



MetaNet: Repository, Identification System, and Applications

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Schedule Overview

14:00 High-level Overview

14:05 I: Background to FrameNet and the Construction

14:45 II: Overview of MetaNet

a. Conceptual Metaphor Theory

b. The MetaNet Repository



15:30-16:00 COFFEE BREAK

c. The Metaphor Identification System

16:00 III: Applications

16:45 IV: Challenges and Opportunities

17:30 END of TUTORIAL



High-level Introduction

- What are **metaphors**?
- Why is **metaphor** important?
- Approaches to **metaphor analysis**

What are Metaphors?

- Metaphors provide a way to reason about one domain of experience (the **target** domain) in terms of some other domain (the **source** domain).
- Prototypically, the **source** domain draws on our rich and complex knowledge of the world

Metaphor Examples

Social problems (the **target** domain) are often discussed in terms of **disease** (the **source** domain):

- *Poverty* is the world's deadliest *disease*.
- This city is experiencing an *epidemic* of *gun violence*.

Why are Metaphors Important?

- Metaphoric phrases are expressions of more general systems of conceptual metaphors.
- For example:
 - *Poverty and gun violence are plagues/epidemics/infections*
 - *We need to cure/alleviate/treat/eradicate these problems.*
 - **Social problems** are **diseases** that need to be cured
- Comprehensive metaphor analysis needs to do more than just identify whether specific words are being used metaphorically (or not)

Challenges of Analyzing **Metaphor**

- While humans are not necessarily conscious of using and understanding **metaphors**, they are pervasive in language.
- Comprehensive **metaphor analysis** must do more than just identify whether specific words are used metaphorically (or not).
- Current **metaphor research** methodologies cannot perform both large-scale and in-depth metaphor analysis adequately.

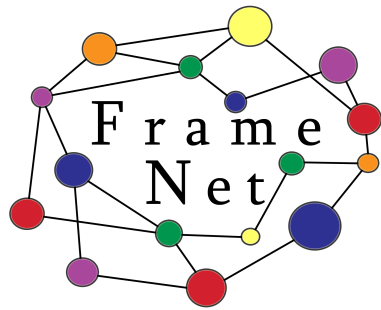
Challenges of Analyzing **Metaphor**

- Manual methods that rely on human experts (e.g. Pragglejaz Group 2007):
 - Find **metaphors** in text accurately, and support in-depth detailed analyses
 - Time and resource intensive, and difficult to scale
- Computational approaches (e.g. Neuman et al. 2013, Shutova et al. 2010, Shutova et al. 2012):
 - Well equipped to perform large-scale data processing
 - Typically produce shallow results and fail to capture much relevant information needed for in-depth **metaphor analysis**

Challenges of Analyzing **Metaphor**

- Corpus linguistic approach (Stefanovich & Gries 2006; Lederer 2015, 2016, forthcoming)
 - Intermediate in scale of processing
 - Time-consuming to expand to new domains
- **MetaNet** (Dodge et al. 2015)
 - Computational **metaphor identification** system supports analysis of large-scale text corpora
 - Knowledge base of **metaphors** facilitates in-depth **metaphor analysis**
 - Readily extendable to new domains

Thanks!



Background to FrameNet and the FrameNet Construction

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Road Map

- Frame Semantics and FrameNet
- Construction Grammar and the FrameNet Construction
- FrameNet's Treatment of Metaphor

Road Map

- ✓ Frame Semantics and FrameNet
- Construction Grammar and the FrameNet Construction
- FrameNet's Treatment of Metaphor

What is FrameNet?

- A unique knowledge base with information on the **mapping of meaning to form** through the theory of **Frame Semantics** (Fillmore 1975, 1985, Fillmore and Atkins 1986, Fillmore and Baker 2010, Fillmore 2012, Fontenelle 2003, Petruck 1996)
- A resource that provides **rich semantics** for the core English vocabulary based on manually annotated corpus evidence, including **valence descriptions** for each item analyzed

Frame Semantics

...defines words in terms of experience-based schematizations of the speaker's world – i.e. **semantic frames**, or script-like structures of inferences that characterize a type of situation, object, or event in terms of its semantic roles, i.e. **frame elements**, or participants and other conceptual roles thus providing the background and motivation for the existence and meaning of words in a language.

What's “in” FrameNet?

- ~ 1,200 semantic frames (including FEs)
- ~ 13,500 lexical units
- > 202,000 manually annotated examples
- > 1,800 frame-to-frame relations constituting a hierarchy of semantic frames

What's a Frame?

A Semantic Frame is a script-like **structure of inferences**, linked by linguistic convention to the meanings of linguistic units - here, lexical items - constituting a **schematic representation** of a situation, object, event, or relation providing the background structure against which words are **understood**. Each frame identifies a set of **frame elements** – participants in the frame.

Semantic Frames in FrameNet

- Situation: Being_attached, Being_necessary, Being_strong, Being_wet, etc.
- Event: **Attack**, Borrowing, Catching_fire, Cooking_creation, Hiring, Replacing, etc.
- Object: Buildings, Containers, Intoxicants, Offenses, People_by_origin, etc .
- Relations: Locative_relation, Spacial_co-location, Interior_profile_relation, Similarity, etc.

What's “in” a Frame?

- **Frame Definition**
a prose description of a **situation** involving various participants and other conceptual roles, each of which constitutes a frame element
- **Frame Elements (FEs):**
semantic roles as the basic unit of a frame, defined specifically to each frame
- **Lexical Units (LUs):**
pairing of a lemma and a frame, i.e. “word” in one of its senses; LU **evokes** a frame

Example: Attack.attack.v

- `Attack`: a situation in which an **ASSAILANT** physically attacks a **VICTIM** (usually sentient), causing or intending to cause the **VICTIM** physical damage; a **WEAPON** that the **ASSAILANT** uses may also be mentioned
- LUs: *ambush.n, assailant.n, assail.v, assault.n, assault.v, attacker.n, attack.v, bomb.v, charge.n, bombardment.n, bombing.n, charge.v, offensive.a, set (upon).v, small arms fire.n*

Example: Attack.attack.v

Cannonical Example:

[The bear _{ASSAILANT}] **ATTACKED** [the man _{VICTIM}].

Corpus Examples:

Why they **ATTACKED** in such numbers] and with such determination is beyond my ken.
The US invasion of Afghanistan prevented Al-Qaida from **ATTACKING** Ryad in 2002.
Two Cookstown men who **ATTACKED** a pair of undercover police have been jailed by Belfast Crown Court.

Valence Pattern Table: attack.v_Attack

Number Annotated	Patterns				
3 TOTAL	Assailant	Assailant	Place	Victim	
(2)	NP Ext	NP Ext	2nd --	NP Obj	
(1)	NP Ext	NP Ext	PP[at] Dep	NP Obj	
1 TOTAL	Assailant	Assailant	Victim		
(1)	NP Ext	NP Ext	NP Obj		
1 TOTAL	Assailant	Depictive	Manner	Victim	
(1)	NP Ext	PP[in] Dep	PP[with] Dep	DNI --	
1 TOTAL	Assailant	Depictive	Victim		
(1)	PP[by] Dep	PP[in] Dep	NP Ext		
3 TOTAL	Assailant	Direction	Victim		
(1)	DNI --	PP[from] Dep	DNI --		
(1)	DNI --	PP[from] Dep	NP Obj		
(1)	NP Ext	PP[from] Dep	NP Obj		
2 TOTAL	Assailant	Event_description	Victim		
(1)	NP Ext	AVP Dep	NP Obj		
(1)	PP[by] Dep	AVP Dep	NP Ext		
1 TOTAL	Assailant	Means	Victim		
(1)	NP Ext	PPing[by] Dep	NP Obj		

live links

Annotation Report

- NPman,woman,to-T(1)
 1. A TRANMERE man who ATTACKED two sisters at a party told police he remembered little or nothing about it because of the quantity of drink he had consumed .
- T-PPfor,by,in-(1)
 1. Their sordid dormitory was ATTACKED by hooligans .
Their sordid dormitory
 2. On Feb. 26 the UK forces suffered their worst losses when nine soldiers were killed after being mistakenly ATTACKED by a US aircraft .
 3. The man was speaking two days after his 14-year-old daughter was ATTACKED in a garden 100 yards from her home in Lanchester , Co Durham .CNI
 4. Two American destroyers , the Maddox and the C. Turner Joy , were ATTACKED by North Vietnamese boats in the Gulf of Tonkin .
 5. The troops fired blanks into the air , but were ATTACKED by the Uzbeks with stones and petrol bombs , and only succeeded in clearing the area by firing live rounds over the heads of the crowd .
 6. ` But why they ATTACKED in such numbers and with such determination is beyond my ken .DNI
- T-NPpolice,man,woman-(1)
 1. ` He and a Ukrainian Nazi ATTACKED and killed a woman during the Russian campaign .
 2. Jack and Rose Hayward were ATTACKED by two men who fired at them at close range .
- matched-(1)
 1. Mr Peter Haliday , the district police commander for the area surrounding the Whitehead Detention Centre , Hong Kong 's largest camp for boat people , said the victims were ATTACKED in their sleep by 10 men .
 2. When Gerard Salvin wanted redress against the men who had ATTACKED his house at Croxdale , just a few miles south of Durham itself , it was Gloucester to whom he appealed .
his house at Croxdale , just a few miles south of Durham itself
 3. Mr Foxon himself was ATTACKED with a crowbar at the same site just last week and the firm has had to double its guard at the retail park .CNI
 4. Anderson , married with two children , ATTACKED the woman in a deserted allotment , after agreeing to give her and a boyfriend a lift home from a discotheque .
 5. TWO Cookstown men who ATTACKED a pair of undercover police have been jailed by Belfast Crown Court .
 6. A WOMAN ATTACKED by a suspected serial rapist was saved when her dog bit him .
 7. Rioters ATTACKED one man with pool cues , breaking his fingers and smashing his cheekbone .
 8. He was ATTACKED by Dark Elf assassins on the road to Avelorn and was only just saved by the timely intervention of a party of Chrastian hunters .

Frame-to-Frame Relations in FN

- Inheritance
- Using
- Subframes
- Precedes
- Perspective_on
- See also
- Inchoative_of
- Causative_of



regular lexical relations

FN's frame-to-frame Relations

Relation	Super_frame	Sub_frame
Inheritance	Parent	Child
Subframes	Complex	Component
Precedes	Earlier	Later
Using	Parent	Child
Perspective_on	Neutral	Perspectivized
See_also	Main Entry	Referring Entry
Inchoative_of	Inchoative	State
Causative_of	Causative	Inchoative/State

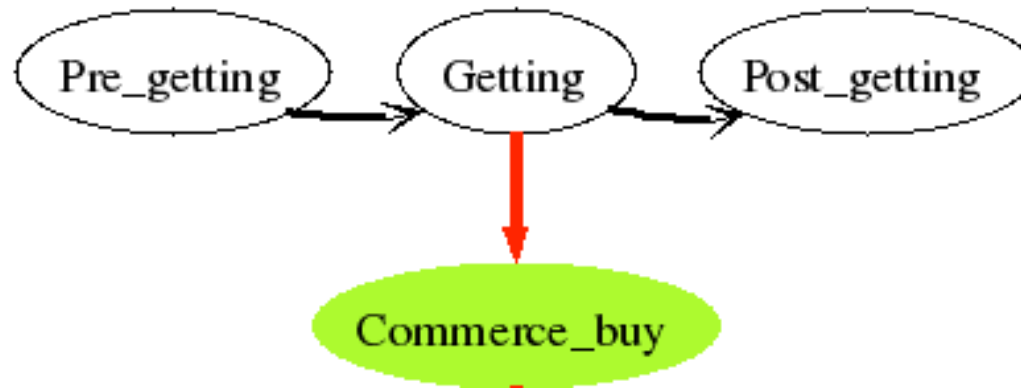
FN's frame-to-frame Relations

- link semantically related frames
- allows paraphrasing and facilitates drawing inferences about events and participants in and across frames
- **Inheritance**

Commerce_buy **inherits** Getting

Inheritance

Commerce_buy **inherits** Getting



→ Inheritance

Paraphrase: **Inheritance**

Commerce_buy **inherits** from Getting.

Example: [Sam_{Buyer}] **BOUGHT** a new telephone

Paraphrase: [Sam_{RECIPIENT}] **GOT** a new telephone.

The paraphrase structure parallels that of original.

The participants of the Commerce_buy event
and that of the Getting event are “the same”.

Road Map

- Frame Semantics and FrameNet
- ✓ Construction Grammar and the FrameNet Construction
- FrameNet's Treatment of Metaphor

Fillmore (2006)

A **lexicon** should specify the grammatical affordances of its entries; a **grammar** should specify the kinds of lexical units capable of occurring in specifiable positions within **grammatical constructions**. The most consistent way to represent such mutual dependencies would be to provide both kinds of information in a single well-articulated **grammar + lexicon** (2006: 35).

Construction Grammar

What must **speakers** of a language know and what can they figure out based on what that **knowledge** to use their **language** successfully?

Grammar

...**intricate networks** of overlapping and complementary patterns, i.e. **constructions** that serve as ‘blueprints’ for encoding and decoding linguistic expressions of all types.

Grammatical Construction

form-meaning pairing integrated in **conventionalized**, and in some respects **non-compositional** ways

- form: any combination of syntactic, morphological, or prosodic patterns
- meaning: understood broadly and includes lexical semantics, pragmatics, and discourse structure

Construction Grammar

Construction: Constructions are the rules that license 'new' linguistic signs based on other linguistic signs (Fillmore 2012 et al.)

Example: Location in Calendar_unit

Construction Elements: LTN + Calendar Unit

Construct: linguistic manifestation of grammatical expression that a construction licenses.

Example: Last Thursday

The FrameNet Construction

Limits of FrameNet: grammatical and semantic idiosyncrasies, grammar beyond valency issues (Fillmore 2008, Fillmore et al. 2012, Ziem 2014)

Construction	Construct
Exclamative CxN	What a beautiful boy.
“Clause-level” CxNs	These events in mind, he wrote a book.
Gap CxN	He made no attempt to flirt with her nor she with him.
Adjective-as-noun CxN	She is a friend to the poor.
Verb- <i>way</i> CxN	He made her way to through the crowd.

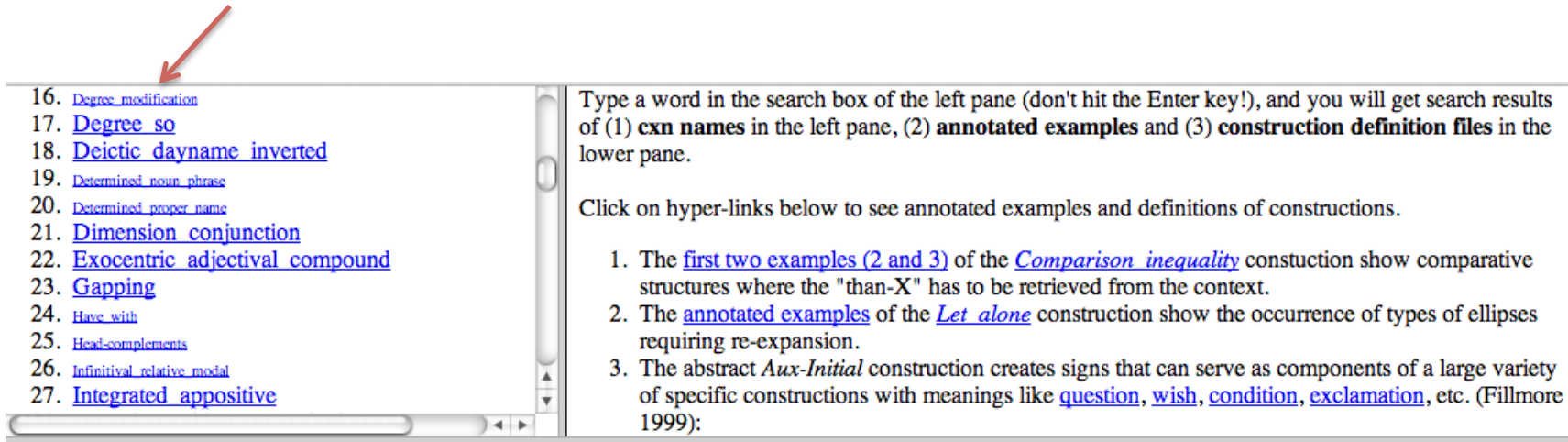
The FrameNet Constructicon

“Beyond the Core” project (2011-2012)

- extending FrameNet to **FrameNet Constructicon**
- collection of approximately 80 analyzed and annotated and grammatical constructions
- Fillmore, Lee-Goldman, Rhomieux (2012):
 - “The kinds of constructions being collected and analyzed in the FrameNet Constructicon are mainly those that cannot be explained simply as instances of familiar constructions with ordinary lexical items.”

Constructicon Viewer

list of constructions



16. [Degree modification](#)
17. [Degree so](#)
18. [Deictic dayname inverted](#)
19. [Determined noun phrase](#)
20. [Determined proper name](#)
21. [Dimension conjunction](#)
22. [Exocentric adjectival compound](#)
23. [Gapping](#)
24. [Have with](#)
25. [Head-complements](#)
26. [Infinitival relative modal](#)
27. [Integrated appositive](#)

Type a word in the search box of the left pane (don't hit the Enter key!), and you will get search results of (1) **cxn names** in the left pane, (2) **annotated examples** and (3) **construction definition files** in the lower pane.

Click on hyper-links below to see annotated examples and definitions of constructions.

1. The [first two examples \(2 and 3\)](#) of the [Comparison inequality](#) construction show comparative structures where the "than-X" has to be retrieved from the context.
2. The [annotated examples](#) of the [Let alone](#) construction show the occurrence of types of ellipses requiring re-expansion.
3. The abstract *Aux-Initial* construction creates signs that can serve as components of a large variety of specific constructions with meanings like [question](#), [wish](#), [condition](#), [exclamation](#), etc. (Fillmore 1999):

Notations used in annotated sentences

1. { ... }: Construct
2. <CEE ... >: Construction evoking element
3. [CE ...]: Construction element
4. Italicized item (ex. *Theme*): Element in the secondary layer.
5. Supp: Support verb or preposition
6. Cop: Copula
7. Gov: Governor; X: Governed

<https://framenet2.icsi.berkeley.edu/frameSQL/cxn/CxNeng/cxn00/21colorTag/index.html>

Location_in_calendar_unit

construction definition

- 27. [Integrated appositive](#)
- 28. [Inversion with preposed element](#)
- 29. [Let alone](#)
- 30. [Location in calendar subunit](#)
- 31. [Location in calendar unit](#)
- 32. [Measurement plus adjective](#)
- 33. [Measurement plus prepositional phrase](#)
- 34. [Modifier-head](#)
- 35. [Noun-noun compound](#)
- 36. [Ones very eyes](#)
- 37. [Open interrogative.non-subject](#)
- 38. [Own right](#)
- 39. [Postpositive adjective](#)
- 40. [Proper name embellishments](#)
- 41. [Rate.cost time](#)
- 42. [Rate.frequency](#)
- 43. [Rate.mileage](#)

Location_in_calendar_unit

NoColor NoTag ColorTag summary

The Location_in_calendar_unit construction picks out a **Calendar_unit** that precedes, follows, or is identified with the the calendar unit which contains a deictically-determined reference time. That time is in general "now," i.e., speech time, but may also be the time of reception of communication, as in correspondence that is read significantly after it is written.

- **Calendar_unit** indicates the type of the Calendar Unit that being referred to. The identity of the **LTN** CE determines whether the **Calendar_unit** in question precedes (*last*), is identified with (*this*), or follows (*next*) the reference time.

ex.: The huge, gently tilting summit plateau is vast and it is easy to believe that locals held horse races here [ltn **last**] [cal **century**].

TRANSLATIONS (1) (2)

- References
 - Fillmore, Charles J. 2002. Mini-grammars of some time-when expressions in English. In Bybee and Noonan (eds.), Complex Sentences in Grammar and Discourse: Essays in Honor of Sandra A. Thompson. Amsterdam/Philadelphia: John Benjamins Publishing Company.
-
- **Calendar_unit**(cal): **Calendar_unit** indicates the type of the calendar unit that is made reference to in locating the described state-of-affairs.
 - **LTN**(ltn): **LTN** indicates the temporal relation between the current (deictically-defined) calendar unit and the calendar unit containing the temporally-located state of affairs.

construction elements

Location_in_CU: Annotation

construction elements

- LTN** **Calendar_unit**
1. A survey by the Committee of Vice-Chancellors and Principals found that a fifth of eligible students applied for help from the government-funded Access Fund {Location_in_calendar_unit[LTN<last>] [Calendar_unit<academic year>]} . Translations (1) (2) ↑
 2. Although Intel was talking {Location_in_calendar_unit[LTN<last>] [Calendar_unit<quarter>]} about getting P6 out of the door by the end of this year (UX No 405) , it is n't about to sweat for it . Translations (1) (2) ↑
 3. Daphne Parish , a British nurse , has been held incommunicado since^{Gov} {Location_in_calendar_unit[LTN<last>] [Calendar_unit<month>]}^x for giving information on casualties caused by an explosion at an Iraqi missile plant in August . Translations (1) (2) ↑
 4. England 's performance confirmed the impressions they made in the second half of their 1-1 draw with Italy at Brighton {Location_in_calendar_unit[LTN<last>] [Calendar_unit<month>]} . Translations (1) (2) ↑
 5. France 's total wine exports declined for the first time in a decade {Location_in_calendar_unit[LTN<last>] [Calendar_unit<year>]} . Translations (1) (2) ↑
 6. Her promotion , following {Location_in_calendar_unit[LTN<last>] [Calendar_unit<week>]}^x 's^{Gov} appointment of Ms Margaret Beckett as shadow Treasury Chief Secretary , underlines Mr Kinnoch 's willingness to put women MPs into subject areas traditionally regarded as male preserves . Translations (1) (2) ↑
 7. Imagine that we could directly observe a particular person 's or group 's expectation formed {Location_in_calendar_unit[LTN<last>] [Calendar_unit<period>]} of the current period 's value of an economic variable . Translations (1) (2) ↑
 8. Mr Ramaphosa -- who {Location_in_calendar_unit[LTN<last>] [Calendar_unit<week>]} accused journalists of lending themselves to ` mischievous purposes `` to discredit Nelson Mandela and the ANC -- was co-investigator in January 1989 for a crucial internal ANC document which accused Mrs Mandela of assaulting Stompie . Translations (1) (2) ↑
 9. The huge , gently tilting summit plateau is vast and it is easy to believe that locals held horse races here {Location_in_calendar_unit[LTN<last>] [Calendar_unit<century>]} . Translations (1) (2) ↑
 10. And some time {Location_in_calendar_unit[LTN<next>] [Calendar_unit<century>]} , metals companies will probably start mining the bottom of the Pacific for potato-sized nodules containing manganese , copper and cobalt . Translations (1) (2) ↑
 11. Christie 's seems to be becoming the shipwreck specialist : {Location_in_calendar_unit[LTN<next>] [Calendar_unit<week>]}^x 's^{Gov} sale is its 13th since 1982 . Translations (1) (2) ↑
 12. Do n't initiate new ideas within a relationship , because they are n't likely to succeed : wait until^{Gov} {Location_in_calendar_unit[LTN<next>] [Calendar_unit<month>]}^x . Translations (1) (2) ↑
 13. I very much look forward to maintaining contact with you all in the future -- and still hope you will meet my ` diving `` husband on his sabbatical here {Location_in_calendar_unit[LTN<next>] [Calendar_unit<academic term>]} ! Translations (1) (2) ↑
 14. Next month : In {Location_in_calendar_unit[LTN<next>] [Calendar_unit<month>]}^x 's^{Gov} Surgery we shall be describing an improved low-battery warning indicator and have a computer program for designing 555 timer circuits . Translations (1) (2) ↑
 15. Storage Technology Corp 's Hinsdale , Illinois -based XL/Datacomp Inc will {Location_in_calendar_unit[LTN<next>] [Calendar_unit<quarter>]} ship its Nearline Library System for IBM Corp AS/400 users . Translations (1) (2) ↑
 16. THE ADVANTAGES of living in Ireland may become more apparent {Location_in_calendar_unit[LTN<next>] [Calendar_unit<week>]} . Translations (1) (2) ↑
 17. They trade with each other and then , {Location_in_calendar_unit[LTN<next>] [Calendar_unit<period>]} , may find themselves on different islands and the whole process is repeated . Translations (1) (2) ↑

Location_in_CU: Summary

27. [Integrated appositive](#)
28. [Inversion with preposed element](#)
29. [Let alone](#)
30. [Location in calendar subunit](#)
31. [Location in calendar unit](#)
32. [Measurement plus adjective](#)
33. [Measurement plus prepositional phrase](#)
34. [Modifier-head](#)
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38. [Own right](#)
39. [Postpositive adjective](#)
40. [Proper name embellishments](#)
41. [Rate.cost time](#)
42. [Rate.frequency](#)

Location_in_calendar_unit NoColor NoTag ColorTag Definition

CEEs: last next this

32	LTN	Calendar_unit		
32	AJP._	N._		
01	LTN	Calendar_unit	LTN	Calendar_unit
01	AJP._	N._	AJP._	N._

Calendar_unit.N._ LTN.AJP._

} construction elements

Location_in_CU: Example

24. [Have with](#)
 25. [Head-complements](#)
 26. [Infinitival relative modal](#)
 27. [Integrated appositive](#)
 28. [Inversion with preposed elem](#)
 29. [Let alone](#)
 30. [Location in calendar subunit](#)
 31. [Location in calendar unit](#)
 32. [Measurement plus adjective](#)

Location_in_calendar_unit NoColor NoTag
 ColorTag Definition
 CEEs: last next this

32	LTN	Calendar_unit		
32	AJP._	N._		
01	LTN	Calendar_unit	LTN	Calendar_unit
01	AJP._	N._	AJP._	N._

1 2 ↑

LTNCalendar_unit**LTN**Calendar_unit

33. Mr Gorbachev first called for a Helsinki 2 summit {Location_in_calendar_unit[LTN<next>]
 [Calendar_unityear]} in Rome {Location_in_calendar_unit[LTN<last>] [Calendar_unitweek]} .

FrameNet Constructicon

- Proof of concept
- Add-on to **FrameNet** lexicon
- Inspiration for new **constructicon** development
 - Japanese
 - Brazilian Portuguese
 - Swedish

Lexicon-Construction Analogues

FrameNet Frames	FrameNet Constructicon
Frame	Construction
Instantiations of valence patterns	Construct
Frame Evoking Element (Lexical Unit, LU)	Construction Evoking Element (CEE)
Frame Element (FE)	Construction Element
lexicographic annotation	constructicographic annotation

FN = Repository of Constructions

- **Frames** as semantic constructions
- **LUs** as lexical constructions
- **Valence** patterns as realization constructions
- **Phrase types** as building-block constructions
- **Grammatical Functions** as meta-realization constructions
- **Control CxN and Supports** (non-local argument realization)

Road Map

- Frame Semantics and FrameNet
- Construction Grammar and the FrameNet Construction
- ✓ FrameNet's Treatment of Metaphor

Metaphor

- CMT defines **metaphor** as a cognitive process, not simply a linguistic or literary phenomenon.
- Frame Semantics considers the **metaphoric use** of a word a separate sense of the lemma.
- FrameNet recognizes the ubiquity of **metaphor in language**, and records instances of its occurrence in certain circumstances.

Metaphor in FrameNet

- FN only distinguishes between **productive** and **lexicalized metaphors**, basing its decision about productivity on criteria about semantically similar LUs behaving similarly, and the **mapping of FEs in a source domain to those in the target domain**.

[Poverty _{ASSAILANT}] **ATTACKS** [children _{VICTIM}].

Literal: Cure.cure.v

The screenshot shows the SubCorpus Editor interface with a text document containing several sentences. The sentence "On a Saturday afternoon, Corporal Tambini tried to cure him of this structural malformation." is highlighted. Below the text, a grid shows the morphological analysis of the words. At the bottom, a panel titled "Cure.cure.v - FE" displays a list of frame elements with radio buttons and dropdown menus. The elements include Affliction <F5>, Body_part , Healer <F1>, Medication <F...>, Patient <F4>, Treatment <F2>, Degree <shift...>, Manner <M>, Place <F3>, Time <F2>, Duration <>, Purpose <U>, and Reciprocation ...

Frame Elements

The screenshot shows the SubCorpus Editor interface with the same text document. The sentence "On a Saturday afternoon, Corporal Tambini tried to cure him of this structural malformation." is highlighted. Below the text, a grid shows the morphological analysis of the words. At the bottom, a panel titled "Cure.cure.v - FE" displays a list of sentence-level tags with checkboxes. The tags include Blend, Idiom, Speech-act, sense1, sense5, and sense9, as well as Canonical, Metalinguistic, delete5, sense2, sense6, sense7, sense8, Content_conditional, Metaphor, keep5, sense3, reexamine, Epistemic, and Special-Sent.

Sentence-level Tags

Metaphorical: Cure.cure.v

The screenshot shows the SubCorpus Editor interface with a text document containing several sentences. The sentence "Do n't you think she 'll cure me of my wickedness , Jane ?" is highlighted. Below the text, a grid shows the morphological analysis of the words. At the bottom, a list of frame elements is displayed, including Affliction <F5>, Body_part , Healer <F1>, Medication <F...>, Patient <F4>, Treatment <F2>, Degree <shift...>, Manner <M>, Place <F3>, Time <F2>, Duration <>, Purpose <U>, and Reciprocation ...

Frame Elements

The screenshot shows the SubCorpus Editor interface with the same text document. The sentence "Do n't you think she 'll cure me of my wickedness , Jane ?" is highlighted. Below the text, a grid shows the morphological analysis of the words. At the bottom, a list of sentence-level tags is displayed, including Blend, Idiom, Speech-act, sense1, sense5, sense9, Canonical, Metalinguistic, delete5, sense2, sense6, Content_conditional, Metaphor (checked), sense3, sense7, Epistemic, Special-Sent, keeps, reexamine, sense4, and sense8.

Sentenc-level Tags

Metaphor

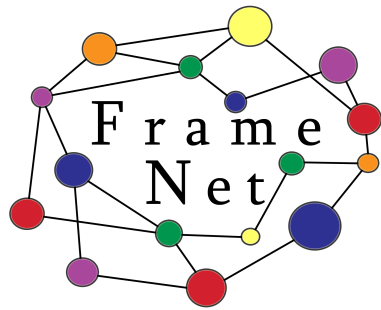
Hot off the Press

Metaphor: a relation between a **Source** frame and a **Target** frame where many or all of the LUs in the **Target** frame are understood, at least partially, in terms of the **Source** frame.

Example: FrameNet defines a metaphor relation between **Cause_motion** and **Suasion**, but not all LUs in these frames have the same strength of connection to the metaphor

Data:

1. The judge was **MOVED** by the lawyer's argument.
2. The judge was **SWAYED** by the lawyer's argument.
3. The judge was **CONVINCED** by the lawyer's argument.



Thanks!

<http://framenet.icsi.berkeley.edu>



MetaNet

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- Luca Gilardi, Jisup Hong

– Conceptual Grounding

- George Lakoff, Srini Narayanan, Eve Sweetser

Road Map

- Overview of MetaNet:
 - Theoretical framework
 - Project background
 - Knowledge base: metaphor and frame networks
 - Metaphor Identification System
 - Database of annotated sentences, Data analytics
- Applications

Road Map

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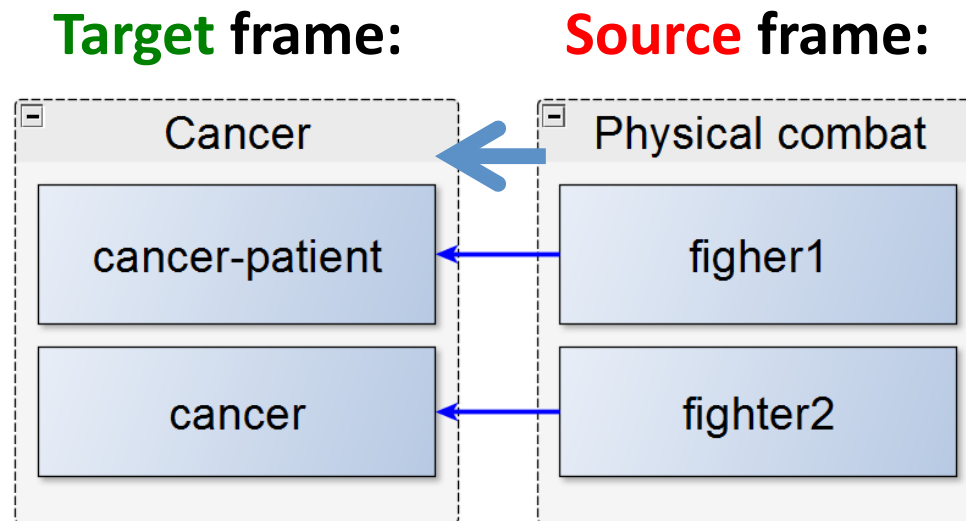
Theoretical Framework

Conceptual Metaphor Theory (Lakoff & Johnson 1980)

- **Metaphors** are a means to understand and reason about one domain (the **Target**) using knowledge of another domain (the **Source**)
- **Metaphors** are not just linguistic, but language points to conceptually active **metaphor(s)**
- Many **metaphors** are more specific versions of more general, **primary metaphors**

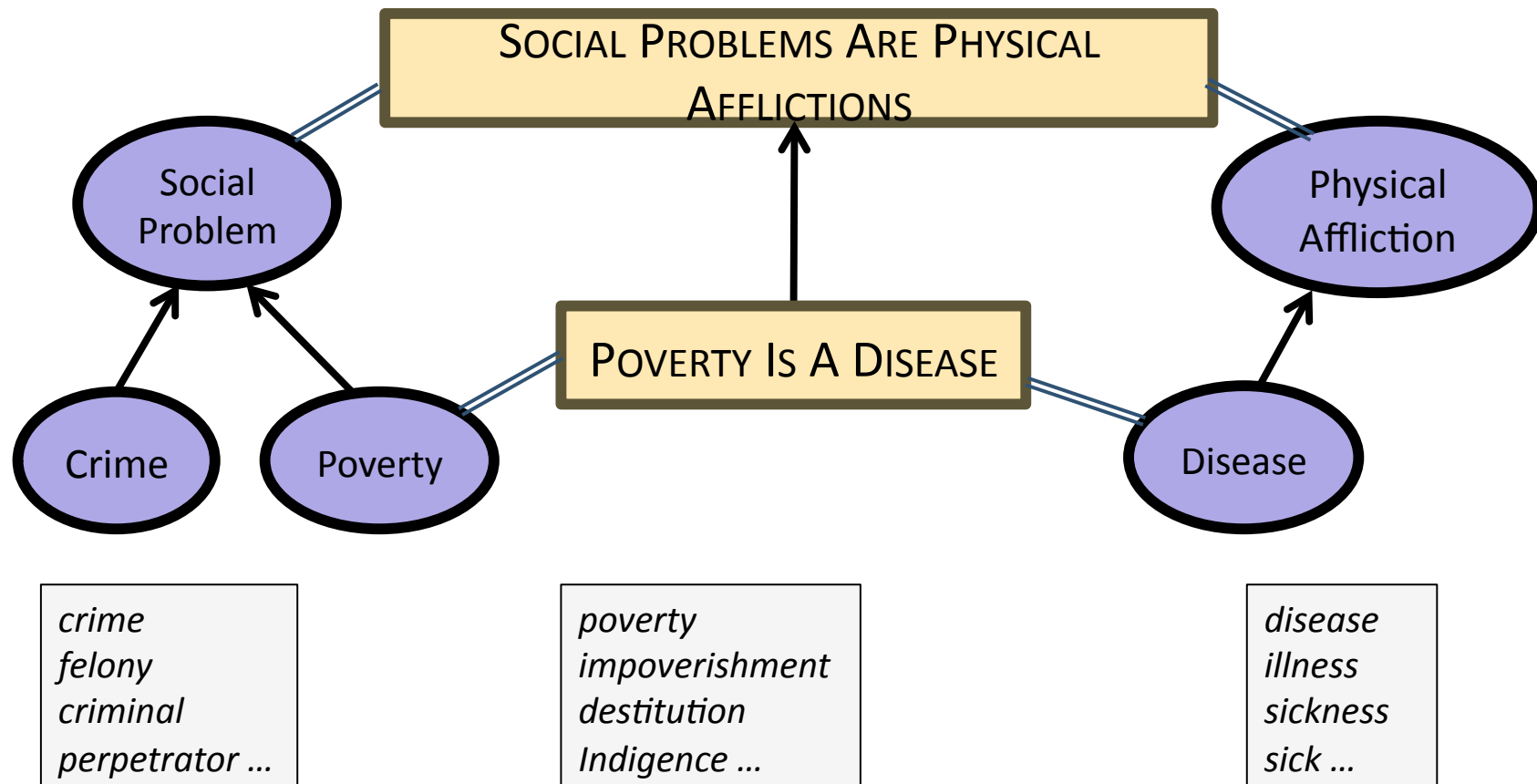
Theoretical Framework

- Frame semantics (Fillmore, 1976; Ruppenhofer et al., 2010):
 - **Source** and **Target** domains can each be represented as frames
 - Metaphors are asymmetric, systematic **source** to **target** mappings



Theoretical Framework

- Interconnected structures:
 - Lexical items and expressions evoke frames
 - Frames populate **source** and **target** domains of metaphors
 - Individual frames and metaphors are parts of larger networks



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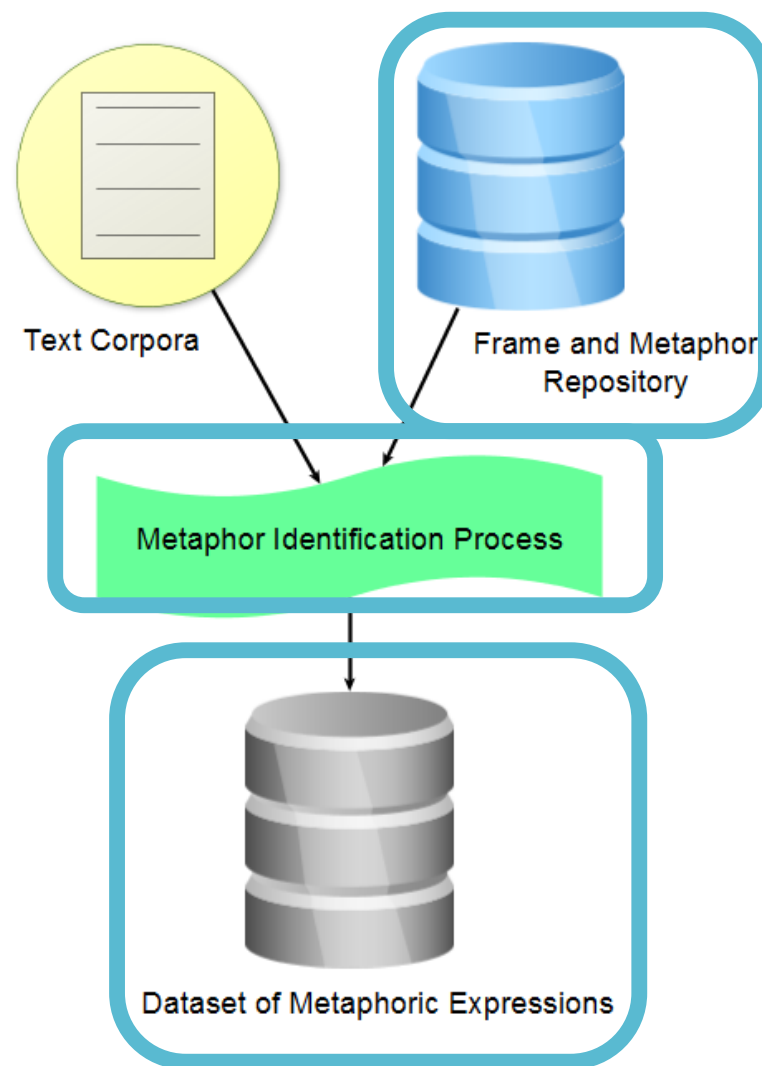
MetaNet Project: Background

- Started in 2012 as part of IARPA's Metaphor Project (<https://www.iarpa.gov/index.php/research-programs/metaphor>)
- Initial Program Objectives:
 - Build a multi-lingual **metaphor repository**
 - Automatically extract **metaphors** from text
 - Compare **conceptual metaphors** that different groups and cultures use to understand their different beliefs and worldviews better than currently understood.
 - Support multilingual analysis

Background: MetaNet System

MetaNet metaphor identification system (Dodge, Hong, & Stickles 2015)

- Knowledge base of frame and metaphor networks
- Processing method for metaphor identification in text corpora
- Database of corpora annotated for frame semantic and metaphoric information



MetaNet System: Background

- Beyond metaphor detection – the MetaNet system facilitates performing many kinds of linguistic analysis of **metaphors** in text
- Iterative developmental process
 - Analysis of extracted data informs linguistic analysis, which improves knowledge base and CMT, and in turn improves quality of output of **metaphor identification** process
- Valuable resources
 - Knowledge base of frames and **metaphors**
 - Large database of annotated examples
 - Computational tools for metaphor identification and data analysis

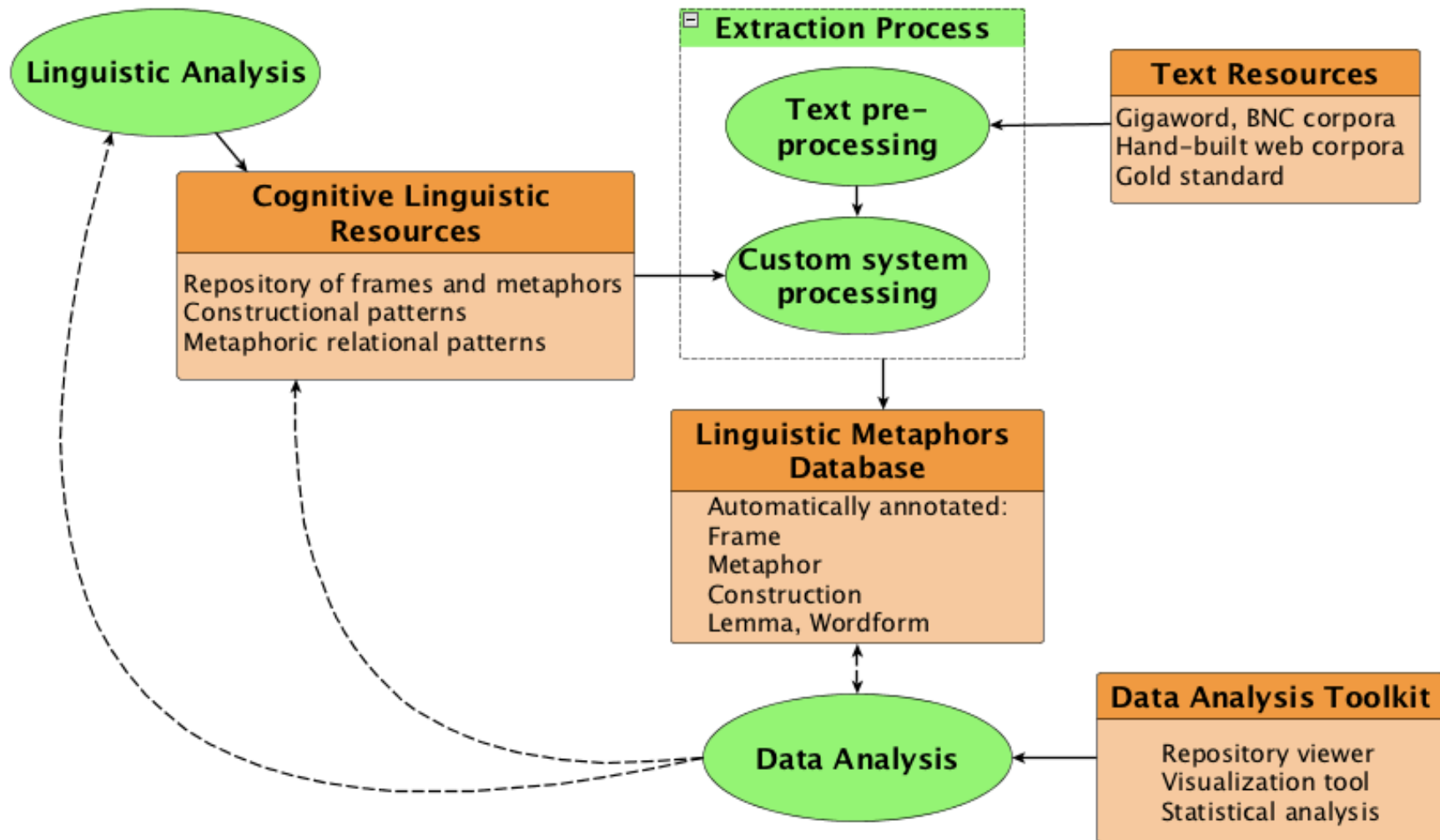
MetaNet: What is its use?

- Determining and analyzing some of the known **metaphors** for talking about a particular social domain:
 - Poverty
 - Democracy
 - Gun rights/Gun control
 - Cancer
- Finding frequencies of particular **metaphors** across prohibitively large corpora
- Finding frequencies of particular **metaphors** across
 - genres of texts (blogs, news wire, forum conversations, Twitter)
 - viewpoints/authors (progressive/conservative, doctor/patient/institutional, etc.)

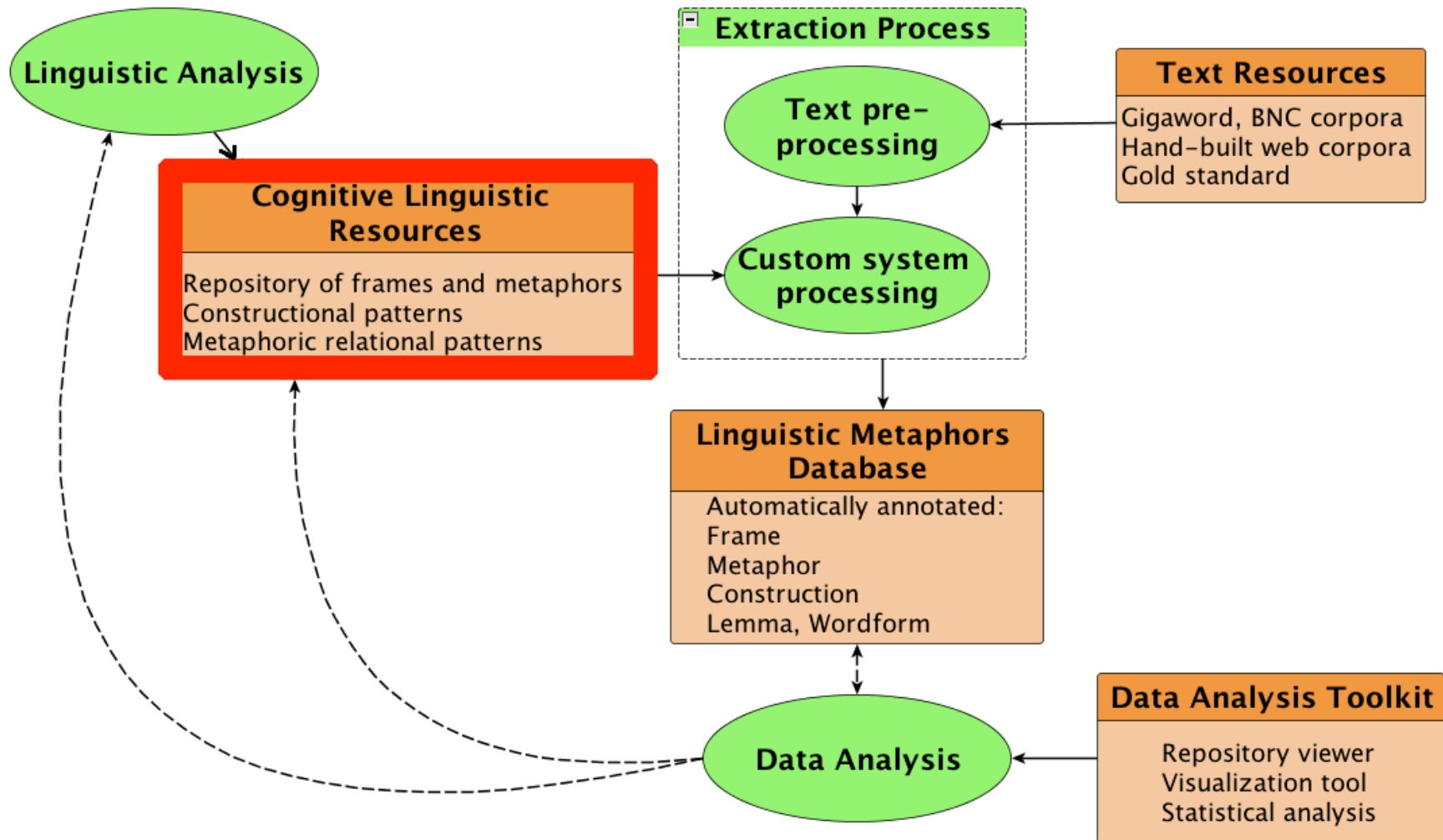
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MetaNet System Diagram



MetaNet System Diagram



MetaNet Knowledge Base (KB)

- Unique resource functions both as a structured inventory of **conceptual metaphors** and as a key component in the automatic **metaphor identification** process (David et al. 2014, Dodge et al. 2013, Hong et al. 2013).

Key features:

- Individual frames and **metaphors** defined in relation to other **frames** and **metaphors**, thus defining larger frame and **metaphor** networks
- **Metaphors** represented as mappings between frames
- Frames include lists of words that evoke those frames
- Metaphors for new domains of interest build on existing frames and **metaphors** in the repository

MetaNet Knowledge Base

- Implemented in Semantic Media Wiki (Krötzsch et al. 2007)
- Provides collaborative tool for knowledge-based construction.
- Multi-lingual Wikis: American English, Mexican Spanish, Russian, and Persian
- English developmental KB currently contains:
 - Over 650 frames
 - 800 **conceptual metaphors**



[Main page](#)

Lists

[Metaphors](#)

[Frames](#)

[Cx Analysis](#)

[Cxn Matching
Patterns](#)

[Metaphoric Relational
Configurations](#)

[IARPA Source
Concepts](#)

[IARPA Target
Concepts](#)

Tools

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In other languages

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[فارسی](#)

[Русский](#)

Category [Discussion](#)

Category:Frame

This is the Frame category. This category uses the form [Frame](#).

Create or edit a Frame:

[Create or edit](#)

Total number of Frame pages: 656

A

- [Ability to act](#)
- [Absorption](#)
- [Access](#)
- [Access to a location](#)
- [Access to an object](#)
- [Access to education](#)
- [Access to knowledge](#)
- [Accompany](#)
- [Across](#)
- [Action](#)
- [Activity](#)
- [Addiction](#)
- [Addressing poverty](#)
- [Addressing social problems](#)
- [Adoption](#)
- [Advocacy](#)

E cont.

- [Evil](#)
- [Evil creature](#)
- [Excess body weight](#)
- [Existence](#)
- [Experience pain](#)
- [Experiencing a negative state](#)
- [Experiencing a state](#)
- [Experiencing an economic status](#)
- [Extinguish](#)

F

- [Factory](#)
- [Fairness](#)
- [Family](#)
- [Fierce animal](#)
- [Finance](#)

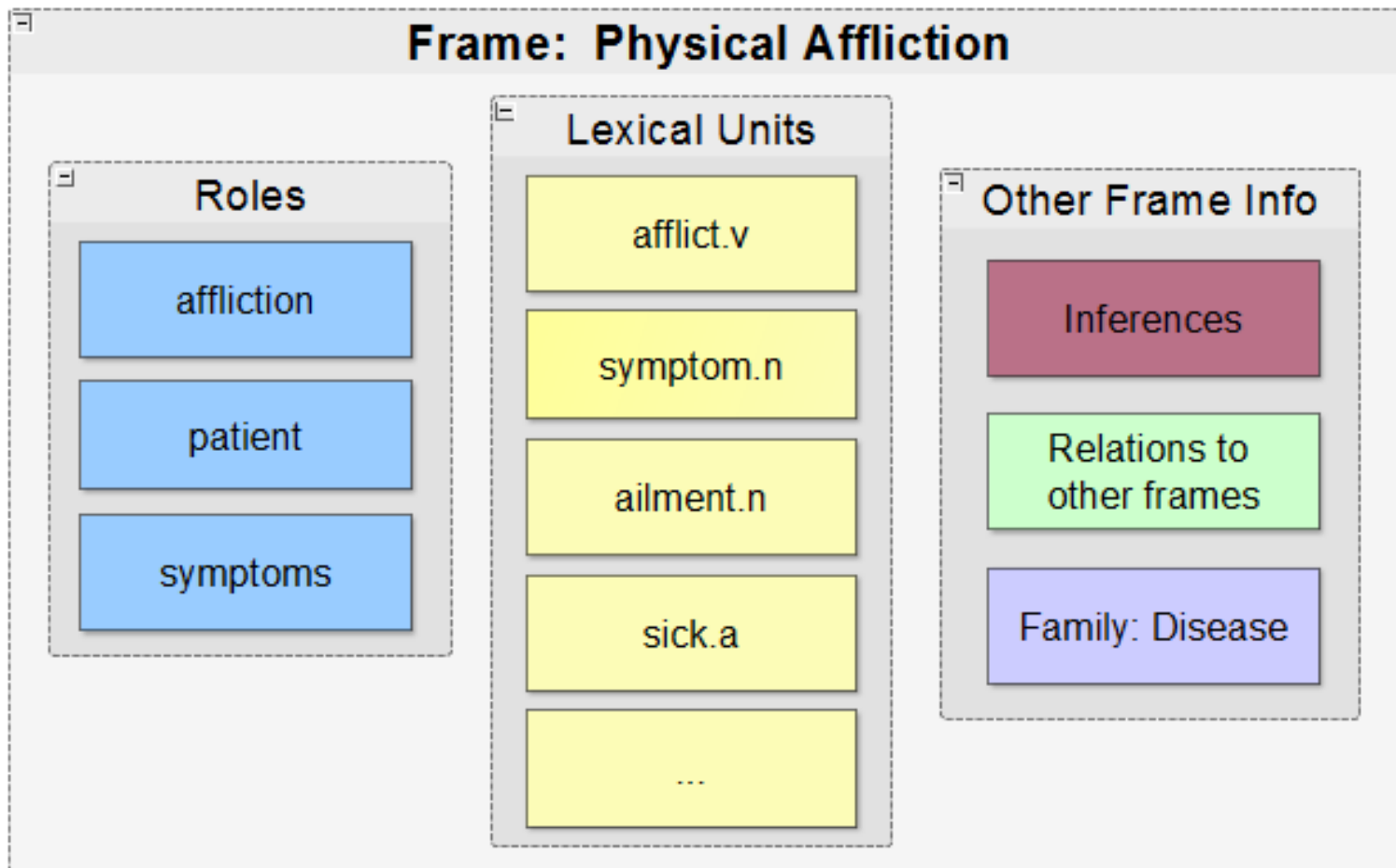
MetaNet Knowledge Base

- Publically-accessible English wiki
 - Release 1.0: contains large portion of development wiki
 - **MetaNet Wiki:** metaphor.icsi.berkeley.edu/pub/en
 - Read-only, with discussion pages
 - Will be updated and expanded in future releases

– Other Data Formats

Wiki contents are expressible in terms of an ontology defined in the industry standard Web Ontology Language (OWL), using Resource Description Framework (RDF) triples, making it easily portable and reusable for different applications.

Frame: Physical Affliction



Frame: Physical Affliction

Roles:

Role Name:	affliction
Role Type:	
Definition/Comments:	
Role Name:	patient
Role Type:	Animate Entity
Definition/Comments:	
Role Name:	symptoms
Role Type:	
Definition/Comments:	
Role Name:	affected_area
Role Type:	
Definition/Comments:	

Relevant Lexical Units:

Lempos affliction.n

Lempos symptom.n

Lempos illness.n

Lempos sick.a

Lempos sickness.n

Lempos disability.n

Lempos hurt.a

Lempos wound.n

Lempos scar.n

Lempos scar.v

Lempos ail.v

Frame: Physical Affliction

Related Frames:

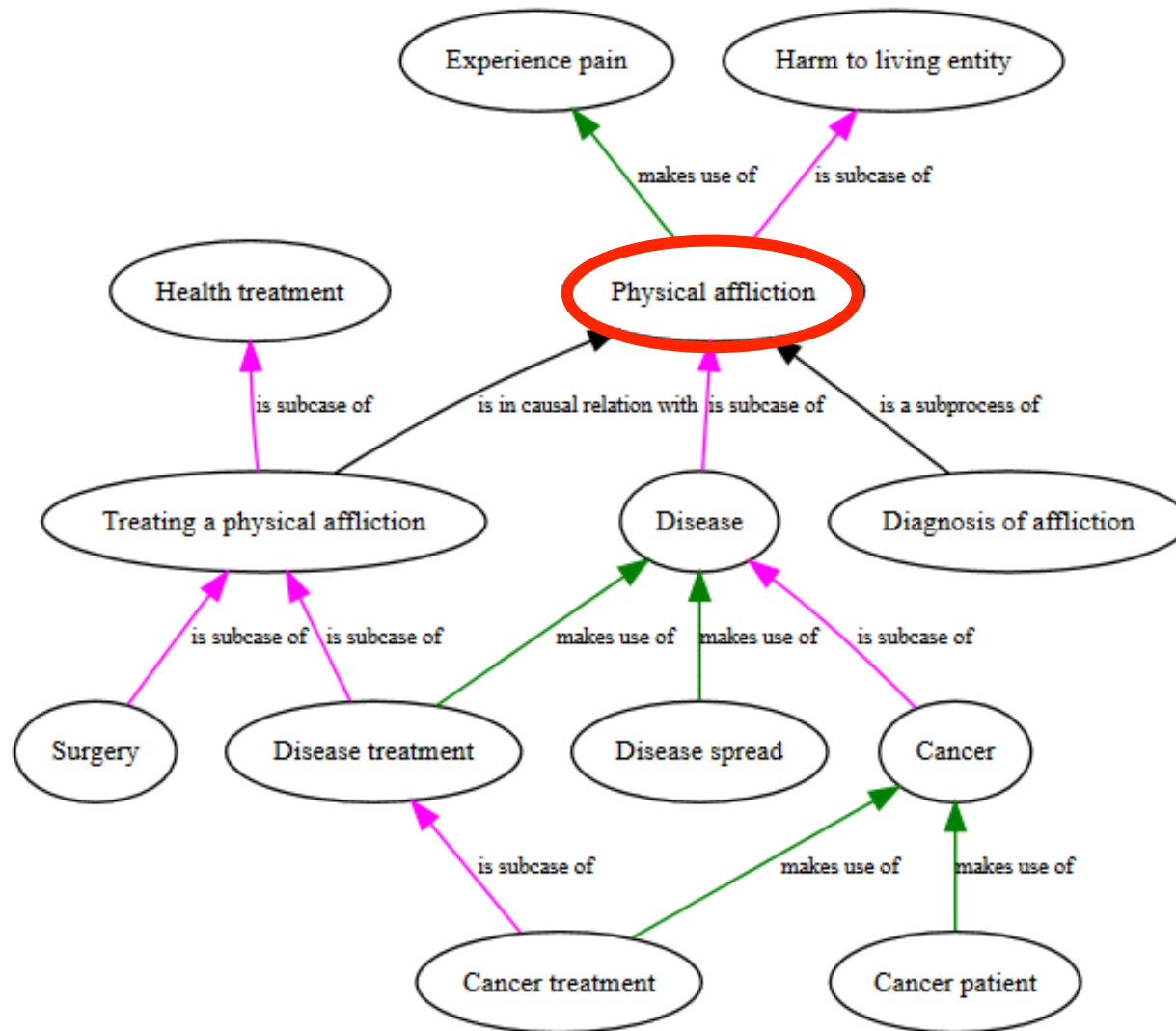
Current Frame:	Physical affliction
Relation Type:	is subcase of
Related Frame:	Harm to living entity ⓘ
Comments:	

Current Frame:	Physical affliction
Relation Type:	makes use of
Related Frame:	Experience pain ⓘ
Comments:	

Metaphors that use this frame:

as Target frame	as Source frame
	<ul style="list-style-type: none">• GUN VIOLENCE IS A PHYSICAL AFFLICTION• IMPEDIMENTS TO IMPROVING ECONOMIC STATUS IS EXPERIENCING A PHYSICAL AFFLICTION• INDICATIONS OF SOCIAL PROBLEMS IS PHYSICAL AFFLICTION• SOCIAL PROBLEMS ARE PHYSICAL AFFLICTIONS

Disease Frame Family

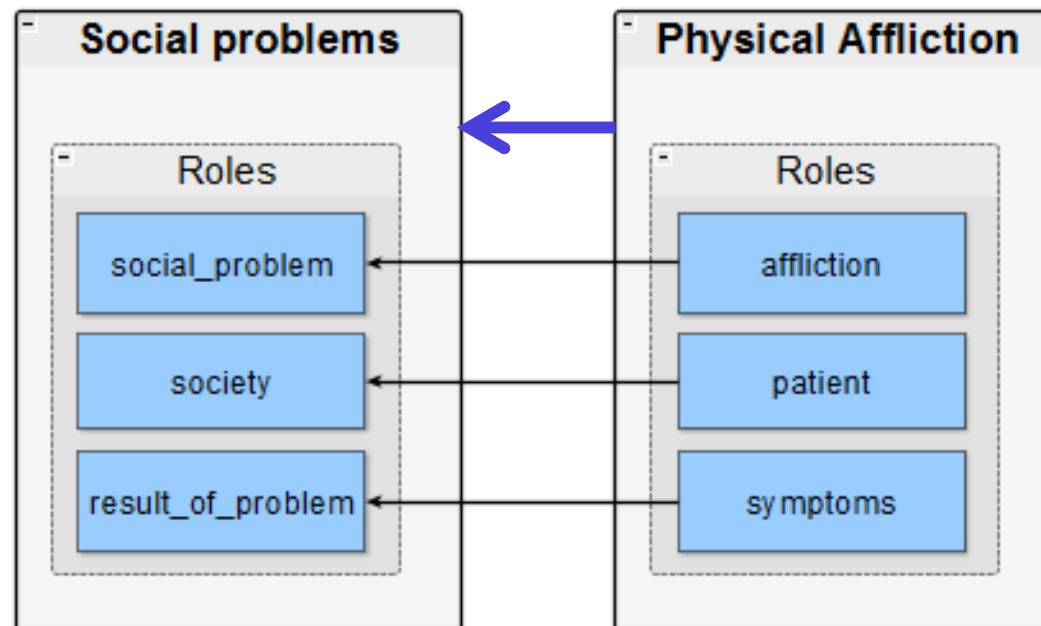


Metaphor: SOCIAL PROBLEMS ARE PHYSICAL AFFLICTIONS

e.g. Our nation is plagued with many social ills.

Target frame:

Source frame:



Metaphor: SOCIAL PROBLEMS ARE PHYSICAL AFFLICTIONS

Source Frame	Physical affliction?
Target Frame	Social problems?

Mappings:

society	<=	patient
---------	----	---------

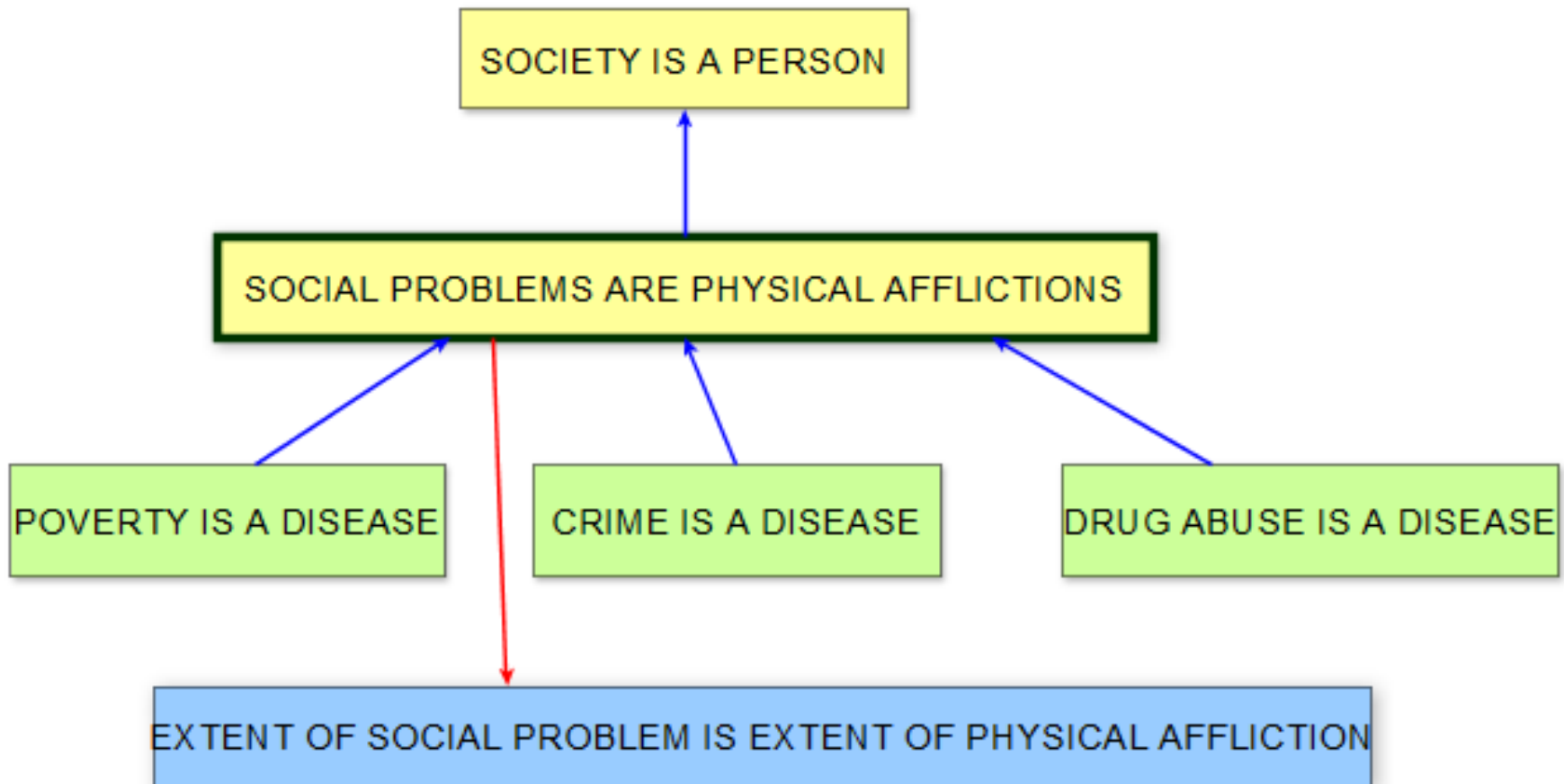
social_problem	<=	affliction
----------------	----	------------

result_of_problem	<=	symptoms
-------------------	----	----------

Related Metaphors:

Current Metaphor	SOCIAL PROBLEMS ARE PHYSICAL AFFLICTIONS
Relation Type	is an entailment of
Related Metaphor	SOCIETY IS A PERSON
Description	societies have social problems and people have physical problems

Metaphor Network



Demonstration: MN Wiki



- Main page
- Lists
 - Metaphors
 - Frames
 - Cx Analysis
 - Cxn Matching Patterns
 - Metaphoric Relational Configurations
 - IARPA Source Concepts
 - IARPA Target Concepts
- Help
 - Glossary
- Tools
 - What links here
 - Related changes
 - Special pages
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 - Permanent link
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 - Browse properties

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Page [Discussion](#) [Read](#) [View source](#)

Metaphor Wiki (English)

Contents [\[hide\]](#)

- [1 Metaphor Data Guide](#)
- [2 Metaphor Summary Pages](#)
- [3 Metaphor Glossary and Property Guide](#)
- [4 Metaphor Standards](#)

Metaphor Data Guide

To edit a metaphor or create a new metaphor, type its name in the box below. If the metaphor already exists, you will be taken to its edit page, otherwise, you can create it from scratch.

- Metaphor names should be in all caps

The Glossary (work in progress, only for Analysis Team)

The list of metaphors is now found here: [Metaphors](#).

A list of metaphor families can be found here: [Metaphor Families](#)

Metaphors listed by type: [Metaphors by Type](#)

The list of frames can be found here: [Frames](#).

A list of frame families can be found here: [Frame Families \(with LUs\)](#).

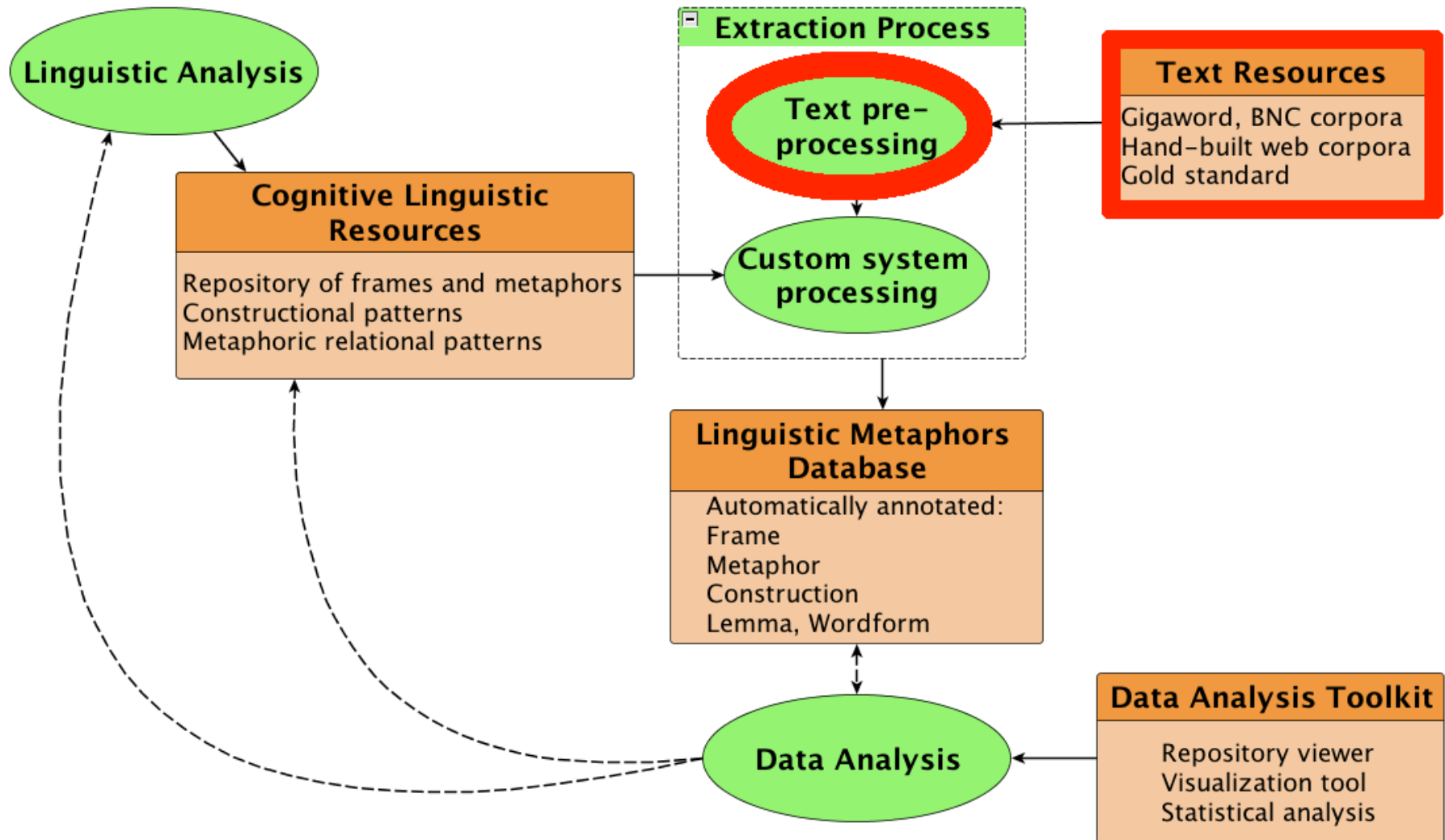
Coffee Break



Road Map

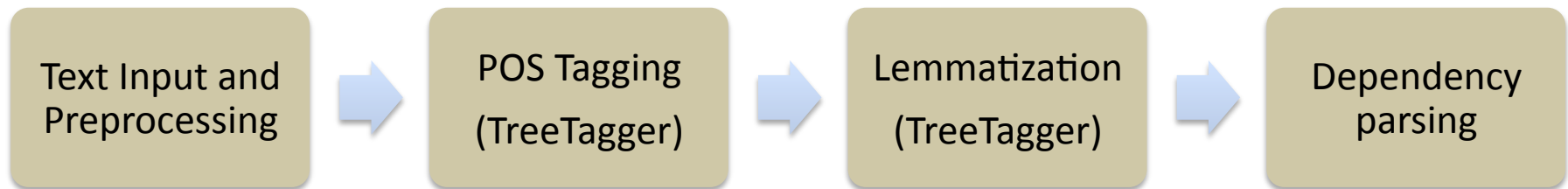
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Extraction Process

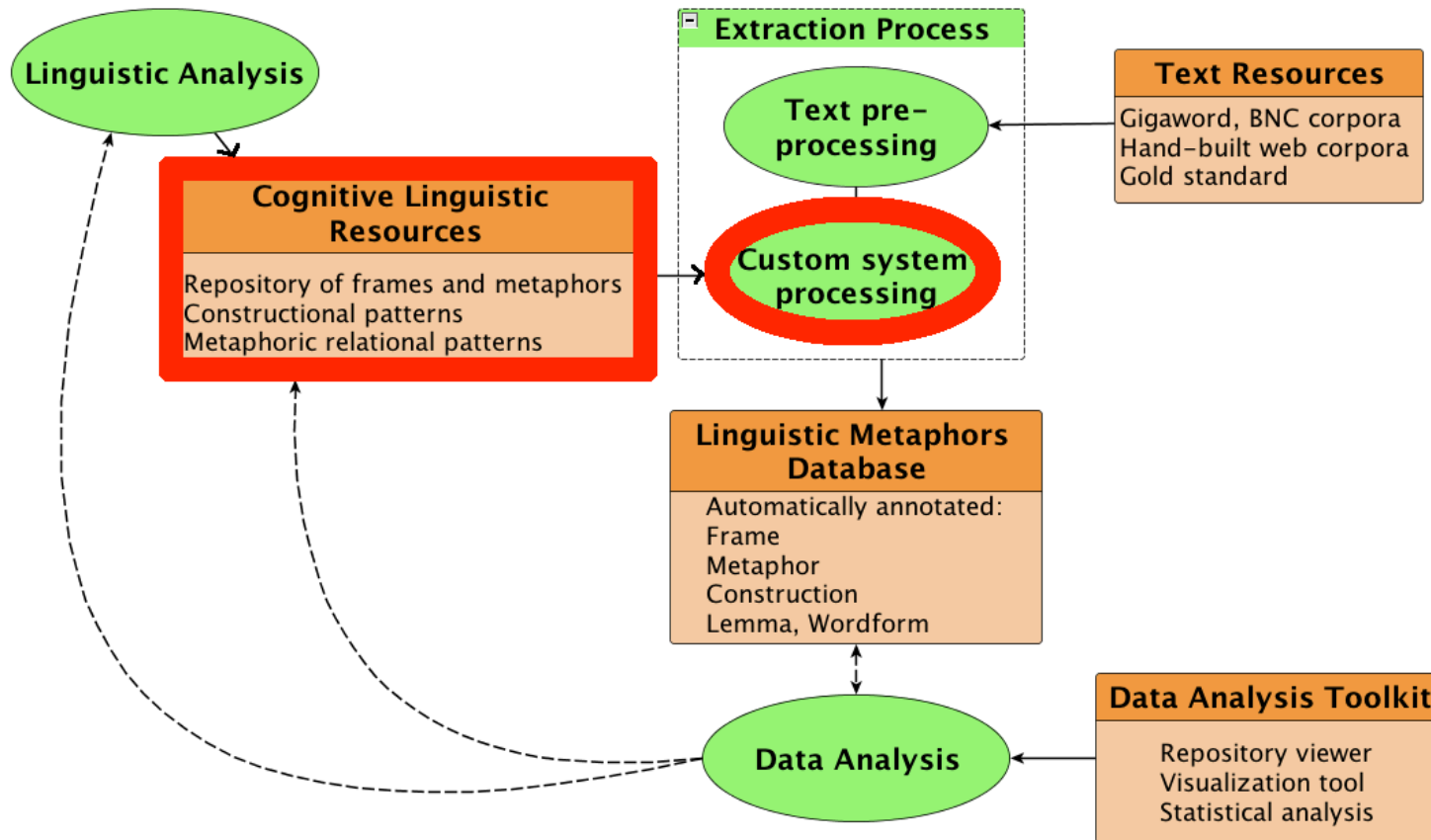


Extraction Process Overview

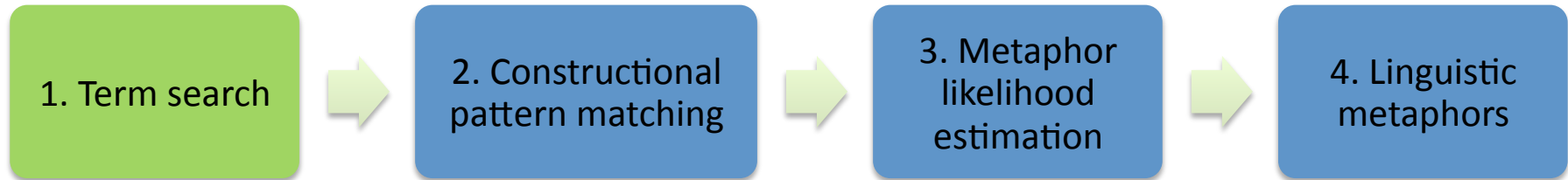
Corpus pre-processing using standard NLP methods



Extraction Process



Metaphor Extraction Process



Filter by terms in the corpus:

- **Target** term(s) for a given semantic domain, e.g. *poverty, destitution, impoverished...*

OR

- **Source** term(s) for a given semantic domain, e.g. *battle, fight, war, defeat, enemy...*

Dodge, Hong, & Stickles NAACL Proceedings 2015.

Metaphor Extraction Process



Conceptual metaphors are typically expressed in particular syntactic patterns

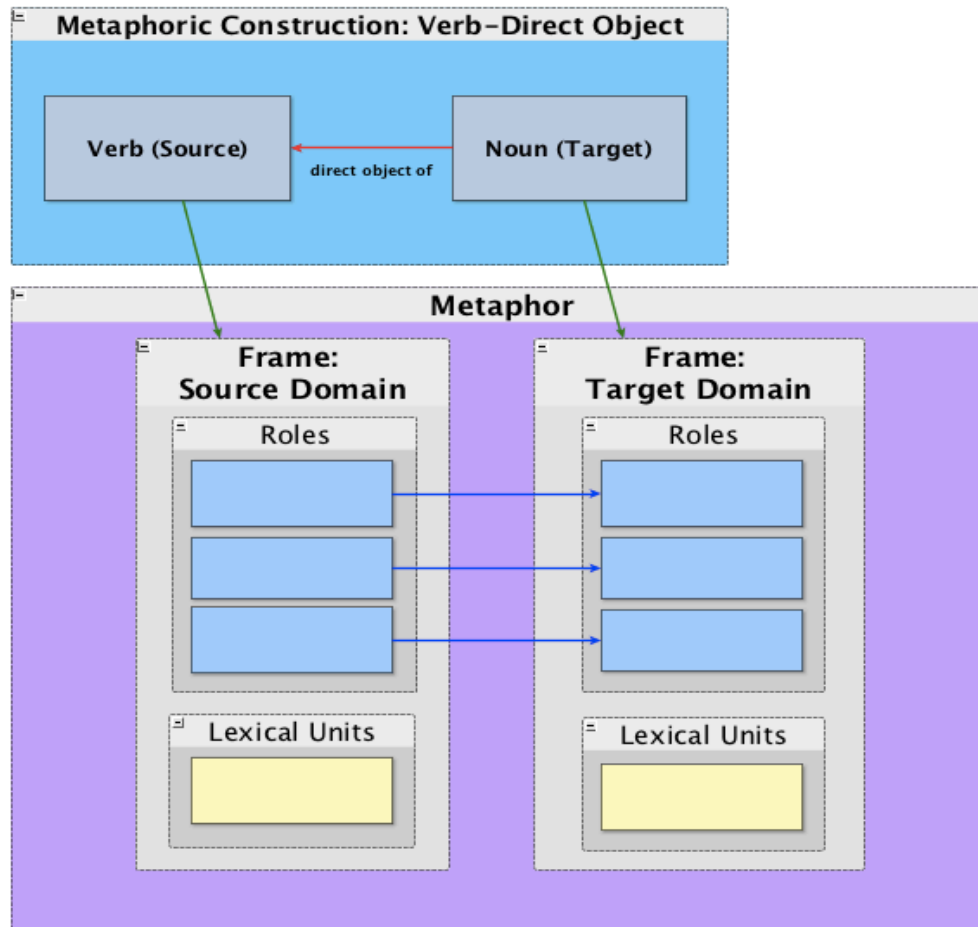
Target and **source** lexemes reliably occupy certain grammatical slots. (Croft 2002; Sullivan 2013). E.g.:

- **Source** is verb, Target is argument: ***Prices rose***
- not **Target** is verb, **Source** is argument: ***??Higher locations priced***

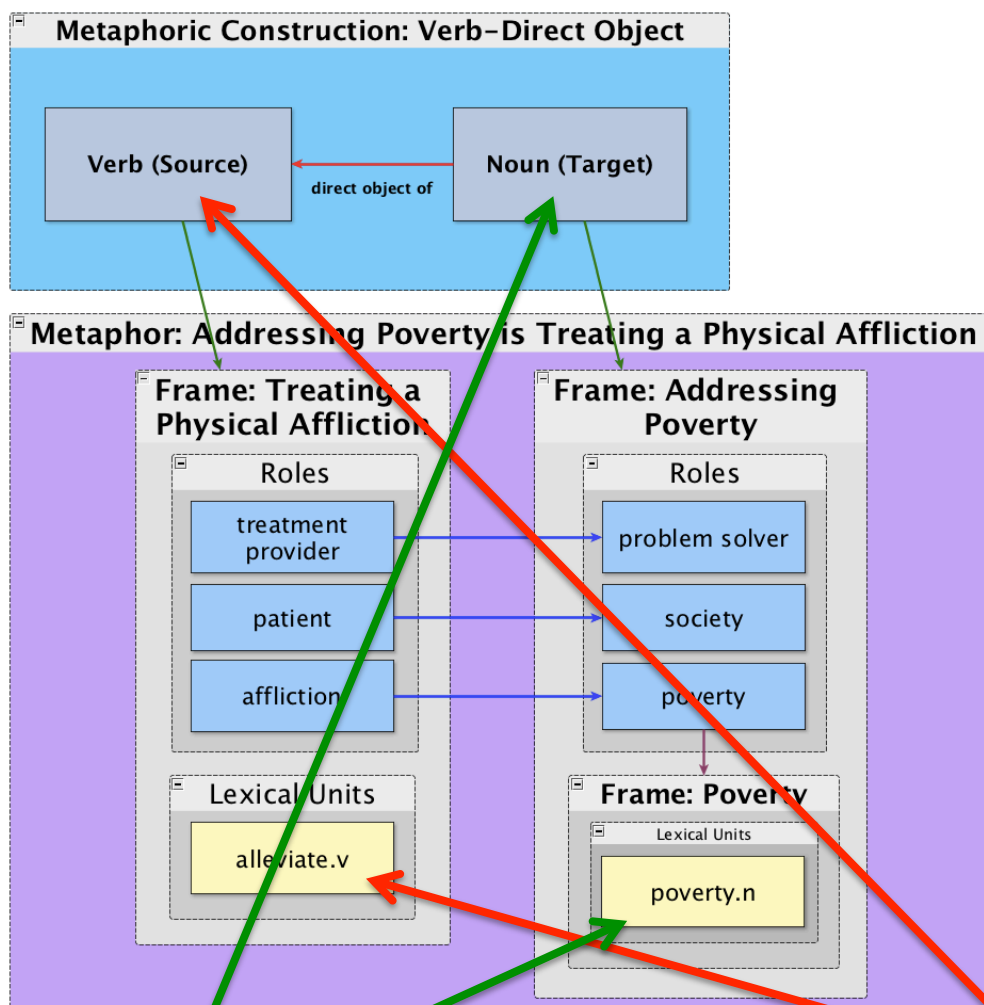
Metaphoric Constructions

Constructional pattern	Examples
T-subj_S-verb	<i>poverty infects</i>
T-subj_S-verb-conj	<i>poverty infects and maims</i>
T-subj-conj_S-verb	<i>homelessness and poverty infect</i>
S-verb_T-dobj	<i>escape poverty</i>
S-verb_T-dobj-conj	<i>escape despair and poverty</i>
S-verb_Prep_T-noun	<i>slide into poverty / pull up out of poverty</i>
S-noun_of_T-noun	<i>trap of poverty</i>
T-noun_poss_S-noun	<i>poverty's undertow</i>
S-noun_prep_T-noun	<i>path to poverty</i>
T-noun_mod_S-noun	<i>poverty trap</i>
S-adj_mod_T-noun	<i>burdensome poverty</i>
T-noun_cop_S-noun-adj	<i>poverty is a disease / poverty is burdensome</i>

Metaphoric Constructions



Metaphoric Constructions



*Neither the free market nor central planning had been able to **alleviate** unemployment and **poverty** (BNC:HKT)*

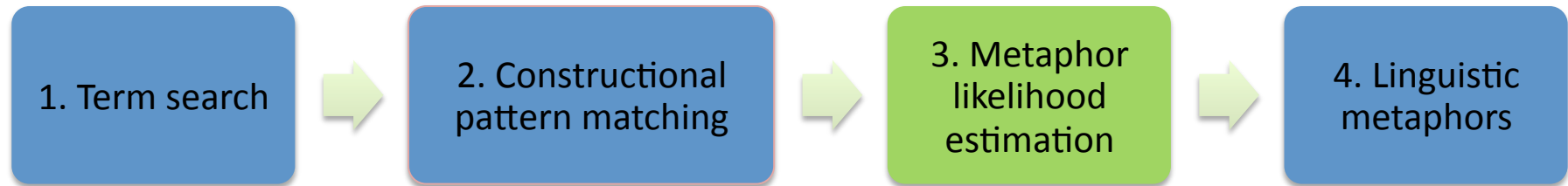
Constructional Pattern Matching Process

- Identify candidate items which appear in appropriate constructional pattern
- E.g., if **Target** term is *poverty*:
- Construction: **Source (noun)** – *of* – **Target (noun)**
 - *Trap of poverty*
 - *problem of poverty*

Constructional Pattern Matching Process

- Identify candidate items which appear in appropriate constructional pattern
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 - *Trap of poverty*
 - *problem of poverty*
- Constructional patterns are a necessary constraint on metaphoric expression, but are not sufficient to guarantee metaphoricity

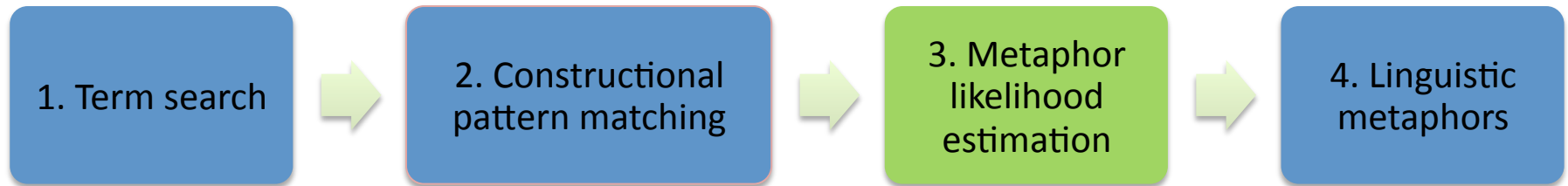
Metaphor Extraction Process



Frame identification

- Using the KB, determine which frames the candidate **source** and **target** terms evoke, and add this as annotated data

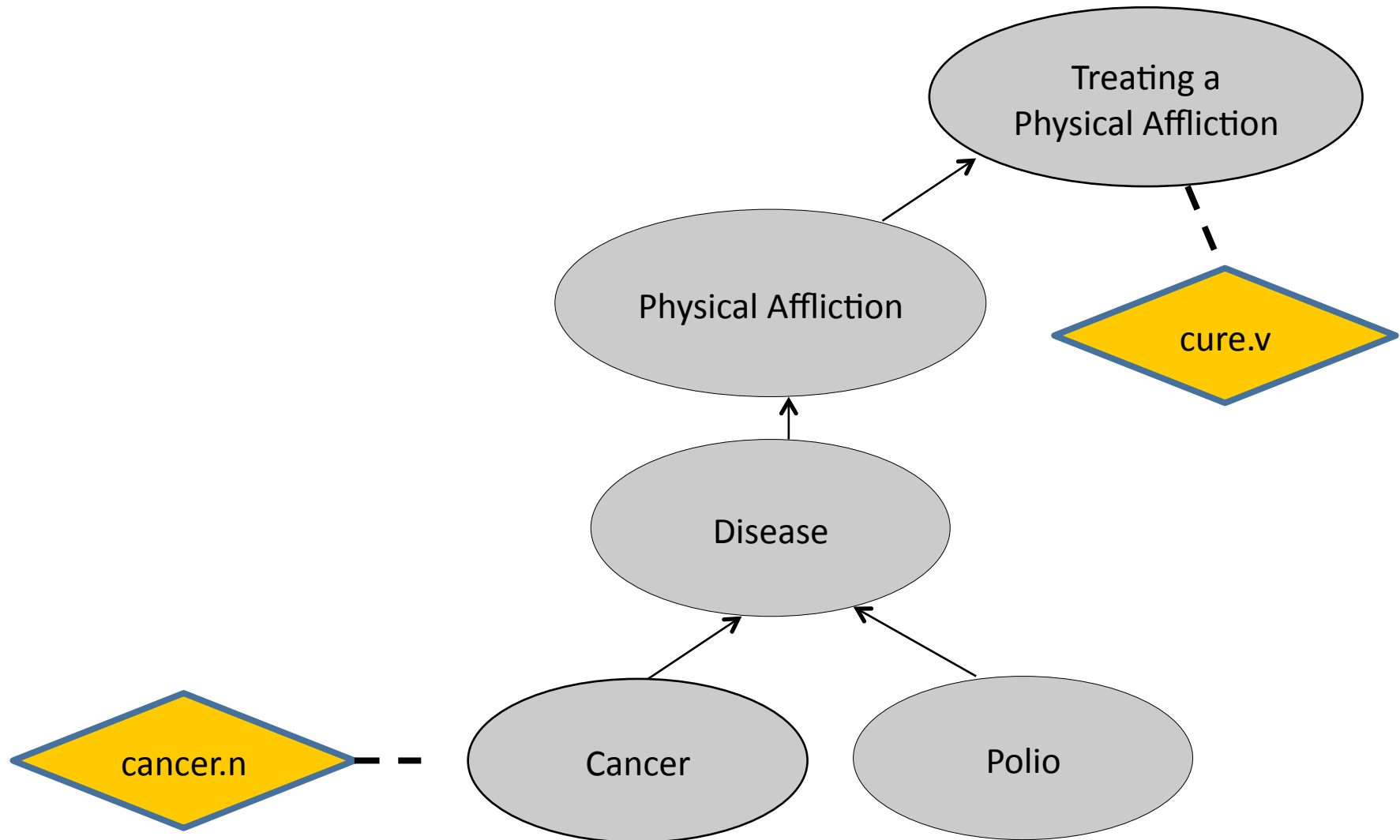
Metaphor Extraction Process



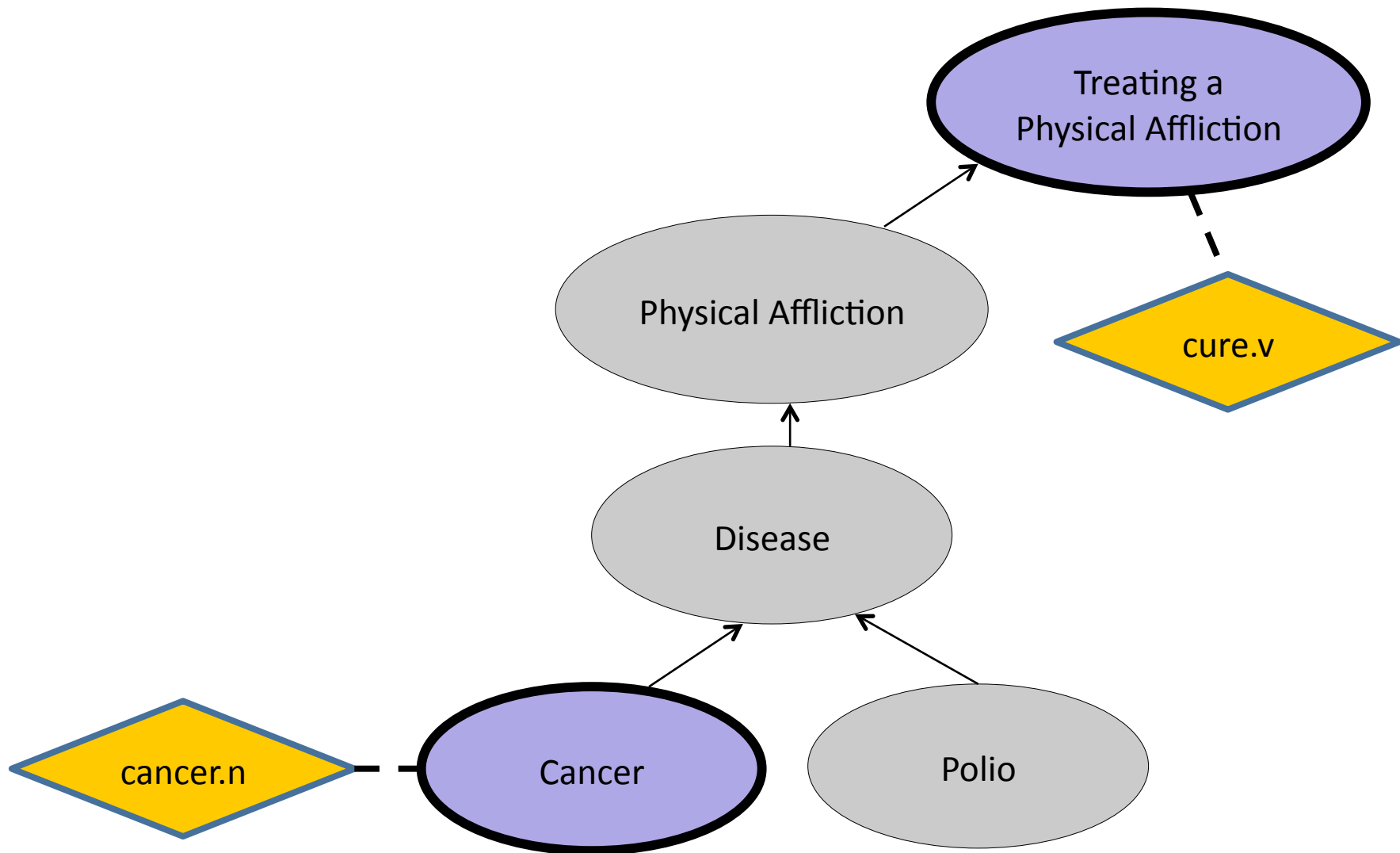
Assess metaphoricity of candidate expressions:

- Repository is searched to determine the relational path(s) that connect these two frames
- Expressions are scored based on the path

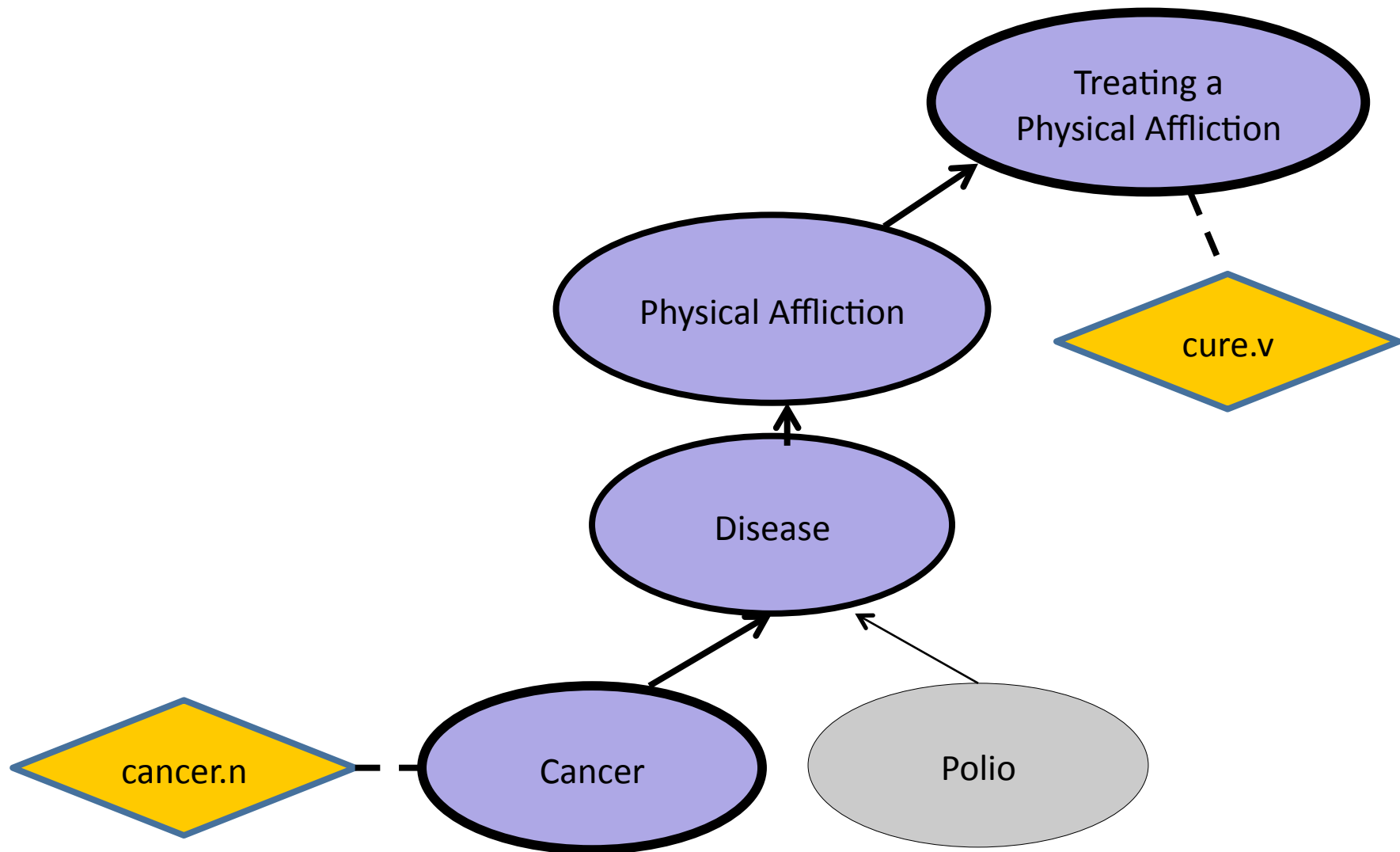
Non-metaphoric Pattern: *cure cancer*.



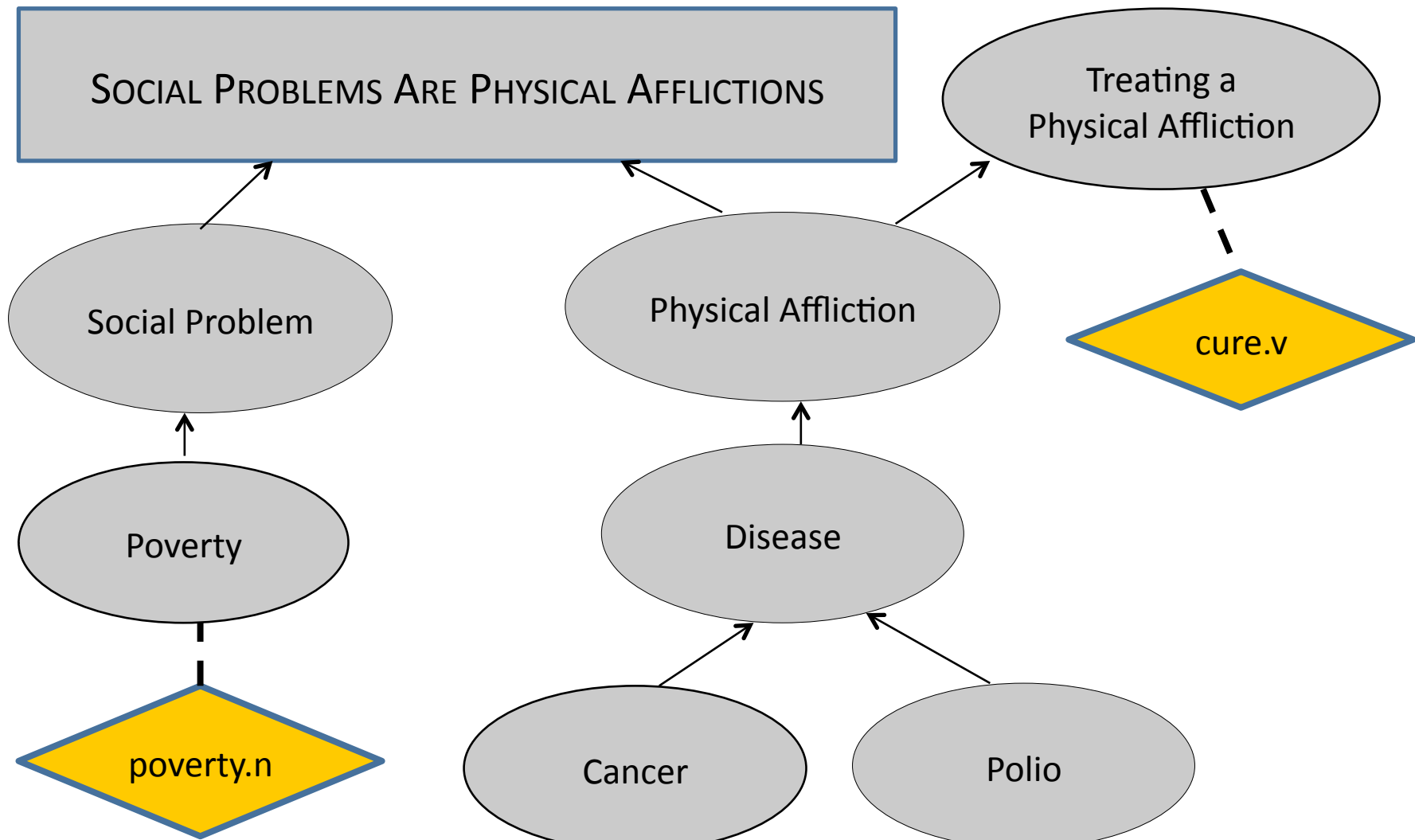
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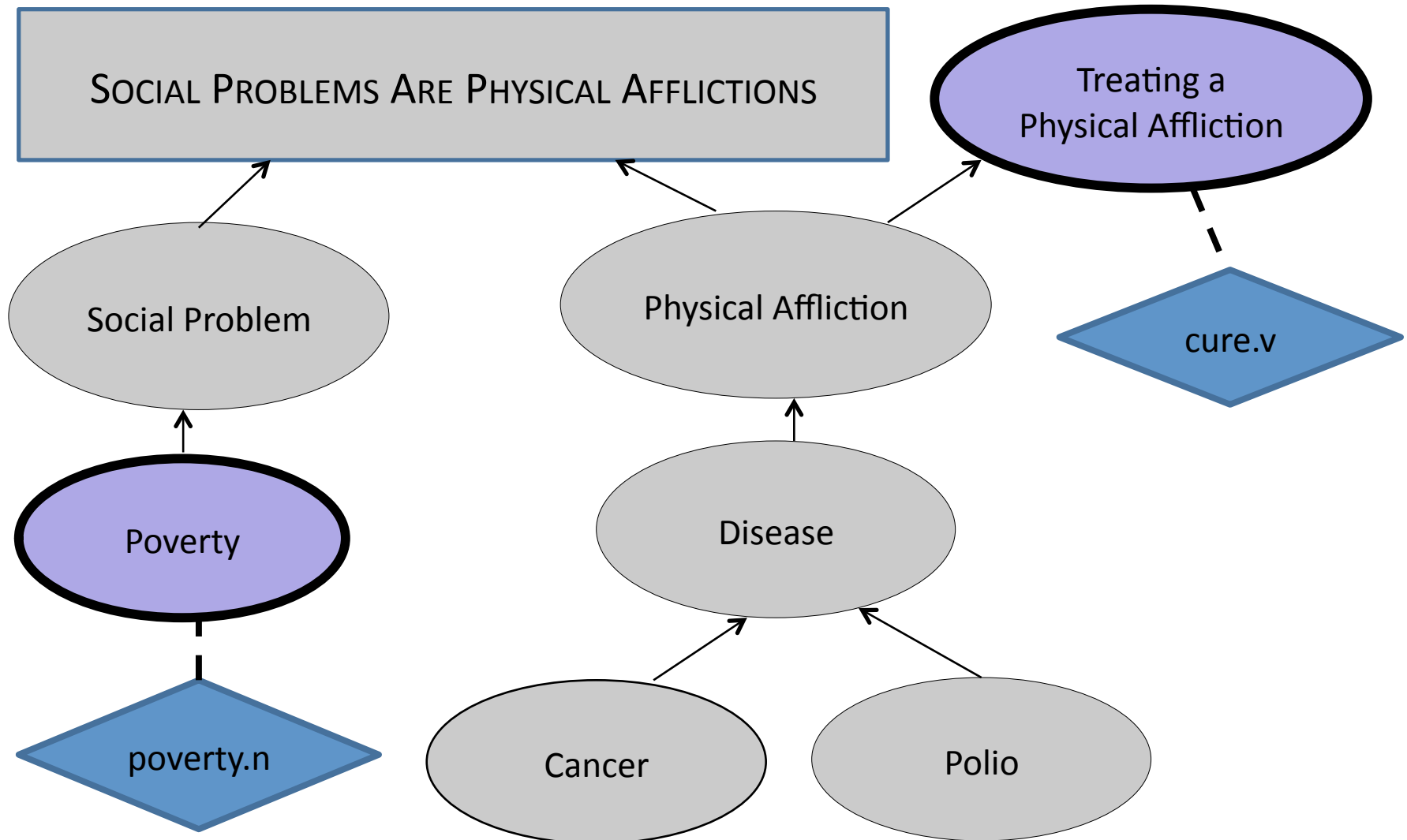
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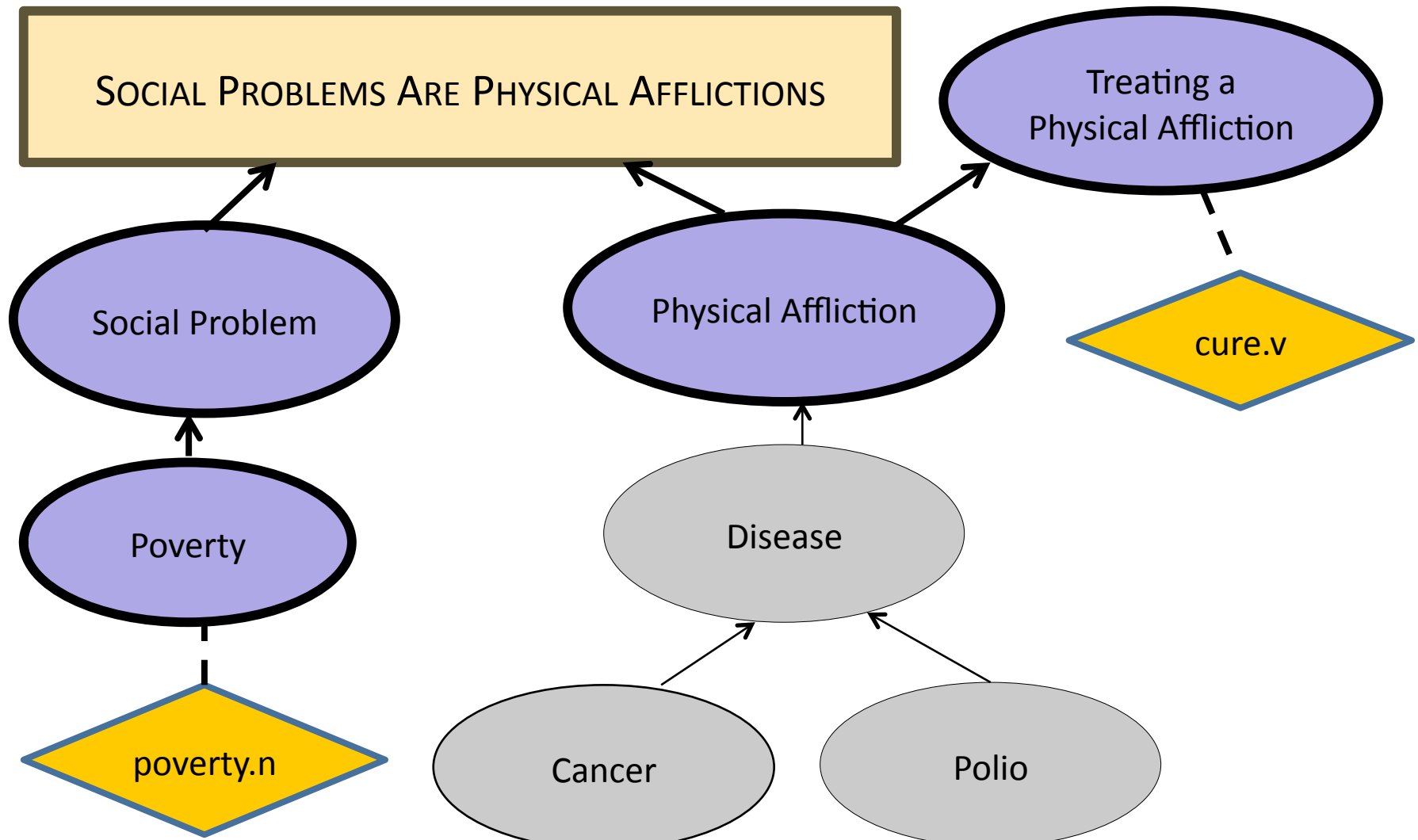
Metaphoric Pattern: *cure poverty*



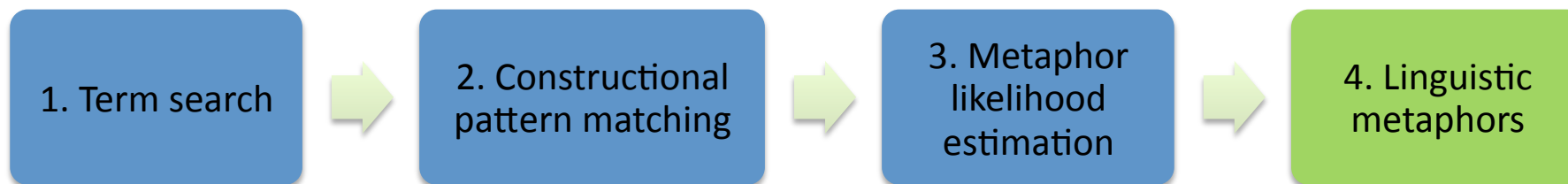
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Metaphoric Pattern: *cure poverty*

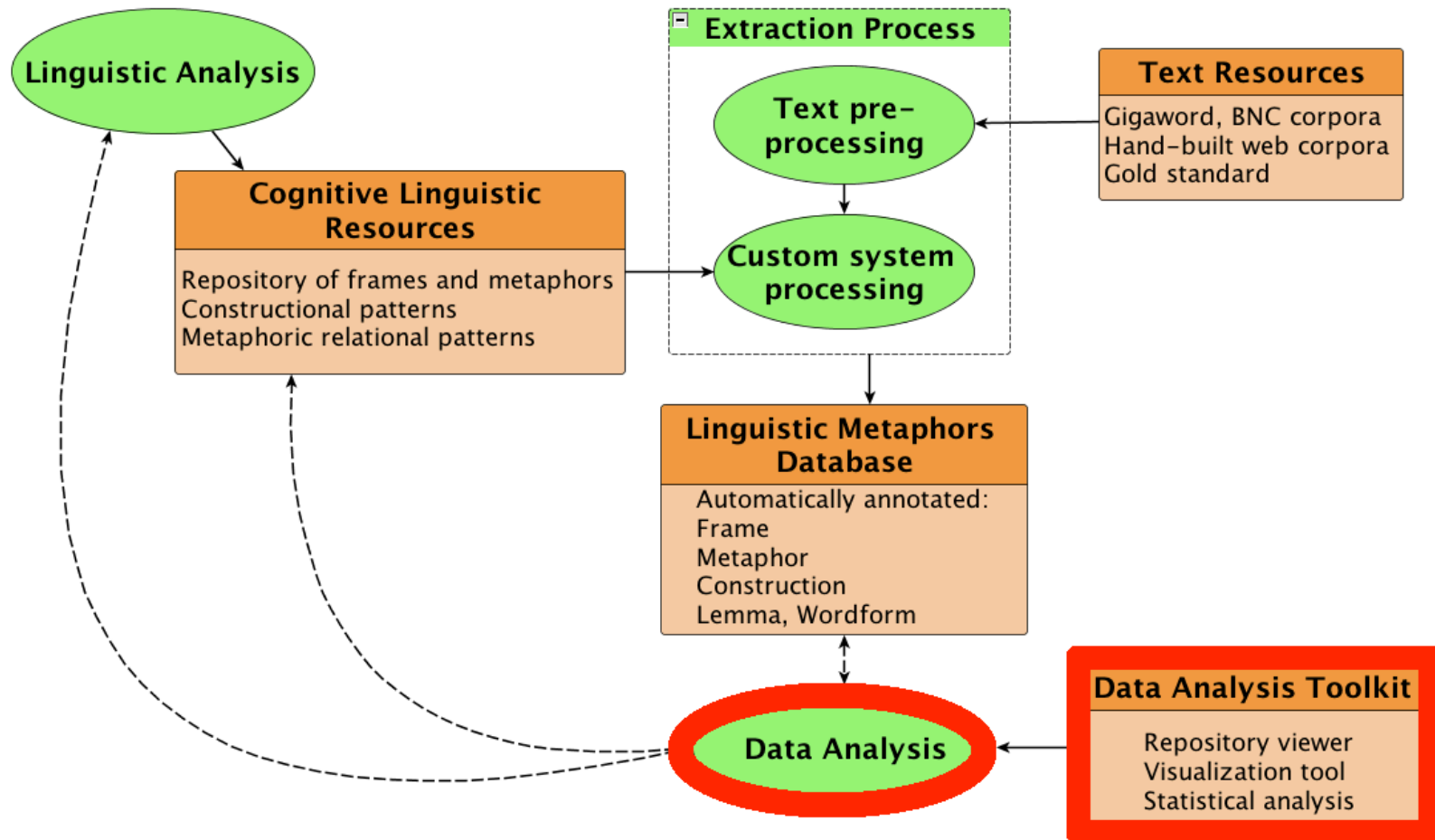


Metaphor Extraction Process



- The output of the metaphor identification process is a database of annotated sentences
- Annotation includes syntactic and semantic information:
 - Dependency parse
 - Lemmas, POS, Frames for **source** and **target** words
 - Metaphor(s) identified by system, if any

Database and Data Analysis



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Applications: Road Map

- Metaphor analysis -- case studies:
 - Poverty
 - Gun debate
 - Cancer
- Multilinguality
- Information extraction

Case Study: Poverty

- Extracted metaphor data can provide insights into metaphors and constructions used to talk about particular domains
- **Target** domain: Poverty
 - Defined by Poverty frame family in repository
- Input:
 - Gigaword corpus (Graff & Cierra 2003)
- Output
 - Annotated ~175,000 sentences (including duplicates)

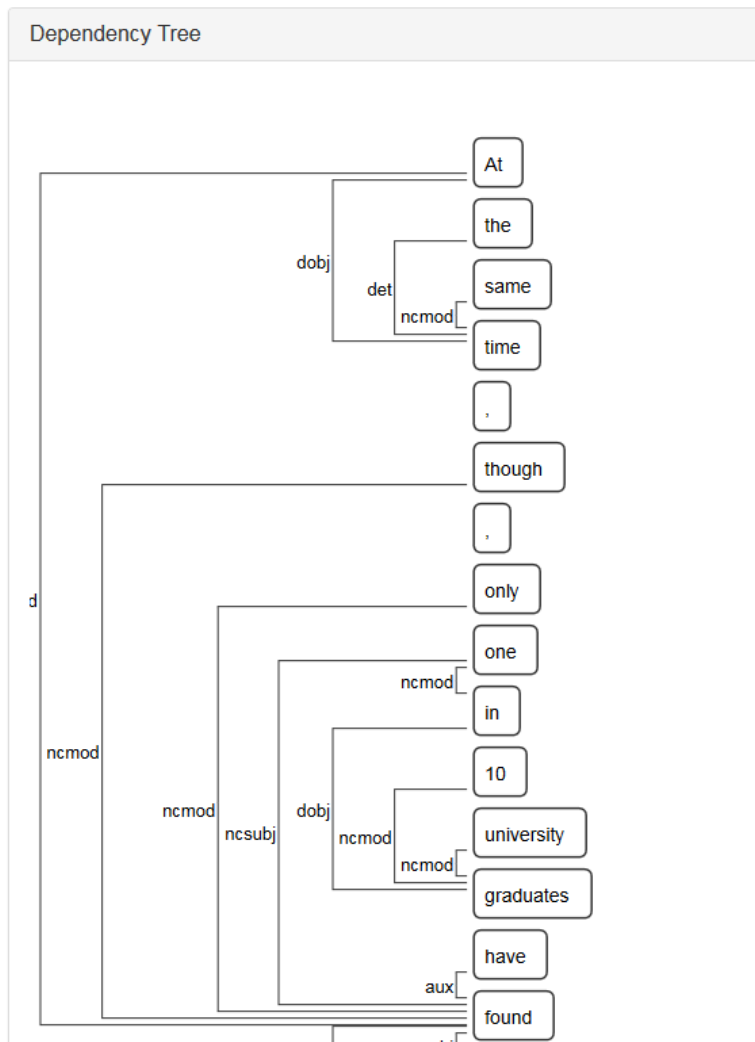
Poverty Metaphor Examples

A year after signing their autonomy agreement with Israel, Palestinians believe they are close to obtaining the hundreds of millions of dollars of foreign aid needed to tackle poverty .	1	POVERTY_afp_eng-00:1301
-- Chapter 3 (Inter-relationships between Population, Sustained Economic Growth and Sustainable Development): The action plan reflects growing awareness that population factors are "inextricably linked" to human development concerns, including poverty alleviation , women's empowerment and environmental protection.	1	POVERTY_afp_eng-00:1337
The UN population conference has adopted a global plan that for the first time puts women out front in a war on poverty and soaring birthrates.	1	POVERTY_afp_eng-00:1338
Meanwhile, poverty rose 4.7 percent and 1,140,600 New Yorkers are receiving public assistance.	1	POVERTY_afp_eng-00:1347
Chiapas was the site of a surprise uprising staged on New Year's Day by Zapatista rebels, who protested abuse and grinding poverty in the southern state.	2	POVERTY_afp_eng-00:1351

Rich Annotation for Example

At the same time, though, only one in 10 university graduates have found work, creating a daunting challenge for the country, which overall remains **mired** in **poverty** despite the economic successes.

1 POVERTY_afp_eng-04:23058



Linguistic Metaphors

poverty mire

Source LU

- Lemma:** mire
- form:** mired
- Part of Speech:** mire.v
- Frames:** Water_Confinement
- Frame Families:** Impediment and enablement frames, Motion-affecting frames, Motion impediments frames, Moving entity frames
- Concepts:** BODY_OF_WATER
- Map method:** CNMS

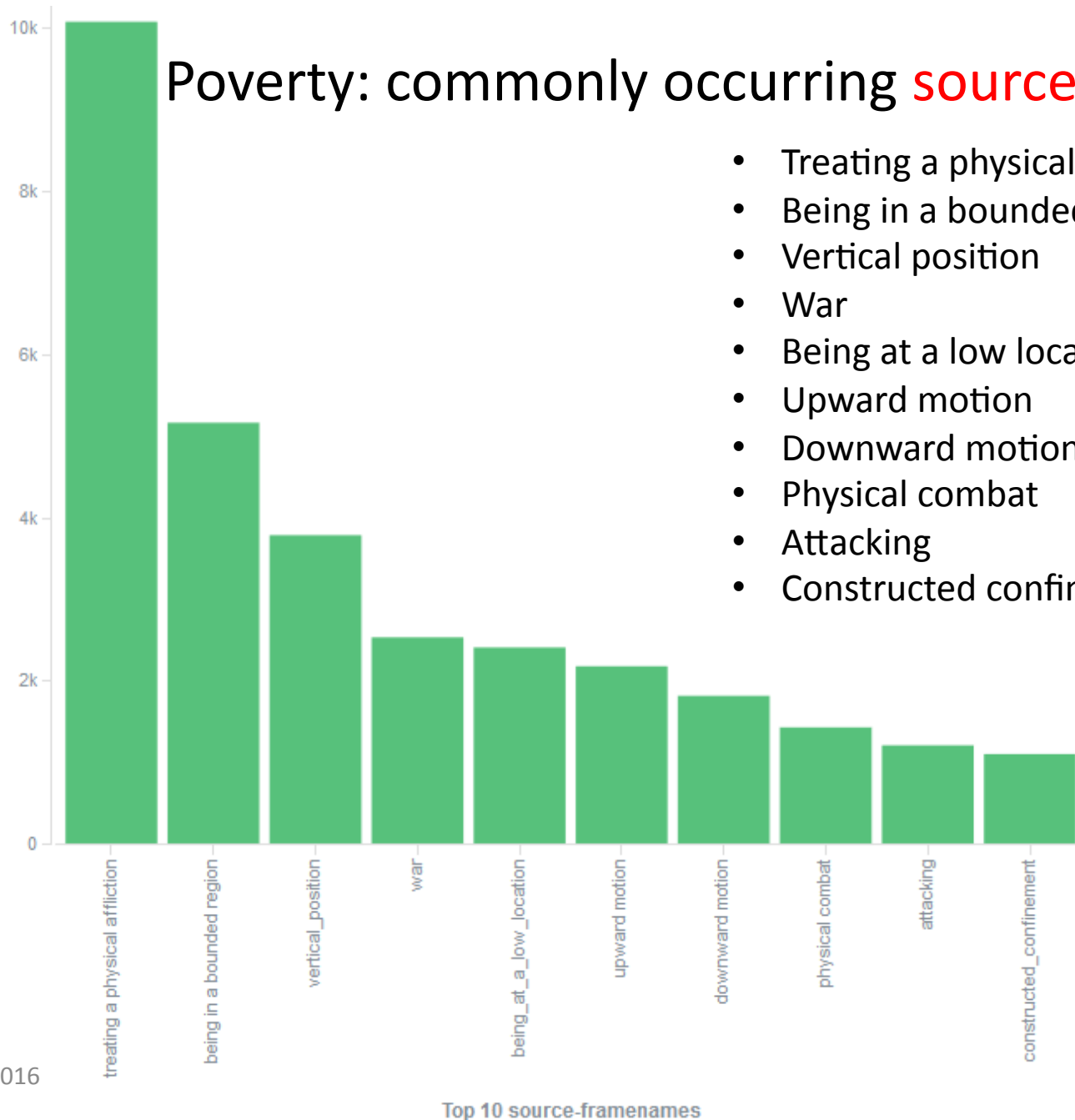
Target LU

- Lemma:** poverty
- Form:** poverty
- Concept:** POVERTY
- Frames:** Poverty
- Frame Families:** (none)
- Cultural concept:** POVERTY
- Concept group:** (none)

Extraction

- Extractor:** CMS:CNMS
- Construction:** S-verb_Prep_T-noun
- Score:** 0.9265
- Conceptual Metapho...** POVERTY IS A MOTION IMPEDIMENT

Poverty: commonly occurring **source** frames



- Treating a physical affliction
- Being in a bounded region
- Vertical position
- War
- Being at a low location
- Upward motion
- Downward motion
- Physical combat
- Attacking
- Constructed confinement

Poverty Metaphors: Source Domain = War

A crowd of roughly 10,000 people were on hand for an inaugural address in which the new president was expected to pledge to combat unemployment, crime, poverty and the drug trade.	1	POVERTY_afp_eng-00:1184
The UN population conference has adopted a global plan that for the first time puts women out front in a war on poverty and soaring birthrates.	1	POVERTY_afp_eng-00:1338
"We must help South Africa to create jobs, housing and schools, to improve health care" and to battle illiteracy and poverty .	1	POVERTY_afp_eng-00:1660
"Any credible attack on world poverty must include a large increase in development cooperation -- and some increase in development assistance -- at its core," said Speth.	1	POVERTY_afp_eng-01:1524
Industry minister Muraosli Maran warned India's leaders here Wednesday that free-market reforms should have a "human heart" to tackle poverty and unemployment.	1	POVERTY_afp_eng-01:2064

Poverty metaphors: **Source** domain = Treating a physical affliction

Bangladesh and Pakistan Tuesday called for a concerted drive by the seven-nation South Asian Association for Regional Cooperation (SAARC) to alleviate poverty in the region.	1	POVERTY_afp_eng-00:4671
"The draft declaration will also focus on poverty eradication programmes in one of the world's poorest regions and appeal to developed nations to reduce the barriers of protectionism," they said.	1	POVERTY_afp_eng-00:4768
SAARC members say they plan to " eradicate " poverty by the year 2002.	1	POVERTY_afp_eng-00:4794

Case Study: Gun Debate

Overall objective:

Analyze metaphors used in the US national debate on guns to gain insights into two contrasting perspectives:

- Individual oversight (IO) :
 - advocates of the Second Amendment, gun rights
 - believe in individual oversight of gun ownership and use
- Government oversight (GO):
 - advocates of gun control laws (as a means to reduce gun violence)
 - believe in government oversight of gun ownership and use

Case Study: Gun Debate

- Corpora
 - Custom-built, web-based corpora
 - Two data sets
 1. Pro-individual oversight perspective
 2. Pro-government oversight perspective
- Search terms – Gun debate frame family
 - Gun control, e.g., *gun control movement, control of guns, gun restrictions, anti-gun*
 - Gun rights, e.g. *right to bear arms, gun freedom, firearms rights, gun rights advocacy, pro-gun*
 - Gun violence, e.g. *gun violence, gun death, gun crime*
 - Other gun-related terms, e.g. *gun lobby, gun owner, gun grabber*

Gun Debate Metaphor Examples

We should look at fixing the mental health system in the United States in conjunction with implementing gun control, but we should not place the blame for the **gun death epidemic** in our country on those who were unfortunate enough to be born with mental problems.

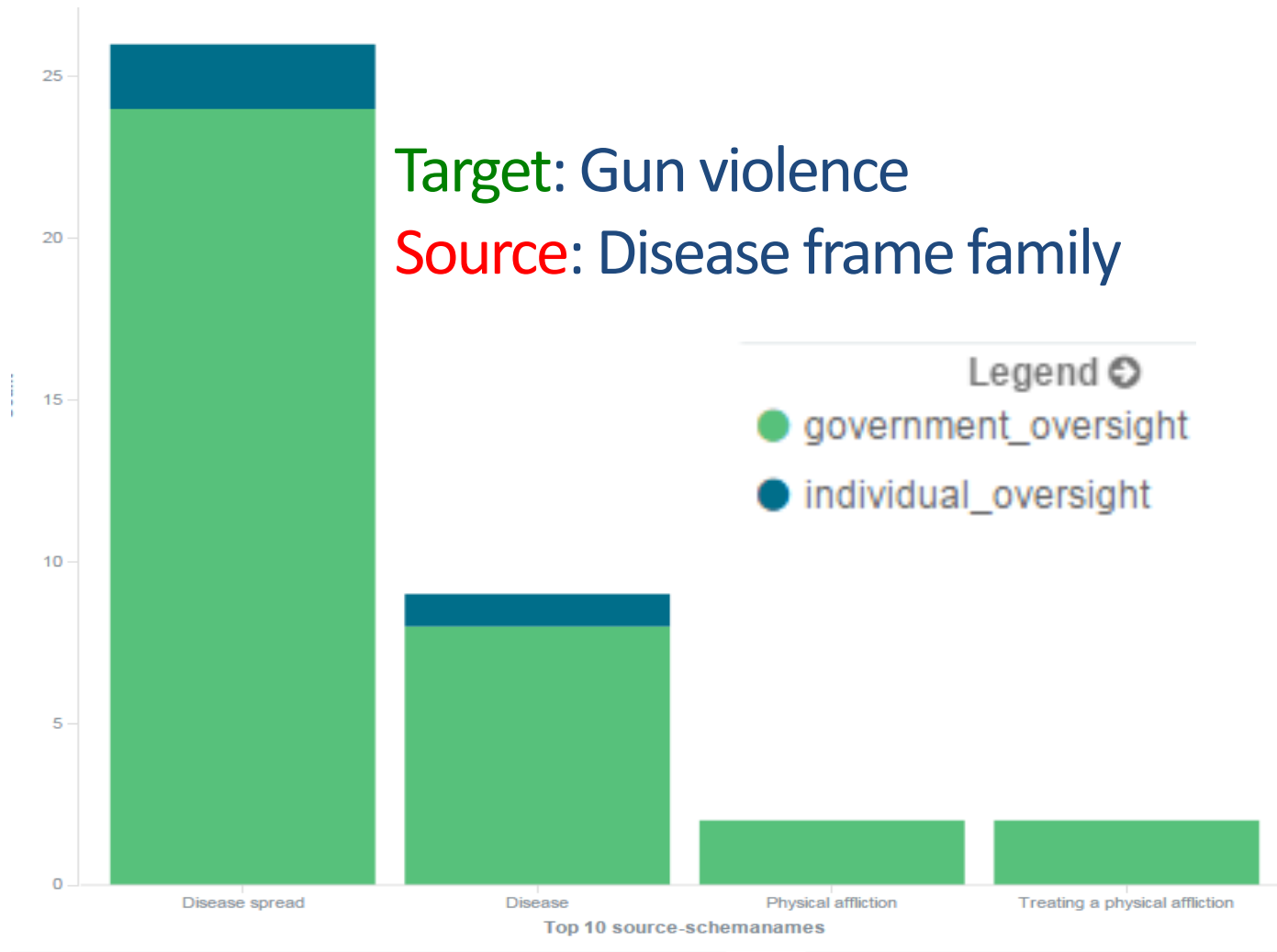
In fact, the reduction of gun availability in our society would help alleviate the **epidemic** of **gun violence** that we are living in and would save many lives.

Or how about discussing the potential merits of a national no-sell list that would give law enforcement and mental health personnel the opportunity to flag potentially dangerous people to licensed gun-merchants? Would these kinds of modest regulations of gun ownership end the **scourge** of **gun violence** in America? Of course not people will always snap.

In the wake of Sandy Hook, US President Barack Obama announced the most aggressive federal gun-control plan in decades to combat what he termed an "**epidemic** of **gun violence**".

This lobby diverts attention from the fact that although revisiting gun control will not solve Americas **cancerous gun violence** , well-considered changes in legislation and enforcement will make a difference, and probably a big difference.

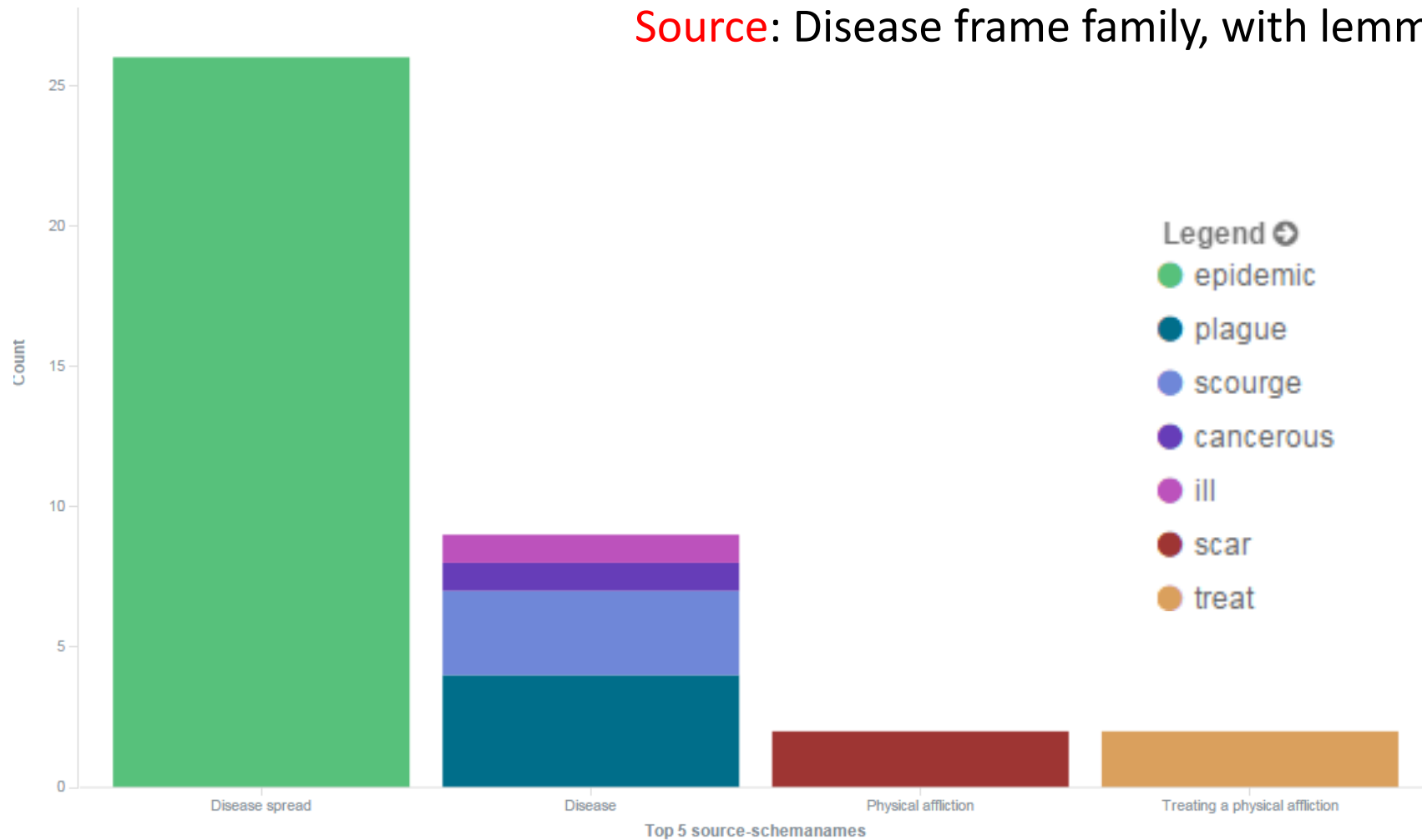
Case Study: Gun Debate



Case Study: Gun Debate

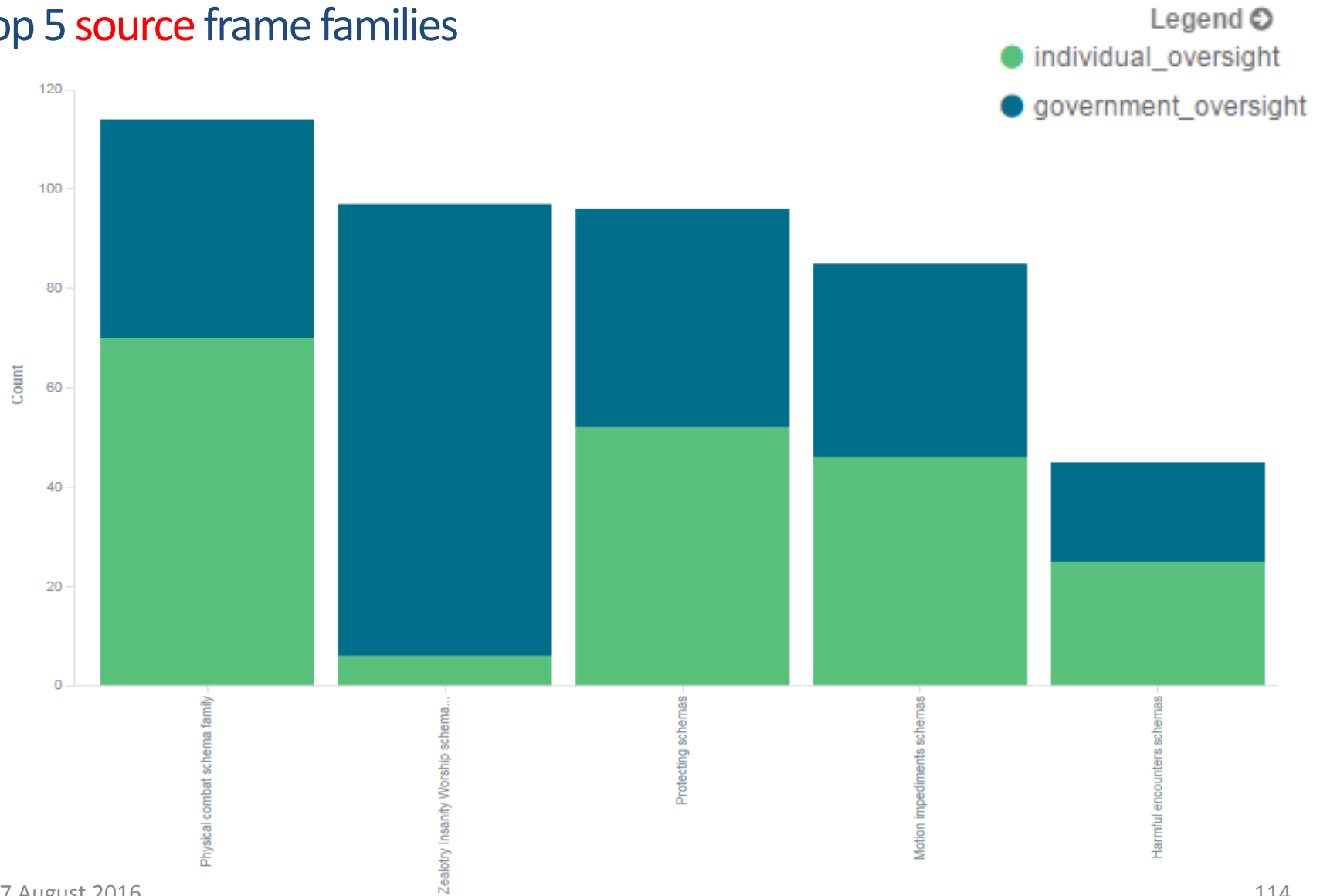
Target: Gun violence

Source: Disease frame family, with lemmas



Target: Gun rights

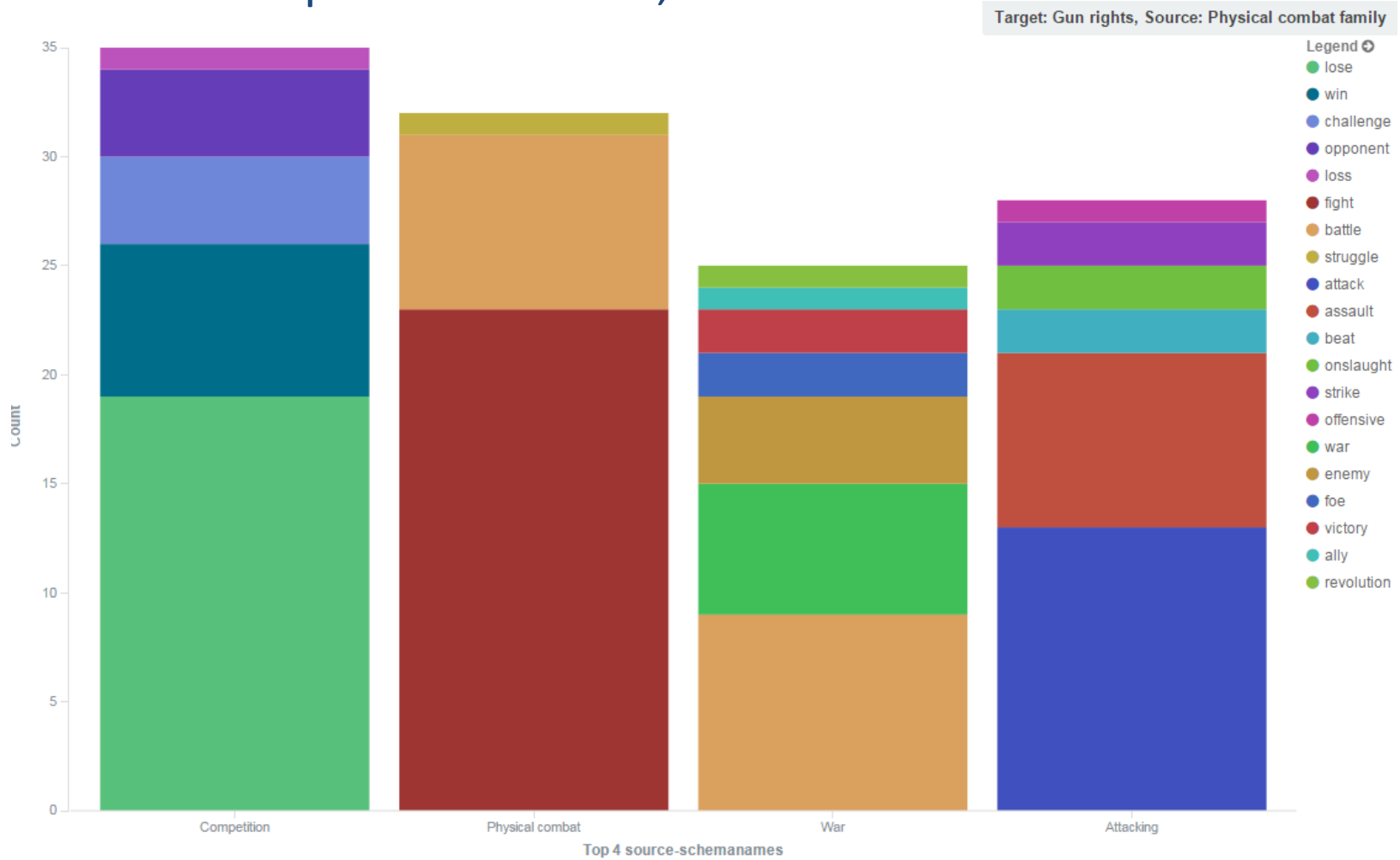
- Top 5 **source** schema families
- Top 5 **source** frame families



Target: Gun rights

Source: Physical combat frame family

-- Top 4 source frames, with lemmas



Case Study: Cancer

- **Objective:** Investigate metaphoric construal of cancer in patient discourse
- **Challenges:**
 - Prior investigations focused on Disease as a *source* domain (*cure poverty, gun epidemic*, etc.)
 - Differences in genre
 - Specialized jargon and slang: *mets* (metastases), *chemo*
 - Casual discourse – increased slang, shorthand; non-standard syntax

Case Study: Cancer

- **Corpora**

- Global Web-based English (Davies 2013), American blogs
 - 48,116 websites
 - 106,365 webpages
 - 133,061,093 words
- Collected data from 3 cancer patient forums
 - 656,171 words

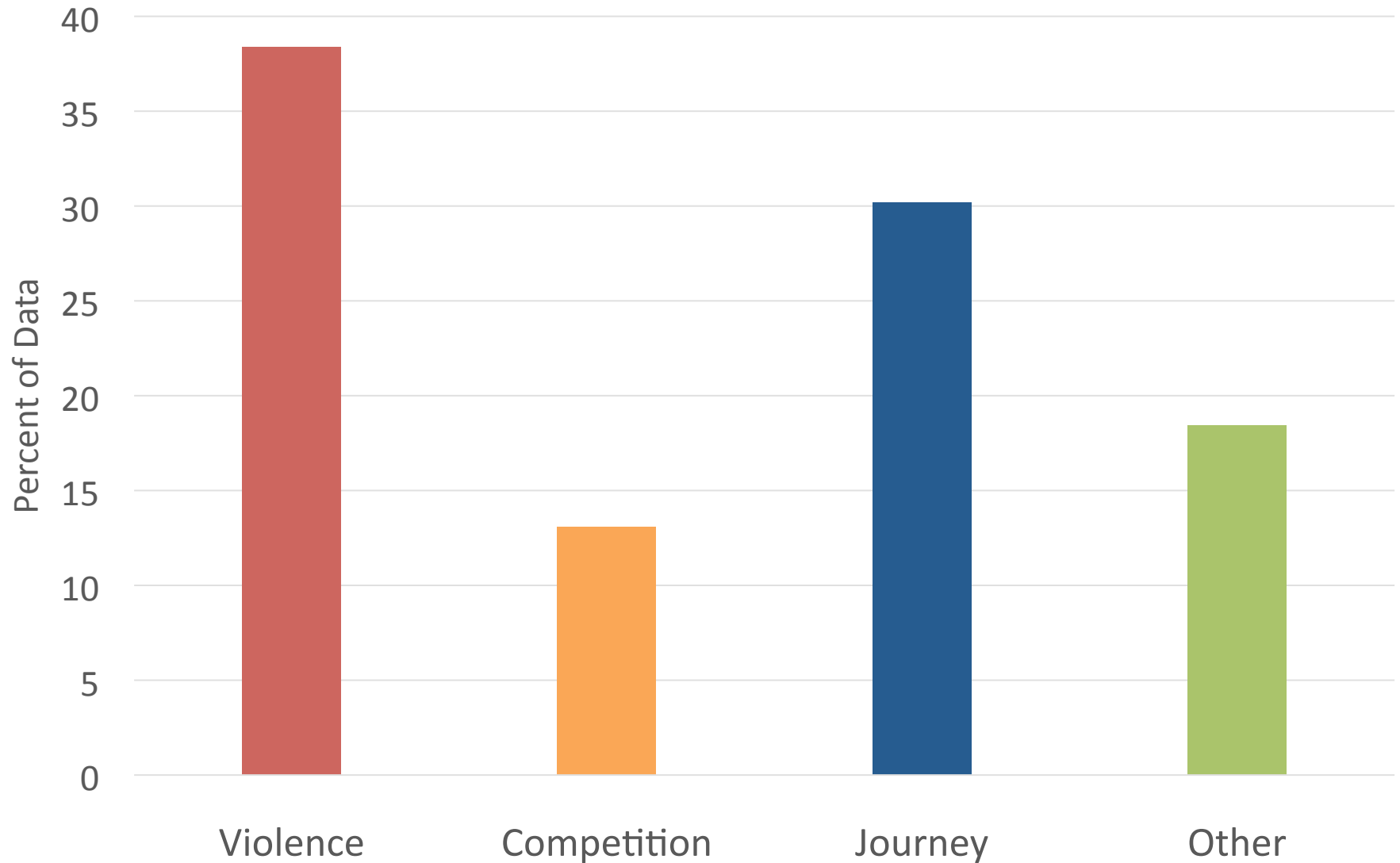
- **Knowledge Base**

- Increased coverage of Cancer domain
- Added metaphors based on cancer metaphor literature

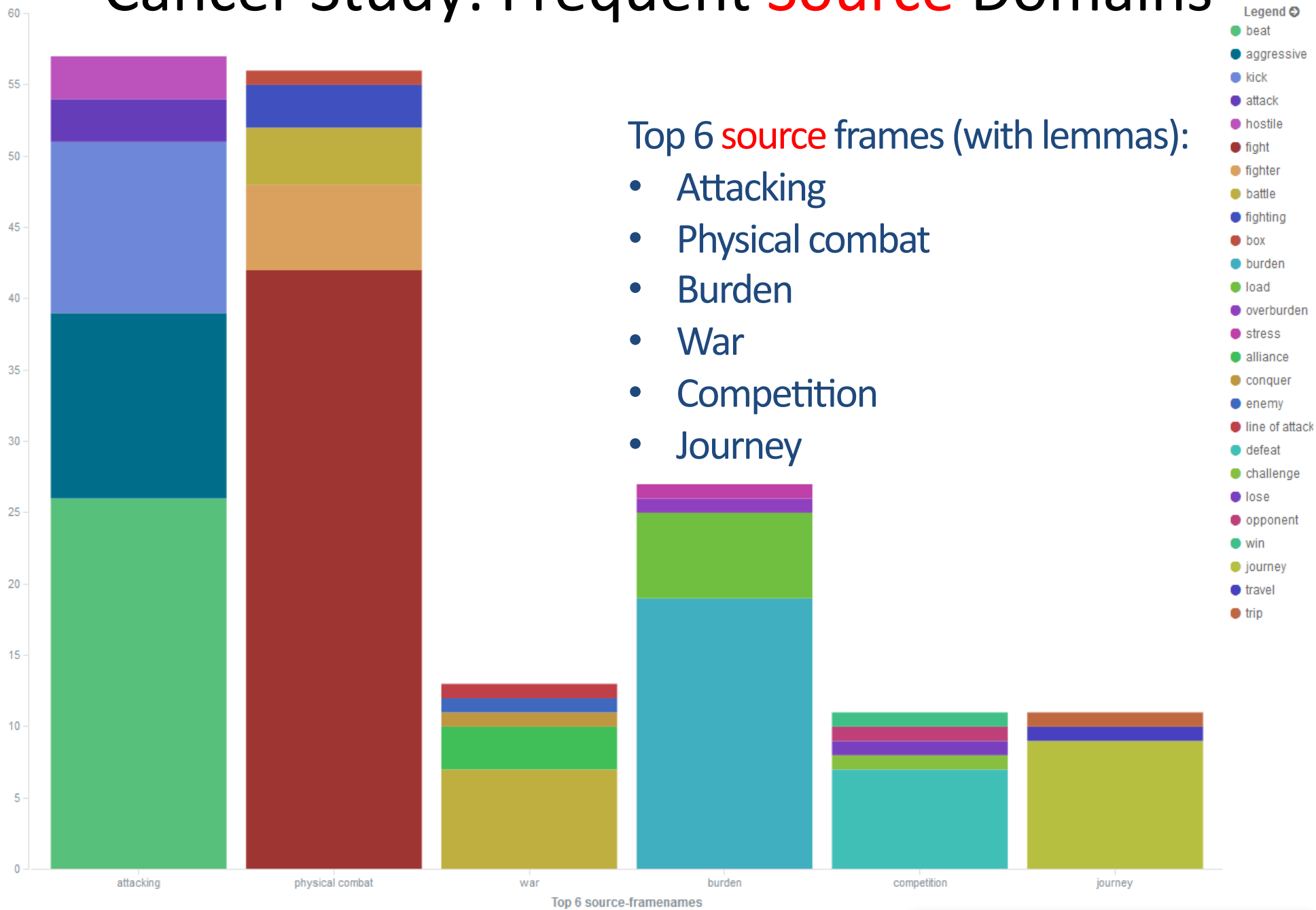
Case Study: Cancer

- Global Web-based English (GloWbE)
 - Extracted only metaphors with Cancer, Cancer Treatment, Cancer Patient **target domains**
- Forum data – two searches
 - Extracted metaphors with any Disease-related **target domain**
 - *Source domain* search focused on Physical Combat and Motion **source domains**
 - Extracted any metaphors with Physical Combat or Motion **source domains**, regardless of **target domain**

Cancer Study: Frequent **Source** Domains



Cancer Study: Frequent **Source** Domains



Cancer Study: Violence metaphors

Cancer as an enemy or harmful entity

The **cancer** that we face is a resilient **enemy** .

1

cancer_te

Cancer is such a sneaky **monster** ! You just never know when it's going to rear its ugly head.

Physical combat with cancer

Live life and breathe it in, stay positive and **defeat** **CANCER** .

You kick some **cancer** **butt** , girl! .

Mom **battled** **breast cancer** for nearly 12 years from Stage IIIA, to Stage II recurrence, to Stage IV mets.

Cancer as the attacker

You'll find plenty of seemingly healthy people -- some who have never smoked and others who quit smoking decades earlier -- that lung **cancer** **attacks** .

1

ca

Cancer treatment as weaponry

Remember that 'good nourishment' is a crucial **weapon** in the **fight** against **cancer** and any **illness** .

Cancer Study: Journey Metaphors

Cancer treatment as a path with recovery as destination

Share your personal story, diagnosis and **treatment path**, and stories of survival, hope and success.

It is expensive for the insurance companies to approve, hence, it appears to be the *last* in the list (at least, this was how it went with my sister's long, long **road** to **diagnosis**).

Different treatments are different paths

I am located in Canada, could have had HIFU here, but would have been required to go **biopsy route**, so Wheeler and London it was.

I think too often, we, the members of this board, try to soften the blow to others who have just started down the **cancer road**.

nov/24/13-sadly but peacefully moms **cancer journey** is at an end, she will start her new spiritual journey together hand in hand with dad.

Cancer Study: Competition Metaphors

I want you to know that cancer will not win .

I am not ready to let this cancer win .

Armstrong 's triumph over cancer and his tireless efforts to fund medical research were the compels in his popularity -- not Jenkins 's glowing prose.

Every round we win is worth ringing the bell for.

Some Other **Source** Domains

Cancer as moving entity

Palliative radiation would only have helped with any pain she was experiencing, but it wouldn't **slow** down the **cancer** as there are micro-metastatic cancer cells traveling via her blood system. 1

Seaweeds such as fucoidan and kombu, eaten in Asia, **contain** molecules that **slow** **cancers** of the breast, prostate, skin and colon **cancer** . 3

Ridding the body of colon plaque and buildup is the most effective way to **stop** **cancer** of the bowel , digestive issues and to improve kidney and liver function.

My physiotherapist even suggested that I could have paraneoplastic syndrome-basically you get symptoms from your immune system trying to **contain** the **cancer** before it's even detectable. 1

Cancer Study: Some Other **Source** domains

Shadow of cancer

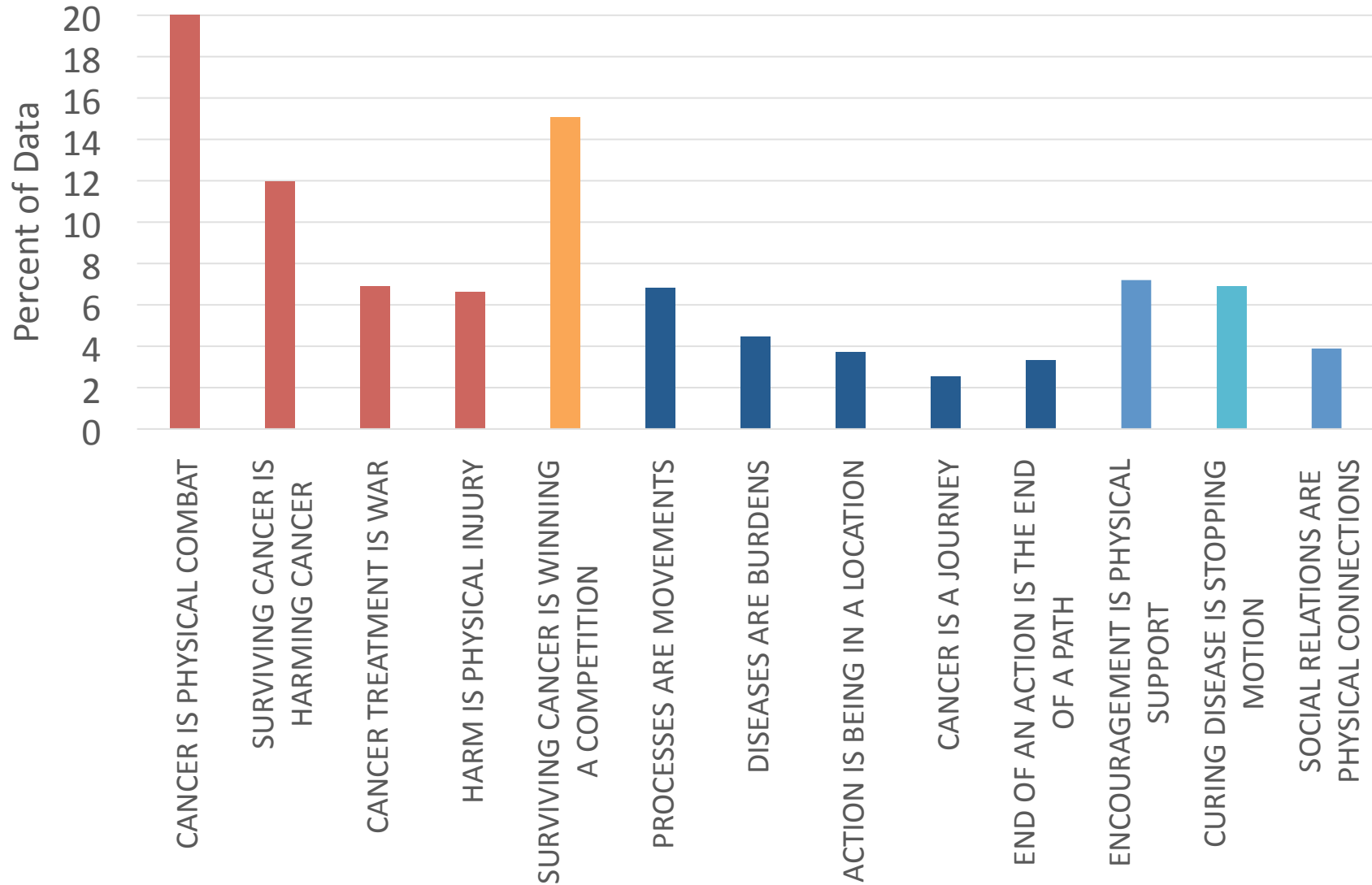
I know we will forever live under the **cancer** **shadow** , but as the doctor's nurse practitioner told us, healthy 1 cancer_test_0:1331
people face death in an instant, whether it's an oncoming bus or a plane crash.

If we don't move out of the **shadow** of **cancer** ... 1 cancer_test_0:2570

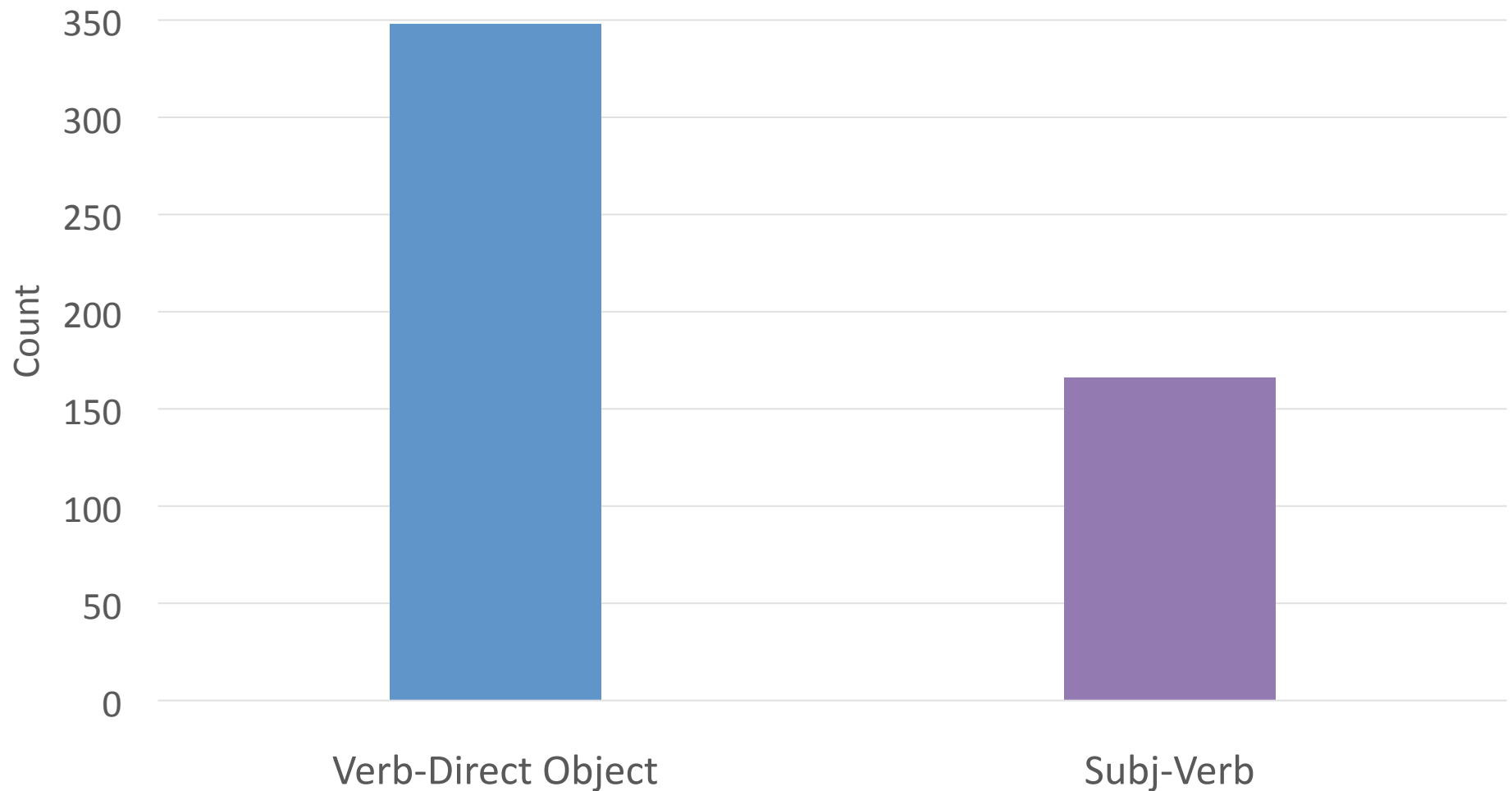
Cancer burden – technical use

One thing I can tell you is that the human body is an amazing work of art and often can continue to thrive 1 cancer_test_1:967
even with a heavy **cancer** **burden** .

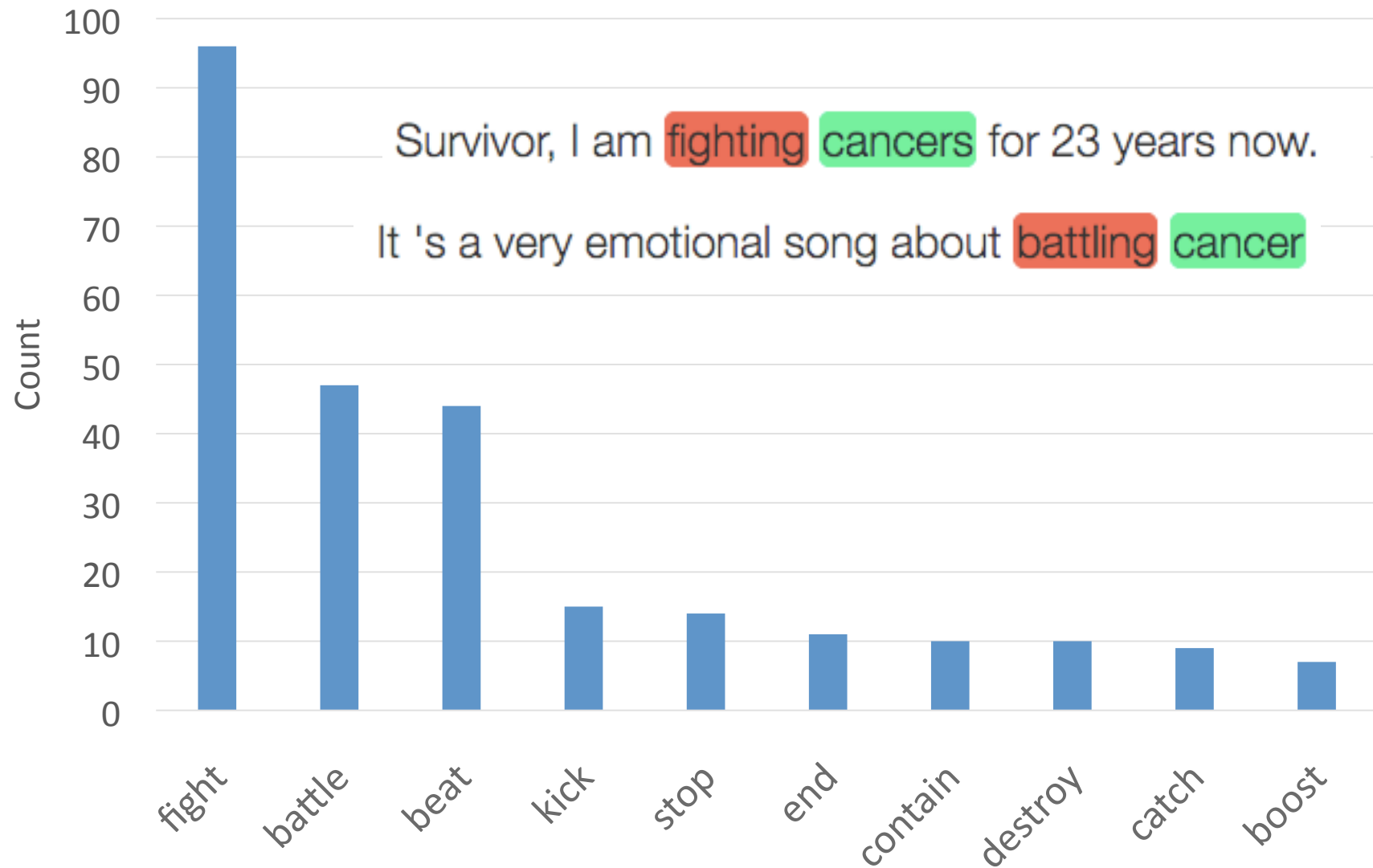
Cancer Study Results: Frequent Metaphors



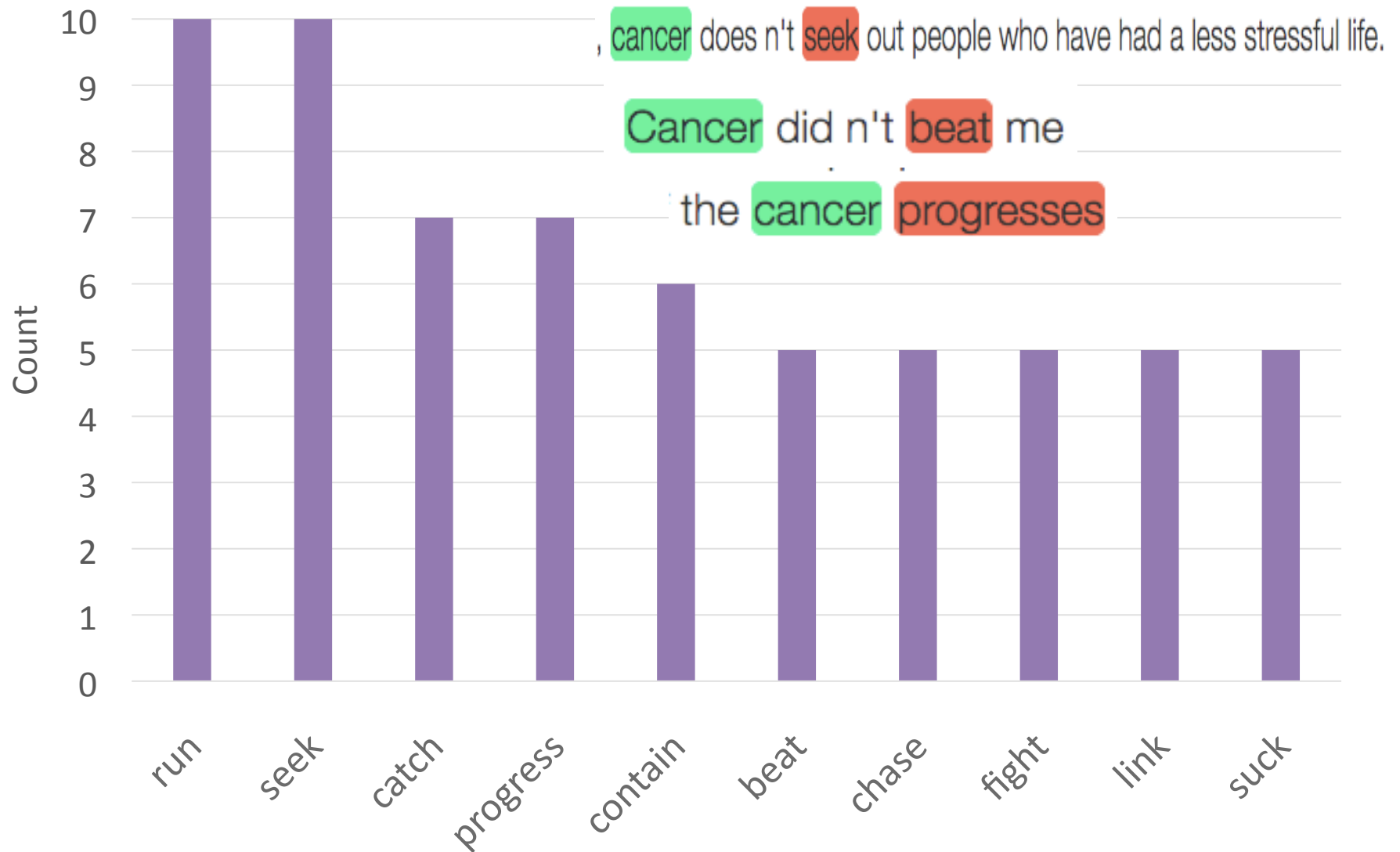
Cancer Study Results: Constructions



Cancer Study Results: lemmas in *verb cancer*



Cancer Study Results: lemmas in *cancer verb*



Cancer Study: no explicit target lemma

Source: Battle

I tried to visualize tiny resistance fighters living in my breast, my own Polish forest, beating away the Nazis ² cancer_test_0:16 inside of me.

We all deserve the metal of honor as we are the soliders on the frontline of a terrible struggle . 1 car

Pat is a savior to a lot of us fighting the battle .

At your stage, surgery will give you the absolute best chance of beating this thing for good .

Source: Journey

I just want to help in any way I can since we're all in this mysterious journey searching for the hope of light at the end of the tunnel ! Thanks =) .

Not an easy journey for any of us.

This applies also to those traveling the road with us .

Applications

- Metaphor Analysis: case studies
- **Multilinguality**
- Information extraction

Multilinguality

- Basic experiential frames
- Primary **metaphors**
- Differences across languages:
 - Lexical items
 - Culturally-specific frames and **metaphors**

Multilinguality – Spanish Wiki



[Main page](#)

Lists

- [Metaphors](#)
- [Frames](#)
- [Cx Analysis](#)
- [Cxn Matching Patterns](#)
- [Metaphoric Relational Configurations](#)
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- [IARPA Target Concepts](#)

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Category:Metaphor

This is the Metaphor category page. This category uses the form [Metaphor](#).

Create or edit a Metaphor:

Total number of Metaphor pages: 530

A

[ABORDAR](#) [EL](#)
addressing hunger

[HAMBRE](#) [ES](#)
is destroying

[DESTRUIR](#) [UN](#)
an object

[OBJETO](#)

[ABORDAR](#) [LA](#)
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poverty is

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E cont.

[ELIMINAR](#) [LA](#)
eliminate the

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poverty is cure

[UNA](#) [ENFERMEDAD](#)
a disease

[ELIMINAR](#) [PROBLEMAS](#)
eliminating problems

[SOCIALES](#) [ES](#) [CURAR](#)
social is curing

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an affliction

M cont.

[MENTE](#) [ES](#) [UN](#)
mind is a

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system concrete

[MENTE](#) [ES](#) [UNA](#)
mind is a

[BIBLIOTECA](#)
library

Multilinguality

Metaphor Identification System accommodates different languages

- **NLP pre-processing**

- Taggers:
 - English, Spanish, Russian: TreeTagger
 - Persian: Custom
- Dependency Parsers:
 - English: RASP
 - Spanish: Freeling
 - Russian/Persian: MALT

Multilinguality

Metaphor identification system accommodates different languages

- NLP pre-processing
- **Custom processing:**
 - Process is very similar across languages
 - Uses frames, **metaphors**, and lexical items from language-specific KBs
 - Searches for language-specific constructional patterns of metaphor expression
 - Identifies frames and **metaphors**

Multilinguality

Metaphor identification system accommodates different languages

- NLP pre-processing
- Custom processing

– Data analysis:

- Use of the same annotation framework facilitates use of the same analytic tools for the different languages

Applications

- ✓ Metaphor analysis -- case studies:
- ✓ Multilinguality
- **Information extraction**

Information Extraction

Correct Event Identification

- Frames and frame elements provide a powerful way to represent which events and event participants are being expressed by a sentence information .
- **Literal** example:

The doctors cured his disease.

Event type: **Treating a Physical Affliction**

Roles:

treatment provider: *the doctors*

treated affliction: *his disease*

treatment procedure: *cure*

Information Extraction

Correct Event Identification

- For metaphoric expressions, must identify relevant metaphor to identify relevant frame and participant roles
- **Metaphoric** example:

The government cured poverty.

Event type: Treating a Physical Affliction → Addressing Poverty

Roles:

treatment provider

treated affliction

treatment procedure: cure

→ policy makers: the government

→ poverty : poverty

→ policies

Information Extraction

MetaNet Analysis of FN Annotations

- Provides a semi-automatic way to identify metaphoric expressions in FN annotated sentences
- Output used to expand and improve recognition of **metaphor** in FrameNet
 - Evaluate previous uses of **metaphor** tag
 - Identify and tag additional **metaphorical** sentences
 - Refine methods for dealing with **metaphor** in FrameNet

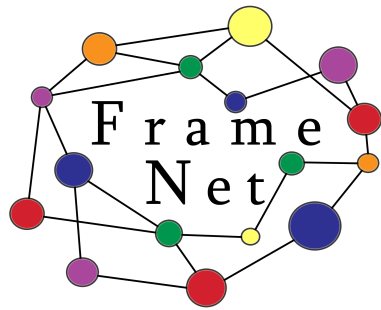
Links to the MN KB provide a way to determine the relevant **target** frames for FN examples, and thus facilitate identification of the relevant event type and participants.



Thanks!

<http://www.metaphor.icsi.berkeley.edu/pub/en>

<https://metanet.icsi.berkeley.edu>



Integrating FrameNet and MetaNet

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Road Map

- Motivation
 - Why bother?
- Challenges
 - Why difficult?
- Integrated Annotation
 - Why not?

Road Map

- ✓ Motivation
 - Why bother?
- Challenge
 - Why difficult?
- Example
 - Why not?

Motivation

- shared approach to meaning representation
- richness of each knowledge base alone
- complementarity of the two KBs together
- increased value and computational tractability of frame-based meaning representations
- high degree of interconnectedness (de Melo 2014)

Similarities of FN and MN

- frame-based meaning representation
- characterize the conceptual and linguistic means that (a) language provides to describe situations (states of affairs, events, objects)
- situate individual frames within a larger structure of interrelated frames, offering a broad perspective on the conceptual structure that (a) language expresses

Challenge of Integration

- Heterogenous structures preclude merging FN and MN through alignment and linking, a much simpler method of achieving integration than creating a new entity, albeit far from simple.
 - Multilingual FrameNet: proposal to align FNs (Brazilian Portuguese, English, French, Italian, Japanese, Swedish, etc.)
 - preliminary work shows that alignment of DBs with same structures is not “simple”.

Differences Between FN and MN

- State of Development

- FN: 1997 – ongoing

- MN: 2012 – “on hold”

} coverage discrepancy

- Objectives

- FN: repository of frames, LUs, annotation sets, manual FS analysis of contemporary English lexicon; semantico-syntactic mappings

- MN: repository of conceptual metaphors; CMT analysis of linguistic metaphor; **source-target** domain mappings; automatic extraction and analysis system

Differences Between FN and MN

- Semantic Granularity of Frames

- FN: mostly general vocabulary of language

- MN: tends to be specific for metaphor

FN: *poverty.n* – `Wealthiness` frame, including
affluent.a, *rich.adj*, *wealth.n*, etc.

MetaNet:

Conceptual Metaphor: Poverty is a Harmful Agent

Linguistic Metaphor: *Poverty* attacks children.

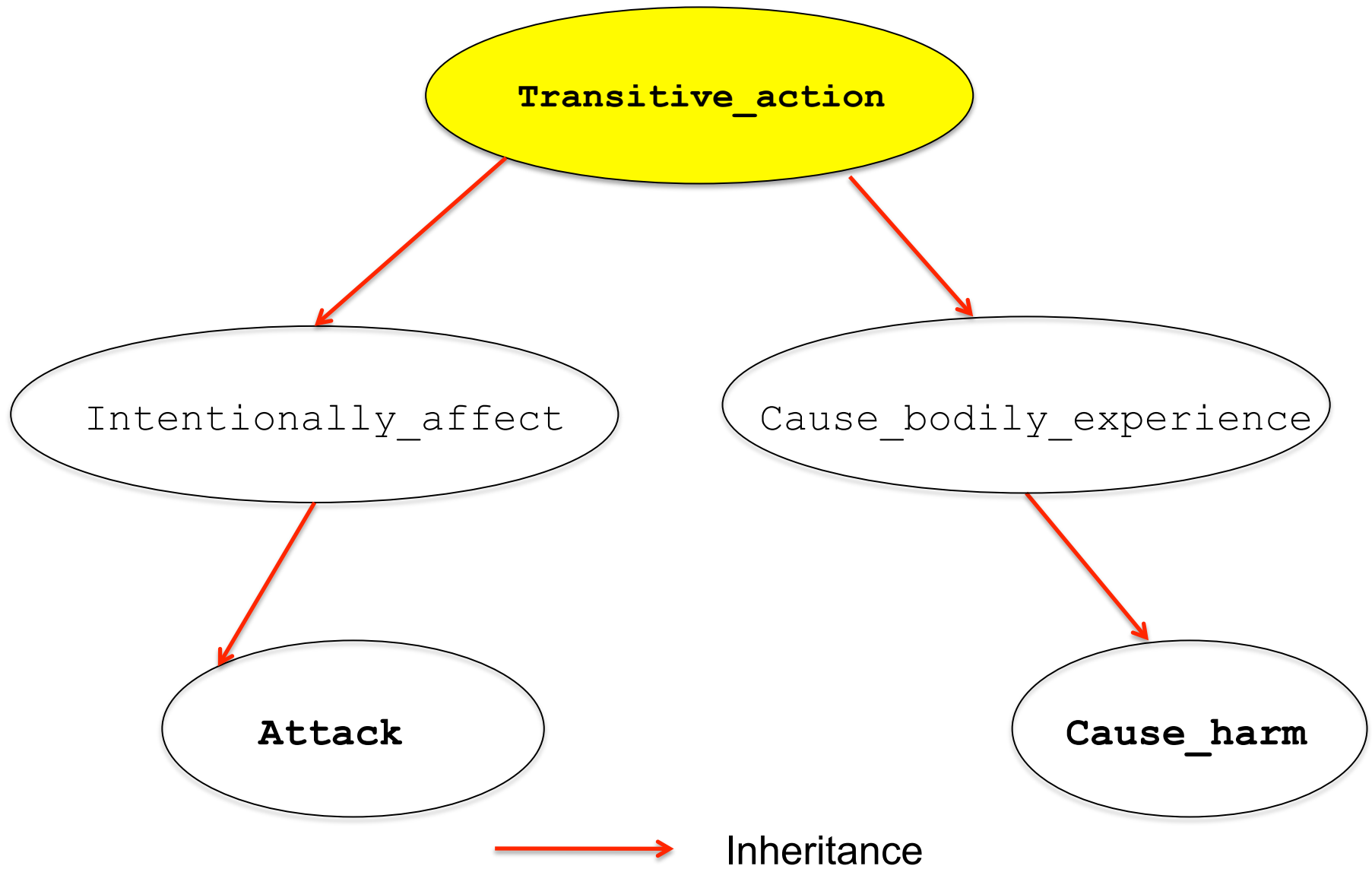
- Frame-to-Frame Relations

Frame-to-Frame Relations in FN and MN

FrameNet	FrameNet Only	MetaNet	MetaNet Only
Inheritance		is subcase of	
Uses		makes use of	
Subframes		is a subprocess of	
Perspective_on		is a perspective on	
	Precedes		
			incorporates as a role
			is in scalar opposition to
	Inchoative_of		
	Causative_of		is in causal relation with
	See_also ⁵		

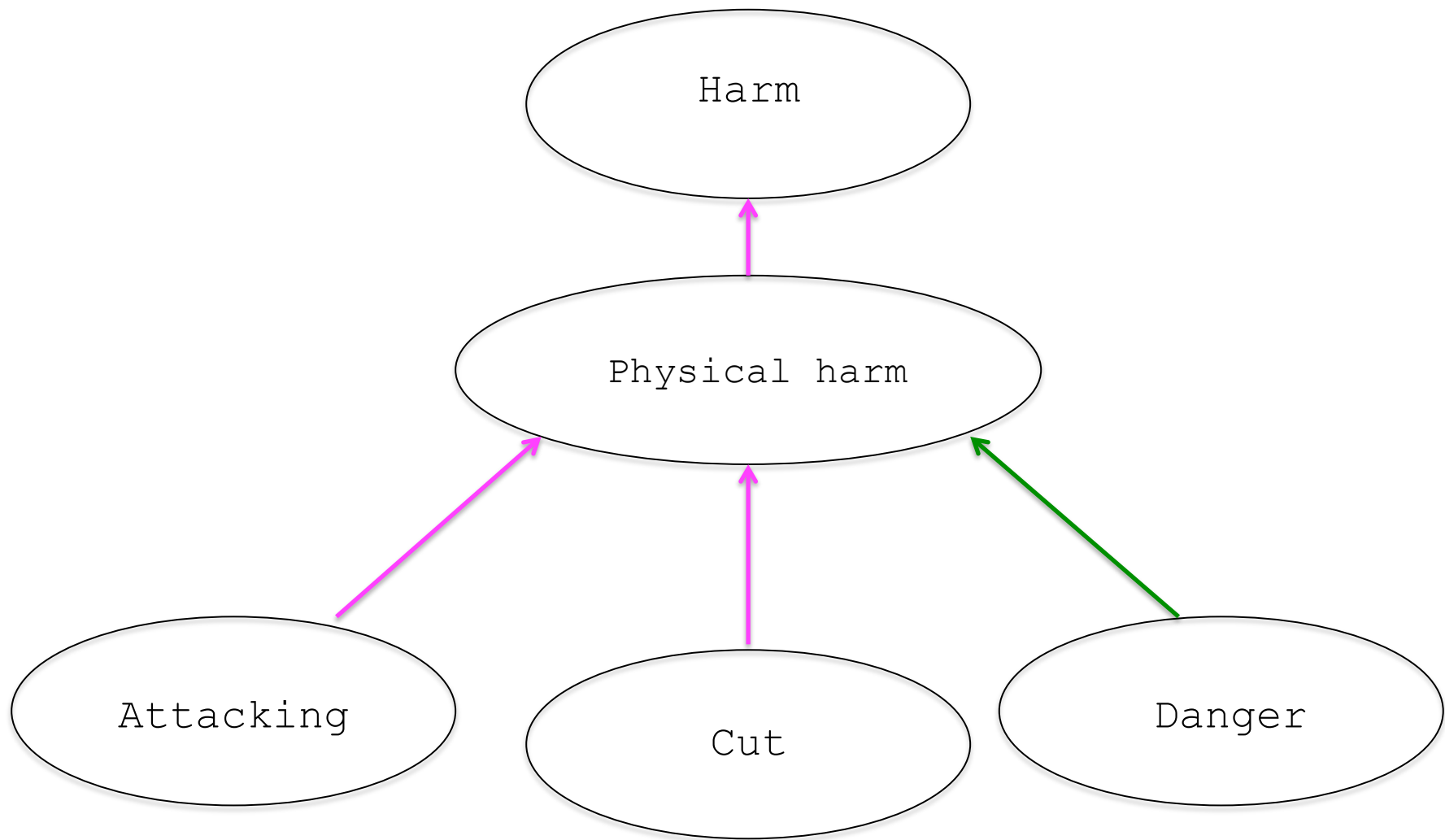
Example: Attack.attack.v

- **Frame-to-Frame Relations:** `Attack` and `Cause_harm` are related via a higher-level **frame**. `Attack` and `Cause_harm` inherit from `Transitive_action`.
- The two FN frames share a grandparent, not a parent; `Attack` and `Cause_harm` are **NOT** in a parent-child relationship.



MetaNet: Attacking Frame

- Roles:
 - attacker (ASSAILANT)
 - attackee (VICTIM)
 - effect_of_attack (RESULT)
- MN's Attacking is a subcase of a more general Physical_harm frame.

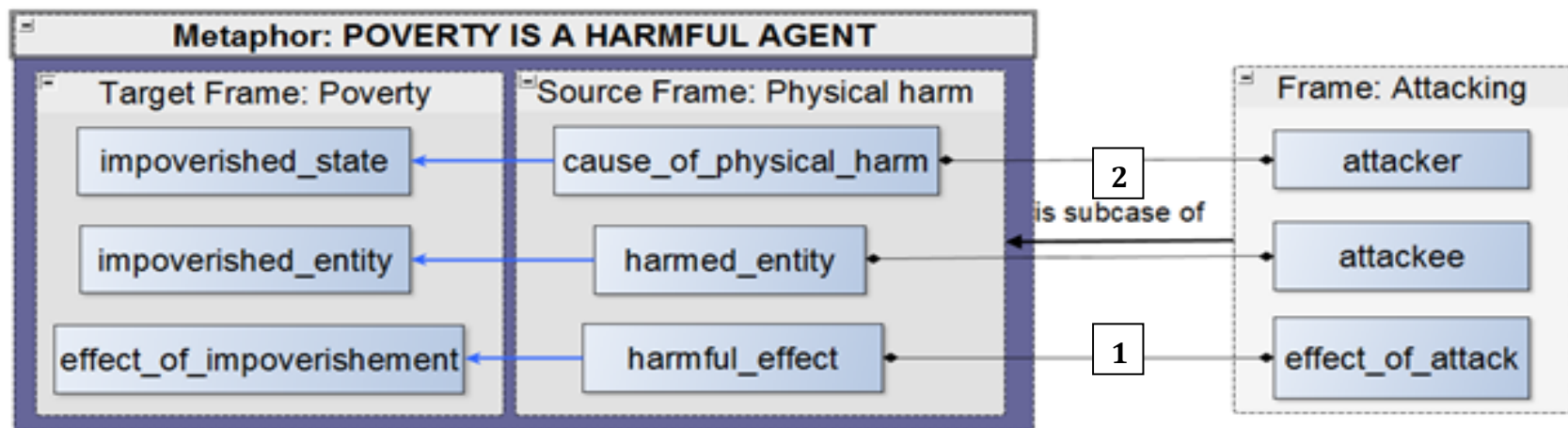


is a subcase of

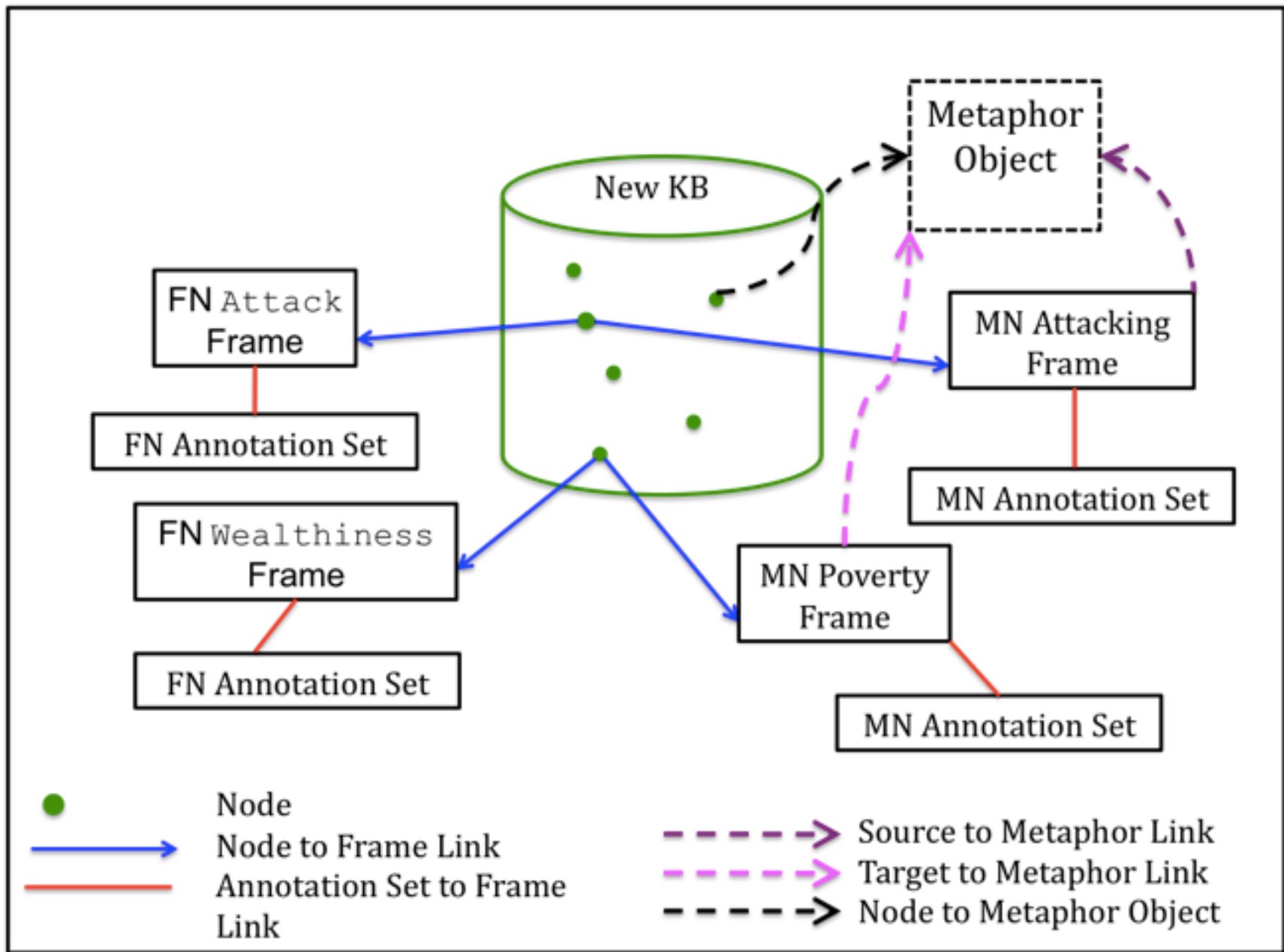


makes use of

Conceptual Metaphor: Poverty is a Harmful Agent



Linguistic Expression: Poverty *attacks* children.



Sentence:	<i>Poverty</i>	<i>attacks</i>	<i>children</i>
FrameNet			
Frame		Attack	
Frame Element	Assailant		Victim
Metaphor Info	✓		
MetaNet			
Frame	Poverty	Attacking	θ
Metaphor Info	Target	Source	
	POVERTY IS A HARMFUL AGENT		

Combined FrameNet and MetaNet Annotation (current soa)

Thanks!

<http://framenet.icsi.berkeley.edu>

<https://metanet.icsi.berkeley.edu>

MetaNet: Development Plans

Two Key Areas

- Improvement of validation and evaluation methods
- Expanded annotation

MetaNet: Development Plans

Improvement of validation and evaluation methods

- Expand the manually compiled gold-standard, which currently contains approximately 400 example sentences that **metaphor** analysts annotated.
- Use gold standard for regression testing to ensure that future changes improve rather than degrade the system
- Modify existing data analytic tool to facilitate manual validation of correctly annotated examples via the automatic **metaphor identification** process, thus creating a much larger high-quality gold-standard.
- Use larger gold-standard as training data for machine learning methods for further system improvements.

MetaNet: Development Plans

Expanded annotation and analysis:

- By defining additional constructional patterns, the MN system could be used to analyze larger patterns of metaphor expression and additional participant roles.

Example:

- Current: *The government **attacked** **poverty**.*
- Future: *The government* **attacked** **poverty**.

MetaNet: Development Plans

Expanded annotation and analysis:

- ✓ additional constructional patterns
- **Combine MetaNet with Automatic Semantic Role Labeling (ASRL)**
 - Use ASRL systems such as SEMAFOR (Das et al. 2014) to produce frame-based annotation of events and participant roles
 - MetaNet **metaphor identification** system produces **metaphor-related annotation**, but without explicit identification of participant roles.
 - Combined annotation would provide more comprehensive semantic analysis, and could serve as basis for expansion and enhancement of MN metaphor identification system

MetaNet: Development Plans

Expanded annotation and analysis:

- ✓ additional constructional patterns
- ✓ MetaNet plus ASRL
- **Combining MetaNet with Embodied Construction Grammar (ECG)**
 - Feldman et al. 2010, Dodge et al. 2014
 - Use existing ECG grammars to expand the range of constructional patterns that the system analyzes

MetaNet: Development Plans

Expanded annotation and analysis:

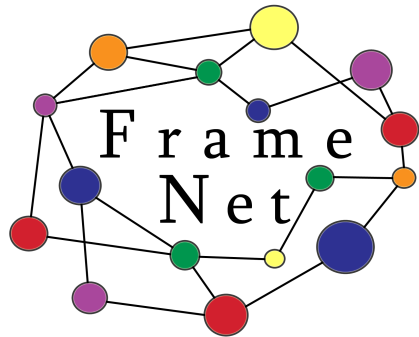
- ✓ additional constructional patterns
- ✓ MetaNet plus SRL
- ✓ MetaNet plus ECG

Ultimately, the goal is creating a system that produces frame-based semantic analyses of both literal and metaphoric sentences.

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Thanks!

<http://framenet.icsi.edu>

<http://www.metaphor.icsi.berkeley.edu/pub/en>

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