How Uniqueness guides Definite Description Processing

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March 23, 2013

Talk Outline

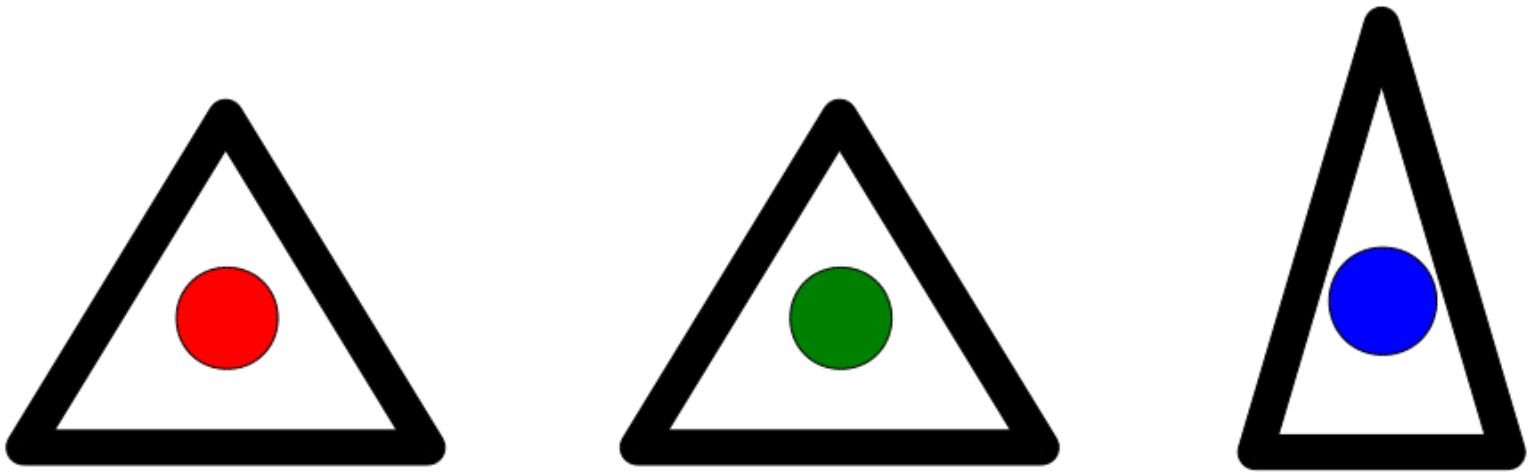
Goals

Examine the impact of uniqueness on the processing of definite descriptions.

- Visual world paradigm: Eye gaze reveals processing of sentences over time (Tanenhaus et al. 1995).
- Processing indicates predictions made by listeners: Effect of determiner choice (a/the) on predictions about referents for DPs.
- Listeners aim to maximize the presupposition of uniqueness being satisfied: For definite DPs (but not indefinites), predictive eye gaze correlates with the number of unique properties.

Example

"The triangle..."



Claim

Uniqueness is important for...

- the theory of definiteness
- processing definite descriptions

Theories of Definiteness

Two Approaches

1. Uniqueness (Russell, 1905; Strawson, 1950; Clark, 1975; Kadmon, 1990)
2. Familiarity (Stalnaker, 1974; Heim, 1982)

Hybrid Approaches (Roberts, 2003)

Referents of definite DPs are

1. familiar
2. unique in being so

Uniqueness

Russell (1905)

1. *Existence*: There is an entity in the world satisfying that description.
2. *Uniqueness*: There is only one such entity.

(1) 'The queen of England has hair' is TRUE iff:
$\exists x.queen.England(x)$ & $has.hair(x)$ & $\forall y.queen.England(y) \rightarrow y = x$

(2) 'The king of France is bald' is TRUE iff:
$\exists x.king.France(x)$ & $is.bald(x)$ & $\forall y.king.France(y) \rightarrow y = x$

Strawson (1950)

Definites contribute semantic content in the form of presuppositions.

Qualifications and Extensions

Bridging

(3) I met a man yesterday. *The man* told me a story.

Definite description does not refer to something that is unique in the world. Does when the domain of reference is restricted to the set of entities that are relevant to what's being said (Clark, 1975)

Plurals

(4) The men told the story

Replace uniqueness with maximality. "the men" must refer to the maximal set of relevant men (Kadmon, 1990).

Familiarity

Heim (1982)

For every indefinite, start a new card; for every definite, update a suitable old card. Definites must be used to refer back to a familiar discourse entity.

1. *Strong Familiarity*: an entity has been either explicitly introduced into the discourse.
2. *Weak Familiarity*: implicitly introduced by the context.

Weak Familiarity

Stalnaker (1974)

Referents are at least weakly familiar when their existence is entailed by the common ground of the speaker and the hearer

(5) I traveled to the farm, but I couldn't find *the farmer*.

(6) Every farmer who owns a donkey takes *the donkey* out to dinner.

Inescapable Uniqueness Effects

Roberts (2003)

(7) I opened the door and pushed *the button I found inside*.

Felicitous only when there is a single button inside the box. Definites presuppose the existence of a weakly familiar discourse referent that is unique as such, with pure uniqueness effects as in (7) being derived via Gricean implicature.

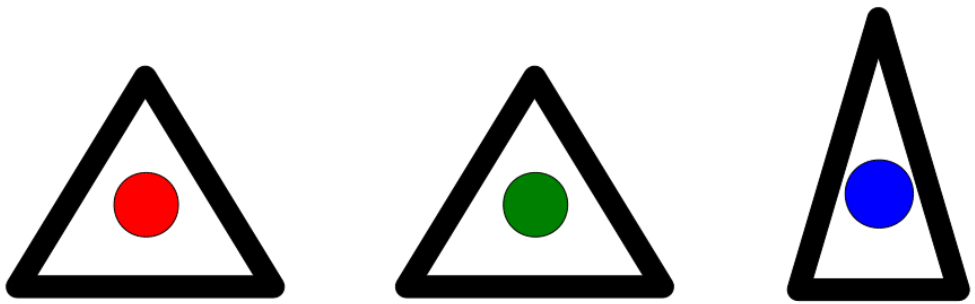
Processing

Questions

1. Do uniqueness and familiarity influence processing behavior as well?
2. Given multiple weakly familiar entities, what role does uniqueness play in guiding the processing of definite descriptions?

Example

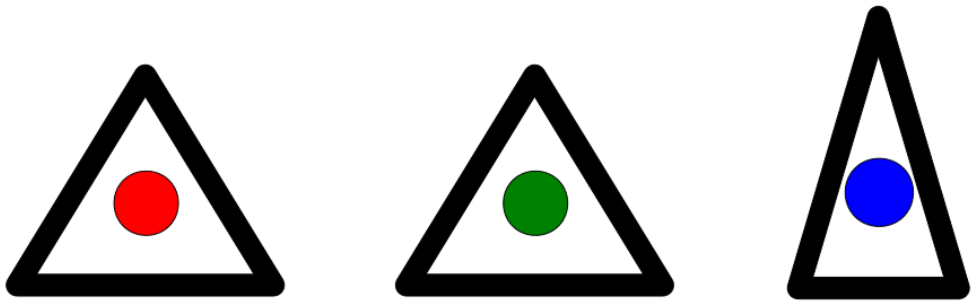
1. The triangle...with the red/green/blue dot
2. The triangle with only two equal sides
3. ...



Example

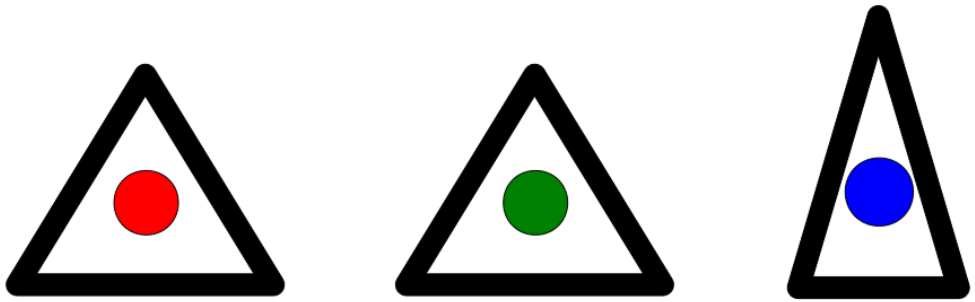
Maximal Uniqueness

The triangle with the blue dot is unique under the most number of descriptions. It is *maximally* unique. A listener aiming to maximize the probability of this presupposition being satisfied will favor the blue triangle.



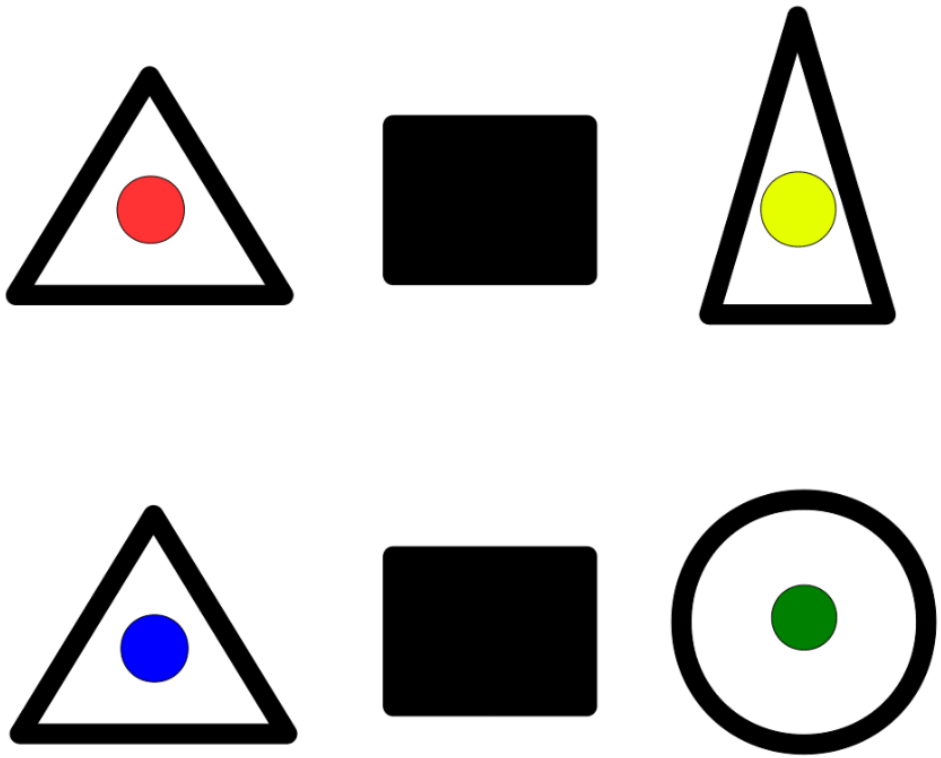
Restrictions

1. ?? Click on a triangle with the red/green/blue dot.
2. ? Click on a triangle with a red/green/blue dot.



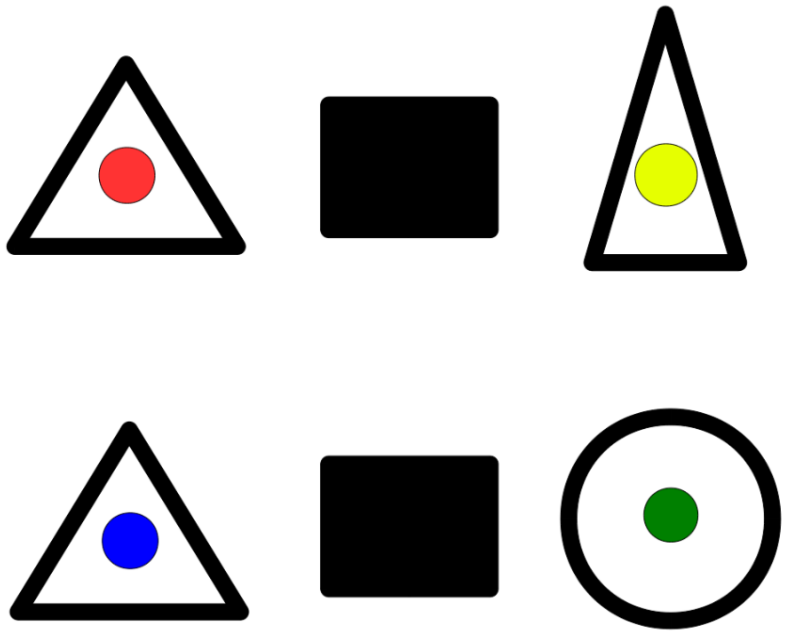
Stimulus

1. Click on the box that's next to **a/the** triangle with a red/yellow/blue dot.



Conditions: determiner × uniqueness

1. Click on the box that's next to **the** triangle with a yellow dot.
2. Click on the box that's next to **the** triangle with a red/blue dot.
3. Click on the box that's next to **a** triangle with a yellow dot.
4. Click on the box that's next to **a** triangle with a red/blue dot.



Design

Materials

- 4 target conditions (6 items per condition): disambiguating property always color.
- 72 filler items: disambiguating property split so that color only ever used half the time across all trials.
- Items balanced for shapes, colors, location.

Methods

- 29 subjects (Undergrads at Penn, 1 excluded due to colorblindness)
- 4 lists (7 subjects per list)
- Location of gaze tracked during period of ambiguity (from offset of determiner until onset of disambiguating information)
- Time window shifted to account for saccade planning.

Predictions

Hypothesis A

For definites, people behave in a predictive manner, as if to maximize the probability of a uniqueness presupposition being satisfied.

Hypothesis B

For definites, people consider all potentially unique referents equally.

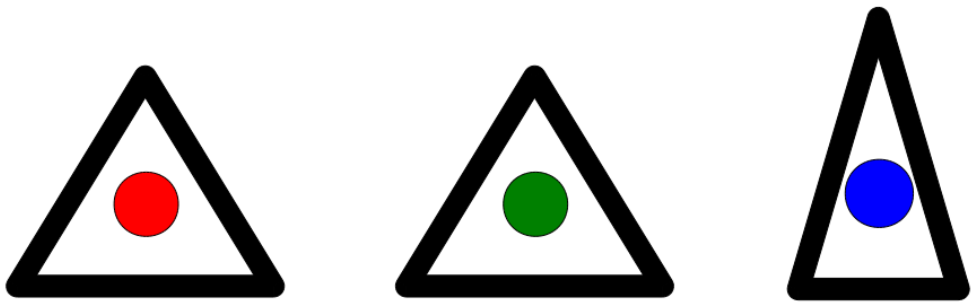
Hypotheses A and B

No effect for indefinites.

Predictions

"Click on **the** triangle..."

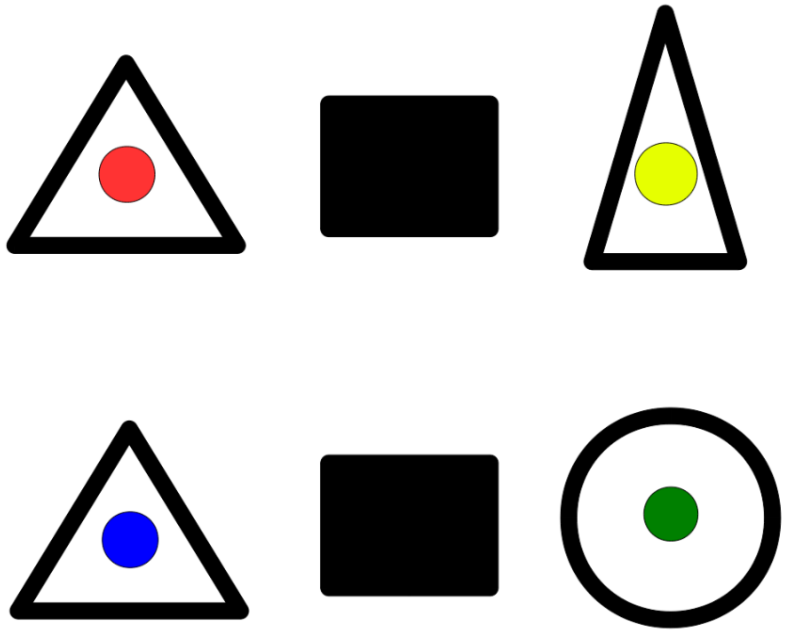
	blue triangle	red triangle	yellow triangle
Hypothesis A	$\frac{1}{3} + c$	$\frac{1}{3} - \frac{c}{2}$	$\frac{1}{3} - \frac{c}{2}$
Hypothesis B	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$



Predictions

"Click on the box that's next to **the** triangle..."

	Max-Unique Row	Other Row
Hypothesis A	$\frac{1}{2} + c$	$\frac{1}{2} - c$
Hypothesis B	$\frac{1}{2}$	$\frac{1}{2}$



Results

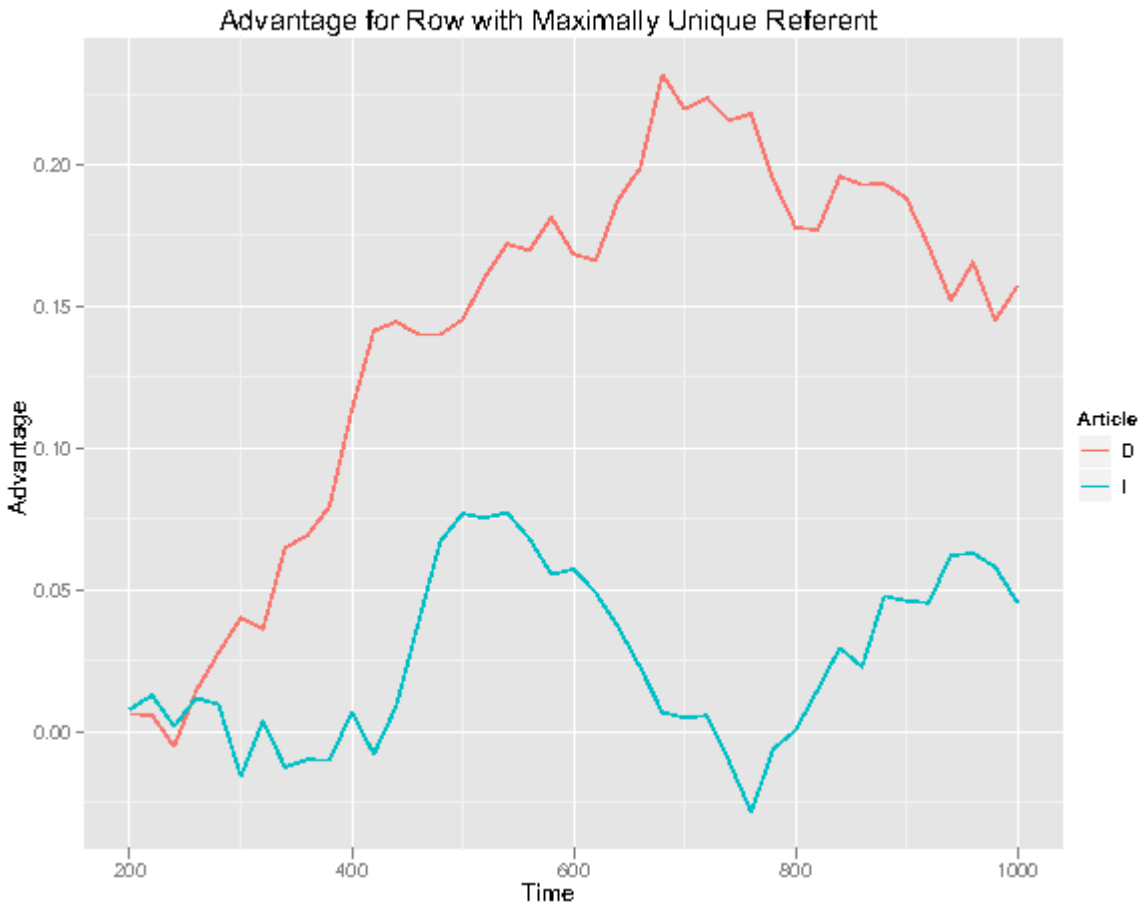
Definites

Advantage in proportion of looks over time for row containing maximally unique object.

Indefinites

No advantage in proportion of looks over time for row containing maximally unique object.

Results



200ms from offset of determiner to account for saccade planning.

Statistics

- ANOVA w/ two time bins: F1=11.8, p=0.001, F2=6.8,p=0.01
- Mixed effects model: % looks to row w/ maximally unique potential referent
- Predictors: definite vs. indefinite, time after determiner
- Random intercepts for subject and item

	Estimate	Std.Error	z-value	p-value	
Intercept	-0.64	0.12	-5.2	10^{-7}	***
Definiteness	-0.14	0.08	-1.9	0.06	
Time	0.003	0.001	3.9	10^{-5}	***
Def. x Time	0.01	0.001	4.4	10^{-5}	***

Uniqueness in Processing

- Participants behave as if to maximize the likelihood of a uniqueness presupposition being satisfied.
- They anticipate the *maximally unique* object for temporarily ambiguous definite descriptions.
- No such effect for indefinites.
- Uniqueness is a factor in both descriptive theories and online processing.

Thanks!

References

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