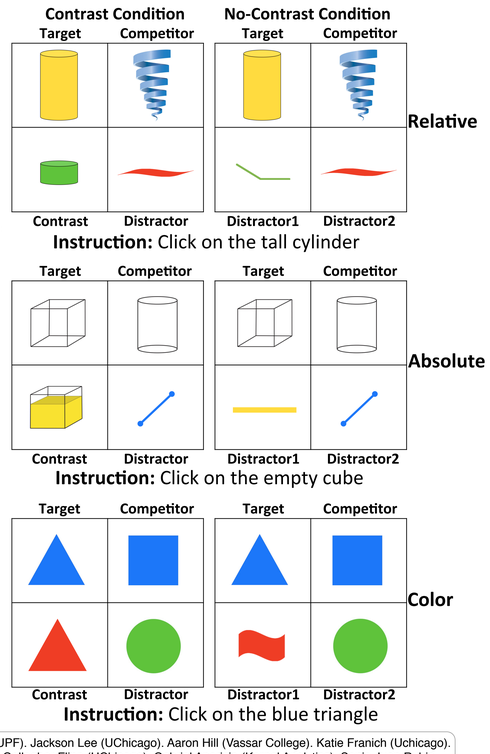
2. Compared-to-phrases
a. Compared to John, Mary is tall.
b. ??Compared to this door, that door is closed.

Design

Figure 1: Item Example

–3 types of adjectives tested:

1. Relative Adjectives (**RA**, n=20)
2. Absolute (maximum) Adjectives (**AA**, n=10). All AAs target pictures were compatible with precise interpretations
3. Color Adjectives (**CA**, n=20) serve as our baseline, since in the current design the interpretation of CAs does not involve comparison class [8]



–Stimuli consisted of geometric shapes in order to avoid category effect (from the head noun) driven by world knowledge

–Participants were 40 native speakers of American English

–2 conditions (Sedivy et al. [1]):
1. Contrast (left panels, Figure 1)
2. No-Contrast (right panels, Figure 1)

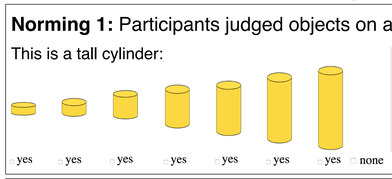
–The No-contrast condition was created by substituting the contrasting object with a second distractor

ACKNOWLEDGEMENTS: We thank Louise McNally (UPF). Jackson Lee (UChicago). Aaron Hill (Vassar College). Katie Franich (Uchicago). Christina Kim (Univ. of Kent). Julian Grove (UChicago). Gallagher Flinn (UChicago). Gabriel Aparicio (Kernel Analytics). Sonia Juan Rubio. Michelle Namkoong. **FUNDING:** NSF BCS#1227144 to C. Kennedy and M. Xiang. **CONTACT:** Helena Aparicio haparicio@uchicago.edu

Stimuli Creation and Norming

- For Relative and Absolute adjectives, experimental target, competitor and contrast objects were normed in three picture matching Mturk studies

Norming 1: Participants judged objects on a 7-point scale



Objects from scale positions **3** and **7** were chosen as the experimental targets and contrasts.

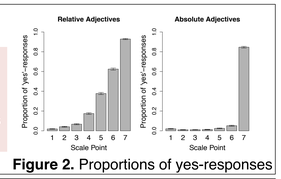


Figure 2. Proportions of yes-responses

Norming 2: Participants judged the target and contrast objects **in isolation**

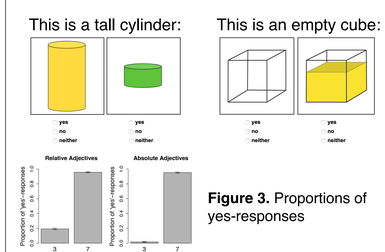


Figure 3. Proportions of yes-responses

Norming Study 3: Participants judged each of the tested **target/contrast pairs side by side**

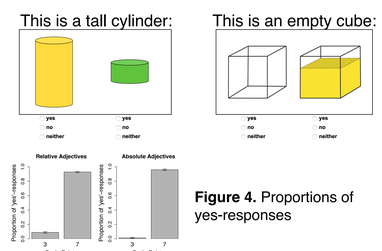
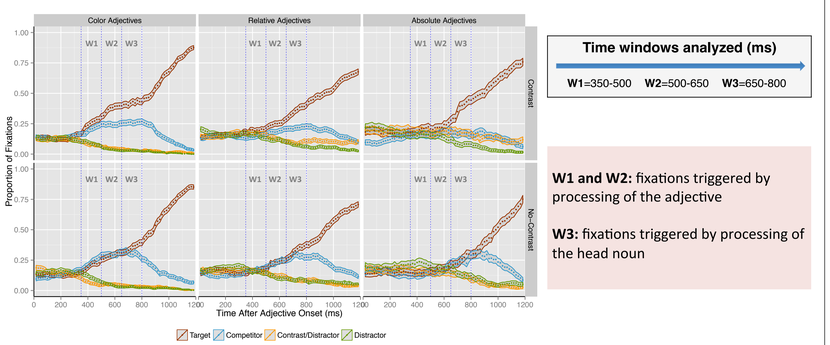


Figure 4. Proportions of yes-responses

General Results

Figure 5. Proportions of fixations starting at the adjective onset



Time windows analyzed (ms)

W1=350-500 **W2**=500-650 **W3**=650-800

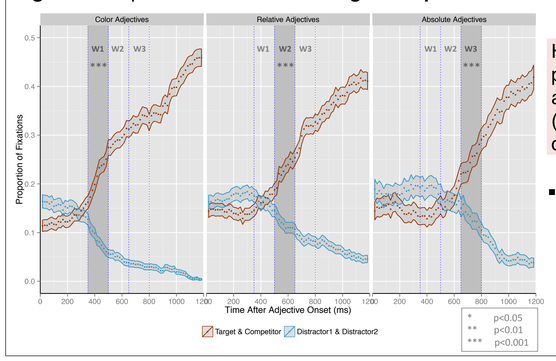
W1 and W2: fixations triggered by processing of the adjective

W3: fixations triggered by processing of the head noun

- General adjectives mean duration is 459 ms with no significant differences across adjective types
- Adjective window was offset 200ms (i.e. 200-659ms)
- Analyses were performed on the aggregated proportions of looks over three consecutive time windows (150ms each), starting from 300ms of the onset of the adjective

Results Breakdown 1—No-Contrast Condition only

Figure 6. Proportions of fixations to **target/competitor *vs.* distractors**

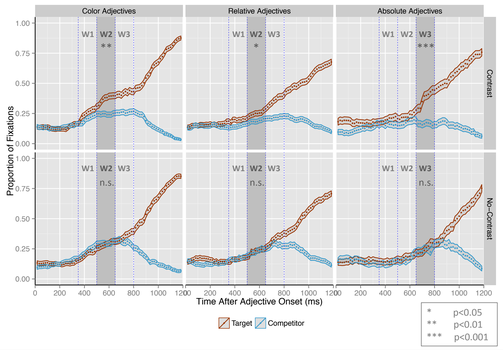


How long does it take to process the adjectives in the absence of contextual support (i.e., in the No-Contrast condition)?

- visual identification of the adjective property (target and competitor) is faster for CAs than for gradable adjectives (RAs and AAs)

Results Breakdown 2—Contrast *vs.* No-Contrast Conditions

Figure 7. Proportions of fixations to **target vs. competitor**



Contrast facilitation is present for all three types of adjectives, but

- **CAs**: disambiguation of target and competitor in the Contrast condition takes place ***after*** the adjective property is identified in the No-Contrast condition.
- **RAs**: disambiguation of target and competitor in the Contrast condition takes place **in the same window** in which the adjective property is identified in the absence of contrast.
- **AAs**: contrast facilitation appeared when head noun information is available

Lexical *vs.* Pragmatic Effects of Contrast

Pragmatic Effect of Contrast

Color Adjectives:

–Effect of Contrast takes place *after* the adjective property is identified in the No-Contrast condition

Absolute Adjectives:

–Effect of Contrast takes place outside the adjective window at a point when information about the head noun is already available

Semantic Effect of Contrast

Relative Adjectives:

–Effect of Contrast takes place in the same time window in which the adjective property is identified in the No-Contrast condition

–The contrast effect for RAs seems to facilitate the lexical semantic processing of the adjective

–We suggest the contrasting object facilitates the construction of a semantic comparison class for RAs, in addition to any pragmatic facilitation effect.

Conclusions

–By evaluating the relative timing of the Contrast effect in the adjective window with respect to the lexical processing of the predicate in the No-Contrast condition, it is possible to tease apart lexical from pragmatic effects of Contrast, as exemplified by RAs and CAs

–The processing of RAs vs. AAs involves different patterns of integration of contextual visual information:

1. For RAs, the contrasting object triggers the semantic processing of constructing a comparison class (semantic effect of contrast, in addition to any pragmatic effect)
2. For AAs, the visually present CC facilitates target identification, but not during the adjective window (pragmatic effect of contrast)

References

[1] Sedivy et al. (1999); [2] Altmann & Steedman (1988); [3] Tanenhaus et al. (1995); [4] Sedivy (2003); [5] Sedivy (2004); [6] Klein (1980); [7] Sassoon & Toledo (2011); [8] Kennedy & McNally (2010).