

# The Impact of Colour Difference and Colour Codability on Reference Production

Jette Viethen, Martijn Goudbeek, Emiel Krahmer



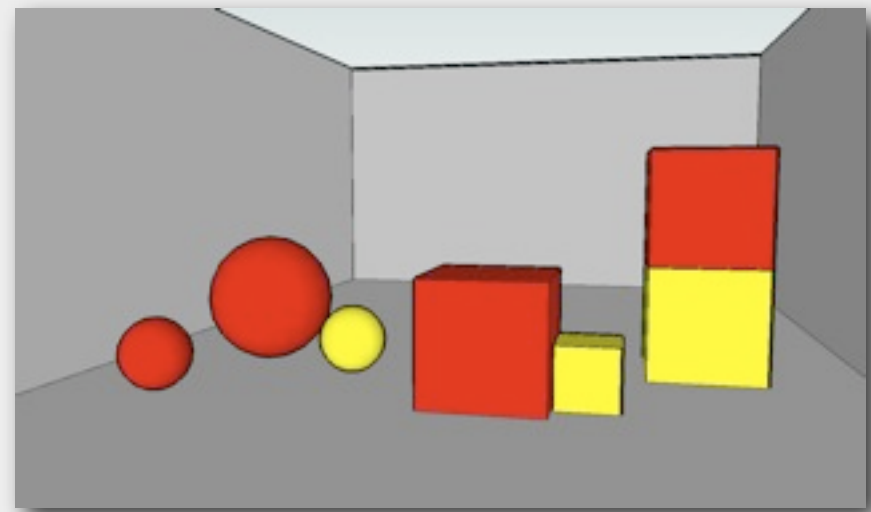
# Previous Research Shows...

## that people use colour in referring expressions

- three times more often than other attributes  
(TUNA Corpus, Gatt 2007)
- even if it's not necessary, while they only use size when it distinguishes from other objects *of the same type*  
(Sedivy 2003, Brown-Schmidt & Tanenhaus 2006, Viethen & Dale 2011)
- sometimes even when all objects have the same colour (Koolen et al. 2012)
- before they've even scanned the whole scene (Pechmann 1989)
- as the first attribute, even if that violates standard word order  
(Pechmann 1989, Belke & Meyer 2002)
- **because it's more easily perceived than other attributes**  
(everyone claims it, some evidence: Belke & Meyer 2002)

# ... Based on Very “Basic” Colours

- Gatt (2007), Koolen et al. (2012): red, grey, blue, green
- Pechman (1989): red, yellow, blue, green
- Viethen & Dale (2011): red, yellow, blue, green
- Belke & Meyer (2002): red, blue, yellow

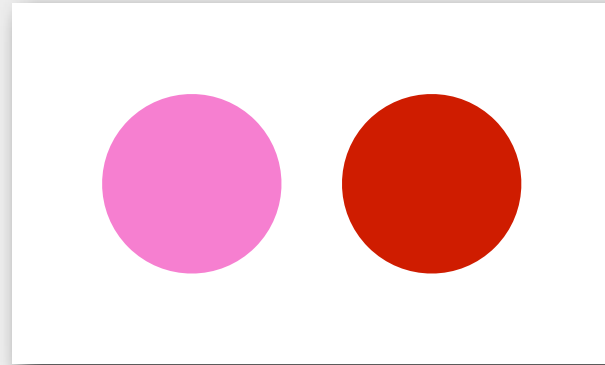


# Making Colour Less Absolute

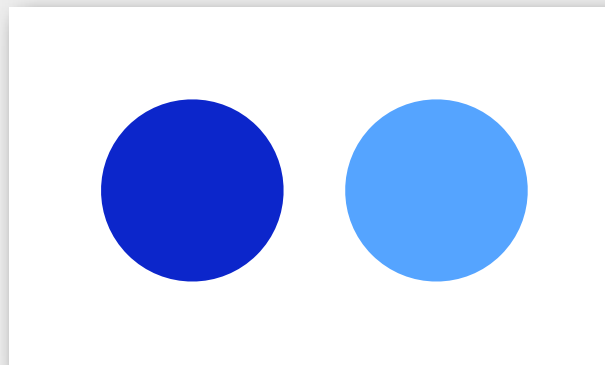
What happens if the colours in a scene...

1. are similar to each other?

Herrmann & Deutsch (1976):  
the smaller the difference in an  
attribute, the less it gets used.



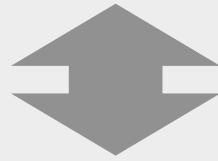
2. can't be distinguished by  
basic colour terms?



# Hypotheses

1. Colour is perceived independently of the surrounding colours.  
(Most of the literature)

→ Similar colours get used just as much.



2. Less distinguishing attributes, get used less.  
(Herrmann and Deutsch)

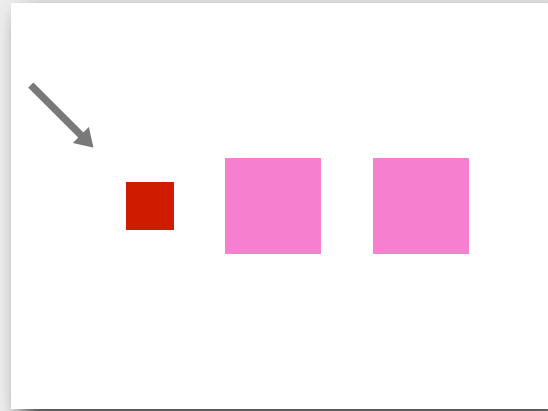
→ Similar colours get used less.

3. Finding complex colour terms is harder than using basic terms.

→ Complex colour terms get used less.

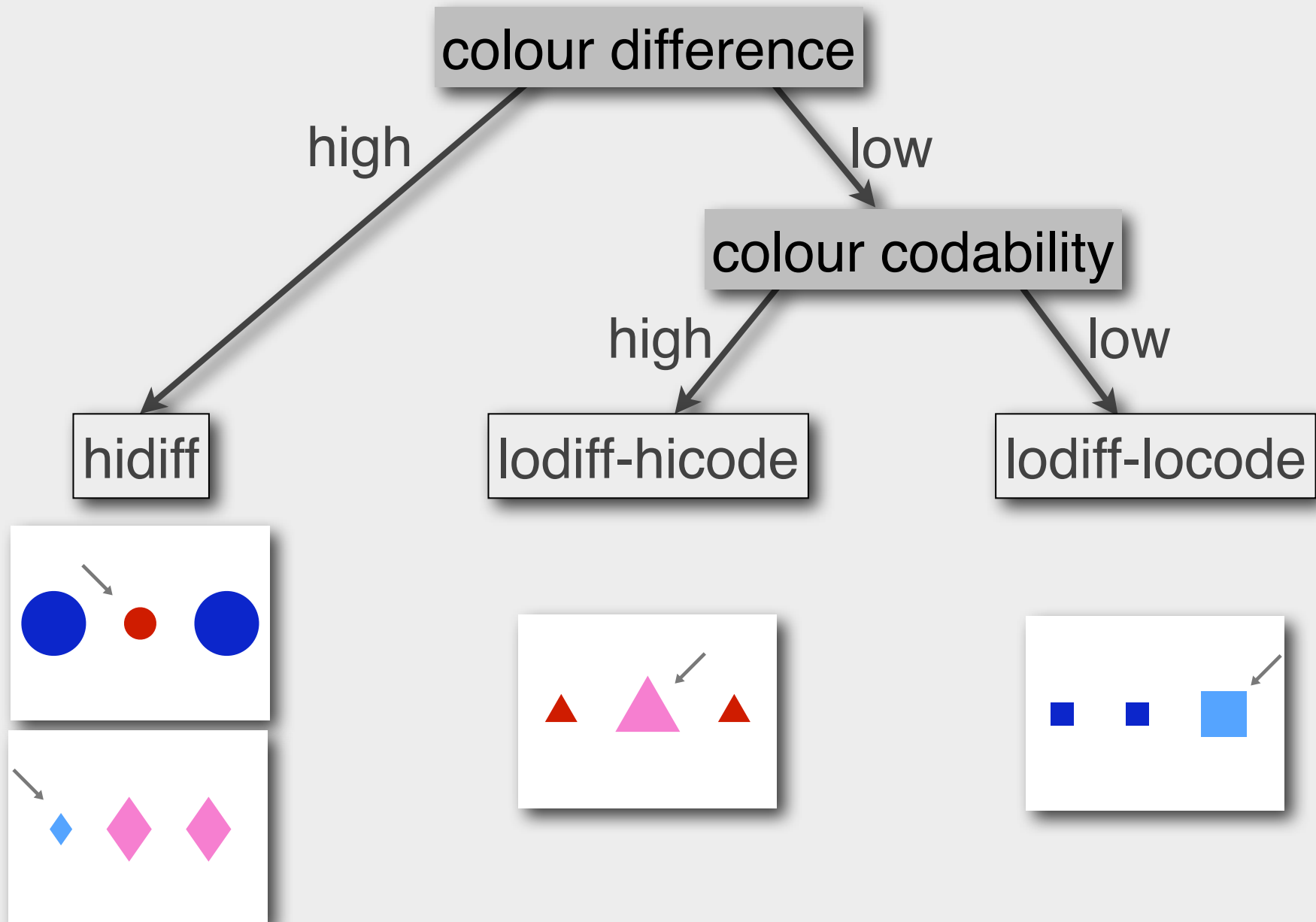
# A Language Production Experiment

- Stimuli: Simple scenes with very simple objects.

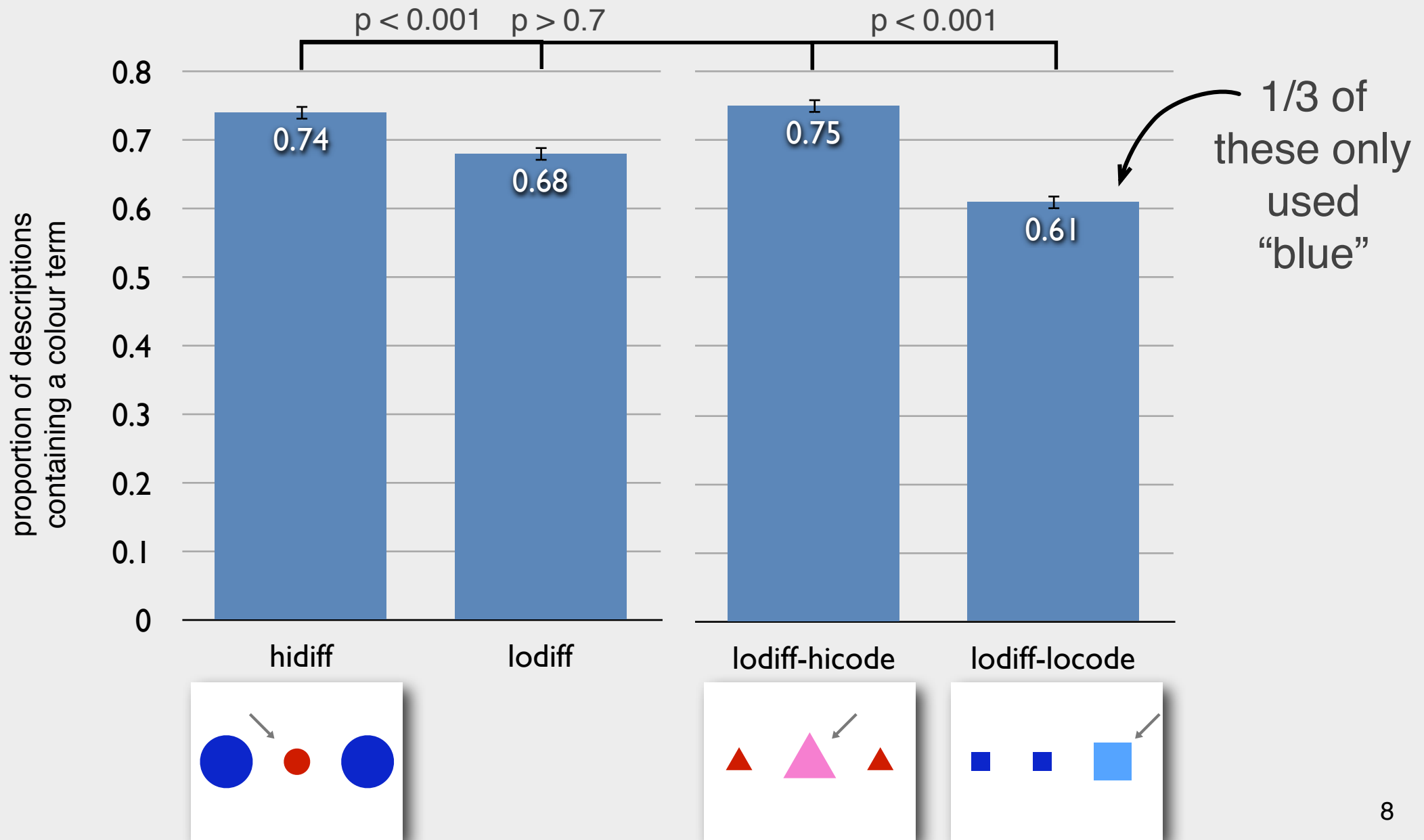


- Task: Describe the target object in such a way that an imaginary partner would be able to identify it - without using location.
- Participants: 63 undergrad students, 48 female, 19–26 years, fluent Dutch, for course credit

# Conditions and Stimuli



# Results: Colour Use





# Conclusions

- Colours that are hard to code do lead to less colour use.
  - The use of colour is influenced by the way it is represented linguistically. (Hyp 3)
- Colours that are hard to code lead to the use of non-distinguishing colour terms.
- A smaller difference in colours alone does not lead to less colour use.
  - People include colour reflexively (possibly due to it being easily available perceptually) rather than based on how distinguishing it is. (Hyp 1)

# Consequences for Computational Modelling

## Referring Expression Generation Algorithms

- choose more distinguishing over less distinguishing attributes.
- should consider (if they want to emulate human behaviour)
  - not using an attribute if it has a hard-to-code value.
  - including a more general, but non-distinguishing, value for preferred attributes with hard-to-code values.

# Open Questions

- What if the colours are even more similar in the lodiff-hicode condition?
- What if the size difference is bigger?
- What if there is a better competing attribute than size (type, pattern...)?
- What happens in other languages with less basic colour terms?