

The utility of vagueness in referring expressions

Matt Green & Kees van Deemter

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The utility of vagueness in referring expressions

Matt Green & Kees van Deemter

NLG group University of Aberdeen

July 20th 2011



Outline of talk

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A definition of vagueness

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Vagueness can be defined as the existence of borderline cases (Keefe & Smith)

• e.g., tall



Why study the effects of vagueness?

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2 main reasons



Why study the effects of vagueness?

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2 main reasons

• Game theory makes odd predictions for vagueness



Why study the effects of vagueness?

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2 main reasons

- Game theory makes odd predictions for vagueness
- NLG systems need help in the form of human data



Vagueness in reference

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Our experiments are limited to vagueness in referring expressions

- highly context-dependent
- potential for vagueness is not necessarily realised



The cost reduction hypothesis

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"For the listener, information which is too specific may require more effort to analyze" (Lipman, 2009)



Experiment 1

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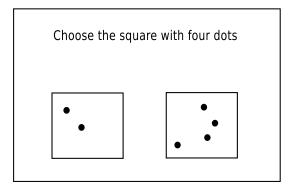
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Experiment one

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Pilot experiment

• H_0 : No difference between vague and precise

• *H*₁: Some difference between vague and precise ... V better than P?

Method: forced choice

DVs: RT. errors

• IVs: Vagueness (Vague, Precise)

• Number combinations: {2,4}, {2,6}, {3,5}, {5,9}, {6,8}, {7,3}, {7,9}, {8,4}



Results, experiment one

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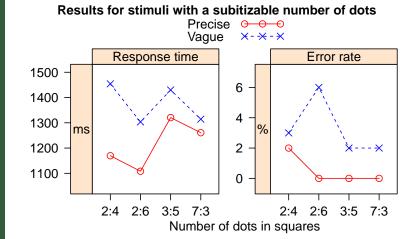
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Experiment 2

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- Avoid subitizable numbers
- *H*₀: No difference between vague and precise
- H_1 : Vagueness helps when the numbers are bigger, and when the difference between the numbers is greater
- Number combinations: $\{5,25\}$ $\{10,25\}$ $\{15,25\}$ $\{20,25\}$ $\{30,25\}$ $\{35,25\}$ $\{40,25\}$



Instruction first

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Choose the square with many dots



Stimulus next

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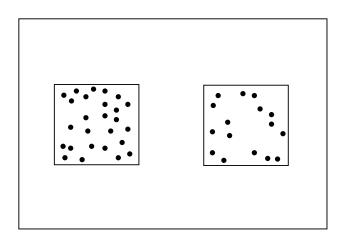
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Results, experiment two

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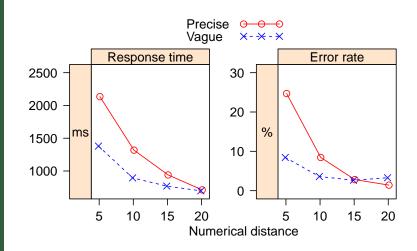
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Summary of expt 1 & expt 2

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Vagueness is worse for very small numbers (expt 1)



Summary of expt 1 & expt 2

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- Vagueness is worse for very small numbers (expt 1)
- Vagueness is better for larger numbers (expt 2)



Summary of expt 1 & expt 2

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- Vagueness is worse for very small numbers (expt 1)
- Vagueness is better for larger numbers (expt 2)
- Diminishing returns for vagueness as gap size grows very large (expt 2)



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Potential for vagueness not realised? (expts 1 & 2)



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- Potential for vagueness not realised? (expts 1 & 2)
 - Definite articles uniquely identify



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- Potential for vagueness not realised? (expts 1 & 2)
 - Definite articles uniquely identify
 - Only two squares means no borderline case



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- Potential for vagueness not realised? (expts 1 & 2)
 - Definite articles uniquely identify
 - Only two squares means no borderline case
 - Solution: use indefinite articles; use > 2 squares



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- Potential for vagueness not realised? (expts 1 & 2)
 - Definite articles uniquely identify
 - Only two squares means no borderline case
 - Solution: use indefinite articles; use > 2 squares
- Vagueness confounded with absence of a number in the instructions?



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 - Definite articles uniquely identify
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 - V: {few, many}; P: {5, twenty}



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- Potential for vagueness not realised? (expts 1 & 2)
 - Definite articles uniquely identify
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 - ullet Solution: factorially manipulate instruction format 2 x 2



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	Vague	Precise
Number	{about 20, about 30}	{16, 34}
Word	{few, many}	{fewest, most}



Stimulus, experiment three

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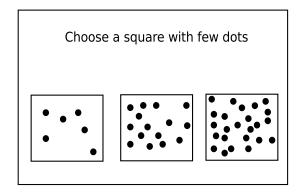
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Operationalising borderline cases

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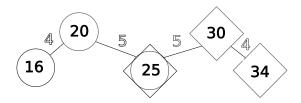
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Number combinations: $\{6, 15, 24\}$, $\{16, 25, 34\}$, $\{26, 35, 44\}$, $\{36, 45, 54\}$

- Number precise: Choose the square with 16 dots
- Number vague: Choose a square with about 20 dots
- Word precise: Choose the square with fewest dots
- Word vague: Choose a square with few dots



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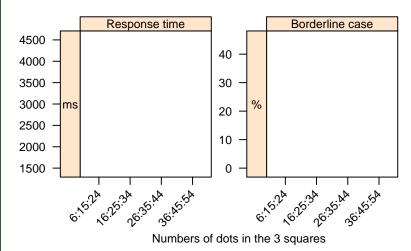
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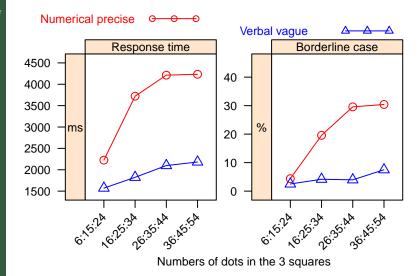
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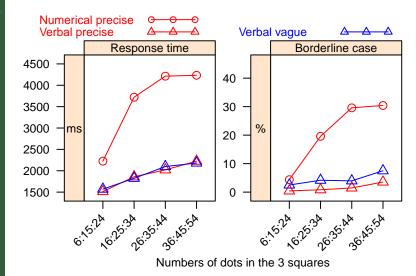
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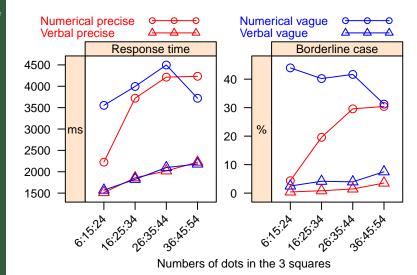
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 We did find response time and accuracy benefits for using vague terms rather than crisp terms in some situations...



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- We did find response time and accuracy benefits for using vague terms rather than crisp terms in some situations...
- ... but it is verbal format, not vagueness, that is largely responsible for the benefits



Further work

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Distinguish differences of gap size from differences of discriminability

 Manipulate ratio between numbers rather than distance between numbers



Further work

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Further work

Distinguish differences of gap size from differences of discriminability

 Manipulate ratio between numbers rather than distance between numbers

Benefts of vagueness in other paradigms

• Indirect effects of vagueness on a primary task. H₁: vague terms interfere less than overly-precise terms do, with processing in a primary task



Take home message

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Vagueness does make things easier in some situations, but really it is non-numerical format that does the heavy lifting.





Thank you for listening





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Lipman, B. L. (2009). Why is Language Vague? (retrieved 12 April 2011 from http://people.bu.edu/blipman/Papers/vague5.pdf)