COMPUTATIONAL LINGUISTIC CREATIVITY

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OUTLINE

Introduction to Computational Linguistic Creativity

Figurative Language & Metaphors

Methods & Tools
LINGUISTIC CREATIVITY

- Language
  - Words
  - Sentences
  - Prosody
  - Semantics
  - ...

- Creativity
  - Novel, Innovative
  - Aptness, Fitness
  - Value
  - ...

EXAMPLES OF LINGUISTIC CREATIVITY

• Poems
• Stories
• Puns
• Sarcasm
• Jokes
• Metaphors
• Lyrics
• . . .
COMPUTERS AND CREATIVE LANGUAGE

- **Generation**
  - E.g. generating poems

- **Interpretation**
  - E.g. interpreting the meaning of a metaphor

- **Detection, Recognition, Identification**
  - E.g. “This lecture is great!”, irony?

- **Evaluation**
  - E.g. How “creative” is a given story?

- ...
FIGURATIVE LANGUAGE

Going beyond the literal meaning of words

To create:

- New interesting expressions
- Persuasive messages
- Dramatic effects
- ...
EXAMPLES OF FIGURATIVE LANGUAGE

- Metaphors
  - E.g. time is money
- Similes
  - E.g. brave as a lion
- Personification
  - E.g. the sky was full of dancing stars
- ...
METAPHORS

• A metaphor involves two concepts:
  • **Tenor** (target, topic)
  • **Vehicle** (source, subject)

• Can be expressed in various forms
  • E.g. verbal, visual

• Syntax of nominal metaphors: “**T** is **V**”
  • E.g. **Time** is **Money**

• Highlight some properties of the tenor or attribute new ones to it from the vehicle

• A given metaphor can have different meanings
BRITNEY SPEARS is a CAT

Any interpretations?
BRITNEY SPEARS is a CAT

- Interpretations by a machine [7, 1]
  - energetic
  - spry
  - vigorous
  - wild
  - ...

- What about *Hillary Clinton* is a *Cat*?
APPLICATIONS OF VERBAL METAPHORS

- Poems
- Stories
- Advertising
- News
- Lyrics
- ...

METHODS & IDEAS

How can we achieve linguistic creativity using computers?

On the next slides, we present some methods, ideas, and techniques inspired by Tony Veale and literature.
1. Linguistic Readymades
   • Naming colours
2. Cut-up Technique
3. Rhyme-as-reason effect
4. Constructing Sentences
LINGUISTIC READYMADES

Using something ready (e.g. a phrase) in a new context, different from its original, to give it a new meaning.
NAMING COLOURS

[Image of a pink square]
NAMING COLOURS

cerise rose

hot pink
NAMING COLOURS

- Using Creative Information Retrieval (CIR)
- Query “ˆnoun - red” in Google 3-grams
  - blood - red (freq: 57,932)
  - ruby - red (freq: 16,366)
- Manual RGB assignment
- Query “ˆstereo ˆstereo” in Google 1- and 2-grams
  - “lemon tree” (freq: 3,236)
  - “honey mustard” (freq: 3,120)
- For input colour, get its analogous colours
- Find suitable names using a KB, then filter
NAMING COLOURS

• Crowd-sourced evaluation
  • Machine-generated names vs human-assigned names on colourlovers.com
  • Randomized orders
  • 70% preferred machine-generated names

• Some applications
  • Colour catalogs
  • Automatic text colouring
  • ...

• For more details [5, 4]
CUT-UP TECHNIQUE

Cutting up two things (e.g. stories, expressions, words) and combining them to reach a new unexpected result.

- How to choose the two things?
- Where to cut?
- How to evaluate?
RHYME-AS-REASON EFFECT

When it rhymes, the truth shines . . . and we read between the lines

- The Keats heuristic
- Fluency heuristic

Techniques to give sentences a more truthful meaning and make them persuasive

\(^1\) Reade more: http://prosecco-network.eu/blog/pretty-packaging
CONSTRUCTING SENTENCES

- Templates
- Combining text fragments
- Language models (statistical or neural network)
- ...
TOOLS & RESOURCES

- Thesaurus Rex
- The Jigsaw Bard
- Sardonicus
- ...
- Knowledge-bases
THESAURUS REX

- Categories of concepts along with their adjectival properties (e.g. cats are furry:animal)
- Finding concepts of a given category and property (e.g. slippery surface)
- Comparing two concepts (e.g. divorce & war)
- Provides an API (XML)
- For more details [6]
THE JIGSAW BARD

Input an adjectival property

as creative as Go

Jigsaw Bard
Phrases in blue are computer-generated; all other phrases are automatically mined from large corpora.

Co-Occurring Properties of 'creative'
- creative and interesting
- creative and attentive
- creative and expressive
- creative and addictive
- creative and passionate
- creative and imaginative
- creative and accurate

simple Elaborations
- an imaginative child (4228)
- an imaginative artist (4225)
- an imaginative director (4212)
- an imaginative poet (4208)
- an imaginative filmmaker (4206)
- an innovative artist (3328)
- an innovative child (3317)
- an innovative director (3313)
- an innovative filmmaker (3311)
- an innovative poet (3311)
- an innovative painter (3310)
- an innovative art form (3309)
- an artistic director (2755)
- an artistic child (2713)
- an artistic painter (2707)
- an original artist (2074)
- an original poet (2015)

complex Elaborations
- the imaginative work of a poet (18340)
- the imaginative heart of a poet (18337)
- the imaginative vision of a poet (18313)
- the imaginative language of a poet (18312)
- the imaginative power of a poet (18307)
- the imaginative nature of a poet (18306)
- the imaginative temperament of a poet (18306)
- the artistic vision of a poet (13713)
- the expressive hands of an artist (12534)
- the inspired life of an artist (11196)
- the inspired work of an artist (11178)
- the inspired soul of an artist (11140)
- the inspired mind of an artist (11137)
- the inspired imagination of an artist (11117)
- the inspired nature of an artist (11113)
- the inspired art of an artist (11112)
- the inspired flair of an artist (11096)

Ironic Descriptions
- a dull mirror (809)
- a flat mirror (249)
- a simple mirror (233)
- a plain mirror (219)
- a poor mirror (215)
- a solid mirror (214)
- a dim mirror (210)
- an outdated mirror (209)
- a conventional mirror (118)
- an empty mirror (115)
- a cheap mirror (113)
- a practical mirror (112)
- a slow mirror (109)
- an ugly mirror (109)
- a stubborn mirror (108)
- a narrow mirror (107)

http://afflatus.ucd.ie/jigsaw/

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6 Nov 2017
### Exemplar adjectives for *cat*:

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<tr>
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<td>tuneful</td>
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<td>sleek</td>
<td>round</td>
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### >Similes: as *quick* as:

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KNOWLEDGE-BASES

- Hand-crafted
- N-grams
- Linguistic patterns
- Statistical Language Models
- Crowdsourced knowledge
- ...
TIPS FOR GENERATING GOOD RHETORICAL FIGURES

- Use knowledge-bases
- Aptness
- Filter and Evaluate
- Divert from norm, be original and novel
- Don’t generate merely
Galvan et al.: Exploring the Role of Word Associations in the Construction of Rhetorical Figures
EXERCISES

- Implementing a second-order Markov chain model
- Implementing Galvan et al.’s (2016) approach for generating rhetorical figures using Thesaurus Rex (v2)
- Using templates to represent generated rhetorical devices
- Analyzing the approach using Boden’s (1992) three types of creativity, which type and why?
ADDITIONAL RESOURCES AND READINGS

• RobotComix.com
• The Computational Foundations of Linguistic Creativity Course at UH (2014)
• Projects by The Creative Language System Group at UCD, and some technical details about them [2, 3]
QUESTIONS?
REFERENCES I


Grounded for life: creative symbol-grounding for lexical invention.  

Unweaving the lexical rainbow: Grounding linguistic creativity in perceptual semantics.  
pages 63–70. Proceedings of the Sixth International Conference on Computational Creativity, 2015.

Creating similarity: Lateral thinking for vertical similarity judgments.  