Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Finding Happiness

Last updated: 2025/01/11, 13:02:00 EST

## Principles of Complex Systems, Vols. 1, 2, & 3D
## CSYS/MATH 6701, 6713, & a pretend number, 2024–2025

Prof. Peter Sheridan Dodds

Computational Story Lab | Vermont Complex Systems Center
Santa Fe Institute | University of Vermont

Licensed under the Creative Commons Attribution 4.0 International

# These slides are brought to you by:

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# These slides are also brought to you by:

## Special Guest Executive Producer

On Instagram at pratchett_the_cat



Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# Outline


## Introduction

## Measurement

## Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

## References





Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

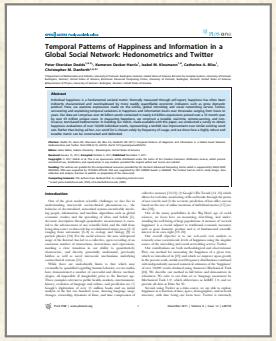
## The Boggoracle Speaks:

O

Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# A few key papers:

"Measuring the happiness of large-scale written expression: Songs, blogs, and presidents.", Dodds and Danforth, Journal of Happiness Studies, **11**, 441–456, 2009. [11]




"Temporal patterns of happiness and information in a global social network: Hedonometrics and Twitter"
Dodds et al.,
PLoS ONE, **6**, e26752, 2011. [13]

"Positivity of the English language", Kloumann et al., PLoS ONE, **7**, e29484, 2012. [28]

"Human language reveals a universal positivity bias", Dodds et al., Proc. Natl. Acad. Sci., **112**, 2389–2394, 2015. [10]

Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# A few more key papers:

"Sentiment analysis methods for understanding large-scale texts: A case for using continuum-scored words and word shift graphs", Reagan et al., EPJ Data Science, **6**, , 2017. [37]

"Generalized word shift graphs: A method for visualizing and explaining pairwise comparisons between texts"
Gallagher et al.,
EPJ Data Science, **10**, 4, 2021. [17]

"Ousiometrics and Telegnomics: The essence of meaning conforms to a two-dimensional powerful-weak and dangerous-safe framework with diverse corpora presenting a safety bias"
Dodds et al.,
, 2021. [9]

# Economics, Schmeconomics



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Alan Greenspan (September 18, 2007):

"I've been dealing with these big mathematical models of forecasting the economy ...

If I could figure out a way to determine whether or not people are more fearful or changing to more euphoric,

I don't need any of this other stuff.

I could forecast the economy better than any way I know."

http://wikipedia.org

# Economics, Schmeconomics



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Greenspan continues:

"The trouble is that we can't figure that out. I've been in the forecasting business for 50 years. I'm no better than I ever was, and nobody else is. Forecasting 50 years ago was as good or as bad as it is today. And the reason is that human nature hasn't changed. We can't improve ourselves."

## Jon Stewart:

"You just bummed the @*!# out of me."

wildbluffmedia.com

- From the Daily Show (September 18, 2007; @5:13)
- The full inteview was once here.

This is a Collateralized Debt Obligation:

Introduction

Measurement

Happiness

Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras

References

## Robert Kennedy on the Gross Domestic Product (GDP) in 1968:

"It measures everything except that which makes life worthwhile. And it can tell us everything about America except why we are proud that we are Americans." [26, 25]

# Basic Science ≃ Describe + Explain:



Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

## Lord Kelvin (possibly):

- "To measure is to know."
- "If you cannot measure it, you cannot improve it."

## But also:

- "There is nothing new to be discovered in physics now. All that remains is more and more precise measurement."
- "X-rays will prove to be a hoax."

Introduction

Measurement

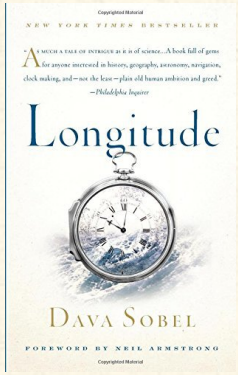
Happiness

Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras

References

# A brief history of measuring time:

- Megaliths for Big Time
- Sundials, 1500 BC, Egypt (solid for over 2000 years)
- Escapements (200s), Hourglasses (1300s?), Pendulum clocks (Galileo, 1500s)
- Chronometers, 1700s:




"Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time"
by Dava Sobel (2007). [39]

- Billionths of a second accuracy: Atomic clocks (Lord Kelvin, 1879)

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Measuring temperature was thought impossible:

The properties measured by our instruments usually begin as subjective judgments. Temperature is a good example. People were aware of variations in temperature long before there were any objective measurements of temperature. Judgments of temperature are imperfectly correlated among different persons, or even the same person at different times, depending on the humidity, the person's activity level and age, surrounding air currents, and so on. The idea that anything as subtle and complex as all the manifestations of changes in temperature could be measured and quantified on a single numerical scale was scoffed at as impossible, even by the leading philosophers of the sixteenth century.

The first thermometer invented by Galileo in 1592 did not go far in dispelling the notion that temperature was inherently unmeasurable, because the earliest thermometers, for about their first hundred years, were so imperfect as to make it possible for those who wished to do so to argue that no one could ever succeed in measuring temperature. Temperature was then confounded with all the subtleties of subjective judgment, which easily seem incompatible with a single numerical scale of measurement. How could the height of a column of mercury in a glass tube possibly reflect the rich varieties of temperature—damp cold, dank cold, frosty cold, crisp cold, humid heat, searing heat, scalding heat, dry heat, feverish heat, prickly heat, and so on?

From "Bias in Mental Testing", Arthur Jensen, 1980 [22]
per @SilverVVulpes: Also: Inventing Temperature, Hasok Chang, 2004 [3]

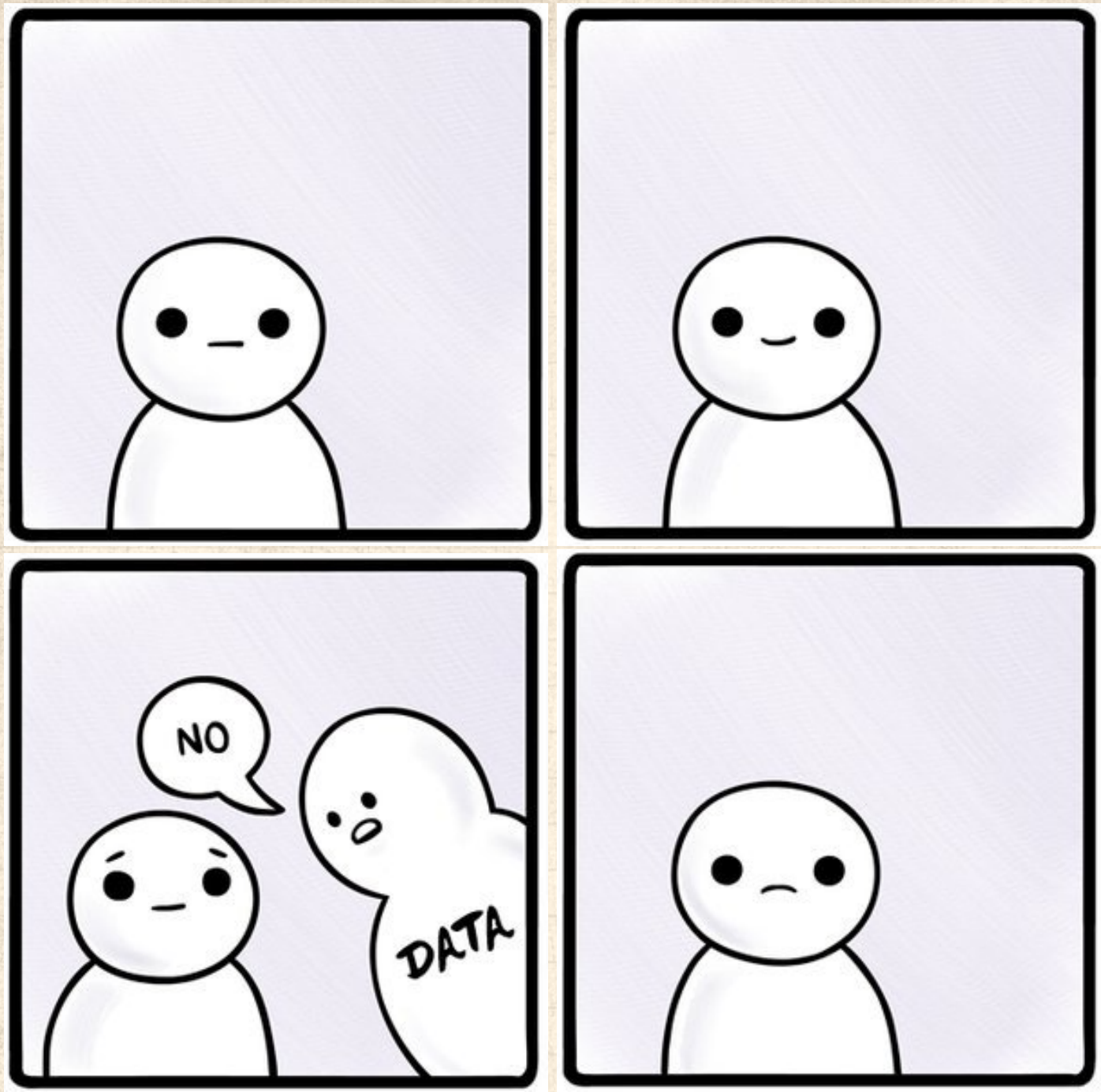
# Measuring temperature was thought impossible:

The early thermometers were inconsistent, both with themselves and with each other. Because they consisted of open-ended glass tubes, they were sensitive to changes in barometric pressure as well as to temperature. And there were problems of calibration, such as where to locate the zero point and how to divide the column of mercury into units. It was believed, incorrectly, that all caves had the same temperature, so thermometers were calibrated in caves. The freezing and boiling points of water were also used in calibration, but, as these vary with impurities in the water and the barometric pressure, the calibration of different thermometers at different times and places resulted in thermometers that failed to correlate perfectly with one another in any given instance. They lacked reliability, as we now would say.

All the while, no one knew what temperature is in a theoretical or scientific sense. There was no theory of thermodynamics that could explain temperature phenomena and provide a complete scientific rationale for the construction and calibration of thermometers. Yet quite adequate and accurate thermometers, hardly differing from those we use today, were eventually developed by the middle of the eighteenth century. Thus the objective measurement of temperature considerably preceded the development of an adequate theory of temperature and heat, and necessarily so, as the science of thermodynamics could not possibly have developed without first having been able to quantify or measure the temperatures of liquids, gasses, and other substances independently of

From “Bias in Mental Testing”, Arthur Jensen, 1980 [22]
per @SilverVVulpes: Also: Inventing Temperature, Hasok Chang, 2004 [3]

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References






Introduction

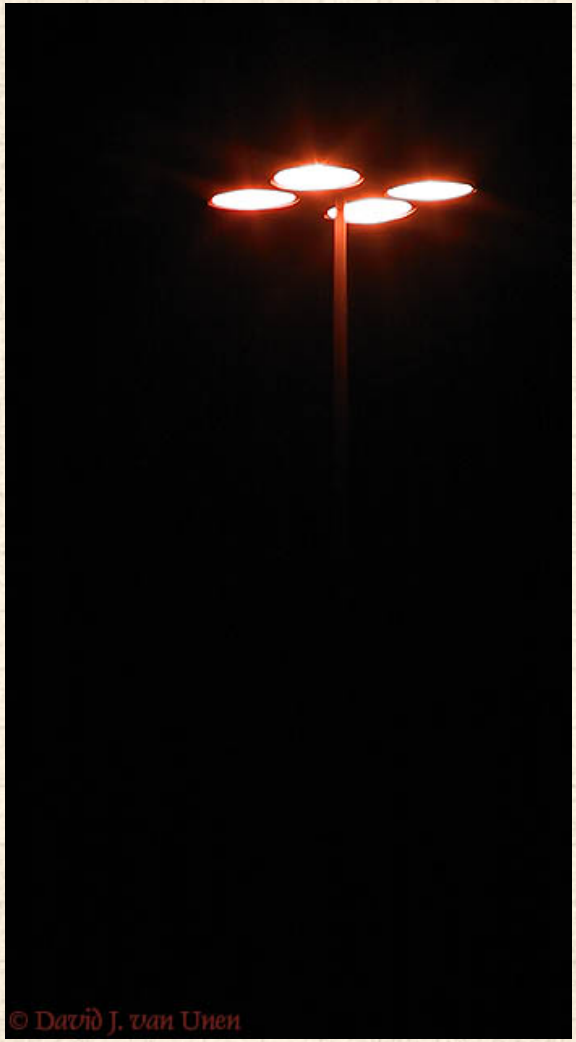
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# What matters and what's measurable:






Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

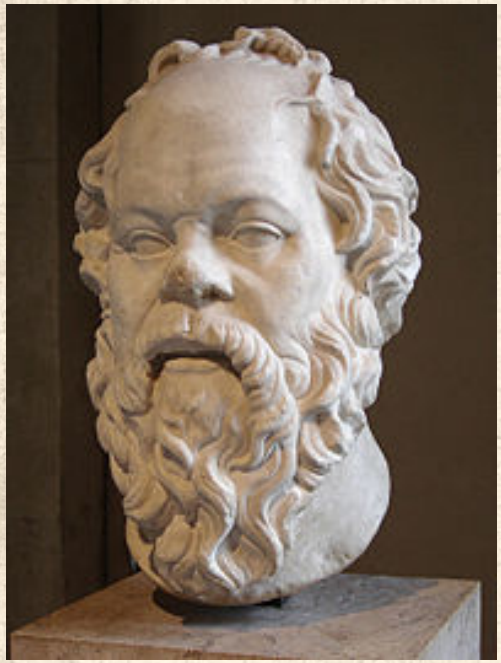
# Panometer—Three kinds of lexical meters:

1. Principled lexical meters:
   - The Hedonometer.
   - The Lexicocalorimeter.
2. Ground truth lexical meters:
   - Insomniometer.
   - Hangoverometer.
3. Bootstrap lexical meters:
   - Boredometer.
   - Hashtagometers.

# Measuring Happiness and Sadness:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



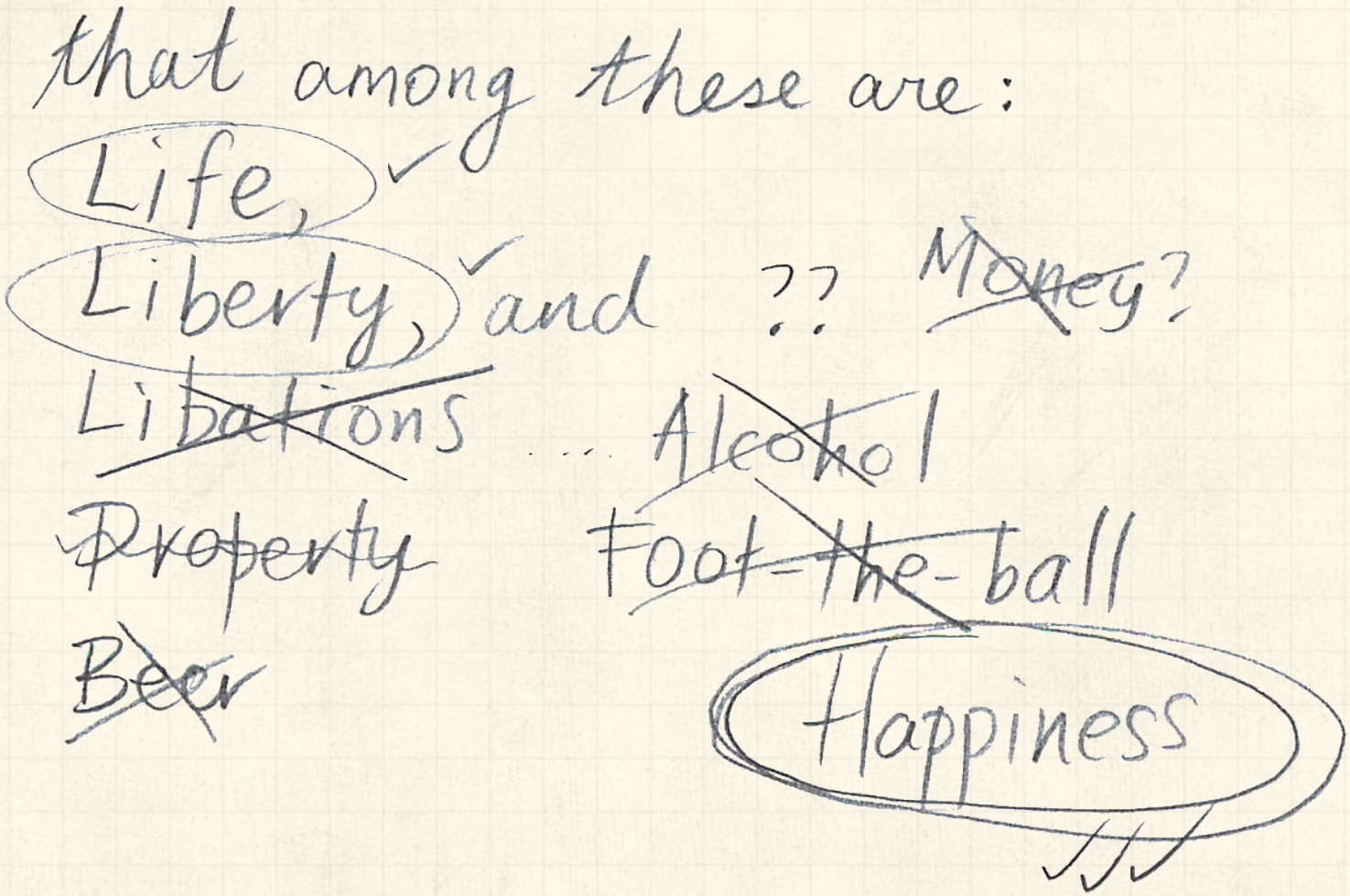
Socrates et al.:
eudaimonia [23]

Bentham:
hedonistic calculus

Jefferson:
...the pursuit of happiness

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Early drafts:



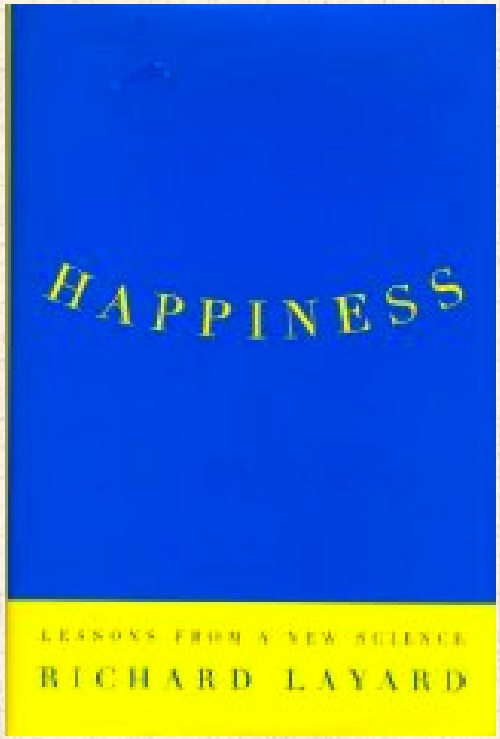
# Happiness:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Even the odd modern economist is happy:

"Happiness" by Richard Layard [29]




[amazon]

# What makes us happy?—Layard's summary:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Dominant factors:

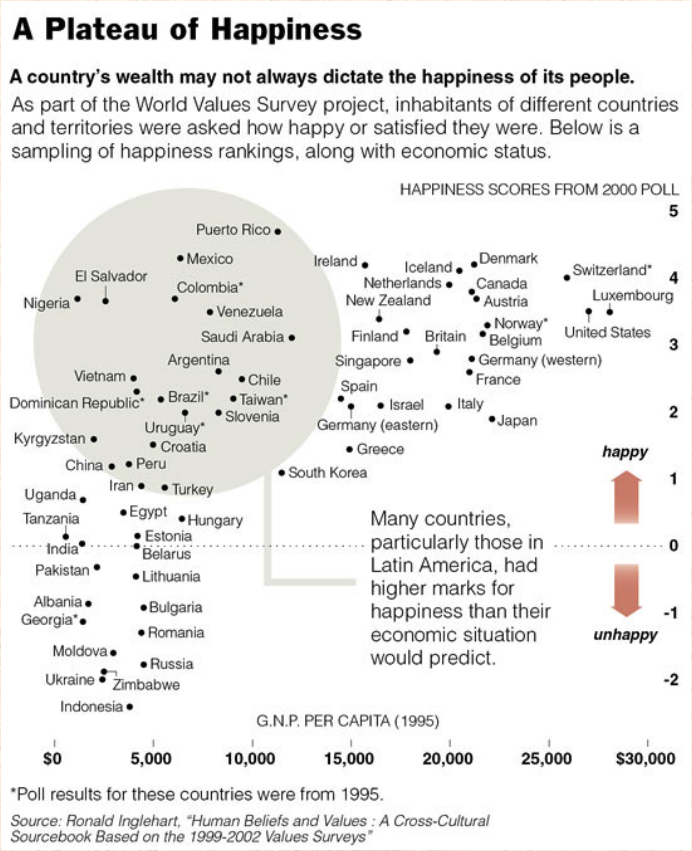
- Family relationships
- Financial situation
- Work
- Community and Friends
- Health
- Personal Values
- Personal Freedom

## Unimportant factors:

- Age
- Gender
- Education
- Inherent intelligence
- Looks

# Desiring happiness—not just for boffins:

- Average people routinely report being happy is what they want most in life [29, 30, 8]
- And it matters: "Happy people live longer:..." Survey by Diener and Chan. [8]




## National indices of well-being:

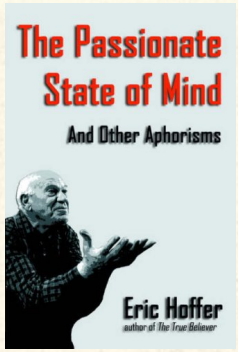
- Bhutan
- UK
- France
- Australia

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Some easy knocks:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References




"The Passionate State of Mind: And Other Aphorisms"
by Eric Hoffer (1954). [21]

"The search for happiness is one of the chief sources of unhappiness."

# Some easy knocks:

## Colbert: "Happiness is totally overrated ..."

"Happiness is for the weak."

Full interview with Jennifer Senior was here



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction

Measurement

Happiness

Some motivation

Measuring emotional content

Hedonometer

Analysis

Songs

Blogs

SOTU

A Better Lexical Lens

Geography

Movement

Extras

References

# 30 Rock, S7E8:

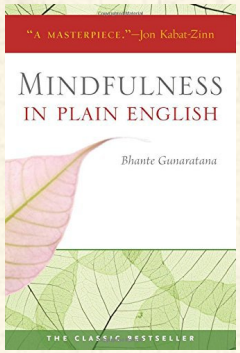
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## 30 Rock, S7E8:

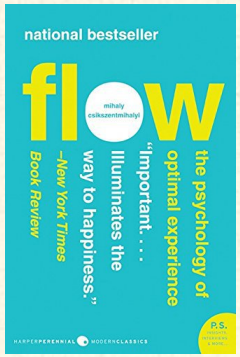
JD: “Before she died, Colleen told me—she just wants me to be happy. ‘I just want you to be happy.’ You know who you say that to? A loser. Someone who can’t hope for anything more in life than just being happy. You say that to someone who has disappointed you.”
LL: “Jack.”
JD: “No. It’s perfect. She’s a genius. One last twist of the knife. Well, thank you for coming, Lemon, but I better get going. The funeral is tomorrow. Colleen wanted to be buried before the rest of the family found out and sold her body to a haunted house. And, of course, I get to eulogize Colleen at the service. One more chance to disappoint her as she looks up at me from her throne in hell.

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Meaning rather than happiness:




"Mindfulness in Plain English"
by Henepola Gunaratana (1992). [20]




"Flow"
by Mihaly Csikszentmihalyi (1990). [6]

- Can we measure Flow in a big data way?
- Maybe drops in social media usage indicate people are doing okay?

# Emotional content



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## So how does one measure

1. happiness?
2. levels of other emotional states?

## Just ask people how happy they are.

- Experience sampling [5, 7, 6] (Csikszentmihalyi et al.)
- Day reconstruction [24] (Kahneman et al.)

## But self-reporting has some drawbacks:

- relies on memory and self-perception
- induces misreporting [31]
- costly

# Happiness, attention, and doing:

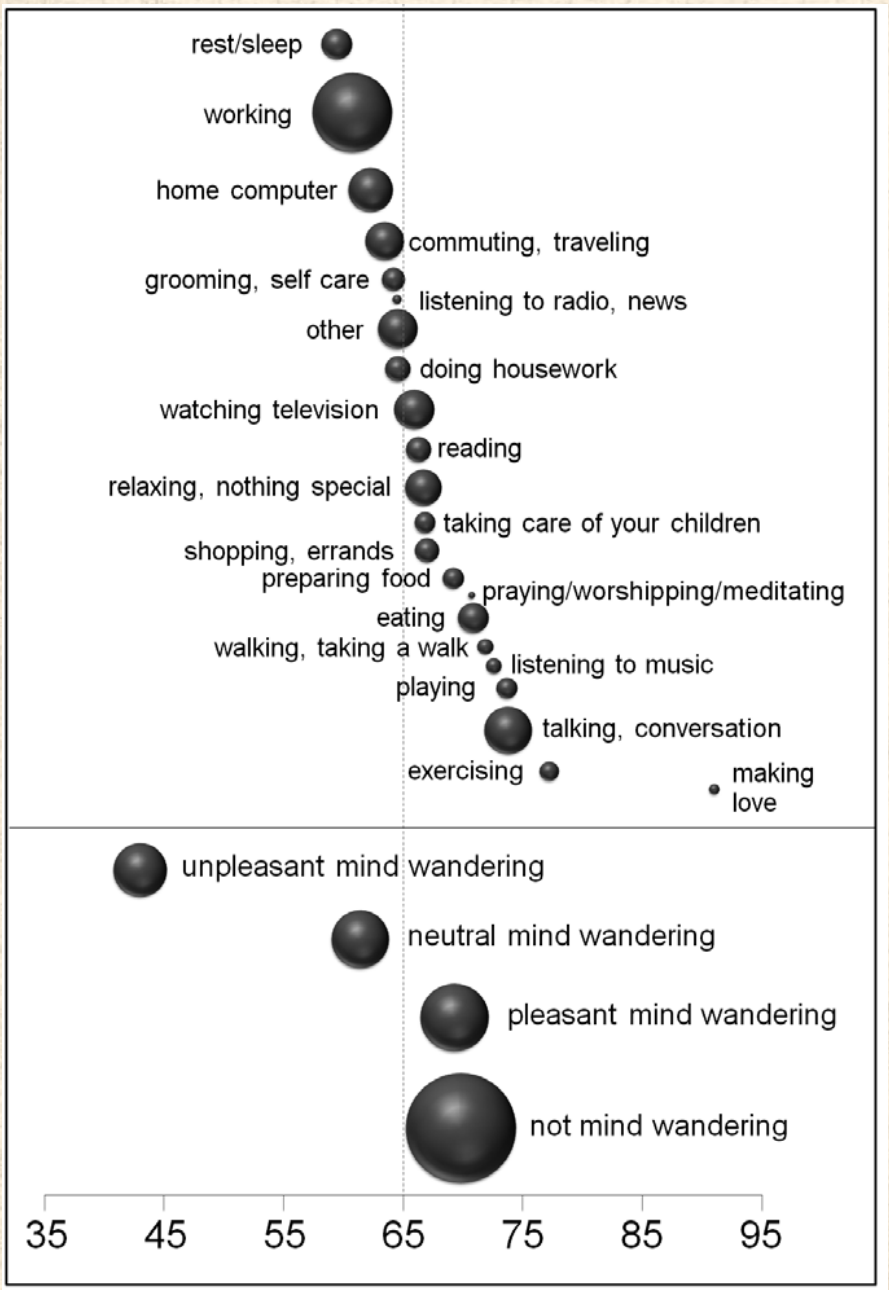



**Fig. 1.** Mean happiness reported during each activity (**top**) and while mind wandering to unpleasant topics, neutral topics, pleasant topics or not mind wandering (**bottom**). Dashed line indicates mean of happiness across all samples. Bubble area indicates the frequency of occurrence. The largest bubble ("not mind wandering") corresponds to 53.1% of the samples, and the smallest bubble ("praying/worshipping/meditating") corresponds to 0.1% of the samples.

Killingsworth and Gilbert, Science, 2010 [27]




Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

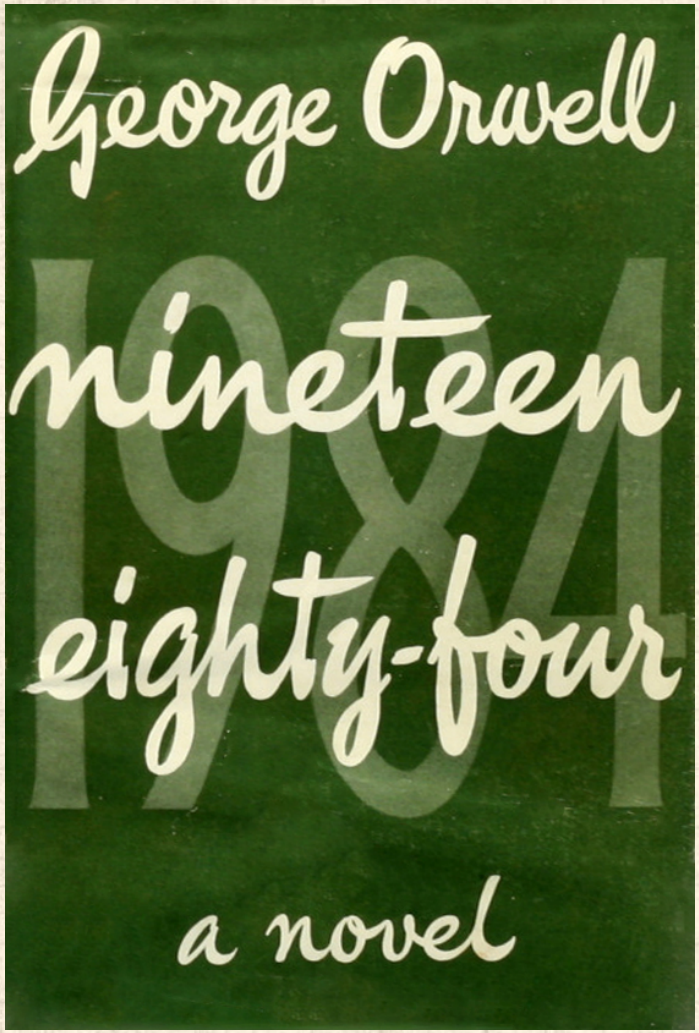
## We'd like to build an 'hedonometer':

- An instrument to 'remotely-sense' emotional states and levels, in real time or post hoc.

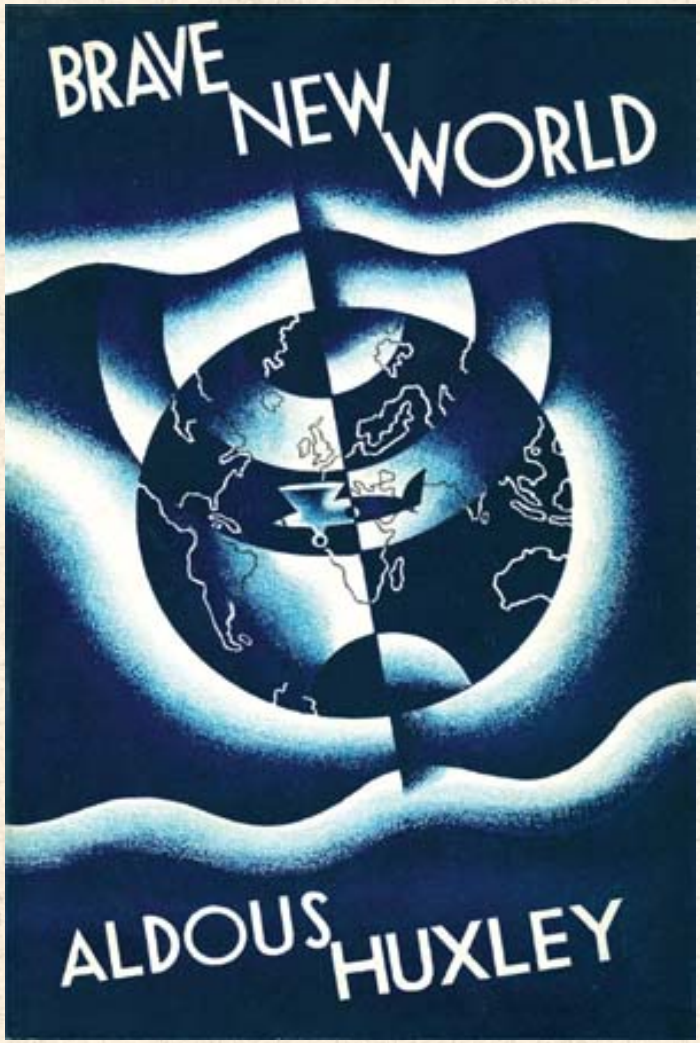
## Ideally:

- Transparent
- Fast
- Based on written expression
- Uses human evaluation
- Non-reactive
- Complementary to self-reported measures
- Improvable

# We don't want to end up here:




Science




Policy



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Ousiometrics before we called it that:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Measuring essential meaning [9]

- Idea: Build on measures of the essential meaning of individual words.
- Osgood et al. (1957) [36] identified a basis of three psychological variables as semantic differentials:
  - Evaluation, Potency, and Activation.
- EPA was recast by Mehrabian and Russell (1974) [33] in the context of emotion:
  - Valence (or sometimes Pleasure): bad ↔ good
  - Arousal: passive ↔ active
  - Dominance: weak ↔ strong
- VAD became more commonly used framework.
- 'VAD ≡ EAP' (more later).

# ANEW study

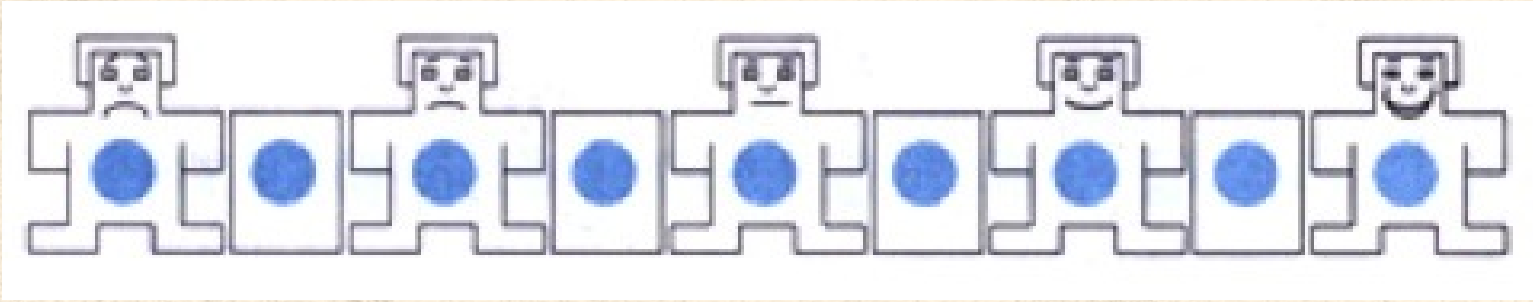


Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

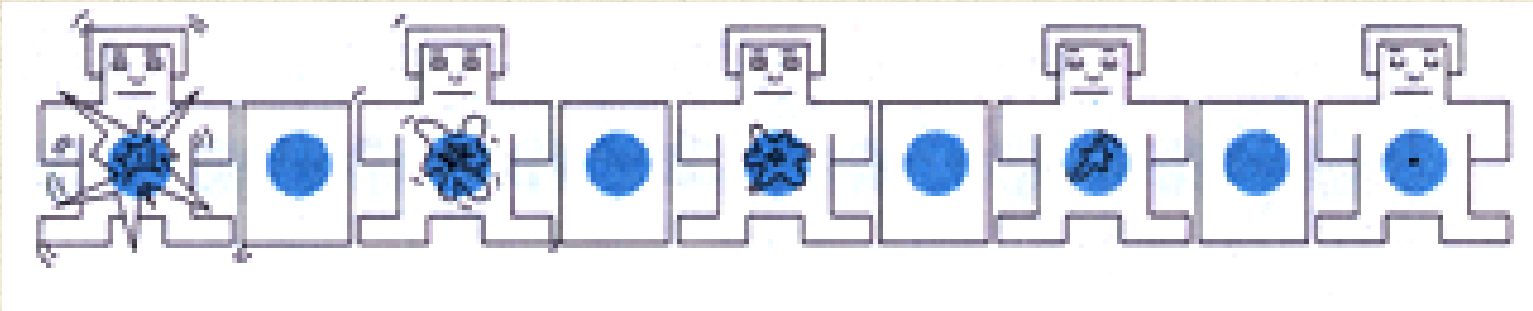
- ANEW = "Affective Norms for English Words"
- Study: participants shown lists of isolated words
- Asked to grade each word's valence, arousal, and dominance level
- Integer scale of 1–9
- $N$ =1034 words—previously identified as bearing emotional weight
- Participants = College students (*cough*)
- Results published by Bradley and Lang (1999) [2]

# 1999 ANEW study—three 1–9 scales: [2]

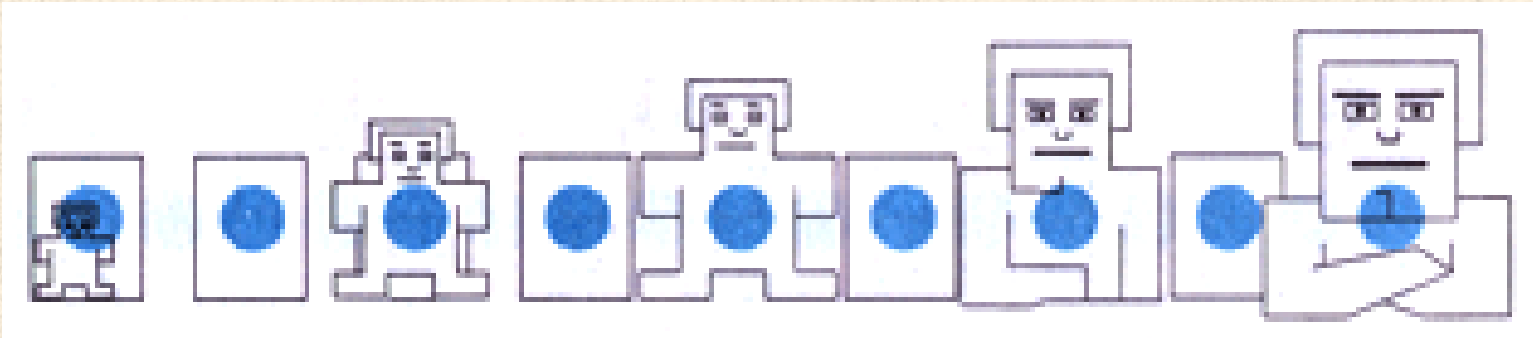
## valence:



## arousal:



## dominance:





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# ANEW study:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Valence = Happiness:

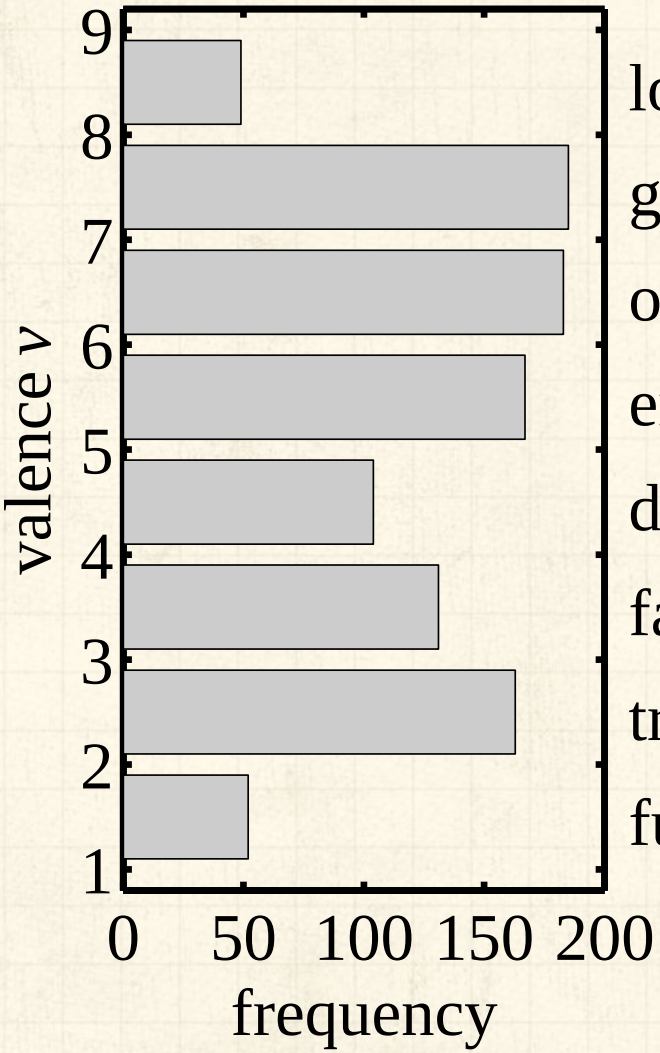
- Valence scale presented to participants as a 'happy-unhappy scale.'
- Participants were further told:

"At one extreme of this scale, you are happy, pleased, satisfied, contented, hopeful. ...

The other end of the scale is when you feel completely unhappy, annoyed, unsatisfied, melancholic, despaired, or bored."

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# ANEW study words—examples




love/paradise/triumphant

glory/luxury/trophy

optimism/pancakes/church

engine/paper/street

derelict/neurotic/vanity

fault/corrupt/lawsuit

trauma/hostage/disgusted

funeral/rape/suicide

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Analysing text:

- Simplest measure for a text:

$$\theta_{\text{avg}} = \sum_{i=1}^{N} p_i \theta_i$$

where $p_i$ is fractional abundance of word $i$ and $\theta$ is average valence, arousal, or dominance for word $i$.

- Focus on happiness (valence), $\theta = h$.
- Average happiness typically falls between 5 and 7.

# Measuring the perceived happiness of a text:

Lyrics for
Michael Jackson's Billie Jean

"She was more like a beauty queen
from a movie scene.
⋮
And mother always told me,
be careful who you love.
And be careful of what you do
'cause the lie becomes the truth.

Billie Jean is not my lover,
She's just a girl who claims
that I am the one.
⋮

| ANEW words | $v_k$ | $f_k$ |
|---|---|---|
| $k$=1. love | 8.72 | 1 |
| 2. mother | 8.39 | 1 |
| 3. baby | 8.22 | 3 |
| 4. beauty | 7.82 | 1 |
| 5. truth | 7.80 | 1 |
| 6. people | 7.33 | 2 |
| 7. strong | 7.11 | 1 |
| 8. young | 6.89 | 2 |
| 9. girl | 6.87 | 4 |
| 10. movie | 6.86 | 1 |
| 11. perfume | 6.76 | 1 |
| 12. queen | 6.44 | 1 |
| 13. name | 5.55 | 1 |
| 14. lie | 2.79 | 1 |

$$v_{\text{text}} = \frac{\sum_k v_k f_k}{\sum_k f_k}$$

$v_{\text{Billie Jean}} = 7.1$

$v_{\text{Thriller}} = 6.3$

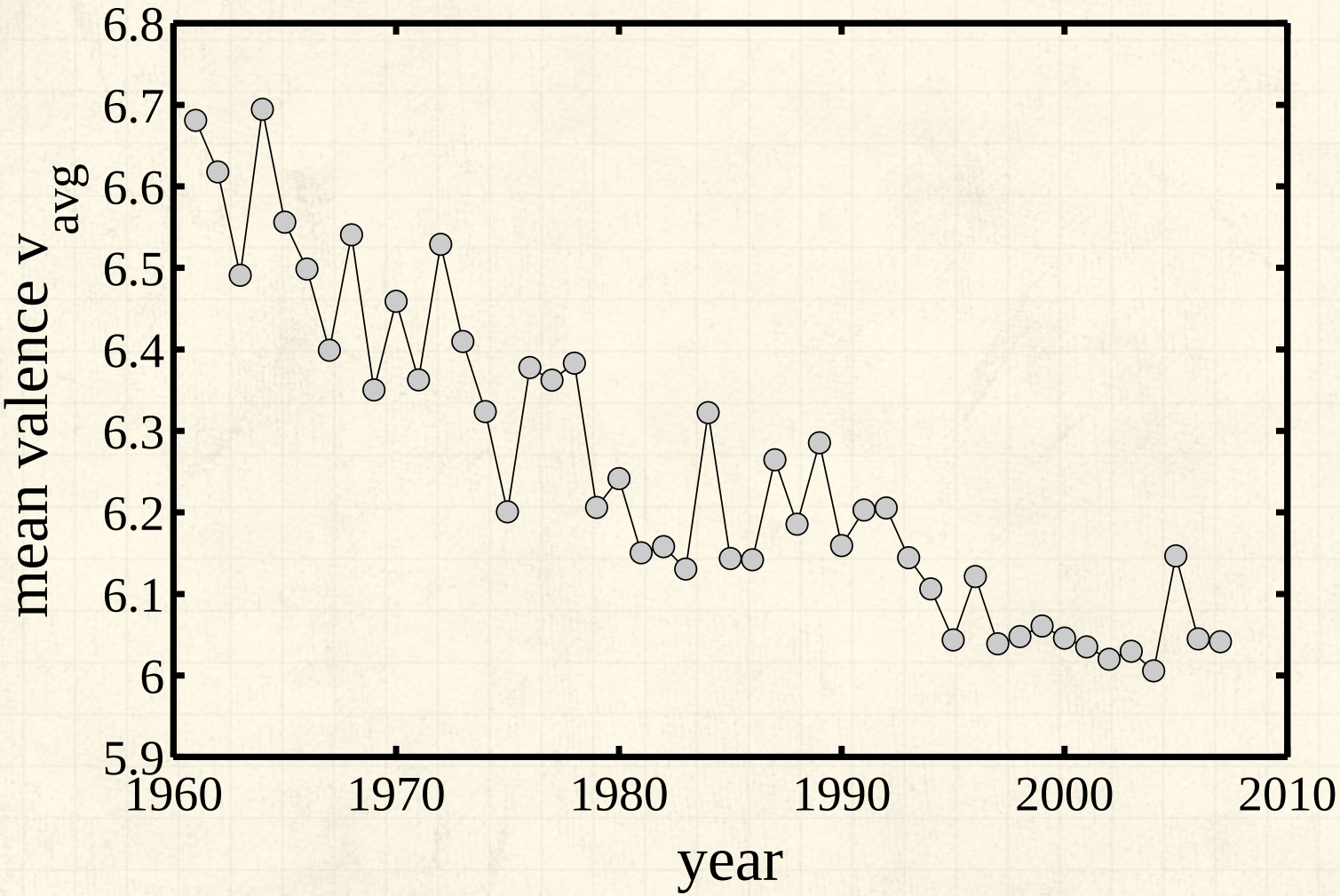
$v_{\text{Michael Jackson}} = 6.4$

- Temperature-like measure—large numbers only.
- Not meant to be used at level of sentence, paragraph, song, tweet, ...
- Important: Social measure of sentiment.
- Later: see instrument is tunable.

## Daft Punk's 1997 "Around the World":

Around the world, around the world
Around the world, around the world
Around the world, around the world
Around the world, around the world

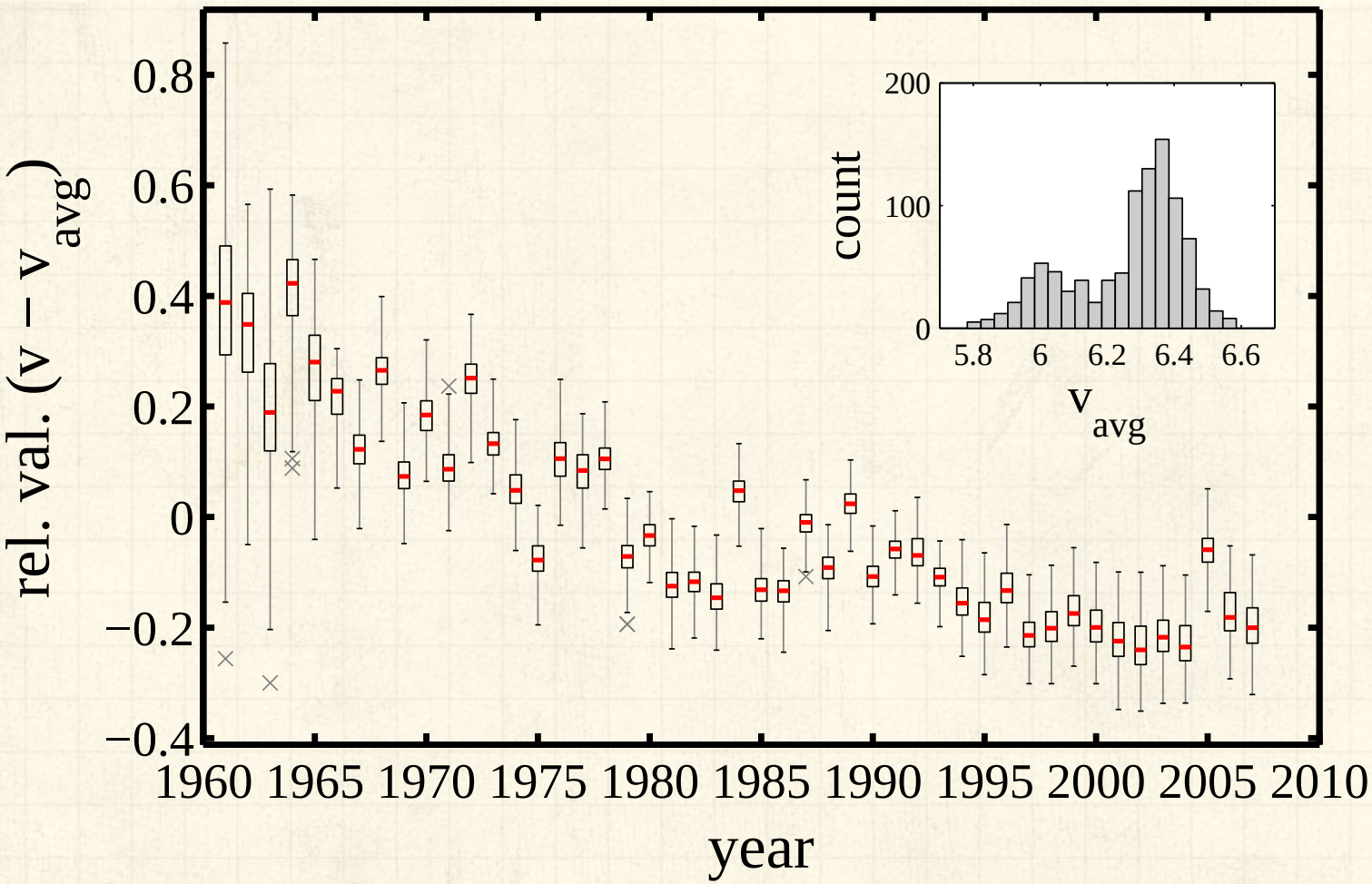
# Song Lyrics—average happiness






Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Song Lyrics—measurement robustness

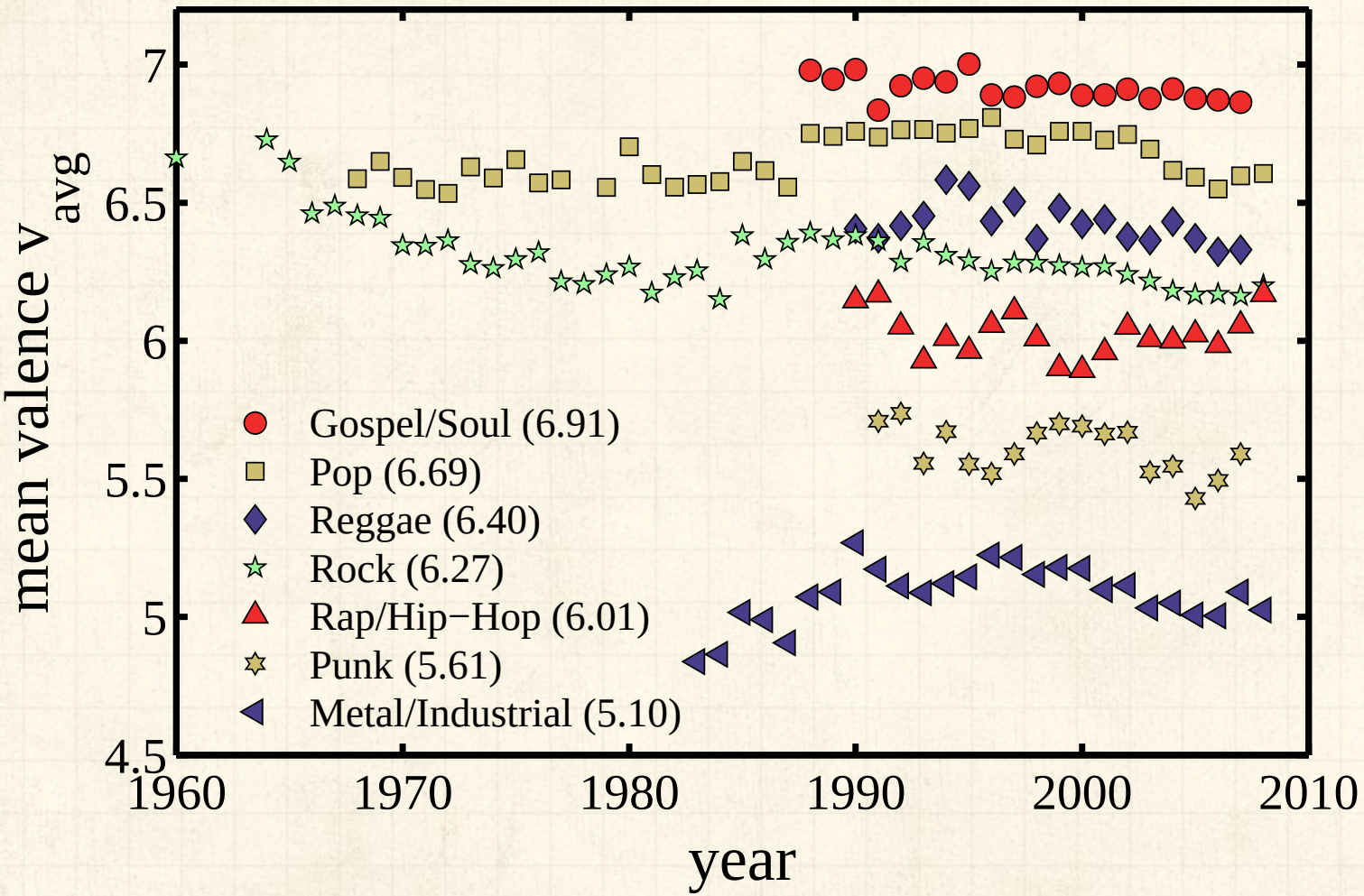



100 random subsets of 750 ANEW words




Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Song Lyrics—average happiness of genres:






Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction

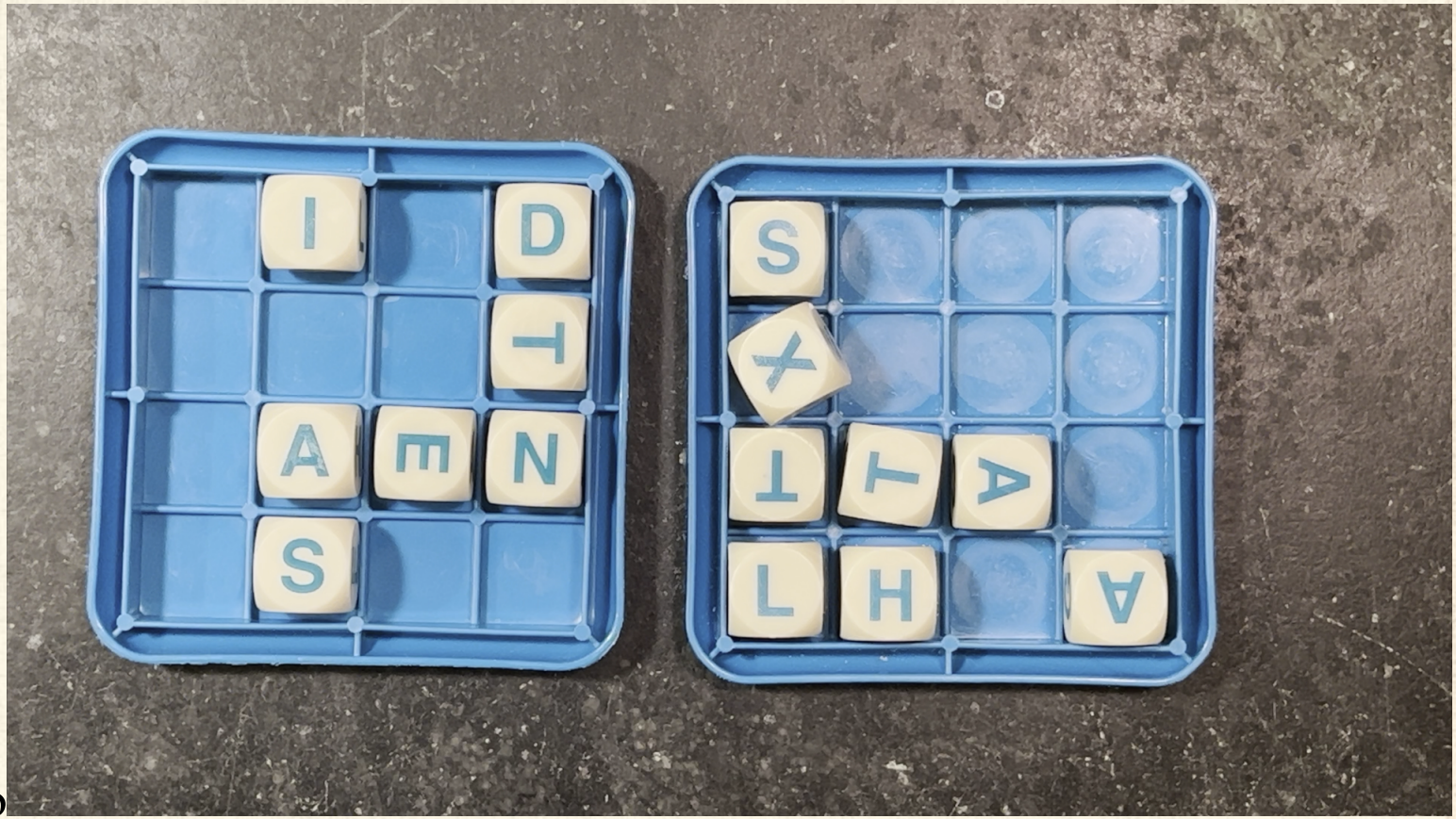
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

## The Boggoracle Speaks:



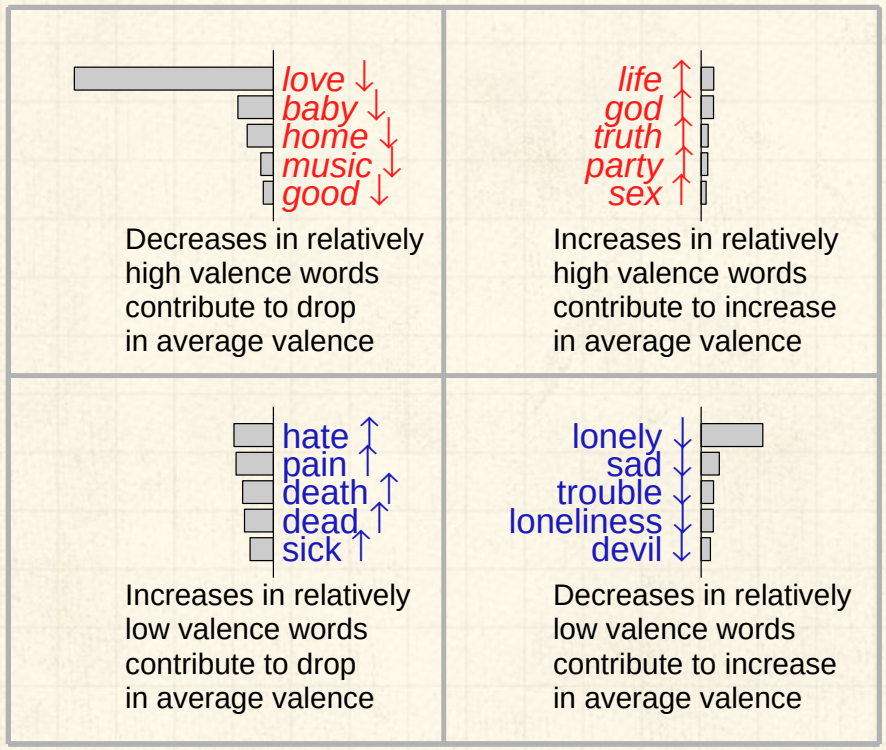

O

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Happiness Word Shift Graph (early version):

Per word drop in valence of lyrics from 1980–2007 relative to valence of lyrics from 1960

Key:



Word shifts are word clouds for grown ups.

# Word data shift details:

Given two texts $T_{\text{ref}}$ and $T_{\text{comp}}$:

- Measure difference in average happiness: $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$
- Evident question: Which words contribute the most to this change?
- Break difference down by contributions from individual words:

$$\delta h_{\text{avg},i} = \frac{100}{\left| h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})} \right|} \underbrace{\left[ h_{\text{avg}}(w_i) - h_{\text{avg}}^{(\text{ref})} \right]}_{+/-} \underbrace{\left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right]}_{\uparrow/\downarrow}$$

- Must have: $\sum_i \delta h_{\text{avg},i} = \pm 100$
- Rank words by $|\delta h_{\text{avg},i}|$

# Word data shift details:

$$h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})} = \sum_{i=1}^{N} h_{\text{avg}}(w_i) p_i^{(\text{comp})} - \sum_{i=1}^{N} h_{\text{avg}}(w_i) p_i^{(\text{ref})}$$

$$= \sum_{i=1}^{N} h_{\text{avg}}(w_i) \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right]$$

$$= \sum_{i=1}^{N} \left[ h_{\text{avg}}(w_i) - h_{\text{avg}}^{(\text{ref})} \right] \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right]$$

where

$$\sum_{i=1}^{N} h_{\text{avg}}^{(\text{ref})} \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right] = h_{\text{avg}}^{(\text{ref})} \sum_{i=1}^{N} \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right]$$

$$= h_{\text{avg}}^{(\text{ref})} (1 - 1) = 0.$$



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

$+\uparrow$: Increased usage of relatively positive words—If a word is happier than text $T_{\text{ref}}$ $(+)$ and appears relatively more often in text $T_{\text{comp}}$ $(\uparrow)$, then the contribution to the difference $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$ is positive;

$-\downarrow$: Decreased usage of relatively negative words—If a word is less happy than text $T_{\text{ref}}$ $(-)$ and appears relatively less often in text $T_{\text{comp}}$ $(\downarrow)$, then the contribution to the difference $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$ is also positive;

$+\downarrow$: Decreased usage of relatively positive words—If a word is happier than text $T_{\text{ref}}$ $(+)$ and appears relatively less often in text $T_{\text{comp}}$ $(\downarrow)$, then the contribution to the difference $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$ is negative; and

$-\uparrow$: Increased usage of relatively negative words—If a word is less happy than text $T_{\text{ref}}$ $(-)$ and appears relatively more often in text $T_{\text{comp}}$ $(\uparrow)$, then the contribution to the difference $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$ is also negative.

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

## The Boggoracle Speaks:

O

# Top 50 of ≃ 20,000 artists:

| Rank | Artist | $h_{avg}$ | Rank | Artist | $h_{avg}$ |
|---|---|---|---|---|---|
| 1 | All-4-One | 7.15 | 26 | Sarah Connor | 6.86 |
| 2 | Luther Vandross | 7.12 | 27 | Darlene Zschech | 6.86 |
| 3 | S Club 7 | 7.05 | 28 | Mary J Blige | 6.86 |
| 4 | K Ci & JoJo | 7.04 | 29 | Steve Miller Band | 6.86 |
| 5 | Perry Como | 7.04 | 30 | New Edition | 6.86 |
| 6 | Diana Ross & The Supremes | 7.03 | 31 | Mandy Moore | 6.86 |
| 7 | Buddy Holly | 7.02 | 32 | Alicia Keys | 6.85 |
| 8 | Faith Evans | 7.01 | 33 | Cher | 6.85 |
| 9 | The Beach Boys | 7.01 | 34 | Modern Talking | 6.85 |
| 10 | Jon B | 6.98 | 35 | Mario | 6.84 |
| 11 | Dru Hill | 6.96 | 36 | Aretha Franklin | 6.84 |
| 12 | Earth Wind & Fire | 6.95 | 37 | Jessica Simpson | 6.84 |
| 13 | Ashanti | 6.95 | 38 | 112 | 6.84 |
| 14 | Otis Redding | 6.93 | 39 | Backstreet Boys | 6.83 |
| 15 | Faith Hill | 6.93 | 40 | Billy Gilman | 6.83 |
| 16 | NSync | 6.93 | 41 | B2K | 6.82 |
| 17 | The Supremes | 6.91 | 42 | Stevie Wonder | 6.82 |
| 18 | The Partridge Family | 6.91 | 43 | John Legend | 6.81 |
| 19 | Kelly Price | 6.89 | 44 | Ricky Nelson | 6.79 |
| 20 | Tamia | 6.89 | 45 | Lionel Richie | 6.79 |
| 21 | Avant | 6.88 | 46 | 98 Degrees | 6.79 |
| 22 | Jennifer Lopez | 6.88 | 47 | Boyzone | 6.79 |
| 23 | Vanessa Williams | 6.87 | 48 | Gerald Levert | 6.79 |
| 24 | Babyface | 6.87 | 49 | Nat King Cole | 6.78 |
| 25 | E Rotic | 6.87 | 50 | Marques Houston | 6.78 |

(criteria: $\geq$ 50 songs and $\geq$ 1000 ANEW words)



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Bottom 50 of ≃ 20,000 artists:

| Rank | Artist | $h_{avg}$ | Rank | Artist | $h_{avg}$ |
|---|---|---|---|---|---|
| 1 | Slayer | 4.80 | 26 | Nine Inch Nails | 5.34 |
| 2 | Misfits | 4.88 | 27 | Sevendust | 5.34 |
| 3 | Staind | 4.93 | 28 | Annihilator | 5.35 |
| 4 | Slipknot | 4.98 | 29 | Biohazard | 5.36 |
| 5 | Darkthrone | 4.98 | 30 | Insane Clown Posse | 5.36 |
| 6 | Death | 5.02 | 31 | Megadeth | 5.36 |
| 7 | Black Label Society | 5.05 | 32 | Manowar | 5.37 |
| 8 | Pig | 5.08 | 33 | Zebrahead | 5.38 |
| 9 | Voivod | 5.14 | 34 | Danzig | 5.39 |
| 10 | Fear Factory | 5.15 | 35 | Acid Drinkers | 5.40 |
| 11 | Iced Earth | 5.16 | 36 | Dag Nasty | 5.40 |
| 12 | Simple Plan | 5.16 | 37 | Iron Maiden | 5.40 |
| 13 | Machine Head | 5.17 | 38 | Flotsam And Jetsam | 5.41 |
| 14 | Metallica | 5.19 | 39 | Powerman 5000 | 5.42 |
| 15 | Dimmu Borgir | 5.20 | 40 | Anthrax | 5.43 |
| 16 | Mudvayne | 5.21 | 41 | Rhapsody | 5.43 |
| 17 | Linkin Park | 5.22 | 42 | Korn | 5.43 |
| 18 | Papa Roach | 5.22 | 43 | Rage | 5.44 |
| 19 | Audioslave | 5.24 | 44 | Accept | 5.45 |
| 20 | Rage Against The Machine | 5.24 | 45 | Esham | 5.46 |
| 21 | Cradle Of Filth | 5.25 | 46 | Blind Guardian | 5.46 |
| 22 | Dark Tranquility | 5.26 | 47 | White Zombie | 5.47 |
| 23 | Jack Off Jill | 5.28 | 48 | Helloween | 5.50 |
| 24 | Evanescence | 5.30 | 49 | W A S P | 5.50 |
| 25 | Twiztid | 5.33 | 50 | Green Day | 5.50 |

(criteria: $\geq$ 50 songs and $\geq$ 1000 ANEW words)



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

| Text: | $h_{\text{avg}}$ | Words with a similar score: |
|---|---|---|
| Soul/Gospel lyrics [12] | 6.9 | chocolate (6.88), leisurely (6.88), penthouse (6.81) |
| Pop lyrics [12] | 6.7 | dream (6.73), honey (6.73), sugar (6.74) |
| Dante's Paradise [?] | 6.5 | muffin (6.57), rabbit (6.57), smooth (6.58) |
| Tweets, 9/9/2008 to 12/31/2010 | 6.4 | thought (6.39), face (6.39), blond (6.42) |
| Rock lyrics [12] | 6.3 | church (6.28), tree (6.32), air (6.34) |
| Enron Emails [?] | 6.2 | clouds (6.18), alert (6.20), computer (6.24) |
| State of the Union Messages [12] | 6.1 | grass (6.12), idol (6.12), bottle (6.15) |
| New York Times (1987–2007) [38] | 6.0 | hotel (6.00), tennis (6.02), wonder (6.03) |
| Blogs [12] | 5.8 | owl (5.80), whistle (5.81), humble (5.86) |
| Dante's Inferno [?] | 5.5 | glacier (5.50), repentant (5.53), mischief (5.57) |
| Heavy Metal lyrics [12] | 5.4 | lamp (5.41), elevator (5.44), truck (5.47) |

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

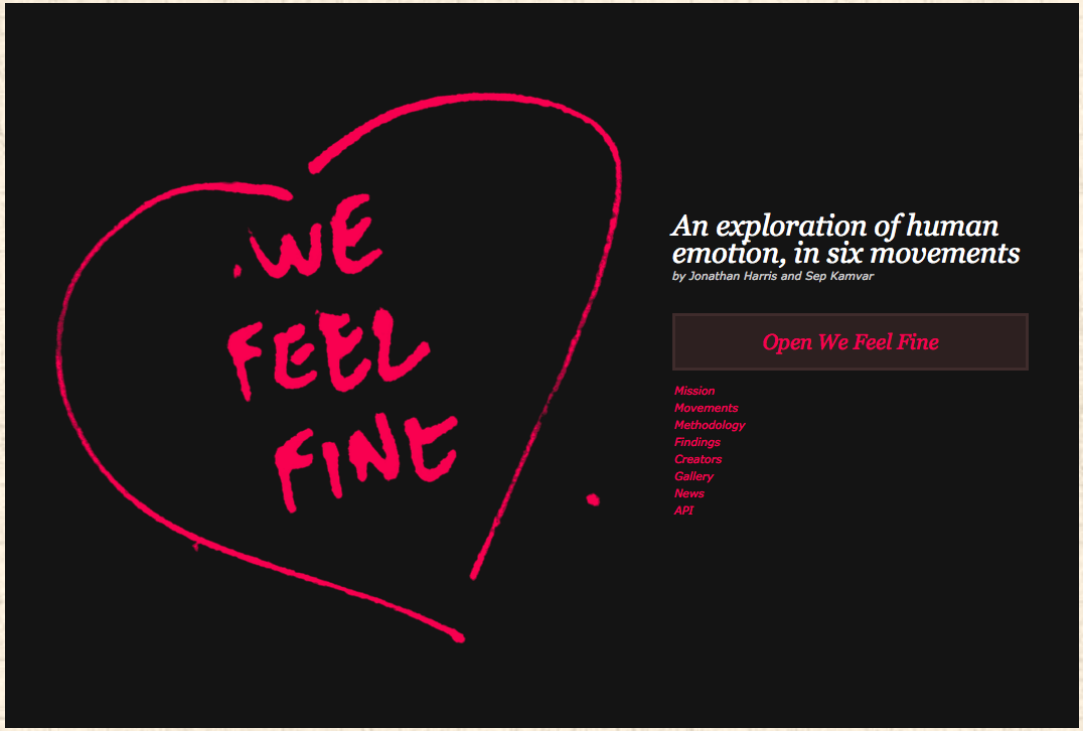
## "Language has a Positivity Bias. How did we measure that?"

Lexicon Valley, Episode #62, The Pollyanna Hypothesis, June 17, 2015 [2]

- Hosts: Mike Vuolo and Bob Garfield.
- The song: Final Six, Raining Blood a bonus track on Slayer's tenth album Christ Illusion.

# Data sets:

- Blog phrases containing "I feel...", "I am feeling", etc., taken from wefeelfine.org (API, 2005–2010)



- Created by Jonathan Harris & Sep Kamvar

The PoCSverse
Finding Happiness
60 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction

Measurement

Happiness

Some motivation

Measuring emotional content

Hedonometer

Analysis

Songs

Blogs

SOTU

A Better Lexical Lens

Geography

Movement

Extras

References

# Jonathan Harris:

2007 TED Talk: The Web's secret stories

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

So I really consider myself a storyteller. But I don't really tell stories in the usual way, in the sense that I don't usually tell my own stories. Instead, I'm really interested in building tools that allow large numbers of other people to tell their stories, people all around the world. I do this because I think that people actually have a lot in common. I think people are very similar, but I also think that we have trouble seeing that.

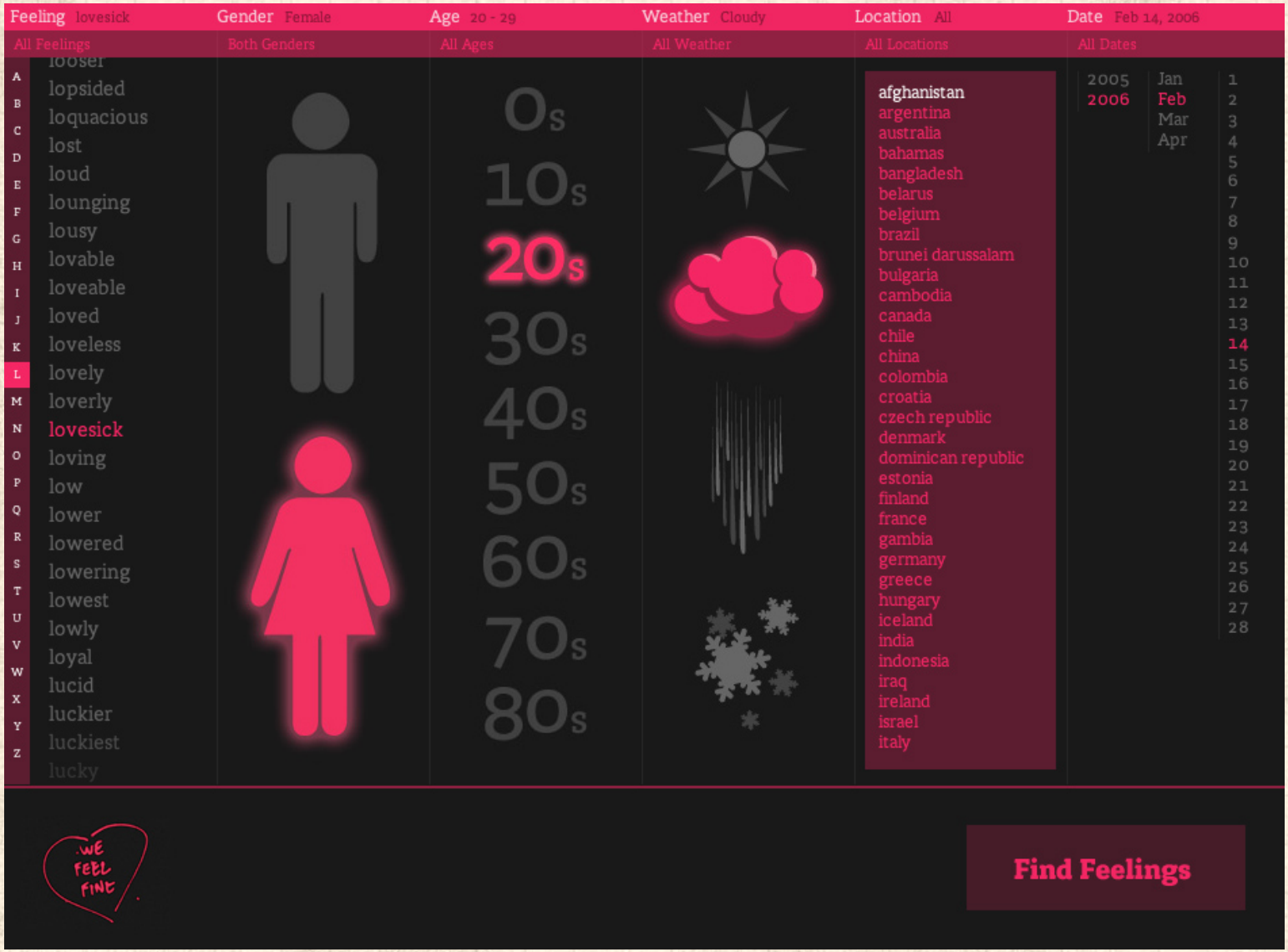
# wefeelfine.org:

Feeling lonely Gender Both Age All Weather All Location All Date All

- i feel very lonely and unoticed and that i am poised in a point of my life when i am able to do great things but just cant quite get them started
  March 30, 2006 / from a 31 year old in fairfax virginia united states when it was cloudy
- i feel lonely recently
  March 30, 2006 / from someone in georgia united states
- i feel lonely things are all good but i miss the way things used to be
  March 31, 2006 / from an 18 year old female in arizona united states
- i feel really lonely every night because i dont have any good friends irl that i can just talk about anything with
  March 31, 2006 / from a 17 year old male in lawrenceville georgia united states
- i feel really lonely and like any sensible loser i have to write about it in a blog
  March 31, 2006 / from an 18 year old male in missouri united states
- i feel so lonely inside
  March 31, 2006 / from a 24 year old male in san diego california united states when it was cloudy
- i feel soooooooo lonely sometimes
  March 31, 2006 / from a 19 year old female in ellensburg washington united states
- i feel lonely
  March 31, 2006 / from someone
- i feel lonely i feel scared
  March 31, 2006 / from a 29 year old in mount vernon ohio united states
- i feel lonely when im with her
  March 31, 2006 / from someone in florida united states
- i feel so much less lonely knowing that there are people out there again


The PoCSverse
Finding Happiness
63 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# wefeelfine.org:





The PoCSverse
Finding Happiness
64 of 165

Introduction

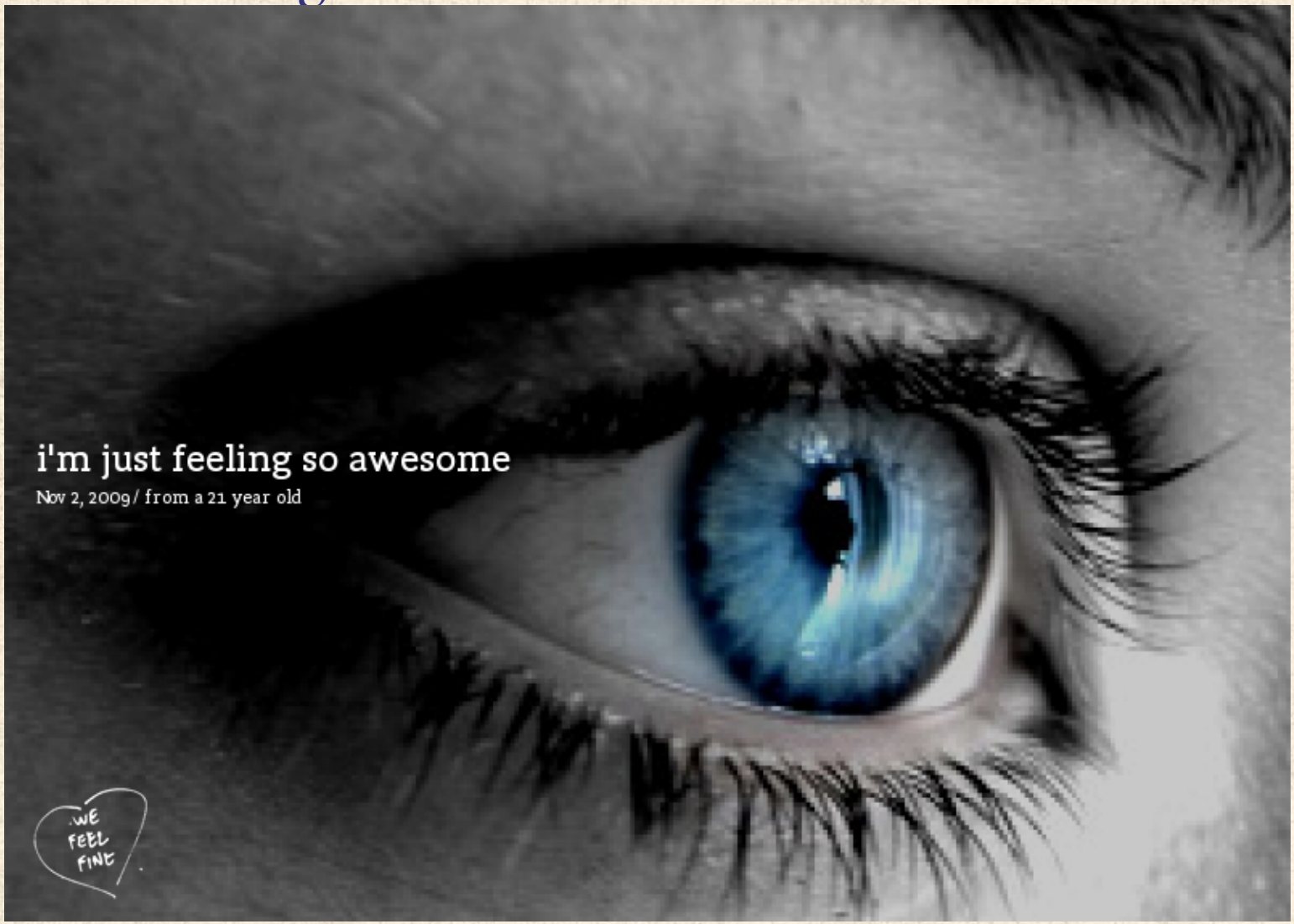
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# wefeelfine.org:



Introduction

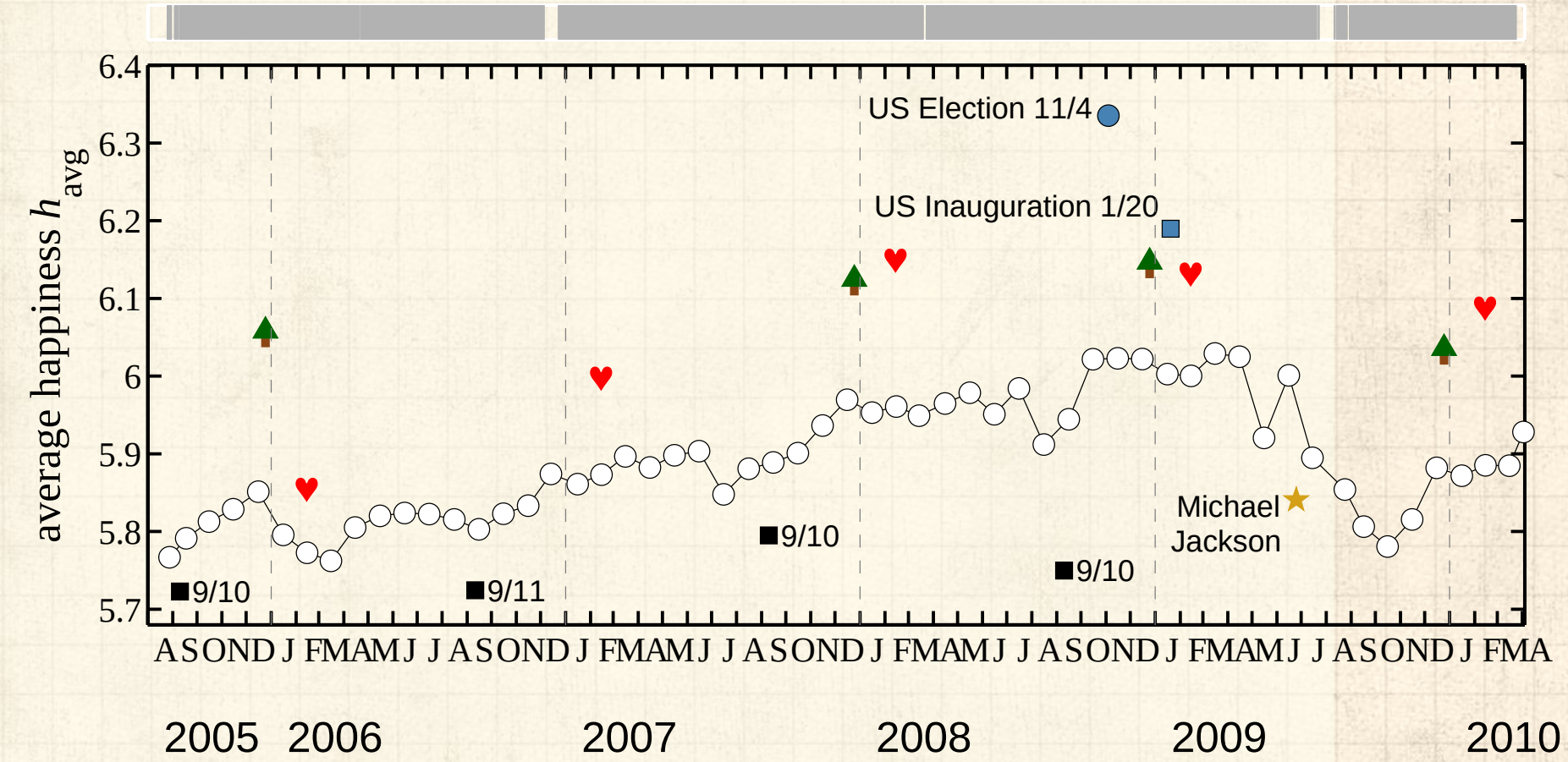
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

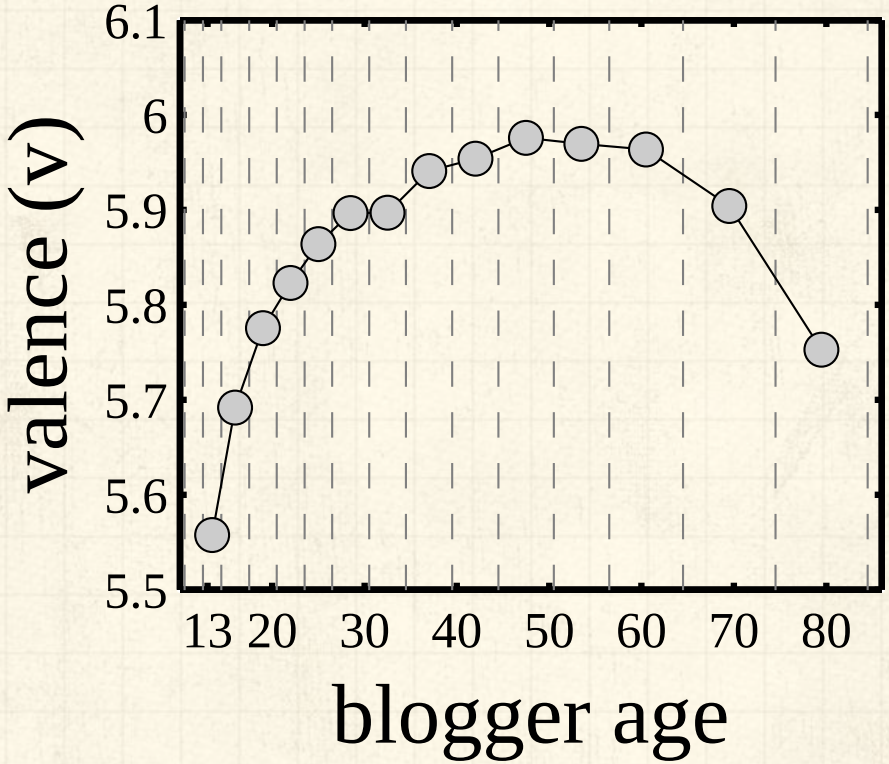
References

# Blogs—Overall trend



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

From wefeelfine.org by Jonathan Harris & Sep Kamvar




Average happiness as a function of the age bloggers report they will turn in the year of their posting.

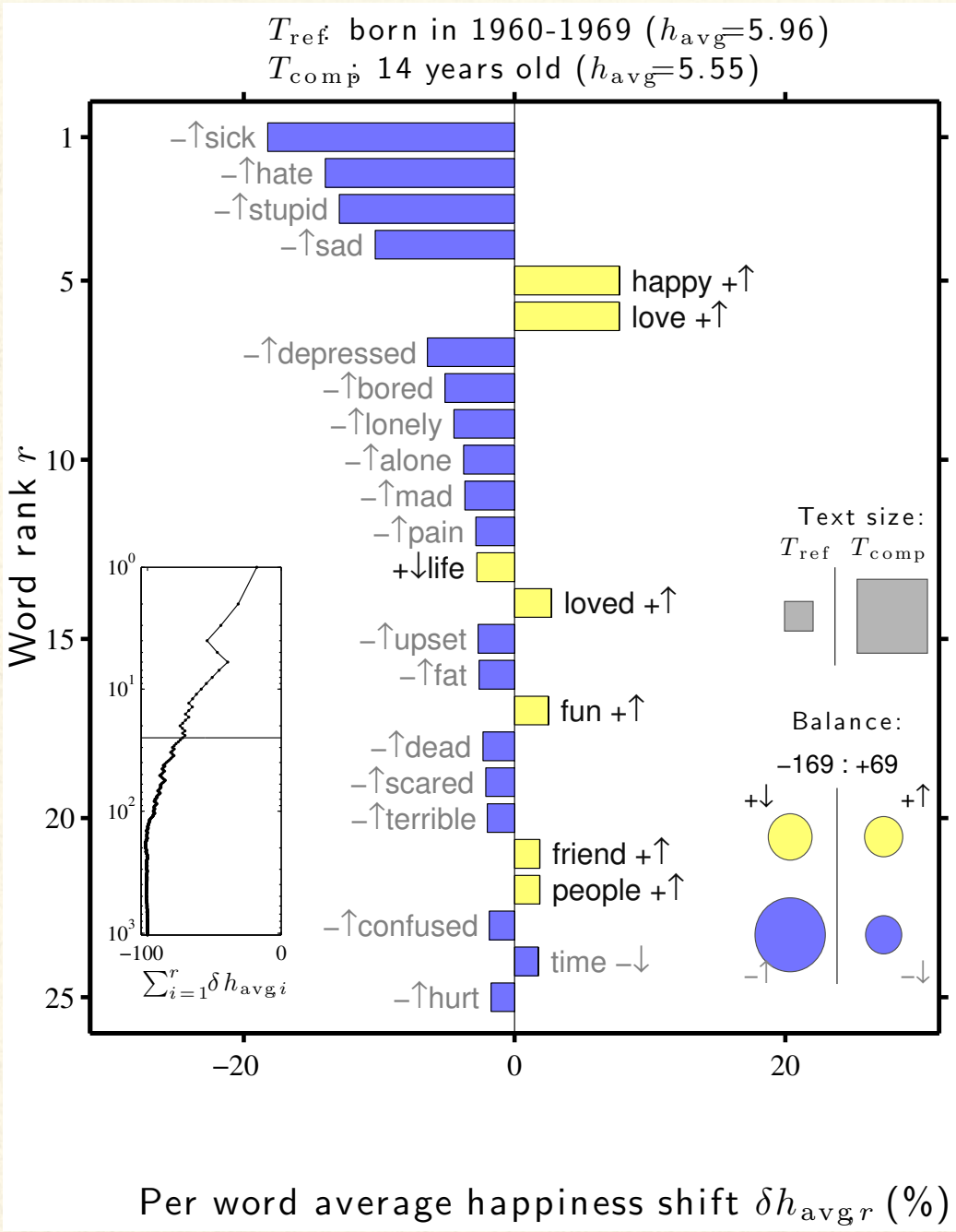
# Blogs—Age



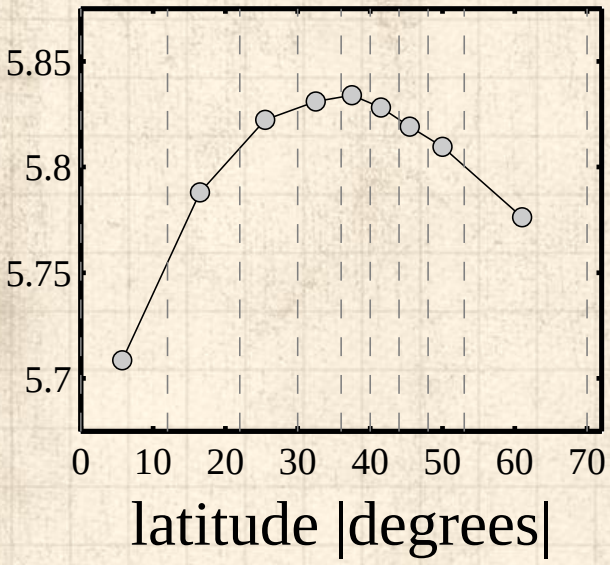
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

- Self-report studies find little variation in happiness with age [14, 15]
- Surprising: Expect a rise and fall.
- A 'challenge' for theory...
- Related to the Easterlin Paradox:
  Money doesn't buy happiness
- But maybe it does a little bit—Veenhoven & Hagerty (2003) and Wolfers & Stevenson (2008).

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



# Blogs—Latitude




## Near equator—social factors

- Increase in ‘sad’, ‘bored’, ‘lonely’, ‘stupid’, ‘guilty’
- Decrease in ‘good’ and ‘people’

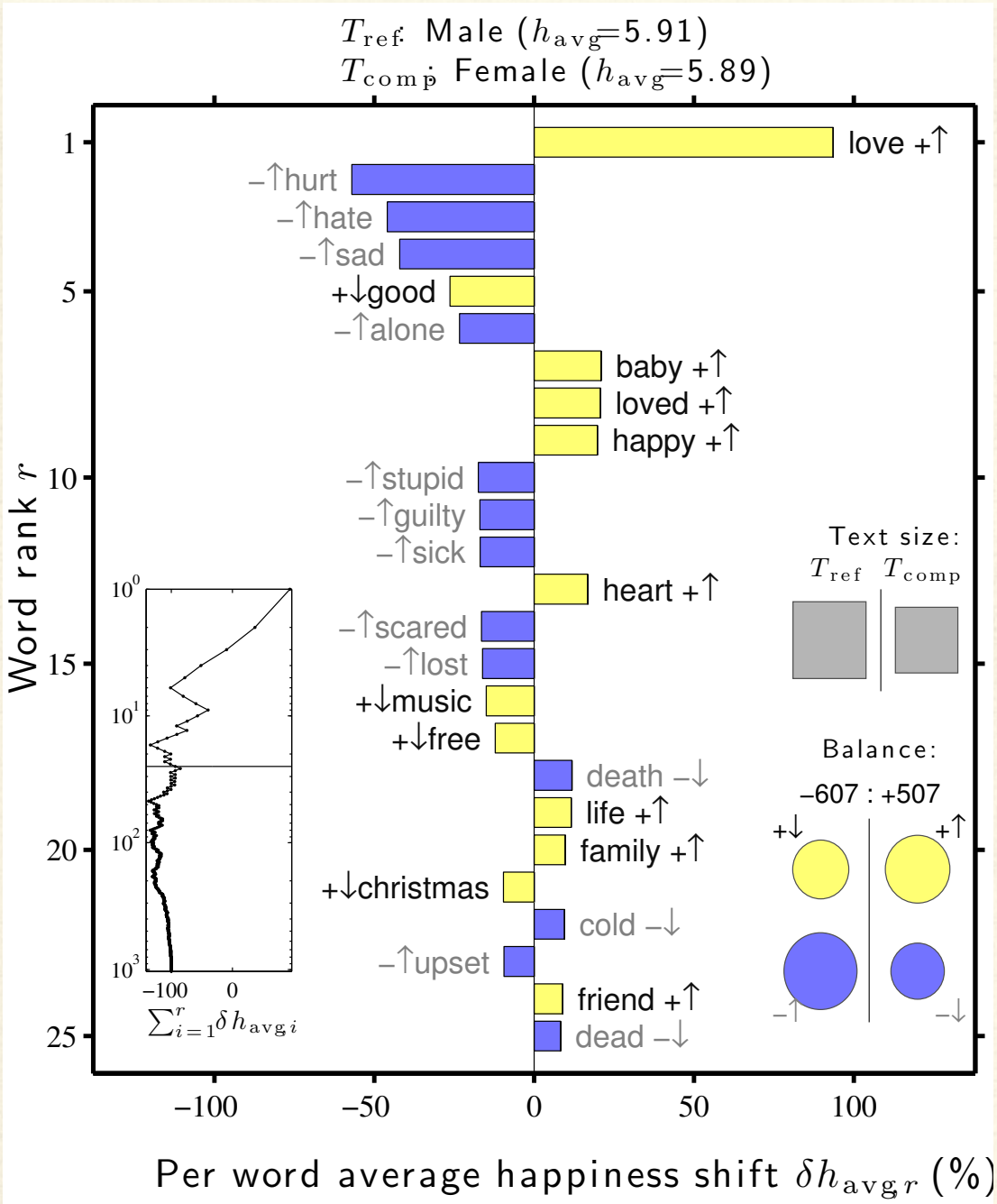
## Near poles—social/psychological/climate

- Increase in ‘sick’, ‘guilty’, ‘cold’, ‘depressed’, and ‘headache’ and decrease of ‘love’ and ‘life.’
- Offset by decrease in ‘hurt’ and ‘pain.’
- More ‘bed’ and ‘sleep.’

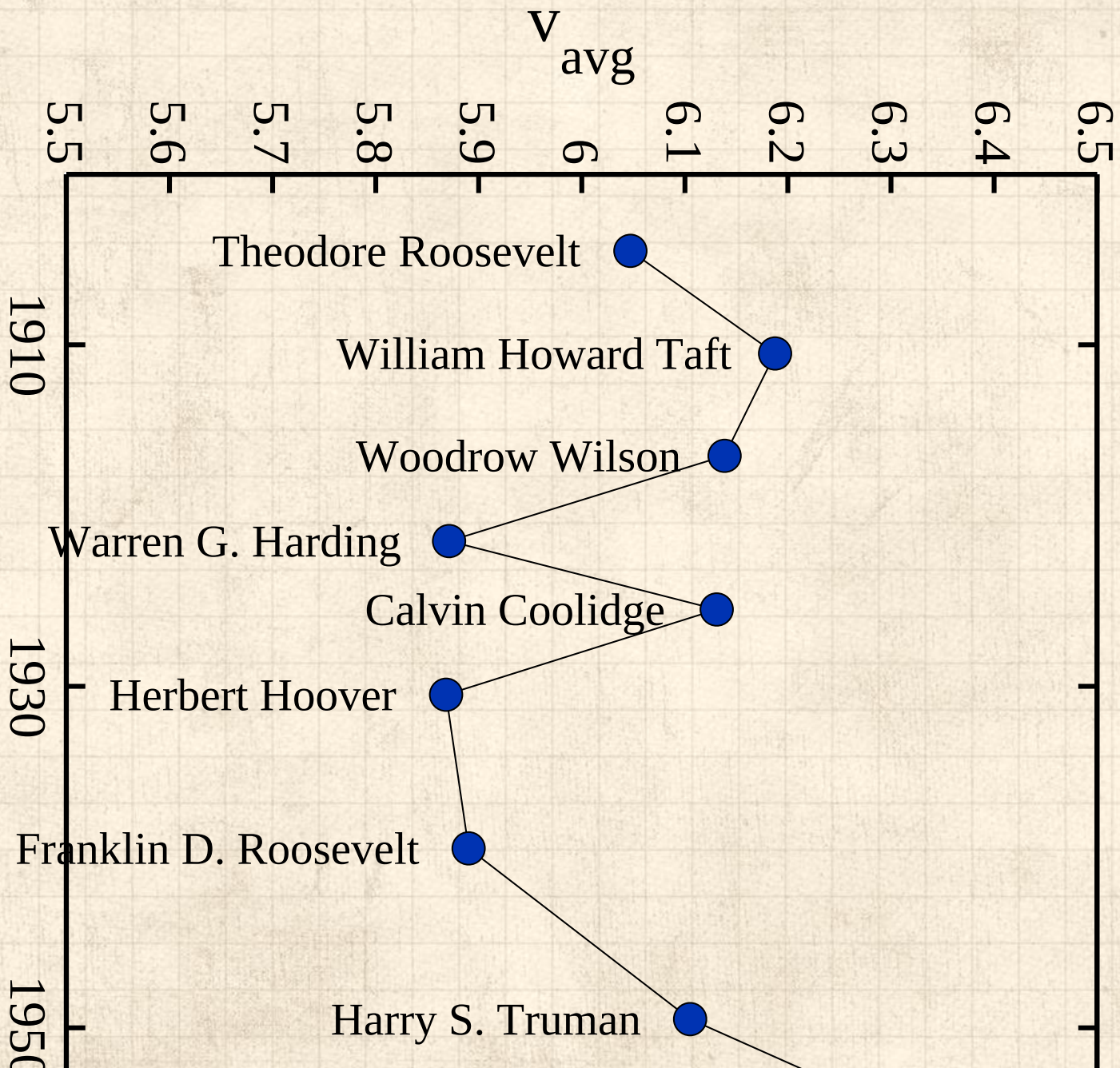


Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



# Presidential happiness:

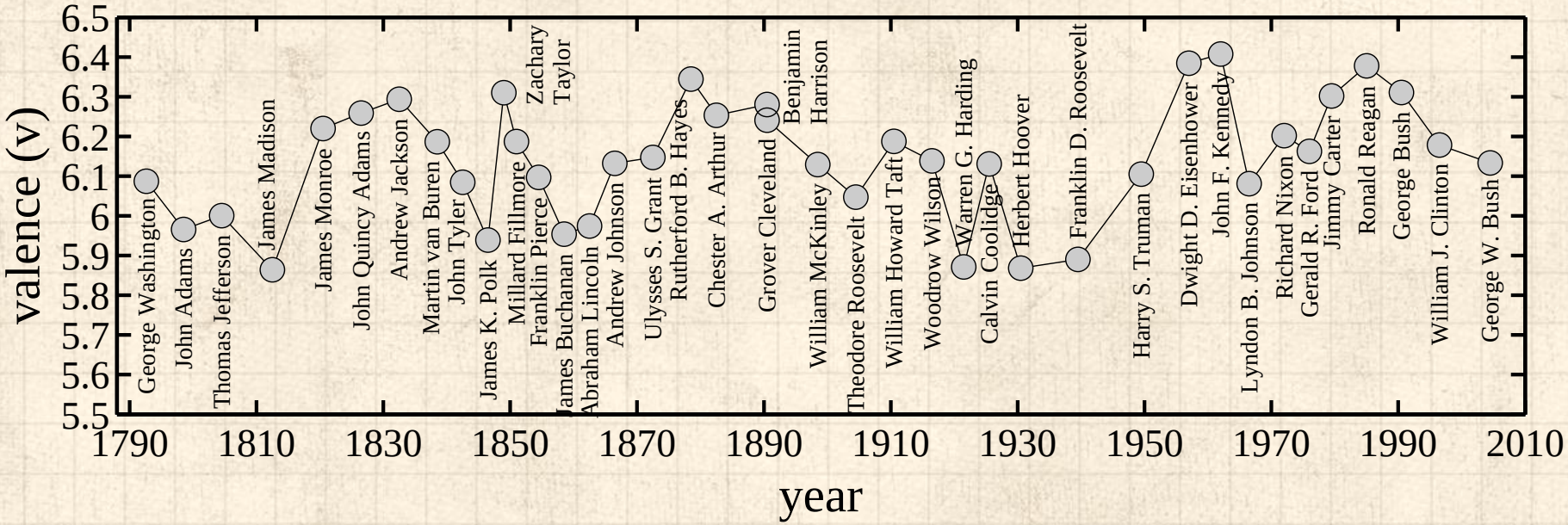


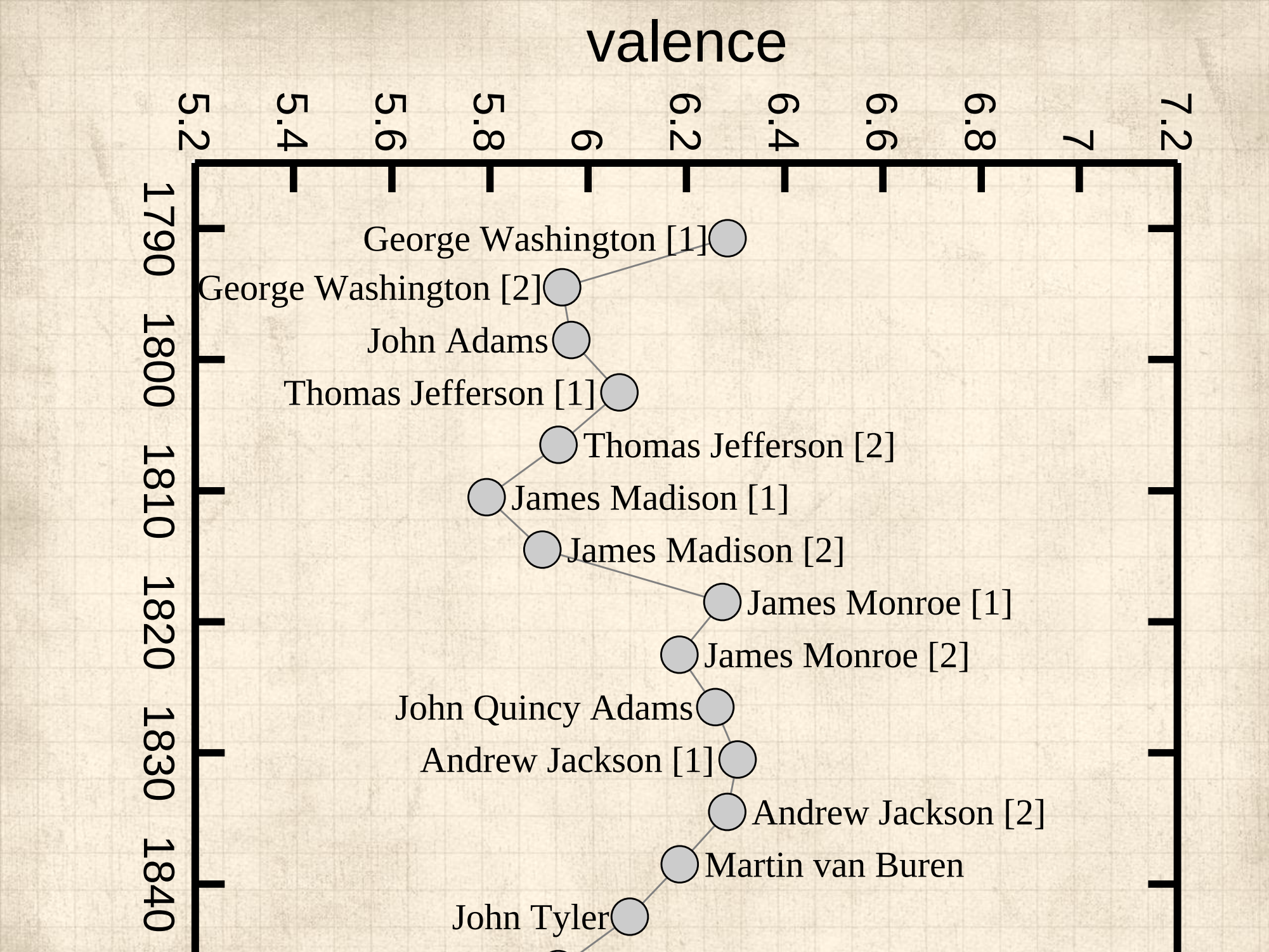




Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Presidential happiness:




valence
5.2
5.4
5.6
5.8
6
6.2
6.4
6.6
6.8
7
7.2
1790
1800
1810
1820
1830
1840
George Washington [1]
George Washington [2]
John Adams
Thomas Jefferson [1]
Thomas Jefferson [2]
James Madison [1]
James Madison [2]
James Monroe [1]
James Monroe [2]
John Quincy Adams
Andrew Jackson [1]
Andrew Jackson [2]
Martin van Buren
John Tyler

Introduction

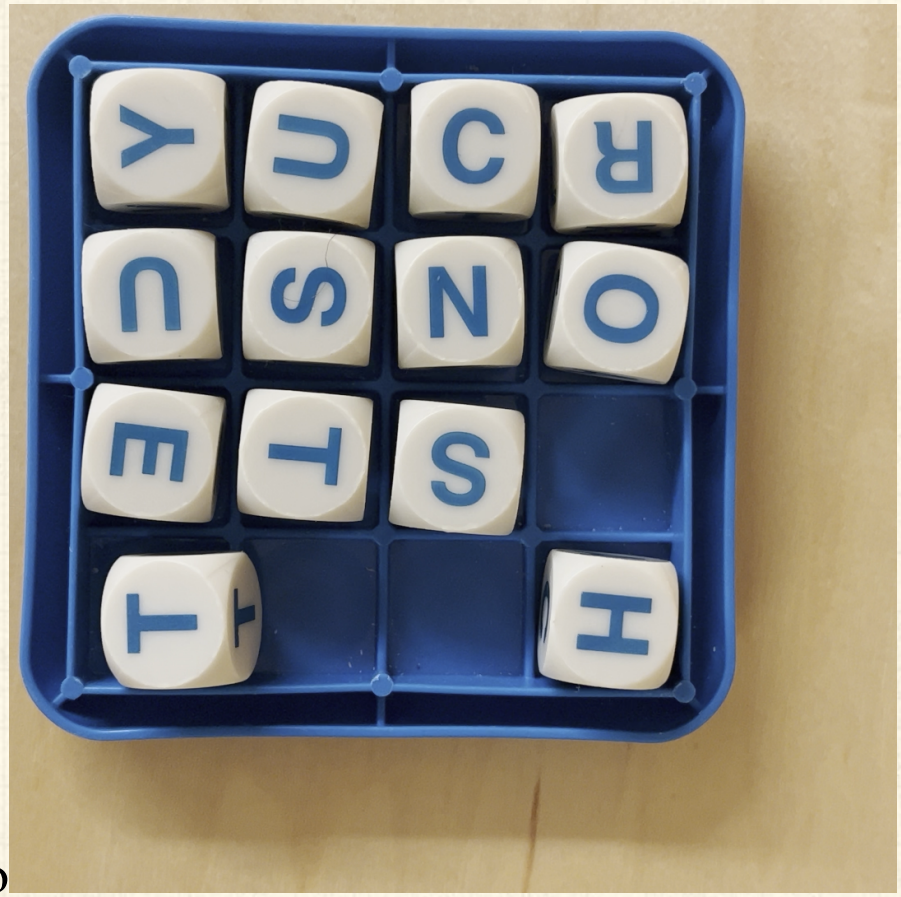
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

## The Boggoracle Speaks:




O

# labMT 1.0:
# language assessment by Mechanical Turk

## Four corpora:

- Twitter
- Google Books
- Music Lyrics
- New York Times

- 5000 most frequently used words for each corpus.
- 10,222 words, 50 evaluations each, 1–9 scale: [32]

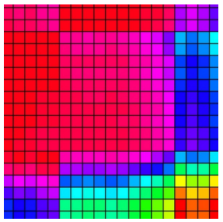
1 2 3 4 5 6 7 8 9

The PoCSverse
Finding Happiness
78 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Submit your research to PLOS ONE
Learn More

## Social Networks



Temporal Patterns of Happiness and Information in a Global Social Network: Hedonometrics and Twitter

Peter Sheridan Dodds, Kameron Decker Harris, Isabel M. Kloumann, Catherine A. Bliss, Christopher M. Danforth

**PLOS ONE**: 07 Dec 2011

Insight into this selection by Sune Lehmann

"This paper has made an MTurk generated list of word-valences openly available to the research community. As a …

**EveryONE Blog**: 31 Mar 2017

Learn More About These Important, Widely Used and Well-Reported Datasets

Read the accompanying post in EveryONE – The *PLOS ONE* Community Blog

READ THE BLOG

Celebrate PLOS

| valence rank | word | valence | std dev | twitter rank | g-books rank | nyt rank | lyrics rank |
|---|---|---|---|---|---|---|---|
| 1 | laughter | 8.50 | 0.93 | 3600 | – | – | 1728 |
| 2 | happiness | 8.44 | 0.97 | 1853 | 2458 | – | 1230 |
| 3 | love | 8.42 | 1.11 | 25 | 317 | 328 | 23 |
| 4 | happy | 8.30 | 0.99 | 65 | 1372 | 1313 | 375 |
| 5 | laughed | 8.26 | 1.16 | 3334 | 3542 | – | 2332 |
| 6 | laugh | 8.22 | 1.37 | 1002 | 3998 | 4488 | 647 |
| 7 | laughing | 8.20 | 1.11 | 1579 | – | – | 1122 |
| 8 | excellent | 8.18 | 1.10 | 1496 | 1756 | 3155 | – |
| 9 | laughs | 8.18 | 1.16 | 3554 | – | – | 2856 |
| 10 | joy | 8.16 | 1.06 | 988 | 2336 | 2723 | 809 |
| 11 | successful | 8.16 | 1.08 | 2176 | 1198 | 1565 | – |
| 12 | win | 8.12 | 1.08 | 154 | 3031 | 776 | 694 |
| 13 | rainbow | 8.10 | 0.99 | 2726 | – | – | 1723 |
| 14 | smile | 8.10 | 1.02 | 925 | 2666 | 2898 | 349 |
| 15 | won | 8.10 | 1.22 | 810 | 1167 | 439 | 1493 |
| 16 | pleasure | 8.08 | 0.97 | 1497 | 1526 | 4253 | 1398 |
| 17 | smiled | 8.08 | 1.07 | – | 3537 | – | 2248 |
| 18 | rainbows | 8.06 | 1.36 | – | – | – | 4216 |
| 19 | winning | 8.04 | 1.05 | 1876 | – | 1426 | 3646 |
| 20 | celebration | 8.02 | 1.53 | 3306 | – | 2762 | 4070 |
| 21 | enjoyed | 8.02 | 1.53 | 1530 | 2908 | 3502 | – |
| 22 | healthy | 8.02 | 1.06 | 1393 | 3200 | 3292 | 4619 |
| 23 | music | 8.02 | 1.12 | 132 | 875 | 167 | 374 |
| 24 | celebrating | 8.00 | 1.14 | 2550 | – | – | – |
| 25 | congratulations | 8.00 | 1.63 | 2246 | – | – | – |
| 26 | weekend | 8.00 | 1.29 | 317 | – | 833 | 2256 |
| 27 | celebrate | 7.98 | 1.15 | 1606 | – | 3574 | 2108 |
| 28 | comedy | 7.98 | 1.15 | 1444 | – | 2566 | – |
| 29 | jokes | 7.98 | 0.98 | 2812 | – | – | 3808 |
| 30 | rich | 7.98 | 1.32 | 1625 | 1221 | 1469 | 890 |
| □ | □ | □ | □ | □ | □ | □ | □ |



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

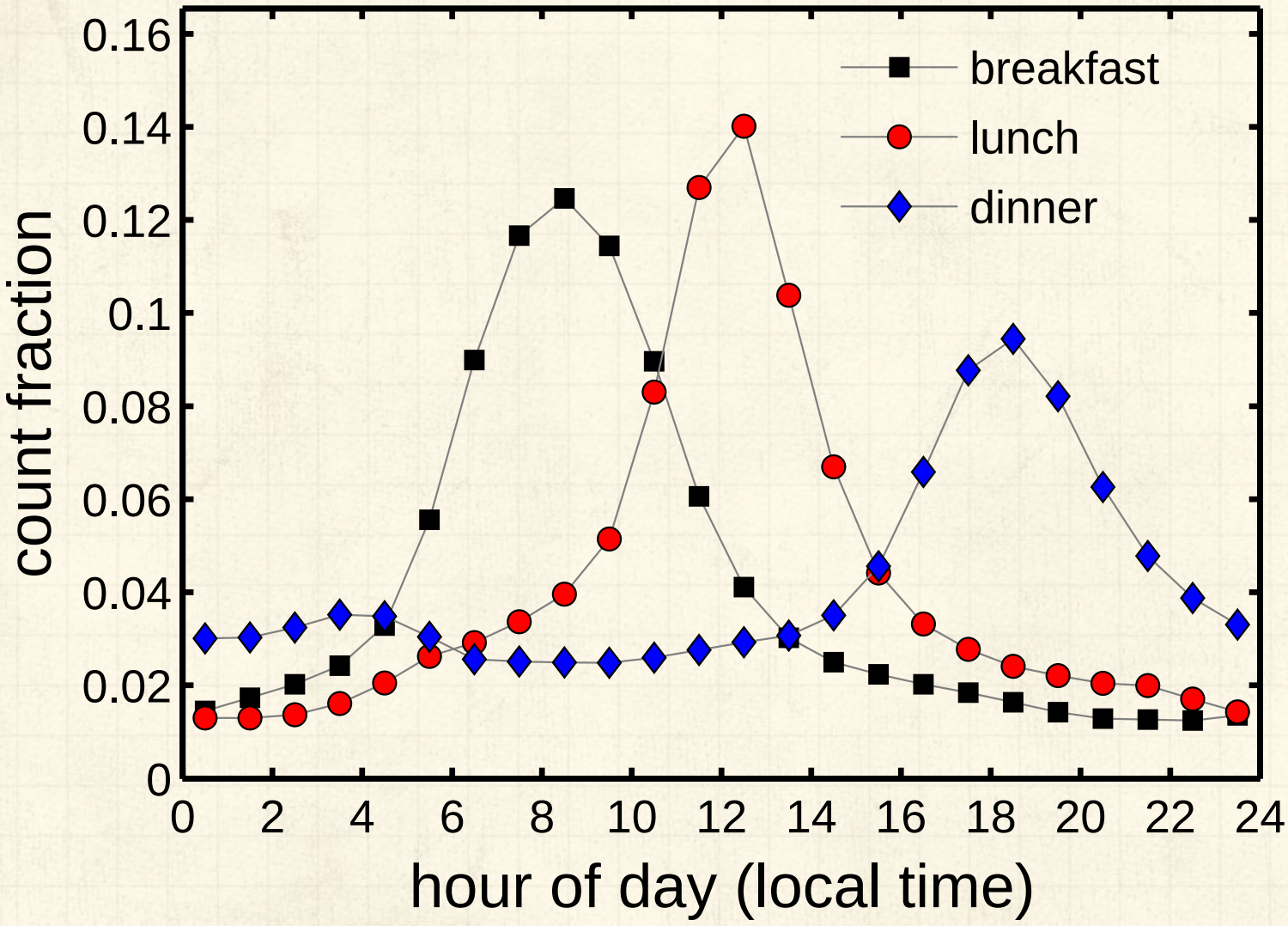
| valence rank | word | valence | std dev | twitter rank | g-books rank | nyt rank | lyrics rank |
|---|---|---|---|---|---|---|---|
| □ | □ | □ | □ | □ | □ | □ | □ |
| 10193 | violence | 1.86 | 1.05 | 4299 | 1724 | 1238 | 2016 |
| 10194 | cruel | 1.84 | 1.15 | 2963 | – | – | 1447 |
| 10195 | cry | 1.84 | 1.28 | 1028 | 3075 | – | 226 |
| 10196 | failed | 1.84 | 1.00 | 2645 | 1618 | 1276 | 2920 |
| 10197 | sickness | 1.84 | 1.18 | 4735 | – | – | 3782 |
| 10198 | abused | 1.83 | 1.31 | – | – | – | 4589 |
| 10199 | tortured | 1.82 | 1.42 | – | – | – | 4693 |
| 10200 | fatal | 1.80 | 1.53 | – | 4089 | – | 3724 |
| 10201 | killings | 1.80 | 1.54 | – | – | 4914 | – |
| 10202 | murdered | 1.80 | 1.63 | – | – | – | 4796 |
| 10203 | war | 1.80 | 1.41 | 468 | 175 | 291 | 462 |
| 10204 | kills | 1.78 | 1.23 | 2459 | – | – | 2857 |
| 10205 | jail | 1.76 | 1.02 | 1642 | – | 2573 | 1619 |
| 10206 | terror | 1.76 | 1.00 | 4625 | 4117 | 4048 | 2370 |
| 10207 | die | 1.74 | 1.19 | 418 | 730 | 2605 | 143 |
| 10208 | killing | 1.70 | 1.36 | 1507 | 4428 | 1672 | 998 |
| 10209 | arrested | 1.64 | 1.01 | 2435 | 4474 | 1435 | – |
| 10210 | deaths | 1.64 | 1.14 | – | – | 2974 | – |
| 10211 | raped | 1.64 | 1.43 | – | – | – | 4528 |
| 10212 | torture | 1.58 | 1.05 | 3175 | – | – | 3126 |
| 10213 | died | 1.56 | 1.20 | 1223 | 866 | 208 | 826 |
| 10214 | kill | 1.56 | 1.05 | 798 | 2727 | 2572 | 430 |
| 10215 | killed | 1.56 | 1.23 | 1137 | 1603 | 814 | 1273 |
| 10216 | cancer | 1.54 | 1.07 | 946 | 1884 | 796 | 3802 |
| 10217 | death | 1.54 | 1.28 | 509 | 307 | 373 | 433 |
| 10218 | murder | 1.48 | 1.01 | 2762 | 3110 | 1541 | 1059 |
| 10219 | terrorism | 1.48 | 0.91 | – | – | 3192 | – |
| 10220 | rape | 1.44 | 0.79 | 3133 | – | 4115 | 2977 |
| 10221 | suicide | 1.30 | 0.84 | 2124 | 4707 | 3319 | 2107 |
| 10222 | terrorist | 1.30 | 0.91 | 3576 | – | 3026 | – |

| std dev rank | word | valence | std dev | twitter rank | g-books rank | nyt rank | lyrics rank |
|---|---|---|---|---|---|---|---|
| 1 | f🗲🗲king | 4.64 | 2.93 | 448 | – | – | 620 |
| 2 | f☆☆kin | 3.86 | 2.74 | 1077 | – | – | 688 |
| 3 | f☆☆ked | 3.56 | 2.71 | 1840 | – | – | 904 |
| 4 | pussy | 4.80 | 2.66 | 2019 | – | – | 949 |
| 5 | whiskey | 5.72 | 2.64 | – | – | – | 2208 |
| 6 | slut | 3.57 | 2.63 | – | – | – | 4071 |
| 7 | cigarettes | 3.31 | 2.60 | – | – | – | 3279 |
| 8 | f☆☆k | 4.14 | 2.58 | 322 | – | – | 185 |
| 9 | mortality | 4.38 | 2.55 | – | 3960 | – | – |
| 10 | cigarette | 3.09 | 2.52 | – | – | – | 2678 |
| 11 | motherf☆☆kers | 2.51 | 2.47 | – | – | – | 1466 |
| 12 | churches | 5.70 | 2.46 | – | 2281 | – | – |
| 13 | motherf☆☆king | 2.64 | 2.46 | – | – | – | 2910 |
| 14 | capitalism | 5.16 | 2.45 | – | 4648 | – | – |
| 15 | porn | 4.18 | 2.43 | 1801 | – | – | – |
| 16 | summer | 6.40 | 2.39 | 896 | 1226 | 721 | 590 |
| 17 | beer | 5.92 | 2.39 | 839 | 4924 | 3960 | 1413 |
| 18 | execution | 3.10 | 2.39 | – | 2975 | – | – |
| 19 | wines | 6.28 | 2.37 | – | – | 3316 | – |
| 20 | zombies | 4.00 | 2.37 | 4708 | – | – | – |
| 21 | aids | 4.28 | 2.35 | 2983 | 3996 | 1197 | – |
| 22 | capitalist | 4.84 | 2.34 | – | 4694 | – | – |
| 23 | revenge | 3.71 | 2.34 | – | – | – | 2766 |
| 24 | mcdonalds | 5.98 | 2.33 | 3831 | – | – | – |
| 25 | beatles | 6.44 | 2.33 | 3797 | – | – | – |
| 26 | islam | 4.68 | 2.33 | – | 4514 | – | – |
| 27 | pay | 5.30 | 2.32 | 627 | 769 | 460 | 499 |
| 28 | alcohol | 5.20 | 2.32 | 2787 | 2617 | 3752 | 3600 |
| 29 | muthaf☆☆kin | 3.00 | 2.31 | – | – | – | 4107 |
| 30 | christ | 6.16 | 2.31 | 2509 | 909 | 4238 | 1526 |
| □ | □ | □ | □ | □ | □ | □ | □ |



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Twitter—living in the now:

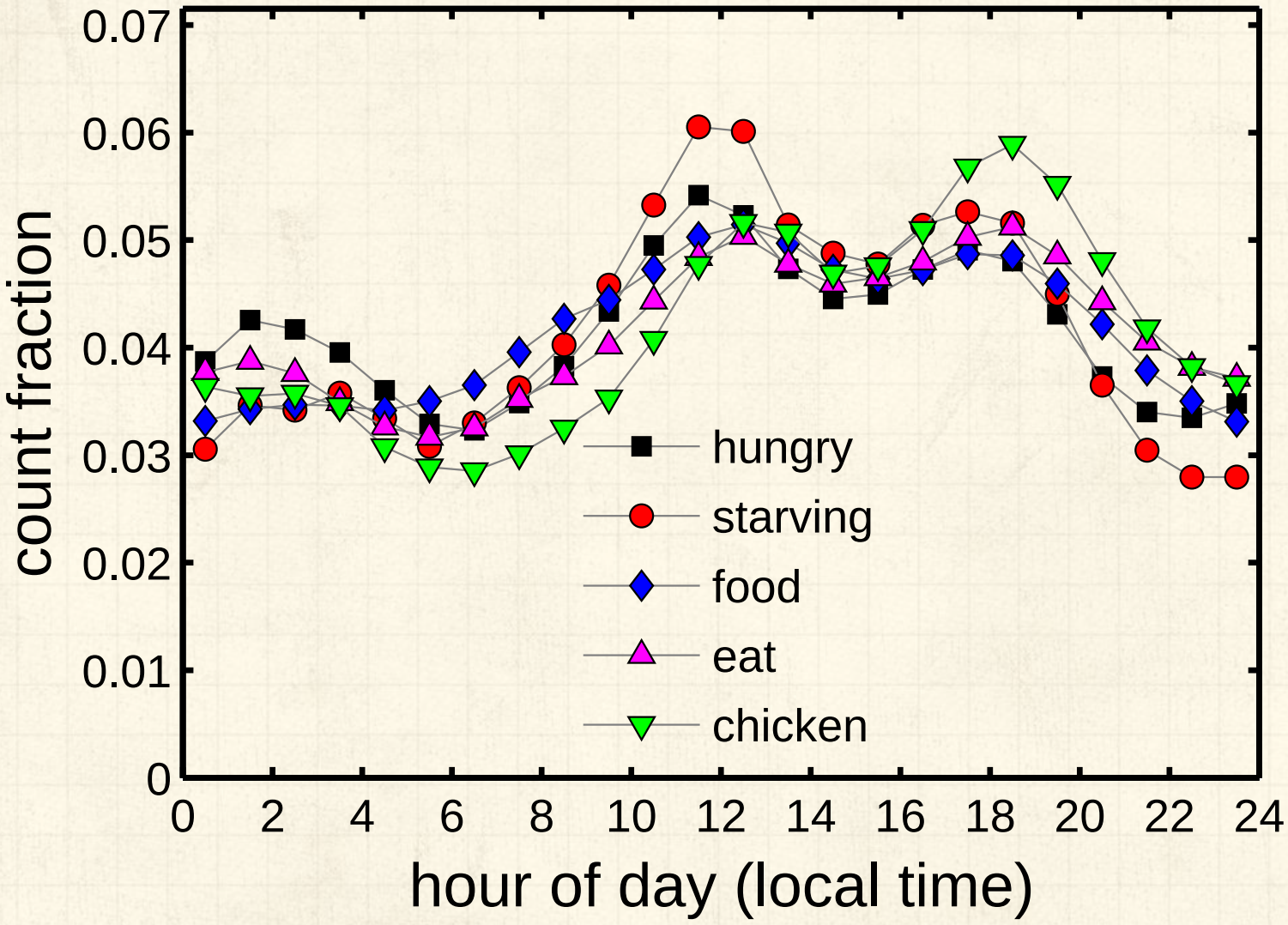



Quantifying the quotidian.



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Twitter—living in the now:

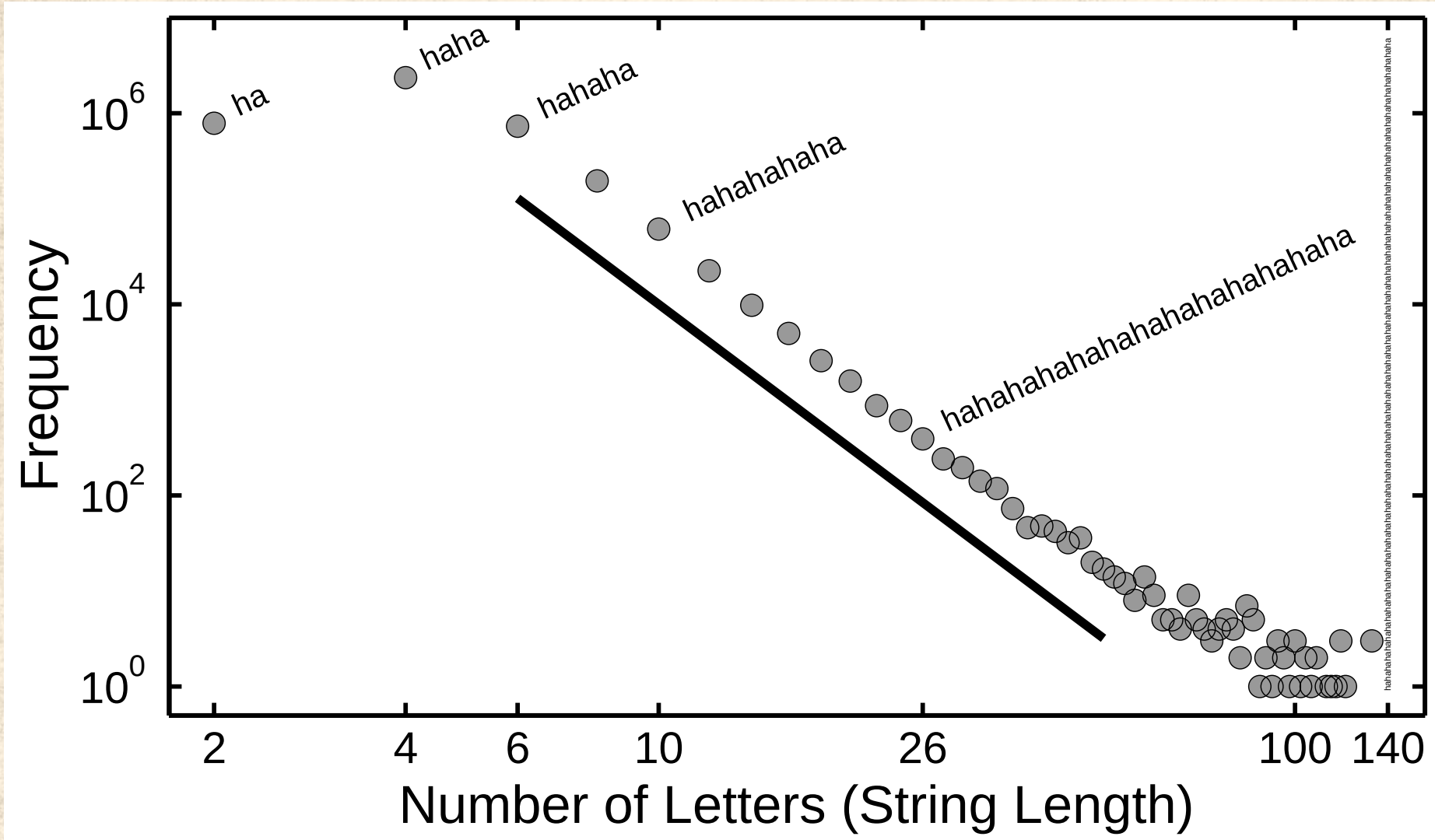



Makes the unexpected believable...



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# The happiest distribution:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

PLOS ONE

Hahahahaha, Duuuuude, Yeeessss!: A two-parameter characterization of stretchable words and the dynamics of mistypings and misspellings

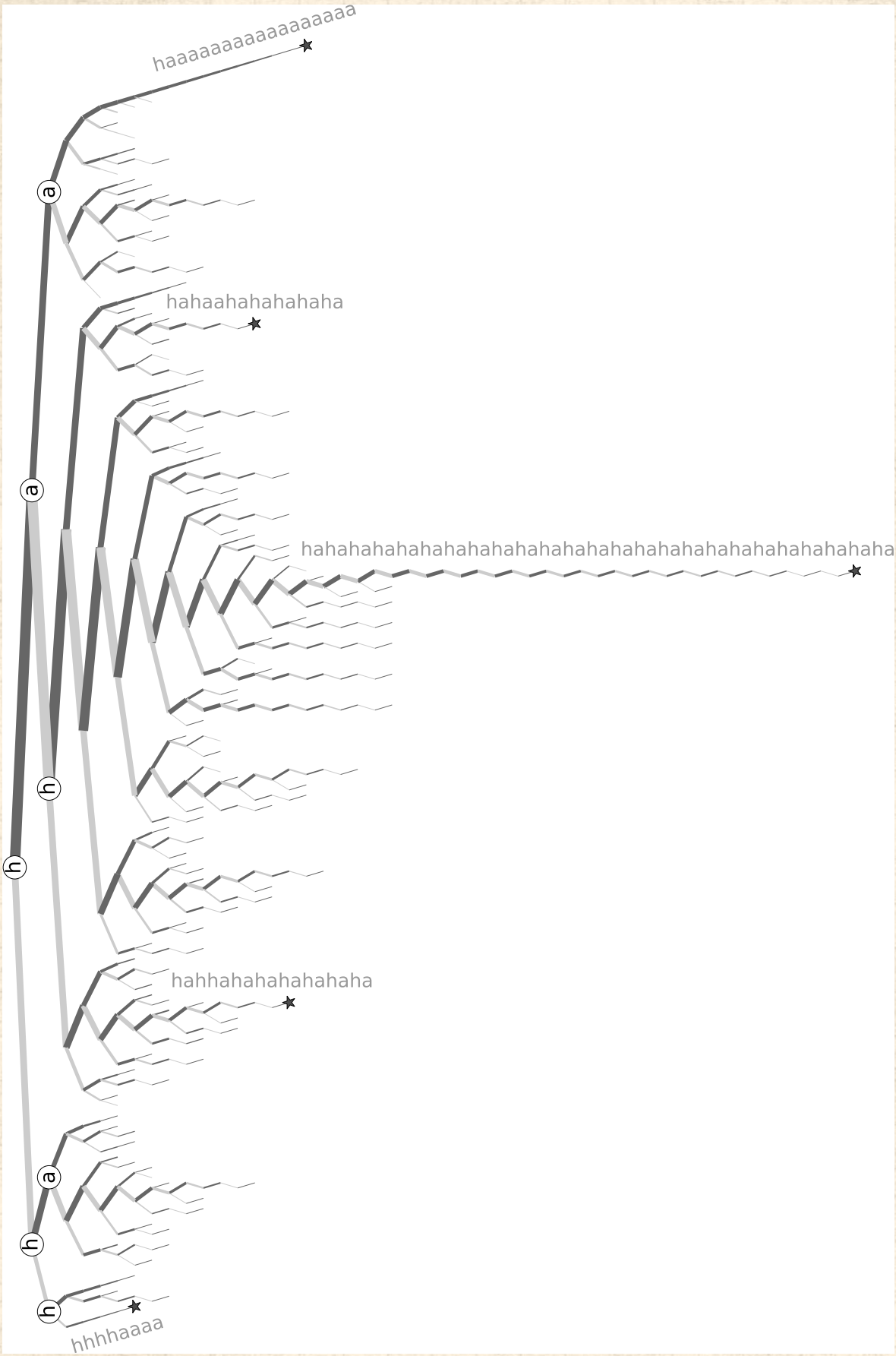
Abstract

1 Introduction

# “Hahahahaha, Duuuuude, Yeeessss!: A two-parameter characterization of stretchable words and the dynamics of mistypings and misspellings”

Gray, Danforth, and Dodds,
PLOS ONE, **15**, e0232938, 2020. [19]

- “GOOOOOOOOOOAAAAAAAAAL!!!!!!”
- An exploration of families of strange lexical creatures.
- Regular expression festival.
- Identified kernels: ha versus goal.
- Defined and measured stretch and balance
- Stretch: Inequality (Gini) coefficient; Balance: (Shannon’s) entropy.
- Spelling trees!


haaaaaaaaaaaaaaaa
a
hahaahahahahaha
a
hahahahahahahahahahahahahahahahahahahahahahahahahahahahaha
h
hahhahahahahahaha
a
h
h
hhhhaaaa

**Tom Sherwood** @tomsherwood 1 Oct

Mississippi congressman moves gate and lets 92 WW2 vets see their monument. pic.twitter.com/541GvLLITz

Retweeted 442 times

Expand

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

{"created_at":"Tue Oct 01 15:59:45 +0000 2013","id":385071546731347968,"id_str":"385071546731347968","text":"RT @tomsherwood: Mississippi congressman moves gate and lets 92 WW2 vets see their monument. http:\/\/t.co\/541GvLLlTz","source":"\u003ca href=\"http:\/\/www.tweetdeck.com\" rel=\"nofollow\"\u003eTweetDeck\u003c\/a\u003e","truncated":false,"in_reply_to_status_id":null,"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,"in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":17912008,"id_str":"17912008","name":"Armen Terjimanian","screen_name":"translator82","location":"Washington DC area","url":null,"description":"Georgetown Univ Web Content Producer. Troy Mich native, Michigan & Columbia alum, Detroit sports fan, Armenian, recovering journalist. Tweets are my own.","protected":false,"followers_count":589,"friends_count":1456,"listed_count":17,"created_at":"Sat Dec 06 00:08:32 +0000 2008","favourites_count":6,"utc_offset":-14400,"time_zone":"Eastern Time (US & Canada)","geo_enabled":false,"verified":false,"statuses_count":11072,"lang":"en","contributors_enabled":false,"is_translator":false,"profile_background_color":"161922","profile_background_image_url":"http:\/\/a0.twimg.com\/profile_background_images\/546144116\/120430_eccentric-photo-boys-power.jpg","profile_background_image_url_https":"https:\/\/si0.twimg.com\/profile_background_images\/546144116\/120430_eccentric-photo-boys-power.jpg","profile_background_tile":true,"profile_image_url":"http:\/\/a0.twimg.com\/profile_images\/3636758525\/0ded5ec190846921f78fe491f345b953_normal.jpeg","profile_image_url_https":"https:\/\/si0.twimg.com\/profile_images\/3636758525\/0ded5ec190846921f78fe491f345b953_normal.jpeg","profile_banner_url":"https:\/\/pbs.twimg.com\/profile_banners\/17912008\/1368126879","profile_link_color":"0E87FB","profile_sidebar_border_color":"133FF1","profile_sidebar_fill_color":"242F7B","profile_text_color":"666666","profile_use_background_image":true,"default_profile":false,"default_profile_image":false,"following":null,"follow_request_sent":null,"notifications":null},"geo":null,"coordinates":null,"place":null,"contributors":null,"retweeted_status":{"created_at":"Tue Oct 01 15:57:50 +0000 2013","id":385071064369225728,"id_str":"385071064369225728","text":"Mississippi congressman moves gate and lets 92 WW2 vets see their monument. http:\/\/t.co\/541GvLLlTz","source":"\u003ca href=\"http:\/\/www.apple.com\" rel=\"nofollow\"\u003eCamera on iOS\u003c\/a\u003e","truncated":false,"in_reply_to_status_id":null,"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,"in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":49793110,"id_str":"49793110","name":"Tom Sherwood","screen_name":"tomsherwood","location":"District of Columbia","url":"http:\/\/nbcwashington.com","description":"Reporter  - NBC4 Washington DC; Analyst - WAMU-FM 88.5  Kojo Nnamdi Politics Hour; Columnist - Current Newspapers","protected":false,"followers_count":7374,"friends_count":350,"listed_count":384,"created_at":"Mon Jun 22 22:38:38 +0000 2009","favourites_count":18,"utc_offset":-14400,"time_zone":"Eastern Time (US & Canada)","geo_enabled":true,"verified":true,"statuses_count":6832,"lang":"en","contributors_enabled":false,"is_translator":false,"profile_background_color":"C0DEED","profile_background_image_url":"http:\/\/abs.twimg.com\/images\/themes\/theme1\/bg.png","profile_background_image_url_https":"https:\/\/abs.twimg.com\/images\/themes\/theme1\/bg.png","profile_background_tile":false,"profile_image_url":"http:\/\/a0.twimg.com\/profile_images\/378800000053048582\/0a5d8ba7690c86b0564ccaffd952d5c7_normal.jpeg","profile_image_url_https":"https:\/\/si0.twimg.com\/profile_images\/378800000053048582\/0a5d8ba7690c86b0564ccaffd952d5c7_normal.jpeg","profile_link_color":"0084B4","profile_sidebar_border_color":"C0DEED","profile_sidebar_fill_color":"DDEEF6","profile_text_color":"333333","profile_use_background_image":true,"default_profile":true,"default_profile_image":false,"following":null,"follow_request_sent":null,"notifications":null},"geo":null,"coordinates":null,"place":null,"contributors":null,"retweet_count":19,"favorite_count":4,"entities":{"hashtags":[],"symbols":[],"urls":[],"user_mentions":[],"media":[{"id":385071064008503296,"id_str":"385071064008503296","indices":[76,98],"media_url":"http:\/\/pbs.twimg.com\/media\/BVgMF6-CMAABE1t.jpg","media_url_https":"https:\/\/pbs.twimg.com\/media\/BVgMF6-CMAABE1t.jpg","url":"http:\/\/t.co\/541GvLLlTz","display_url":"pic.twitter.com\/541GvLLlTz","expanded_url":"http:\/\/twitter.com\/tomsherwood\/status\/385071064369225728\/photo\/1","type":"photo","sizes":{"medium":{"w":600,"h":450,"resize":"fit"},"thumb":{"w":150,"h":150,"resize":"crop"},"large":{"w":960,"h":720,"resize":"fit"},"small":{"w":340,"h":255,"resize":"fit"}}}]},"favorited":false,"retweeted":false,"possibly_sensitive":false,"lang":"en"},"retweet_count":0,"favorite_count":0,"entities":{"hashtags":[],"symbols":[],"urls":[],"user_mentions":[{"screen_name":"tomsherwood","name":"Tom Sherwood","id":49793110,"id_str":"49793110","indices":[3,15]}],"media":[{"id":385071064008503296,"id_str":"385071064008503296","indices":[93,115],"media_url":"http:\/\/pbs.twimg.com\/media\/BVgMF6-CMAABE1t.jpg","media_url_https":"https:\/\/pbs.twimg.com\/media\/BVgMF6-CMAABE1t.jpg","url":"http:\/\/t.co\/541GvLLlTz","display_url":"pic.twitter.com\/541GvLLlTz","expanded_url":"http:\/\/twitter.com\/tomsherwood\/status\/385071064369225728\/photo\/1","type":"photo","sizes":{"medium":{"w":600,"h":450,"resize":"fit"},"thumb":{"w":150,"h":150,"resize":"crop"},"large":{"w":960,"h":720,"resize":"fit"},"small":{"w":340,"h":255,"resize":"fit"}},"source_status_id":385071064369225728,"source_status_id_str":"385071064369225728"}]},"favorited":false,"retweeted":false,"possibly_sensitive":false,"filter_level":"medium","lang":"en"}

# Individual tweets have all kinds of potential impact:

```
twitter.03.13.23.04.13.json:{"created_at":"Tue Apr 23 17:07:50 +0000 2013","id":326744234273161216,"id_str":"326744234273161216","text":
"Breaking: Two Explosions in the White House and Barack Obama is injured","source":"web","truncated":false,"in_reply_to_status_id":null,
"in_reply_to_status_id_str":null,"in_reply_to_user_id":null,"in_reply_to_user_id_str":null,"in_reply_to_screen_name":null,"user":{"id":5
1241574,"id_str":"51241574","name":"The Associated Press","screen_name":"AP","location":"Global","url":"http:\/\/www.ap.org","descriptio
n":"News, discussion and a behind-the-scenes look at the process from The Associated Press. Managed 24\/7 by a team of editors based in
NY: http:\/\/apne.ws\/APStaff","protected":false,"followers_count":1903225,"friends_count":7012,"listed_count":42154,"created_at":"Fri J
un 26 21:48:52 +0000 2009","favourites_count":0,"utc_offset":-18000,"time_zone":"Eastern Time (US & Canada)","geo_enabled":false,"verifi
ed":true,"statuses_count":50187,"lang":"en","contributors_enabled":false,"is_translator":false,"profile_background_color":"333333","prof
ile_background_image_url":"http:\/\/a0.twimg.com\/profile_background_images\/734506342\/b3be603514207db70cb0a991c26f2718.jpeg","profile_
background_image_url_https":"https:\/\/si0.twimg.com\/profile_background_images\/734506342\/b3be603514207db70cb0a991c26f2718.jpeg","prof
ile_background_tile":false,"profile_image_url":"http:\/\/a0.twimg.com\/profile_images\/1848193664\/APLogo_normal.jpg","profile_image_url
_https":"https:\/\/si0.twimg.com\/profile_images\/1848193664\/APLogo_normal.jpg","profile_banner_url":"https:\/\/si0.twimg.com\/profile_
banners\/51241574\/1365092409","profile_link_color":"CC3300","profile_sidebar_border_color":"FFFFFF","profile_sidebar_fill_color":"CCCCC
C","profile_text_color":"333333","profile_use_background_image":true,"default_profile":false,"default_profile_image":false,"following":n
ull,"follow_request_sent":null,"notifications":null},"geo":null,"coordinates":null,"place":null,"contributors":null,"retweet_count":0,"f
avorite_count":0,"entities":{"hashtags":[],"symbols":[],"urls":[],"user_mentions":[]},"favorited":false,"retweeted":false,"filter_level"
:"medium","lang":"en"}
```


## Meme come true: Fleetwood Mac re-enter US charts thanks

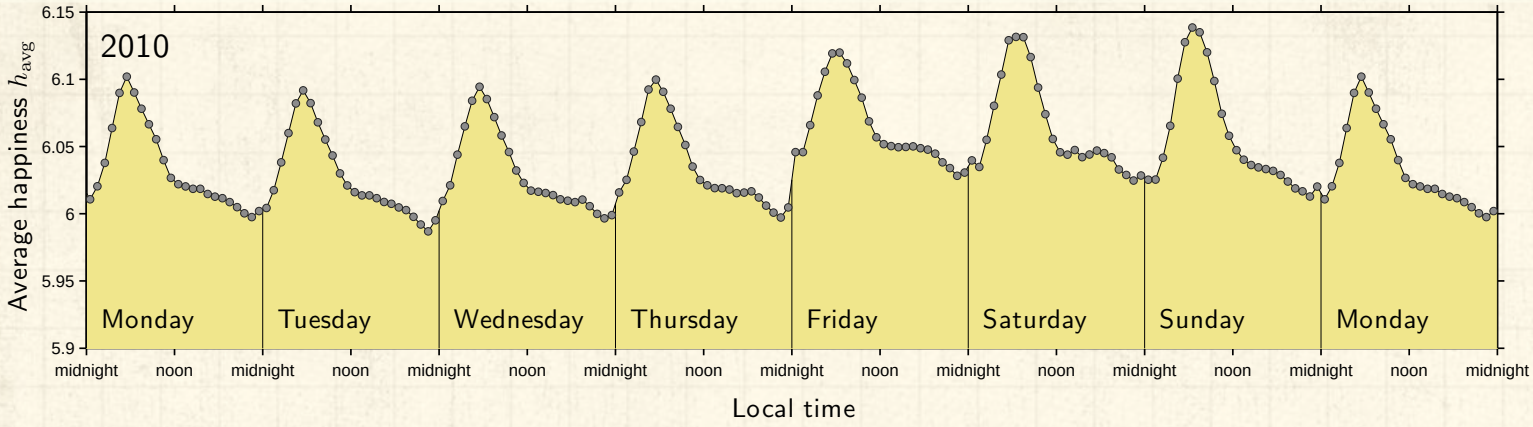
# Mentions of CIA on Twitter, end of 2011:

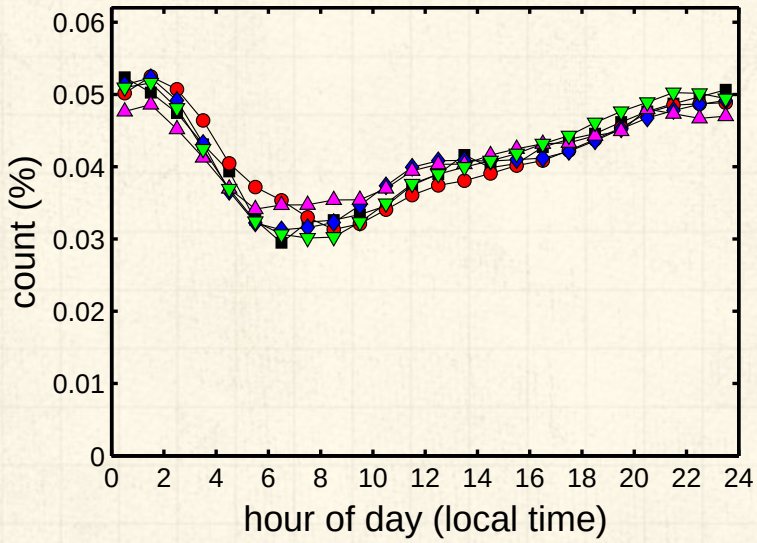
See story here for example [slate].

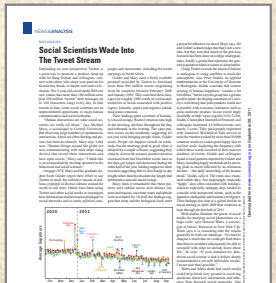


Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# The daily unravelling of the human mind:



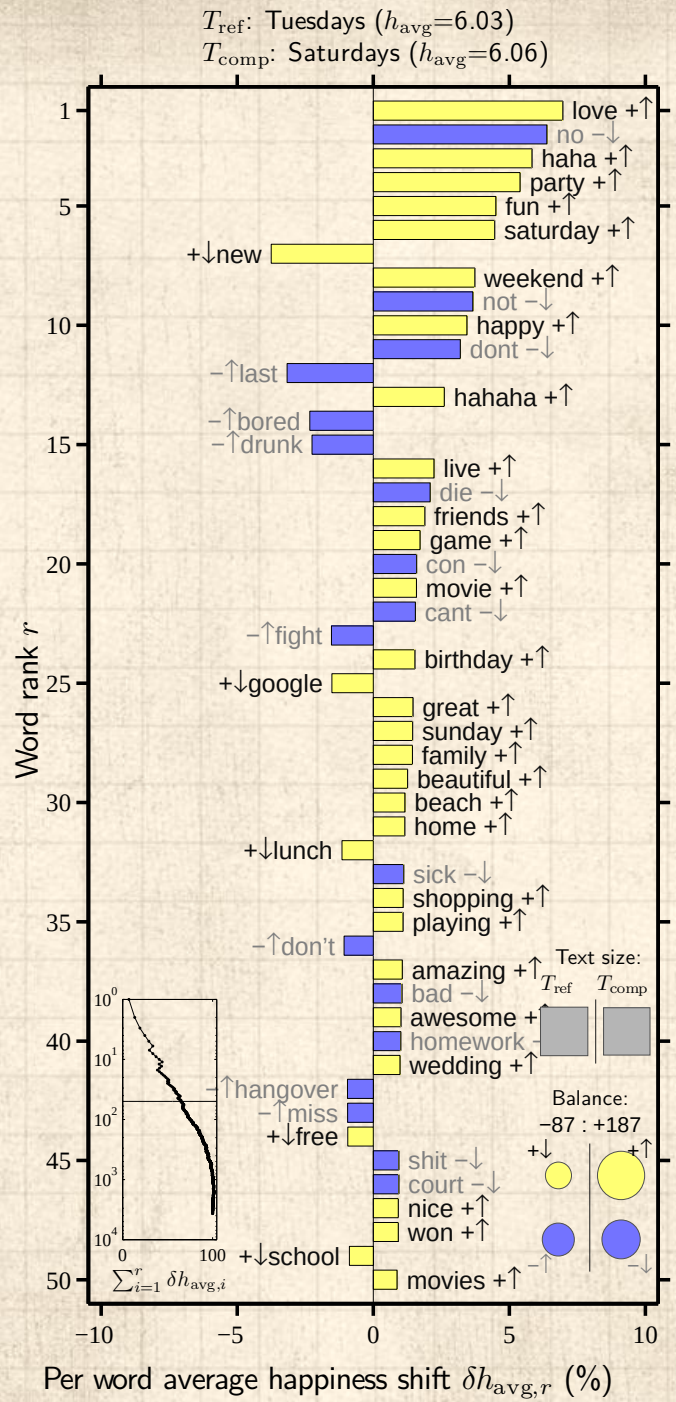





Social Scientists Wade Into The Tweet Stream

"Social Scientists wade into the Tweet stream"

Greg Miller,
Science, **333**, 1814–1815, 2011. [34]


The PoCSverse
Finding Happiness
92 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

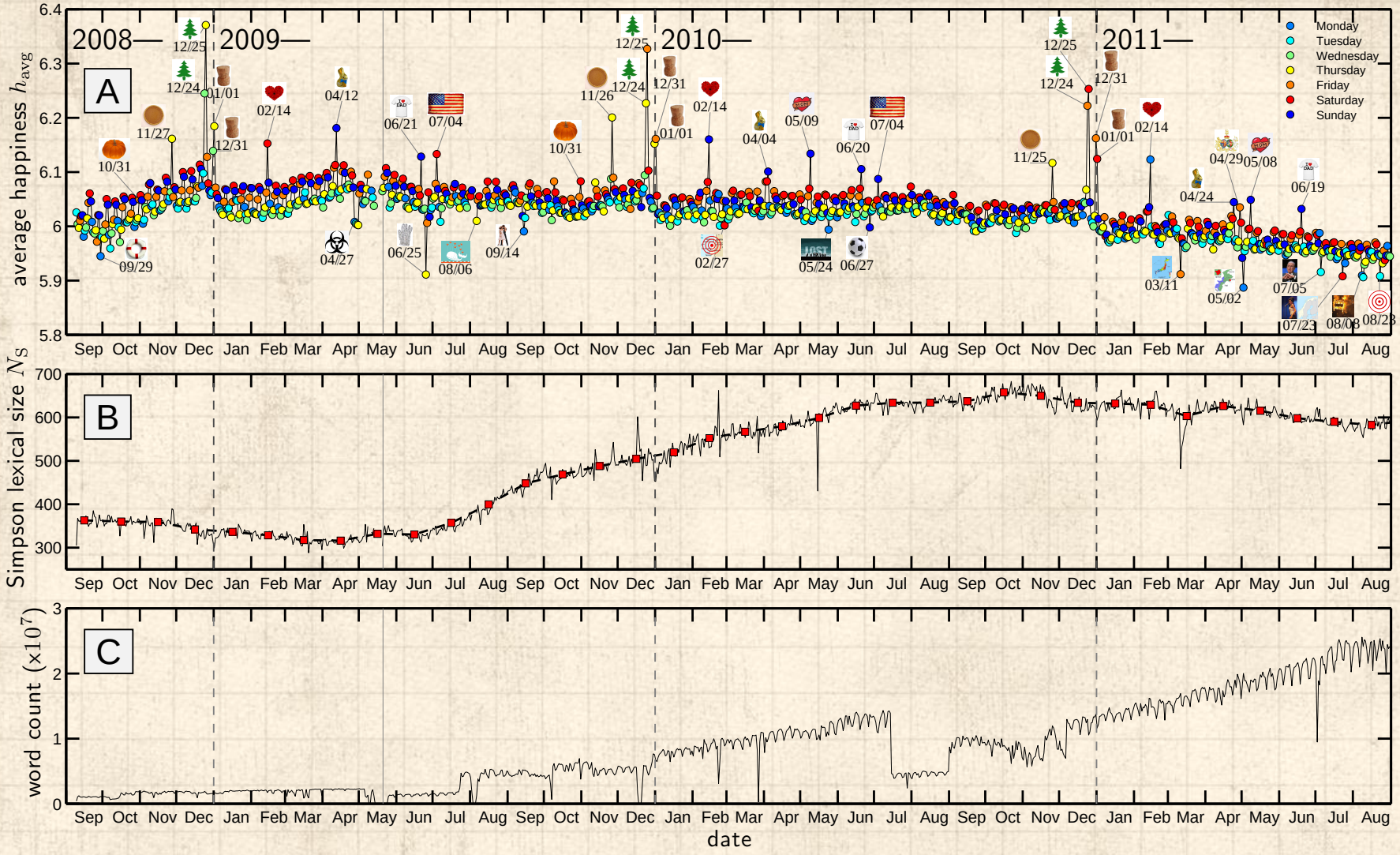


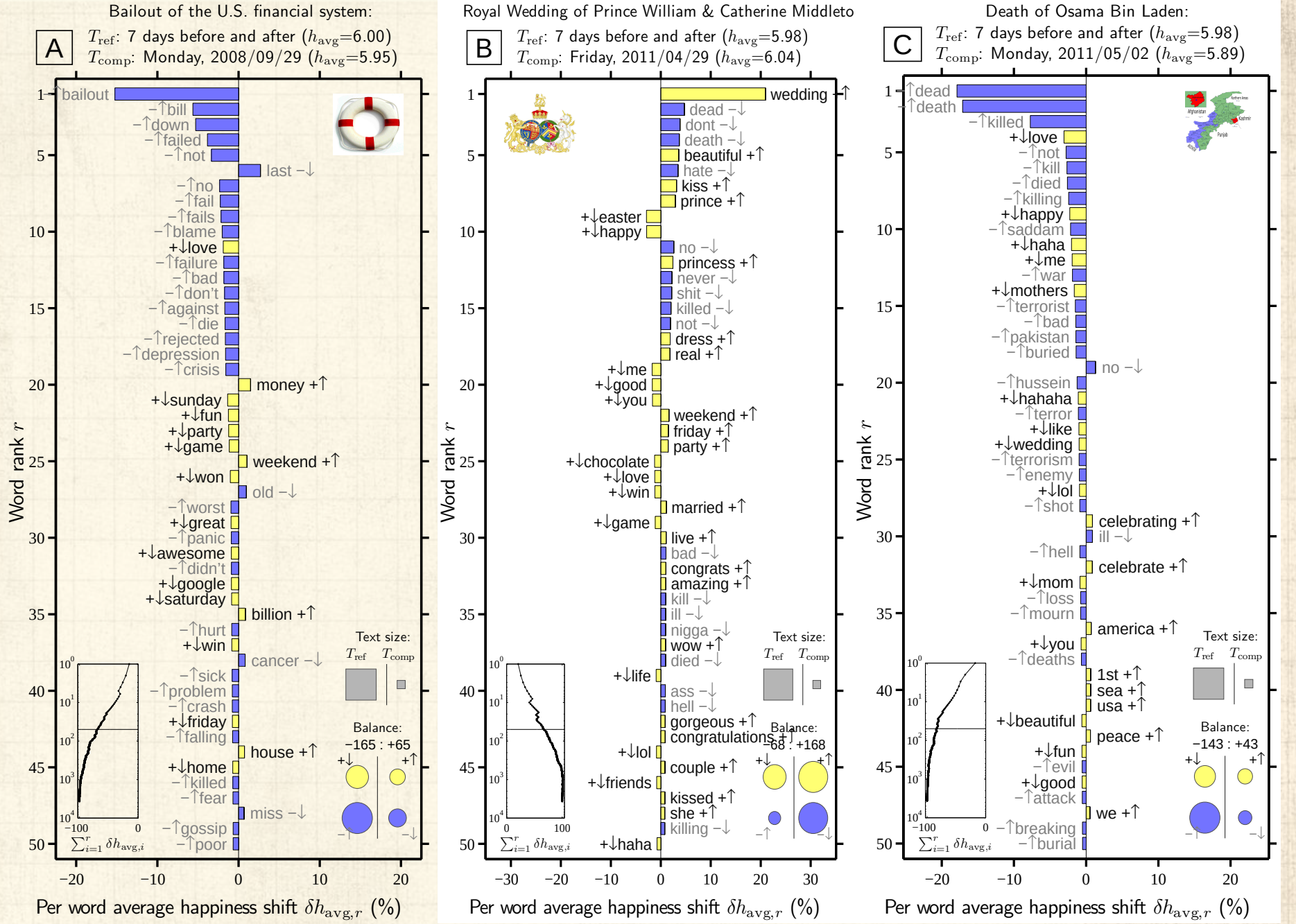

The PoCSverse
Finding Happiness
93 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Text element and context correlate in happiness scores:

- Compare ambient happiness with text element happiness.
- Rank correlation coefficient:
  $r_s \simeq 0.79$, $p$-value $< 10^{-10}$.
- An on-average result: says nothing about any individual sentence.
- Extra random piece: stemming is fallible.


A
B
C
2008—
2009—
2010—
2011—
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
average happiness $h_{avg}$
Simpson lexical size $N_S$
word count (x$10^7$)
date
Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
10/31
11/27
09/29
12/25
12/24
01/01
12/31
02/14
04/12
04/27
06/21
07/04
06/25
08/06
09/14
10/31
11/26
12/25
12/24
12/31
01/01
02/14
04/04
02/27
05/09
05/24
06/20
07/04
06/27
11/25
12/25
12/24
12/31
01/01
02/14
03/11
04/24
04/29
05/08
05/02
06/19
07/05
07/23
08/08
08/23


A
Bailout of the U.S. financial system:
$T_{ref}$: 7 days before and after ($h_{avg}$=6.00)
$T_{comp}$: Monday, 2008/09/29 ($h_{avg}$=5.95)
B
Royal Wedding of Prince William & Catherine Middleto
$T_{ref}$: 7 days before and after ($h_{avg}$=5.98)
$T_{comp}$: Friday, 2011/04/29 ($h_{avg}$=6.04)
C
Death of Osama Bin Laden:
$T_{ref}$: 7 days before and after ($h_{avg}$=5.98)
$T_{comp}$: Monday, 2011/05/02 ($h_{avg}$=5.89)
Word rank $r$
Per word average happiness shift $\delta h_{avg,r}$ (%)
Text size:
Balance:
−165 : +65
−68 : +168
−143 : +43

# Ambient happiness:

| Word | $h_{\text{avg}}^{(\text{amb})}$ | Total Tweets | $h_{\text{avg}}^{(\text{norm})}$ | Word | $h_{\text{avg}}^{(\text{amb})}$ | Total Tweets | $h_{\text{avg}}^{(\text{norm})}$ |
|---|---|---|---|---|---|---|---|
| 1. happy | +0.430 | 1.65e+07 (13) | +1.104 (1) | 51. snow | -0.051 | 2.60e+06 (49) | +0.083 (39) |
| 2. Christmas | +0.404 | 4.89e+06 (35) | +0.953 (3) | 52. Jon Stewart | -0.052 | 5.21e+04 (97) | -0.024 (48) |
| 3. vegan | +0.315 | 1.84e+05 (90) | -0.015 (46) | 53. school | -0.056 | 9.26e+06 (24) | +0.050 (42) |
| 4. :) | +0.274 | 1.04e+07 (20) | +0.630 (12) | 54. Lehman Brothers | -0.078 | 8.50e+03 (100) | -0.721 (79) |
| 5. family | +0.251 | 5.01e+06 (32) | +0.716 (7) | 55. them | -0.090 | 1.54e+07 (15) | -0.280 (60) |
| 6. :-) | +0.228 | 1.67e+06 (60) | +0.560 (16) | 56. right | -0.090 | 1.92e+07 (10) | +0.126 (35) |
| 7. our | +0.207 | 1.41e+07 (16) | +0.159 (33) | 57. woman | -0.115 | 2.54e+06 (51) | +0.202 (30) |
| 8. win | +0.204 | 7.98e+06 (26) | +0.924 (4) | 58. left | -0.118 | 4.89e+06 (34) | -0.383 (63) |
| 9. vacation | +0.200 | 9.35e+05 (67) | +0.817 (5) | 59. me | -0.119 | 1.44e+08 (4) | +0.160 (32) |
| 10. party | +0.170 | 6.44e+06 (29) | +0.679 (9) | 60. election | -0.127 | 5.60e+05 (75) | -0.306 (61) |
| 11. love | +0.164 | 4.67e+07 (6) | +0.977 (2) | 61. Sarah Palin | -0.128 | 2.26e+05 (87) | -0.681 (76) |
| 12. friends | +0.155 | 7.67e+06 (27) | +0.685 (8) | 62. no | -0.132 | 9.51e+07 (5) | -1.415 (90) |
| 13. hope | +0.149 | 1.18e+07 (18) | +0.515 (19) | 63. rain | -0.134 | 3.23e+06 (41) | +0.050 (44) |
| 14. coffee | +0.147 | 2.80e+06 (46) | +0.518 (18) | 64. climate | -0.135 | 3.64e+05 (80) | -0.160 (51) |
| 15. cash | +0.146 | 1.28e+06 (63) | +0.601 (14) | 65. gay | -0.152 | 2.73e+06 (47) | -0.552 (72) |
| 16. sun | +0.144 | 2.39e+06 (52) | +0.737 (6) | 66. lose | -0.157 | 2.06e+06 (55) | -1.181 (86) |
| 17. income | +0.137 | 5.10e+05 (76) | +0.621 (13) | 67. they | -0.159 | 2.74e+07 (8) | -0.208 (58) |
| 18. summer | +0.135 | 3.00e+06 (43) | +0.221 (29) | 68. oil | -0.162 | 1.38e+06 (62) | -0.411 (65) |
| 19. church | +0.131 | 1.81e+06 (58) | -0.016 (47) | 69. cold | -0.162 | 3.67e+06 (36) | -0.546 (71) |
| 20. Valentine | +0.127 | 2.47e+05 (84) | +0.593 (15) | 70. I feel | -0.173 | 5.17e+06 (31) | -0.129 (50) |
| 21. Stephen Colbert | +0.126 | 2.38e+04 (99) | +0.001 (45) | 71. man | -0.175 | 1.59e+07 (14) | -0.163 (52) |
| 22. USA | +0.113 | 2.16e+06 (54) | +0.325 (26) | 72. Republican | -0.181 | 2.30e+05 (86) | -0.539 (70) |
| 23. ! | +0.106 | 3.44e+06 (40) | +0.195 (31) | 73. sad | -0.187 | 3.56e+06 (38) | -1.366 (89) |
| 24. winter | +0.101 | 1.26e+06 (64) | +0.050 (43) | 74. gas | -0.193 | 1.02e+06 (65) | -0.471 (67) |
| 25. God | +0.099 | 8.58e+06 (25) | +0.468 (20) | 75. economy | -0.203 | 6.09e+05 (73) | -0.525 (69) |
| 26. hot | +0.095 | 7.12e+06 (28) | -0.172 (54) | 76. Obama | -0.205 | 2.98e+06 (44) | -0.173 (55) |
| 27. ;) | +0.094 | 2.61e+06 (48) | +0.326 (25) | 77. Democrat | -0.226 | 9.32e+04 (93) | -0.384 (64) |
| 28. Jesus | +0.094 | 2.03e+06 (56) | +0.247 (28) | 78. Congress | -0.231 | 3.92e+05 (79) | -0.580 (74) |
| 29. today | +0.092 | 2.56e+07 (9) | +0.126 (36) | 79. hell | -0.250 | 6.27e+06 (30) | -1.551 (96) |
| 30. kiss | +0.072 | 1.70e+06 (59) | +0.632 (11) | 80. sick | -0.262 | 3.58e+06 (37) | -1.630 (97) |
| 31. yes | +0.056 | 1.16e+07 (19) | +0.321 (27) | 81. Muslim | -0.262 | 2.15e+05 (88) | -0.569 (73) |
| 32. tomorrow | +0.054 | 1.04e+07 (21) | +0.086 (38) | 82. war | -0.270 | 1.96e+06 (57) | -2.040 (100) |
| 33. you | +0.052 | 1.73e+08 (3) | +0.111 (37) | 83. Pope | -0.277 | 1.52e+05 (91) | -0.316 (62) |
| 34. heaven | +0.041 | 7.42e+05 (71) | +0.674 (10) | 84. hate | -0.282 | 9.65e+06 (23) | -1.520 (94) |
| 35. ;-) | +0.041 | 9.39e+05 (66) | +0.395 (23) | 85. Glenn Beck | -0.282 | 1.14e+05 (92) | -0.776 (82) |
| 36. we | +0.035 | 3.91e+07 (7) | +0.146 (34) | 86. Islam | -0.299 | 1.87e+05 (89) | -0.710 (78) |
| 37. yesterday | +0.033 | 3.08e+06 (42) | -0.168 (53) | 87. George Bush | -0.333 | 3.23e+04 (98) | -0.747 (80) |
| 38. dark | +0.031 | 1.58e+06 (61) | -0.766 (81) | 88. Goldman Sachs | -0.337 | 5.27e+04 (96) | -0.984 (84) |
| 39. ? | +0.030 | 2.32e+06 (53) | -0.503 (68) | 89. depressed | -0.339 | 2.81e+05 (82) | -1.541 (95) |
| 40. RT | +0.028 | 3.39e+08 (1) | -0.443 (66) | 90. Senate | -0.340 | 4.48e+05 (78) | -0.601 (75) |
| 41. Michael Jackson | +0.018 | 8.26e+05 (70) | -0.213 (59) | 91. BP | -0.355 | 5.82e+05 (74) | -0.902 (83) |
| 42. night | +0.014 | 1.71e+07 (12) | +0.074 (40) | 92. gun | -0.367 | 6.81e+05 (72) | -1.476 (93) |
| 43. life | +0.012 | 1.40e+07 (17) | +0.422 (22) | 93. drugs | -0.382 | 5.10e+05 (77) | -1.452 (91) |
| 44. health | -0.000 | 2.58e+06 (50) | +0.447 (21) | 94. headache | -0.437 | 8.57e+05 (69) | -1.881 (98) |
| 45. sex | -0.008 | 3.55e+06 (39) | +0.542 (17) | 95. :-( | -0.455 | 3.40e+05 (81) | -1.174 (85) |
| 46. work | -0.010 | 1.84e+07 (11) | -0.174 (56) | 96. :( | -0.472 | 2.89e+06 (45) | -1.288 (88) |
| 47. girl | -0.010 | 1.01e+07 (22) | +0.331 (24) | 97. Afghanistan | -0.703 | 2.74e+05 (83) | -1.458 (92) |
| 48. boy | -0.026 | 4.93e+06 (33) | +0.062 (41) | 98. mosque | -0.709 | 6.98e+04 (95) | -0.694 (77) |
| 49. I | -0.048 | 3.08e+08 (2) | -0.062 (49) | 99. flu | -0.735 | 9.01e+05 (68) | -1.912 (99) |
| 50. commute | -0.048 | 9.01e+04 (94) | -0.206 (57) | 100. Iraq | -0.773 | 2.39e+05 (85) | -1.282 (87) |



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Simpson lexical size, $N_S$:

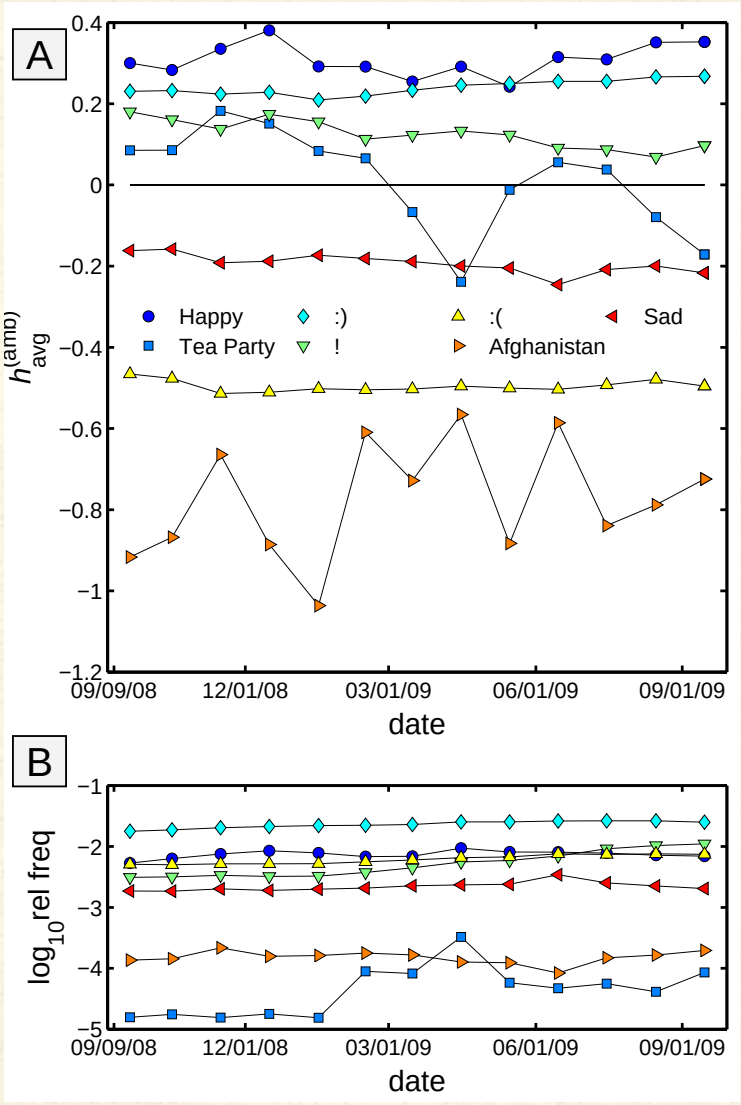
| Word | $h_{avg}^{(amb)}$ | Total Tweets | $h_{avg}^{(norm)}$ | Word | $h_{avg}^{(amb)}$ | Total Tweets | $h_{avg}^{(norm)}$ |
|---|---|---|---|---|---|---|---|
| 1. happy | +0.430 | 1.65e+07 (13) | +1.104 (1) | 51. snow | -0.051 | 2.60e+06 (49) | +0.083 (39) |
| 2. Christmas | +0.404 | 4.89e+06 (35) | +0.953 (3) | 52. Jon Stewart | -0.052 | 5.21e+04 (97) | -0.024 (48) |
| 3. vegan | +0.315 | 1.84e+05 (90) | -0.015 (46) | 53. school | -0.056 | 9.26e+06 (24) | +0.050 (42) |
| 4. :) | +0.274 | 1.04e+07 (20) | +0.630 (12) | 54. Lehman Brothers | -0.078 | 8.50e+03 (100) | -0.721 (79) |
| 5. family | +0.251 | 5.01e+06 (32) | +0.716 (7) | 55. them | -0.090 | 1.54e+07 (15) | -0.280 (60) |
| 6. :-) | +0.228 | 1.67e+06 (60) | +0.560 (16) | 56. right | -0.090 | 1.92e+07 (10) | +0.126 (35) |
| 7. our | +0.207 | 1.41e+07 (16) | +0.159 (33) | 57. woman | -0.115 | 2.54e+06 (51) | +0.202 (30) |
| 8. win | +0.204 | 7.98e+06 (26) | +0.924 (4) | 58. left | -0.118 | 4.89e+06 (34) | -0.383 (63) |
| 9. vacation | +0.200 | 9.35e+05 (67) | +0.817 (5) | 59. me | -0.119 | 1.44e+08 (4) | +0.160 (32) |
| 10. party | +0.170 | 6.44e+06 (29) | +0.679 (9) | 60. election | -0.127 | 5.60e+05 (75) | -0.306 (61) |
| 11. love | +0.164 | 4.67e+07 (6) | +0.977 (2) | 61. Sarah Palin | -0.128 | 2.26e+05 (87) | -0.681 (76) |
| 12. friends | +0.155 | 7.67e+06 (27) | +0.685 (8) | 62. no | -0.132 | 9.51e+07 (5) | -1.415 (90) |
| 13. hope | +0.149 | 1.18e+07 (18) | +0.515 (19) | 63. rain | -0.134 | 3.23e+06 (41) | +0.050 (44) |
| 14. coffee | +0.147 | 2.80e+06 (46) | +0.518 (18) | 64. climate | -0.135 | 3.64e+05 (80) | -0.160 (51) |
| 15. cash | +0.146 | 1.28e+06 (63) | +0.601 (14) | 65. gay | -0.152 | 2.73e+06 (47) | -0.552 (72) |
| 16. sun | +0.144 | 2.39e+06 (52) | +0.737 (6) | 66. lose | -0.157 | 2.06e+06 (55) | -1.181 (86) |
| 17. income | +0.137 | 5.10e+05 (76) | +0.621 (13) | 67. they | -0.159 | 2.74e+07 (8) | -0.208 (58) |
| 18. summer | +0.135 | 3.00e+06 (43) | +0.221 (29) | 68. oil | -0.162 | 1.38e+06 (62) | -0.411 (65) |
| 19. church | +0.131 | 1.81e+06 (58) | -0.016 (47) | 69. cold | -0.162 | 3.67e+06 (36) | -0.546 (71) |
| 20. Valentine | +0.127 | 2.47e+05 (84) | +0.593 (15) | 70. I feel | -0.173 | 5.17e+06 (31) | -0.129 (50) |
| 21. Stephen Colbert | +0.126 | 2.38e+04 (99) | +0.001 (45) | 71. man | -0.175 | 1.59e+07 (14) | -0.163 (52) |
| 22. USA | +0.113 | 2.16e+06 (54) | +0.325 (26) | 72. Republican | -0.181 | 2.30e+05 (86) | -0.539 (70) |
| 23. ! | +0.106 | 3.44e+06 (40) | +0.195 (31) | 73. sad | -0.187 | 3.56e+06 (38) | -1.366 (89) |
| 24. winter | +0.101 | 1.26e+06 (64) | +0.050 (43) | 74. gas | -0.193 | 1.02e+06 (65) | -0.471 (67) |
| 25. God | +0.099 | 8.58e+06 (25) | +0.468 (20) | 75. economy | -0.203 | 6.09e+05 (73) | -0.525 (69) |
| 26. hot | +0.095 | 7.12e+06 (28) | -0.172 (54) | 76. Obama | -0.205 | 2.98e+06 (44) | -0.173 (55) |
| 27. ;) | +0.094 | 2.61e+06 (48) | +0.326 (25) | 77. Democrat | -0.226 | 9.32e+04 (93) | -0.384 (64) |
| 28. Jesus | +0.094 | 2.03e+06 (56) | +0.247 (28) | 78. Congress | -0.231 | 3.92e+05 (79) | -0.580 (74) |
| 29. today | +0.092 | 2.56e+07 (9) | +0.126 (36) | 79. hell | -0.250 | 6.27e+06 (30) | -1.551 (96) |
| 30. kiss | +0.072 | 1.70e+06 (59) | +0.632 (11) | 80. sick | -0.262 | 3.58e+06 (37) | -1.630 (97) |
| 31. yes | +0.056 | 1.16e+07 (19) | +0.321 (27) | 81. Muslim | -0.262 | 2.15e+05 (88) | -0.569 (73) |
| 32. tomorrow | +0.054 | 1.04e+07 (21) | +0.086 (38) | 82. war | -0.270 | 1.96e+06 (57) | -2.040 (100) |
| 33. you | +0.052 | 1.73e+08 (3) | +0.111 (37) | 83. Pope | -0.277 | 1.52e+05 (91) | -0.316 (62) |
| 34. heaven | +0.041 | 7.42e+05 (71) | +0.674 (10) | 84. hate | -0.282 | 9.65e+06 (23) | -1.520 (94) |
| 35. ;-) | +0.041 | 9.39e+05 (66) | +0.395 (23) | 85. Glenn Beck | -0.282 | 1.14e+05 (92) | -0.776 (82) |
| 36. we | +0.035 | 3.91e+07 (7) | +0.146 (34) | 86. Islam | -0.299 | 1.87e+05 (89) | -0.710 (78) |
| 37. yesterday | +0.033 | 3.08e+06 (42) | -0.168 (53) | 87. George Bush | -0.333 | 3.23e+04 (98) | -0.747 (80) |
| 38. dark | +0.031 | 1.58e+06 (61) | -0.766 (81) | 88. Goldman Sachs | -0.337 | 5.27e+04 (96) | -0.984 (84) |
| 39. ? | +0.030 | 2.32e+06 (53) | -0.503 (68) | 89. depressed | -0.339 | 2.81e+05 (82) | -1.541 (95) |
| 40. RT | +0.028 | 3.39e+08 (1) | -0.443 (66) | 90. Senate | -0.340 | 4.48e+05 (78) | -0.601 (75) |
| 41. Michael Jackson | +0.018 | 8.26e+05 (70) | -0.213 (59) | 91. BP | -0.355 | 5.82e+05 (74) | -0.902 (83) |
| 42. night | +0.014 | 1.71e+07 (12) | +0.074 (40) | 92. gun | -0.367 | 6.81e+05 (72) | -1.476 (93) |
| 43. life | +0.012 | 1.40e+07 (17) | +0.422 (22) | 93. drugs | -0.382 | 5.10e+05 (77) | -1.452 (91) |
| 44. health | -0.000 | 2.58e+06 (50) | +0.447 (21) | 94. headache | -0.437 | 8.57e+05 (69) | -1.881 (98) |
| 45. sex | -0.008 | 3.55e+06 (39) | +0.542 (17) | 95. :-( | -0.455 | 3.40e+05 (81) | -1.174 (85) |
| 46. work | -0.010 | 1.84e+07 (11) | -0.174 (56) | 96. :( | -0.472 | 2.89e+06 (45) | -1.288 (88) |
| 47. girl | -0.010 | 1.01e+07 (22) | +0.331 (24) | 97. Afghanistan | -0.703 | 2.74e+05 (83) | -1.458 (92) |
| 48. boy | -0.026 | 4.93e+06 (33) | +0.062 (41) | 98. mosque | -0.709 | 6.98e+04 (95) | -0.694 (77) |
| 49. I | -0.048 | 3.08e+08 (2) | -0.062 (49) | 99. flu | -0.735 | 9.01e+05 (68) | -1.912 (99) |
| 50. commute | -0.048 | 9.01e+04 (94) | -0.206 (57) | 100. Iraq | -0.773 | 2.39e+05 (85) | -1.282 (87) |



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Ambient happiness:



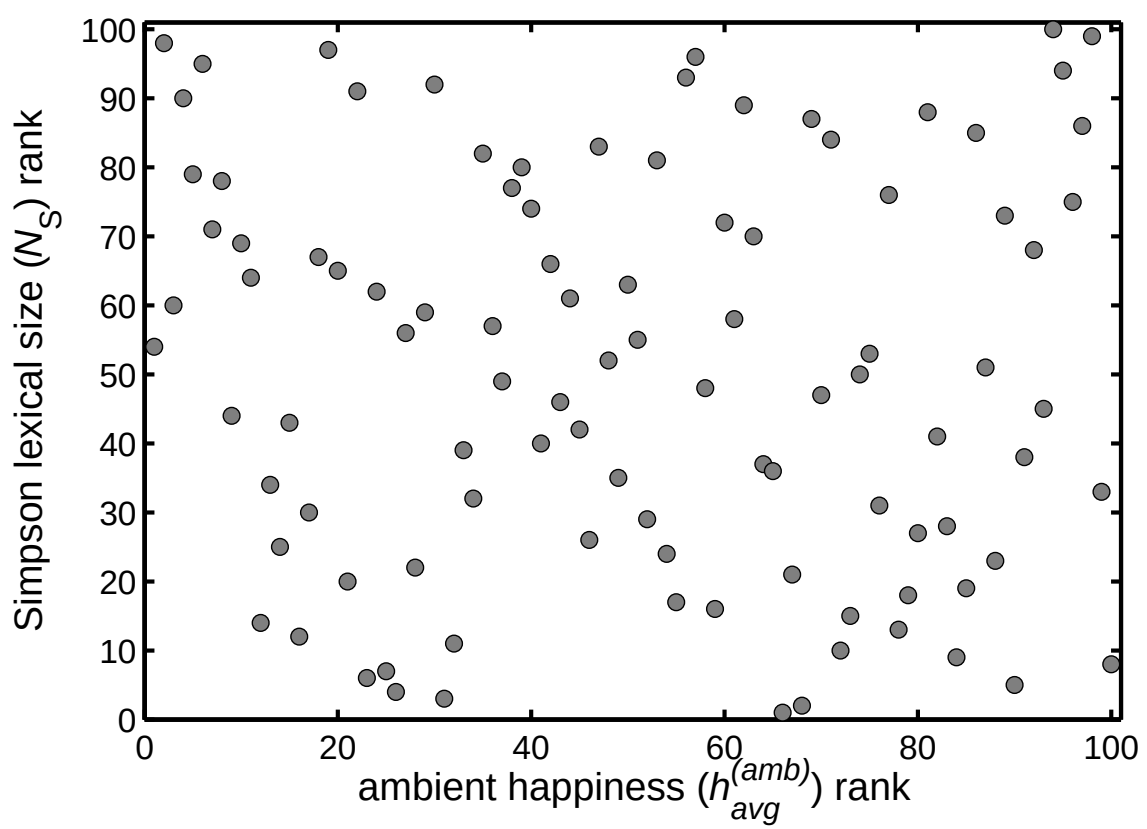
Introduction

Measurement

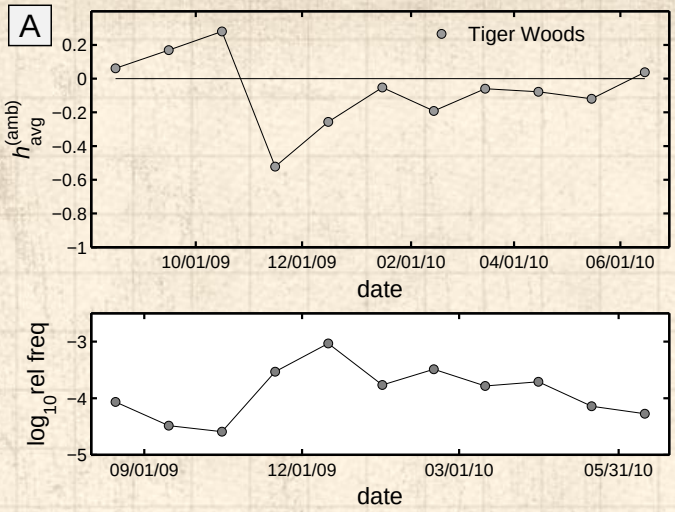
Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

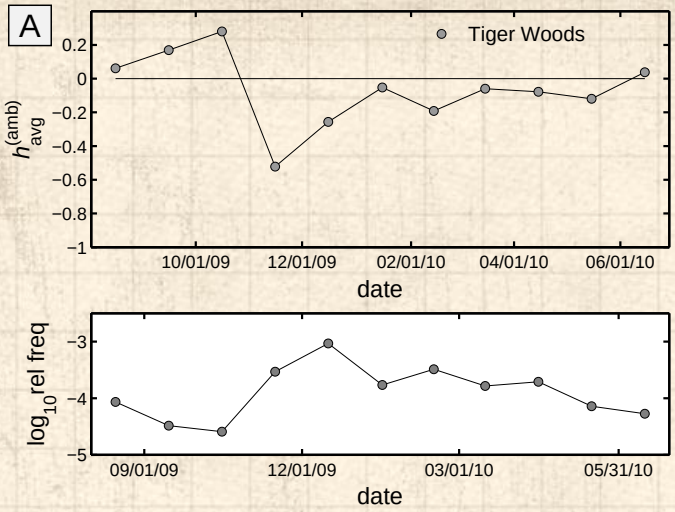
References

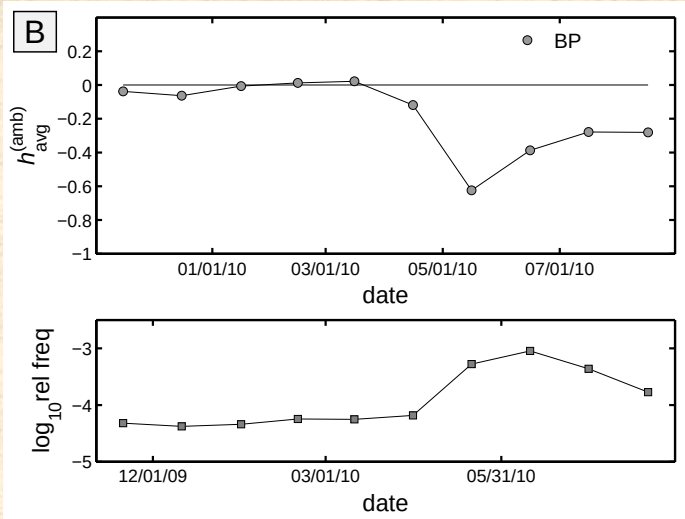


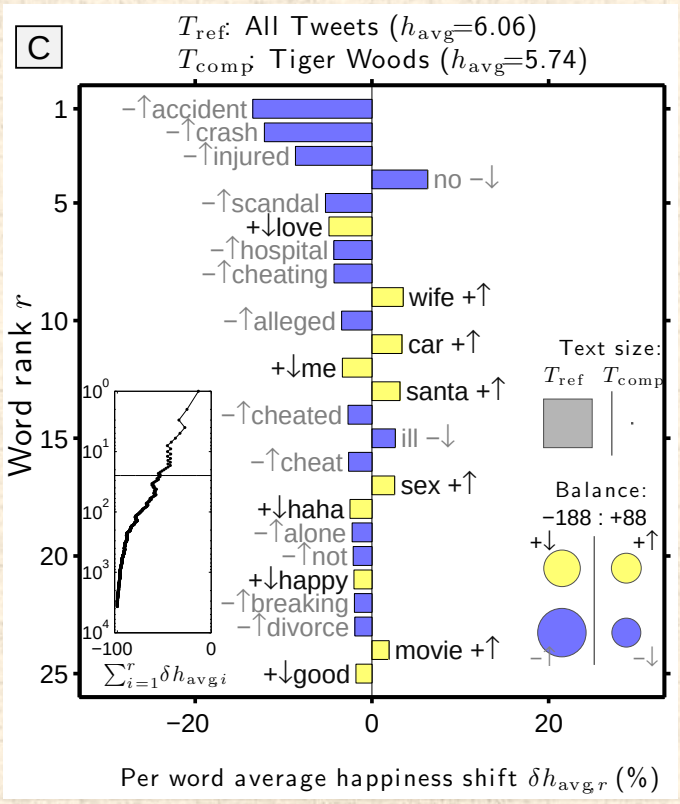
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

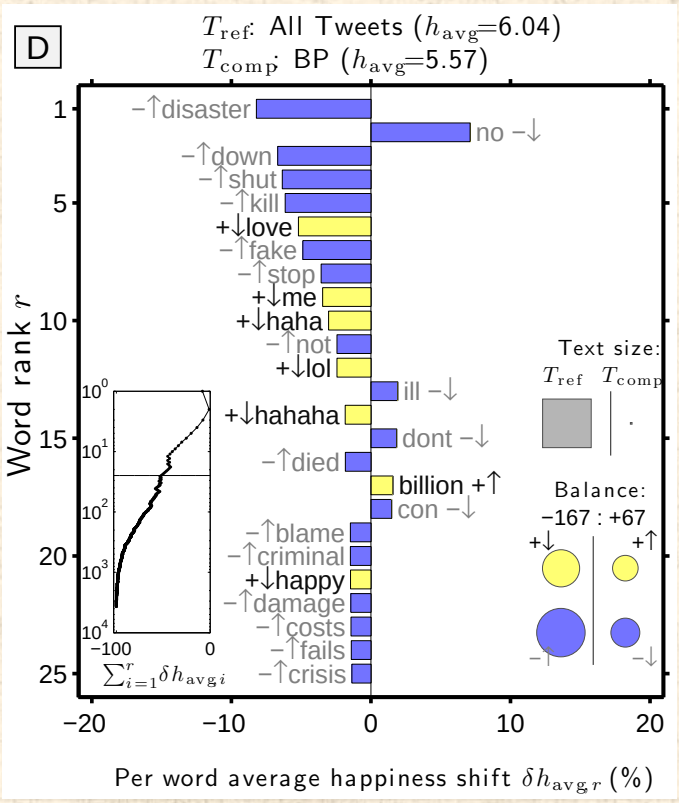


Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

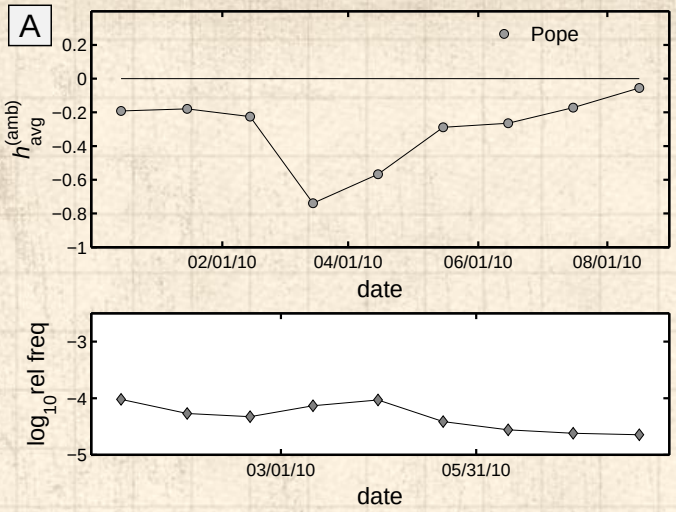


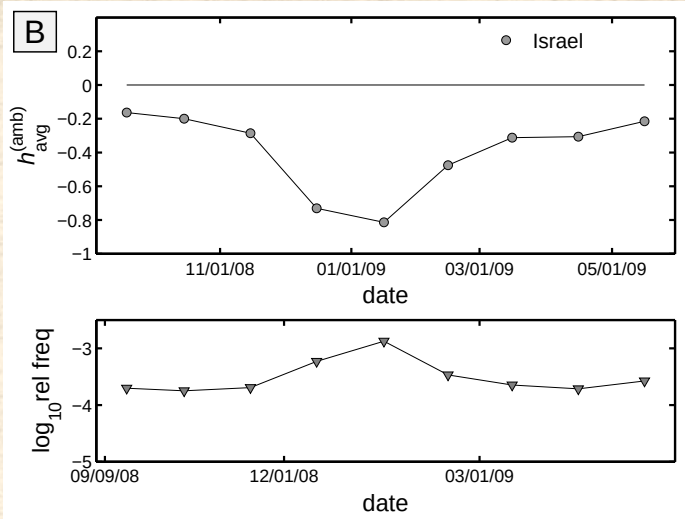



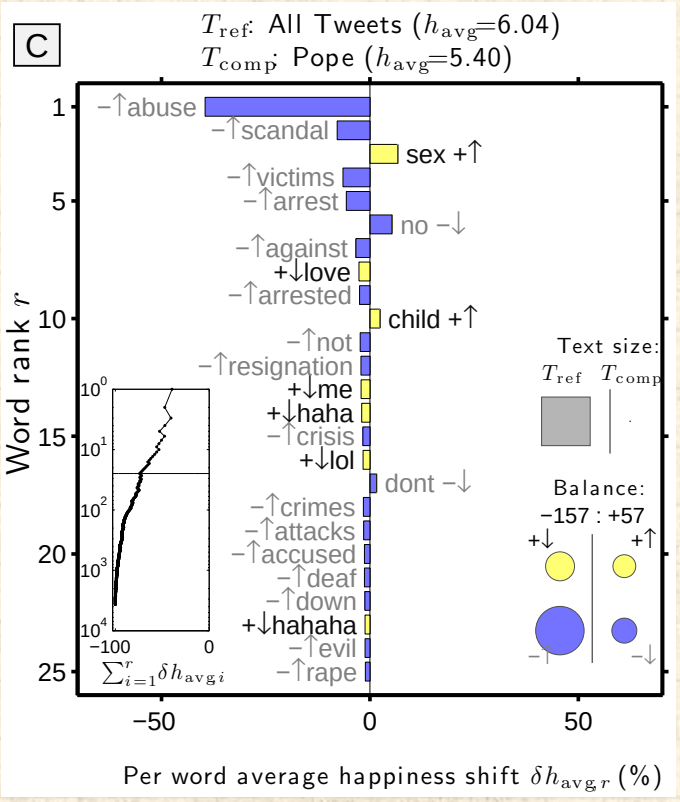



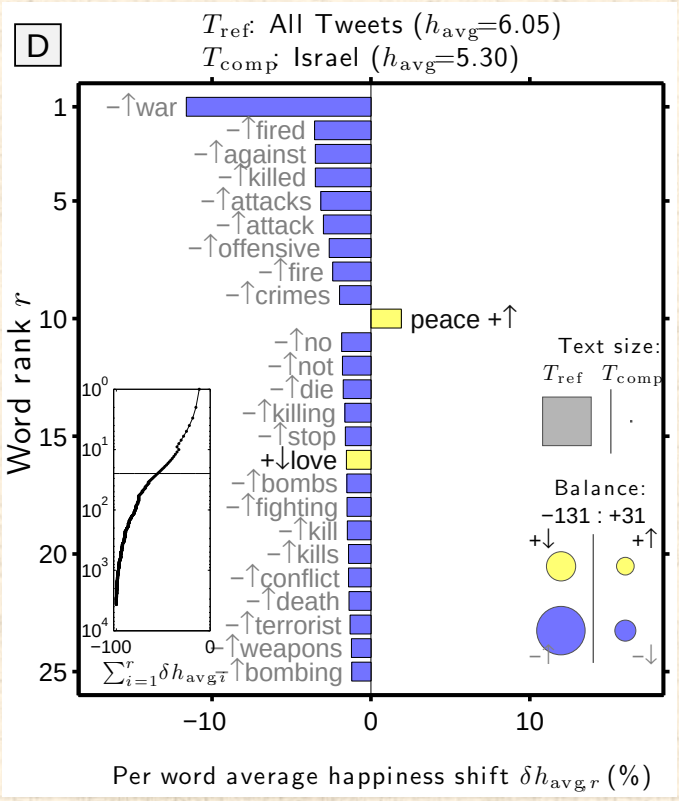



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



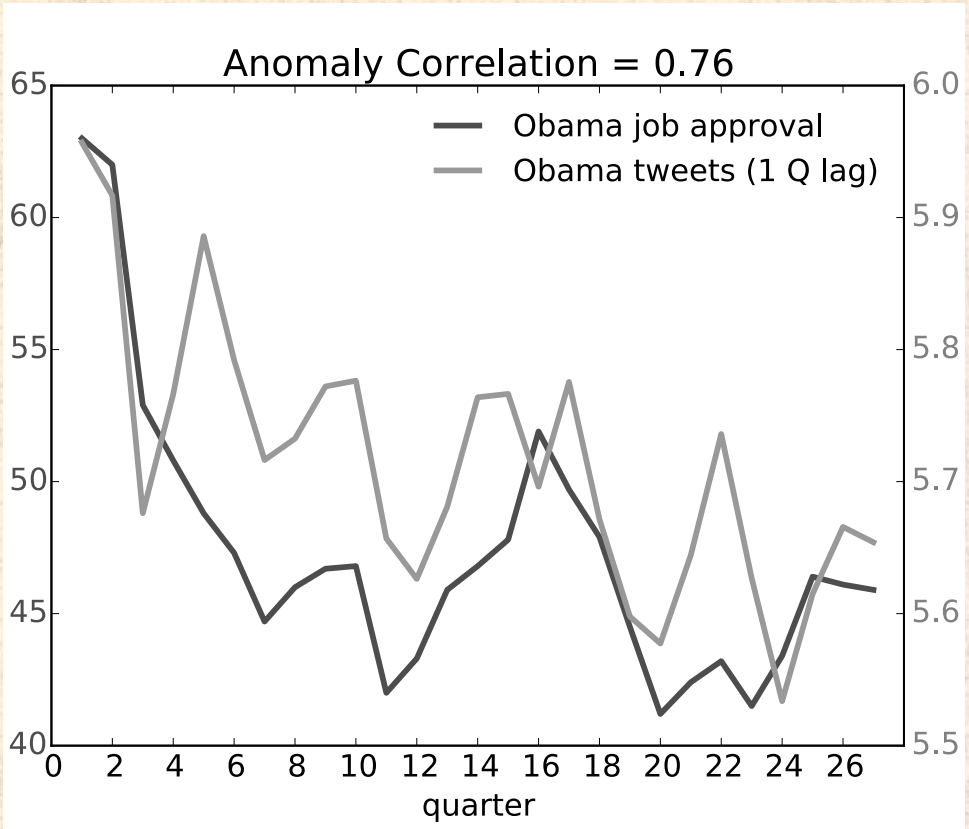



## "Public opinion polling with Twitter"

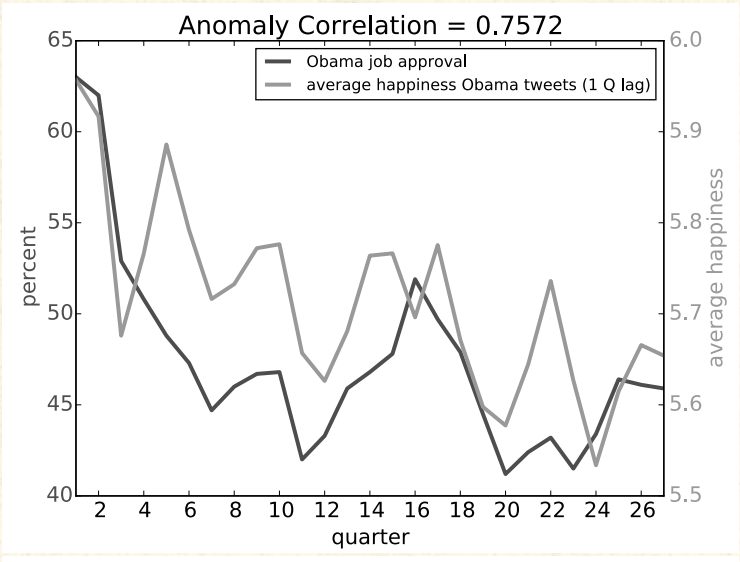
Cody et al.,
Available online at
https://arxiv.org/abs/1608.02024, 2016. [4]

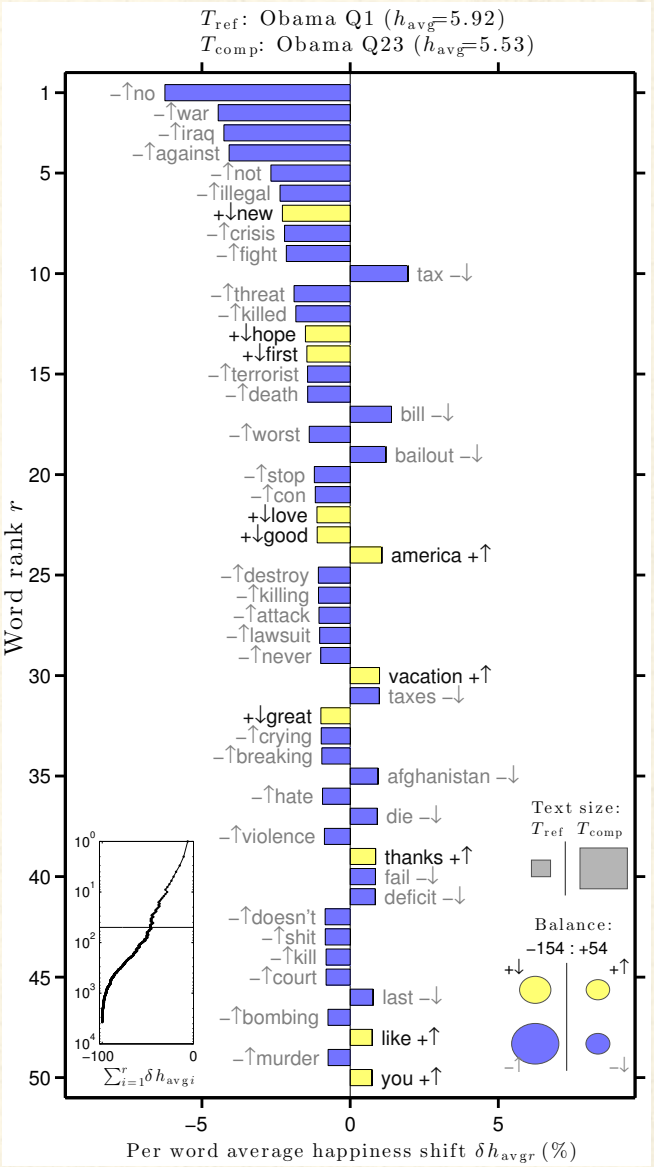




The PoCSverse
Finding Happiness
104 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Twitter's Feels predict Obama's Approval Rating:

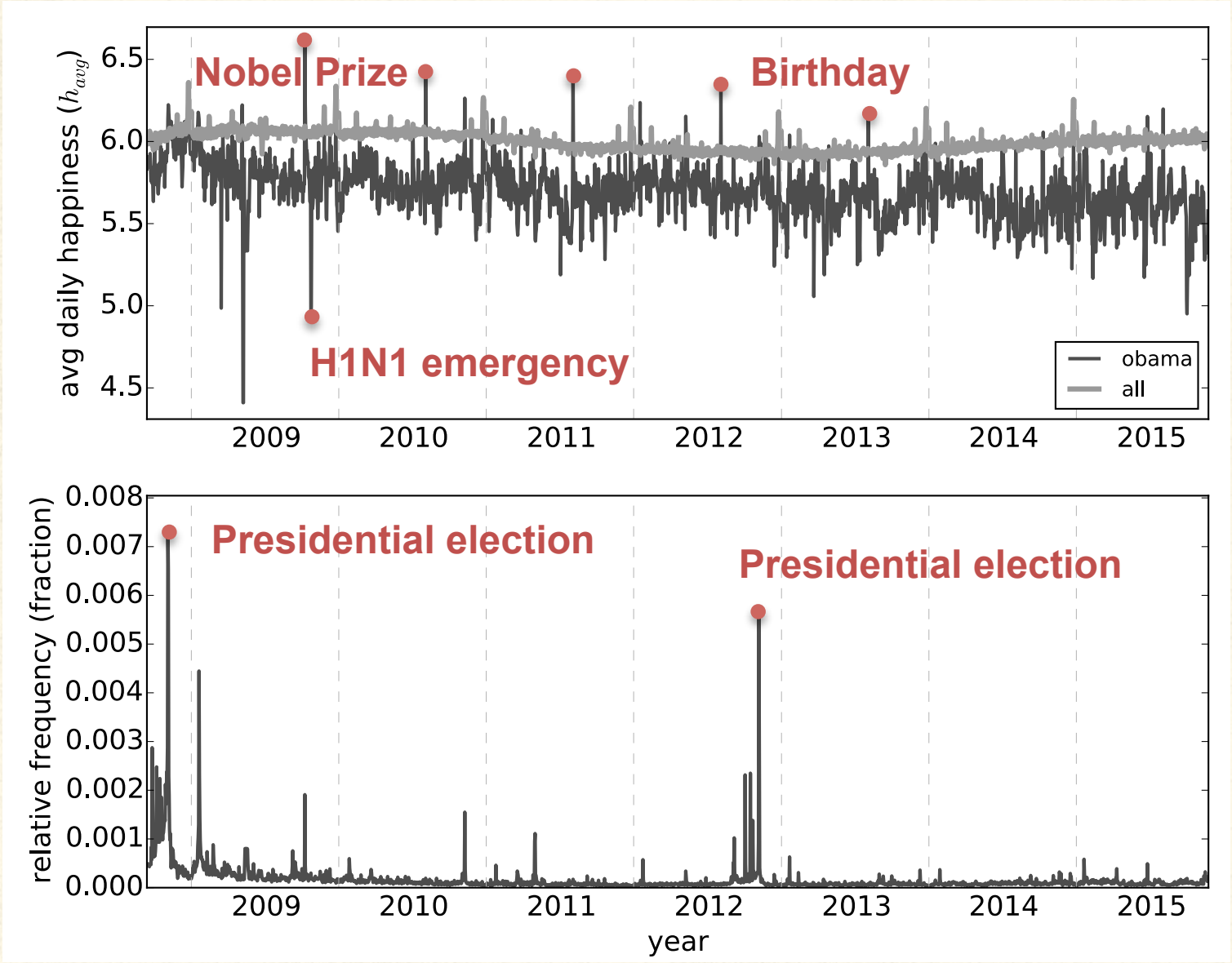




The PoCSverse
Finding Happiness
105 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Ambient happiness for “Obama”:







Introduction

Measurement

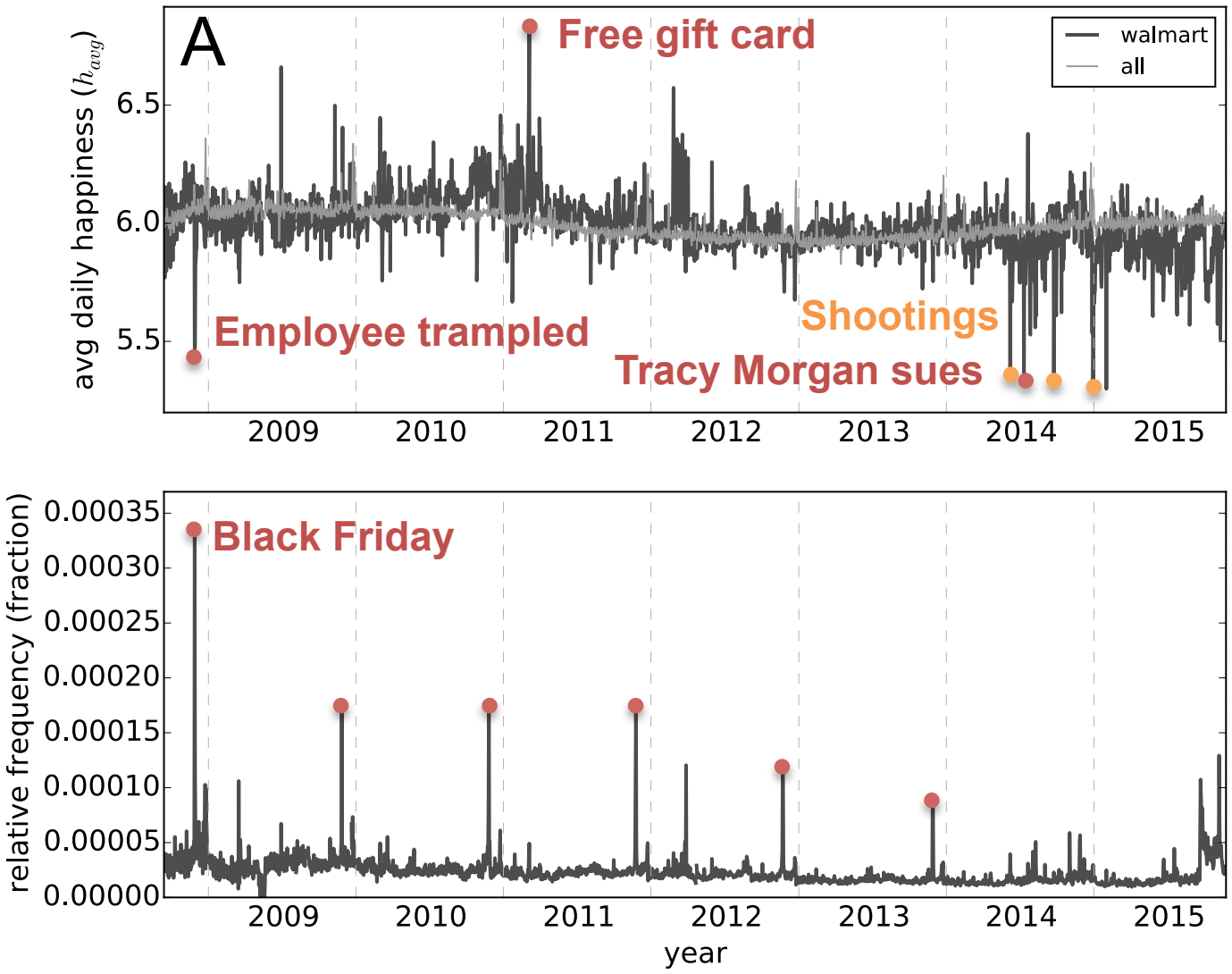
Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

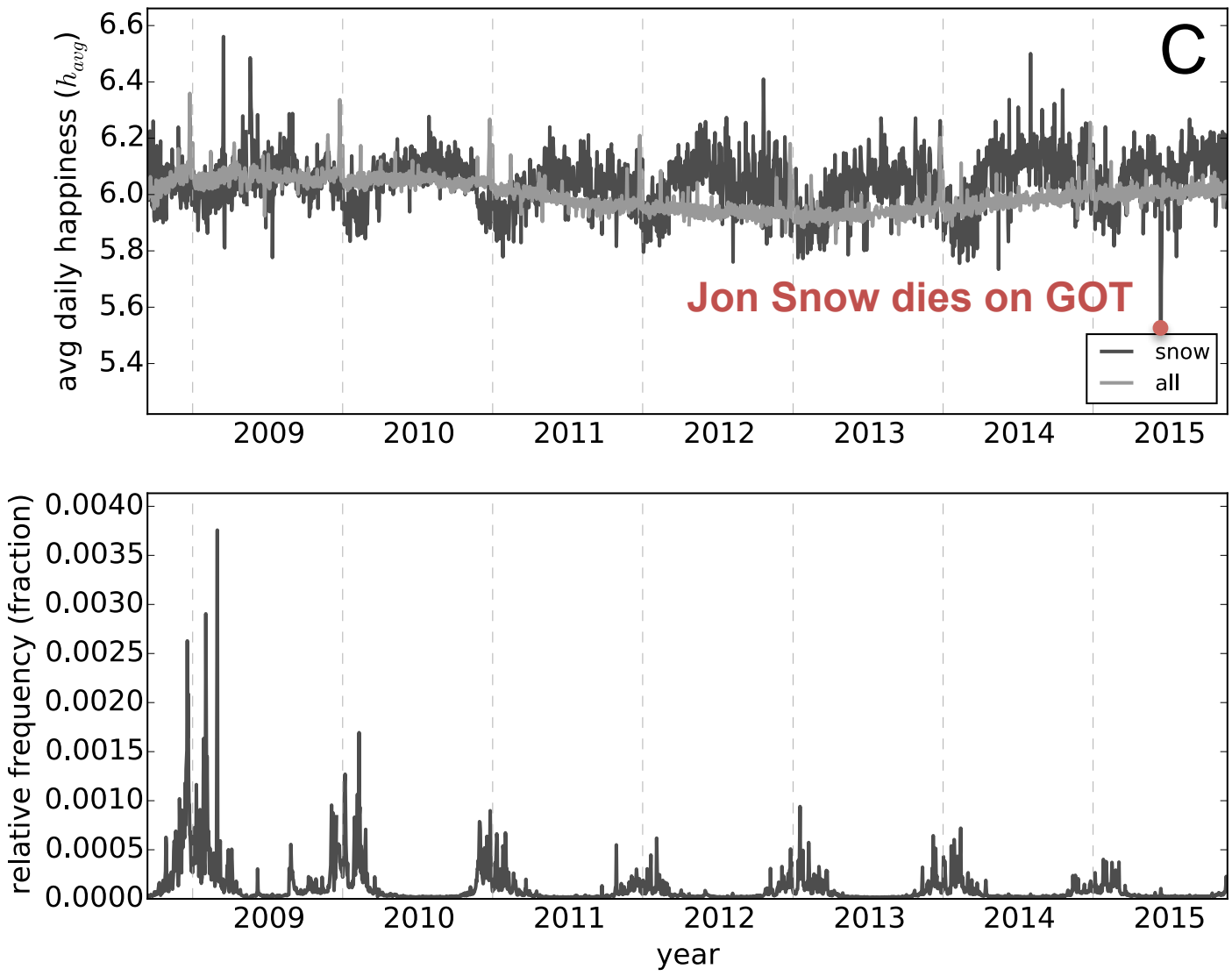
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Ambient happiness for "Walmart":



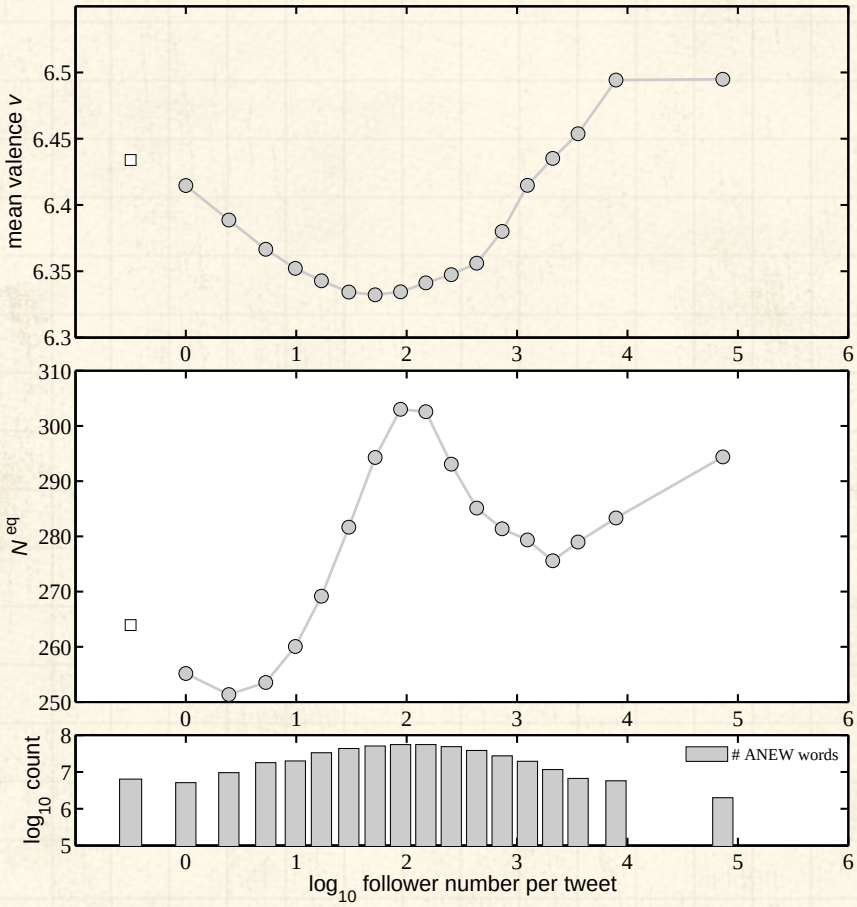
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Ambient happiness for “snow”:



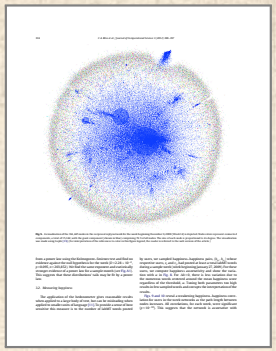
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Dunbar number action:



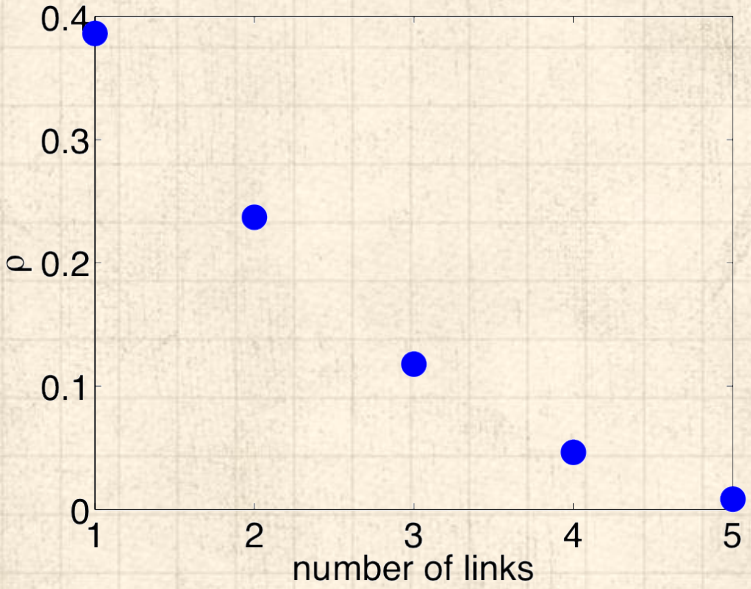

- Early Twitter data—follower counts are not worth so much.
- Unpublished.

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



"Twitter reciprocal reply networks exhibit assortativity with respect to happiness"

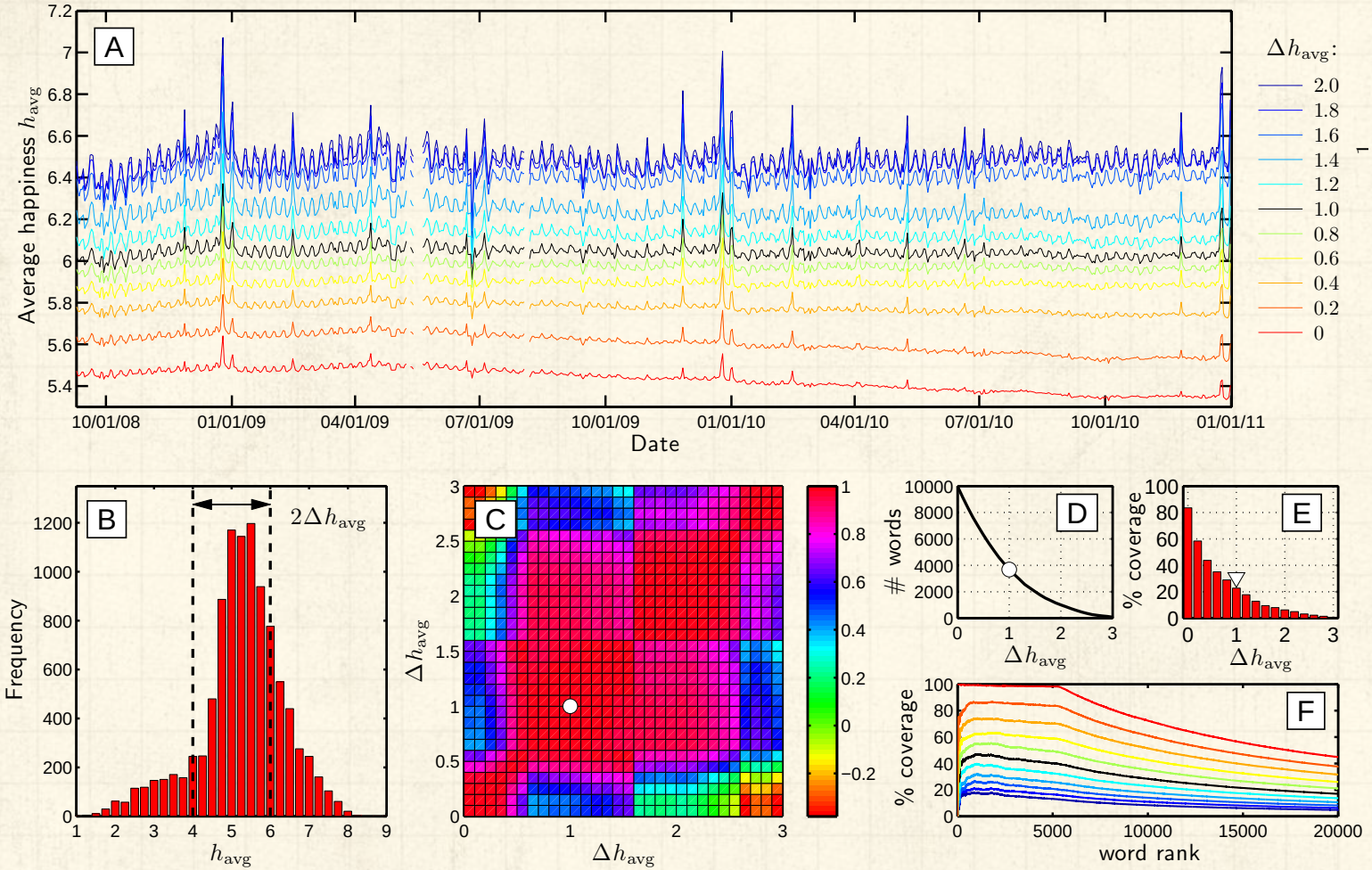
Bliss et al.,
Journal of Computational Science, **3**, 388–397, 2012. [1]

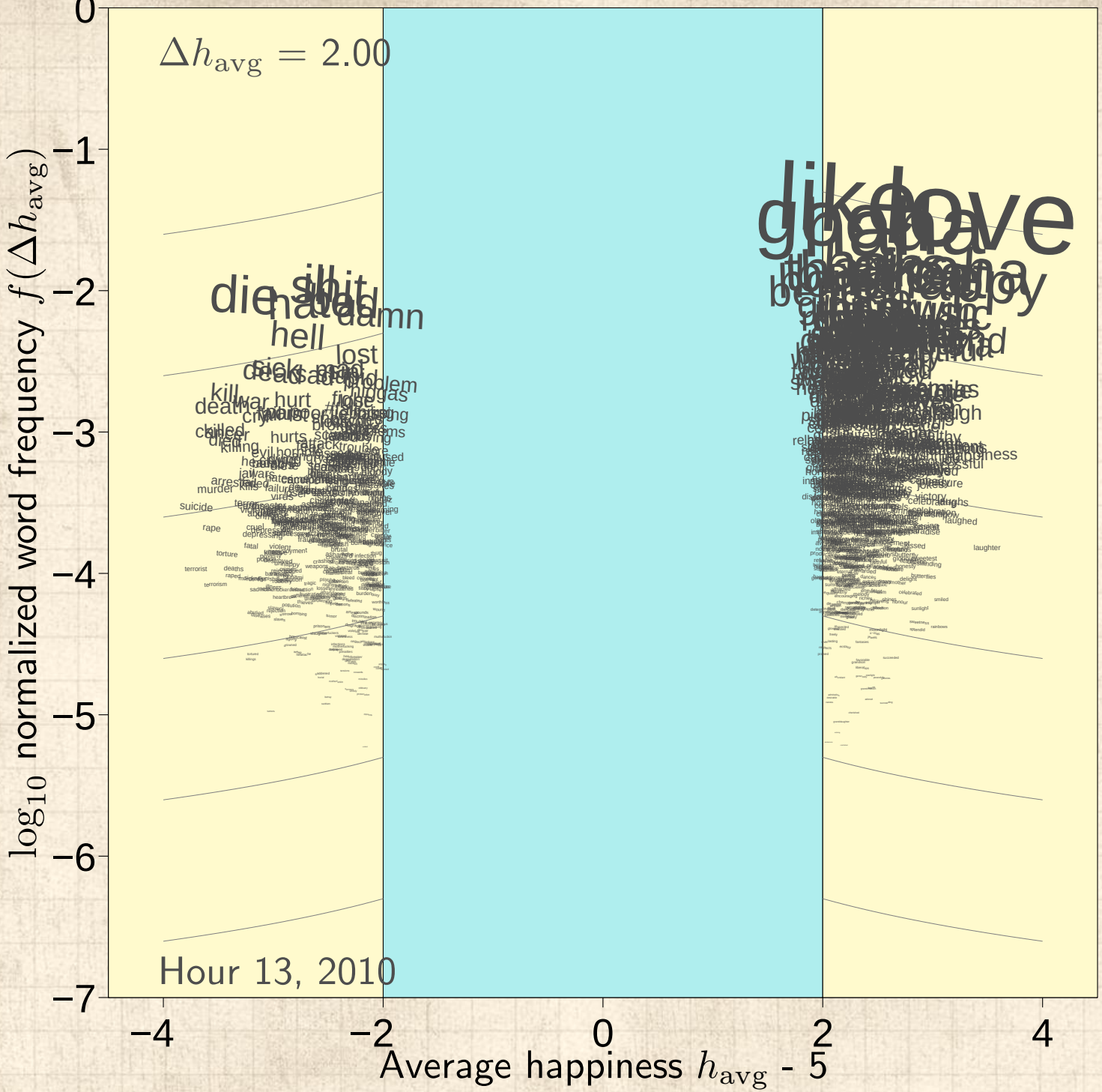



- Decay in happiness correlation in social network.
- Not a test of contagion ...

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

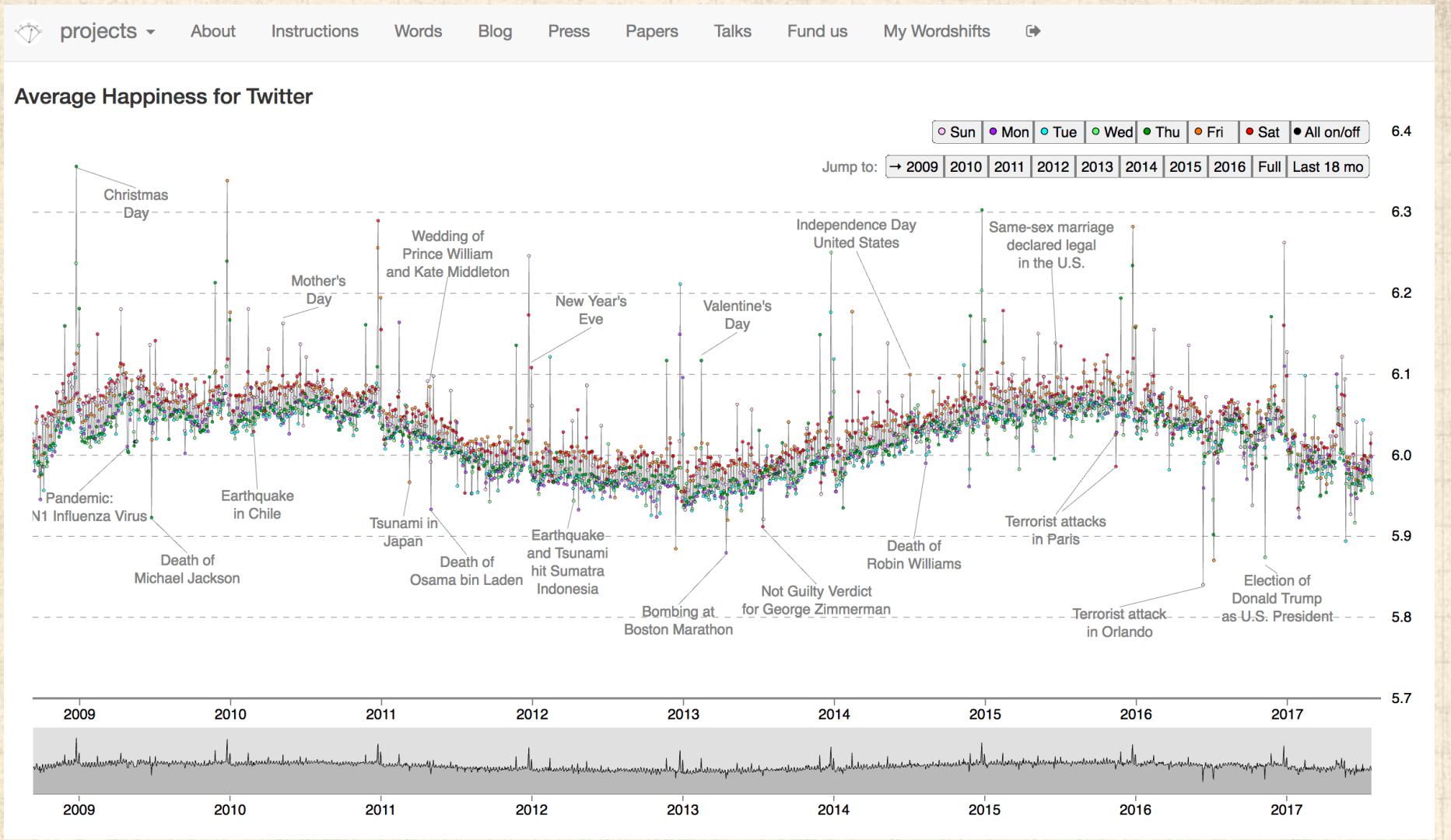
# The very surprising tunable hedonometer:






The PoCSverse
Finding Happiness
112 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Online instrument: hedonometer.org

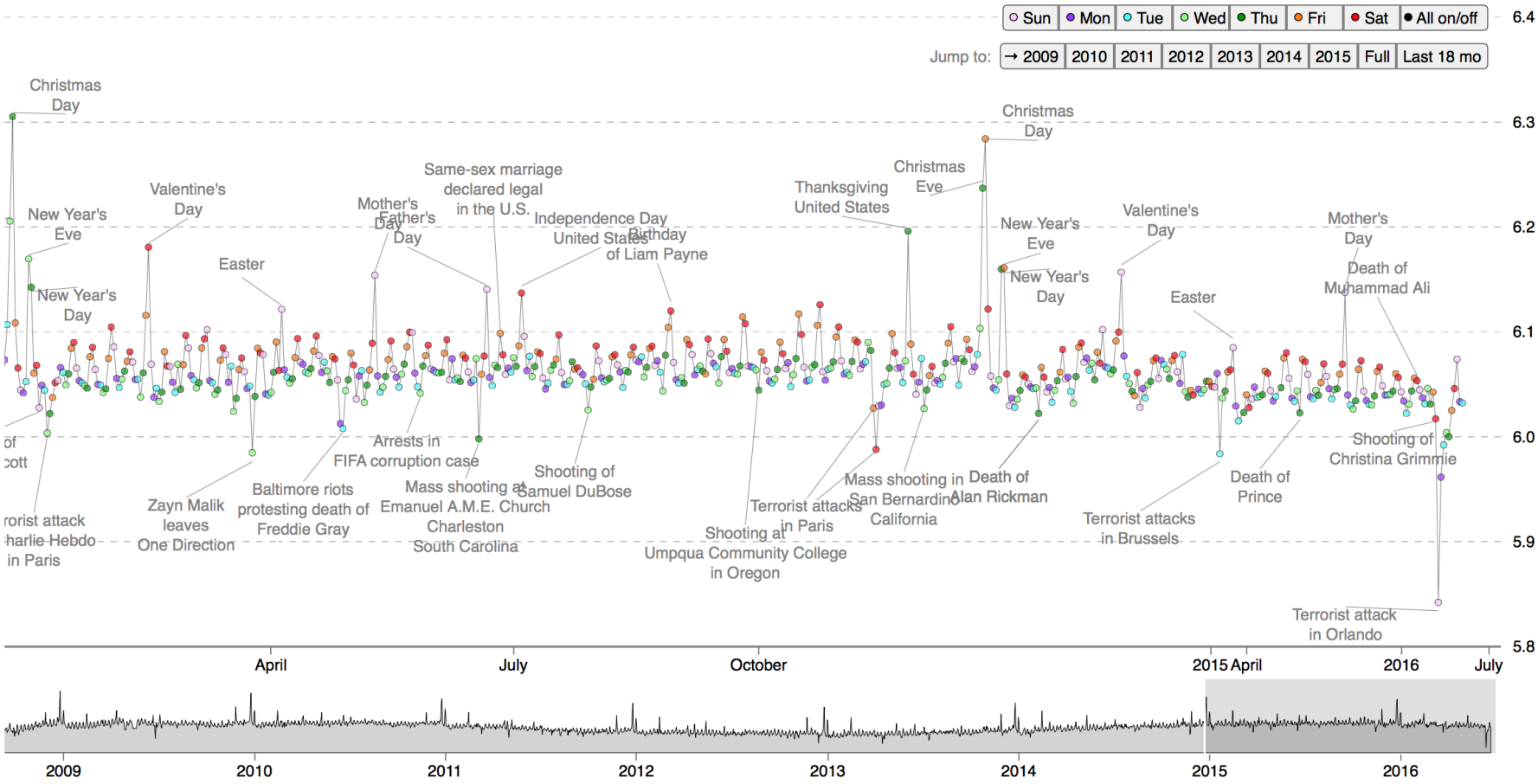



- Machine: @andyreagan
- Planned happiness versus tragedies.

hedonometer.org

projects About Instructions Words Blog Press Papers Talks Fund us

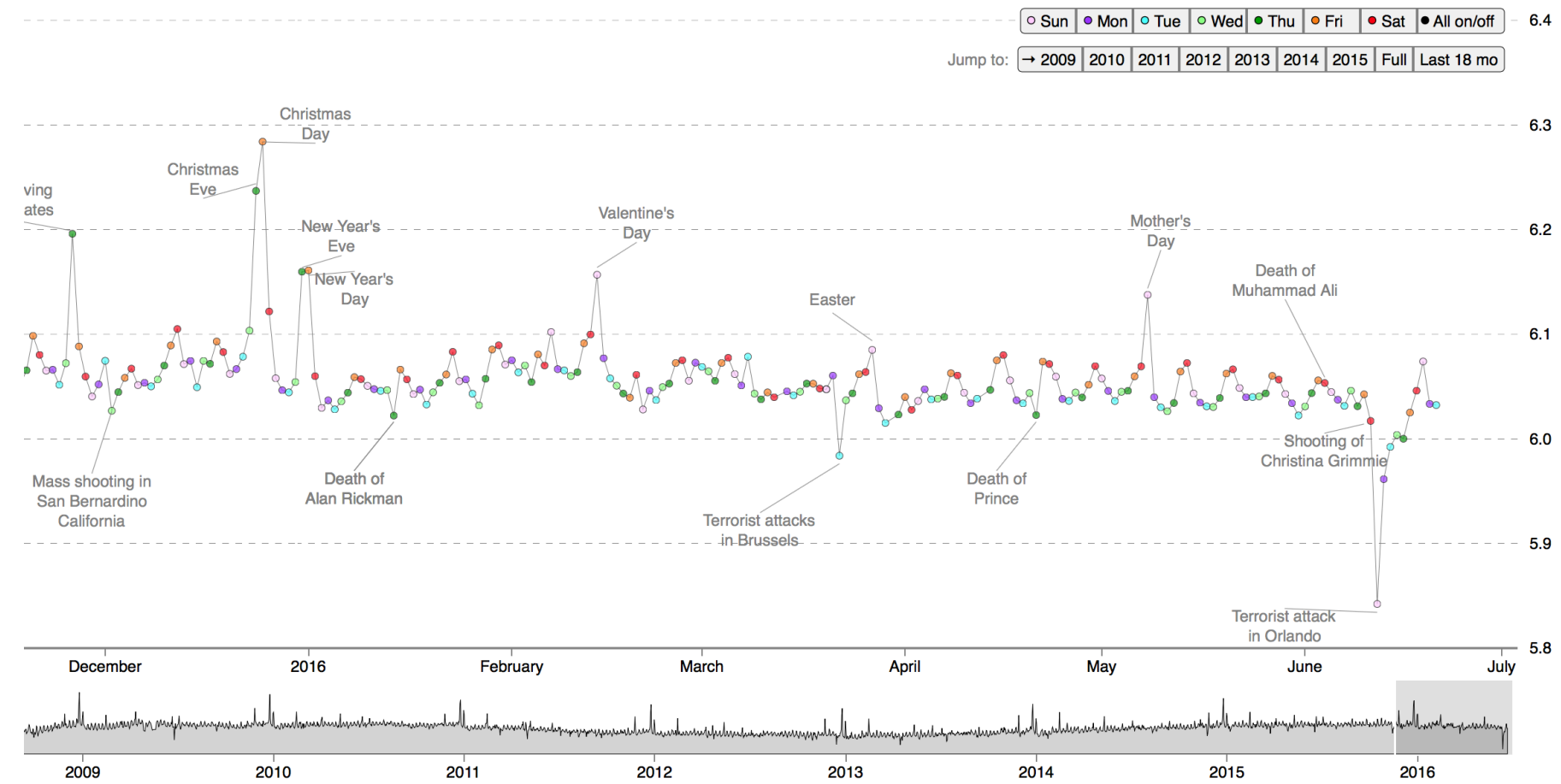
## Average Happiness for Twitter




Machine: @andyreagan

hedonometer.org

projects About Instructions Words Blog Press Papers Talks Fund us




Machine: @andyreagan

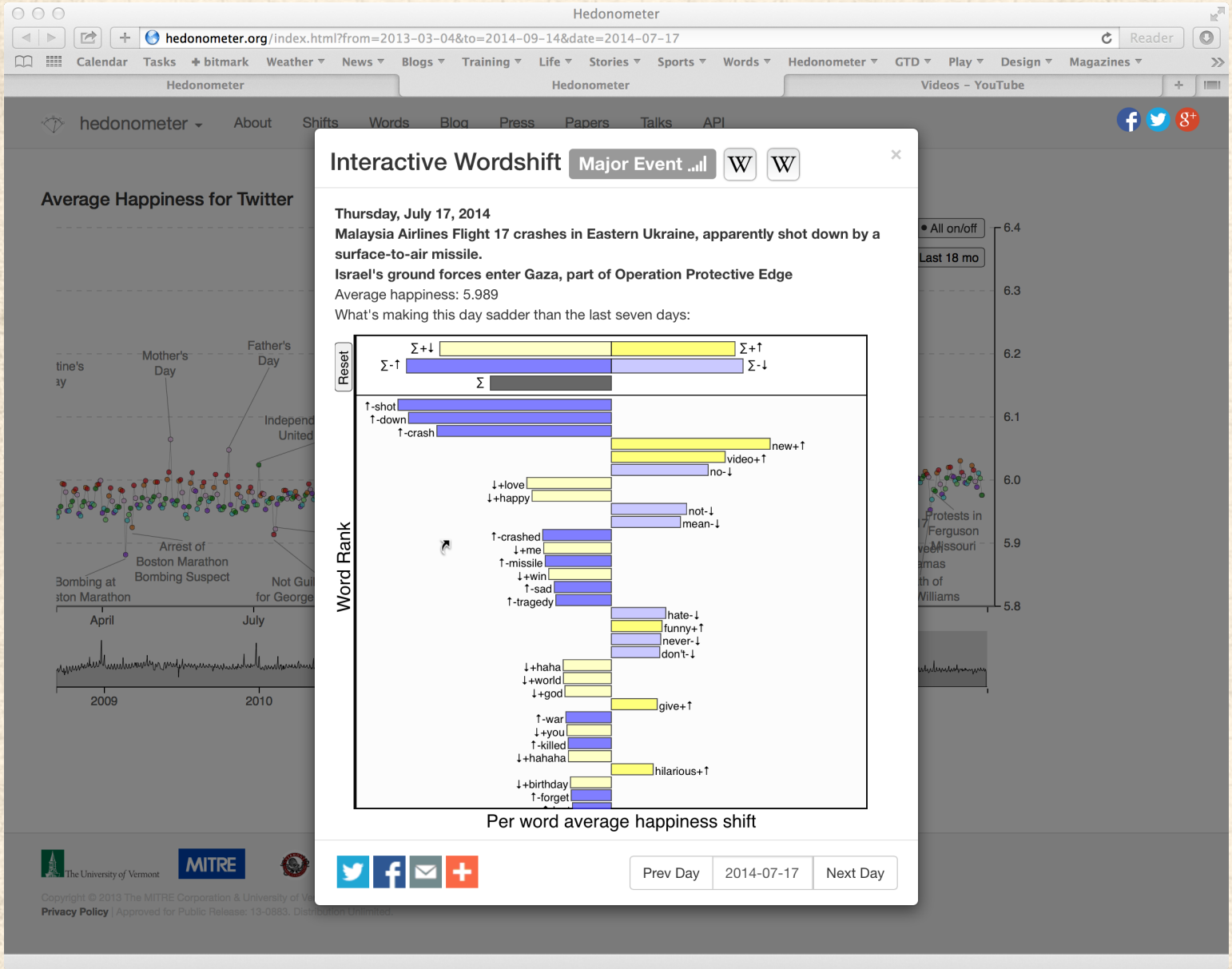
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

The one reliable source of spontaneous, widespread happiness and despair:

O

Original tweet. 2024-02-08: Account is no longer. Things fall apart.

# hedonometer.org—word shifts:





The PoCSverse
Finding Happiness
117 of 165

Introduction

Measurement

Happiness

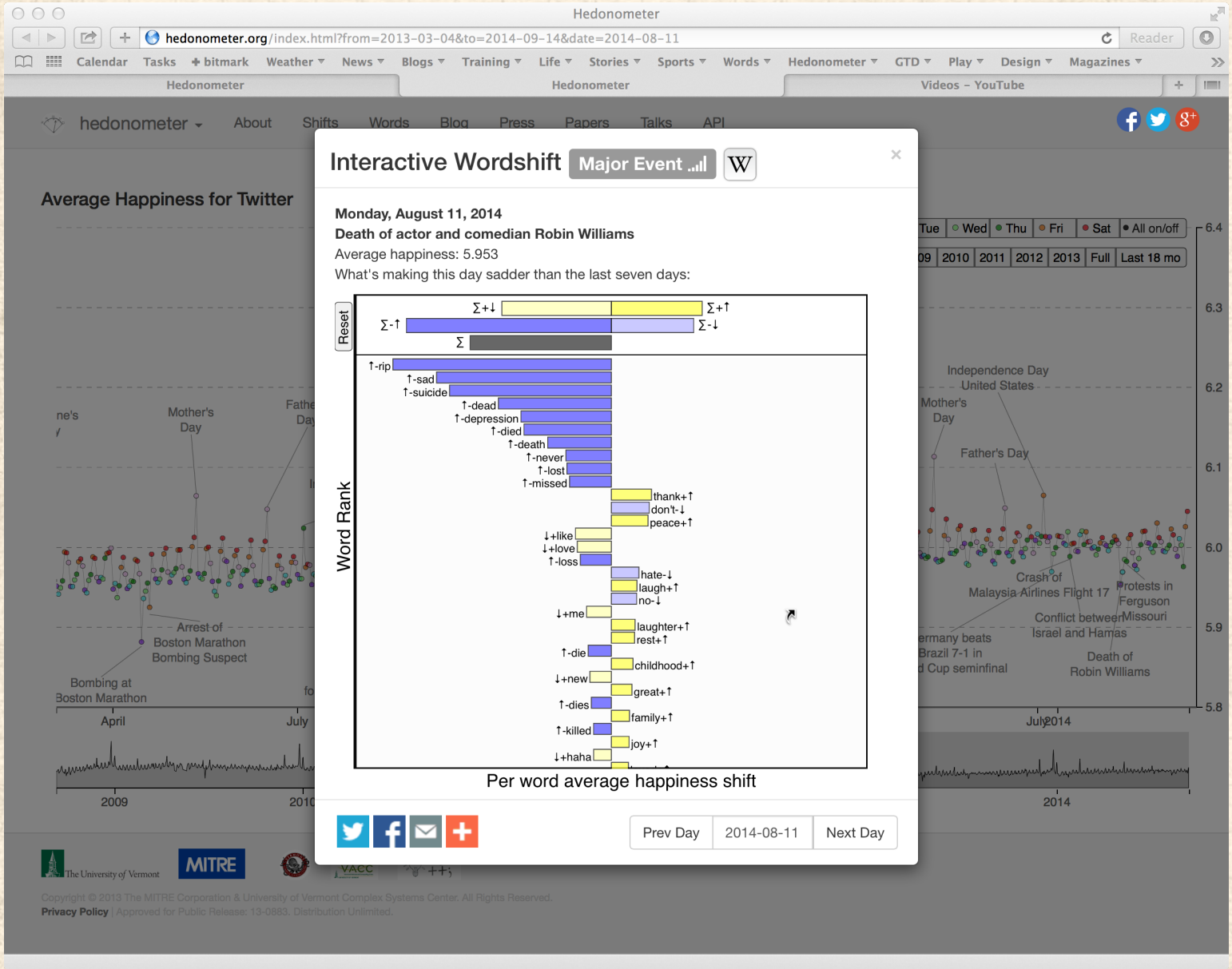
- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

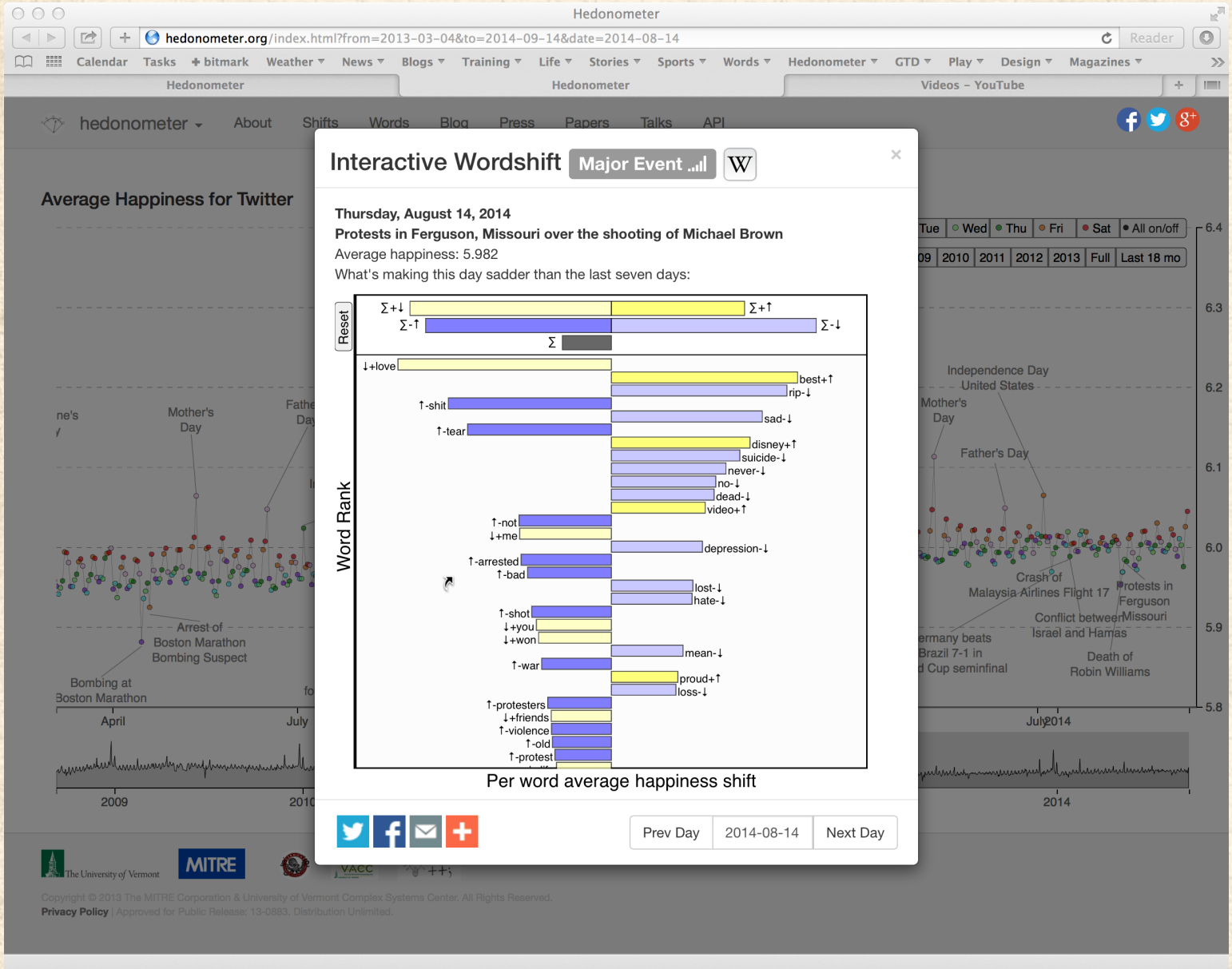
# hedonometer.org—word shifts:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



# hedonometer.org—word shifts:





The PoCSverse
Finding Happiness
119 of 165

Introduction

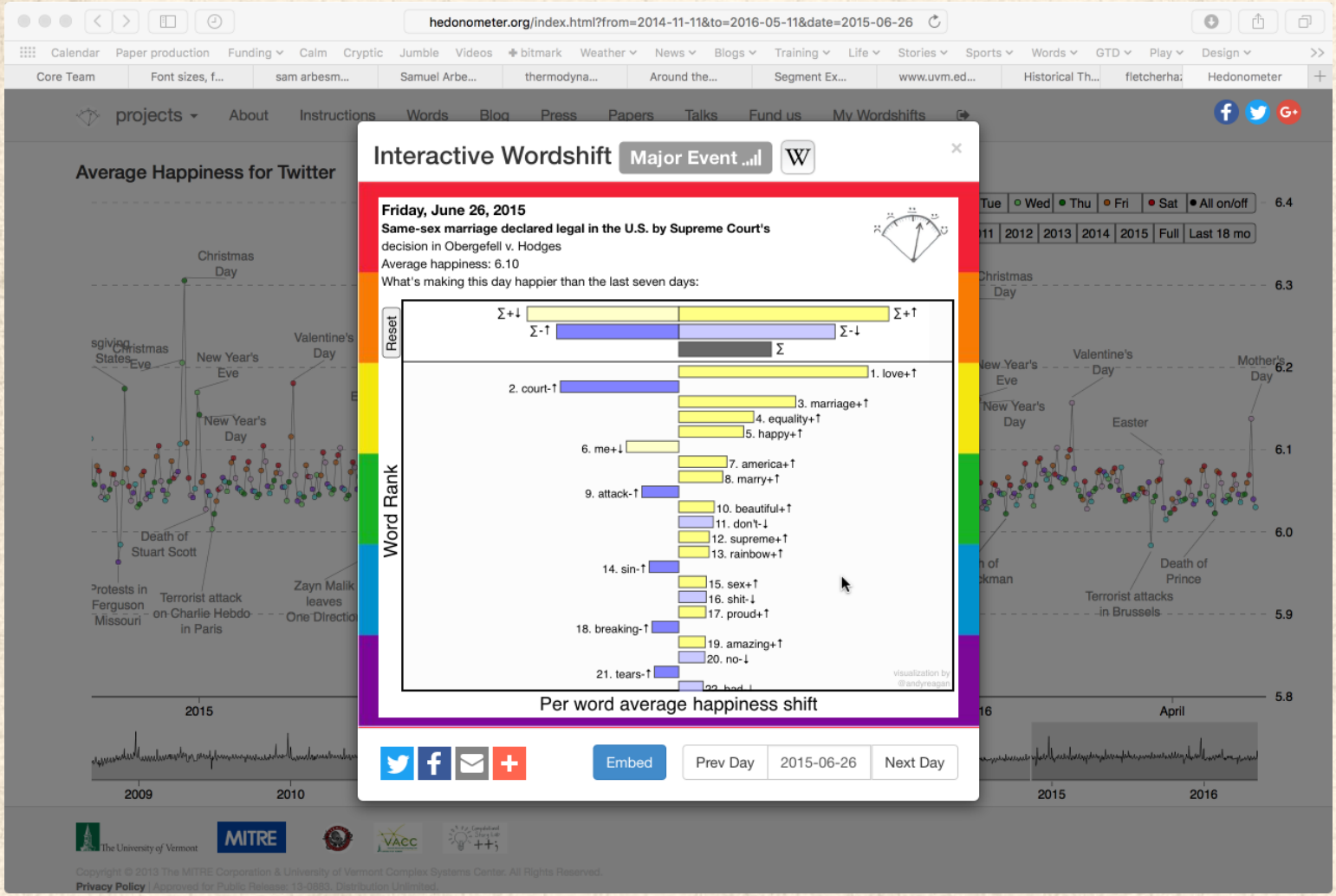
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# hedonometer.org—word shifts:





The PoCSverse
Finding Happiness
120 of 165

Introduction

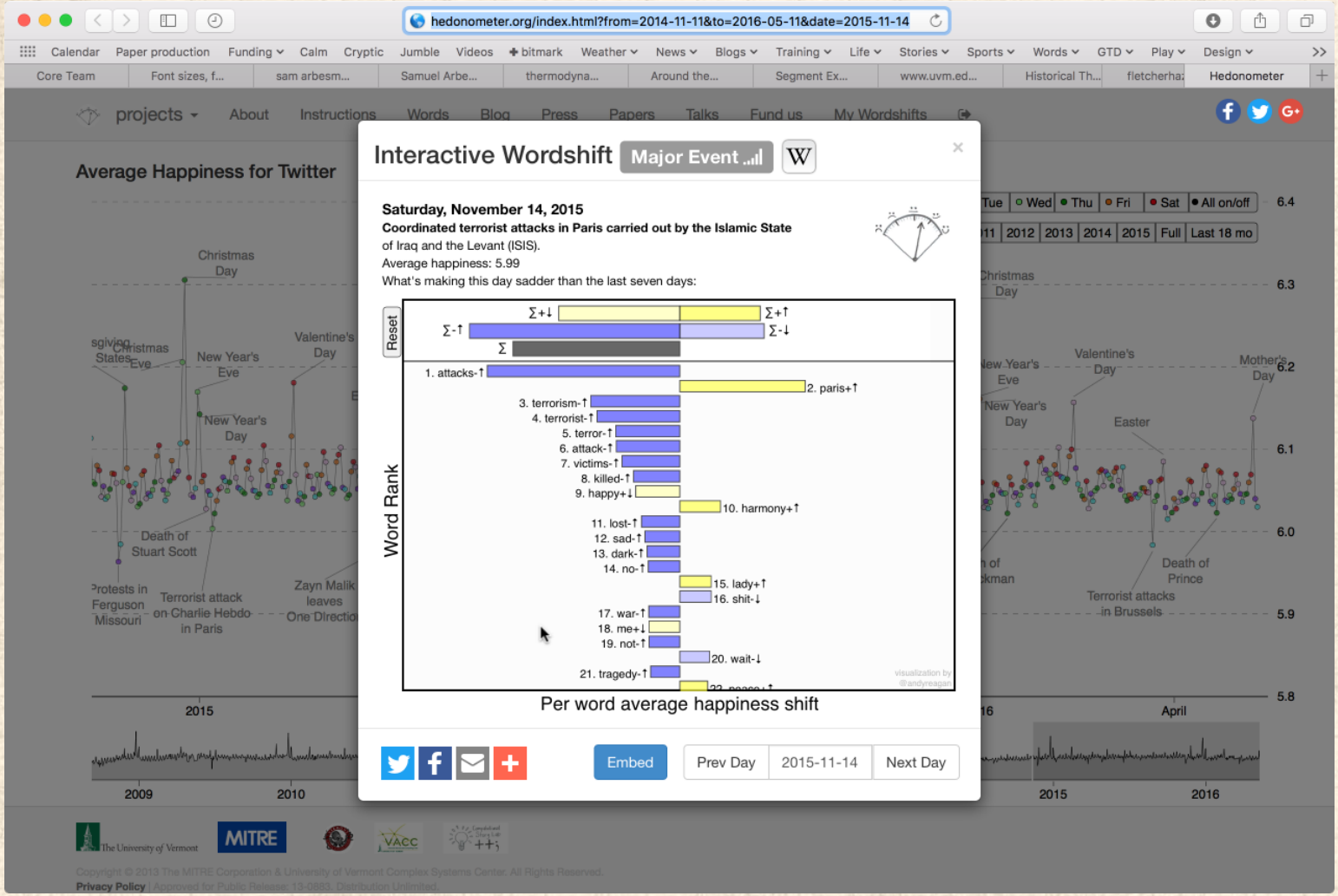
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# hedonometer.org—word shifts:





The PoCSverse
Finding Happiness
121 of 165

Introduction

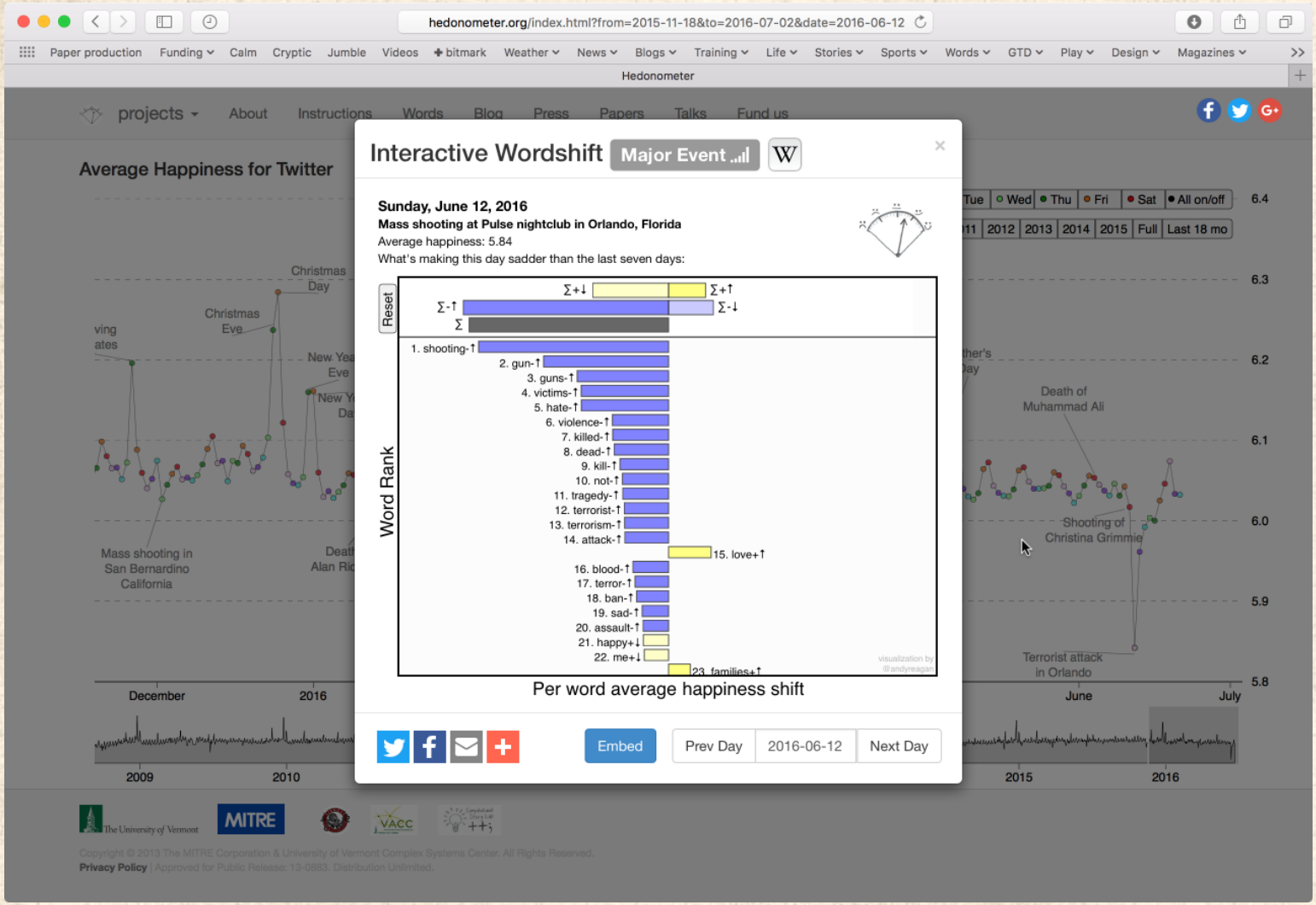
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# hedonometer.org—word shifts:







Introduction

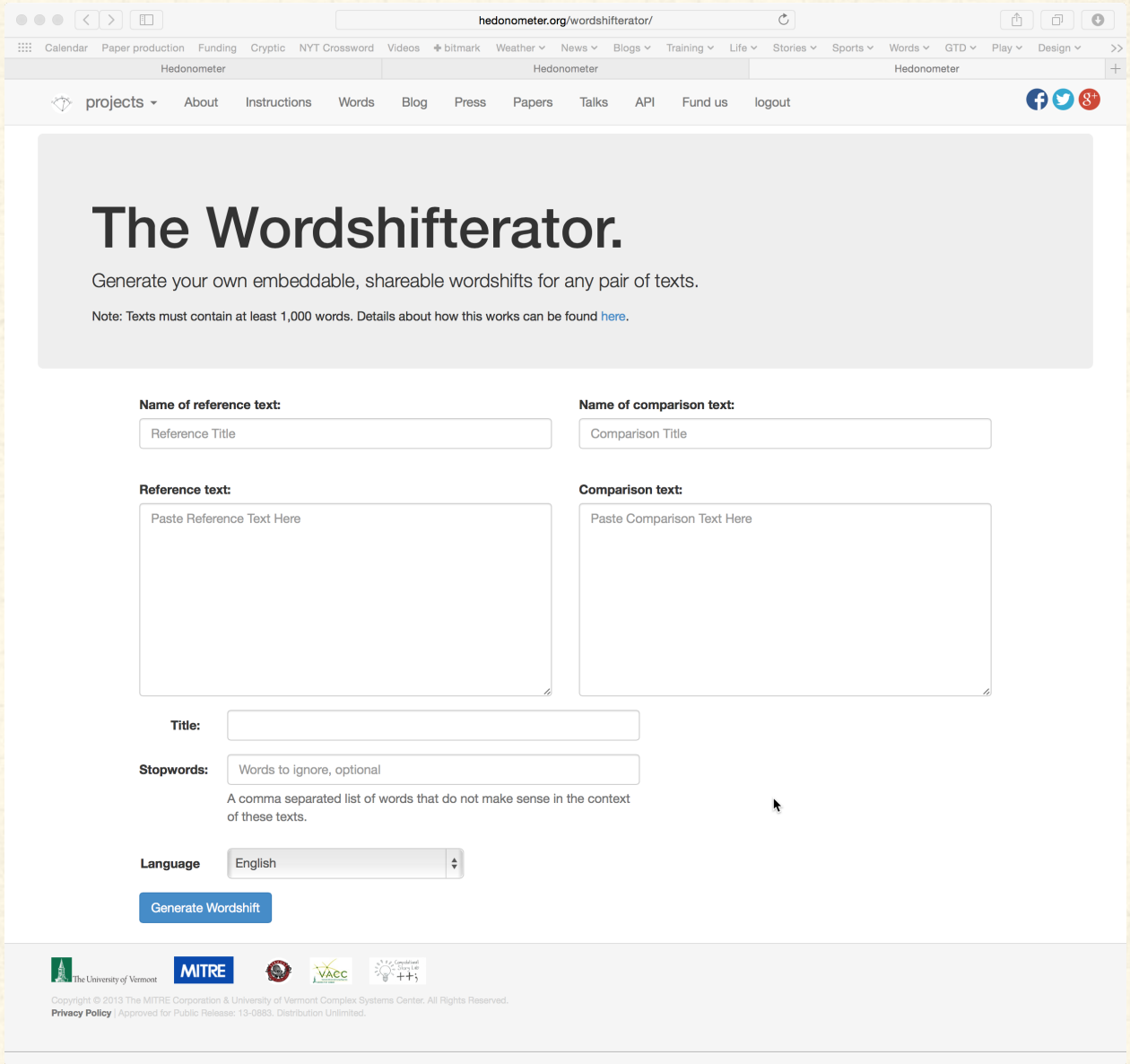
Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Make your own:





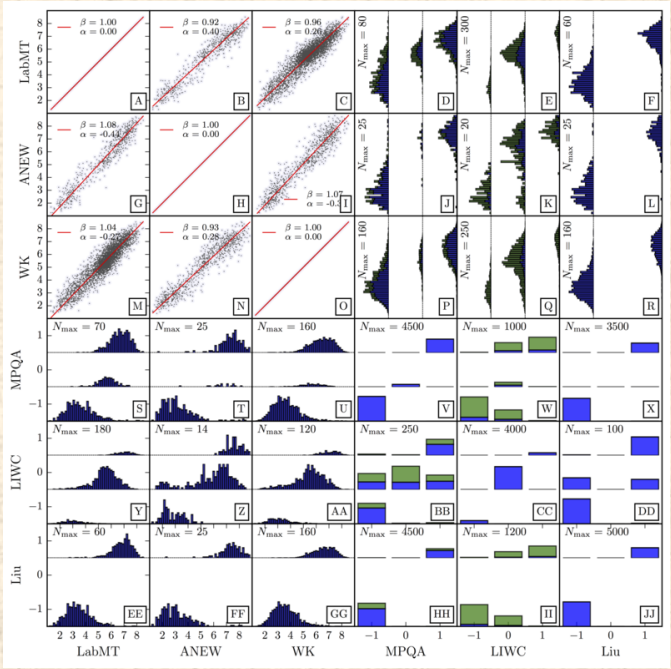

Introduction
Measurement
Happiness
- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

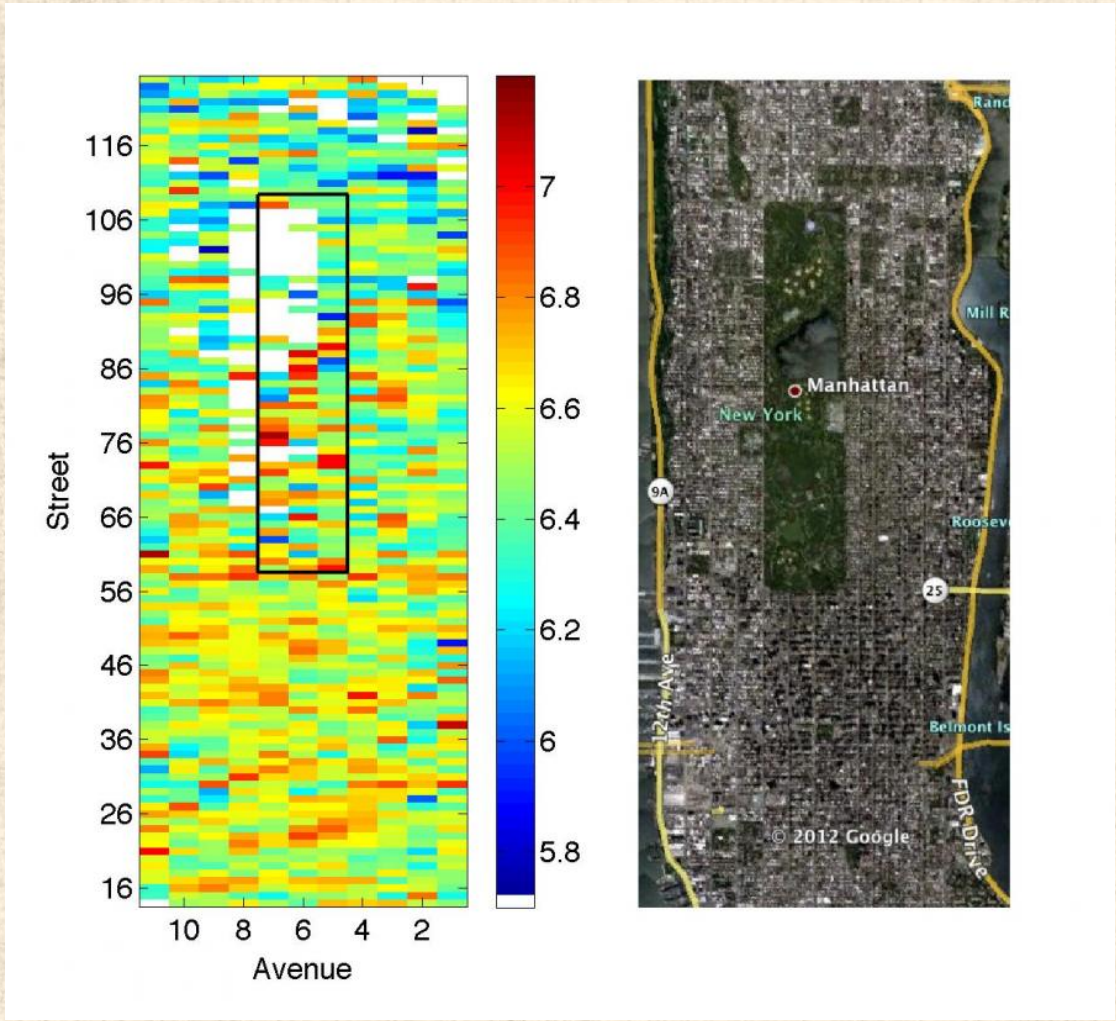
## "Sentiment analysis methods for understanding large-scale texts: A case for using continuum-scored words and word shift graphs"

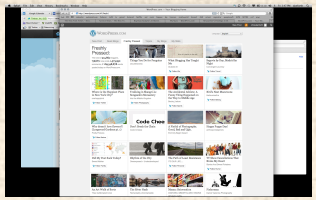
Reagan et al.,
EPJ Data Science, **6**, , 2017. [37]




Upshots: (1) do use wordshifts, and (2) do not use LIWC ...

# Happiness in Manhattan:



See Blog post on compstorylab.org


The PoCSverse
Finding Happiness
126 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

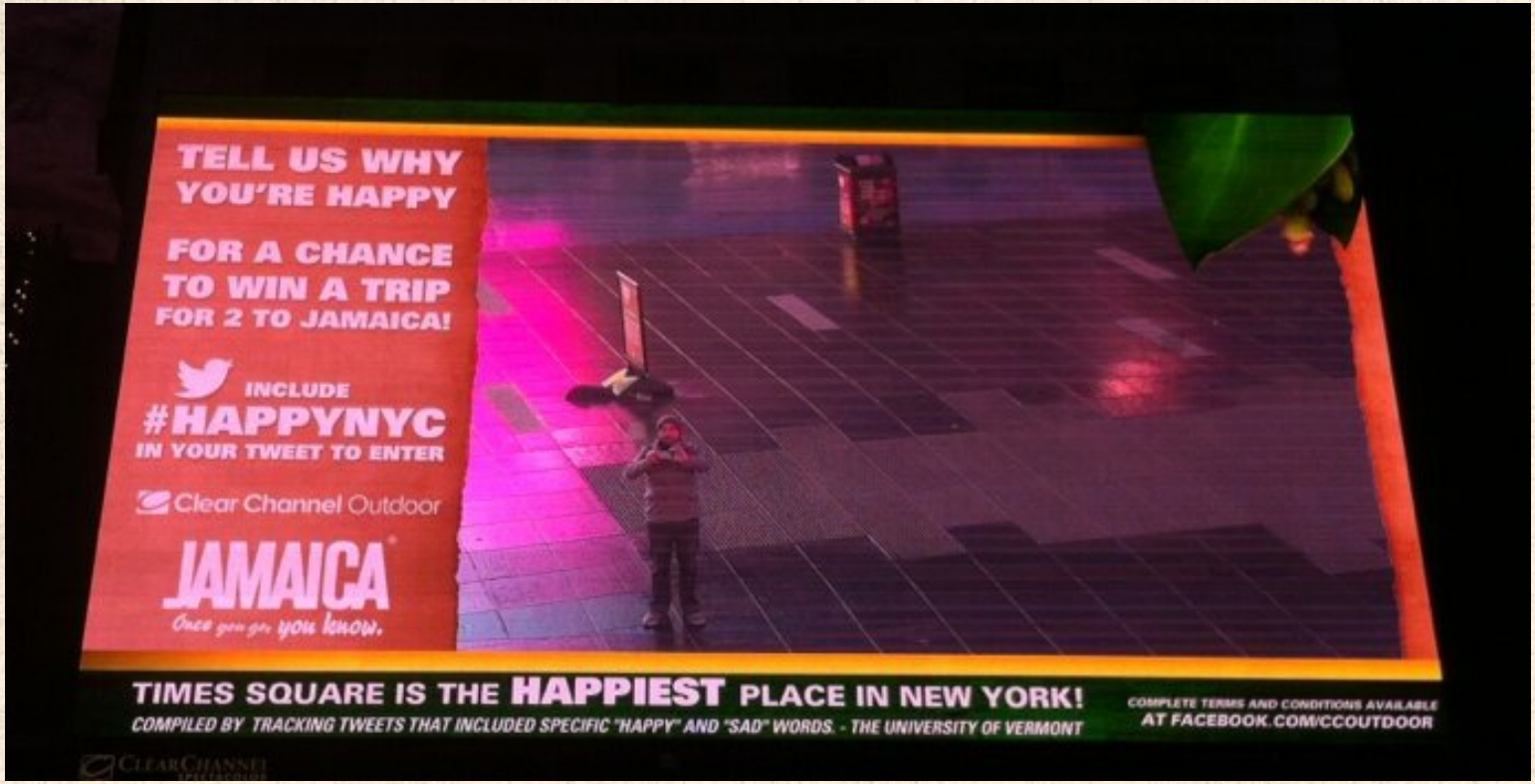
Introduction

Measurement

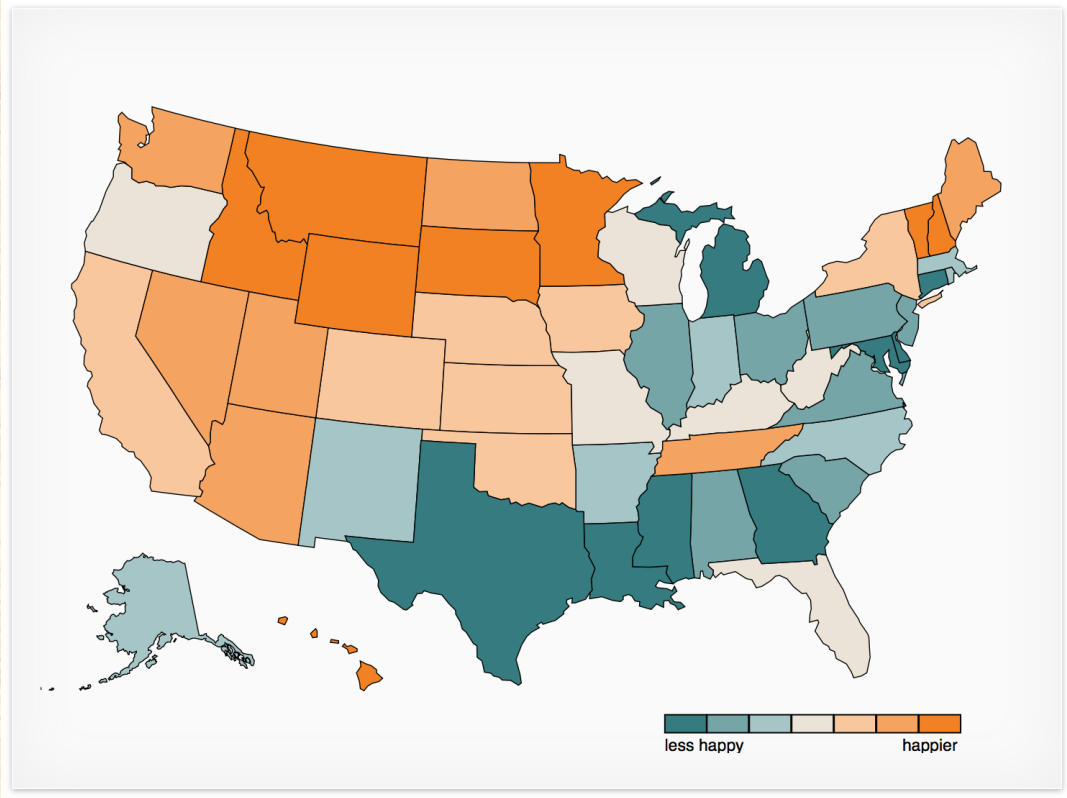
Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References



# The Geography of Happiness:

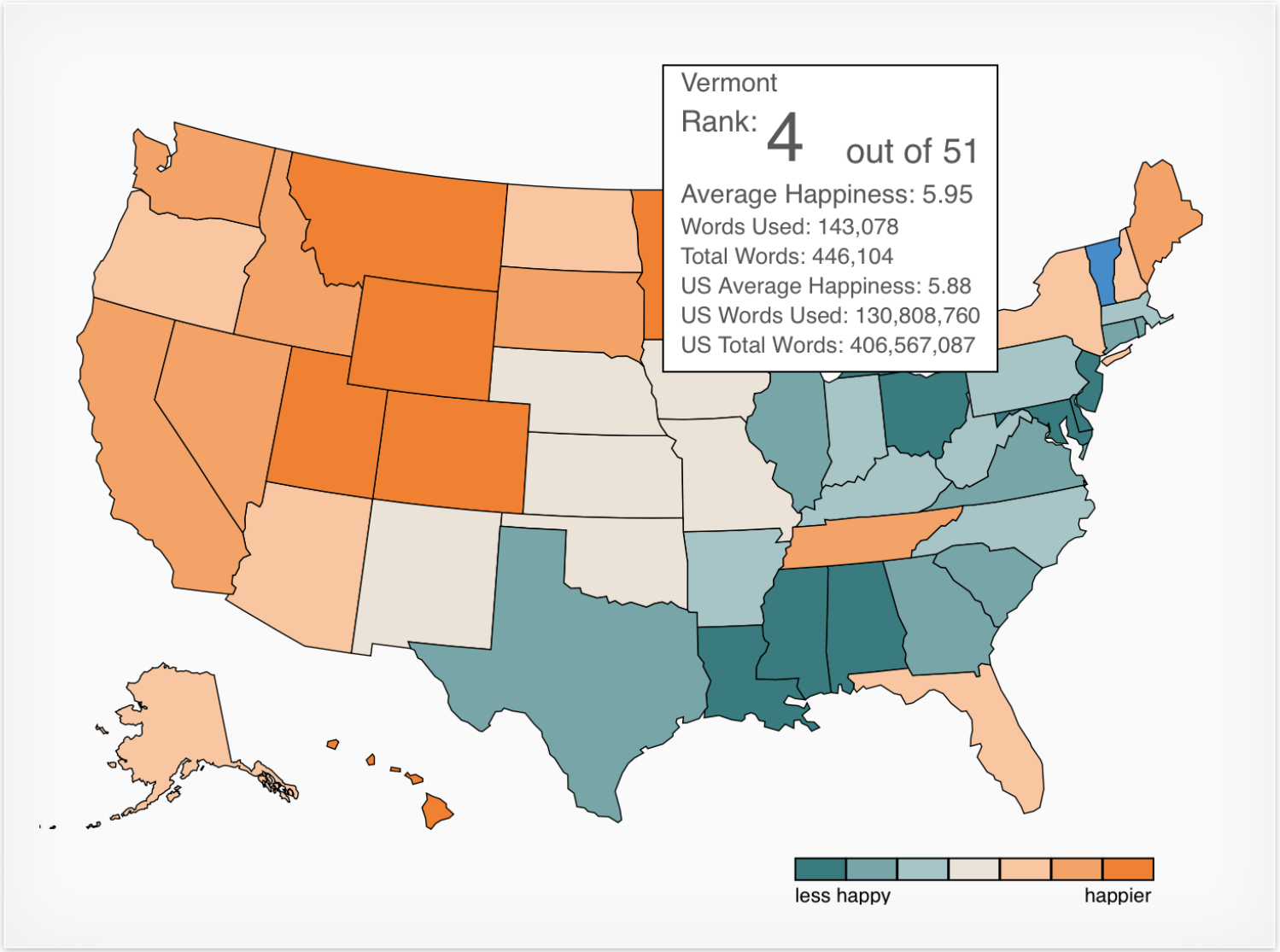



- Mitchell et al., PLoS ONE, 2013. [35]
- It's a paper that tweets: @geographyofhapp
- Online **App**endices
- Much interesting and amusing press ...
- Online, interactive US map at hedonometer.org

The PoCSverse
Finding Happiness
128 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Online, interactive US map at hedonometer.org

## Average Happiness of United States for 2013

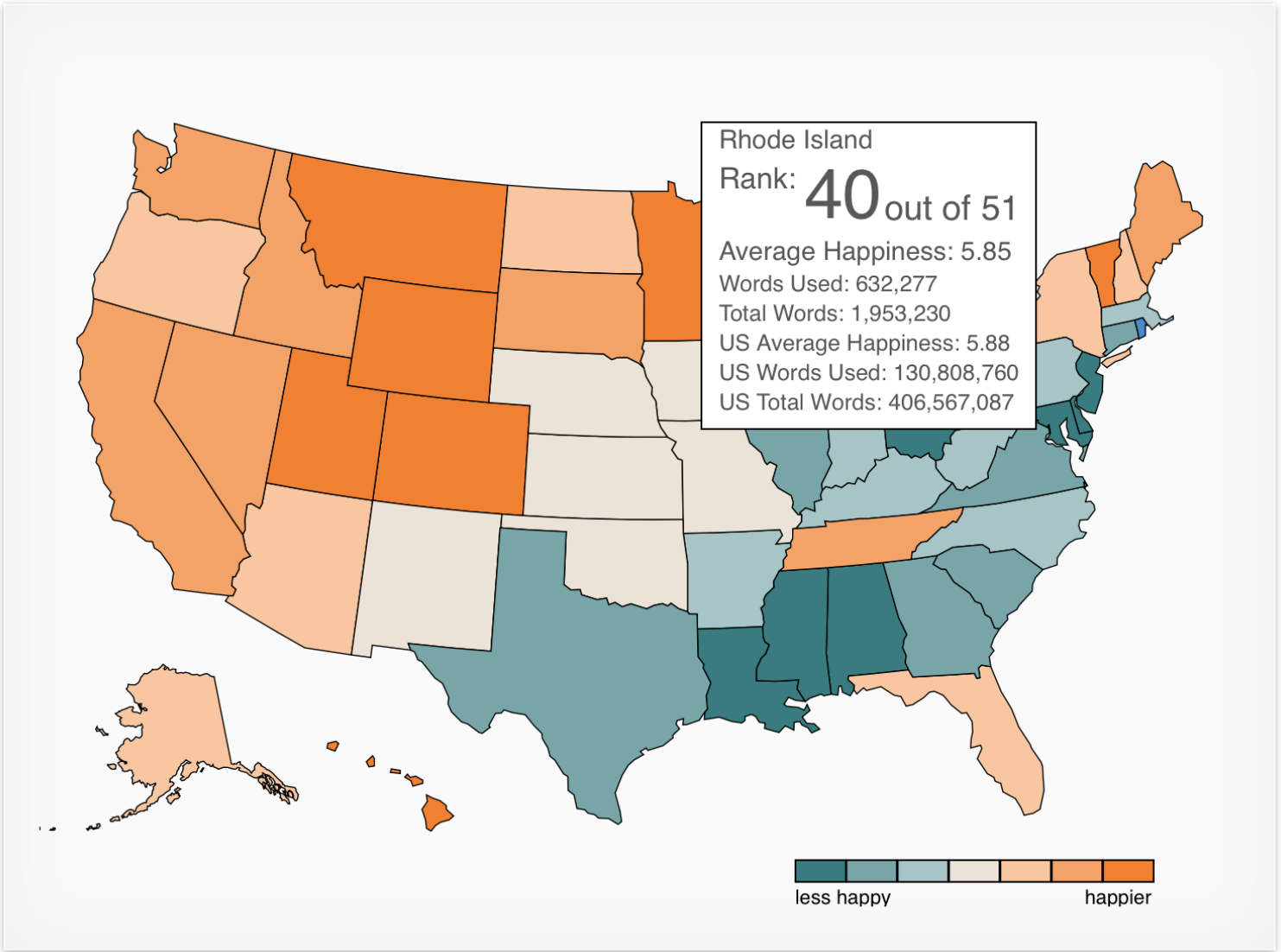




The PoCSverse
Finding Happiness
129 of 165
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Online, interactive US map at hedonometer.org

## Average Happiness of United States for 2013






Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

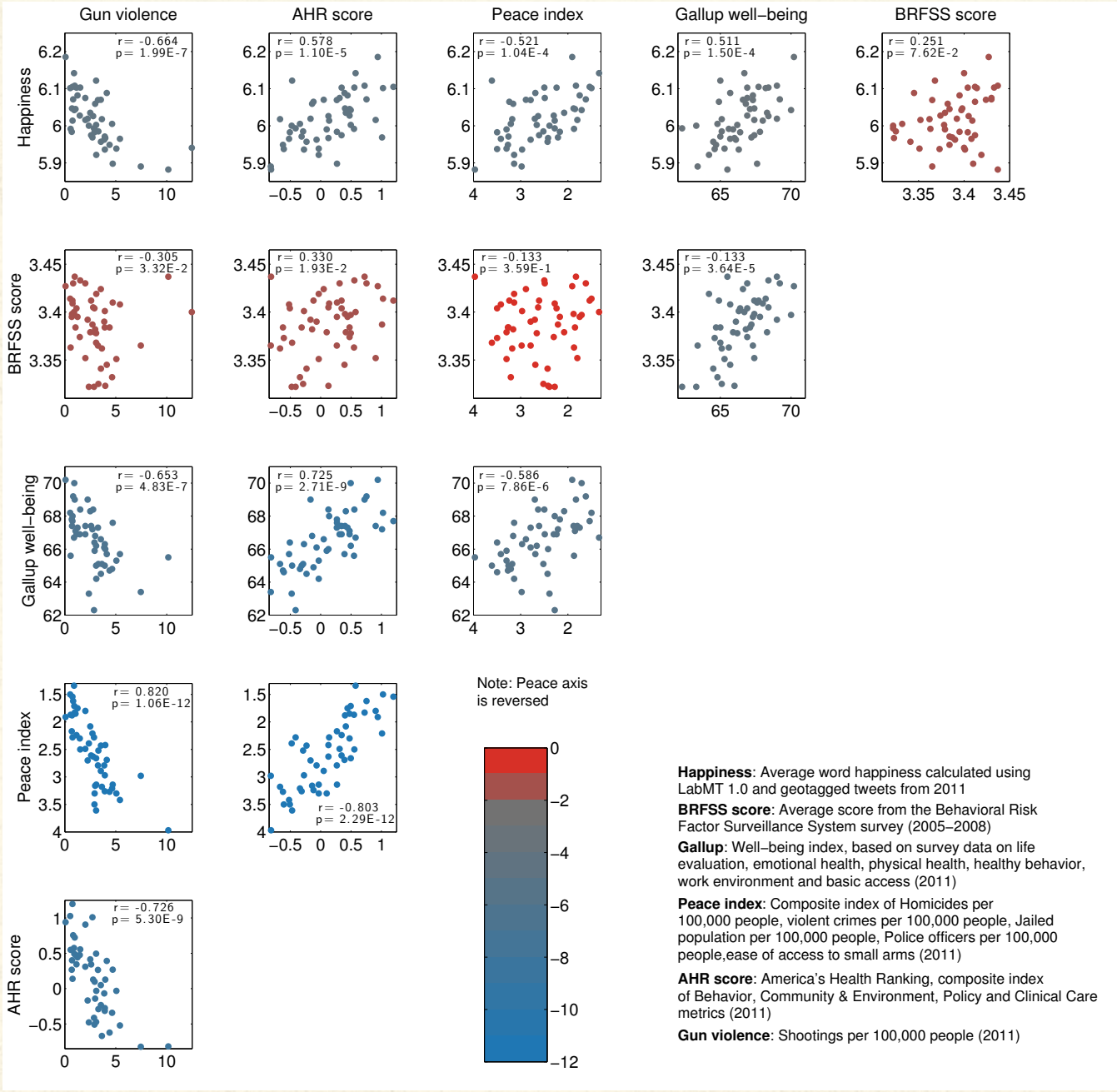


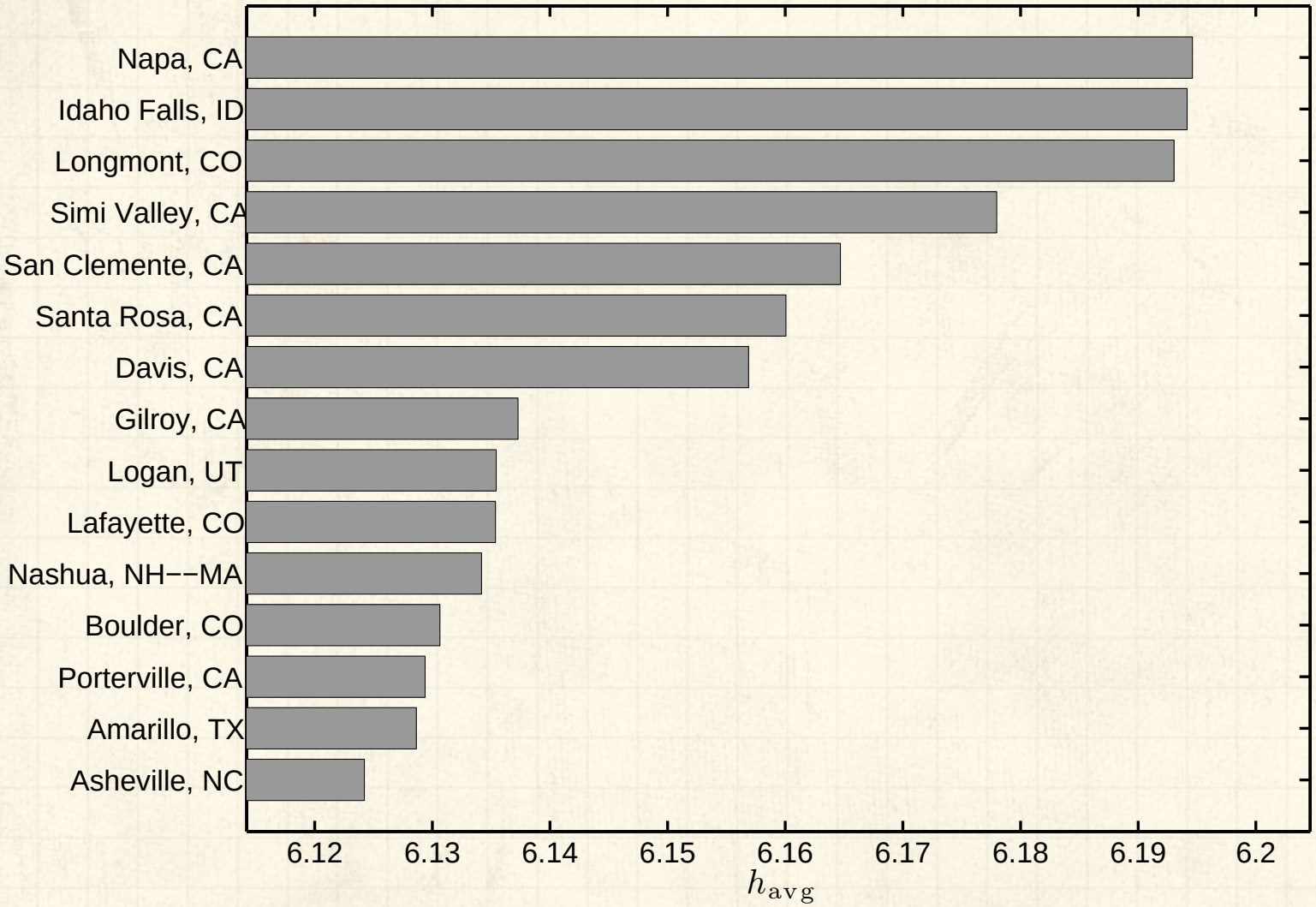

FIG. 2: Scatter plot matrix of correlations between different well-being measures. Points are colored by $p$-value, statistically insignificant correlations above $p = 0.01$ are shown in red. Spearman's $r$ and $p$-value are reported in the inset.



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

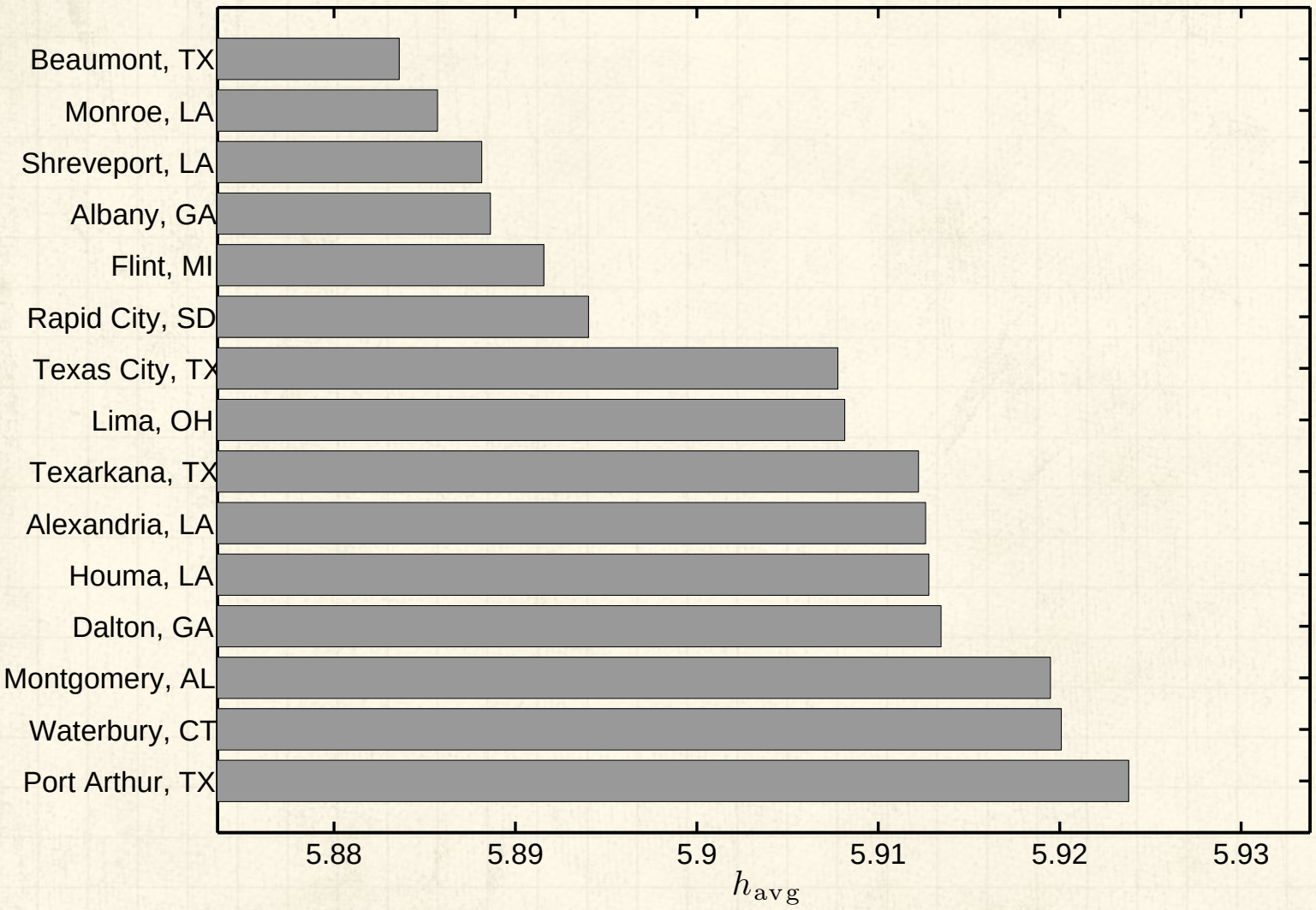
Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

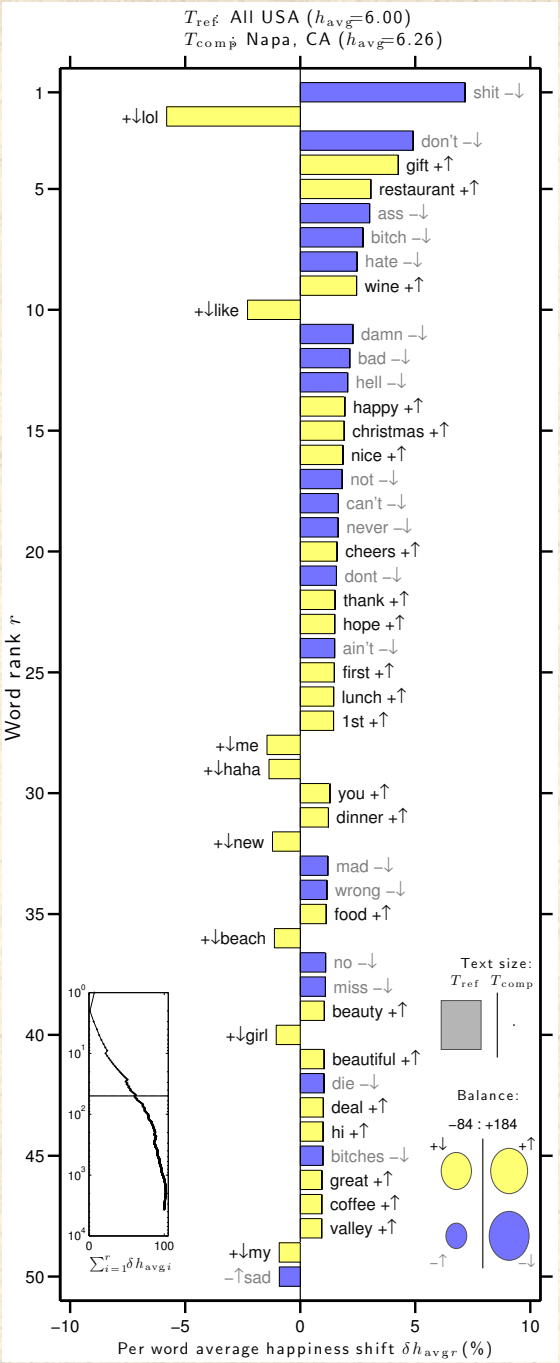
# Happiest Cities:



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# Saddest Cities (Sorry Beaumont):








Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# The Today Show

O

Al Roker, John Legend, Chrissie Teigan

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# Rhode Island

O

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## The Ellen DeGeneres Show

o

Ellen, married to Portia de Rossi—Lindsay Bluth—who was born in ... Horsham

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

**rednnneecckckkkkkkk**

2013/02/18 at 8:53 pm (Edit)

I've lived in quite a few places. The most recently Beaumont, TX. Its a pure hellhole. Hot, humid, trashy, terrible schools, corrupt government, lots of crime, no public parks or activities, terrible culture (other than crawfish boils), completely lacks diversity. This study confirms my suspicions that cities don't get any more miserable than this.

Reply

Blog post: Where is the happiest city in the US?

Introduction

Measurement

Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

ONE WAY
Beaumont
is
not
sad

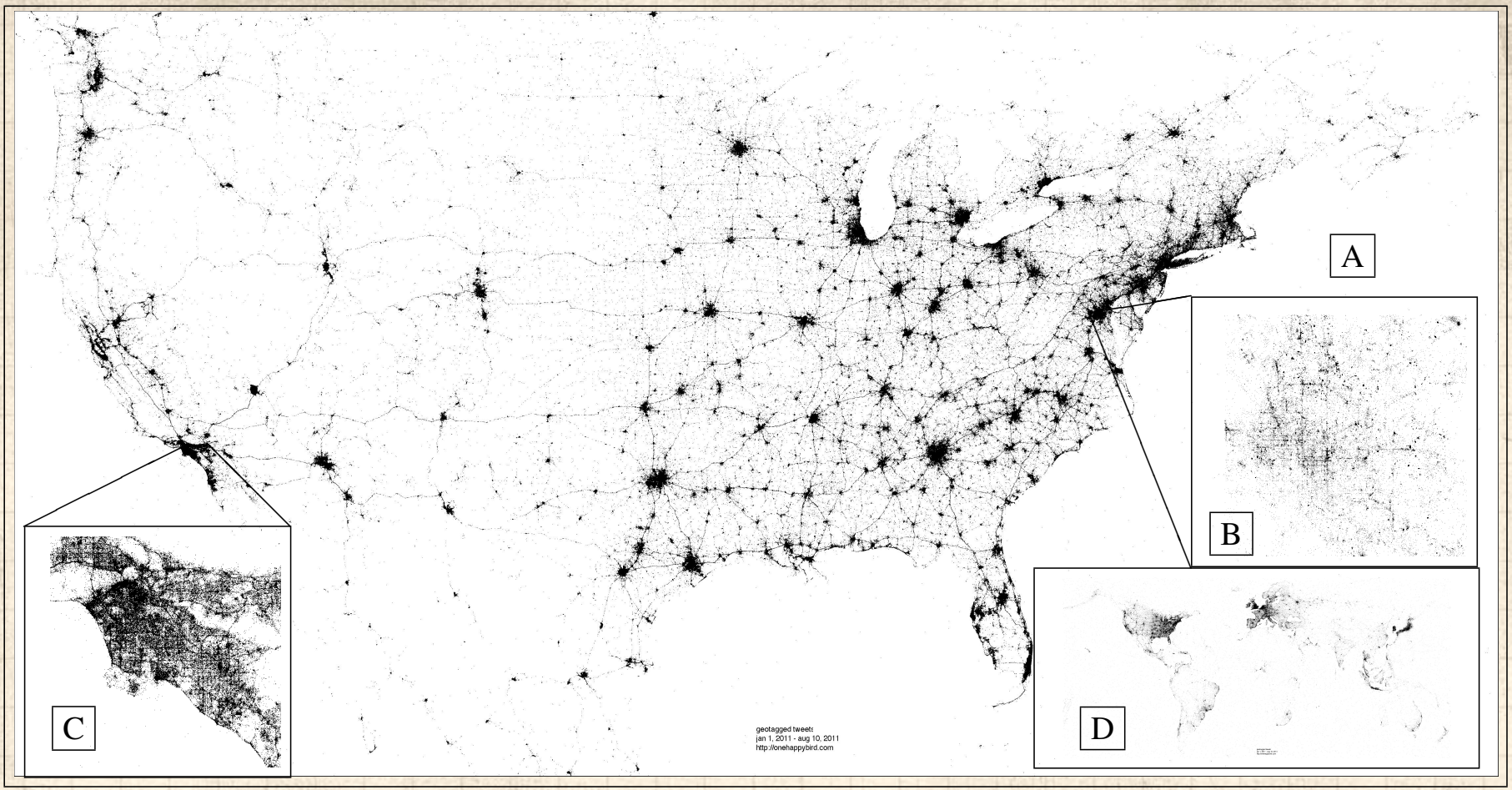
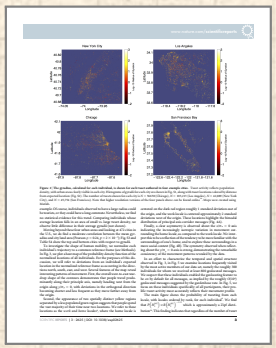



**Figure 1.** Each point corresponds to a geo-located tweet posted between 1/1/11 and 8/10/11. Twitter activity seems to correlate with urban areas. Note that the image contains no cartographic borders, simply a small dot for each message. Insets: **A** (U.S.), **B** (Washington, D.C.), **C** (Los Angeles, C.A.), and **D** (Earth).



"Happiness and the Patterns of Life: A Study of Geolocated Tweets"

Frank et al.,

Nature Scientific Reports, **3**, 2625, 2013. [16]

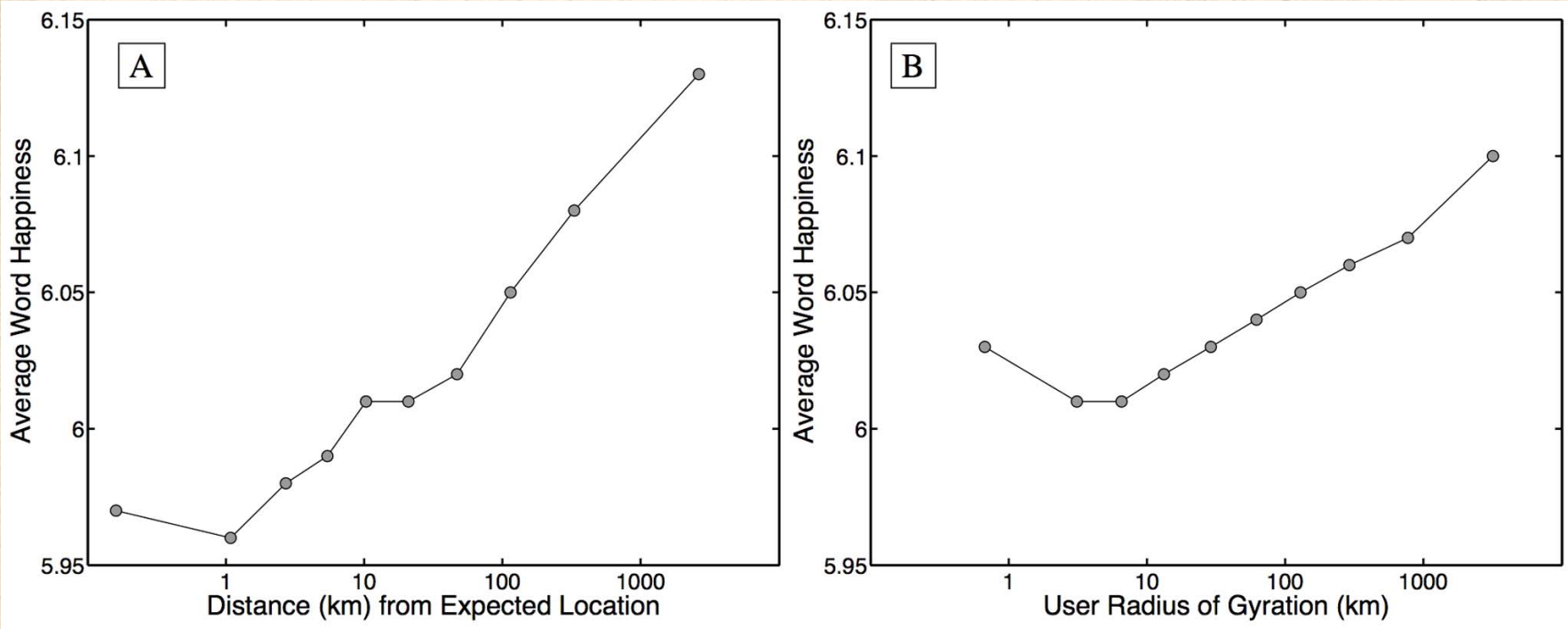
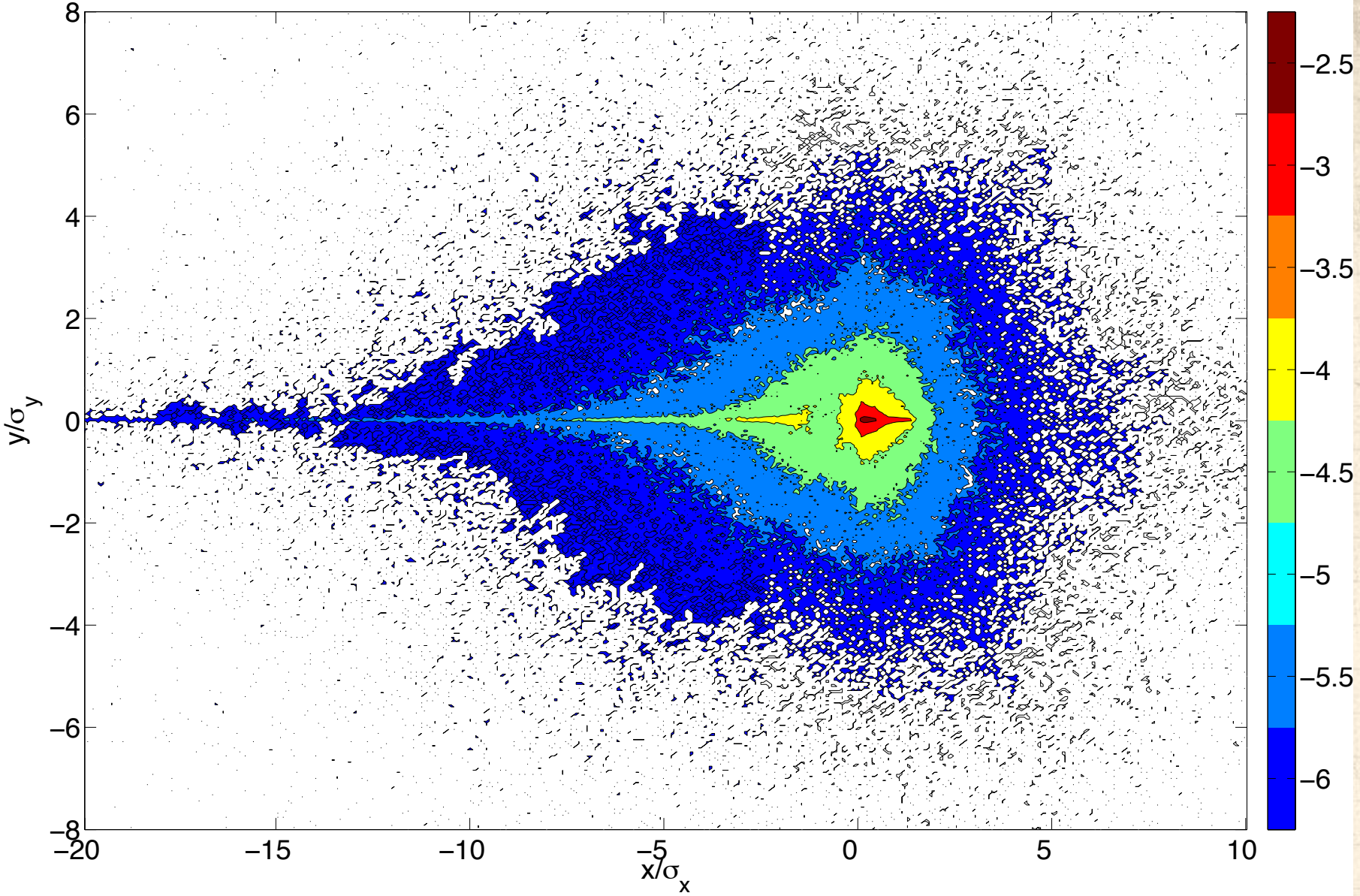



**Figure 6** | (A) Average happiness of words written as a function of distance from an author's expected location, with tweets grouped into ten equally populated bins. Expressed happiness grows logarithmically with distance distance from expected location. (B) A similar trend is observed when individuals are grouped into ten equally populated bins according to their gyradius. Both trends persist through variations in binning and different measures of mobility.

We grow fonder as we wander.




- Raw movement patterns agree with cell phone data findings. [18]
- For cell phone data: Time spent at locations decays as an

MR

Summarize the PNAS article entitled "Human language reveals a universal positivity bias" by Peter Sheridan Dodds, Eric M Clark, Suma Desu, Morgan R Frank, Andrew J Reagan, Jake Ryland Williams, Lewis Mitchell, Kameron Decker Harris, Isabel M Kloumann, James P Bagrow, Karine Megerdoomian, Matthew T McMahon, Brian F Tivnan, and Christopher M Danforth. Write the summary in a rhyming scheme like Dr. Seuss.

2 / 2 ›

This study looked at language, and what it can teach,
About how people express themselves when they speak.
The researchers analyzed words that were used,
To see if there was a bias, positive or abused.

And what they found was quite revealing,
A positivity bias, all people revealing.
From English to Chinese, to Spanish and more,
People speak positively, that's what the data bore.

Words like "love" and "happy" are used with more weight,
Than negative ones like "hate" that people debate.
This bias is universal, across all tongues,
A happy outlook, with few pessimistic lungs.

So next time you're talking, try to keep in mind,
That positive words can be quite a find.
They make people happier, and that's no fable,
As this study shows, with language on the table.

MR

Summarize the PLOS one publication entitles "The Geography of Happiness: Connecting Twitter Sentiment and Expression, Demographics, and Objective Characteristics of Place" by Lewis Mitchell, Morgan R. Frank, Kameron Decker Harris, Peter Sheridan Dodds, and Christopher M. Danforth using a rhyme scheme like Dr. Seuss

In this study of sentiment on Twitter,
The authors sought to see if they could deliver
A connection between happiness and place,
By analyzing tweets and what they could trace.

They found that location played a big part,
In the positivity of a Twitter art,
With income, education, and nature too,
All contributing to a happier view.

The words people used were also telling,
In happier places, there was more yelling,
About love and friends and other good things,
And fewer mentions of money or bling.

Overall, the study makes clear,
That social media data can help us steer,
Towards a better understanding of community well-being,
And how we can improve it, by seeing what we're feeling.

MR

Summarize the PLOS one publication entitles "The Geography of Happiness: Connecting Twitter Sentiment and Expression, Demographics, and Objective Characteristics of Place" by Lewis Mitchell, Morgan R. Frank, Kameron Decker Harris, Peter Sheridan Dodds, and Christopher M. Danforth. Write the summary as a sad poem in the style of Edgar Allen Poe.

Upon Twitter's vast and dreary plain,
A study sought to find what brings us pain,
By analyzing tweets from sea to sea,
To uncover what plagues our society.

"The Geography of Happiness" was its name,
A study in PLOS ONE that sought to claim,
That our well-being is tied to location,
And objective factors cause our damnation.

Income, education, and access to nature,
Were all factors that could shape our future,
And the sentiment expressed on Twitter,
Could reveal what makes us bitter.

In sad communities, words were often bleak,
Depression, suicide, and loneliness we'd seek,
But in happier places, joy was all around,
Hope, laughter, and love could be easily found.

So take heed, dear reader, and look around,
Your community's health may be easily found,
In the words that we tweet and the things that we say,
Our well-being is tied to our environment, come what may.

Introduction

Measurement

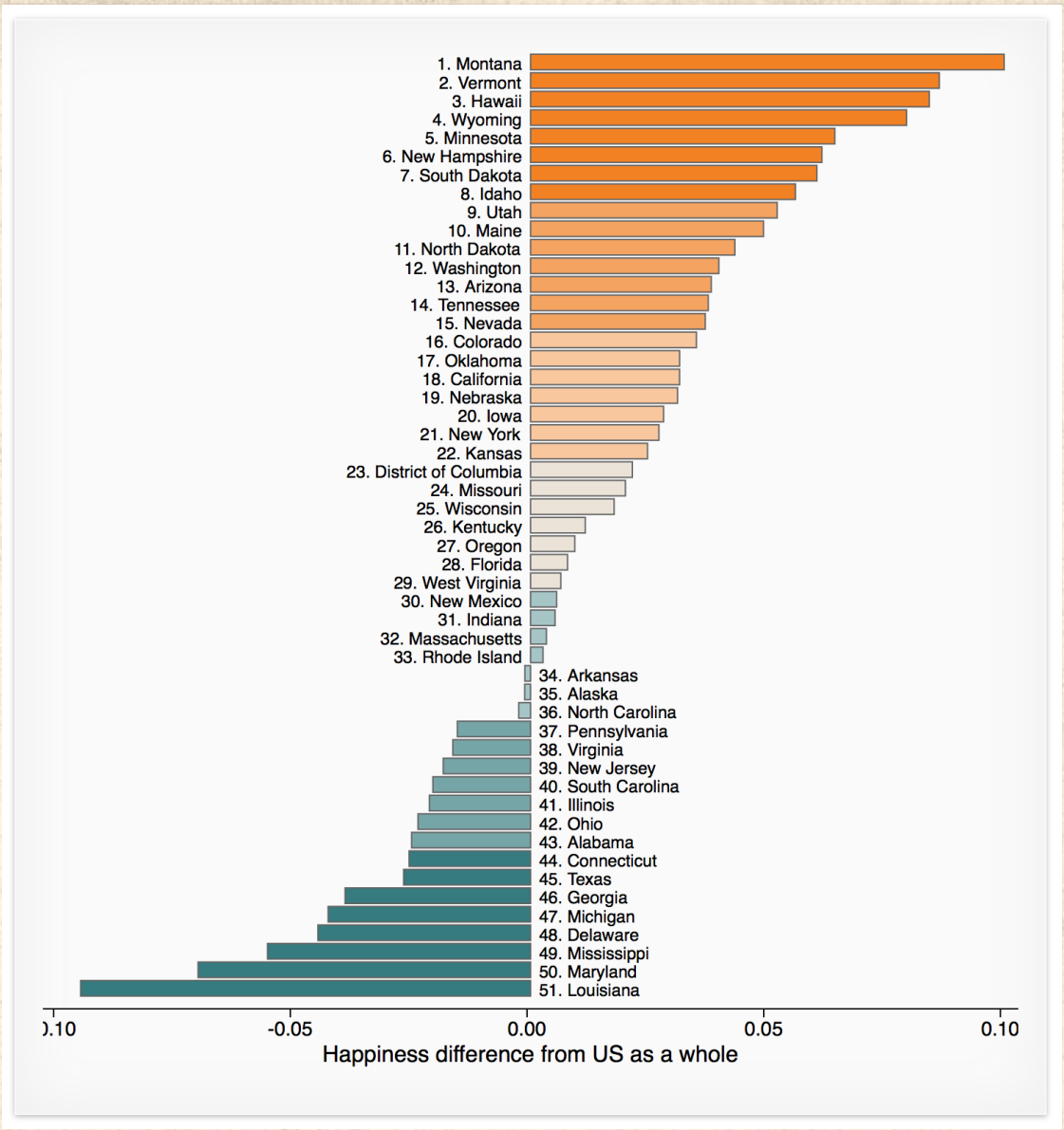
Happiness

- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

Quokka Labs

Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References



Developmental Sankey diagrams states and cities.

# Or here: Facebook Lexicon Sentiment Analysis (2008)

Introduction
Measurement
Happiness
- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

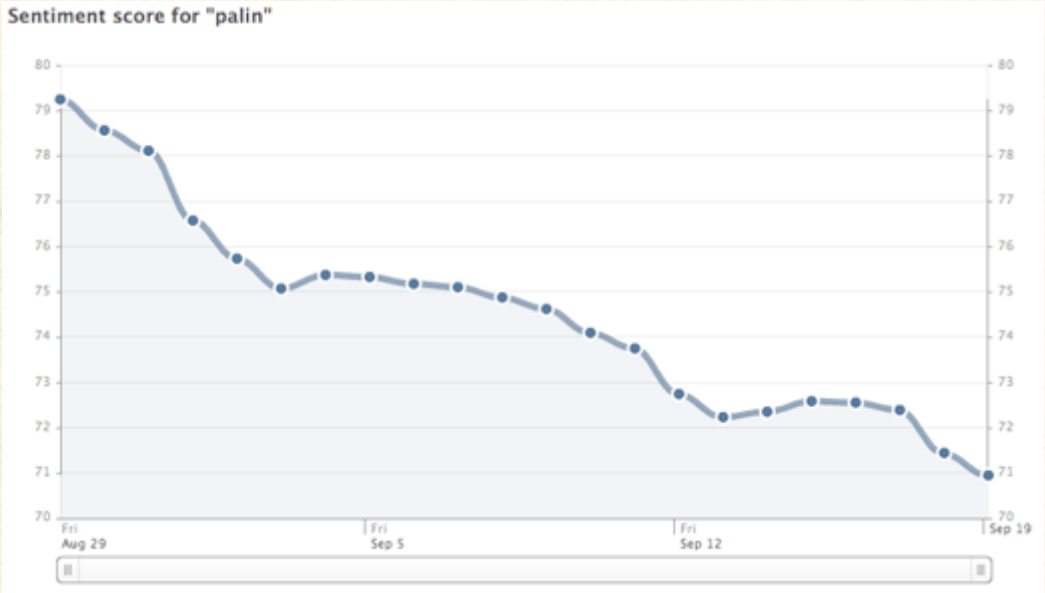
References

# Facebook Lexicon Sentiment Analysis



Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

## Binary decision on emotional content



- Limitation: Sentiments are classified as either positive or negative.
- 'I like Sarah Palin' given same score as 'Sarah Palin's voice fills me with unbridled joy!'

# References I


[1] C. A. Bliss, I. M. Kloumann, K. D. Harris, C. M. Danforth, and P. S. Dodds.
Twitter reciprocal reply networks exhibit assortativity with respect to happiness.
Journal of Computational Science, 3:388–397, 2012. pdf

[2] M. M. Bradley and P. J. Lang.
Affective norms for English words (ANEW): Stimuli, instruction manual and affective ratings.
Technical report c-1, University of Florida, Gainesville, FL, 1999.

[3] H. Chang.
Inventing temperature: Measurement and scientific progress.
Oxford University Press, 2004.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References II


[4] E. M. Cody, A. J. Reagan, P. S. Dodds, and C. M. Danforth.
Public opinion polling with Twitter, 2016.
Available online at https://arxiv.org/abs/1608.02024. pdf

[5] T. Conner Christensen, L. Feldman Barrett, E. Bliss-Moreau, K. Lebo, and C. Kaschub.
A practical guide to experience-sampling procedures.
Journal of Happiness Studies, 4:53–78, 2003.

[6] M. Csikszentmihalyi.
Flow.
Harper & Row, New York, 1990.

[7] M. Csikszentmihalyi, R. Larson, and S. Prescott.
The ecology of adolescent activity and experience.
Journal of Youth and Adolescence, 6:281–294, 1977.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References III


[8] E. Diener and M. Y. Chan.
Happy people live longer: Subjective well-being contributes to health and longevity.
Applied Psychology: Health and Well-Being, 3:1–43, 2011. pdf

[9] P. S. Dodds, T. Alshaabi, M. I. Fudolig, J. W. Zimmerman, J. Lovato, S. Beaulieu, J. R. Minot, M. V. Arnold, A. J. Reagan, and C. M. Danforth.
Ousiometrics and Telegnomics: The essence of meaning conforms to a two-dimensional powerful-weak and dangerous-safe framework with diverse corpora presenting a safety bias, 2021.
Available online at https://arxiv.org/abs/2110.06847. pdf

# References IV


[10] P. S. Dodds, E. M. Clark, S. Desu, M. R. Frank, A. J. Reagan, J. R. Williams, L. Mitchell, K. D. Harris, I. M. Kloumann, J. P. Bagrow, K. Megerdoomian, M. T. McMahon, B. F. Tivnan, and C. M. Danforth.
Human language reveals a universal positivity bias.
Proc. Natl. Acad. Sci., 112(8):2389–2394, 2015.
Available online at
http://www.pnas.org/content/112/8/2389.pdf

[11] P. S. Dodds and C. M. Danforth.
Measuring the happiness of large-scale written expression: Songs, blogs, and presidents.
Journal of Happiness Studies, 11(4):441–456, 2009. pdf





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References V


[12] P. S. Dodds and C. M. Danforth.
Measuring the happiness of large-scale written expression: songs, blogs, and presidents.
Journal of Happiness Studies, 2009.
doi:10.1007/s10902-009-9150-9. pdf

[13] P. S. Dodds, K. D. Harris, I. M. Kloumann, C. A. Bliss, and C. M. Danforth.
Temporal patterns of happiness and information in a global social network: Hedonometrics and Twitter.
PLoS ONE, 6:e26752, 2011. pdf

[14] R. A. Easterlin.
Income and happiness: towards a unified theory.
The Economic Journal, 111:465–484, 2001. pdf

# References VI


[15] R. A. Easterlin.
Explaining happiness.
Proc. Natl. Acad. Sci., 100:11176–11183, 2003. pdf

[16] M. R. Frank, L. Mitchell, P. S. Dodds, and C. M. Danforth.
Happiness and the patterns of life: A study of geolocated Tweets.
Nature Scientific Reports, 3:2625, 2013. pdf

[17] R. J. Gallagher, M. R. Frank, L. Mitchell, A. J. Schwartz, A. J. Reagan, C. M. Danforth, and P. S. Dodds.
Generalized word shift graphs: A method for visualizing and explaining pairwise comparisons between texts.
EPJ Data Science, 10:4, 2021.
Available online at https://arxiv.org/abs/2008.02250. pdf





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References VII


[18] M. C. González, C. A. Hidalgo, and A.-L. Barabási.
Understanding individual human mobility patterns.
Nature, 453:779–782, 2008. pdf

[19] T. J. Gray, C. M. Danforth, and P. S. Dodds.
Hahahahaha, Duuuuuude, Yeeessss!: A two-parameter characterization of stretchable words and the dynamics of mistypings and misspellings.
PLOS ONE, 15:e0232938, 2020.
Available online at https://arxiv.org/abs/1907.03920. pdf

[20] H. Gunaratana.
Mindfulness in Plain English.
Wisdom Publications, Somerville, Massachusetts, 1992.

[21] E. Hoffer.
The Passionate State of Mind: And Other Aphorisms.
Buccaneer Books, 1954.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References VIII


[22] A. R. Jensen.
Bias in mental testing.
ERIC, 1980.

[23] W. T. Jones.
The Classical Mind.
Harcourt, Brace, Jovanovich, New York, 1970.

[24] D. Kahneman, A. B. Krueger, D. A. Schkade, N. Schwarz, and A. A. Stone.
A survey method for characterizing daily life experience: The day reconstruction method.
Science, 306(5702):1776–1780, 2004. pdf





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References IX


[25] K. Kennedy Townsend.
The Pursuit of Happiness: What the Founders meant—And didn't.
The Atlantic, 2011.
http://www.theatlantic.com/business/archive/2011/06/the-pursuit-of-happiness-what-the-founders-meant-and-didnt/240708/.

[26] K. Kennedy Townsend.
What makes life worthwhile? GDP won't tell you.
The Atlantic, 2011.
http://www.theatlantic.com/business/archive/2011/06/what-makes-life-worthwhile-gdp-wont-tell-you/240343/.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References X


[27] M. A. Killingsworth and D. T. Gilbert.
A wondering mind is an unhappy mind.
Science, 330:932, 2010. pdf

[28] I. M. Kloumann, C. M. Danforth, K. D. Harris, C. A. Bliss, and P. S. Dodds.
Positivity of the English language.
PLoS ONE, 7:e29484, 2012. pdf

[29] R. Layard.
Happiness.
The Penguin Press, London, 2005.

[30] S. Lyubomirsky.
The How of Happiness.
The Penguin Press, New York, 2007.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References XI


[31] C. Martinelli and S. W. Parker.
Deception and misreporting in a social program.
forthcoming in Journal of the European Economic Association, 2007. pdf

[32] S. McCloud.
Making Comics.
William Morrow, 2006.

[33] A. Mehrabian and J. A. Russell.
An Approach to Environmental Psychology.
MIT Press, 1974.

[34] G. Miller.
Social Scientists wade into the Tweet stream.
Science, 333:1814–1815, 2011. pdf





Introduction
Measurement
Happiness
- Some motivation
- Measuring emotional content
- Hedonometer
- Analysis
- Songs
- Blogs
- SOTU
- A Better Lexical Lens
- Geography
- Movement
- Extras

References

# References XII


[35] L. Mitchell, M. R. Frank, K. D. Harris, P. S. Dodds, and C. M. Danforth.
The geography of happiness: Connecting Twitter sentiment and expression, demographics, and objective characteristics of place.
PLoS ONE, 8:e64417, 2013. pdf

[36] C. Osgood, G. Suci, and P. Tannenbaum.
The Measurement of Meaning.
University of Illinois, Urbana, IL, 1957.

[37] A. J. Reagan, B. F. Tivnan, J. R. Williams, C. M. Danforth, and P. S. Dodds.
Sentiment analysis methods for understanding large-scale texts: A case for using continuum-scored words and word shift graphs.
EPJ Data Science, 6, 2017. pdf





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References

# References XIII


[38] E. Sandhaus.
The New York Times Annotated Corpus.
Linguistic Data Consortium, Philadelphia, 2008.
Available online at: https://doi.org/10.35111/77ba-9x74.

[39] D. Sobel.
Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time.
Bloomsbury Publishing, US, 2007.





Introduction
Measurement
Happiness
Some motivation
Measuring emotional content
Hedonometer
Analysis
Songs
Blogs
SOTU
A Better Lexical Lens
Geography
Movement
Extras
References