Emotional arcs of stories

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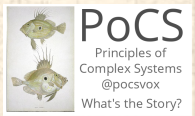
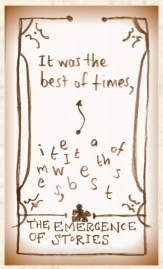
Principles of Complex Systems, Vols. 1 & 2
CSYS/MATH 300 and 303, 2021–2022| @pocsvox

Prof. Peter Sheridan Dodds | @peterdodds

Computational Story Lab | Vermont Complex Systems Center
Vermont Advanced Computing Core | University of Vermont





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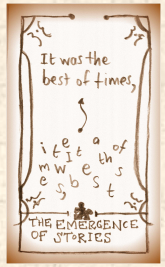

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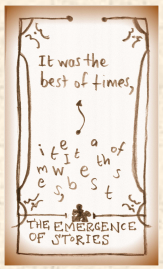

Outline

Stories

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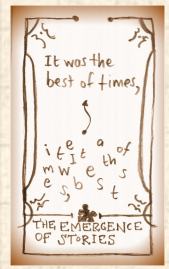

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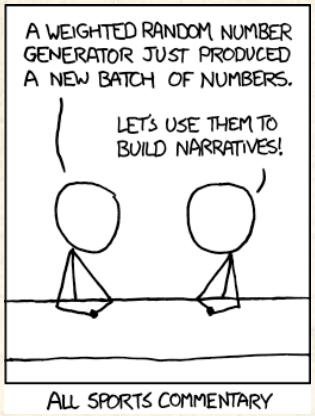

xkcd.com/904/

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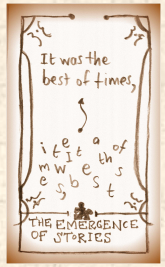

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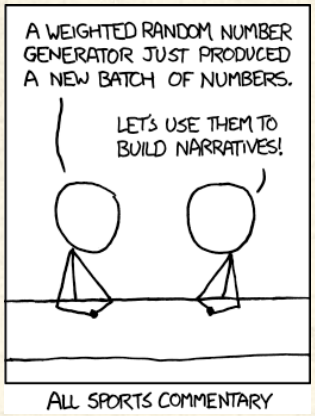

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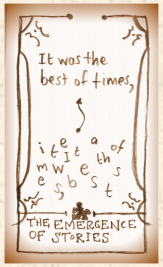

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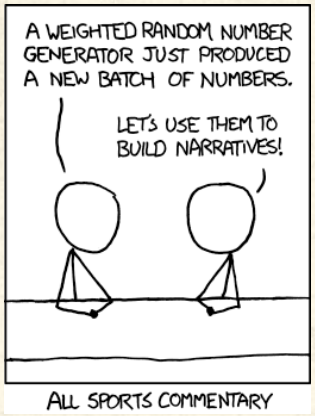

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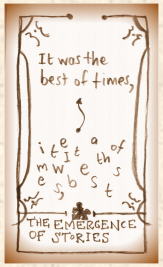

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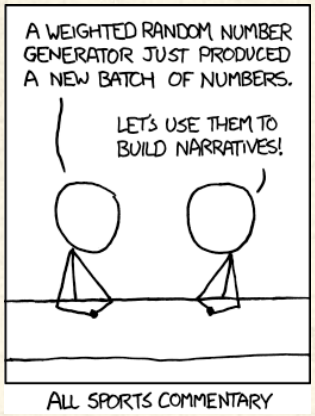

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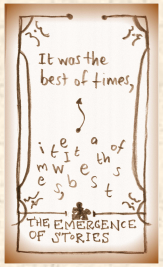

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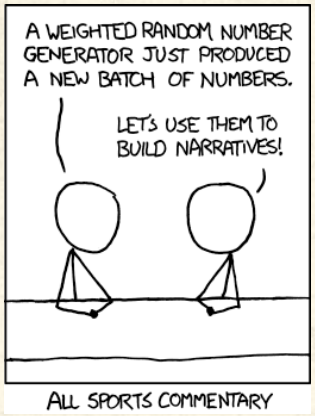

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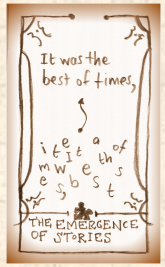

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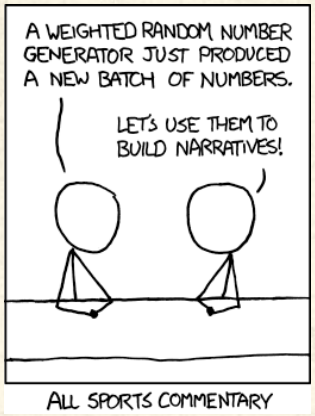

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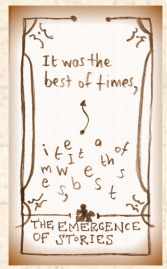

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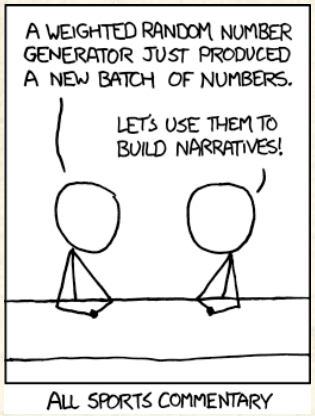

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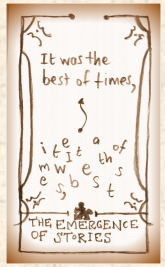
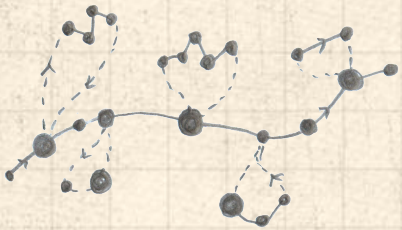
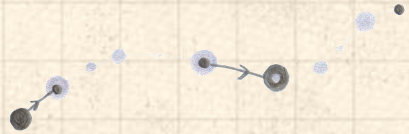
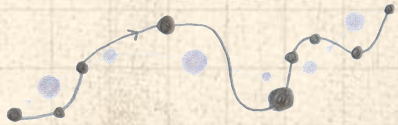
- Research: The taxonomy of human stories.

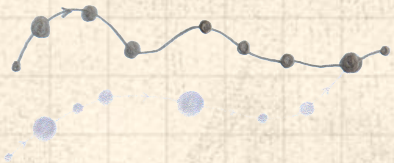


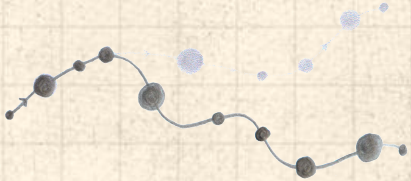
Adjacent narratives—why mistruths and conspiracy theories exist and flourish:

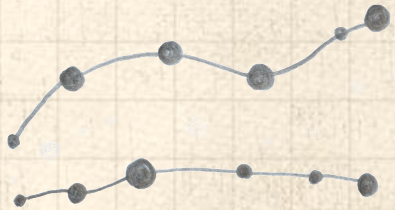


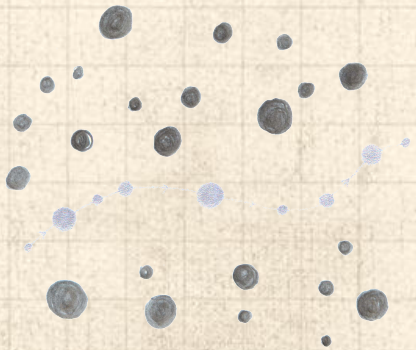


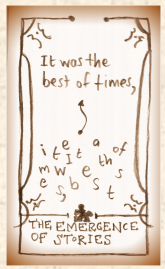








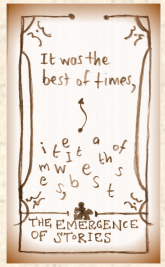




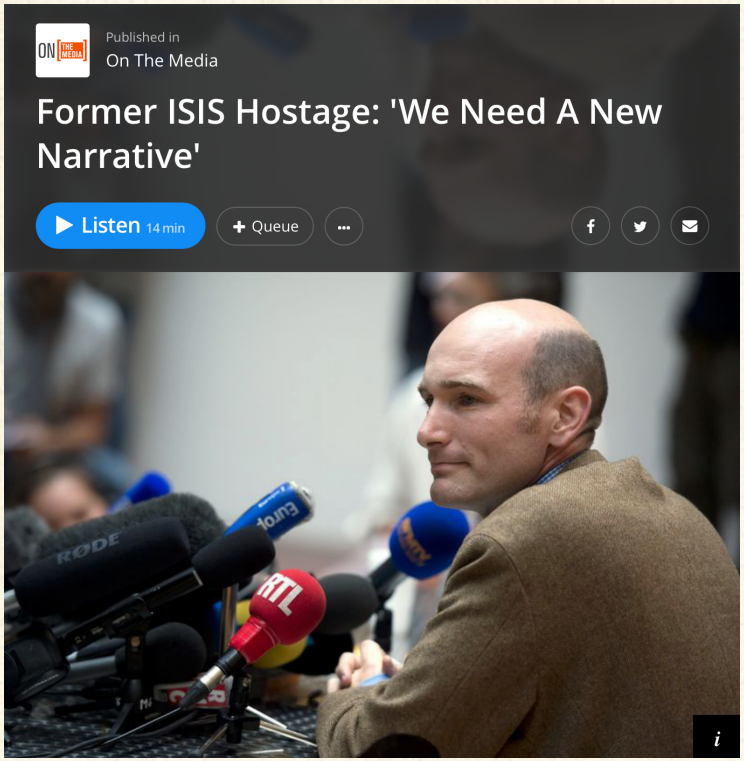
1999 Gallup poll:

- 6% of Americans said the lunar landings were fake.
- 5% were undecided.

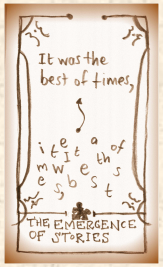
Video replay (disputed):



Story Wars:



Nicholas Hénin, French Journalist, held captive for 10 months.



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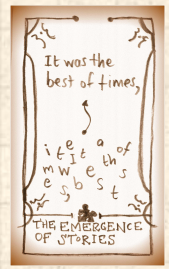

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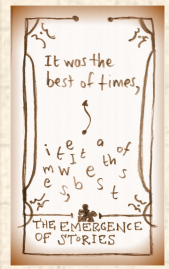

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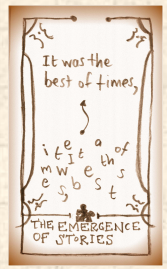

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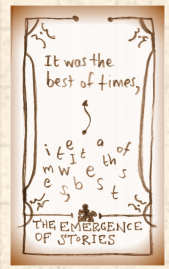

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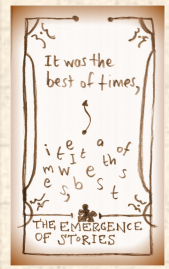

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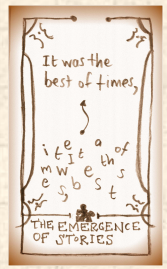

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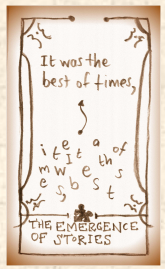

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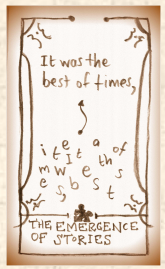

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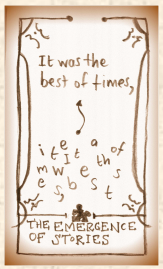

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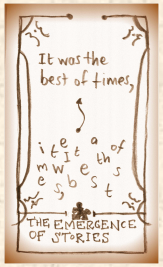

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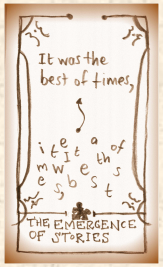
[BROOKE LAUGHS]



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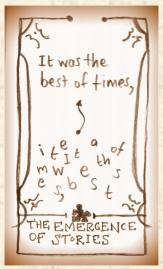
[BROOKE LAUGHS]

Just because we have no imagination, we cannot just tell beautiful stories, create beautiful characters, beautiful heroes.



From the end of the interview:

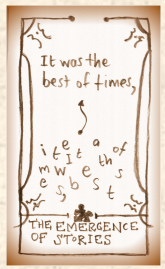
NICOLAS HENIN: No, it was just like in a movie. And, by the way, even the people going to Syria, joining ISIS in Syria to fight, even these people see himself as movie characters. They play their own movie. This is why I think that the most powerful way to fight ISIS are not bombs. It is to kill the narrative. We have to write another movie. We have to build other heroes. And this is why I believe that the French are making big mistakes in the ways they, they fight ISIS.

We created, for instance, accounts on the social media named "Stop Jihadism," and this is [BLEEP], like they did not understand anything. And I did understand why we are so bad. It's just because in France we don't know how to write TV series properly.

[BROOKE LAUGHS]

Just because we have no imagination, we cannot just tell beautiful stories, create beautiful characters, beautiful heroes.

And this is what we have to do because in our world, in our societies what do people want?



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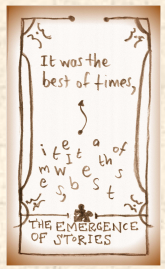
And this is what we have to do because in our world, in our societies what do people want? They want to become heroes.



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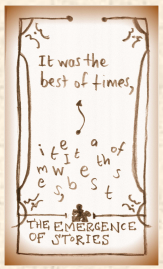

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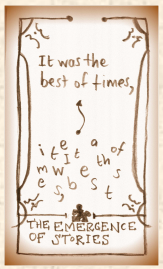
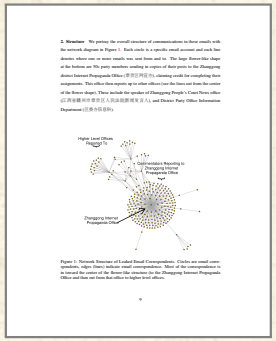


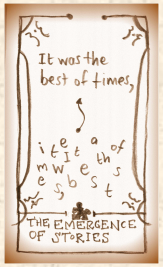
Massive informational misdirection as a cognitive denial of service:



"How the Chinese government fabricates social media posts for strategic distraction, not engaged argument"

King, Pan, and Roberts,
American Political Science Review, , ,
Forthcoming. [6]

- Make the truth a needle in a haystack



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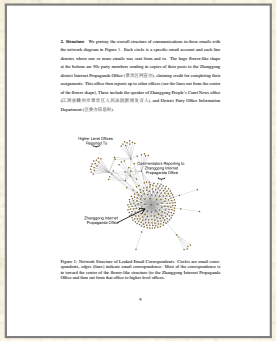

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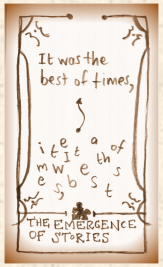

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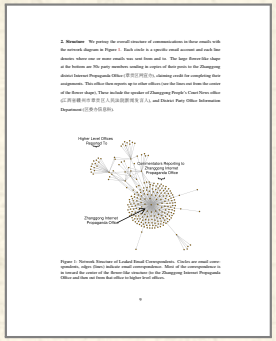

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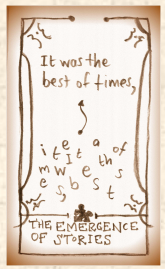
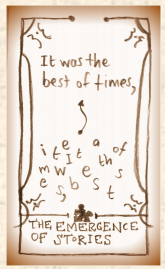
- "Surkov turned Russian politics into a bewildering constantly changing piece of theater. He sponsored all kinds of groups, ...no one was sure what was real or fake. ...it is a strategy of power that keeps any opposition constantly confused."

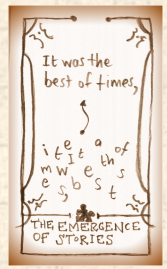


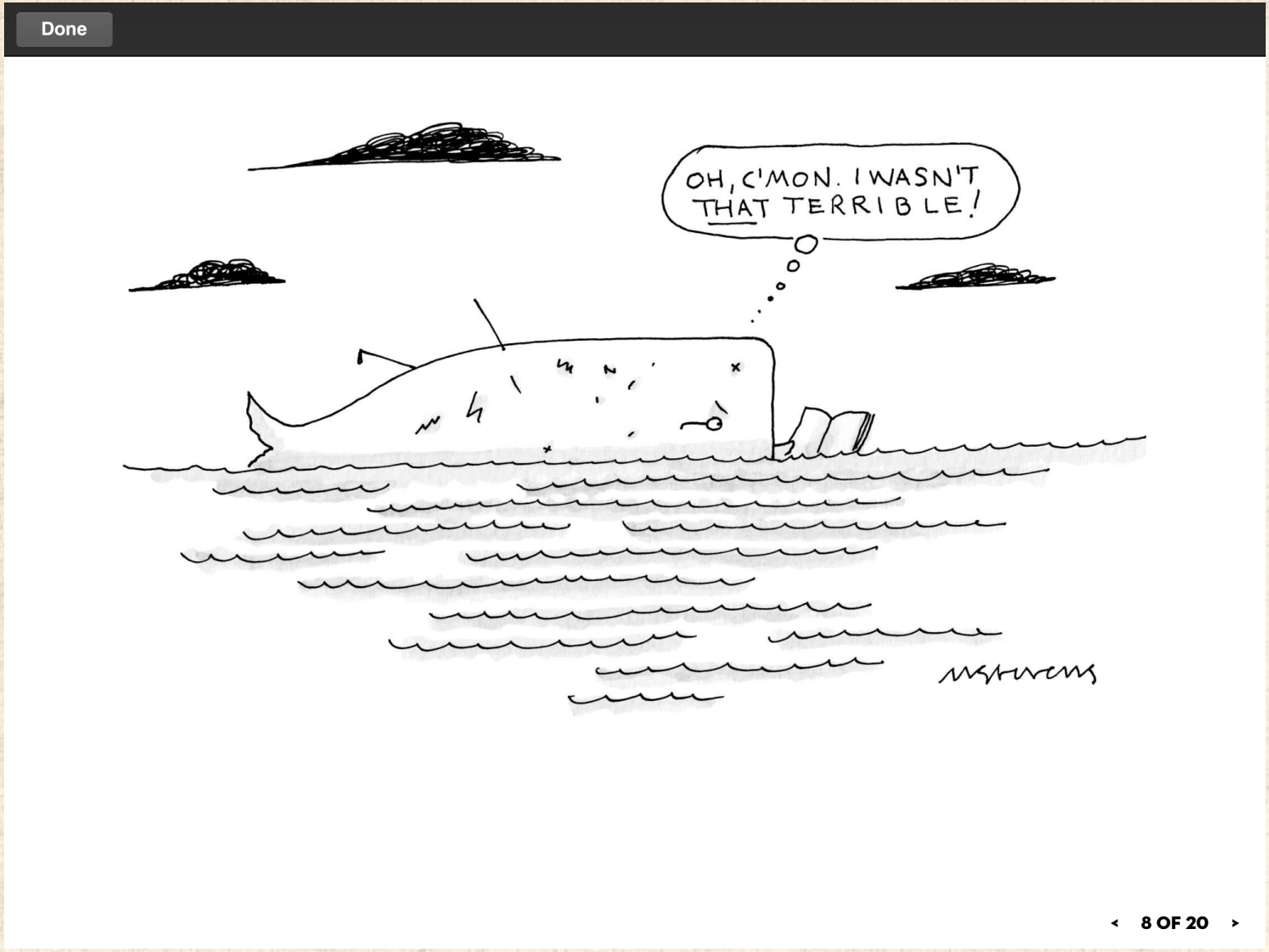
The story trap by Philip Ball, 2015-11-12

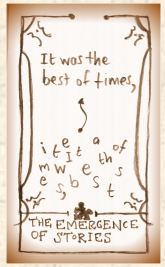
- “We use neat stories to explain everything from sports matches to symphonies. Is it time to leave the nursery of the mind?”
- “...we might wonder if the ultimate intelligibility of the universe will be determined not so much by the capacity of our minds to formulate the appropriate concepts and equations, but by whether we can find a meaningful story to tell about it.”



Kurt Vonnegut on the Shapes of Stories

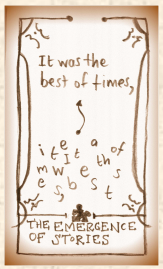






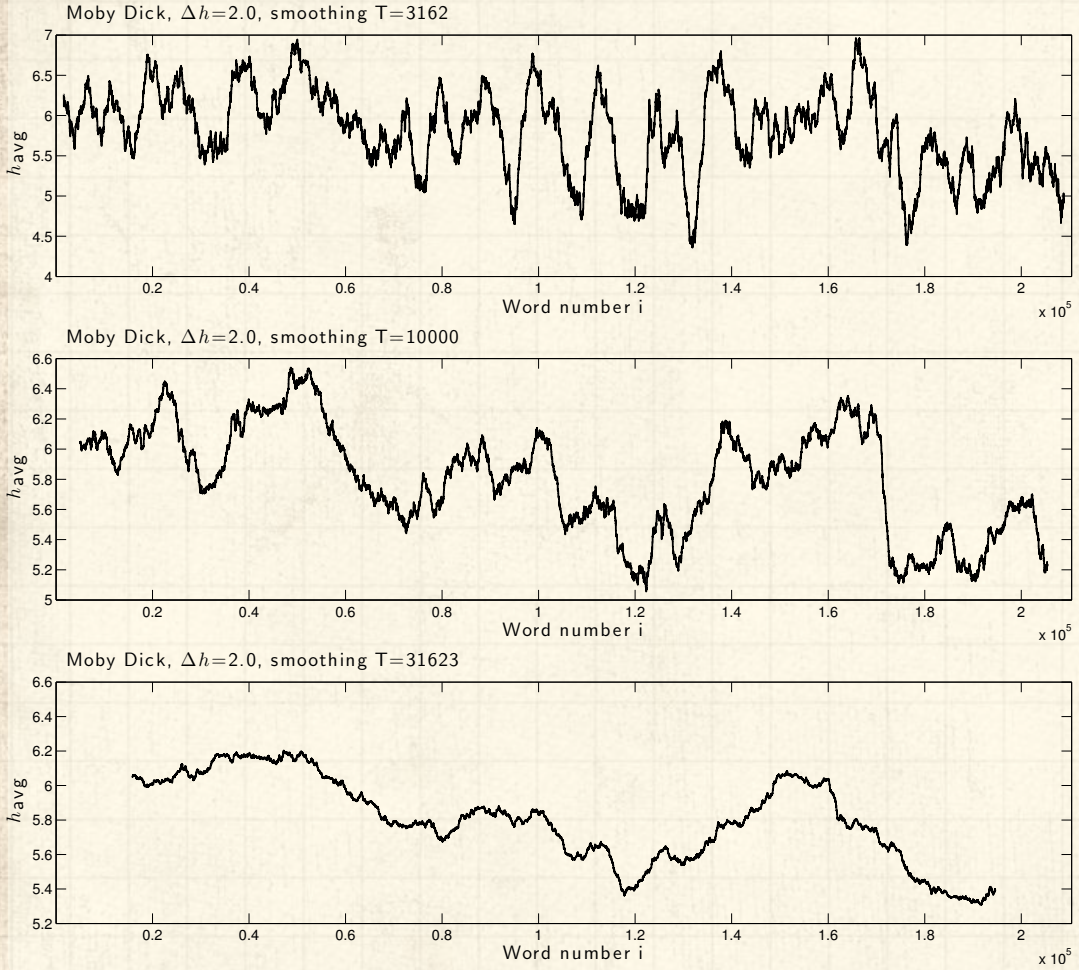
The New Yorker, December 16, 2013, p. 56.

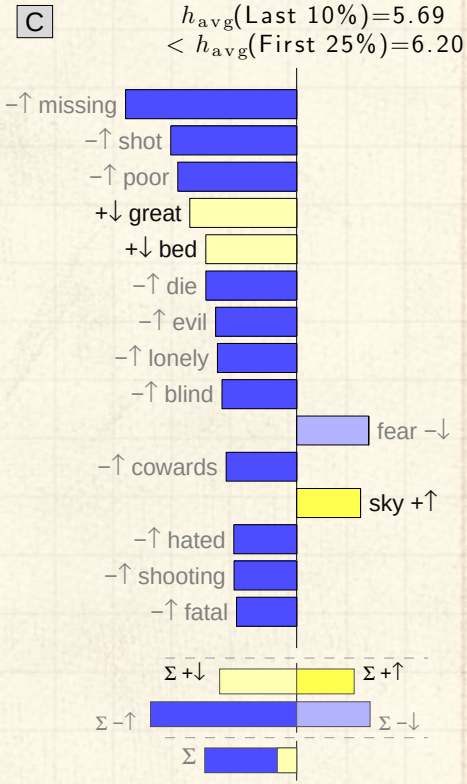
Ron Swanson on metaphors:

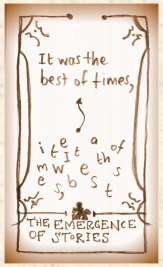


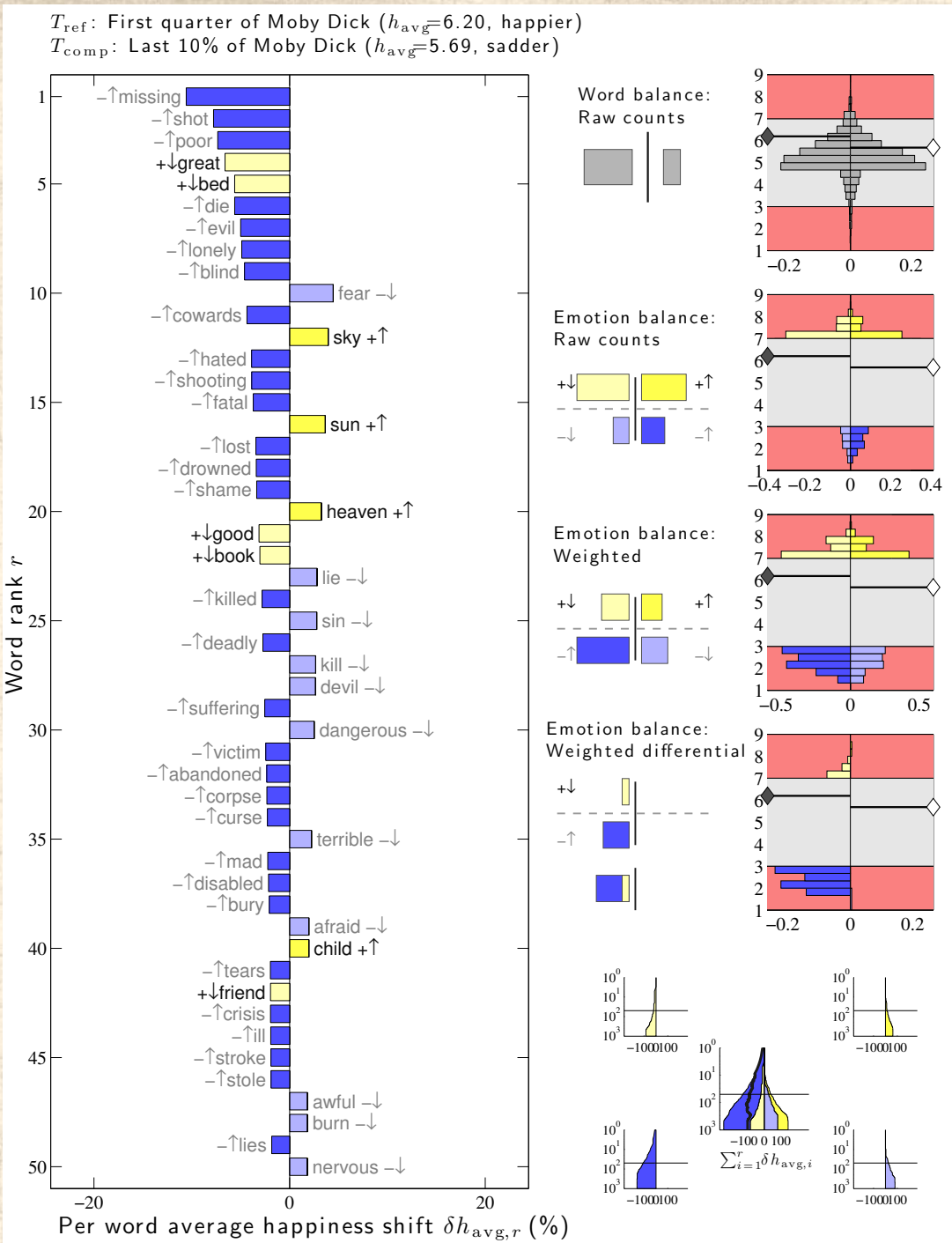
- “I hate metaphors. That’s why my favorite book is Moby Dick. No frou-frou symbolism. Just a good, simple tale about a man who hates an animal.”

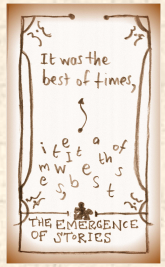
The emotional shapes of stories—Moby Dick:

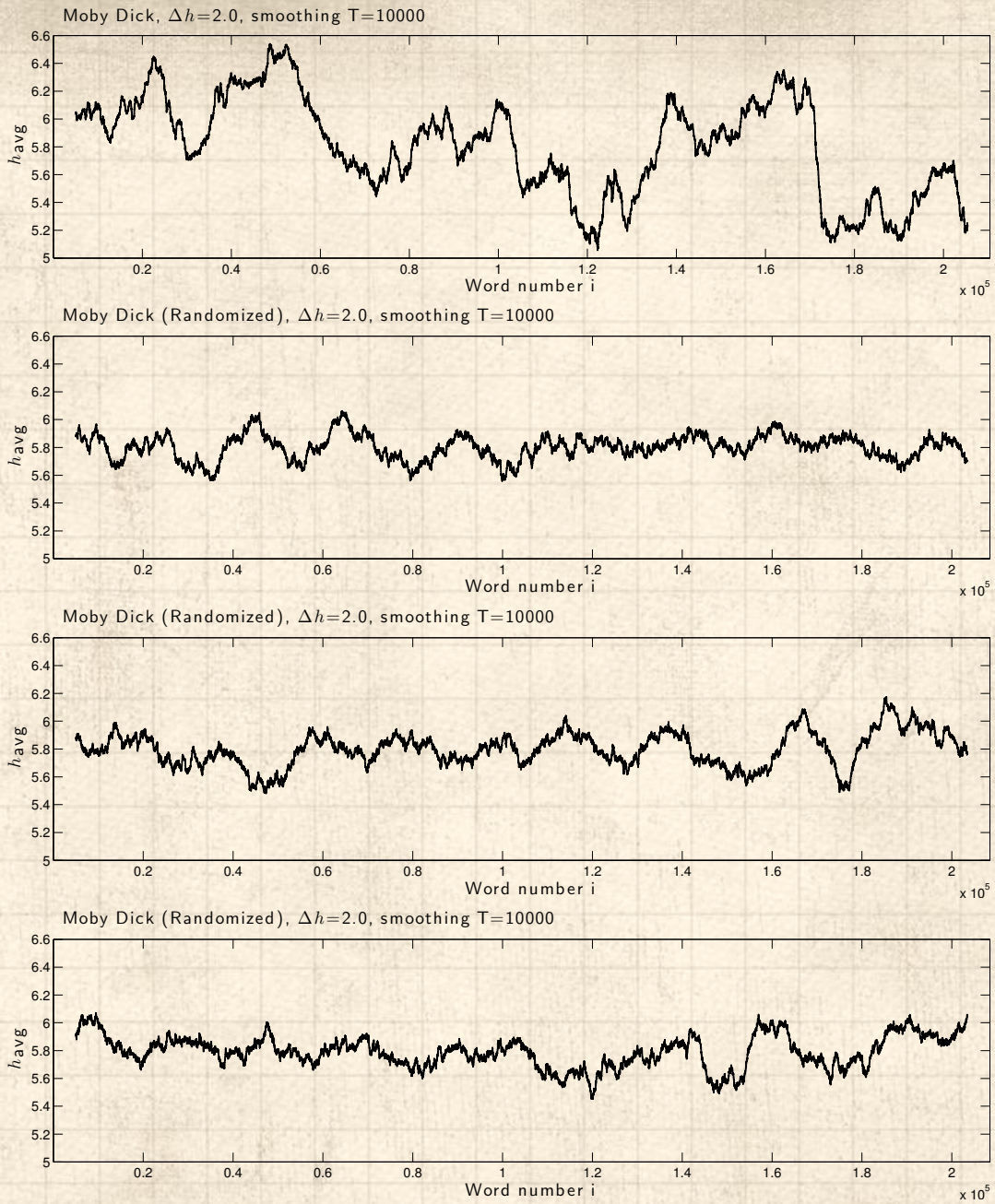


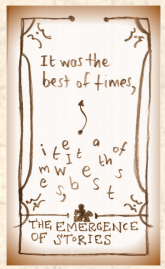




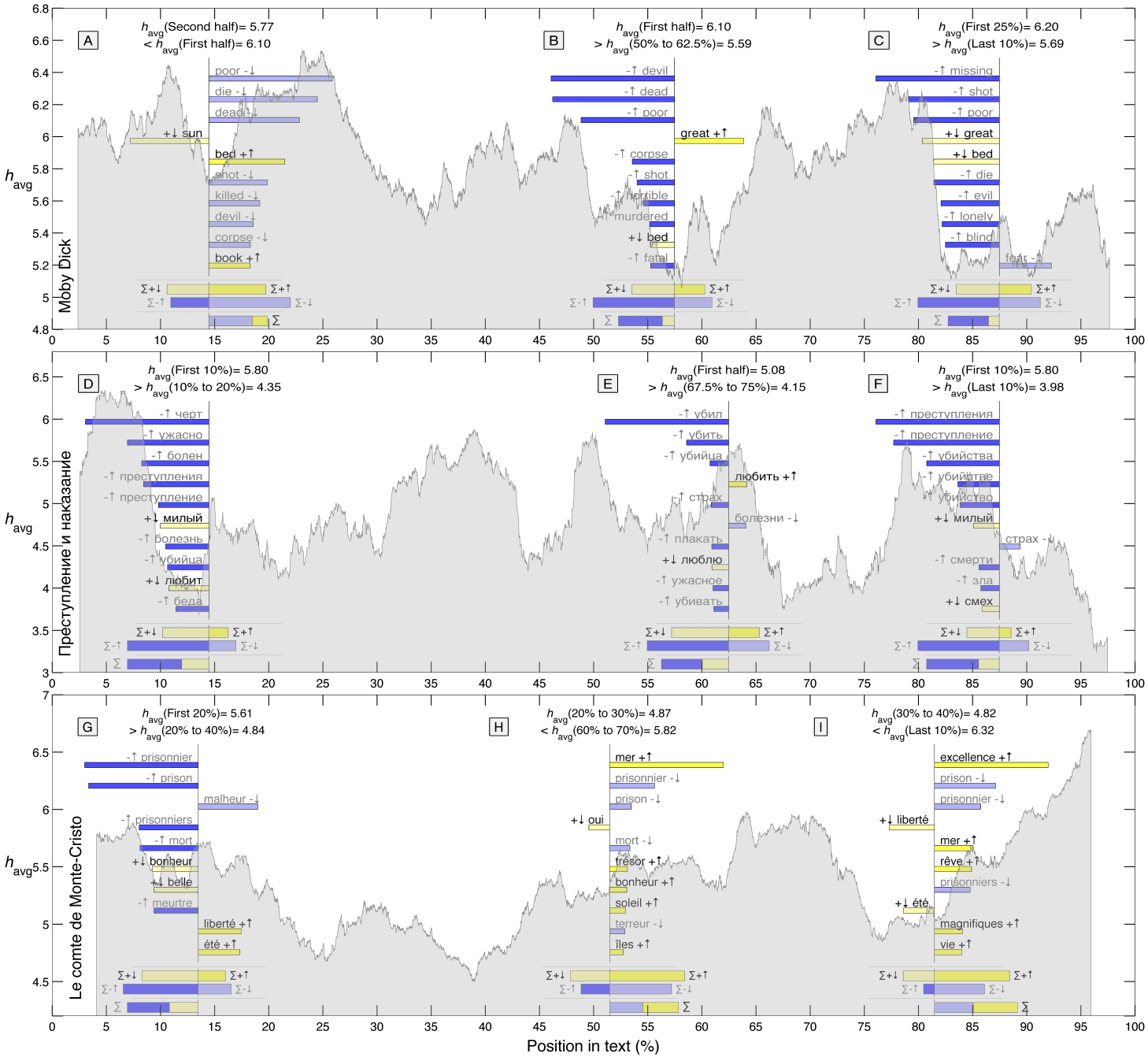

T_{ref}: First quarter of Moby Dick (h_{avg}=6.20, happier)
T_{comp}: Last 10% of Moby Dick (h_{avg}=5.69, sadder)
Word rank r
Per word average happiness shift $\delta h_{\mathrm{avg},r}$ (%)
–↑missing
–↑shot
–↑poor
+↓great
+↓bed
–↑die
–↑evil
–↑lonely
–↑blind
fear –↓
–↑cowards
sky +↑
–↑hated
–↑shooting
–↑fatal
sun +↑
–↑lost
–↑drowned
–↑shame
heaven +↑
+↓good
+↓book
lie –↓
–↑killed
sin –↓
–↑deadly
kill –↓
devil –↓
–↑suffering
dangerous –↓
–↑victim
–↑abandoned
–↑corpse
–↑curse
terrible –↓
–↑mad
–↑disabled
–↑bury
afraid –↓
child +↑
–↑tears
+↓friend
–↑crisis
–↑ill
–↑stroke
–↑stole
awful –↓
burn –↓
–↑lies
nervous –↓
Word balance:
Raw counts
Emotion balance:
Raw counts
Emotion balance:
Weighted
Emotion balance:
Weighted differential
$\sum_{i=1}^{r} \delta h_{\mathrm{avg},i}$

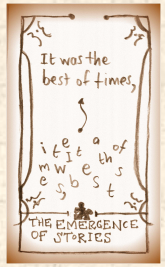

It was the best of times,
THE EMERGENCE OF STORIES





Comparison of the emotional trajectory of Moby Dick with the results for three example randomized


A
h_{avg}(Second half)= 5.77
< h_{avg}(First half)= 6.10
poor -↓
die -↓
dead -↓
+↓ sun
bed +↑
shot -↓
killed -↓
devil -↓
corpse -↓
book +↑
B
h_{avg}(First half)= 6.10
> h_{avg}(50% to 62.5%)= 5.59
-↑ devil
-↑ dead
-↑ poor
great +↑
-↑ corpse
-↑ shot
-↑ horrible
-↑ murdered
+↓ bed
-↑ fatal
C
h_{avg}(First 25%)= 6.20
> h_{avg}(Last 10%)= 5.69
-↑ missing
-↑ shot
-↑ poor
+↓ great
+↓ bed
-↑ die
-↑ evil
-↑ lonely
-↑ blind
fear -↓
Moby Dick
D
h_{avg}(First 10%)= 5.80
> h_{avg}(10% to 20%)= 4.35
-↑ черт
-↑ ужасно
-↑ болен
-↑ преступления
-↑ преступление
+↓ милый
-↑ болезнь
-↑ убийца
+↓ любит
-↑ беда
E
h_{avg}(First half)= 5.08
> h_{avg}(67.5% to 75%)= 4.15
-↑ убил
-↑ убить
-↑ убийца
любить +↑
-↑ страх
болезни -↓
-↑ плакать
+↓ люблю
-↑ ужасное
-↑ убивать
F
h_{avg}(First 10%)= 5.80
> h_{avg}(Last 10%)= 3.98
-↑ преступления
-↑ преступление
-↑ убийства
-↑ убийстве
убийство
+↓ милый
страх -↓
-↑ смерти
-↑ зла
+↓ смех
Преступление и наказание
G
h_{avg}(First 20%)= 5.61
> h_{avg}(20% to 40%)= 4.84
-↑ prisonnier
-↑ prison
malheur -↓
-↑ prisonniers
-↑ mort
+↓ bonheur
+↓ belle
-↑ meurtre
liberté +↑
été +↑
H
h_{avg}(20% to 30%)= 4.87
< h_{avg}(60% to 70%)= 5.82
mer +↑
prisonnier -↓
prison -↓
+↓ oui
mort -↓
trésor +↑
bonheur +↑
soleil +↑
terreur -↓
îles +↑
I
h_{avg}(30% to 40%)= 4.82
< h_{avg}(Last 10%)= 6.32
excellence +↑
prison -↓
prisonnier -↓
+↓ liberté
mer +↑
rêve +↑
prisonniers -↓
+↓ été
magnifiques +↑
vie +↑
Le comte de Monte-Cristo
h_{avg}
Position in text (%)


It was the best of times,
THE EMERGENCE OF STORIES

Online, interactive Emotional Shapes of Stories for 10,000+ books:

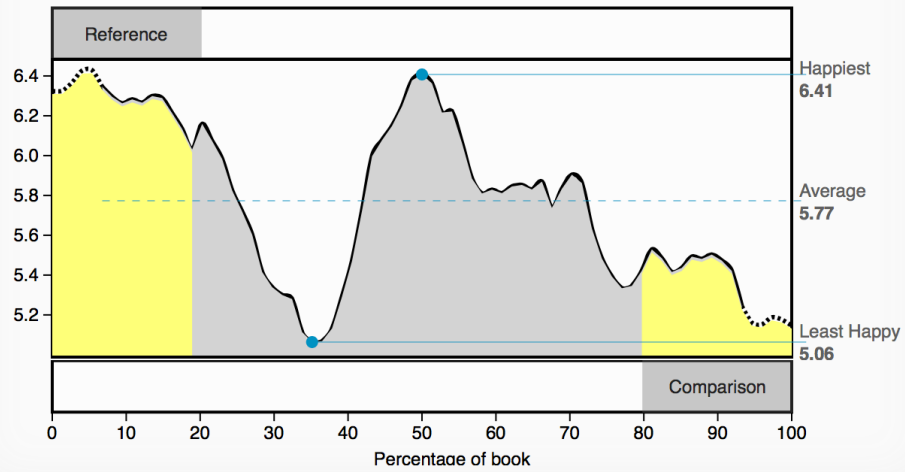
Frankenstein; Or the Modern Prometheus (wiki)

by Mary Shelley

Search Gutenberg Corpus | by Title | Classics | Harry Potter | Random

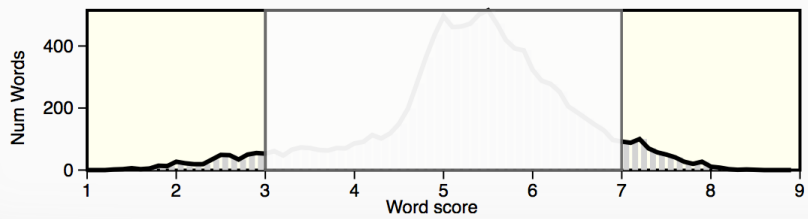
Book happiness time series:

Explore the work's emotional dynamics by sliding and resizing the reference and comparison sections.



Lens (for advanced users):

Slide and resize the stop-window to change the lens:

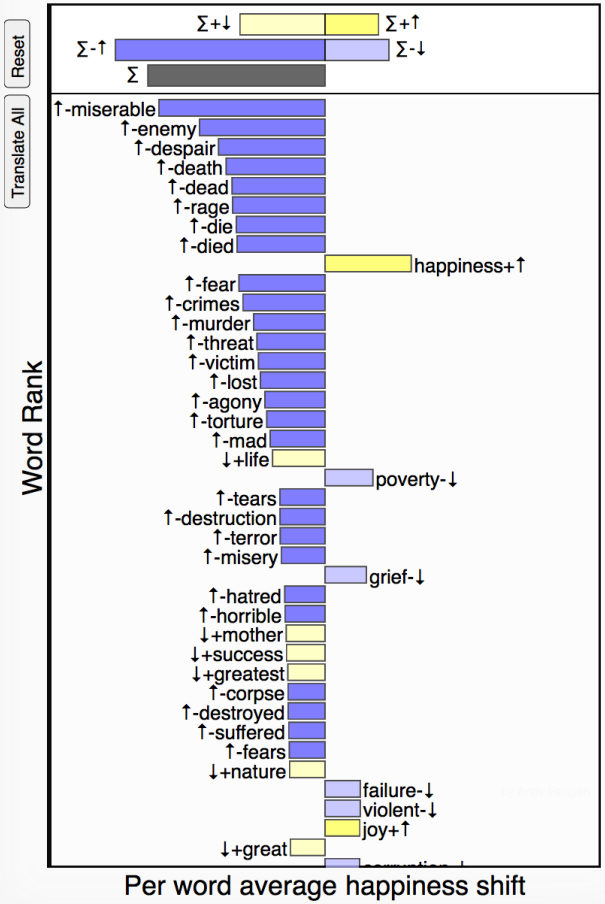


Word Shift:

Why comparison section is less happy than the reference one

Reference sections's happiness = 6.31

Comparison section's happiness = 5.35



Online, interactive Emotional Shapes of Stories for 10,000+ books:

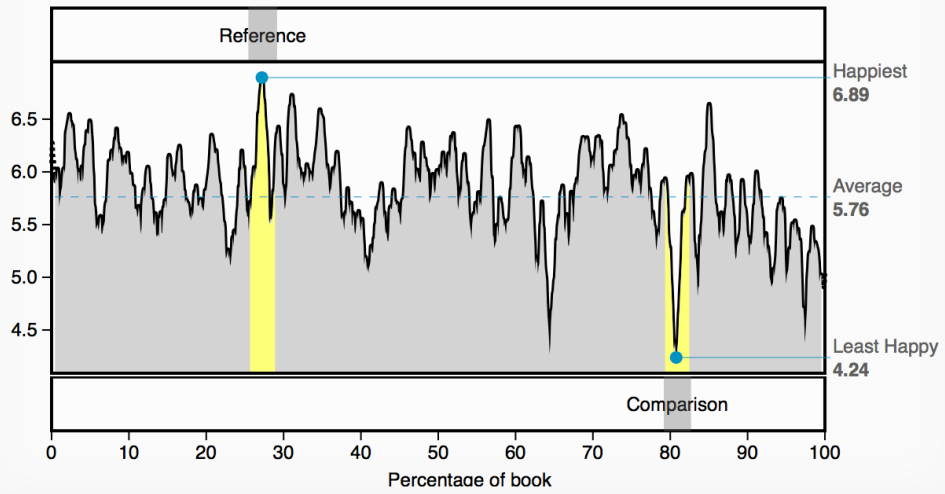
Harry Potter (all books together)

by J.K. Rowling

Search Gutenberg Corpus | by Title | Classics | Harry Potter | Random

Book happiness time series:

Explore the work's emotional dynamics by sliding and resizing the reference and comparison sections.



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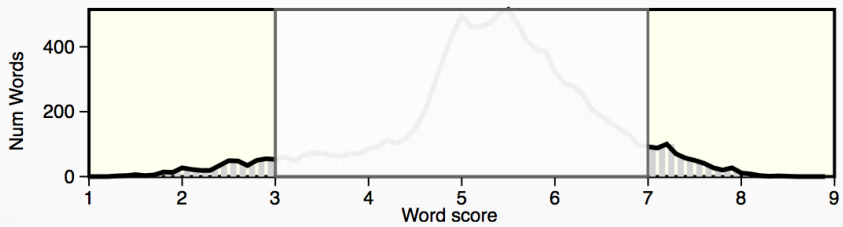
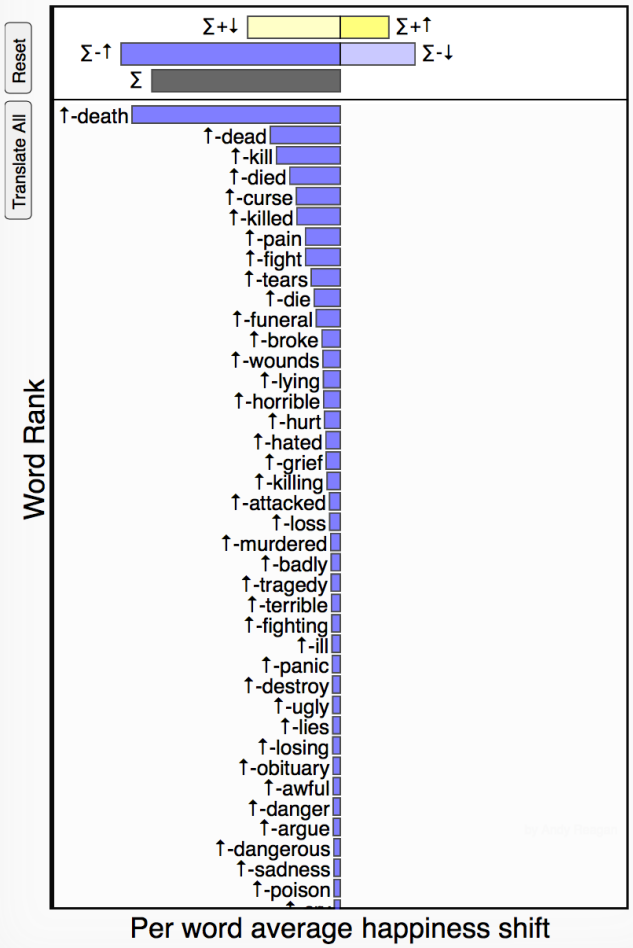


Word Shift:

Why comparison section is less happy than the reference one

Reference sections's happiness = 6.13

Comparison section's happiness = 5.14



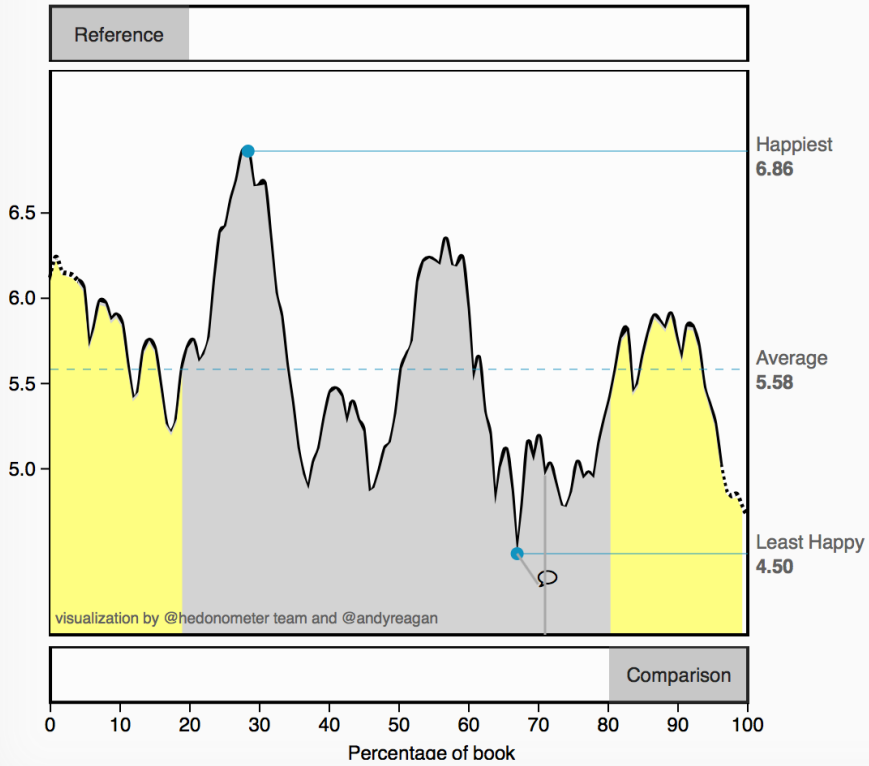
Online, interactive Emotional Shapes of Stories for 1,000+ movie scripts:

Pulp Fiction

directed by Quentin Tarantino

Search Movies | Classics | Team Picks | Random

Movie happiness time series:
Explore the work's emotional dynamics by sliding and resizing the reference and comparison sections.



Movie script:
Portion of script scored for each point in timeseries.

Zed takes the chair, sits it in front of the two prisoners, then lowers into it. Maynard hands The Gimp's leash to Zed, then backs away.

MAYNARD
(to The Gimp)
Down!

The Gimp gets on its knees.

Maynard hangs back while Zed appraises the two men.

MAYNARD
Who's first?

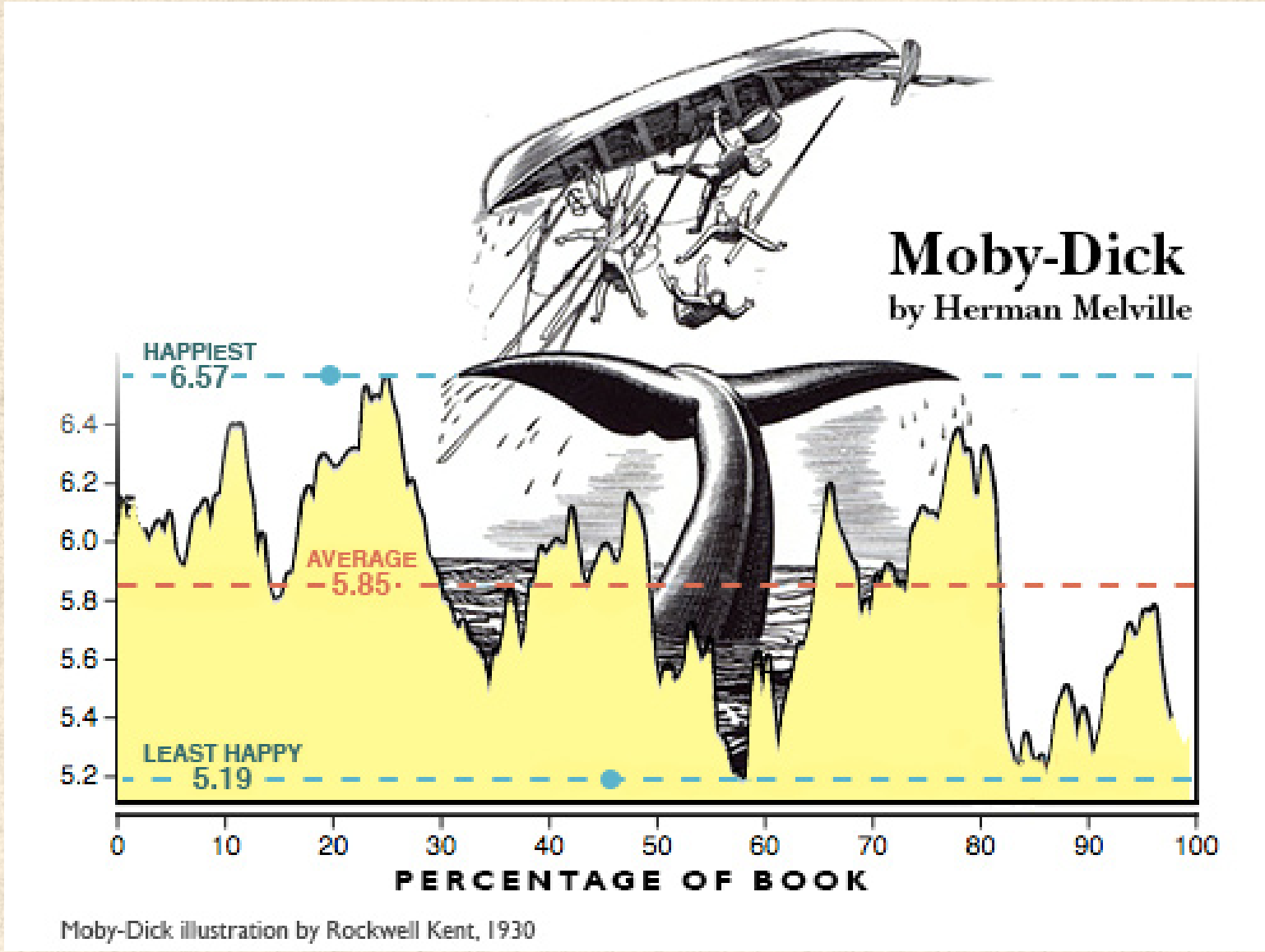
ZED
I ain't fer sure yet.

Then with his little finger, Zed does a silent "Eenie, meany, miney, moe... " just his mouth mouthing the words and his finger going back and forth between the two.

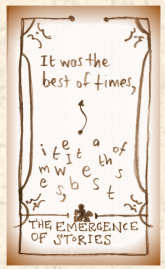
Butch are Marsellus are terrified.

Maynard looks back and forth at the victims.

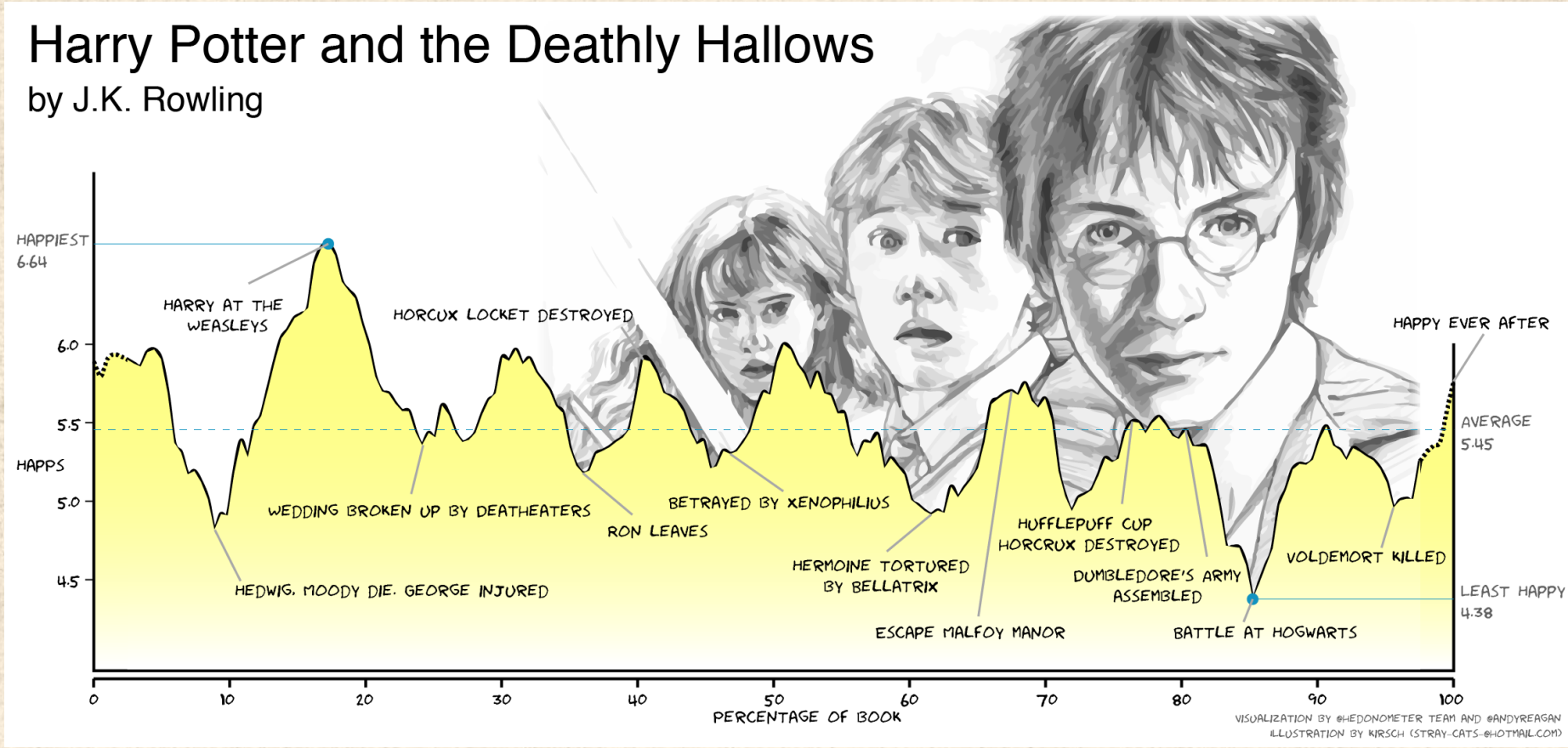
The Gimps's eyes go from one to the other inside the mask.

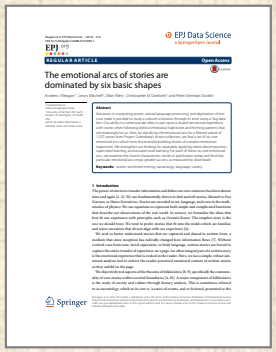


Moby-Dick illustration by Rockwell Kent, 1930



http://whyfiles.org/2015/in-10-languages-happy-words-beat-sad-ones/




EPJ Data Science
a SpringerOpen Journal
REGULAR ARTICLE
Open Access
The emotional arcs of stories are dominated by six basic shapes
Springer

"The emotional arcs of stories are dominated by six basic shapes"
Reagan, Mitchell, Danforth, and Dodds.
EPJ Data Science, **5**, 31, 2016. [7]

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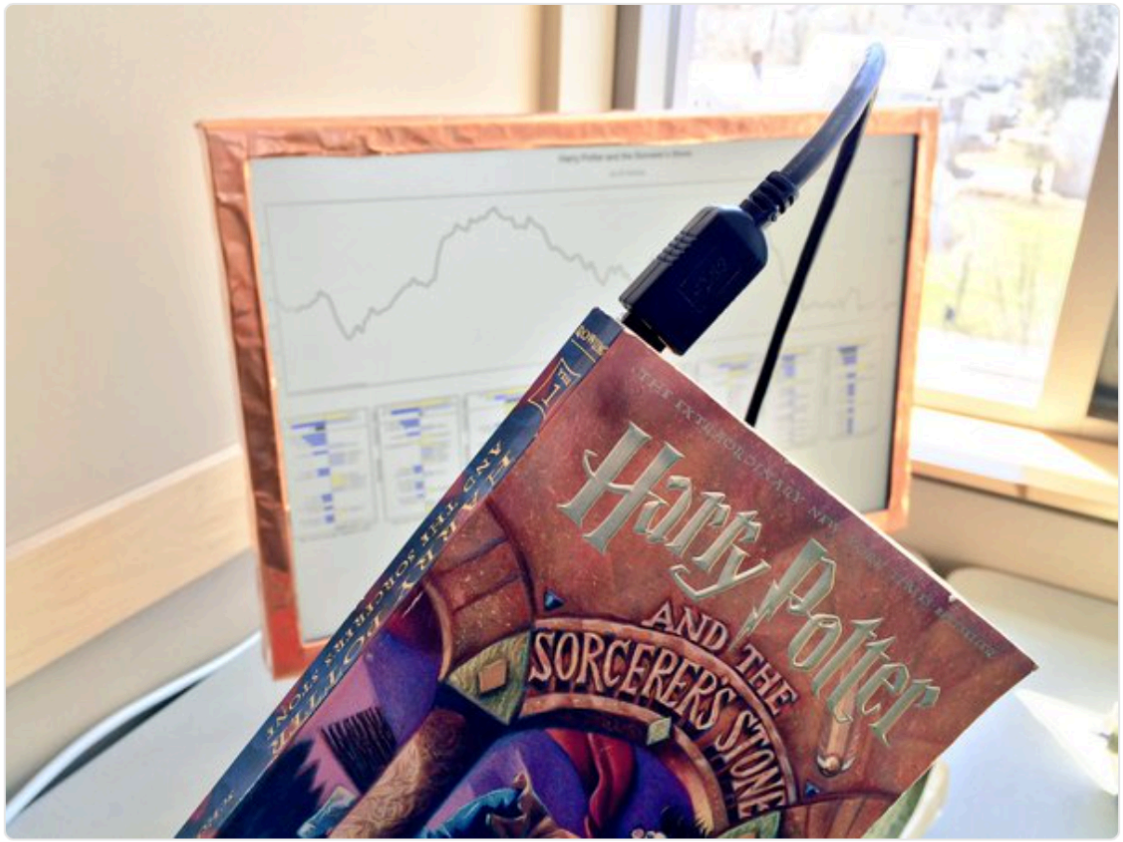
Following

USB in a book? What is this wizardry? Check it out at the Student Research Conference creative lounge. #uvmresearch



RETWEETS 8 LIKES 14

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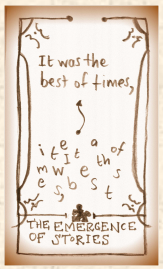
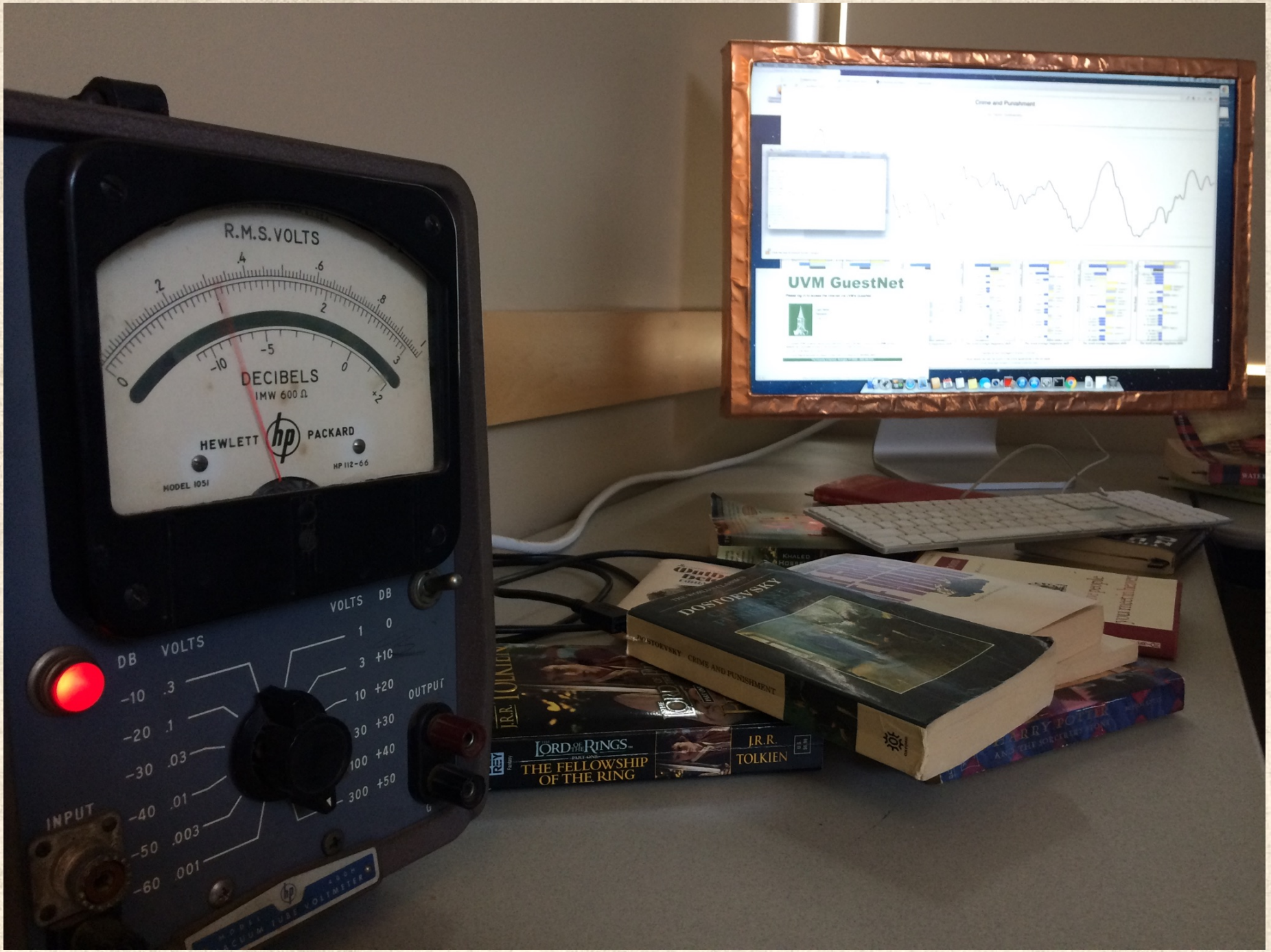
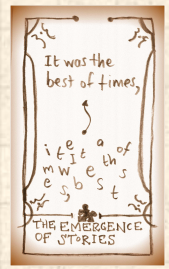
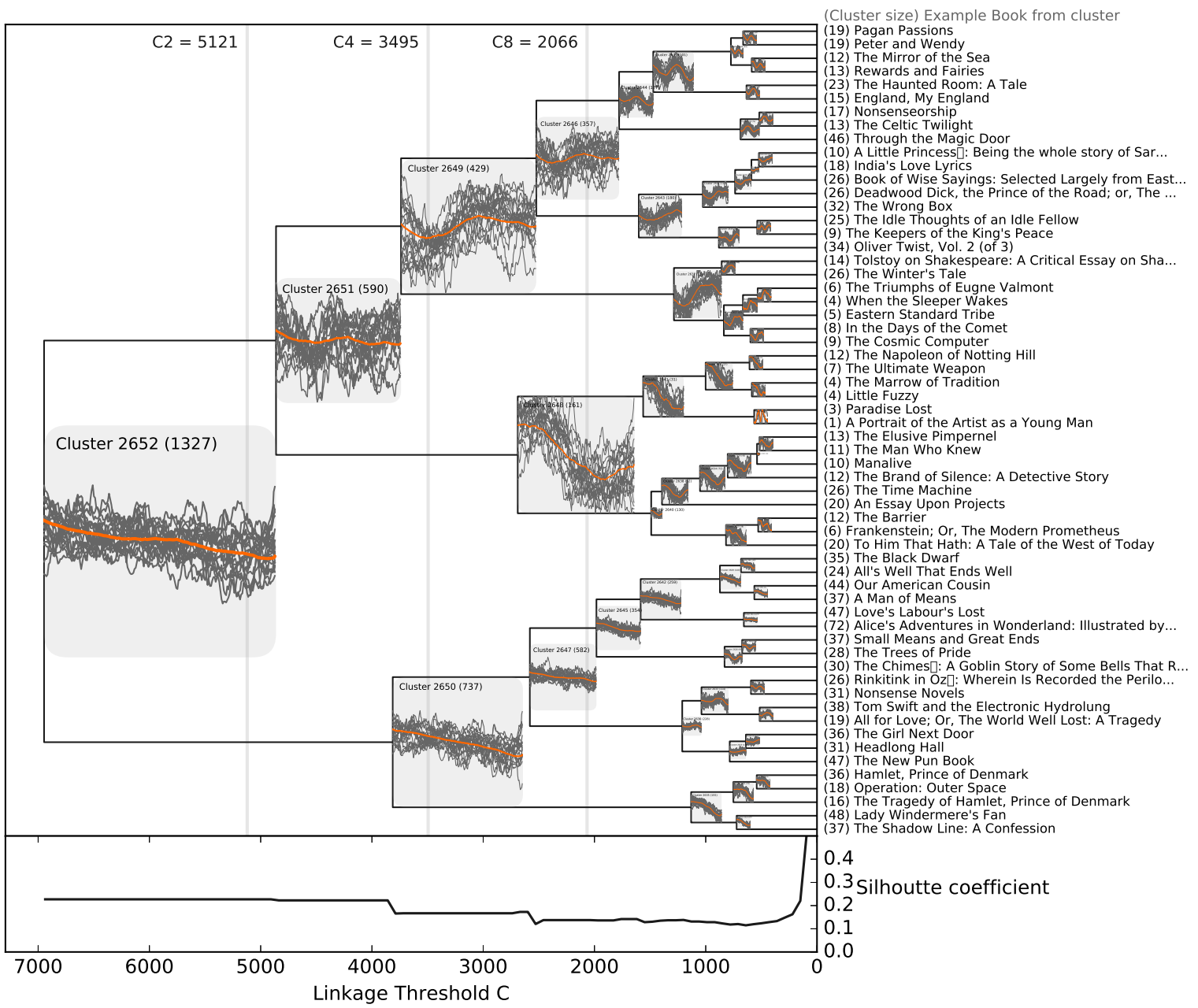


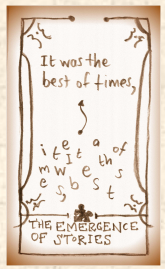

R.M.S. VOLTS
DECIBELS
1MW 600 Ω
HEWLETT PACKARD
MODEL 1051
HP 112-66
VOLTS DB
DB VOLTS
INPUT
OUTPUT
UVM GuestNet
DOSTOEVSKY
CRIME AND PUNISHMENT
THE FELLOWSHIP OF THE RING
J.R.R. TOLKIEN

Harry Potter and the Chamber of Plot Devices:



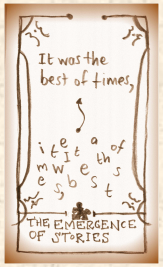
Emotional arcs for 1748 books from gutenberg.org



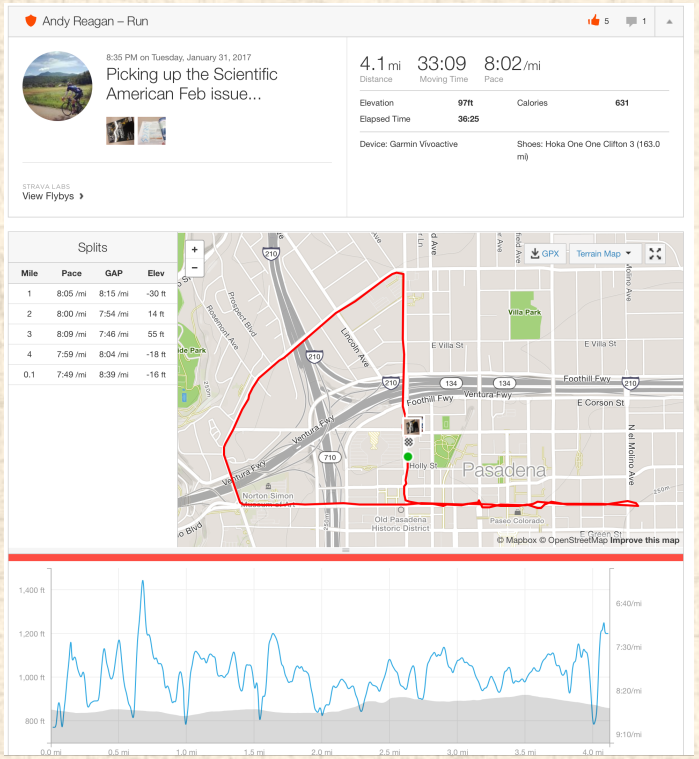


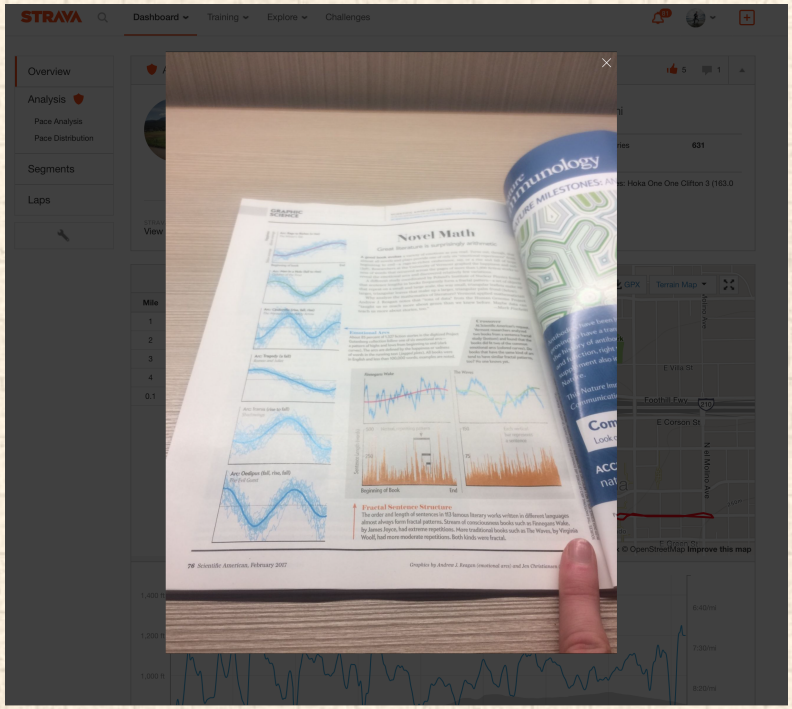
Mode	Mode Arc	N_m	N_m/N	DL Median ▼	DL Mean ▽	DL Variance	Download Distribution
SV 1		263	15.1%	295.0	644.3	2207201	
-SV 1		442	25.3%	337.5	636.0	913464	
SV 2		230	13.2%	314.0	630.3	1058916	
-SV 2		169	9.7%	296.0	569.1	780365	
SV 3		104	6.0%	298.0	874.5	7826797	
-SV 3		108	6.2%	298.0	748.7	2517822	
SV 4		108	6.2%	316.0	848.8	2763060	
-SV 4		50	2.9%	292.0	770.7	1546202	
SV 5		48	2.7%	280.0	421.7	182443	
-SV 5		48	2.7%	263.5	462.0	211259	

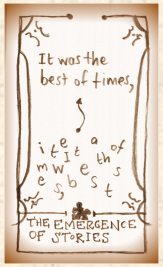
FIG. 6: Download statistics for SVD Modes with more than 2.5% of books. Modes *SV 3* through *-SV 4* (both polarities of modes 3 and 4) exhibit a higher average number of downloads and more variance than the rest.



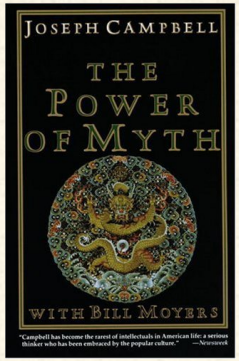
Another Great Moment in being Andy Reagan:



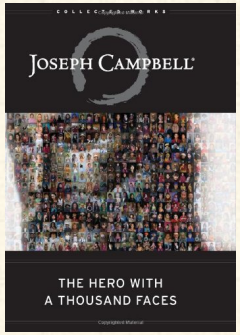




The “I wonder who wrote this?” Great Man Theory:



“The Power of Myth” by Campbell and Moyers (1991). [4]



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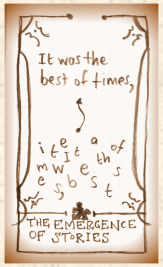

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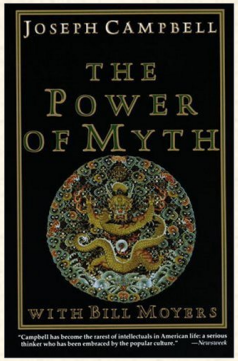

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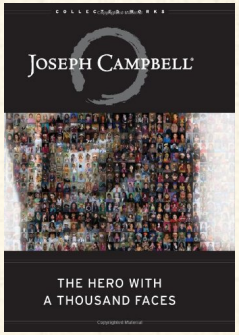

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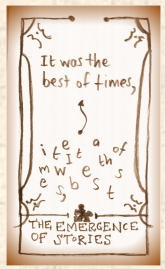
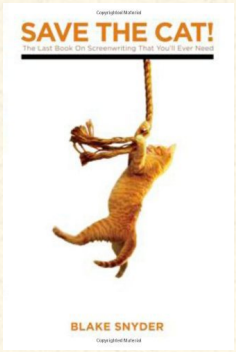
Highly influential but it’s a trap!

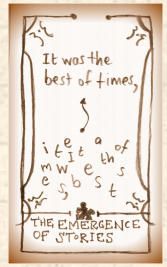


How to write a screenplay:



"Save the Cat!"
by Blake Snyder (2005). [8]

- 9 acts.



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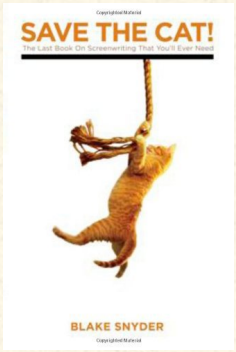

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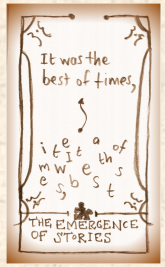

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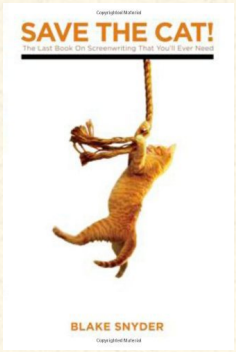

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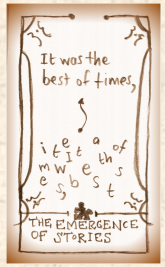

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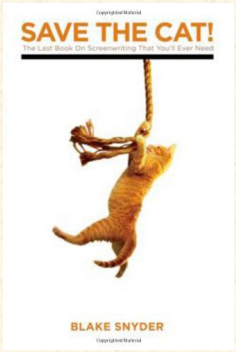

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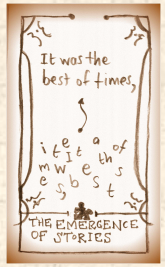
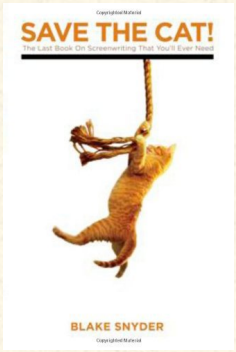
- Logline = one or two sentence summary.



How to write a screenplay:



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- 9 acts.
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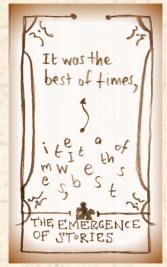
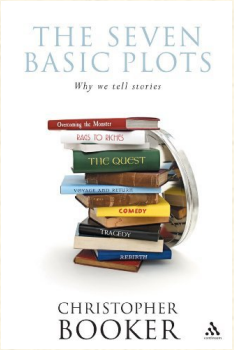
- Believes irony is key.
- Logline = one or two sentence summary.
- Logline fails to be a summary of logline.

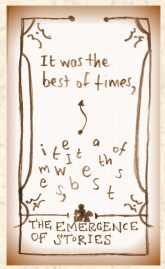


Seven “good” stories?:



“The Seven Basic Plots: Why We Tell Stories”
by Christopher Booker (2005). [2]

- Seven Gateways to the Underworld (?)
- Overcoming the Monster $\times 2$ and the Thrilling escape from Death (plot).
- Rags to Riches (plot).
- The Quest (plot).
- Voyage and Return (plot).
- Comedy $\times 2$ (plot but really structure).
- Tragedy $\times 3$ (plot).
- Rebirth (plot).
- The Dark Power: From Shadow into Light (master structure).

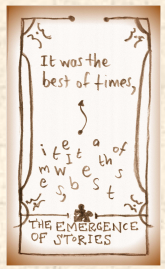


The taxonomy of stories:

- ANIMAL TALES 1-299
  - Wild Animals 1-99
    - The Clever Fox (Other Animal) 1-69
    - Other Wild Animals 70-99
  - Wild Animals and Domestic Animals 100-149
  - Wild Animals and Humans 150-199
  - Domestic Animals 200-219
  - Other Animals and Objects 220-299
- TALES OF MAGIC 300-749
  - Supernatural Adversaries 300-399
  - Supernatural or Enchanted Wife (Husband) or Other Relative 400-459
    - Wife 400-424
    - Husband 425-449
    - Brother or Sister 450-459
  - Supernatural Tasks 460-499
  - Supernatural Helpers 500-559
  - Magic Objects 560-649
  - Supernatural Power or Knowledge 650-699
  - Other Tales of the Supernatural 700-749
- RELIGIOUS TALES 750-849
  - God Rewards and Punishes 750-779
  - The Truth Comes to Light 780-799
  - Heaven 800-809
  - The Devil 810-826
  - Other Religious Tales 827-849
- REALISTIC TALES 850-999
  - The Man Marries the Princess 850-869
  - The Woman Marries the Prince 870-879
  - Proofs of FidelitY and Innocence 880-899
  - The Obstinate Wife Learns to Obey 900-909
  - Good Precepts 910-919
  - Clever Acts and Words 920-929

Folkloristics:

- Aarne–Thompson classification systems
- Motif-based taxonomy.
- Online classification database



contributed articles

A searchable meta-graph can connect even troublesome house elves and other supernatural beings to scholarly folk categories.

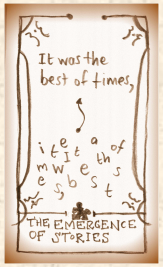
BY JAMES ABELLO, PETER BROADWELL, AND TIMOTHY R. TANGHERLINI

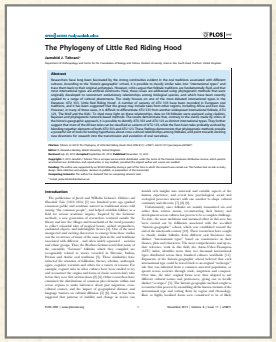
Computational Folkloristics

"Computational folkloristics"

Abello, Broadwell, and Tangherlini, Communications of the ACM, **55**, 60–70, 2012. [1]

- Motivation: "As a simple, historical example from the Danish materials, no one has yet classified (according to the ATU index) the several thousand fairy tales in the collections of the Danish Folklore Archive (http://www.dafos.dk), nor does it seem anyone ever will."
- 'Imagine a system in which the complexities of a folklore corpus can be explored at different levels of resolution, from the broad perspective of "distant reading" down to the narrow perspective of traditional "close reading."'




The Phylogeny of Little Red Riding Hood

Jamshid J. Tehrani*

Department of Anthropology and Centre for the Coevolution of Biology and Culture, Durham University, Durham, South Road, Durham, United Kingdom

Abstract

Researchers have long been fascinated by the strong similarities evident in the oral traditions associated with different cultures around the world. Perhaps the most striking of these parallels are those between stories that have clearly descended from regional archetypes. However, little is known how folktale traditions are fundamentally built and how their international types and attributes influenced them. These issues are addressed using phylogenetic methods that rarely been applied to folklore data. Focusing on the tale of Little Red Riding Hood, a comparative dataset of 58 texts was analysed using a range of cultural phylogenetic algorithms. The study focuses on one of the most debated international types in the literature, namely the relationship between the tale of Little Red Riding Hood and the story of Grandmother's Tale. The results of the Bayesian analysis support the hypothesis that these two tales are historically related to one another, and cluster together with other stories featuring tricksters, such as The Wolf and the Kids. To shed more light on these relationships, three tree topologies were examined using ancestral state reconstructions. The maximum parsimony tree, which features Grandmother's Tale as ancestral to Little Red Riding Hood, is supported by the majority of the evidence. Based on the pattern of models retained in the 95% credible set, the most likely region of origin for the tale is Europe, although subsequent horizontal transmission has occurred between populations in Europe, Africa and East Asia. Additional phylogenetic analyses were conducted to explore the evolutionary relationships between different versions of Little Red Riding Hood. The study demonstrates that phylogenetic methods provide valuable new insights into the evolutionary processes responsible for folktale diversity, and have enormous potential for generating testable hypotheses about the factors underlying the formation of culturally transmitted narratives.

Citation: Tehrani JJ (2013) The Phylogeny of Little Red Riding Hood. PLoS ONE 8(11): e78871. doi:10.1371/journal.pone.0078871

Editor: Alexander Bentley, Binghamton University, United States of America

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Competing Interests: The author has declared that no competing interests exist.

* E-mail: jamshid.tehrani@durham.ac.uk

Introduction

In the collection of Jacob and Wilhelm Grimm's children and household tales (1812–22), the Brothers Grimm not only established fairy tales as a literary genre, but also laid the foundations for modern folkloristic methods. Inspired by the Grimms' methods, a new generation of researchers created models for classifying folktales according to their form and content, and began to collect a sizeable body of original stories, which subsequently served as the basis for theories about the origin, history and meaning of folktales. Despite the huge amount of energy that has been invested in the study of folktales, however, many questions remain unanswered and exciting directions for enquiry have been overlooked. For example, although it is widely recognised that many folktales are associated with different – and often widely separated – societies and ethnic groups, there has been relatively little research into the historical processes responsible for the distribution of folktales in particular regions. Similarly, although it is generally accepted that folktales are subject to change over time, relatively few studies have explored the structure of folktales, the way they evolve, and the factors responsible for stability and change in narrative form. Although a number of researchers have attempted to map the geographical variation in folktales (e.g. [1–3]), and to identify correlations between the distribution of narratives and climatic, cultural and linguistic factors (e.g. [4–6]), few have explored the historical connections that account for the similarities between folktales from different societies. Such insights may be of considerable significance for our understanding of the cognitical processes involved in folktale transmission, and may also help to shed light on the deep history of folktales, and the societies that told them.

Over the last few years, a number of researchers have begun to explore the potential of applying phylogenetic methods to cultural data (e.g. [7–9]). Such methods, originally developed for use in evolutionary biology, are designed to reconstruct the historical relationships between species, based on the principle that species which share many similar characteristics have inherited them from a relatively recent common ancestor. Because cultural traditions also change through descent with modification, it is possible to use phylogenetic methods to reconstruct the evolutionary relationships between folktales, and to identify the most likely ancestral forms. Such methods have been successfully applied to a range of cultural phenomena, including Austronesian canoe designs [10], Indo-European languages [11], Bantu kinship terminology [12], Pama-Nyungan kinship systems [13], Austronesian basketry [14], Arabian tribal names [15], Native American projectile points [16], and Polynesian adzes [17]. Applications to folktales have, to date, been relatively few in number, but have yielded some very promising results. For example, Graça da Silva and Tehrani [18] used phylogenetic methods to explore the interrelationships between 76 Portuguese folktales, and found that certain tales tend to cluster together because they share a similar combination of motifs. Similarly, Tehrani [19] used cladistic methods to reconstruct the evolutionary history of 58 tales from the Indo-European family, and found that folktales with animal protagonists tend to be more conservative in terms of their morphology than tales without animal characters. Other studies have explored the origins of individual folktales, including Cinderella [20], Fair Ines [21], Rapunzel [22], Jack and the Beanstalk [23], and Sweet Porridge [24].

Despite the growing interest in the application of phylogenetic methods to folktales, relatively little attention has been paid to the validity of the models employed in these studies. Consequently, it is unclear how much confidence we can have in the results. Moreover, the majority of studies have been exploratory in nature, and have not explored in detail the historical processes underlying the origin and evolution of folktales. The present study aims to address these issues by applying a battery of phylogenetic methods to a dataset of 58 variants of Little Red Riding Hood. The tale is one of the most widely known folktales in the world, and has been the subject of numerous studies by folklorists and anthropologists. Of particular interest is the relationship between Little Red Riding Hood and Grandmother's Tale, a widespread international type in which a child is tricked into eating the flesh of her grandmother. Some researchers have argued that the two tales are historically related to one another [25–27], while others have suggested that they are independent [28–30]. Using a phylogenetic framework, I explore the evolutionary relationships between different versions of Little Red Riding Hood, and test the hypothesis that Grandmother's Tale is ancestral to Little Red Riding Hood. I also examine the geographical origins of the tale, and explore the historical connections between Little Red Riding Hood and other folktales featuring tricksters, such as The Wolf and the Kids. Finally, I explore the relationships between different versions of Little Red Riding Hood, and investigate the factors responsible for the formation of distinct variants.

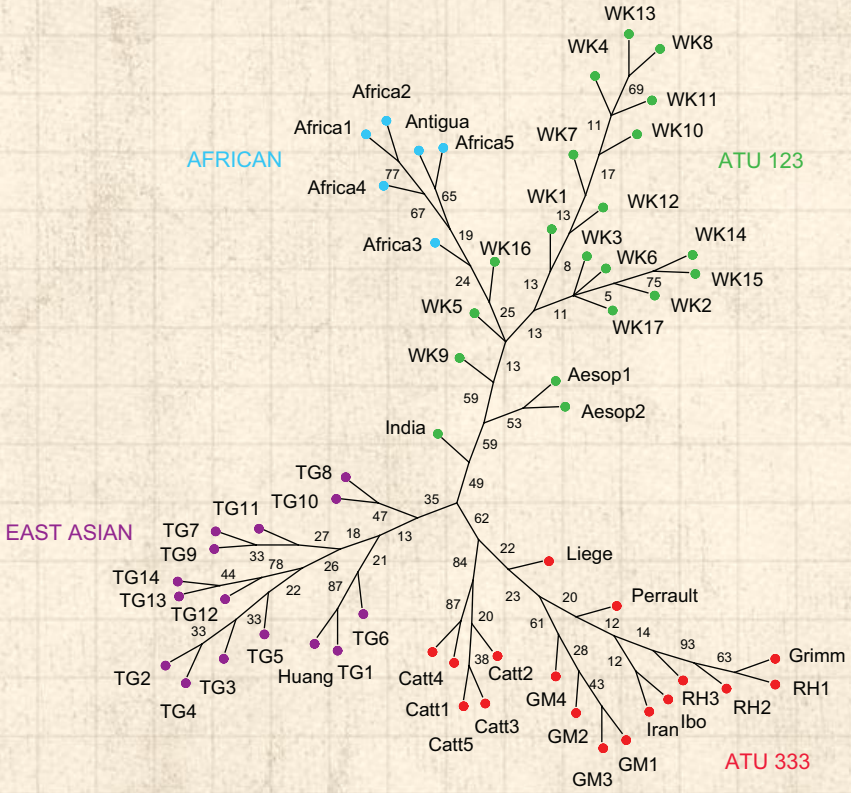
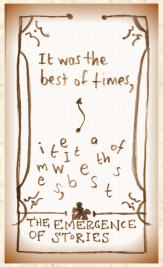
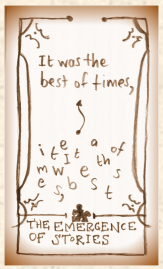


Figure 2. Majority-rules consensus of the most parsimonious trees returned by the cladistic analysis of the tales. Major groupings are labelled by region or ATU international type and indicated by the coloured nodes. Sub-types are indicated in the taxa labels (RH = Little Red Riding Hood; GM = Story of Grandmother; Catt = Catterinella; WK = The Wolf and the Kids; TG = Tiger Grandmother). Variants by particular authors, or from countries/ethnic groups that are discussed in the text have individual labels. Numbers beside the edges represent the level of support for individual clades returned by the bootstrap analysis.
doi:10.1371/journal.pone.0078871.g002



Famous folklore scholar:

- Comic Book Guy (CBG).
- Real name: Jeffrey “Jeff” Albertson.
- Master’s degree in Folklore and Mythology.



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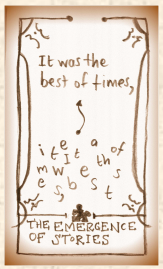
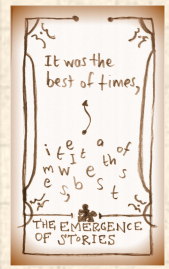
- Thesis: translated Lord of the Rings into Klingon.



Stories are algorithms for life:

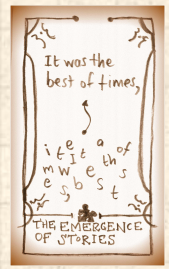
Homo narrativus:



Stories are algorithms for life:

Homo narrativus:

- Provide dynamic paths and trajectories.



Stories are algorithms for life:

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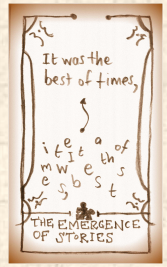
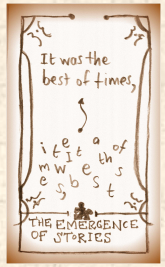
- Provide dynamic paths and trajectories.
- If this, then that.



Stories are algorithms for life:

Homo narrativus:

- Provide dynamic paths and trajectories.
- If this, then that.
- Convey and reinforce how to behave, how not to behave.



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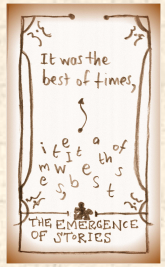
- If this, then that.
- Convey and reinforce how to behave, how not to behave.
- Full ecology of stories =
  Competing, self-defending operating system for people's minds.



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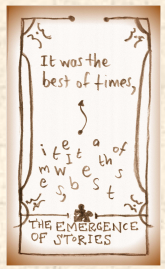
Aphorisms as algorithms:

- Pride cometh before the fall.
- A stitch in time saves nine.
- Look before you leap.



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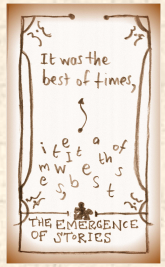
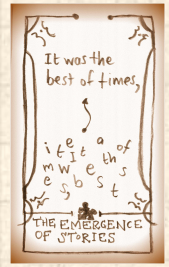
- Pride cometh before the fall.
- A stitch in time saves nine.
- Look before you leap.
- Anti-aphorism: The one who hesitates is lost.



The taxonomy of stories:

Fundamental arcs:

- Kill the Monster.



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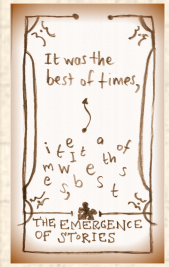

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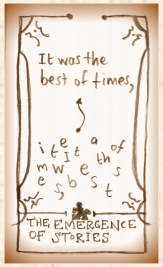

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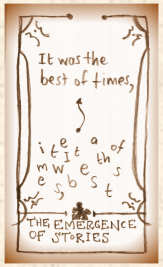

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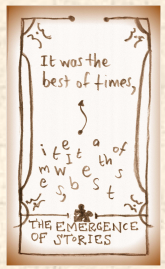

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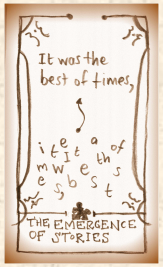
The three fundamental events of (non-clone) life:



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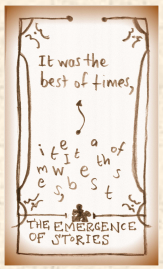
- Hatchings, Matchings, and Dispatchings.



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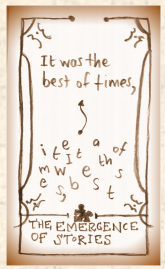
The three fundamental events of (non-clone) life:

- Hatchings, Matchings, and Dispatchings.
- Stories encode survival algorithms.



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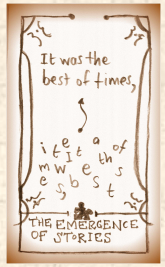
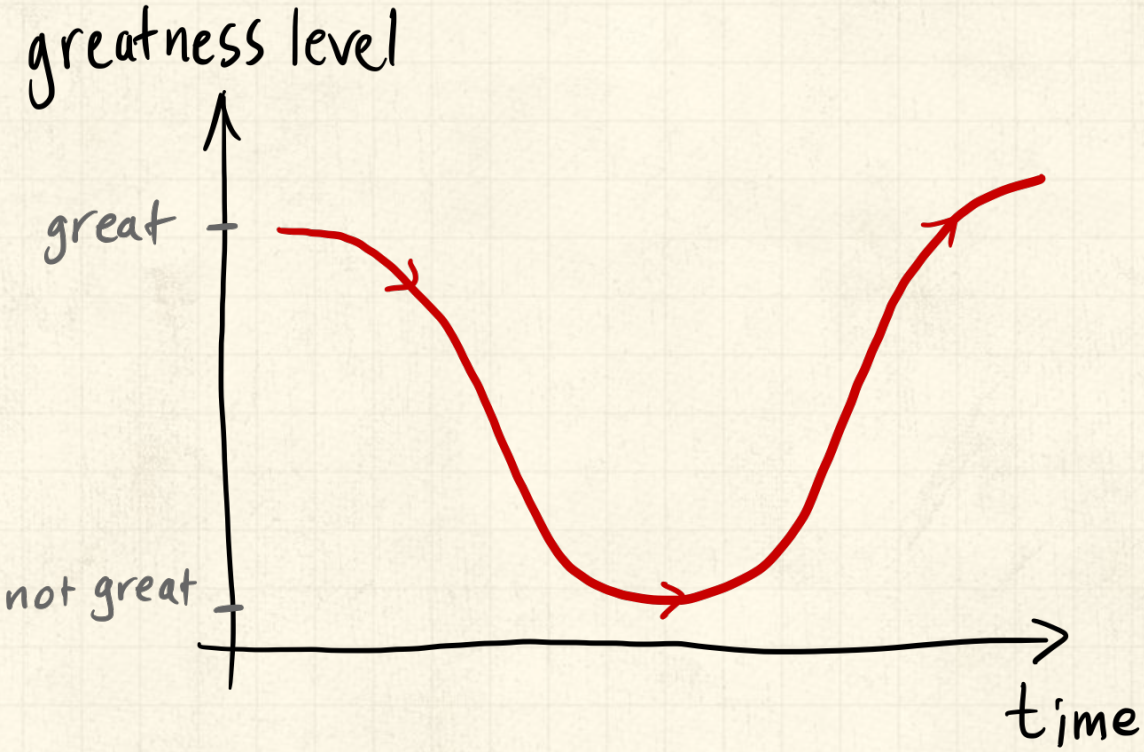
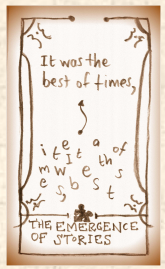
- Hatchings, Matchings, and Dispatchings.
- Stories encode survival algorithms.
- Dynamic paths: the true, the possible, the unlikely.



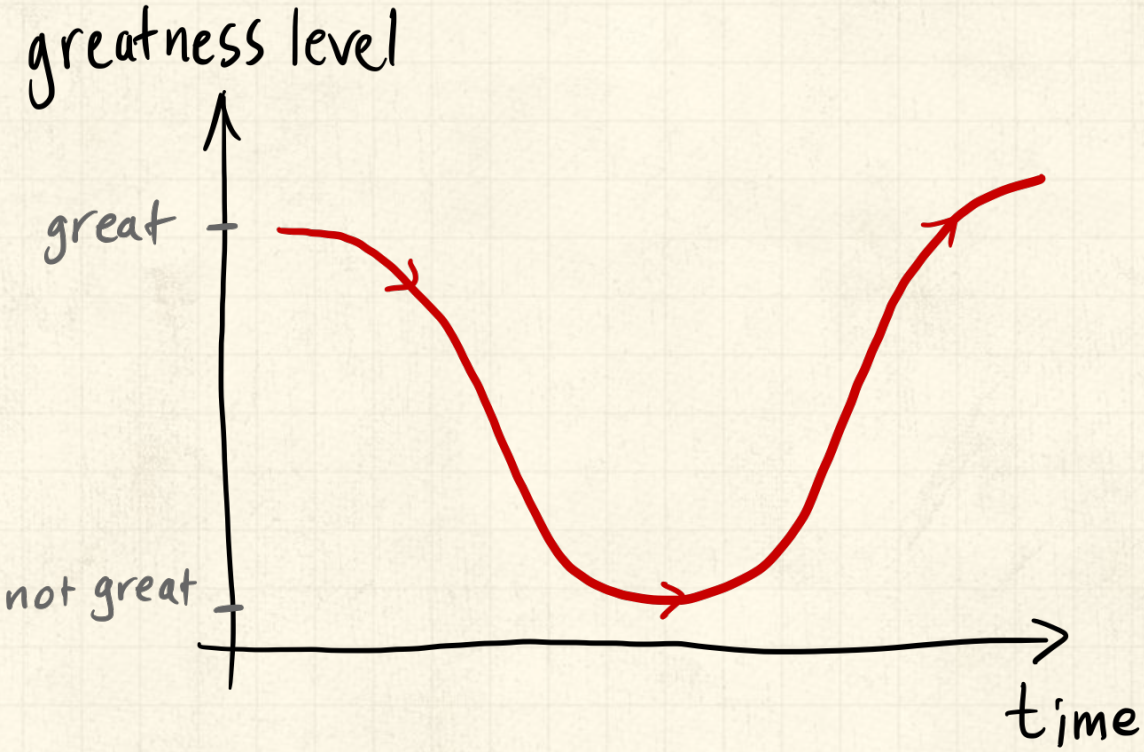
Stories matter:

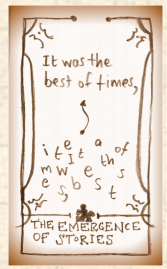




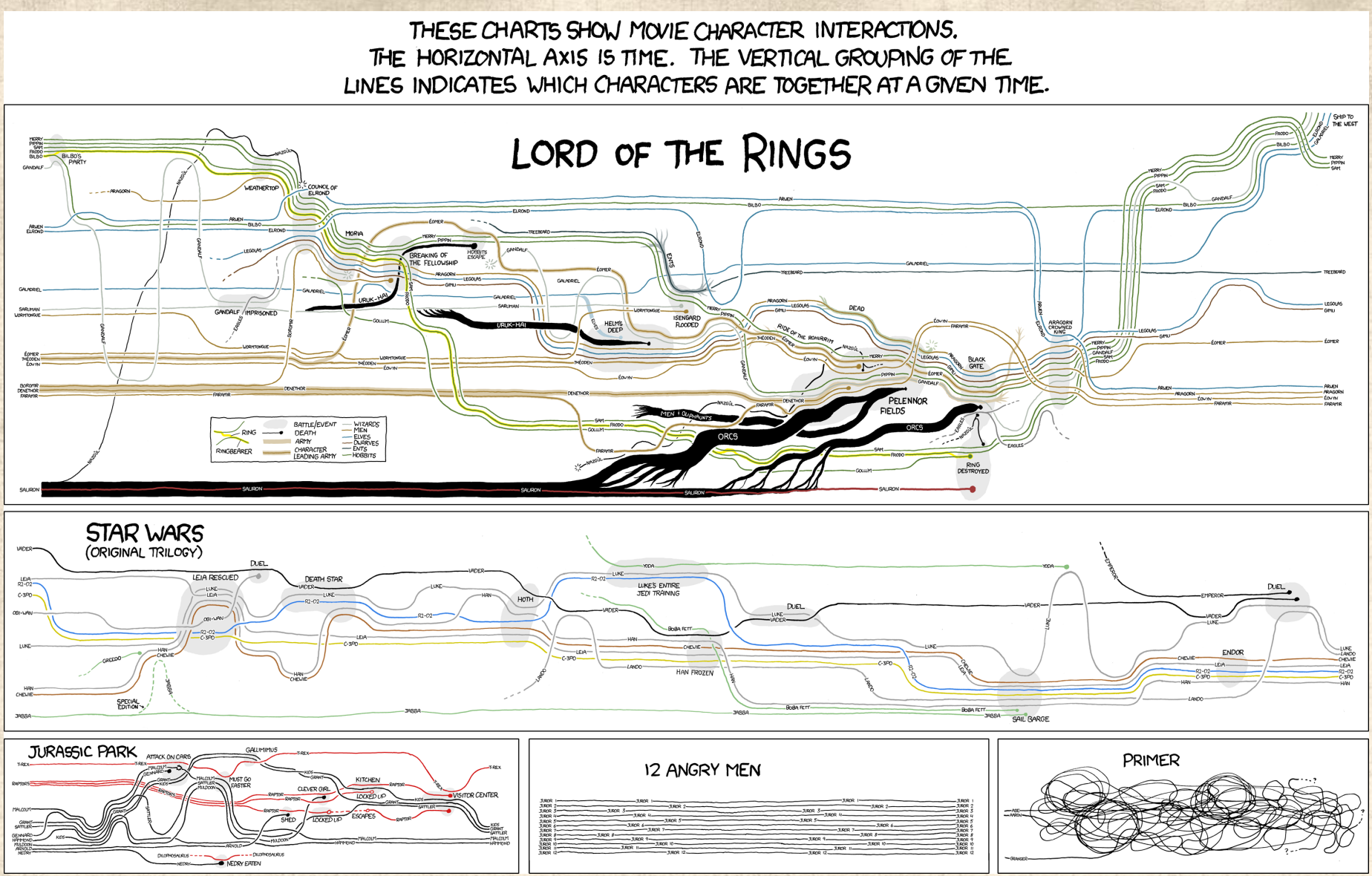
- Used by Reagan and Bush in 1980.

Stories matter:



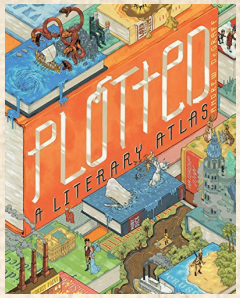


- Used by Reagan and Bush in 1980.
- Template used by many others including Bill Clinton.

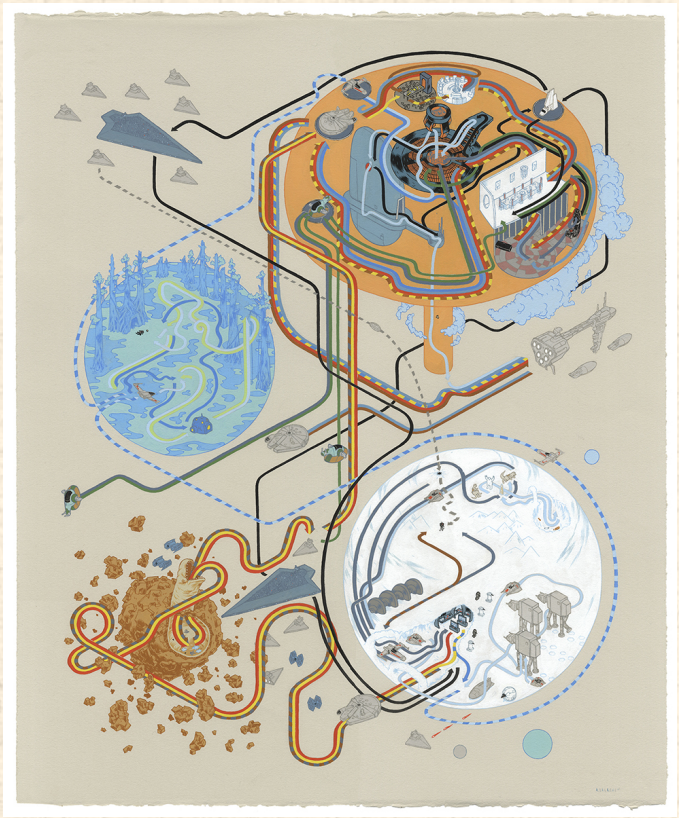


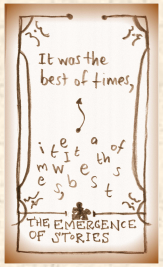
https://xkcd.com/657/

Science/Art project: Create dynamic versions, ideally automatically.



"Plotted: A Literary Atlas" by Andrew DeGraff (2015). [5]

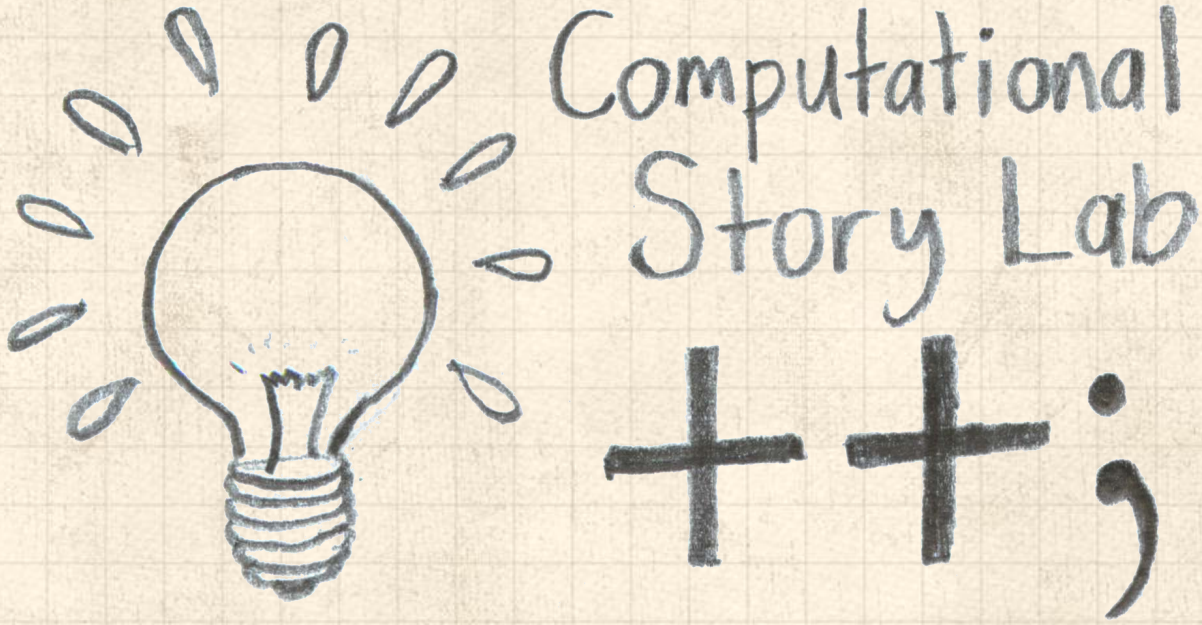




http://www.andrewdegraff.com/moviemaps/

Next:

- Evolve hedonometer.org and panometer.org
- Add more thing-o-meters.
- More retrospective pieces (music lyrics, speeches).
- Continue work on other emotions.
- Other input streams (e.g., BBC).
- Full expansion to phrase-based analysis.
- Real-time extraction of Frames and Stories.
- Everything about stories.


Computational
Story Lab
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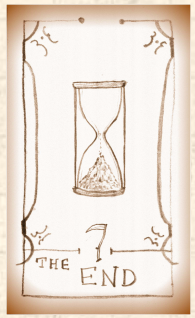
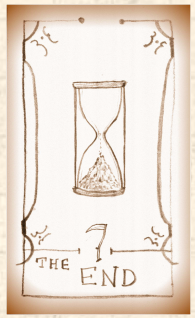

THE END

Neural reboot (NR):

Falling maple leaf



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