



Cyber-detectives, Robot Mysteries

Micha Elsner, dept. of Linguistics (melsner@ling.ohio-state.edu)



img: Kevin Rae (cc)



In many games, you can do
whatever you want...

Games with stories are different... Plots are handwritten by designers

Tactus: Back again? I'm still not sure about trading those medical supplies.

Do the right thing.

Take ours as a gift.

Don't be a fool.

You should reconsider.

Nothing has changed since 1990...



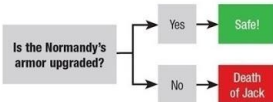
What's the problem with that Largo guy?
Nice apron. Are you some sort of chef?
How much wood could a woodchuck chuck if a woodchuck
could chuck wood?
I'd just like to browse, thanks. +

Monkey Island 2

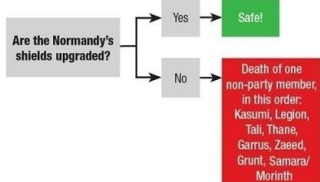
Moby
Games

THE APPROACH

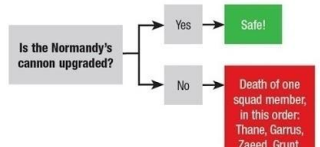
ARMOR CHECK



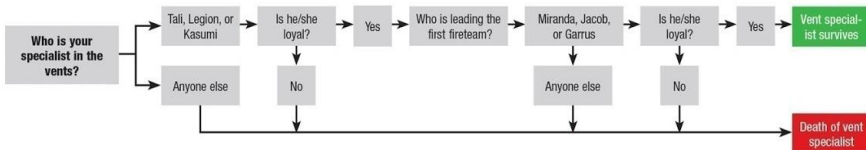
SHIELD CHECK



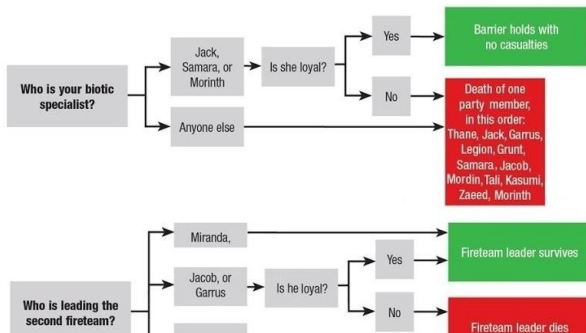
WEAPONS CHECK



THE BASE

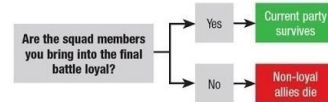


THE LONG WALK

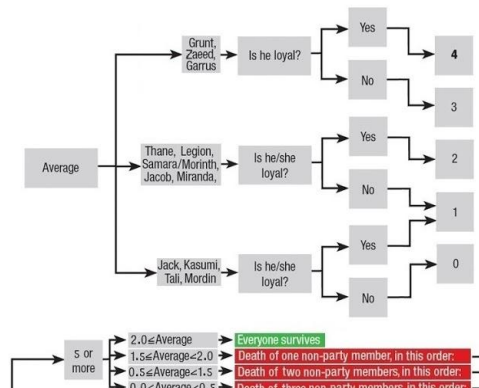


THE ENDGAME

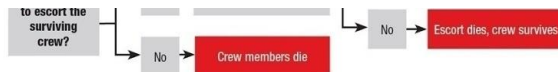
THE FINAL FIGHT



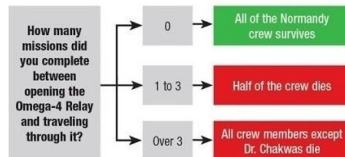
HOLD THE LINE



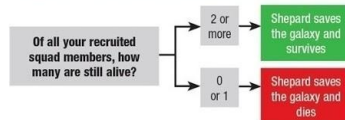
Complex plots are hard to write...



THE CREW



THE COMMANDER



Computer-aided storytelling isn't just fun and games...

Characters from USC project
Army Excellence in Leadership



from U Washington's Center for Game Science



RIDDLE BOOKS

Sharpen your math and reading
skills by solving riddles!



Storytelling for education

Automated storytelling requires artificial intelligence

- What should **happen** in the story?
- What should the story make you **feel**?



img: wikipedia

Grimesby Roylott's evil plan

If my daughters get married, I'll lose money...
I don't want to lose money...

If my daughters die, they can't get married...

If a poisonous snake bites my daughters, they'll die

If I put a snake in the ventilator, it will bite my daughters

THEREFORE: I should put a snake in the ventilator!

Is this actually a good plan?



Computer-aided planning

Open ... / Close ...	
Open door dx.	
OPEN(dx)	
Preconditions:	NEXTTO(ROBOT, dx), TYPE(dx,DOOR), STATUS(dx,CLOSED)
Deletions:	STATUS(dx,CLOSED)
Additions:	*STATUS(dx,OPEN)
Close door dx.	
CLOSE(dx)	
Preconditions:	NEXTTO(ROBOT,dx), TYPE(dx,DOOR), STATUS(dx,OPEN)
Deletions:	STATUS(dx,OPEN)
Additions:	*STATUS(dx,CLOSED)

(img: Rutgers U)

Use predefined logical rules to plan for a goal...

What do you think of this approach?

Problem!



The Analytical Engine has no pretensions to *originate* anything. It can do *whatever we know how to order it to perform*
-Ada Lovelace

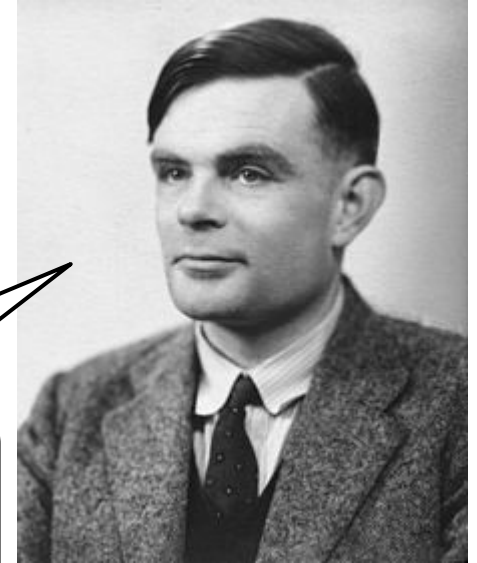
Programming all the rules is almost like writing the story!

...The programmer decides in advance what will happen

Another approach...



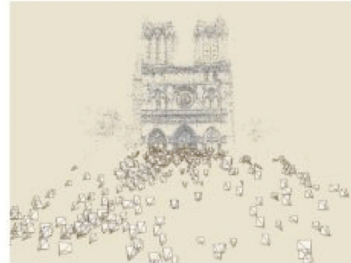
The Analytical Engine has no pretensions to *originate* anything. It can do *whatever we know how to order it to perform*
-Ada Lovelace



Learning machines:
Instead of trying to produce a programme to simulate the adult mind, why not rather try to produce one which simulates the child's?
-Alan Turing

Machines that learn...

- Lots of data
 - Tells us what the options are



img: Tamara Berg

- Probability
 - Combines evidence to make good choices

Newer projects learn rules from existing stories

Plan steps learned from 60 stories
about robbing a bank

img: Li et al, from Georgia Tech

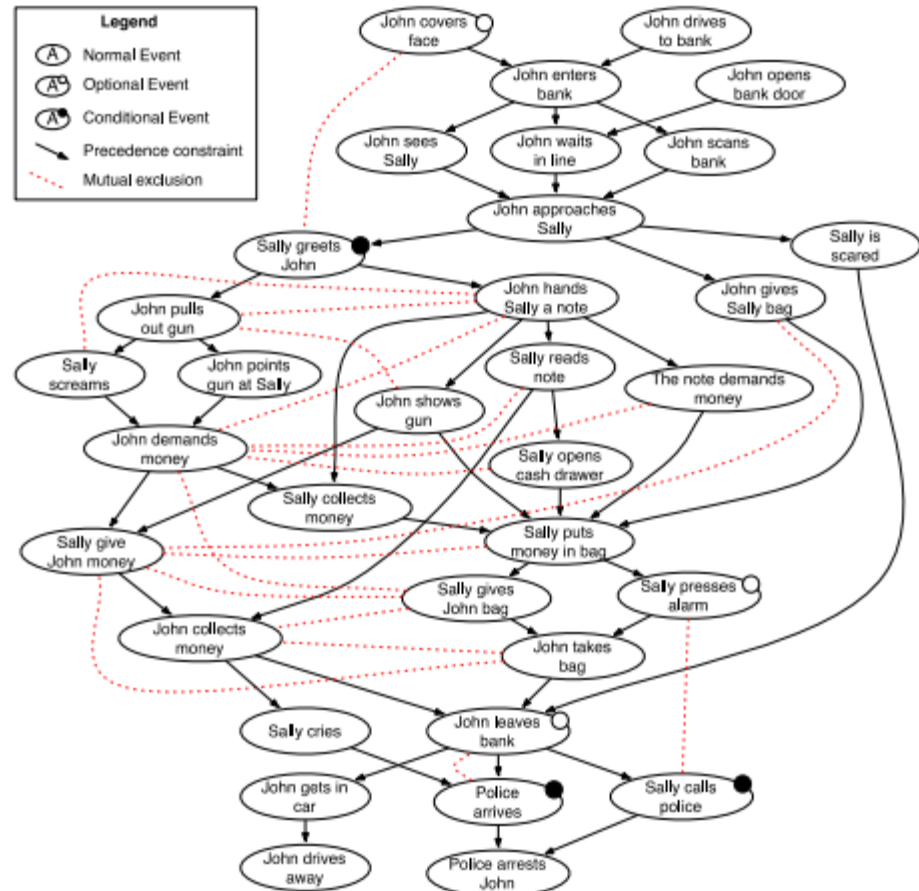


Figure 2. A plot graph for the bank robbery activity.

Plans aren't enough...

There was a detektav wuns named Cal, who was a very good detektav and very brave. Nuthin fritened him. Imajin his surprise one night when he herd an introoder in his masters home.

He came russian into the riting office. There was an introoder. He had cum in throo the windo. There was broken glas. That was what Cal, the brave detektav, had herd with his good hering.

He said, "Stop, introoder."

The introoder stopped and looked skared. Cal felt bad that the introoder looked skared. Cal said, "Look what you have done. You have broken the windo."

"Yes," said the introoder, looking very ashaymed. "I did not mean to break the windo."

-Isaac Asimov, "Cal"

The Introoder's evil plan

(img: anorak.co.uk)

I need money...

There's money in the house...

If I were in the house, I could take the money...

I can't get in because of the window

THEREFORE, I should break the window!

Is this a good plan?

Does it make an interesting story?

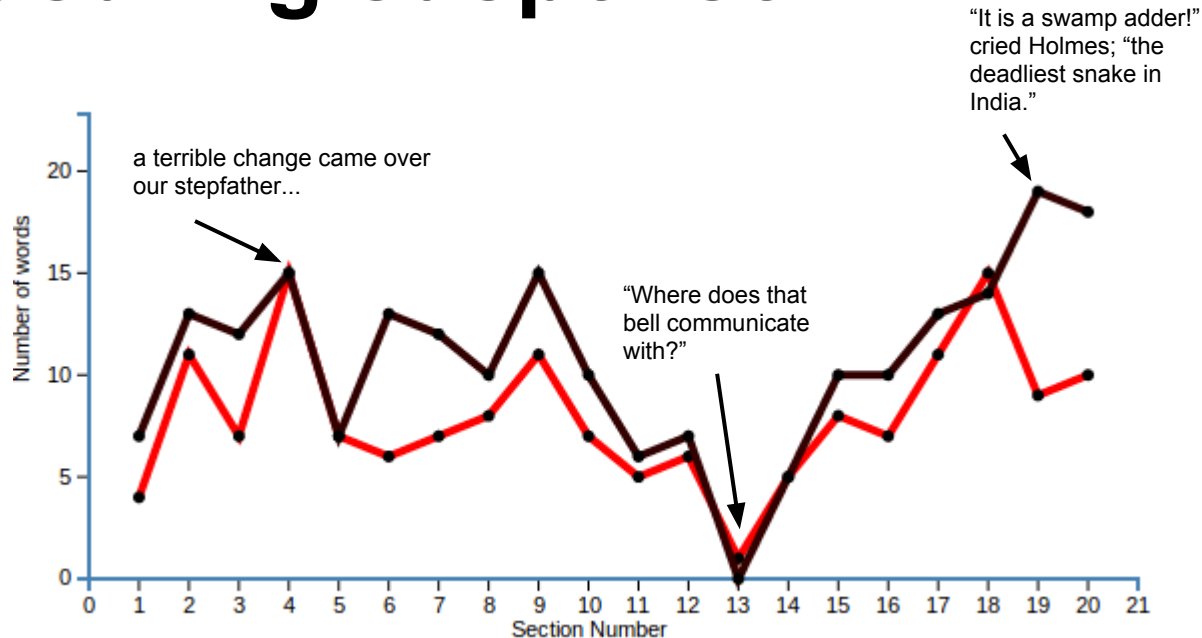


We need clues! We need suspense!

- Roylott plans to kill Helen ***and not get caught***
- Mysterious hissing sounds, dummy bell-ropes...
- Solution ***makes sense*** (sort of) but still surprising



Measuring suspense?



Anger and fear in *Adventure of the Speckled Band*

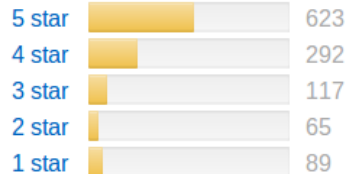
tool by Robert Ang, Jon Oberlander, Vicky Adams (U of Edinburgh), Micha Elsner (OSU)

Sentiment analysis

Customer Reviews

★★★★★ (1,186)

4.1 out of 5 stars



[See all 1,186 customer reviews](#)

amazon.com reviews for 2010 "Sherlock Holmes"

Good movie, lots of action and very good acting.

Robert A. Smiley

It is not pushed too far and, though sometimes improbable, is not more so than in some stories - and is certainly mild compared to most films.

Bill R. Moore

I've watched it many times and hopefully the second Sherlock Holmes will be as good as this one.

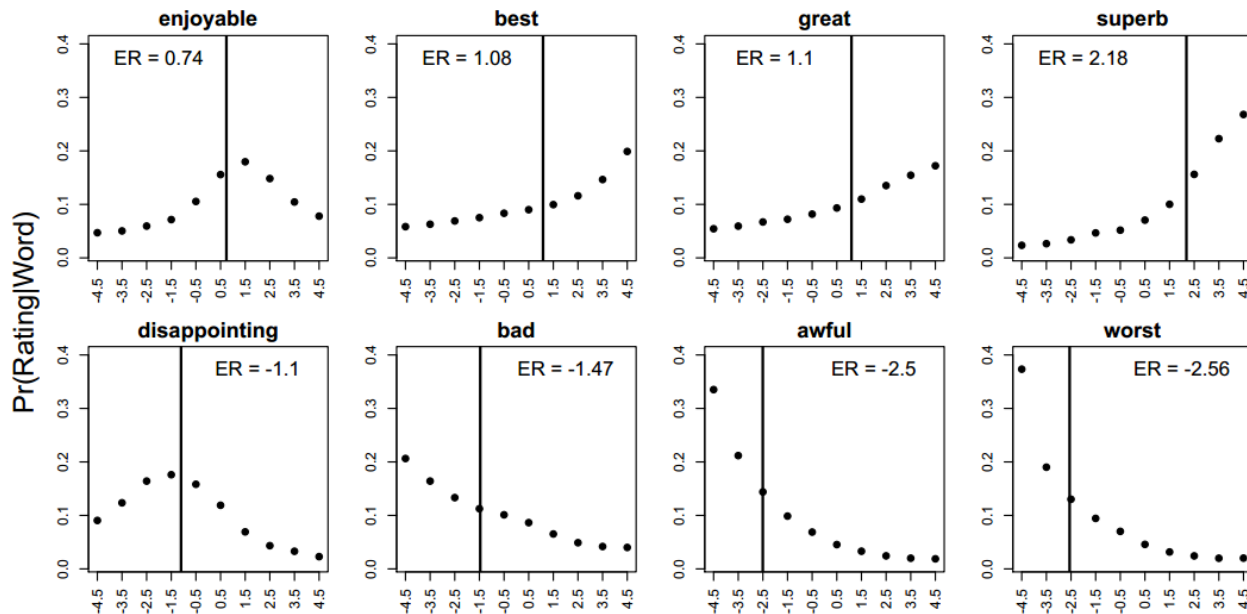
G. L. Nootens

Originally used for customer service



Sentiment word by word

- Ask “is this word [angry/sad...]”?
- Count average stars for reviews with word



star ratings in IMBD
reviews containing
various words

from de Marneffe
(OSU), Manning and
Potts (Stanford)

This doesn't always work...

“See that you keep yourself out of my grip,” he snarled, and hurling the twisted poker into the fireplace he strode out of the room.

“He seems a very **amiable** person,” said Holmes, **laughing**. (positive emotion)

I have no one to **turn to**—none, save only one, who cares for me, and he, poor **fellow**, can be of little **aid**. (trust)

I found myself in my old armchair in my own old room, and only wishing that I could have seen my old **friend** Watson in the other chair which he has so often **adorned**. (happiness)

I am naturally observant, as you may have remarked, Mr. Holmes, and I soon had a **pretty good** plan of the whole house in my head.

...versus: She is a very **pretty** girl and has attracted admirers who have occasionally hung about the place. That is the only drawback which we have found to her, but we believe her to be a thoroughly **good** girl in every way.

(positive emotion)

From sentiment to music

Hannah Davis and Saif Mohammad's evil plan?

- Convert text to emotional graph

 - Determine overall positive vs negative

 - active emotions (anger and joy) vs inactive (sadness)

 - level of emotion at beginning, middle or end?

 - dominant emotions

 - Map to major or minor key

 - tempo

 - number of notes in melody

 - higher or lower notes

- Create a musical score using JFugue composition software

<http://www.musicfromtext.com/>

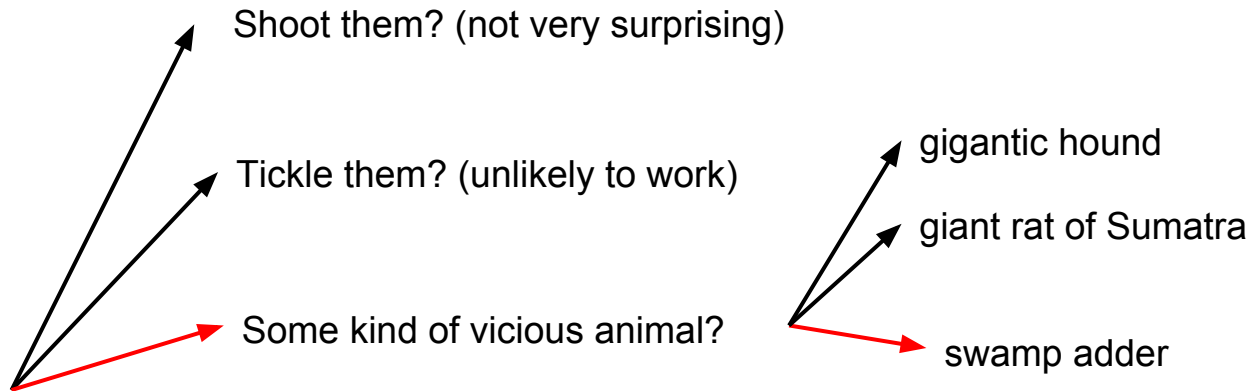
Computer storytelling: still unsolved

Need both planning and sentiment...

But how?



Roylott wants to murder daughters...



Clues shouldn't be too obvious...

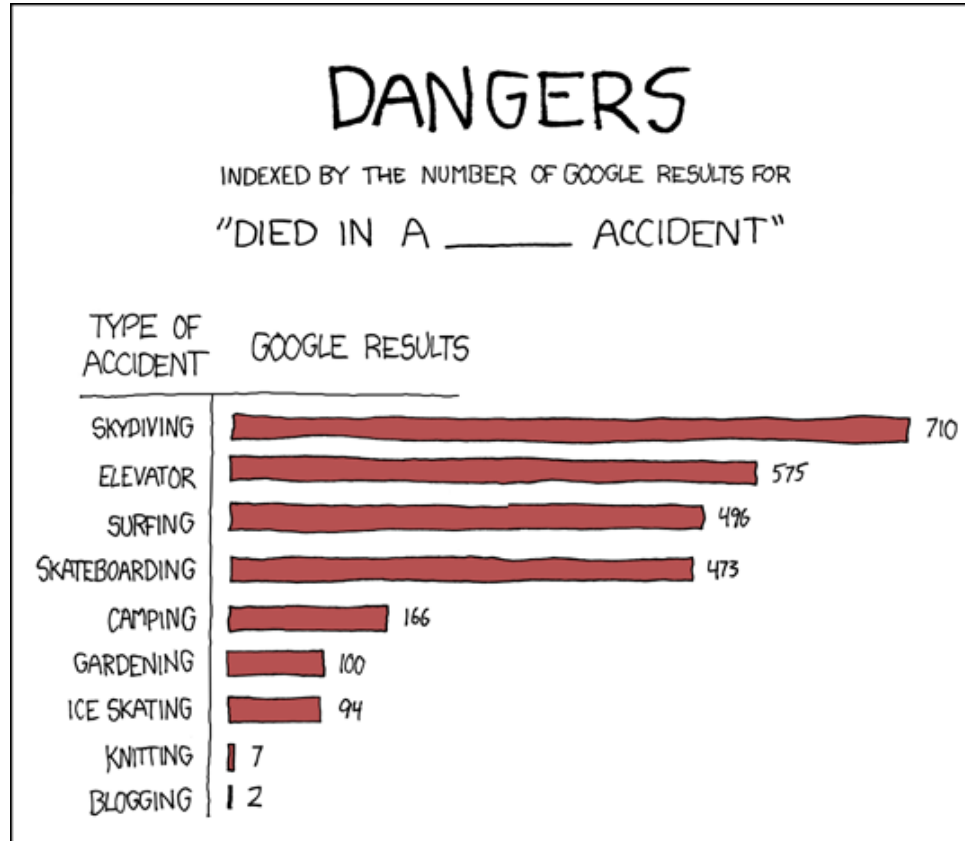
Good: The sight of the **safe**, the **saucer of milk**, and the **loop of whipcord** were enough to finally dispel any doubts which may have remained.

Not good: The sight of the **glass tank**, the **bucket of mice**, and the **snake tongs** were enough to finally dispel any doubts which may have remained.

Don't even try: 'Oh, my God! Helen! It was the **scarf!** The **scaly scarf!**'



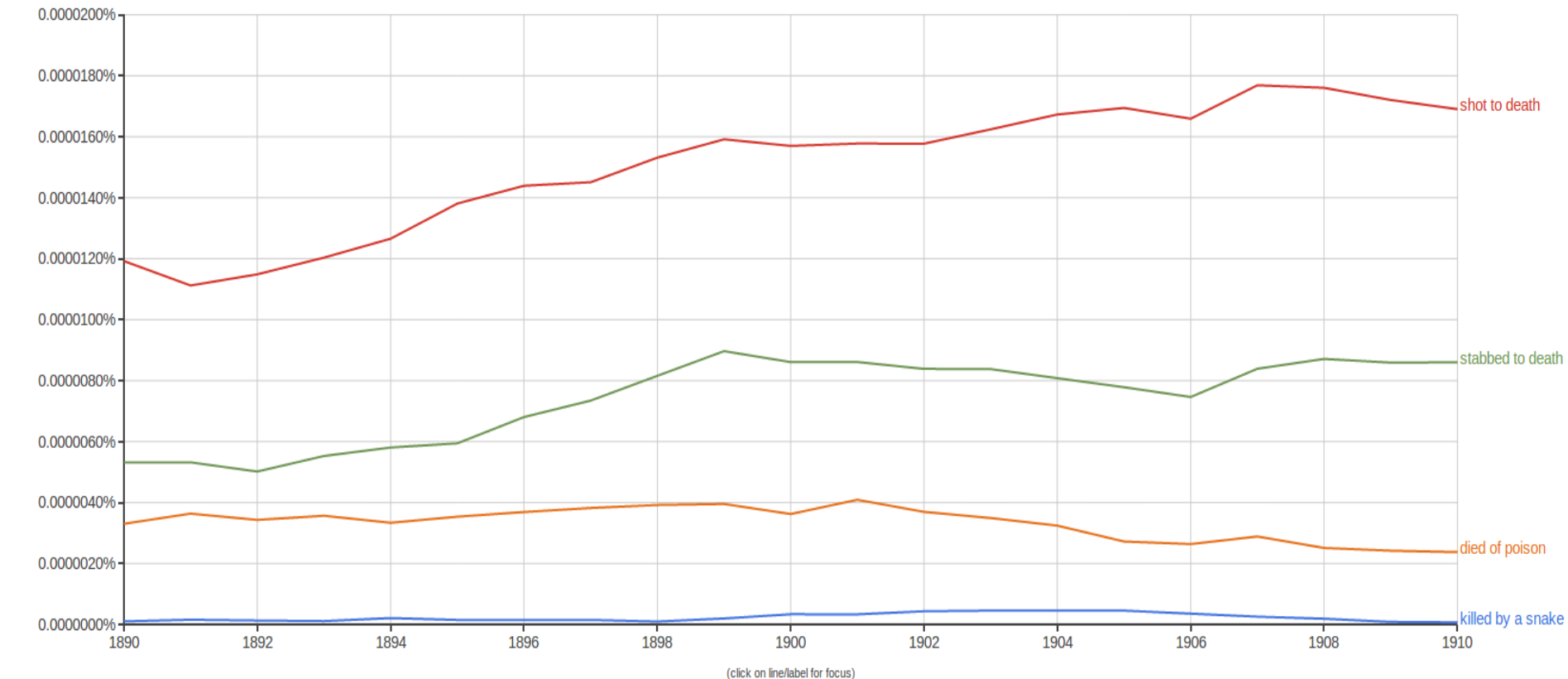
Measuring “how obvious” with data



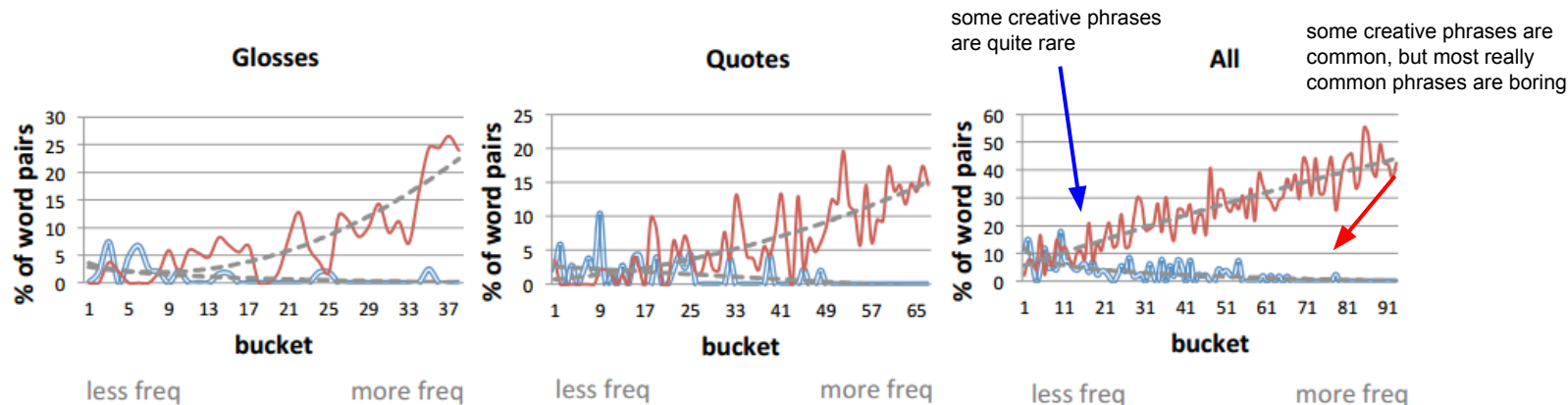
xkcd: Randall Munroe

Graph these comma-separated phrases: ☐ case-insensitive

between and from the corpus with smoothing of [Search lots of books](#)



But frequency is not enough



(a)

Results from a paper by
Kuznetzova, Chen and Choi
(SUNY Stonybrook)

Data with creativity
scores from survey
on Amazon
Mechanical Turk

Common

quiet teenager
constant longitude
watery juice
noble political
diet cooking
verbal interpretation
unwelcome situation

Creative

inglorious success
thorny existence
relaxed symmetry
sardonic destiny
dispassionate history
poetical enthusiasm
verbal beauty

What we've learned...

- A good mystery should *make sense*
 - Which takes *planning*
- It should be *exciting*
 - Which takes *sentiment analysis*
- It should be *creative*
 - We're still not sure how to do this
- And then you need to put it all together...

"THE GAME
IS ON."

221B

**Maybe someday soon, computers
will be able to tell interesting stories!**