

The influence of metaphor on reasoning

Katja Markert (Figures from Thibodeau and Boroditsky
2011,2013)

Heidelberg 2016

- 1 Thibodeau, Paul H., and Lera Boroditsky. *Metaphors we think with: The role of metaphor in reasoning*. PloS one 6.2 (2011).
- 2 Thibodeau, Paul H., and Lera Boroditsky. *Natural language metaphors covertly influence reasoning*. PloS one 8.1 (2013).
- 3 Steen, Gerard J., W. Gudrun Reijniere, and Christian Burgers. *When do natural language metaphors influence reasoning? A follow-up study to Thibodeau and Boroditsky (2013)*. PloS one 9.12 (2014).
- 4 Thibodeau, Paul H., and Lera Boroditsky. *Measuring effects of metaphor in a dynamic opinion landscape*. PloS one 10.7 (2015).

- Motivation: crime metaphors
- Explicit reasoning based on metaphors (Exp 1, 2013)
- Implicit influence via extensive metaphors (Exp 1, 2011)
- Implicit influence via one-word metaphors (Exp 2 and 4 2011, Exp 2-4 2013)
- Comparison to priming (Exp. 3 2011)
- Ordering effects (Exp. 5, 2011)
- Criticism, Follow-Up

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- 2 Main Setup
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Conceptualisations of Crime

CRIME IS A VIRUS

- Criminal is a patient?
- Criminal is a therapeutic client?
- Crime is contagious?
- Crime treated like a disease?
- Crime can be cured?
- One can inoculate vs. crime?
- Prevention via hygienic conditions?

CRIME IS A BEAST

- Criminals are wild animals?
- Criminals should be hunted?
- Criminals should be killed?
- Criminals should be caged?

Which metaphor you use will influence your political response to crime

CRIME IS A VIRUS

Social reform

Economic improvements

Therapy for offenders

CRIME IS A BEAST

Increase Punishment

Increase Law enforcement

- 1 Can people explicitly derive the wished-for entailments from a given metaphor?
- 2 Are people (covertly) influenced by extended metaphors?
- 3 Are people (covertly) influenced by short metaphors?
- 4 Is the influence of metaphor just an instance of priming?
- 5 Is the influence dependent on where the metaphor occurs?
- 6 Is the influence of metaphor dependent on personal factors (age, political orientation etc)?

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Caution: Metaphor analogies are not always fully determined

In principle, CRIME IS A VIRUS could also instantiate:

- ① We have to eradicate the virus → kill the criminal?
- ② Crime is contagious → we have to isolate criminals → lock them up
- ③ ...

The authors don't discuss this a lot...

They do admit that there are different crime-disease metaphors:

CRIME IS A VIRUS vs. CRIME IS CANCER

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Neutral text

Crime is ravaging the city of Addison. Five years ago, Addison was in good shape, with no obvious vulnerabilities. Unfortunately, in the past five years the city's defense systems have weakened, and the city has succumbed to crime. Today, there are more than 55,000 criminal incidents a year – up by more than 10,000 per year. There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.

- Already includes many metaphors
- albeit compatible with both metaphorical frames
- *ravaging, succumb, in shape*

See also Steen et al 2014

- Apart from for Exp 1, 2011, Mechanical Turk
- Used pre-experiment quality controls
- In 2011, also some post-experiment controls
- Report disappears before crime-related questions (in 2013)
- Final screen: Background questions

Variants of the following in Exp 1-3, 2011

- 1 In your opinion, what does Addison need to do to reduce crime?
- 2 What is the role of a police officer in Addison (Exp 2-3, 2011 only)?
- 3 Identify part of report that is influential in your response

Answers are **coded** (by whom?) binary into *reform* vs. *enforcement*. Agreement high.

Variants of identifying preference in Exp 1-4, 2013

- 1 Increase street patrols that look for criminals (enforcement, congruent with beast)
- 2 Increase prison sentences for convicted offenders (enforcement, congruent with beast)
- 3 Reform education practices and create after school programs (reform, congruent with virus)
- 4 Expand economic welfare programs and create jobs (reform, congruent with virus)
- 5 Develop neighborhood watch programs and do more community outreach (Exp 3-4, 2013), (enforcement?)

Norming Study: Mechanical Turk

Norming studies need to be **repeated and kept up-to-date**

See also Thibeaudeau and Boroditsky, 2015

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Crime is ravaging the city of Addison. Five years ago, Addison was in good shape, with no obvious vulnerabilities. . .

City officials with two different metaphors. Choose one of four programs for each official.

- 226 participants
- Overall more enforcement approaches chosen (63%)
- Expected distribution of congruence: 1/3 (0 congruent), 1/3 (1 congruent), 1/3 (2 congruent)
- Real distribution: 10%, 33%, 57%
- distribution test $\chi^2 = (129 - 75.3)^2/75.3 + (74 - 75.3)^2/75.3 + (23 - 75.3)^2/75.3 = 74.61$

People can extract metaphorical entailments when given the chance to compare frames explicitly

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Extended Metaphor

Crime is **(a wild beast preying on)/(virus infecting)** the city of Addison. . . . that crime is **(lurking in)/(plaguing)** every neighbourhood

Free form: what should city do?
Which part of text influential?

- 1 485 - 30 = 455 responses
- 2 65% enforcement strategies

	beast	virus	
enforce	170	126.5	296.5
reform	61	97.5	158.5
	231	224	455

- 3
$$\chi^2 = \frac{455 \cdot (170 \cdot 97.5 - 126.5 \cdot 61)^2}{231 \cdot 224 \cdot 296.5 \cdot 158.5} = 14.68$$

- 4 Only 3% identified metaphoric frame as important (?)

People are influenced by extended metaphors without being aware of it

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People are influenced by extended metaphors without being aware of it

Exp 2, 2011, Exp 2-4 2013: Implicit Influence via Short Metaphors

Crime is a (virus/beast) ravaging the city of Addison. Five years ago, Addison was in good shape, with no obvious vulnerabilities. Unfortunately, in the past five years the city's defense systems have weakened, and the city has succumbed to crime. Today, there are more than 55,000 criminal incidents a year – up by more than 10,000 per year. There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.

- Variants: free form vs. 4 choices vs. 5 choices
- Variants: Copying answers, vs. drag/dropping
- Variants: Identify important part vs. recall question for metaphor

- Many other metaphors present
- 5 choice setup debatable
- 5th choice not clearly reform or enforcement

Short Metaphors: Example Result

Exp 2 in 2011:

- 246 participants

	beast	virus	
enforce	80	72	152
reform	33	61	94
	113	133	246

- $\chi^2 = \frac{246 \cdot (80 \cdot 61 - 72 \cdot 33)^2}{152 \cdot 94 \cdot 113 \cdot 133} = 7.182$

Short Metaphors: Differences in Results

Overall frequency of enforcement responses varies a lot (around 65% in 2011, between 19% and 76% in 2013). Possible reasons:

- Neighbourhood watch inclusion in Exp 3 and 4, 2013.
Explains shift from Exp 2, 2013 to Exp 3, 2013
- Different demographics???? Does not adequately explain shift from Exp3, 2013 to Exp 4, 2013.
- **From free form to choices:** not discussed in paper, explains maybe shift from 2011 to 2013?

- Exp 3 and 4, 2013: no statistical difference between people who remembered or forgot the metaphor

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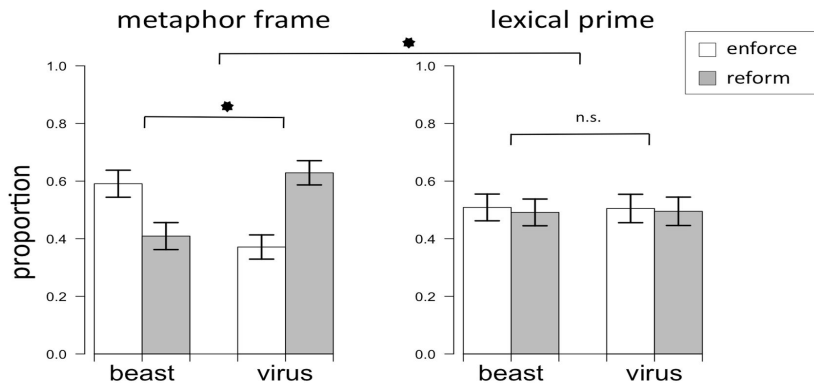
- 1 Provide a synonym for *beast* or *virus*
- 2 Then read neutral text
- 3 Then give free-form crime solution suggestions

Neutral Text

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Comparison to priming: results

236 participants



Metaphor is significantly more influential than lexical prime.

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Beginning: Activate Frame for

Crime is a (beast/virus) ravaging the city of Addison. Five years ago, There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.

End: activate fossilised idea

Five years ago, . . . There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.
Crime is a (beast/virus) ravaging the city of Addison.

Metaphor Ordering: Result

- Metaphor effect only given when metaphor comes in the beginning!
- Consistent with a framing/amalogy viewpoint of metaphor

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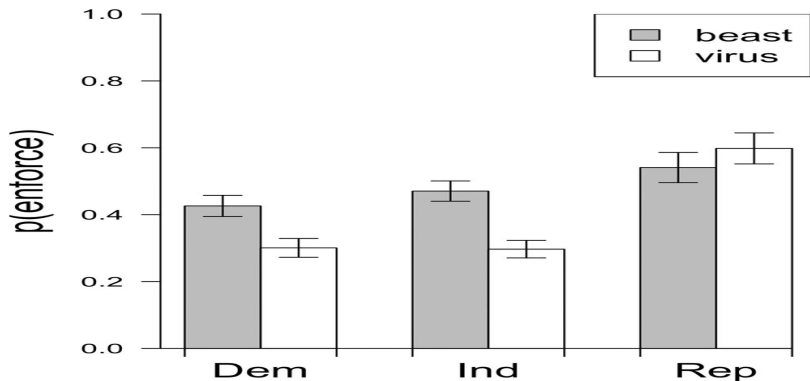
- Demographics: Republicans more likely to choose enforcement responses
- Men more likely to choose enforcement than women (in 2011)
- No effect of age, gender, personality ... (in 2013) (???)
- Differences of opinion induced by metaphor bigger than difference induced by political bias or gender (2011)

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- Here for binary classification of solution ($Y = 1$ means answer was enforcement)
- $\text{Logit}(P(Y = 1)) = \ln\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_1 \cdot \textit{frame} + \beta_2 \cdot \textit{gender} + \beta_3 \cdot \textit{republican} + \dots$
- Model with metaphor frame predictor better than constant only model
- Further including gender and political affiliation does not help
- Interaction variables???

Demographics

- Republicans less likely to be influenced by metaphor frame: committed to a viewpoint in advance (49% congruence vs. 63%, 2011 study)



- Also Logistic regression to predict congruence of answer with metaphorical frame

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- Significant **influence of metaphor** on crime suggestions, going beyond priming and recency
- Metaphor as an interpretative frame
- **Relatively robust effect** across different setups
- People not aware of the metaphor influence

Your own ?

- Some rather large differences of responses overall between 2011 and 2013 not explained (frequency of enforcement answers overall)
- Demographics studies not entirely convincing as results are partially counterintuitive and also (with regard to gender) contradictory across 2011-2013
- No control text
- Many other metaphors in text

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Steen et al. (2014):

- Non-metaphorical control condition: *Crime is a problem*
- Metaphors without other potentially supporting metaphors: *succumbed, in good shape ...*
- Pre or post tests of political affiliation

3 (metaphorical frame: beast metaphor, virus metaphor, no metaphor) \times 2 (metaphorical support: present, absent) = 6 texts.

From Steen et al (2014)

In contrast to the original studies, we consistently found no effects of metaphorical frames on policy preference. Additionally, there was no difference between the two metaphorical frames on the one hand and the non-metaphorical, neutral frame on the other hand, either. All three frames worked in the same way, consistently guiding all participants to a preference for enforcement-oriented policies. Our prediction that there might be an effect of metaphorical support for the metaphorical framing effects reported by Thibodeau and Boroditsky [1] was not supported either.

Thibeaudeau and Boroditsky (2015) criticise Steen et al back:

- Small participant sizes
- Norming study was not repeated. Repetition of norming study in 2015 led to *neighbourhood watch* now being classified as *reform*.
- If this is taken into account and Steen data reanalysed, framing effect is reported.
- If we exclude ambiguous *neighbourhood watch* option: framing effect reported.

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Metaphor annotation Procedure: MIP

- 1 Read entire text
- 2 Determine lexical units
- 3
 - 1 Establish contextual meaning for each lexical unit
 - 2 Determine if it has a more basic contemporary meaning in other contexts. Basic is more concrete, or related to bodily action or more precise, often historically older.
 - 3 Decide whether contextual meaning can be understood in comparison to basic contemporary meaning. If yes, metaphor.

Pragglejazz Group. *MIP: A method for identifying metaphorically used words in discourse*. In: *Metaphor and Symbol*, 22: 1-39, 2007

Martin Luther King: I have a dream speech.

- 1 Mark metaphorical lexical items
- 2 Mark source and target
- 3 What are extended metaphors?

- Read the best-worst scaling paper (Kiritchenko and Mohammad (2016)) linked on website
- Write a brief discussion (max 1 page) as to how you would organise best-worst scaling for the annotation of metaphors in the Martin Luther King text (Experimental Setup design).