# Referential entropy influences overspecification: Evidence from production

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## Introduction & Hypothesis

**Specificity in referential communication**

- **Grice's Maxim of Quantity** [1]: Speakers should produce only information that is strictly necessary for identifying the target
- However, it is possible to establish reference with either **minimally-specified** (MS; precise) or **over-specified** (OS; redundant) expressions
- Moreover, **speakers overspecify frequently** and systematically [e.g., 2-6]

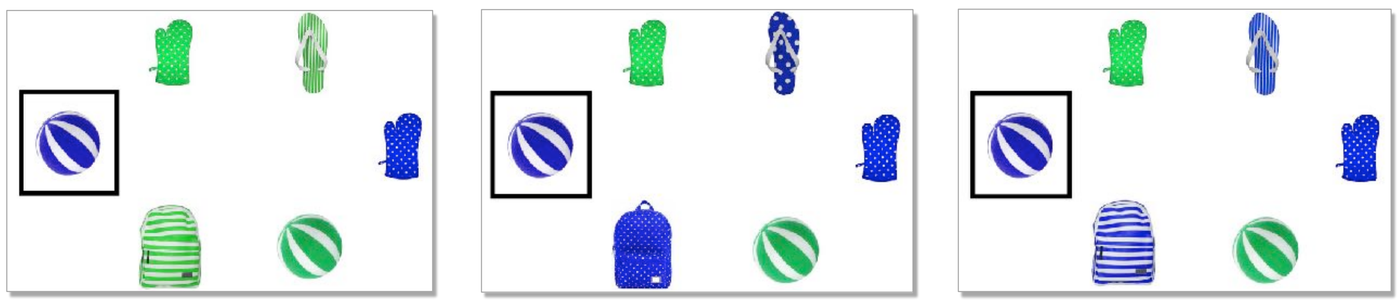
**Q: Why do people overspecificy?**

**Referential Entropy**

- A measure of visual scene **complexity** based on number of potential targets that are consistent with the description at a given point in the referring expression
- Incoming **words can reduce referential entropy** to a greater or lesser extent [7]
- **Overspecification facilitates processing**, in general, and even more so when it reduces entropy efficiently [8]

**Hypothesis:** Speakers may include redundant information in order to help listeners restrict search space, and thereby reduce cognitive effort

**Colour Necessary**

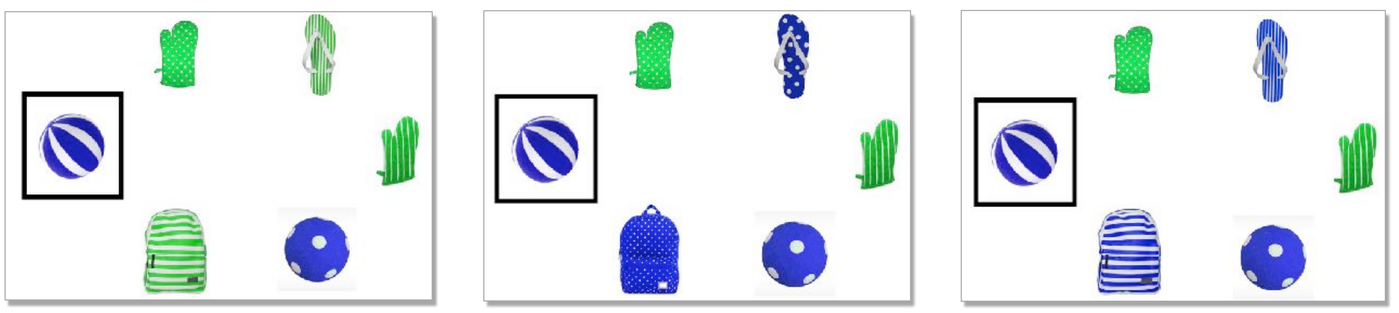


a. 2s 2c 4p
Colour reduces entropy more

b. 2s 4c 2p
Pattern reduces entropy more

c. 2s 4c 4p
Colour and Pattern reduce entropy equally

**Pattern Necessary**



d. 2s 2c 4p
Colour reduces entropy more

e. 2s 4c 2p
Pattern reduces entropy more

f. 2s 4c 4p
Colour and Pattern reduce entropy equally

## Methods

**Participants**

- Current status: 41 pairs of native German speakers (mean age = 24.1, 48 female)
- Randomly assigned as Speaker or Listener

**Task**

- Speaker and Listener see same set of objects, but in different spatial arrangements
- Speaker's task: Ask which side of the Listener's screen the target object appears on

**Stimuli**

- Crossed **Necessary Adjective** (Colour, Pattern) X **Entropy Reduction Advantage** (Colour, Pattern, Equal) (6 items per condition)
- Intermixed with 3 kinds of fillers for total of 144 trials

**Predictions**

- Greatest OS rate should be found when redundant adjective reduces entropy more than necessary adjective (b & d)

**Exclusion Criteria**

- 4 speakers > 90% minimal specifications
- 2 speakers > 15 % underspecifications (cf. <5%)
- Trials containing underspecifications or self-repairs of adjective/noun or order/amount of information conveyed (8.8%)
- Overspecifications primed by the immediately previous trial (i.e. identical word order) (32.6%)

## Preliminary Results

**Listener Accuracy**

- Mean = 98.3%

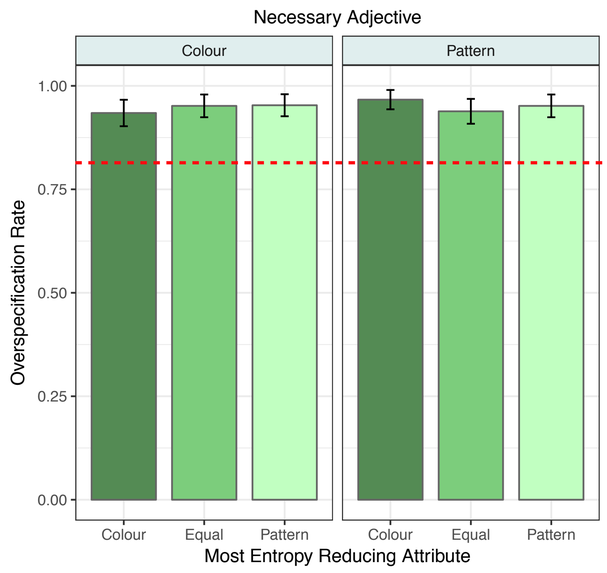
**Speaker Productions**

- MS = 77.6%
- OS = 22.4%

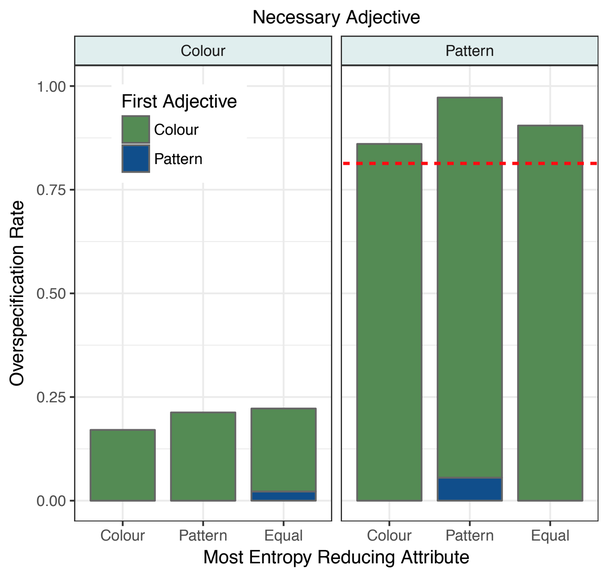
**Speakers were categorised into 3 groups**

- **Universal OS Group** (N=14)**:** OS rate > 80% for both Colour and Pattern Necessary items
- **Colour OS Group** (N=10)**:** OS rate > 80% for Pattern Necessary items
- **Rational OS Group** (N=11)**:** remainder of speakers

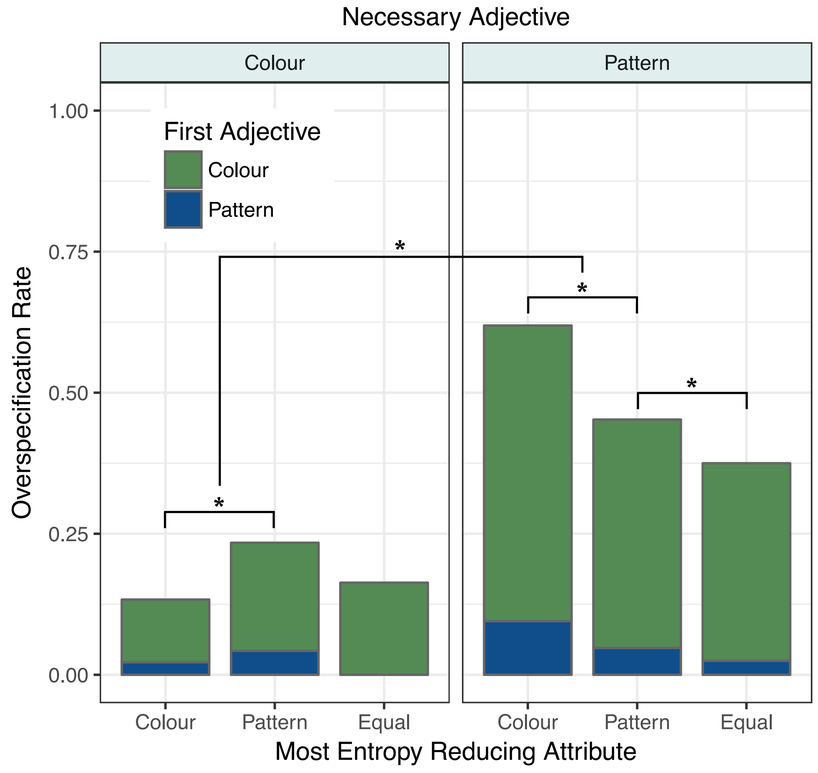
**Universal Overspecification Group**




**Colour Overspecification Group**




**Rational Overspecification Group**




## References

[1] Grice (1975) in Cole & Morgan
[2] Pechmann (1989) *Linguistics*
[3] Arts et al. (2011) *J Pragmat*
[4] Koolen et al. (2013) *Cognitive Sci*
[5] Tarenskeen et al. (2015) *Front Psych*
[6] Rubio-Fernández (2016) *Front Psych*
[7] Hale (2003) *J Psycholing Res*
[8] Tourtouri et al. (2017) *CogSci*
[9] Frank & Goodman (2012) *Science*

## Conclusion & Discussion

- Results contribute to growing evidence that speakers frequently use redundant information, and that this does not adversely affect listeners' performance (listener accuracy at ceiling)
- Individual differences in use of redundant information may reflect differing strategies
  - Universal OS may be a strategy to minimise speaker effort
  - Colour OS may be "low cost" for both Speakers and Listeners due to language-wide frequency of colour modification and/or visual salience of colour
  - OS may be a rational strategy when redundant information reduces entropy [cf. 9]

**Ongoing Analyses**

- Does the Entropy Reduction Advantage manipulation influence word order preferences?
- For instance, fronting the maximally entropy reducing word (noun or adjective)?
- Data collection is under way, so stay tuned!

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