

Pulling a pretence rabbit out of the hat

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Overview

- 1 Introduction
- 2 Core and extended uses of idioms
- 3 Figurative uses
- 4 Formal analysis of analogical extension
- 5 Integrating pretence into the formal theory of idioms
- 6 The rabbit examples
- 7 Conclusion

Idioms as form-meaning mismatches

- (1)
 - a. kick the bucket 'die'
 - b. pull strings 'use connections'
 - c. pull a rabbit out of the hat 'unexpectedly present a solution'

- Mismatch 1: Literal and idiomatic reading:

(2) Alex pulled strings.

- Mismatch 2: Figurative reading:

(3) Alex pulled the strings. But they were frayed.
'Alex used connections. But they were useless.'

Aim of the talk

Integrate an account of figurative readings into a formal theory of idioms.

- Identify core uses and present simple, formal theory for core uses.
- Identify non-core/figurative uses
- Present model for figurative uses.
- Discuss an example.

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Idiom theories

- Direct access
 - ▶ “ordinary” ambiguity between literal and idiomatic reading
 - ▶ common assumption in formal linguistics, since Chomsky (1965)

- Mapping:
 - ▶ literal meaning is computed and mapped to the idiomatic meaning.
 - ▶ prominent in early psycholinguistic research (Bobrow & Bell, 1973) and in more philosophical idiom theories (Egan, 2008)

Evidence for direct access

- Not all idioms have a literal meaning:
 - (4) a. trip the light fantastic (syntactically non-wellformed)
'dance'
 - b. leave someone in the lurch (bound word)
'abandon an associate abruptly in a difficult situation'
 - Intuition about diverging syntactic flexibility
(Fraser 1970; Wasow et al. 1983; Nunberg et al. 1994; ...)
 - (5) a. The strings were pulled.
 - b. The strings that Chris pulled got Kim the job.
 - (6) a. #The bucket was kicked.
 - b. #The bucket that Chris kicked was in the news.
- Swinney & Cutler (1979): Idioms are recognized as well-formed phrases faster than free combinations. – Evidence for direct access even if just a familiarity effect (Tabossi et al., 2009)

Direct access

- Various approaches: Lexical (Gazdar et al., 1985; Kay et al., ms.; Bargmann & Sailer, 2018); phrasal (Abeillé, 1995; Findlay, 2017)
- Here: λ -combinatorics with appropriate type shifting operations – as in lexicalised flexible Montague Grammar (Hendriks, 1993; Sailer, 2003), applied to Kay et al. (ms.)

Direct access: decomposable idiom

(7) pull strings

- a. $pull \mapsto \lambda y \lambda x. \mathbf{use-i}(x, y)$
- b. $strings \mapsto \lambda P. \exists y (\mathbf{connections-i}(y) \wedge P(y))$

(8) Alex pulled strings.

- a. $pull \mapsto \lambda x \lambda y. \mathbf{use-i}(x, y)$
Argument raising: $\lambda Y \lambda x. Y(\lambda y. \mathbf{use-i}(x, y))$
- b. $pull\ strings: \lambda x. \exists y (\mathbf{connections-i}(y) \wedge \mathbf{use-i}(x, y))$
- c. $Alex\ pulled\ strings: \exists y (\mathbf{connections-i}(y) \wedge \mathbf{use-i}(alex, y))$

Direct access: non-decomposable idiom

- (9) kick the bucket
- a. *kick*: $\lambda x.\mathbf{die-i}(x)$
 - b. *the*: $\lambda Q_{(et)}(et).Q$ (identity function)
 - c. *bucket*: $\lambda P_{et}.P$ (identity function)
- (10) Alex kicked the bucket.
- a. *the bucket*: $\lambda P.P$
 - b. *kick the bucket*: $\lambda x.\mathbf{die-i}(x)$
 - c. *Alex kicked the bucket*: $\mathbf{die-i}(\mathbf{alex})$

Difference in syntactic flexibility

- Birner & Ward (1994, 1998); Kuno & Takami (2004):
Syntactic processes can impose restrictions on syntactic, semantic, and pragmatic properties of their “input”.
- Application to idioms: Dobrovol'skij (2000), Kay et al. (ms.), Bargmann & Sailer (2018)
- English passive: passive subjects must make an identifiable meaning contribution.

- (11) a. **Strings** were pulled.
 $\exists x \exists y (\text{connection-i}(y) \wedge \text{pull-i}(x, y))$
b. *The bucket was kicked. $\exists x (\text{die-i}(x))$

- German passive: no identifiability requirement.

- (12) Da wird schon mal der Löffel abgegeben.
there is PART PART the spoon on-passed
 $\exists x (\text{die-i}(x))$

Formal theory of idioms

- Formal encoding is compatible with many theories of grammar,
- accounts for “core uses” of idioms,
- including different degrees of syntactic flexibility.
- However: present authors work with different versions (Findlay, 2017; Bargmann & Sailer, 2015)

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Idioms beyond direct access

- Direct access covers core uses of idioms.
- Non-core uses:
 - ▶ (some cases of) lexical substitutions (Gibbs et al., 1989; McGlone et al., 1994)
 - ▶ figurative expansions (Egan, 2008)
 - ▶ conjunction modification (Ernst, 1981)

Lexical variation

- Excluded cases (Gibbs et al., 1989)

(13) Alex kicked the *pail* / *punted* the bucket / *punted* the *pail*.
≠ Alex kicked the bucket.

- Systematic cases (Richards, 2001, 184 & 191)

(14) a. The Count *gives* everyone the creeps.
b. You *get* the creeps (just looking at him).
c. I *have* the creeps.

- Figurative cases (McGlone et al., 1994)

(15) shatter the ice
= break down an uncomfortable and stiff social situation
flamboyantly in one fell swoop

(break the ice)
(break → shatter)

Lexical variation

- The excluded and the systematic cases follow from the encoding of the combinatorial semantic properties of idiom parts.
- McGlone et al. (1994); Glucksberg (2001): The figurative uses take longer to process than the literal or the idiomatic uses.
- McGlone et al. (1994, 170): model for lexical substitution:
 - 1 Recognize the utterance as an intentional variant of the original idiom, not simply a speaker error;
 - 2 Retrieve the meaning of the original idiom;
 - 3 Activate the word meanings of both the variant and the original idiom;
 - 4 Compare the word meanings of the two idiom forms;
 - 5 Identify the relation(s) between those word meanings; and
 - 6 Take this relation (these relations) between the word meanings to infer, by analogy, the relation(s) between the meanings of the variant and the original idiom.

Figurative expansions

Egan (2008):

- (16) The strings we've been pulling to keep you out of prison are fraying badly.
- (17) If you let this cat out of the bag, a lot of people are going to get scratched.
- (18) Livia didn't quite kick the bucket, but she took a good strong swing at it.

Pretence theory of idioms:

- ① Compute the literal content via the usual compositional process.
⇒ This is what is “pretended” .
- ② Stored pretence relation for the idiom: *If someone dies, pretend there is a salient bucket that they kicked.*
- ③ What needs to be the case in the actual situation so that the literal content is interpreted fictionally?

Pretence theory of idioms

(18) Livia didn't quite kick the bucket, but she took a good strong swing at it.

Egan (2008, 395):

We know right away how to extend the pretense in order to figure out what has to have actually happened in order for it to be fictional that Livia took a good strong swing at the bucket, but failed to kick it.

Analogical Mapping

- Gentner (1983); Gentner & Maravilla (2018): formal theory of analogy
- Structure-mapping framework:
objects, attributes and relations are mapped from the base situation onto a target situation
- Different types of mapping for different types of relations:
 - ▶ literal similarity: Most objects and properties are mapped.

(19) X12 star system in the Andromeda galaxy is like our solar system.
 - ▶ analogy: Objects and relations are mapped, but few attributes.

(20) The hydrogen atom is like our solar system.
- Useful model for figurative language (Glucksberg, 2001).
- Here: Adaptation to enhance a direct access theory with a figurativity mechanism!

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Analogical mapping

- Capture figurative extensions.
- Inspired by pretence approach, but only for non-core uses of idioms.
- Model-theoretic situation-semantic rendering of Gentner-style structural mapping.

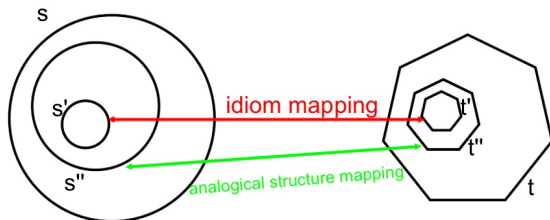
Architecture of figurative interpretation

(21) A (base) situation s figuratively describes a (target) actual situation t iff

there is a sub-situation of s , s' , and a sub-situation of t , t' , such that there is an structural mapping between s' and t' .

- Embedded in a model-theoretic situation semantics (Kratzer, 1989).
- Base case:
 - ▶ $s' \leq s$ and $t' \leq t$
 - ▶ Bijection from s' to t'
- Analogical inference:
 - ▶ $s' \leq s'' \leq s$ and $t' \leq t'' \leq t$
 - ▶ Expanding the basic mapping by identical relations and corresponding objects

Architecture of figurative interpretation



Structural mappings for idioms:

- Base case:

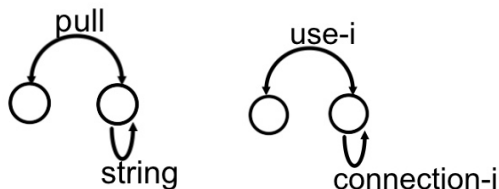
- ▶ $s' \leq s$ and $t' \leq t$
- ▶ Pretence establishes relation between an idiom base s' and an idiom target t' .

- Analogical inference:

- ▶ $s' \leq s'' \leq s$ and $t' \leq t'' \leq t$
- ▶ Expanded idiom base s'' relates to expanded idiom target t'' by adding the same relations and corresponding objects.

Idiom-based mapping

(22) pull strings:



Idiom mapping: Minimal situations compatible with the pretence, i.e. “if someone pulls strings, pretend that they are using connections”

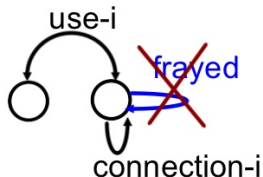
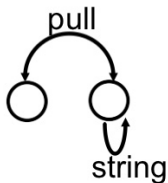
Note: The idiom mapping is not a structural mapping!

Extension

(23) Alex pulled strings. But they were frayed.

Adding the second sentence:

- The relation **frayed** cannot possibly be part of the target situation.

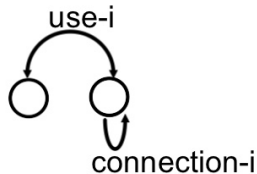
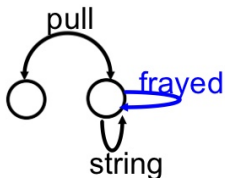


Extension

(23) Alex pulled strings. **But they were frayed.**

Adding the second sentence:

- The relation **frayed** cannot possibly be part of the target situation.
- But it can be part of the base situation.

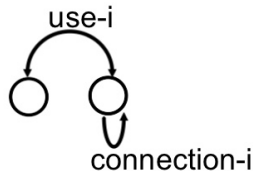
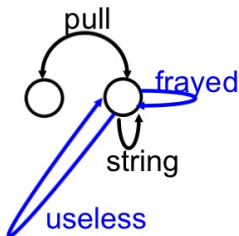


Extension

(23) Alex pulled strings. **But they were frayed.**

Adding inference on the second sentence:

- The relation **frayed** cannot possibly be part of the target situation.
- But it can be part of the base situation.
- World knowledge: whenever strings are frayed, they are useless. So, the **useless** has the same extension in the base situation as **frayed**.

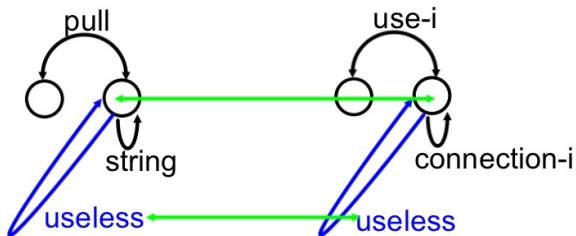


Extension

(23) Alex pulled strings. **But they were frayed.**

Analogical mapping: expand the idiom base and the idiom target in a structurally analogical way, i.e.

- with the same relation(s), applying to corresponding objects,
- where at least one argument of each relation is part of the original idiom



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Encoding: *pull strings*

- Explicit situation variables:
[$s : \phi$]: interpret ϕ with respect to situation s .
- Lexical encoding of the idiom; parts of it enhanced by the idiom mapping as a conventional implicature (Potts, 2005).

(24) pull strings:

$$\begin{aligned}\Pi_{\mathbf{ps}} &= \lambda s \lambda t. \forall x ([s : \exists y (\mathbf{string}(y) \wedge \mathbf{pull}(x, y)) \\ &\quad \leftrightarrow [t : \exists y (\mathbf{connection-i}(y) \wedge \mathbf{use-i}(x, y))]])\end{aligned}$$

- Titone & Connine (1999): *idiom key*: part(s) of the idiom triggering the idiomatic reading.

(25) a. *pull*: $\lambda y \lambda x. \mathbf{use-i}(x, y)$

b. *strings*: $\lambda P. \exists y (\mathbf{connection-i}(y) \wedge P(y))$ CI: $\Pi_{\mathbf{ps}}$

Encoding: *kick the bucket*

- Idiom mapping:

(26) kick the bucket:

$$\begin{aligned}\Pi_{\mathbf{kb}} &= \lambda s \lambda t. \forall x ([s : \mathbf{The} \ y(\mathbf{bucket}(y) \wedge \mathbf{kick}(x, y))] \\ &\quad \leftrightarrow [t : \mathbf{die-i}(x)])\end{aligned}$$



- Lexical entries:

(27) a. *kick*: $\lambda x. \mathbf{die-i}(x)$

b. *the*: $\lambda P. P$ Cl: $\Pi_{\mathbf{kb}}$

c. *bucket*: $\lambda P. P$ Cl: $\Pi_{\mathbf{kb}}$

- Idiom key(s) and items with empty semantics trigger the idiom mapping

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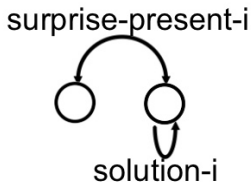
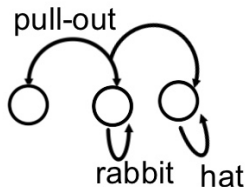
The rabbit examples

- (28) The CEO pulled a rabbit out of the hat.
'The CEO presented a solution out of the blue.'
- But it wasn't elaborate enough.
 - But it left droppings everywhere.
 - #But it had purple ears.

- (28-a): Idiomatic interpretation of *rabbit* as *solution*
- (28-b): Figurative continuation, analogical mapping possible.
- (28-c): No salient analogical mapping

Pull a rabbit out of the hat: (28-b)

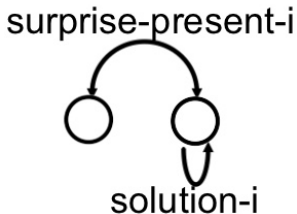
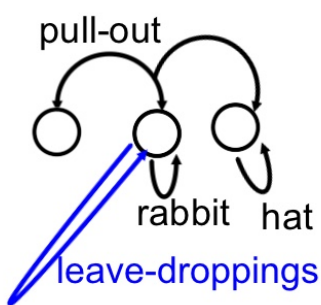
- (29) The CEO pulled a rabbit out of the hat.
 $\exists x(\mathbf{solution-i}(x) \wedge \mathbf{surprise-present-i}(\mathbf{CEO}, x))$



Pull a rabbit out of the hat: (28-b)

(30) The CEO pulled a rabbit out of the hat. **But it left droppings everywhere.**

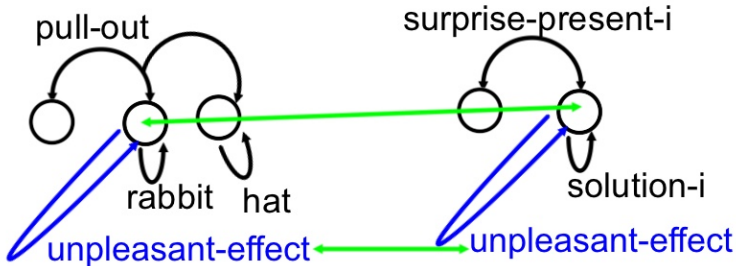
- **leave-droppings** is not compatible with the target situation.
- It can be integrated into the base situation, though.



Pull a rabbit out of the hat: (28-b)

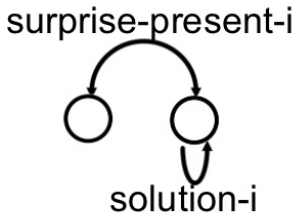
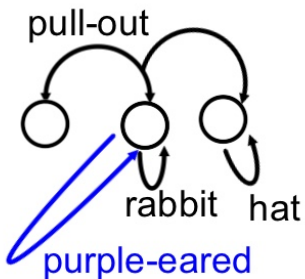
(30) The CEO pulled a rabbit out of the hat. *But it left droppings everywhere.*

- In the base: leaving dropping is extensionally equivalent to having unpleasant side effects.
- This relation can be integrated into the idiom target and applied to an object from the original idiom target situation.



Pull a rabbit out of the hat: (28-c)

(31) The CEO pulled a rabbit out of the hat. # But it had purple ears.



- Continuation incompatible with the idiomatic reading.
- However: it is difficult to find a relation that is extensionally equivalent to **purple-eared** and applicable to an object in the target situation.

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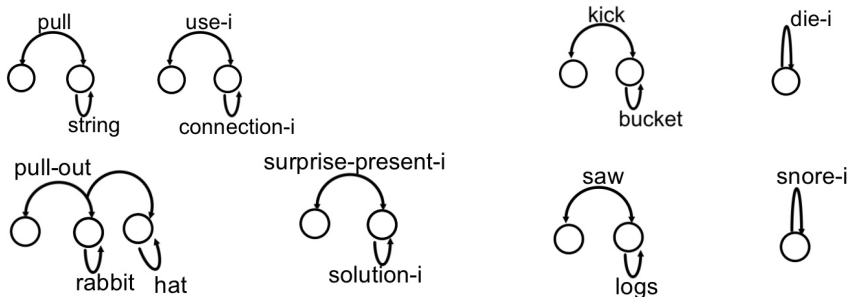
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Summary

- Mismatch1: literal and idiomatic reading:
 - ▶ Direct access: core uses of idioms
 - ▶ Here: idiom-specific meanings for idiom components
 - ▶ Accounts for syntactic flexibility and some lexical substitution data.
- Mismatch 2: figurative reading:
Literal interpretation in non-actual situation analogically related to actual situation
 - ▶ Based on a pretence statement (CI)
 - ▶ Integrating ideas from pretence theory and analogical reasoning theory

Summary

- Model-theoretic, situation-semantic rendering of basic concepts of theories of analogical reasoning.
- Idiom mapping: lexically encoded link between the two readings; used to restrict co-occurrence of idiom parts.
- Decomposability, transparency, . . . captured directly in the idiom mapping!



Future work

- Connection to cognitive theories of idioms (Dobrovol'skij & Piirainen, 2005)
- Application to wide range of idiom types
- Application to other cases of figurative uses of idioms
 - ▶ Figurative lexical substitution (*break/shatter the ice*)
 - ▶ Conjunction modification (Ernst, 1981)

(32) He bit his thirst-swollen tongue.
'He bit his tongue.' AND 'His tongue was thirst-swollen.'

Thank you for your attention!

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