Finding Happiness

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Principles of Complex Systems, Vols. 1, 2, & 3D
CSYS/MATH 300, 303, & 394, 2022–2023| @pocsvox

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Santa Fe Institute | University of Vermont

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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]

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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

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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

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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 is here.

This is a Collateralized Debt Obligation:

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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:

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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."

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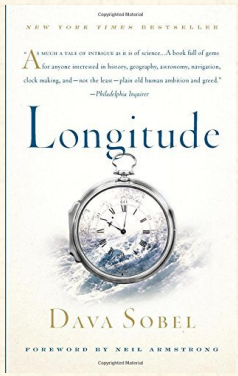
A brief history of measuring time:

- 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)

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]

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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]

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What matters and what's measurable:

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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:

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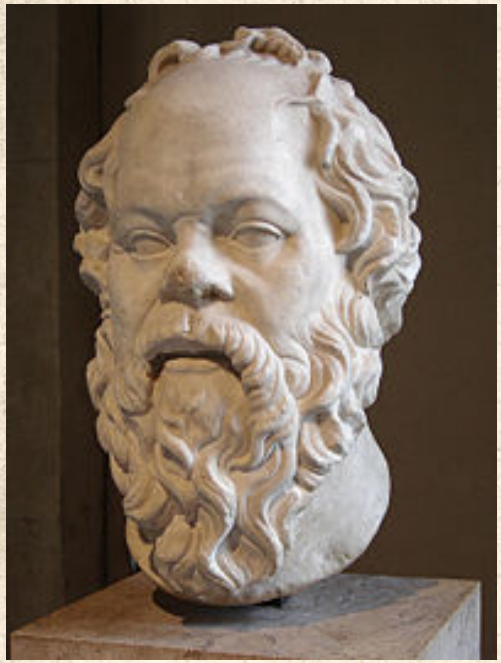

Socrates et al.:
eudaimonia [23]

Bentham:
hedonistic calculus

Jefferson:
...the pursuit of happiness

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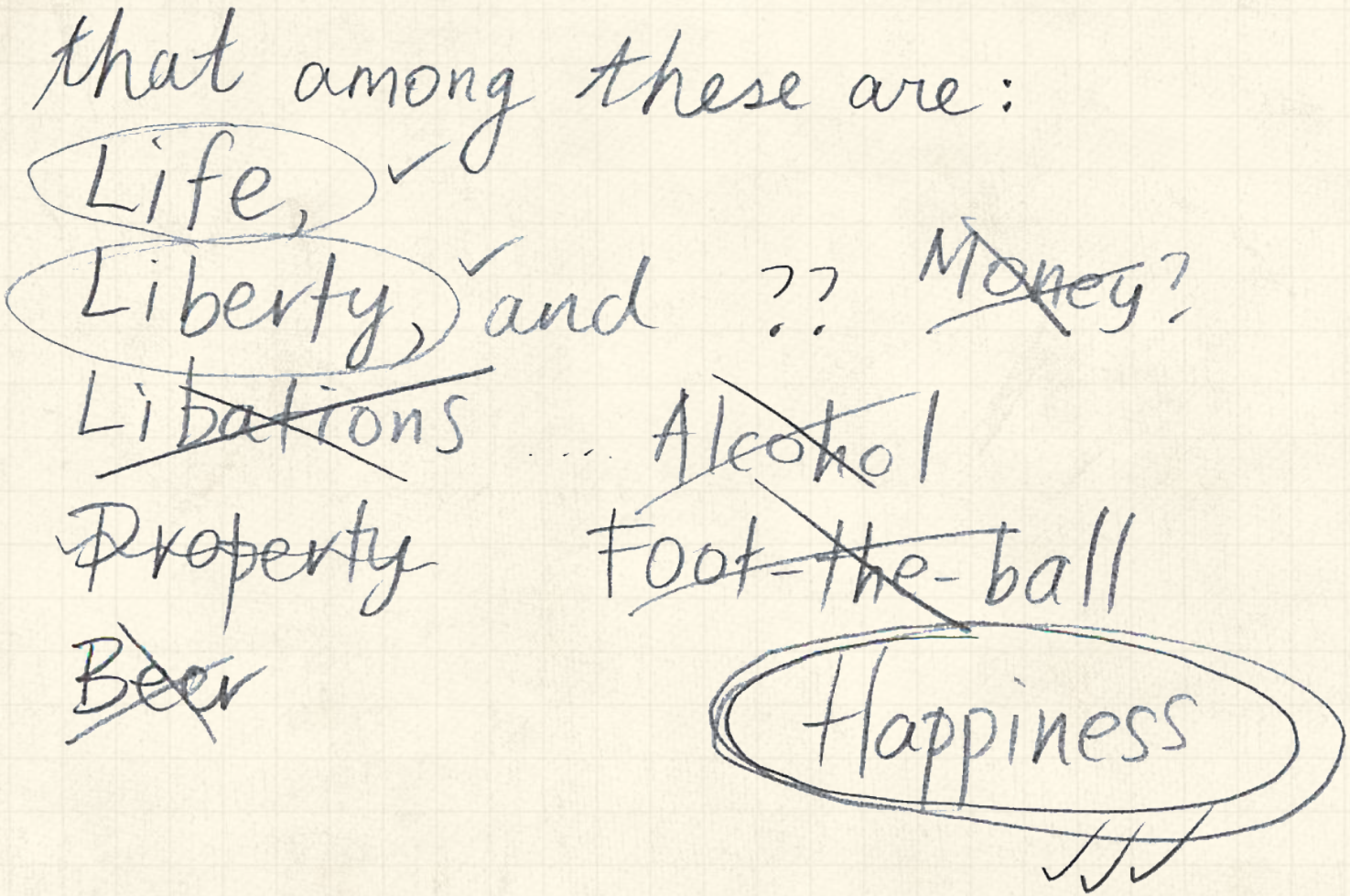
Early drafts:



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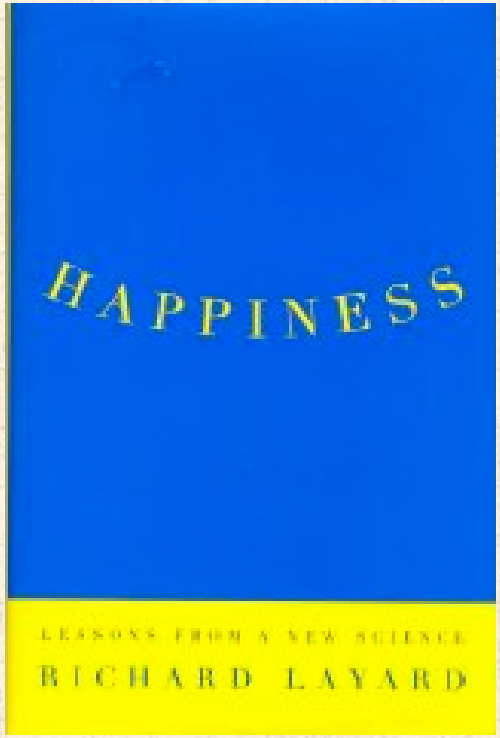
Even the odd modern economist is happy:

"Happiness" by Richard Layard [29]



[amazon]

What makes us happy?—Layard's summary:

Dominant factors:

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

Unimportant factors:

- Age
- Gender
- Education
- Inherent intelligence
- Looks

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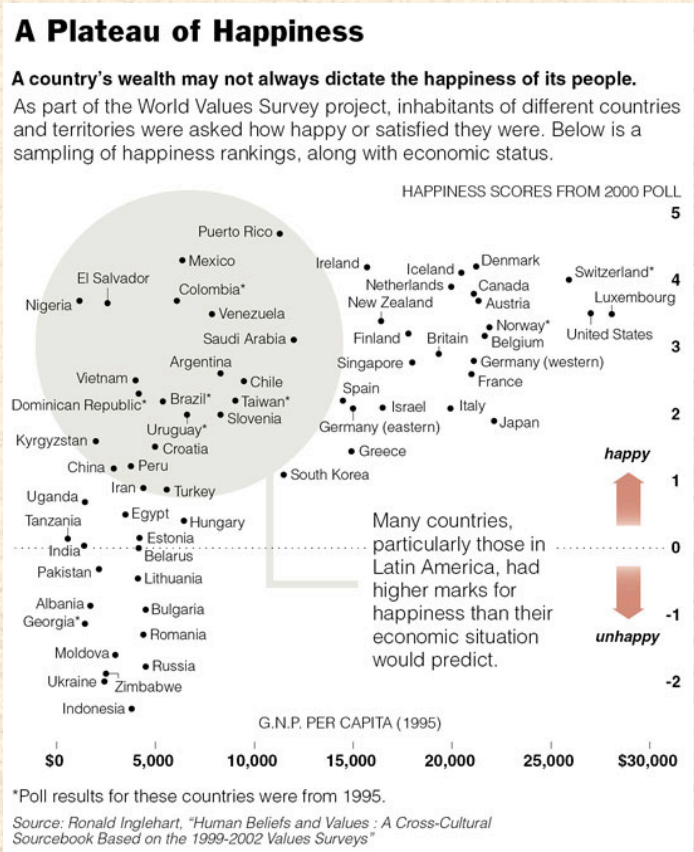
Desiring happiness—not just for boffins:

- 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

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Some easy knocks:

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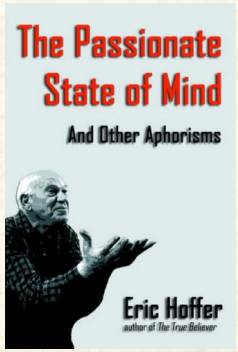

"The Passionate State of Mind: And Other Aphorisms" by Eric Hoffer (1954). [21]

"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 here (2014/02/03)

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30 Rock, S7E8:

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.

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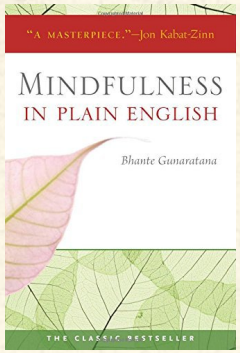
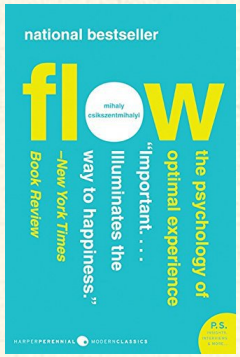
Meaning rather than happiness:



"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

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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:

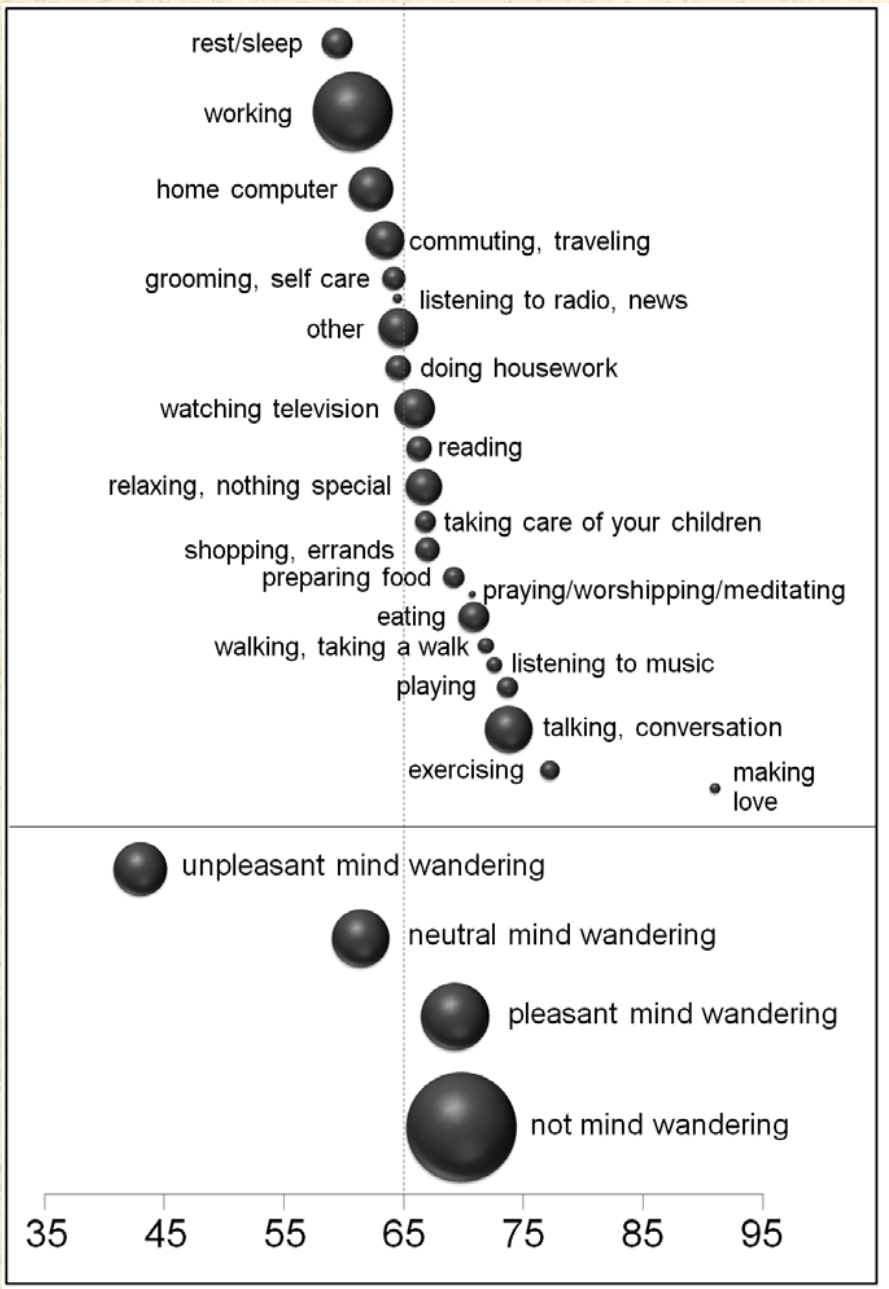

Fig. 1. Mean happiness reported during each activity (**top**) and while mind wandering to unpleasant topics, neutral topics, pleasant topics or not mind wandering (**bottom**). Dashed line indicates mean of happiness across all samples. Bubble area indicates the frequency of occurrence. The largest 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]

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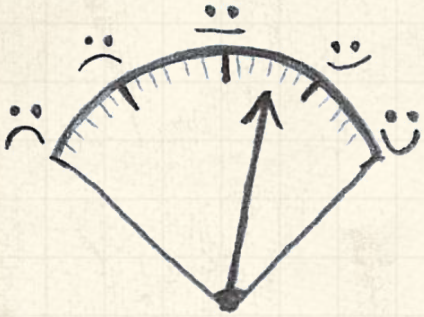
We'd like to build an 'hedonometer':

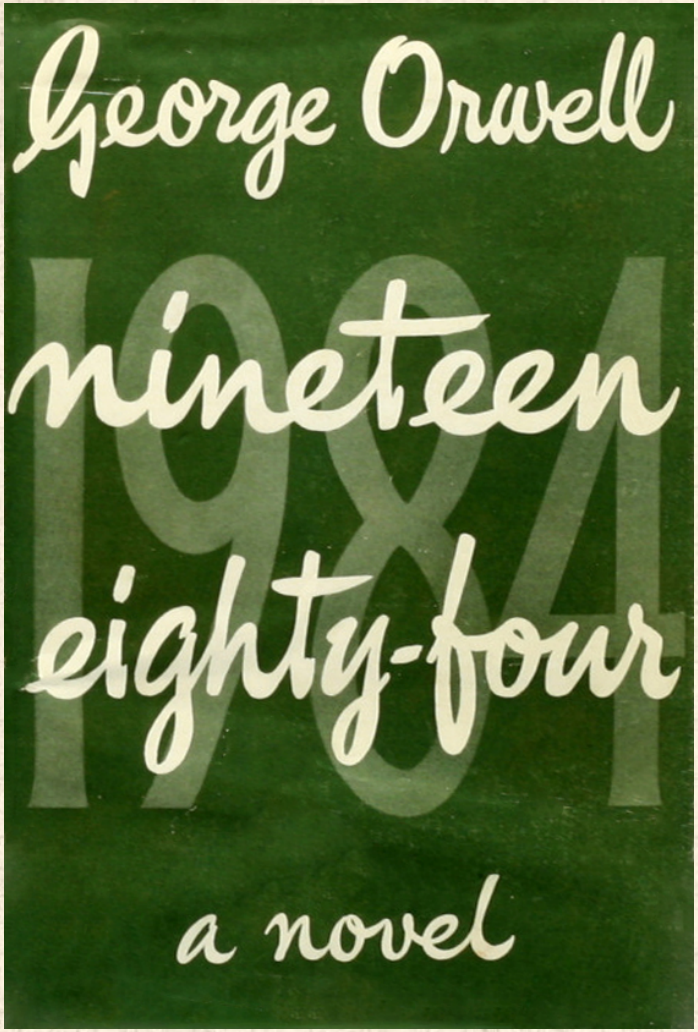


- An instrument to 'remotely-sense' emotional states and levels, in real time or post hoc.

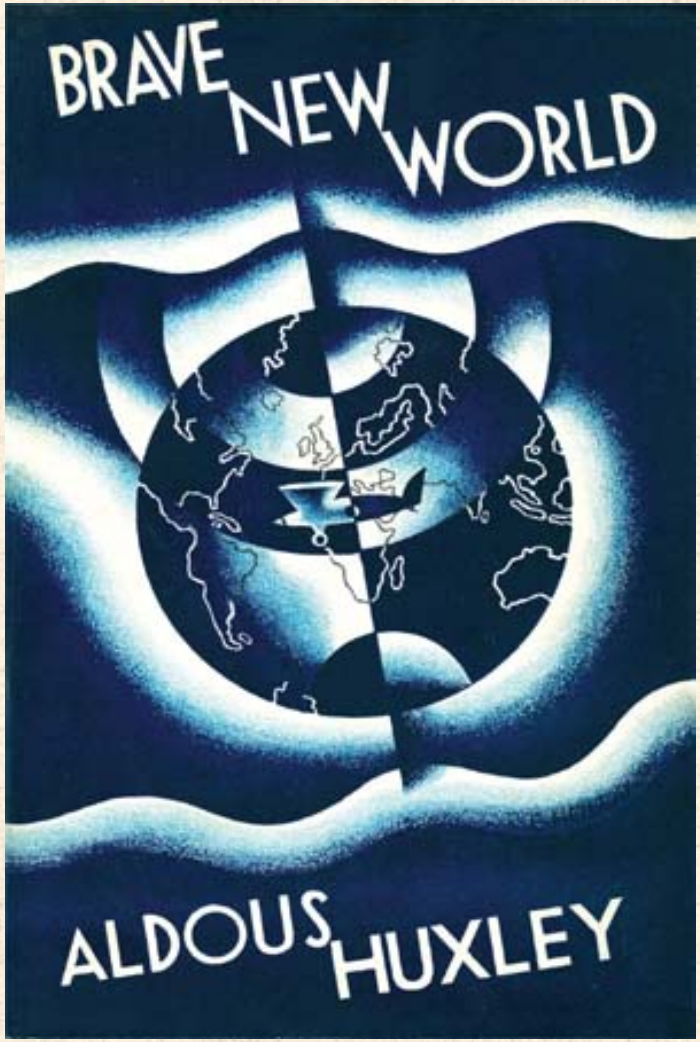
Ideally:

- 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



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Or here: Facebook Lexicon Sentiment Analysis (2008)

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Facebook Lexicon Sentiment Analysis

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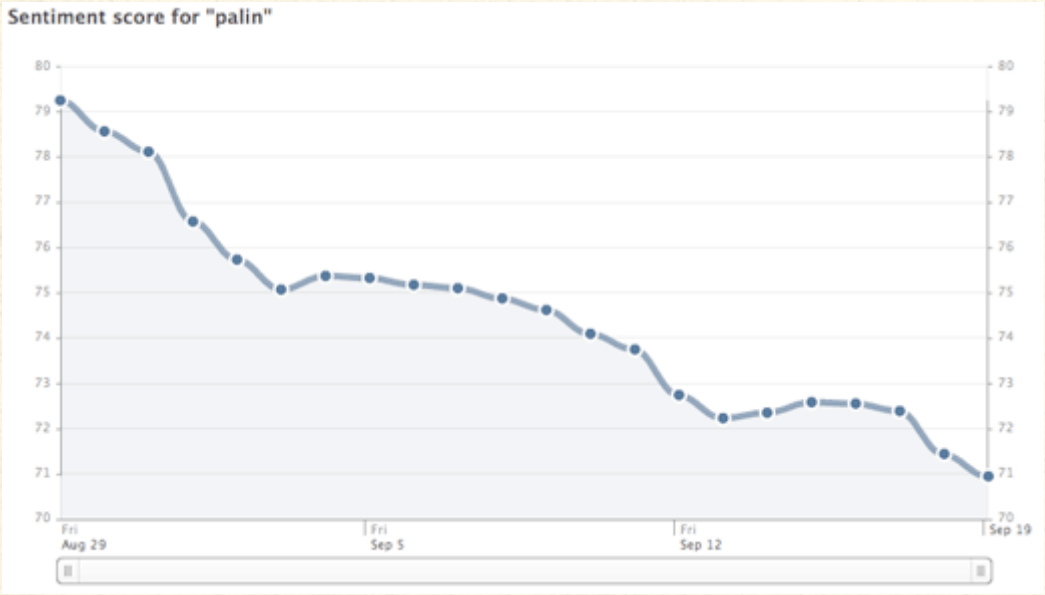
Binary decision on emotional content



- 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!'

Ousiometrics before we called it that:

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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 $\leftrightarrow$ good
  - Arousal: passive $\leftrightarrow$ active
  - Dominance: weak $\leftrightarrow$ strong
  -
- VAD became more commonly used framework.
- 'VAD $\equiv$ EAP' (more later).

ANEW study

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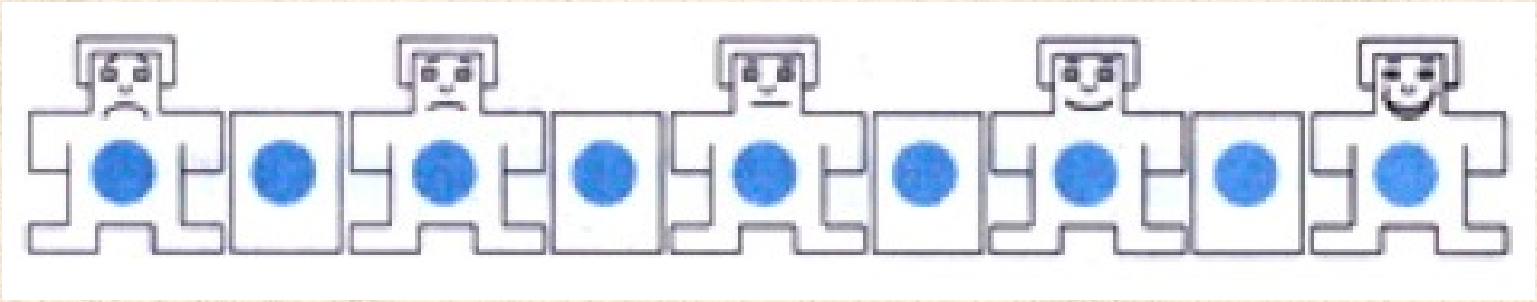
- ANEW = “Affective Norms for English Words”

- Study: participants shown lists of isolated words
- Asked to grade each word’s valence, arousal, and dominance level
- Integer scale of 1–9

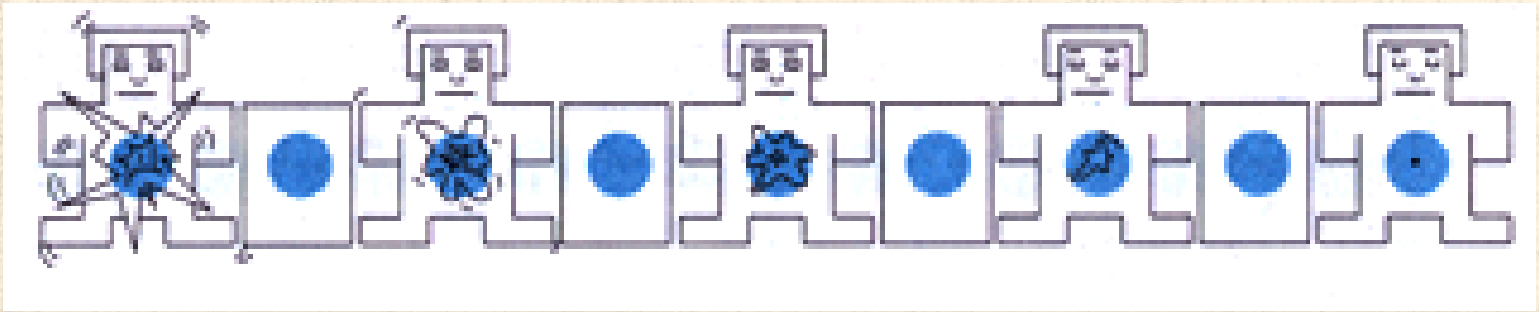
- $N = 1034$ words—previously identified as bearing emotional weight
- Participants = College students (*cough*)
- Results published by Bradley and Lang (1999) [2]

1999 ANEW study—three 1–9 scales: [2]

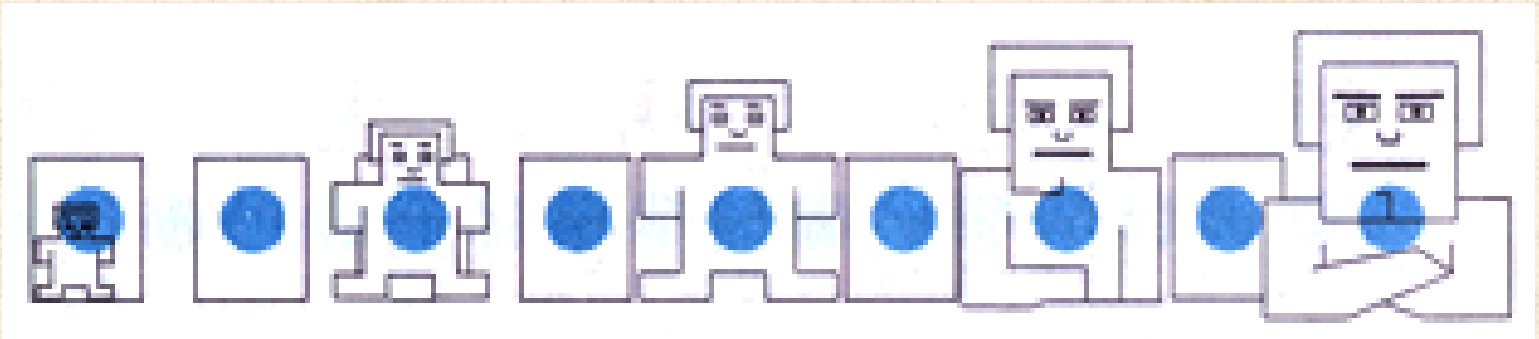
valence:



arousal:



dominance:



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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."

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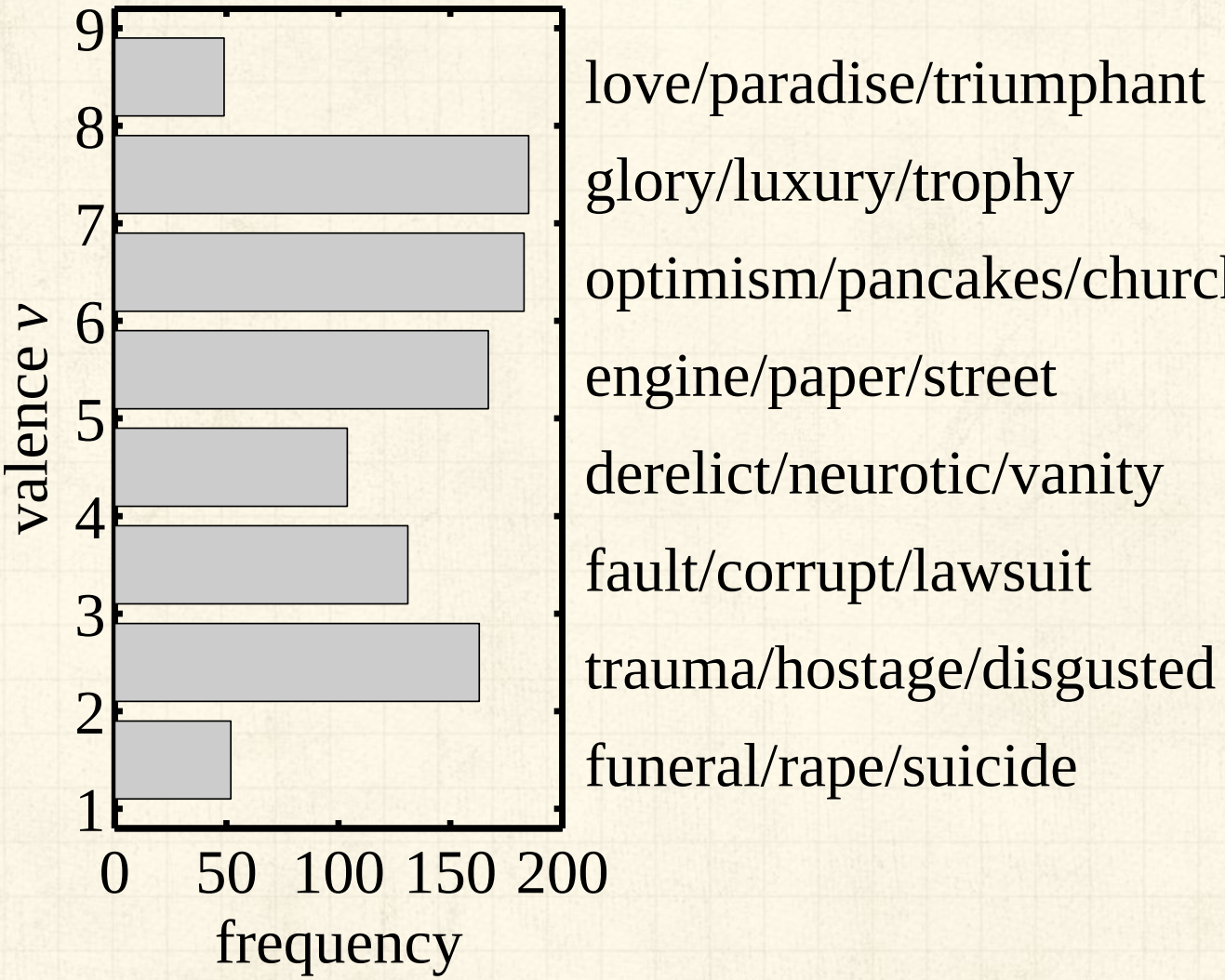
ANEW study words—examples



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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 θ 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

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

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

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

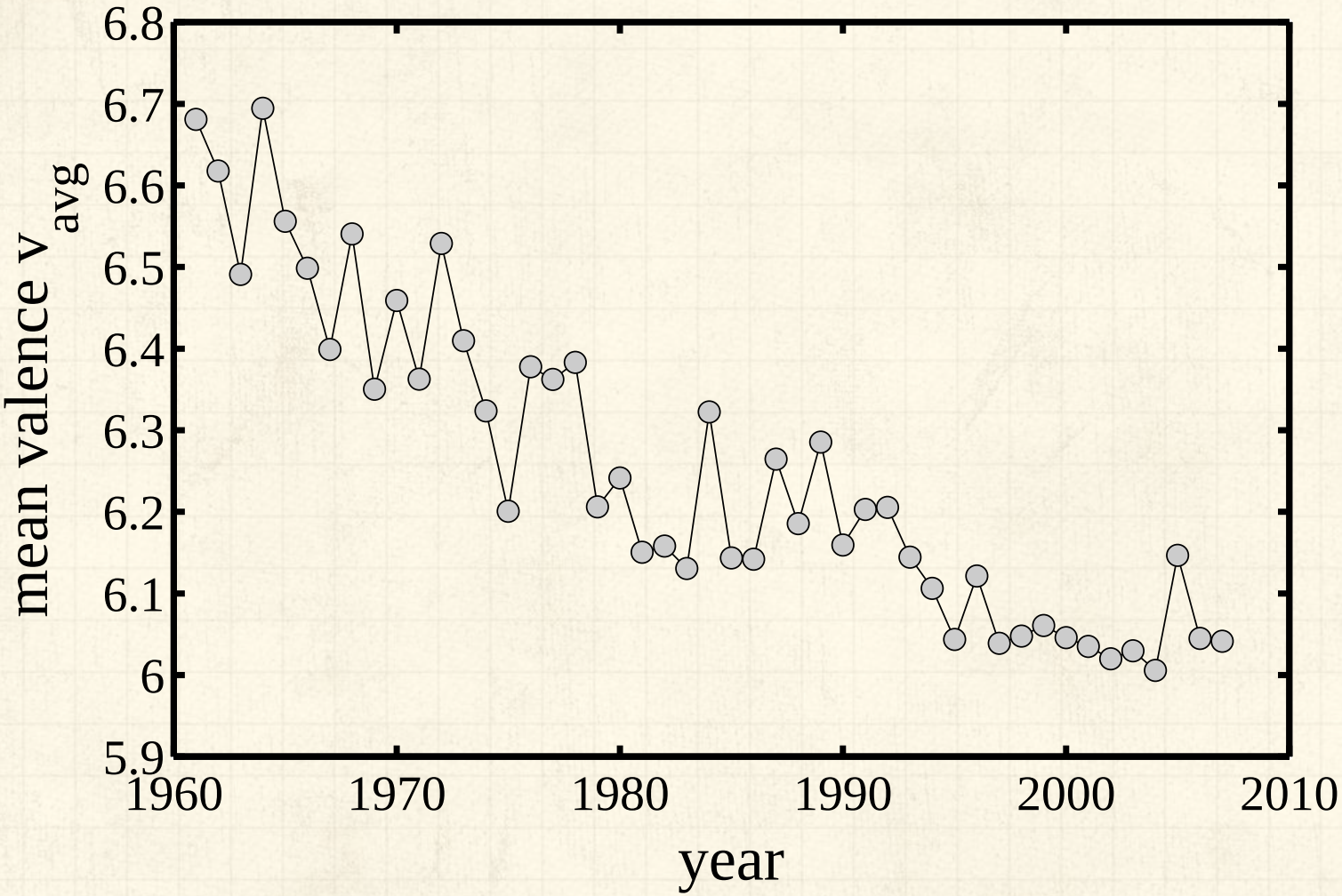
$v_{\text{Michael Jackson}} = 6.4$

- 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 "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



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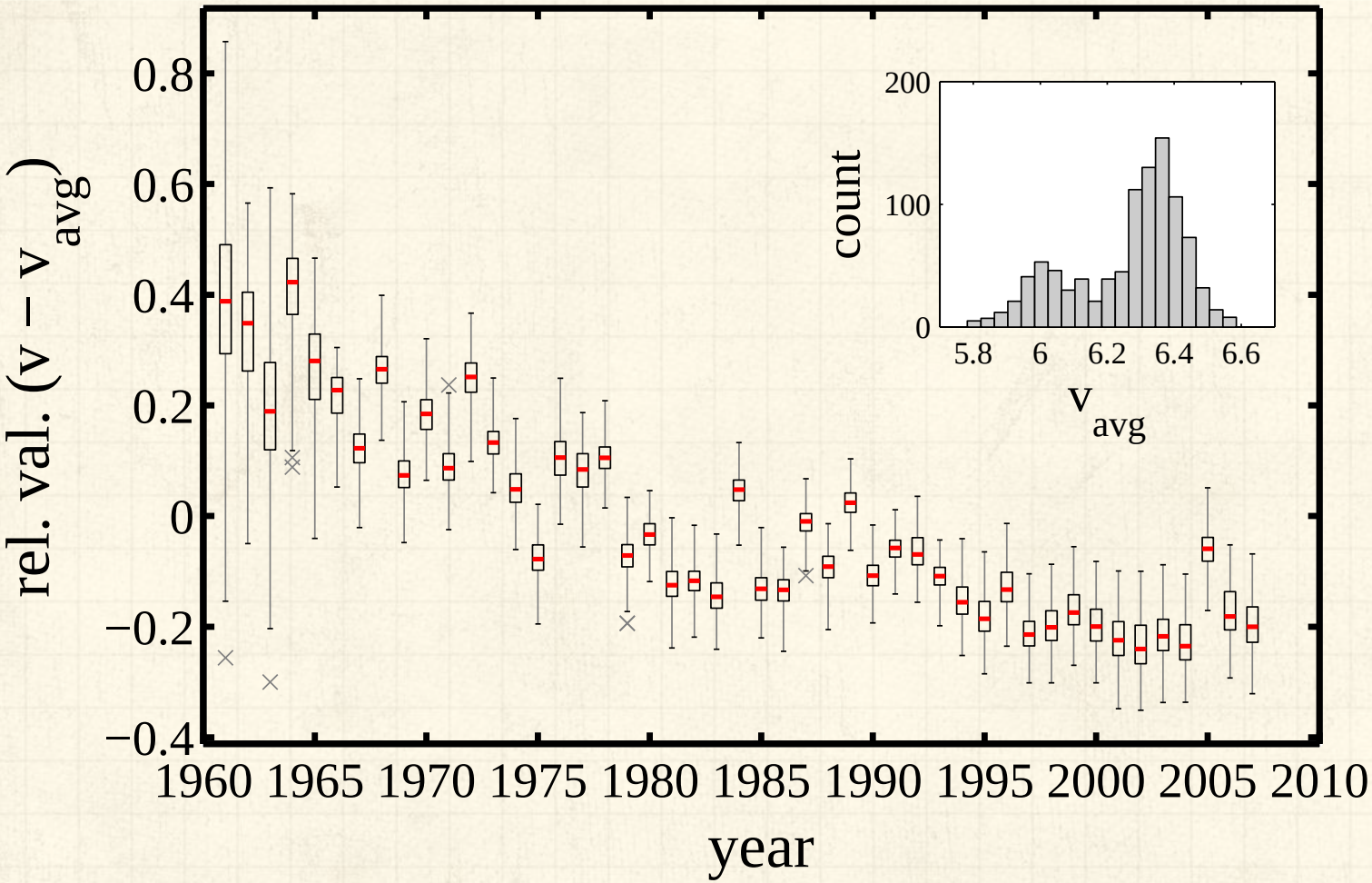
Song Lyrics—measurement robustness



100 random subsets of 750 ANEW words

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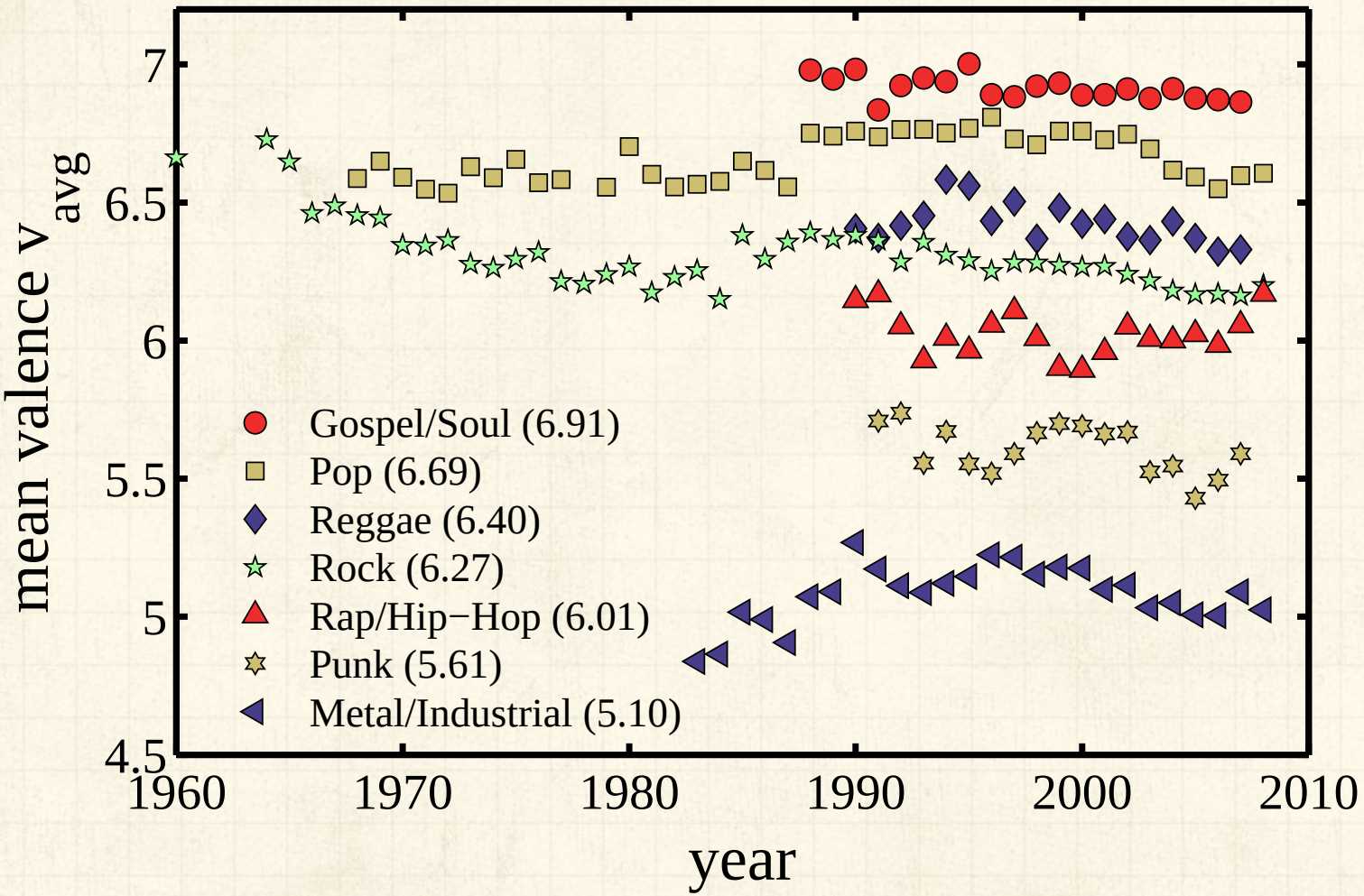
Song Lyrics—average happiness of genres:



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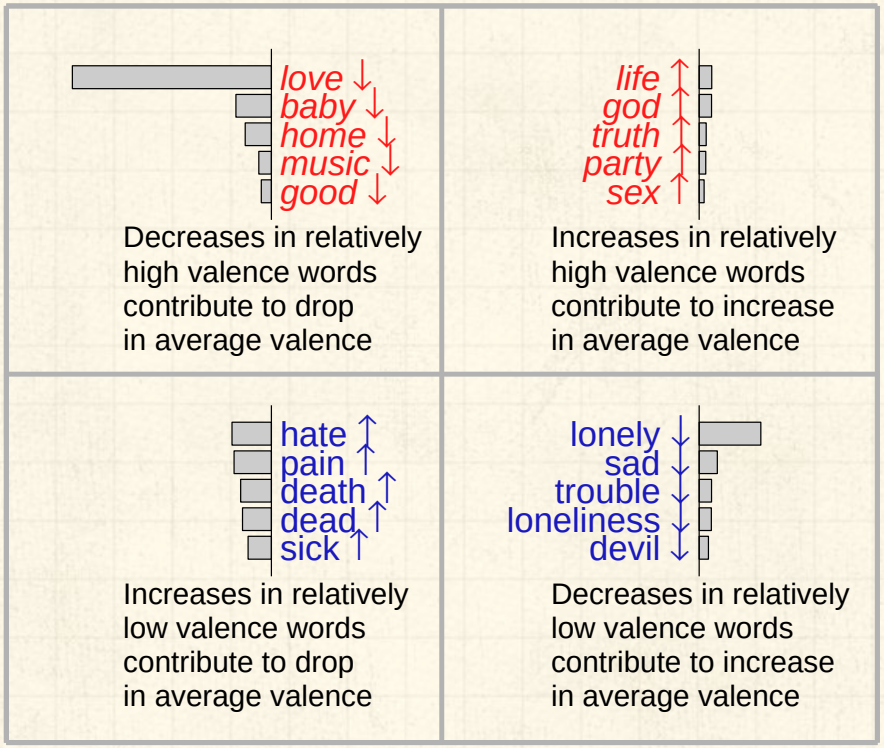
Happiness Word Shift Graph (early version):

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_{ref} and T_{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

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

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

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

Top 50 of $\simeq$ 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)

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Bottom 50 of $\simeq$ 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)

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Text:	h_{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)

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Lexicon Valley, Episode #62, June 17, 2015

- Mike Vuolo and Bob Garfield.

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

Data sets:

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

- Created by Jonathan Harris & Sep Kamvar

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Jonathan Harris:

2007 TED Talk: The Web's secret stories

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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

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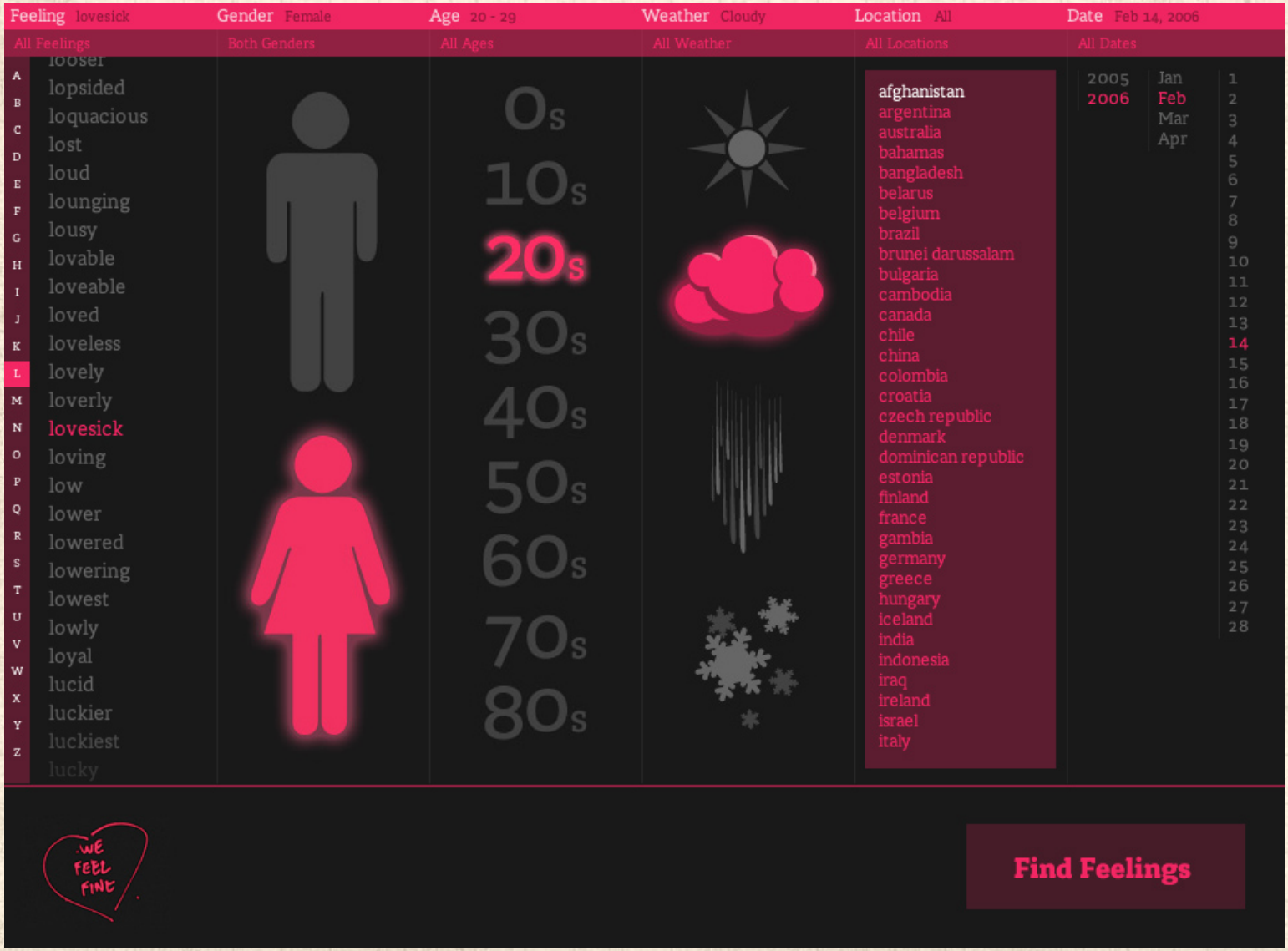
wefeelfine.org:



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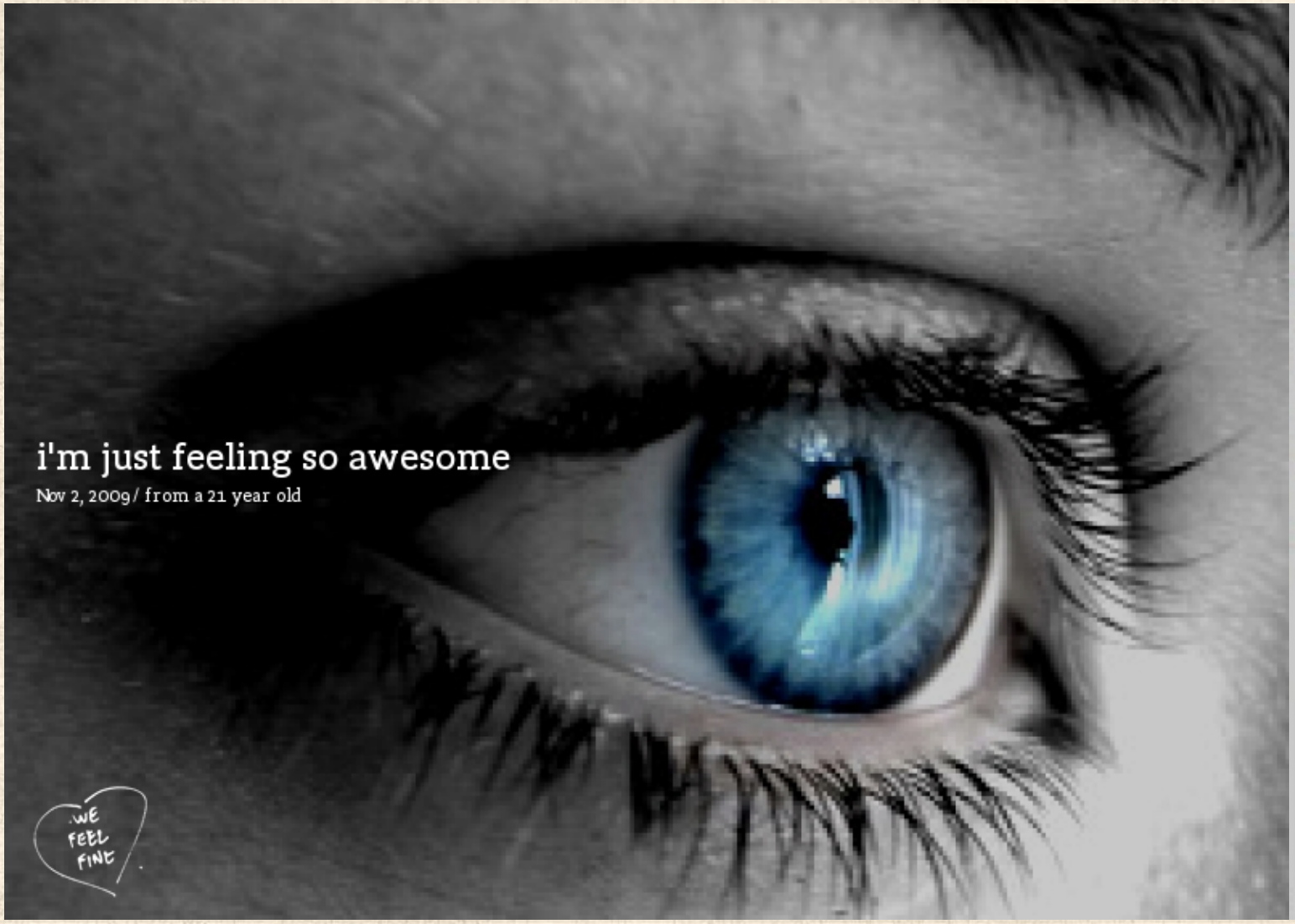
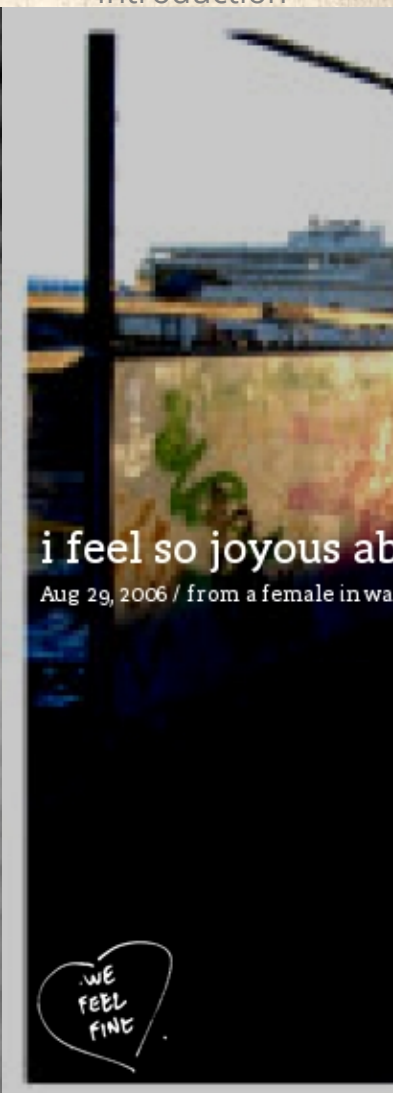
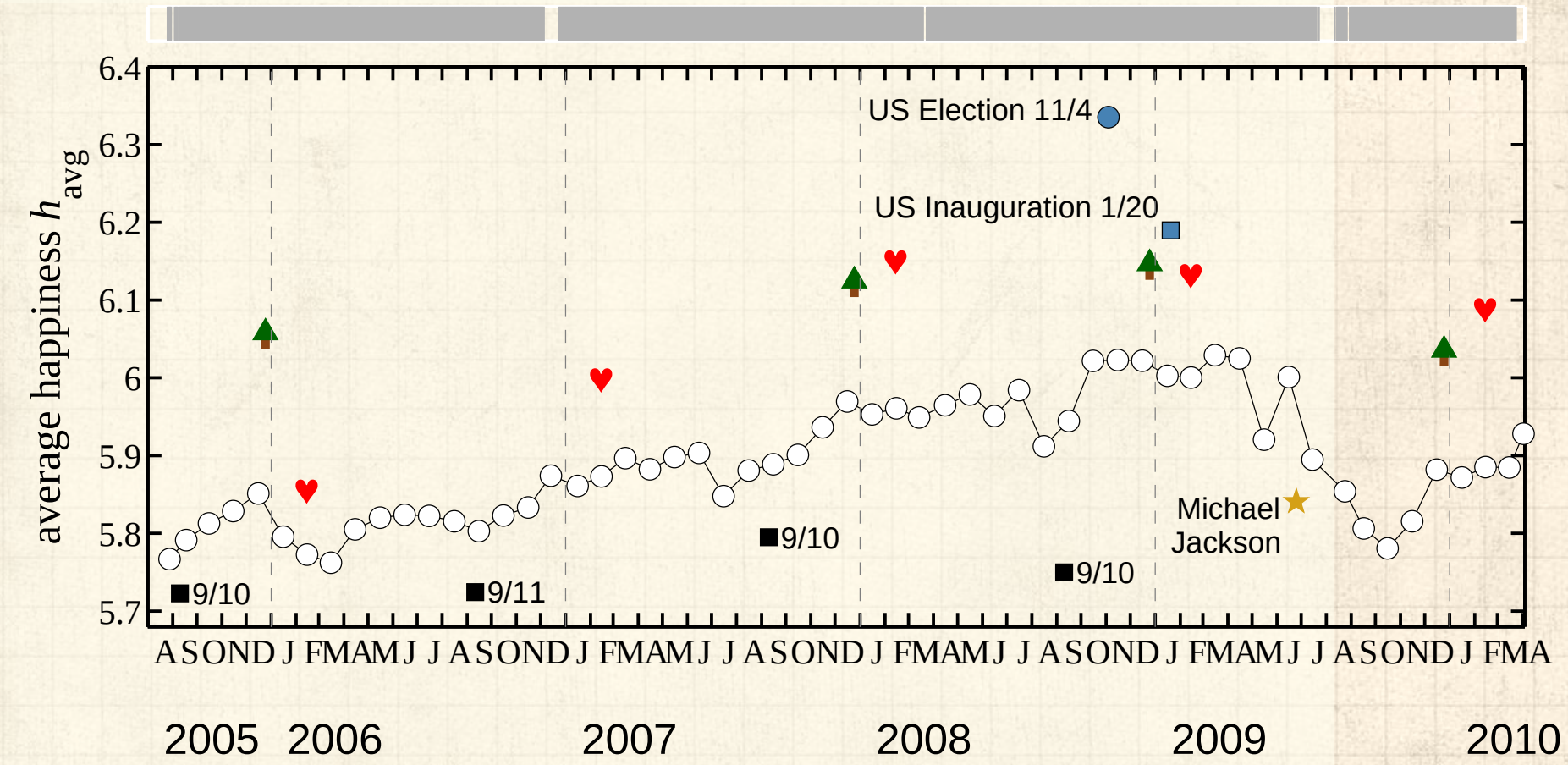
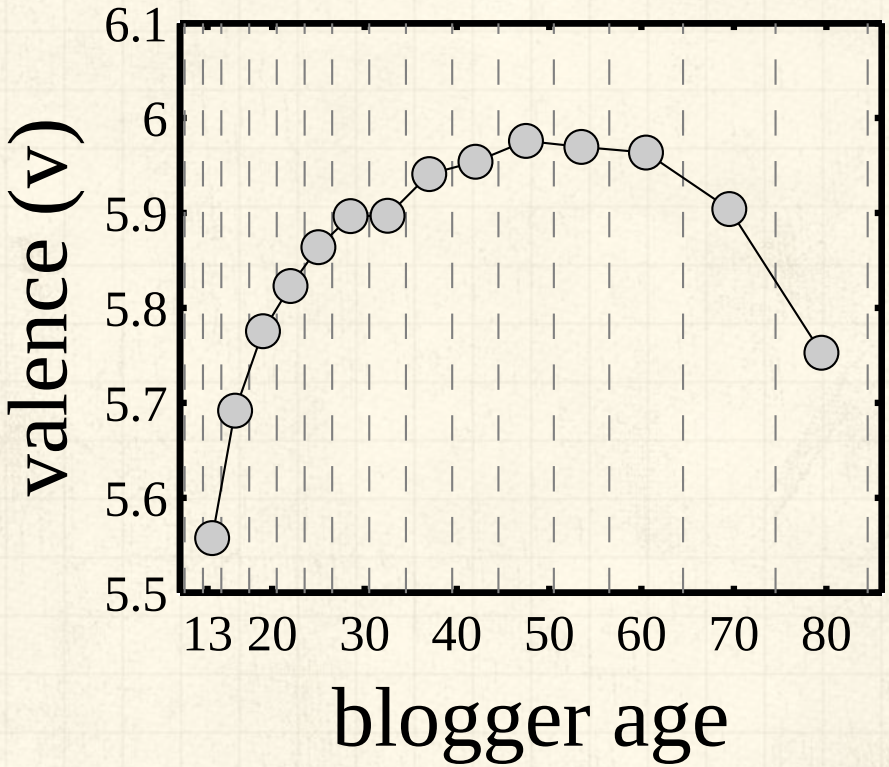




Blogs—Overall trend



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.

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- 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).

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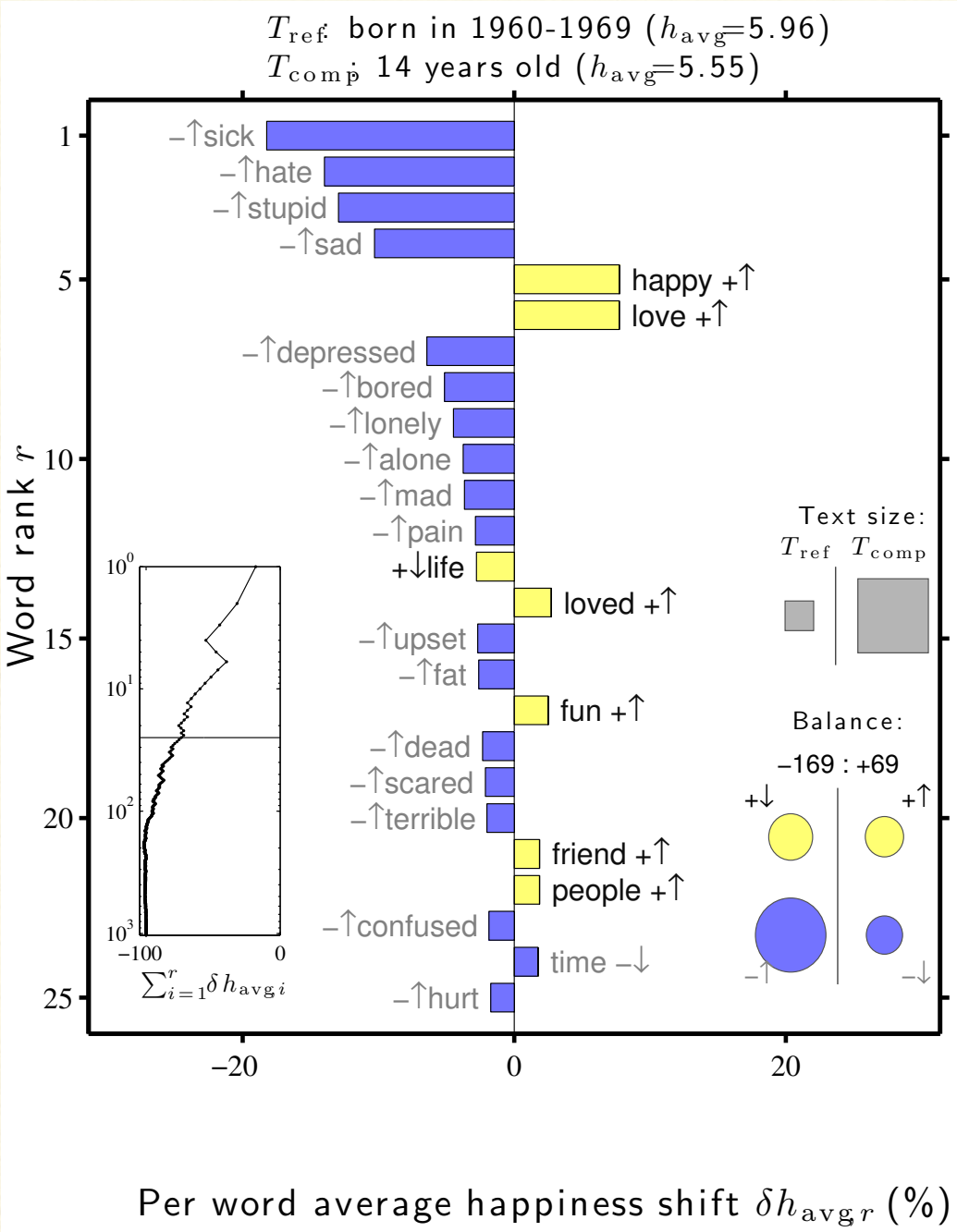
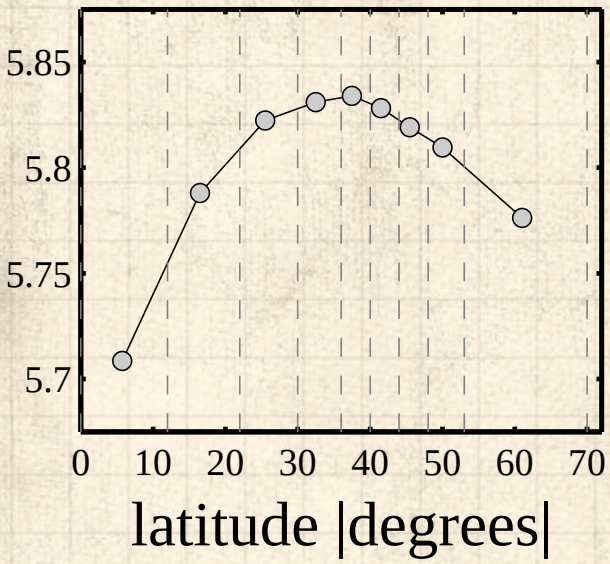


Blogs—Latitude



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.’

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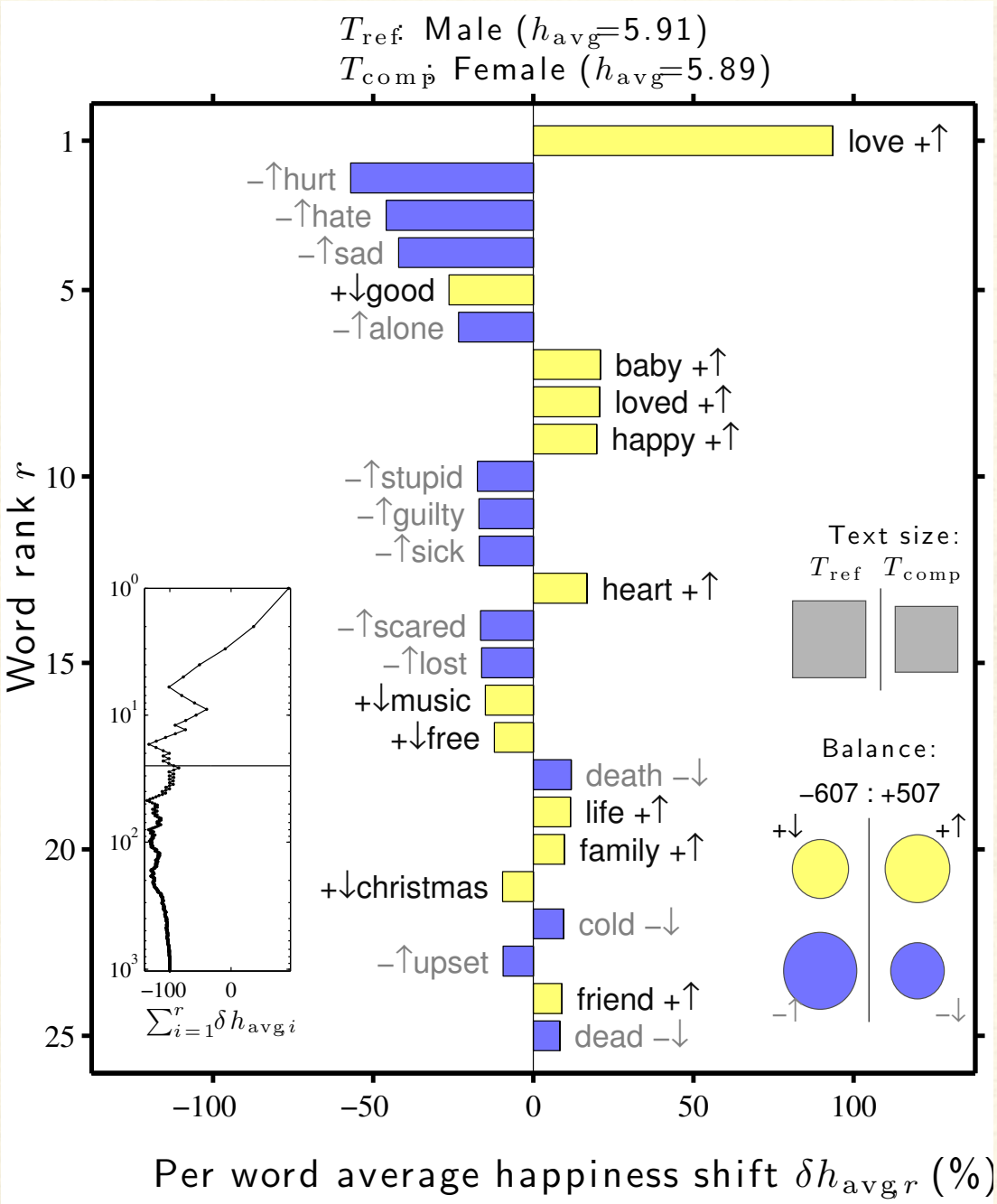
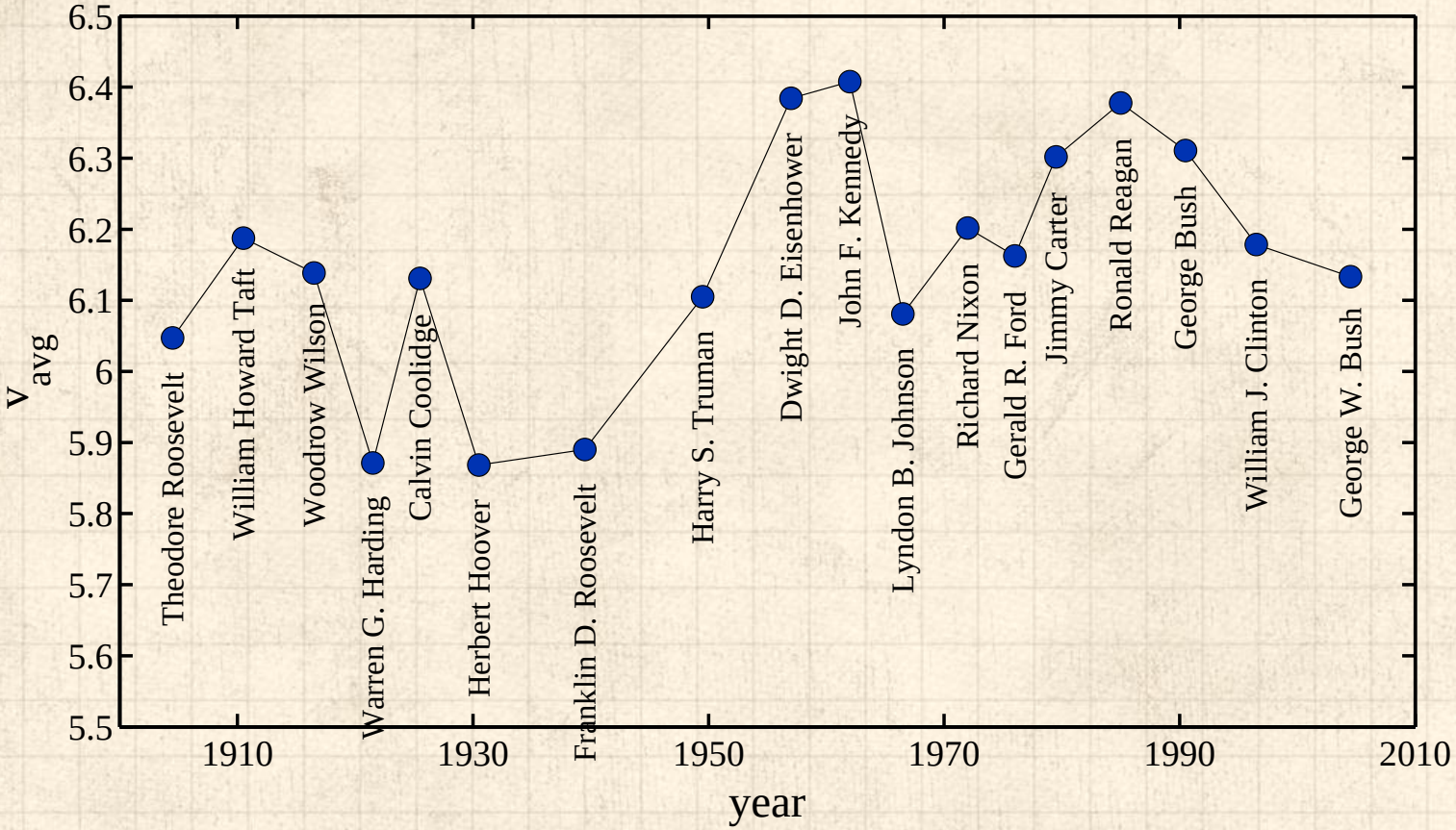


Presidential happiness:



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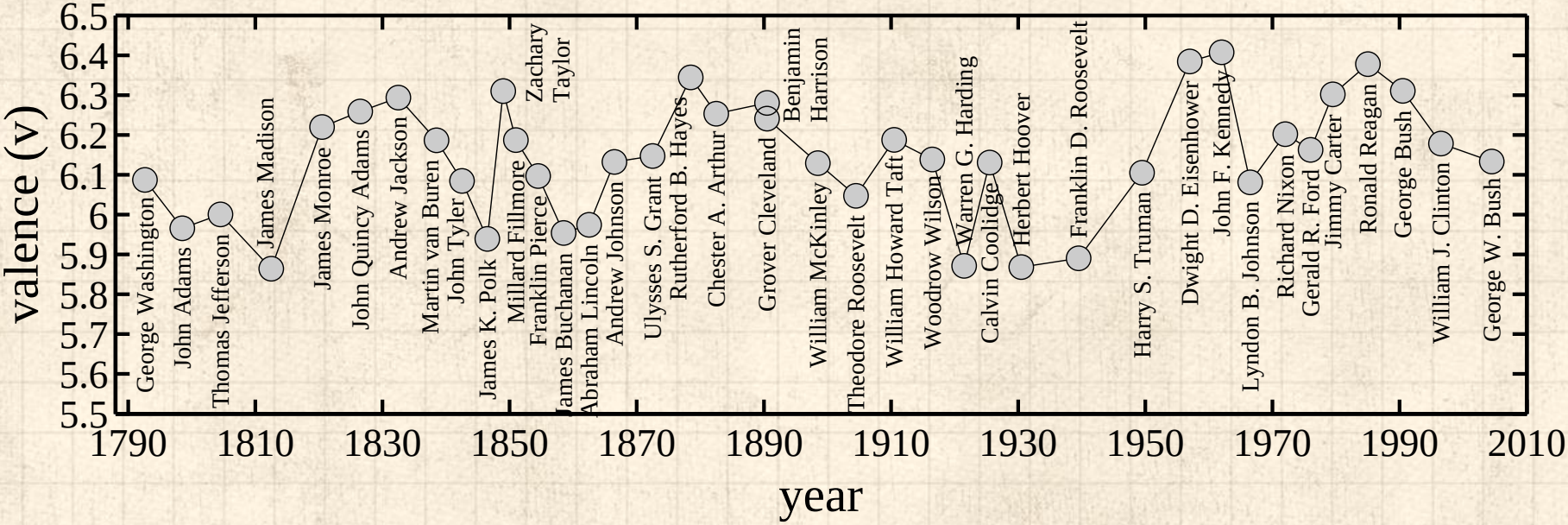

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George Washington [1]
George Washington [2]
John Adams
Thomas Jefferson [1]
Thomas Jefferson [2]
James Madison [1]
James Madison [2]
James Monroe [1]
James Monroe [2]
John Quincy Adams
Andrew Jackson [1]
Andrew Jackson [2]
Martin van Buren
John Tyler
James K. Polk
Zachary Taylor
Millard Fillmore
Franklin Pierce
James Buchanan
Abraham Lincoln
Andrew Johnson
Ulysses S. Grant [1]
Ulysses S. Grant [2]
Rutherford B. Hayes
Chester A. Arthur
Grover Cleveland [1]
Benjamin Harrison
Grover Cleveland [2]
William McKinley
Theodore Roosevelt [1]
Theodore Roosevelt [2]
William Howard Taft
Woodrow Wilson [1]
Woodrow Wilson [2]
Warren G. Harding
Calvin Coolidge [1]
Calvin Coolidge [2]
Herbert Hoover
Franklin D. Roosevelt [1]
Franklin D. Roosevelt [2]
Franklin D. Roosevelt [3]
Franklin D. Roosevelt [4]
Harry S. Truman
Dwight D. Eisenhower [1]
Dwight D. Eisenhower [2]
John F. Kennedy
Lyndon B. Johnson [1]
Lyndon B. Johnson [2]
Richard Nixon
Gerald R. Ford
Jimmy Carter
Ronald Reagan [1]
Ronald Reagan [2]
George Bush
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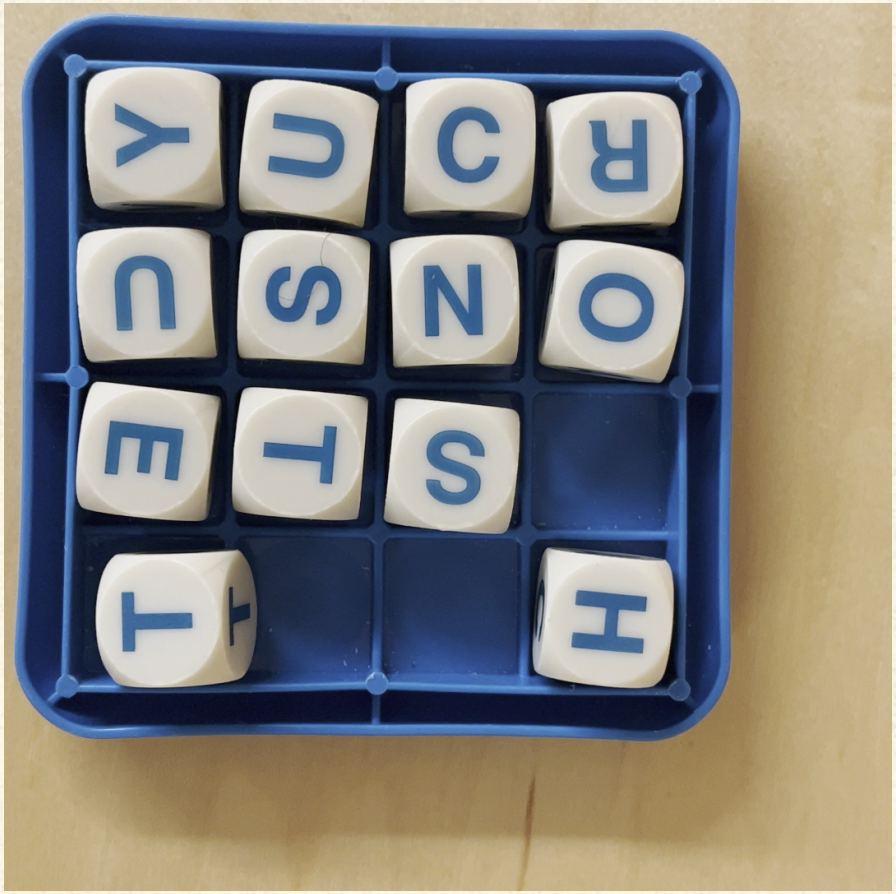
The Boggoracle Speaks:



labMT 1.0:
language assessment by Mechanical Turk

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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]

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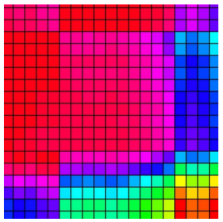

Temporal Patterns of Happiness and Information in a Global Social Network: Hedonometrics and Twitter

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
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

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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	–

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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
□	□	□	□	□	□	□	□

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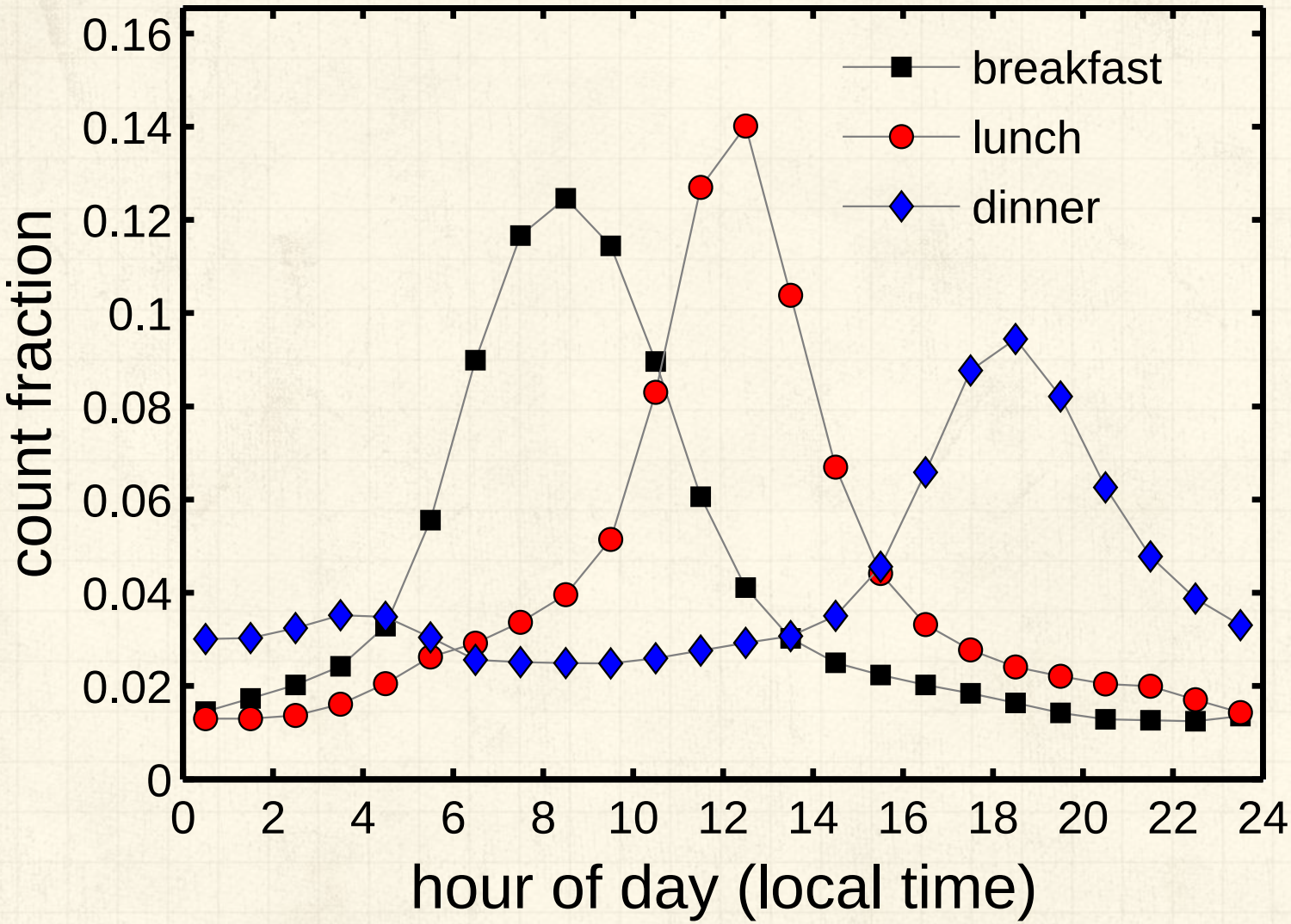
Twitter—living in the now:



Quantifying the quotidian.

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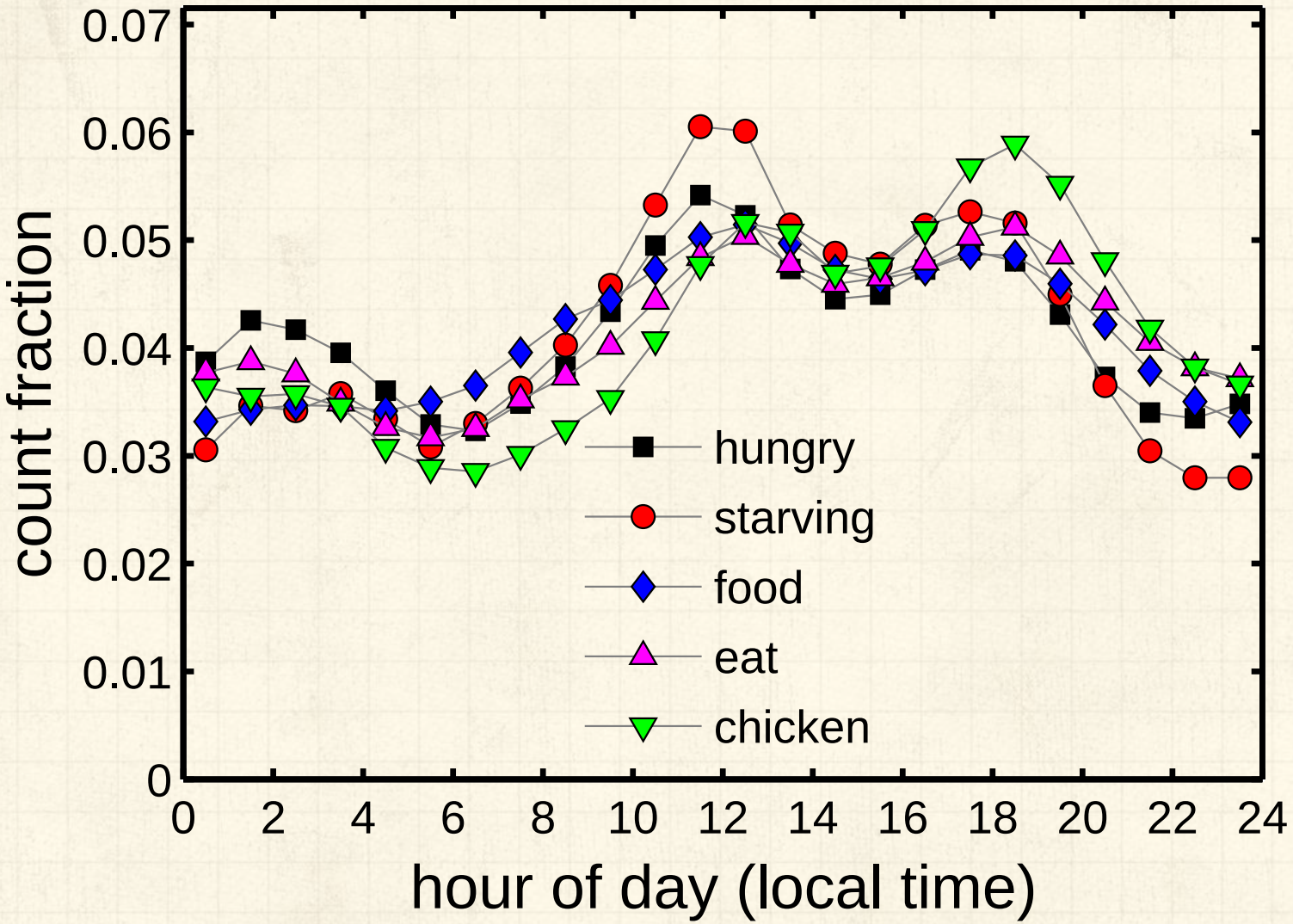

- Makes the unexpected believable...

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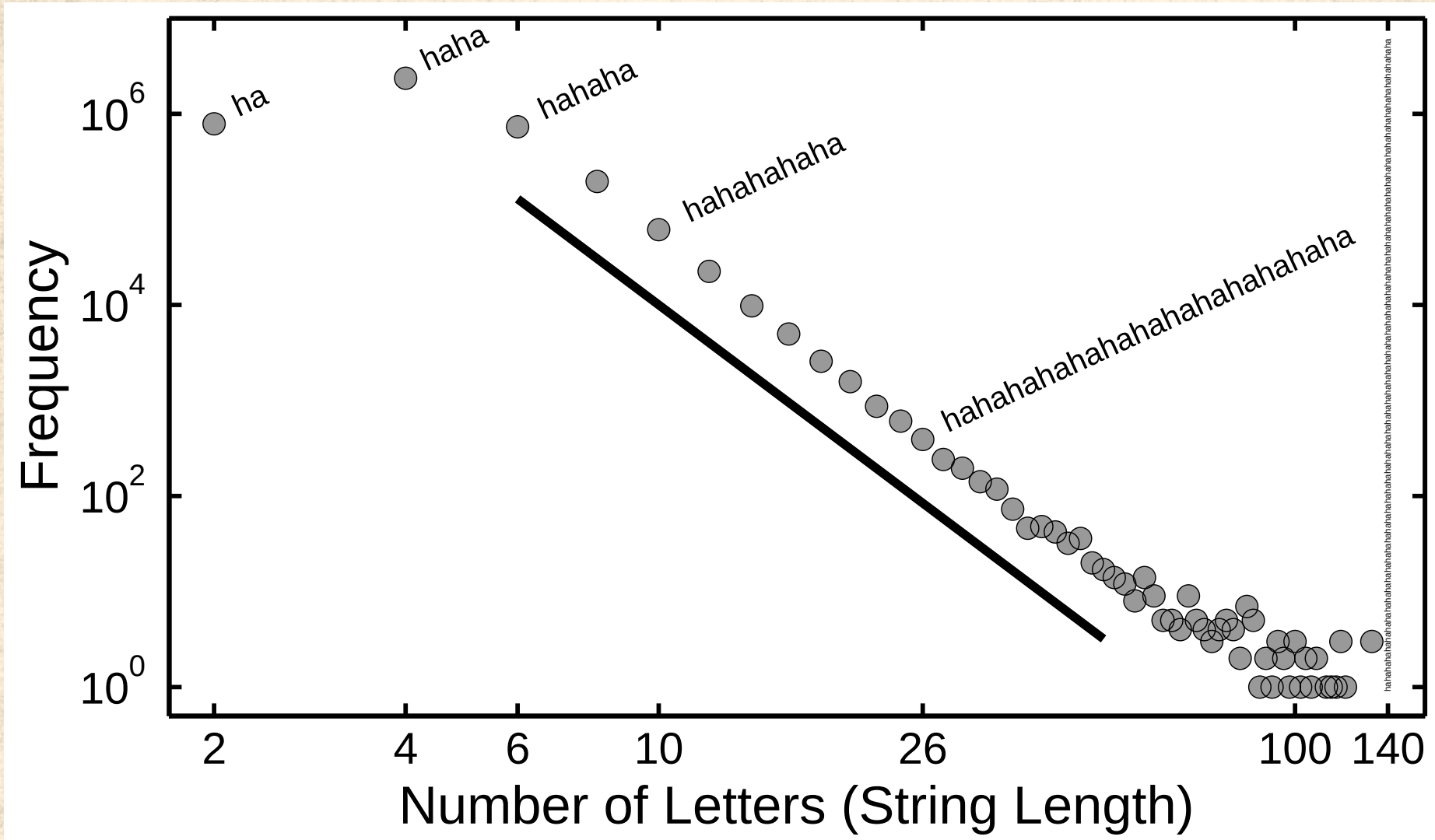
The happiest distribution:



PLOS ONE

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

Abstract

"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]

- "GOOOOOOOOOAAAAAAAAL!!!!!!"
- 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!

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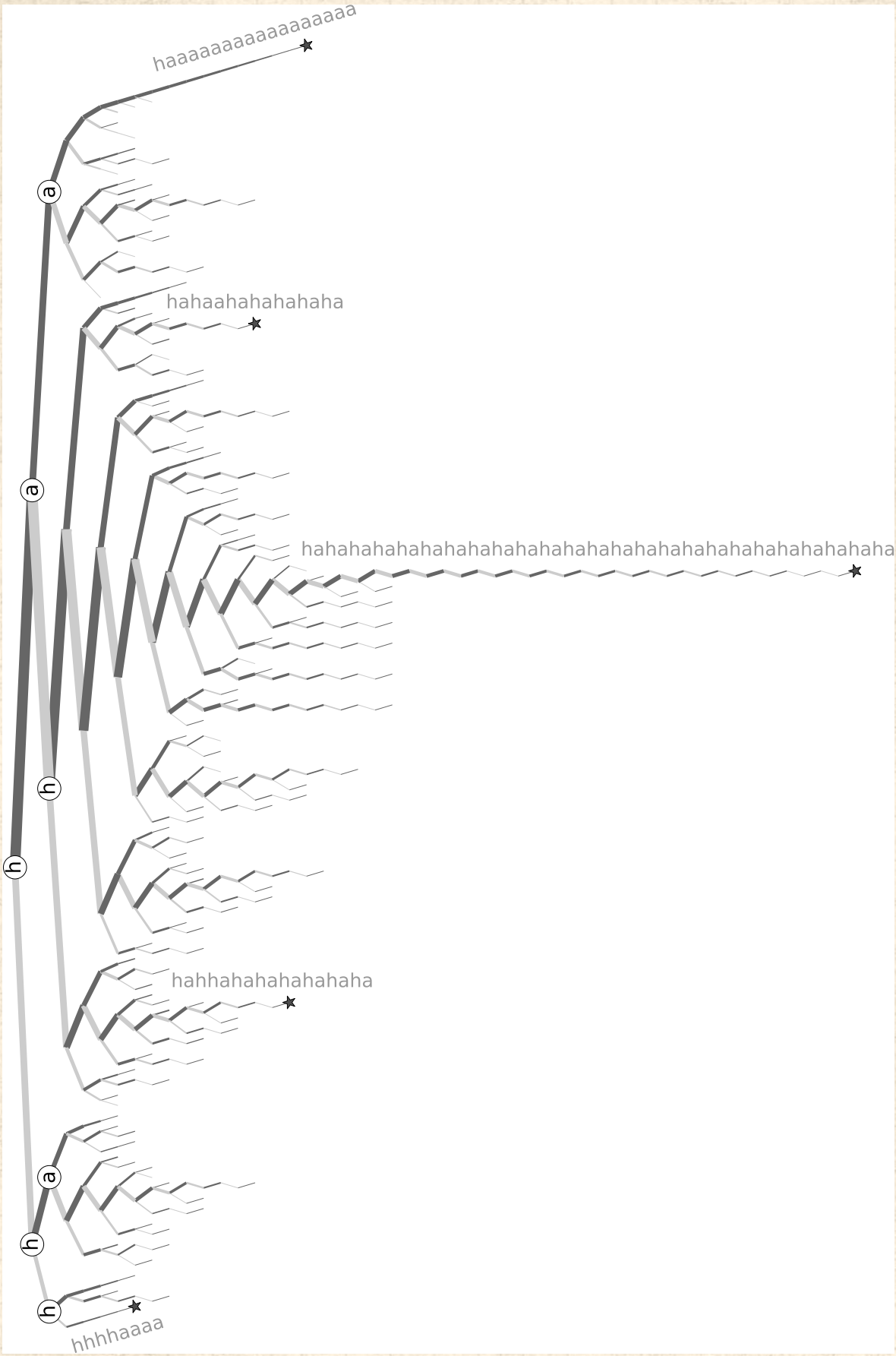
haaaaaaaaaaaaaaaa
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hhhhaaaa

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

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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":51241574,"id_str":"51241574","name":"The Associated Press","screen_name":"AP","location":"Global","url":"http:\/\/www.ap.org","description":"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 Jun 26 21:48:52 +0000 2009","favourites_count":0,"utc_offset":-18000,"time_zone":"Eastern Time (US & Canada)","geo_enabled":false,"verified":true,"statuses_count":50187,"lang":"en","contributors_enabled":false,"is_translator":false,"profile_background_color":"333333","profile_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","profile_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":"CCCCCC","profile_text_color":"333333","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,"retweet_count":0,"favorite_count":0,"entities":{"hashtags":[],"symbols":[],"urls":[],"user_mentions":[]},"favorited":false,"retweeted":false,"filter_level":"medium","lang":"en"}

Mentions of CIA on Twitter, end of 2011:

See story here for example [slate].

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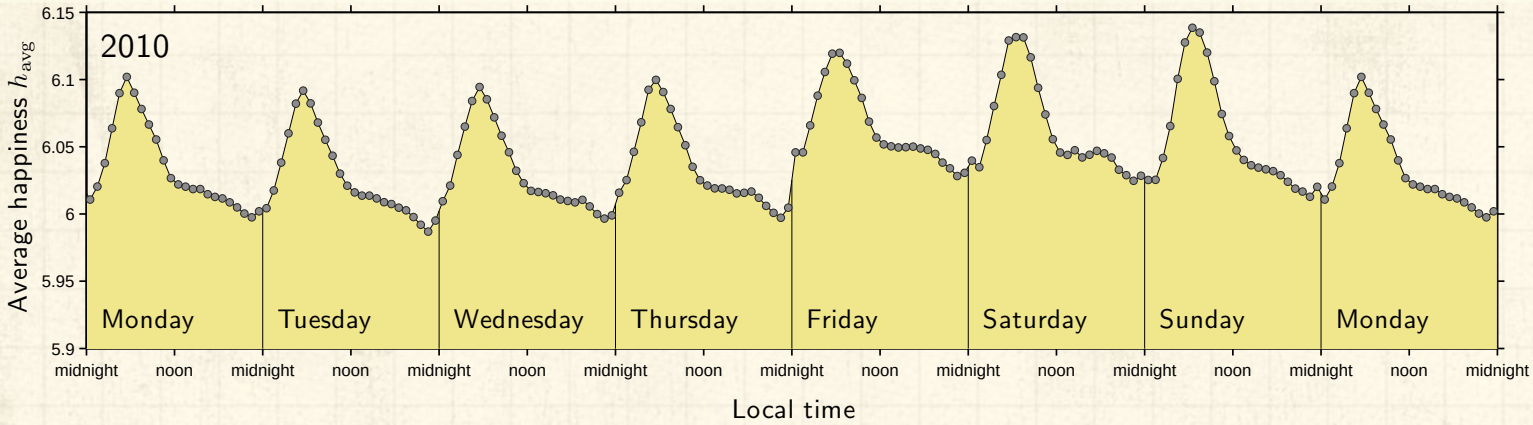
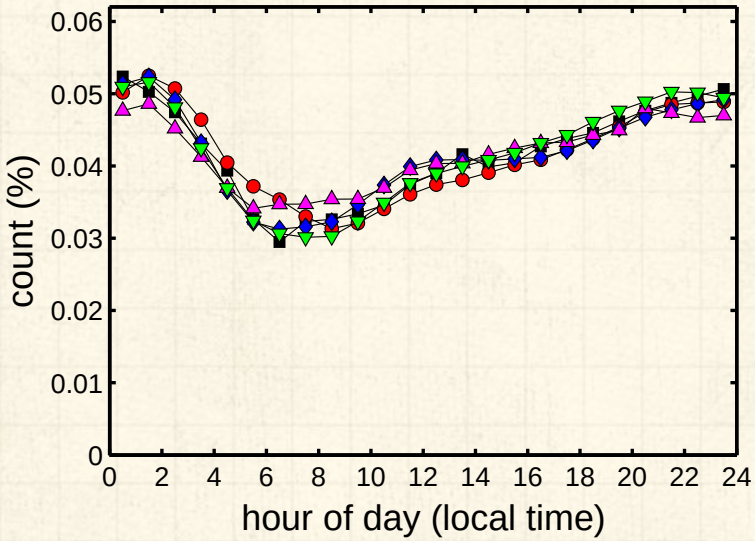
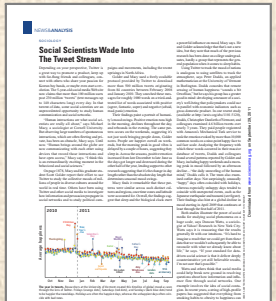
The daily unravelling of the human mind:






Social Scientists Wade Into The Tweet Stream

"Social Scientists wade into the Tweet stream"

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

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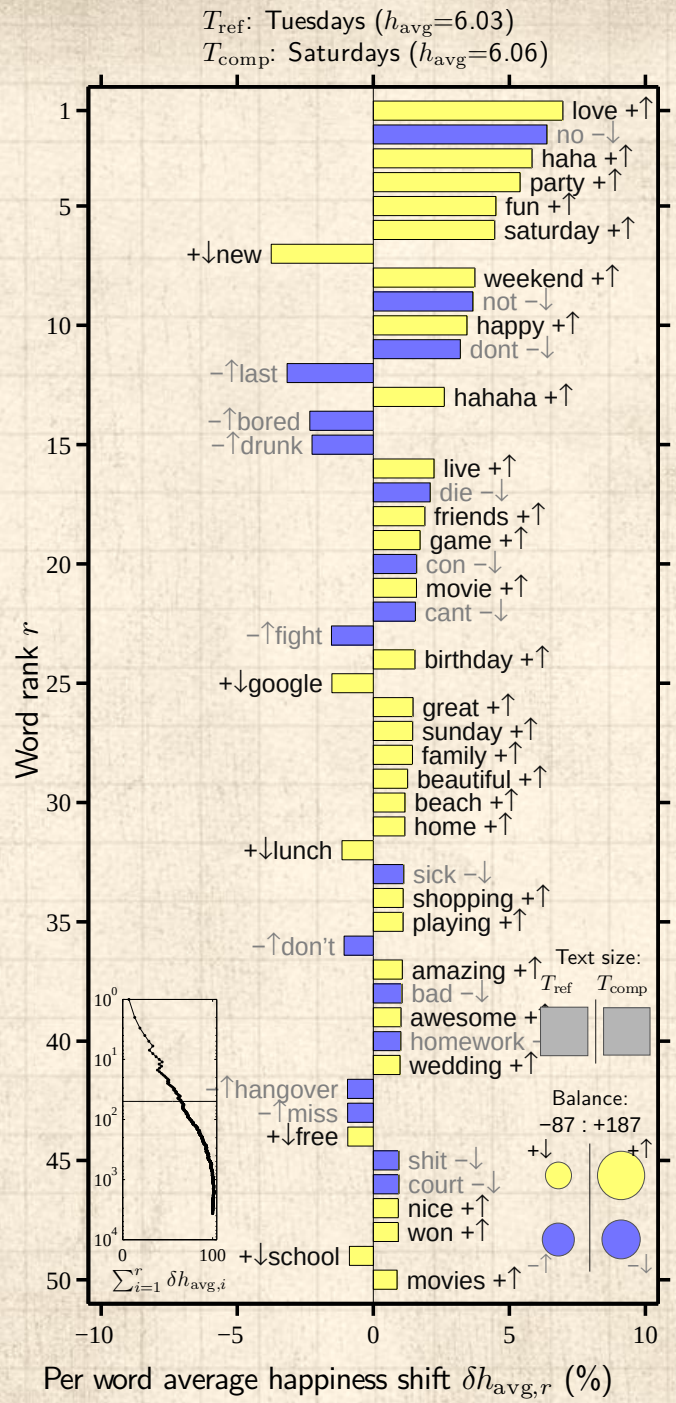

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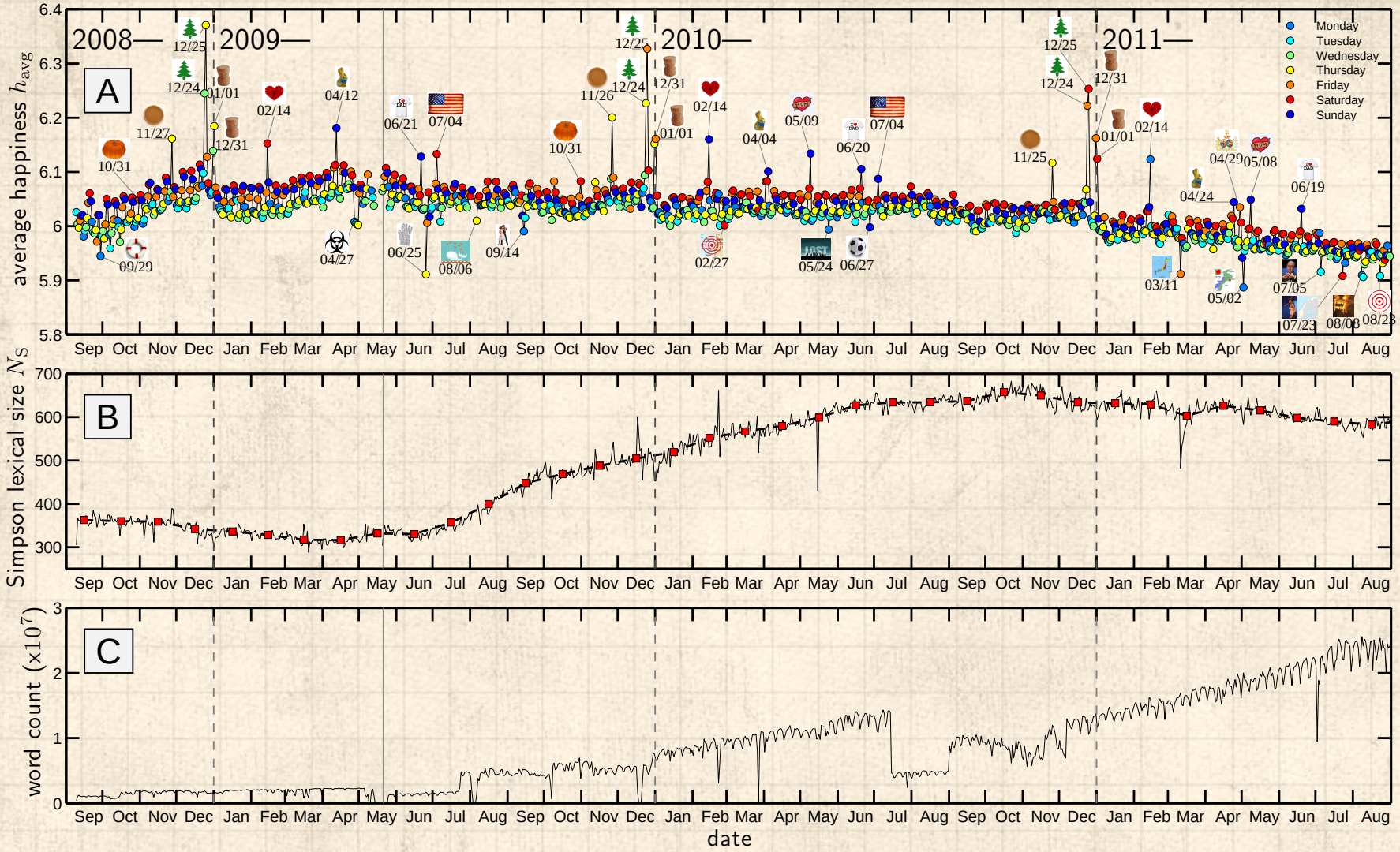
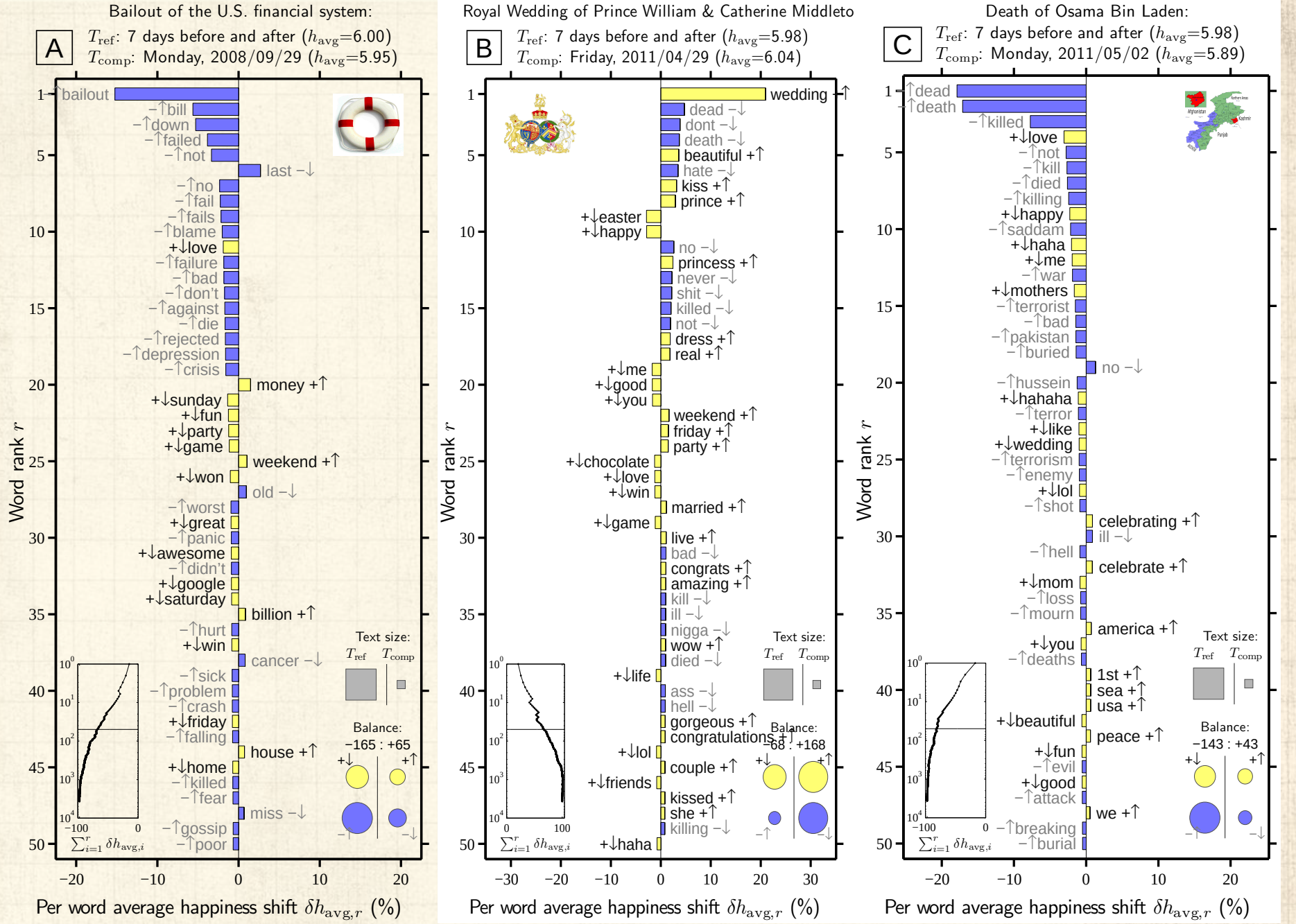
Text element and context correlate in happiness scores:

- Compare ambient happiness with text element happiness.
- Spearman 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 (x10^7)
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
02/27
04/04
05/09
06/20
07/04
05/24
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)
bailout
bill
down
failed
not
last −↓
no
fail
fails
blame
+↓love
failure
bad
don't
against
die
rejected
depression
crisis
money +↑
+↓sunday
+↓fun
+↓party
+↓game
weekend +↑
+↓won
old −↓
worst
+↓great
panic
+↓awesome
didn't
+↓google
+↓saturday
billion +↑
hurt
+↓win
cancer −↓
sick
problem
crash
+↓friday
falling
house +↑
+↓home
killed
fear
miss −↓
gossip
poor
Word rank r
Per word average happiness shift $\delta h_{\text{avg},r}$ (%)
Text size:
Balance:
−165 : +65
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)
wedding +↑
dead −↓
dont −↓
death −↓
beautiful +↑
hate −↓
kiss +↑
prince +↑
+↓easter
+↓happy
no −↓
princess +↑
never −↓
shit −↓
killed −↓
not −↓
dress +↑
real +↑
+↓me
+↓good
+↓you
weekend +↑
friday +↑
party +↑
+↓chocolate
+↓love
+↓win
married +↑
+↓game
live +↑
bad −↓
congrats +↑
amazing +↑
kill −↓
ill −↓
nigga −↓
wow +↑
died −↓
+↓life
ass −↓
hell −↓
gorgeous +↑
congratulations +↑
+↓lol
couple +↑
+↓friends
kissed +↑
she +↑
killing −↓
+↓haha
Word rank r
Per word average happiness shift $\delta h_{\text{avg},r}$ (%)
Text size:
Balance:
−68 : +168
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)
dead
death
killed
+↓love
not
kill
died
killing
+↓happy
saddam
+↓haha
+↓me
war
+↓mothers
terrorist
bad
pakistan
buried
no −↓
hussein
+↓hahaha
terror
+↓like
+↓wedding
terrorism
enemy
+↓lol
shot
celebrating +↑
ill −↓
hell
celebrate +↑
+↓mom
loss
mourn
america +↑
+↓you
deaths
1st +↑
sea +↑
usa +↑
+↓beautiful
peace +↑
+↓fun
evil
+↓good
attack
we +↑
breaking
burial
Word rank r
Per word average happiness shift $\delta h_{\text{avg},r}$ (%)
Text size:
Balance:
−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)

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Simpson lexical size, N_S:

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)
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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)

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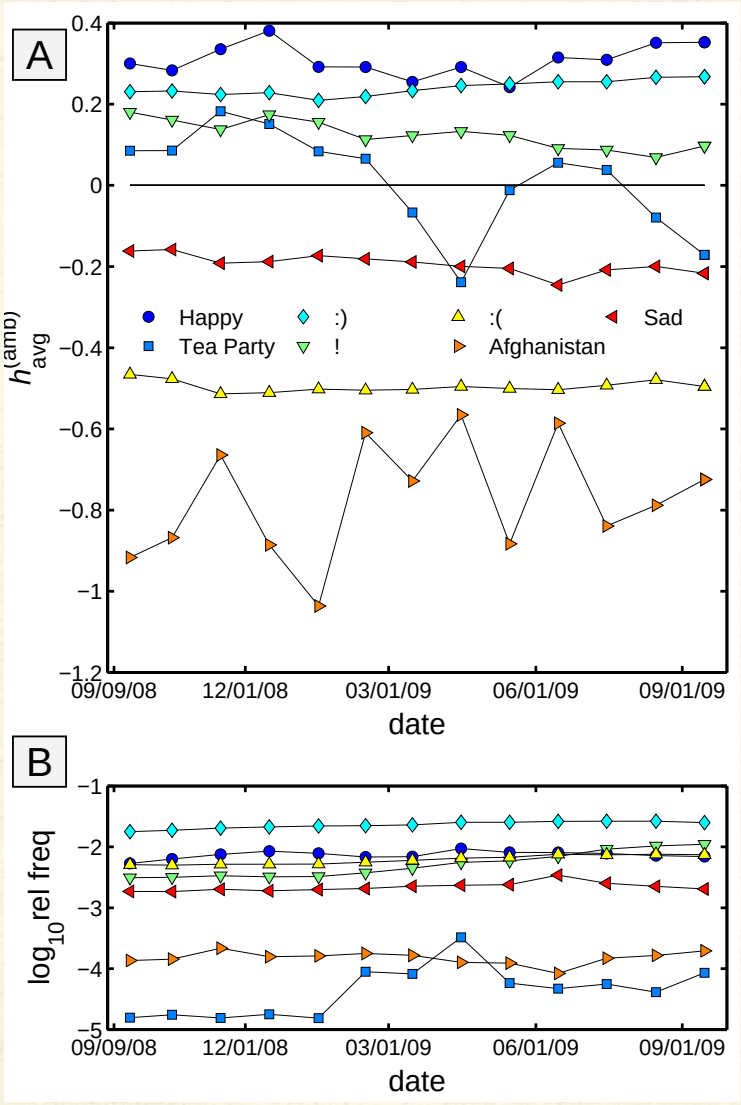
Ambient happiness:



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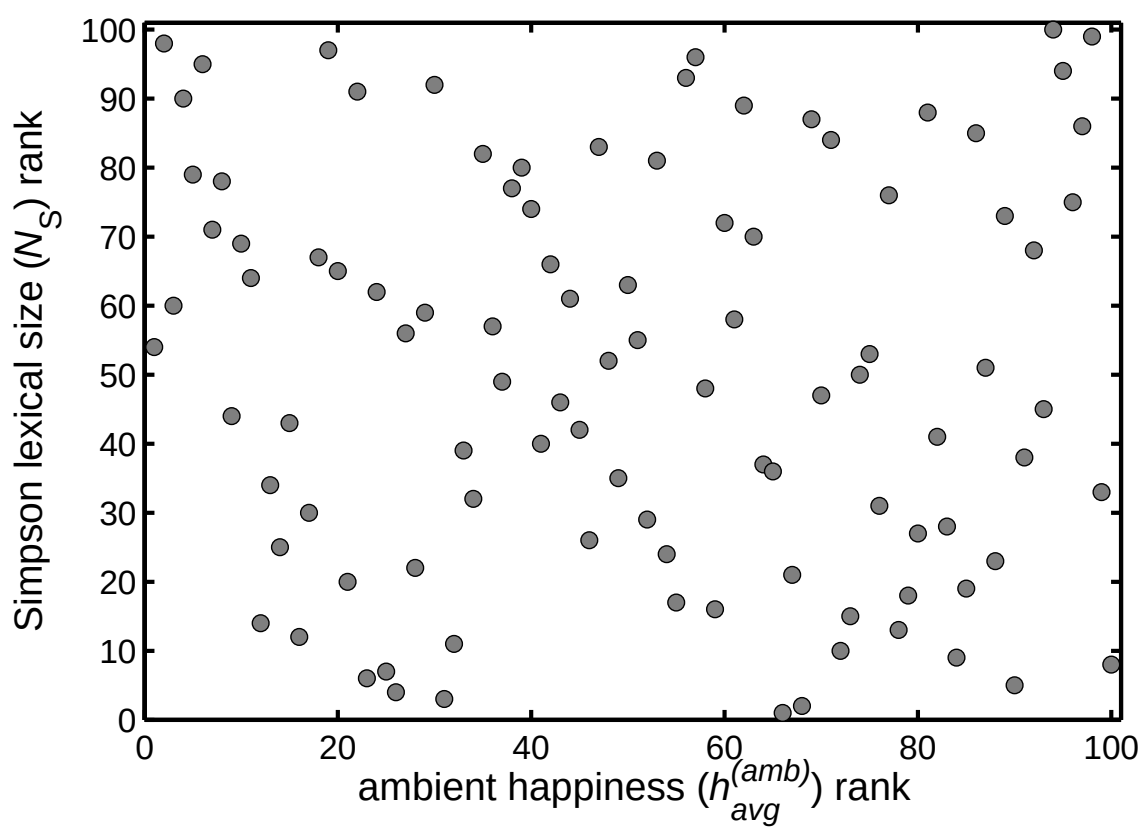

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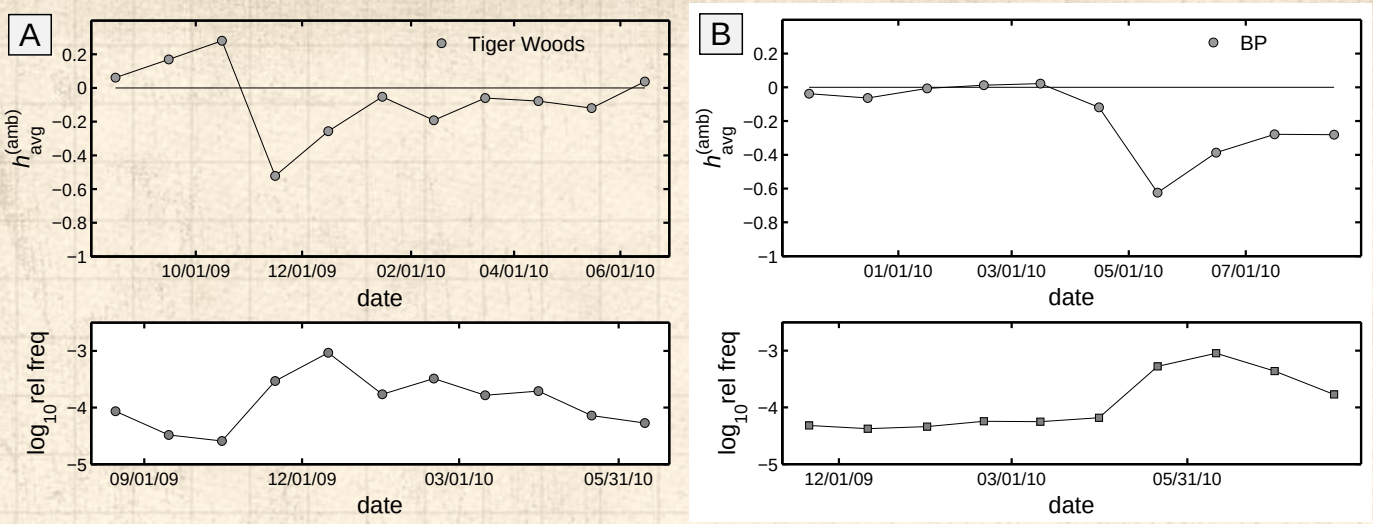

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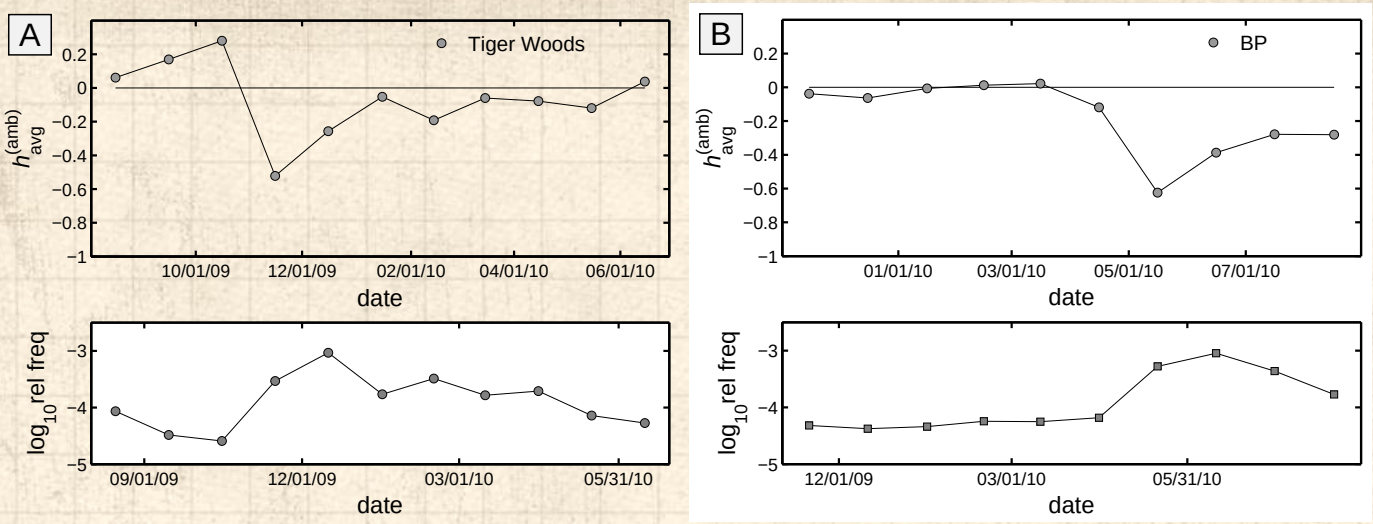

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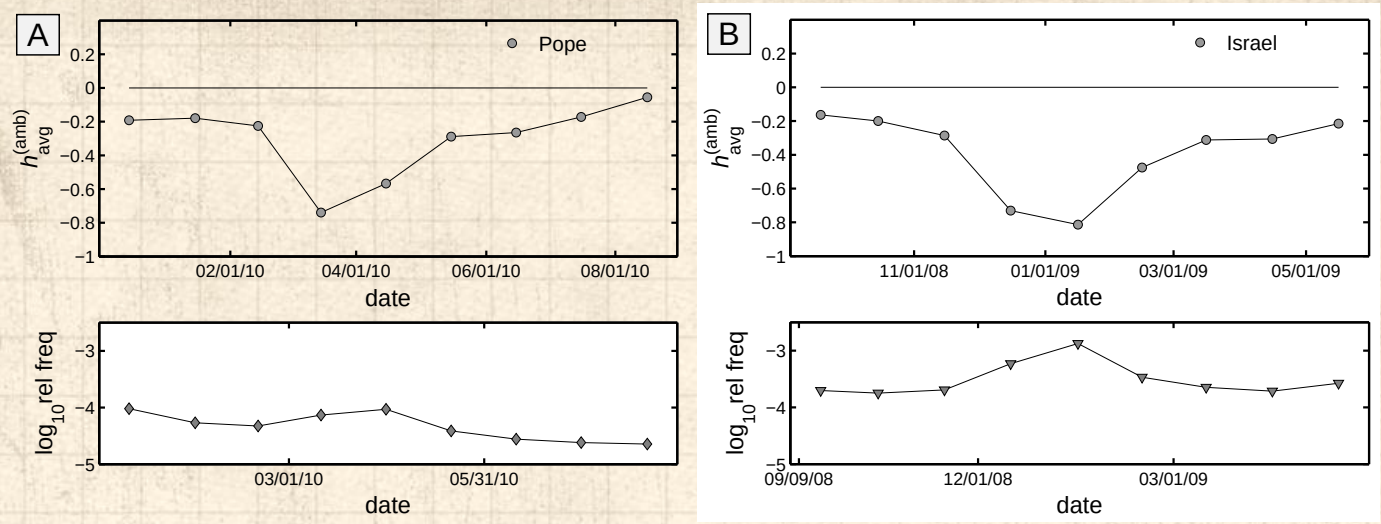
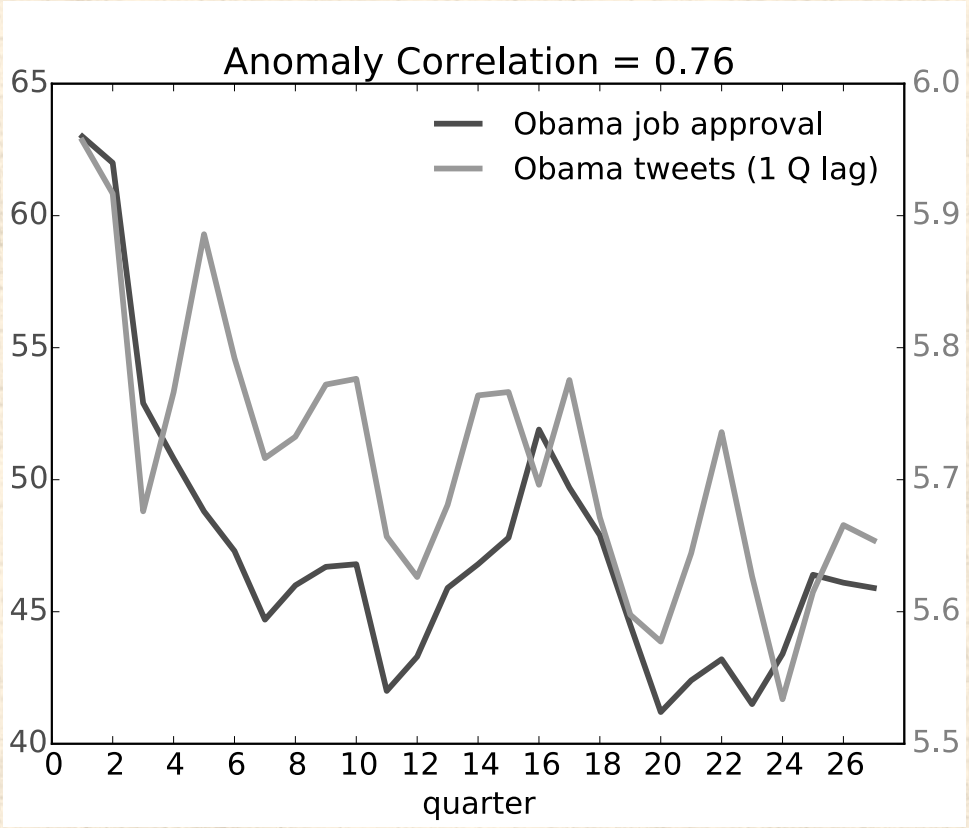


"Public opinion polling with Twitter"

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



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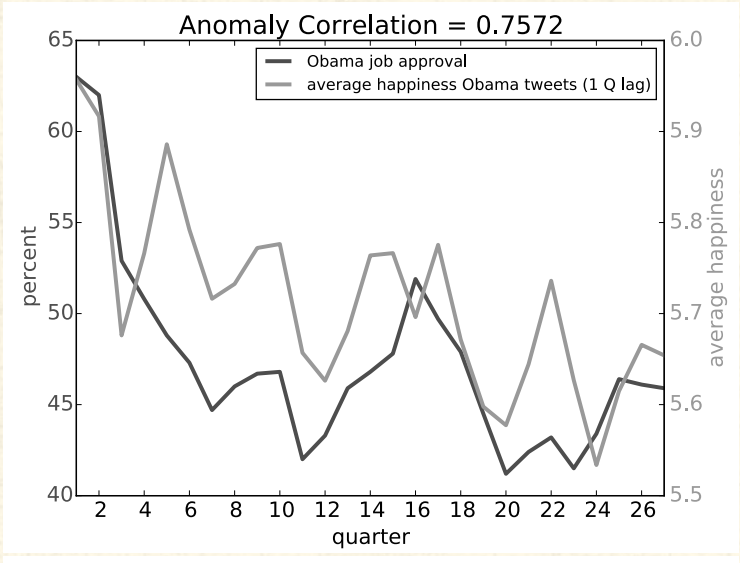
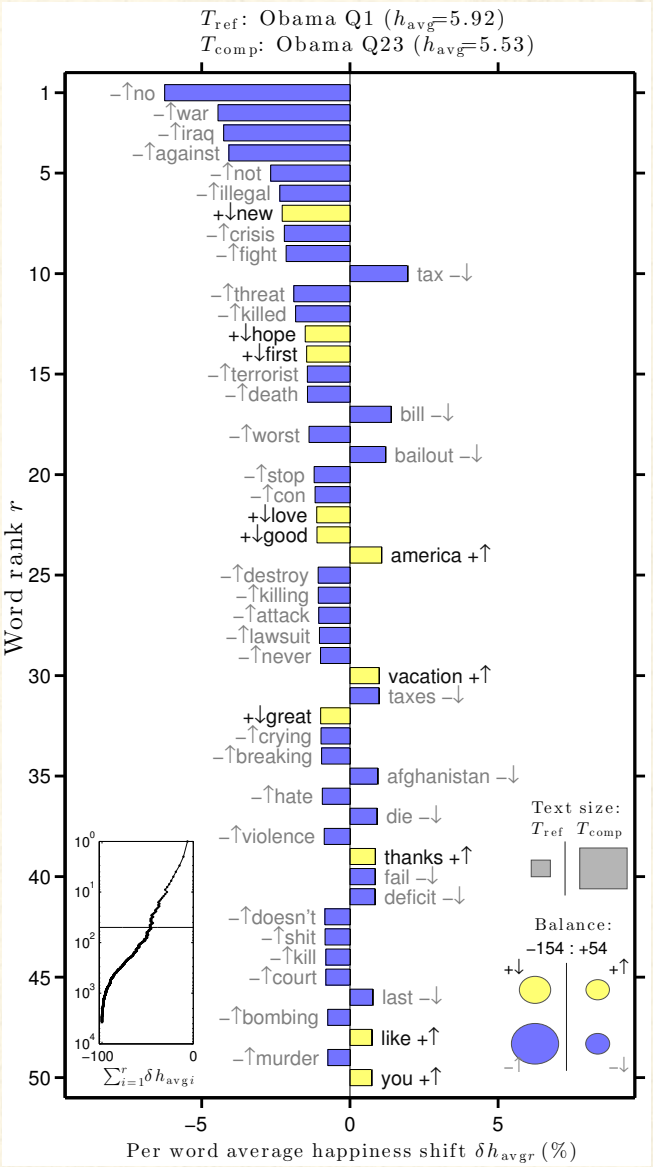
Twitter's Feels predict Obama's Approval Rating:





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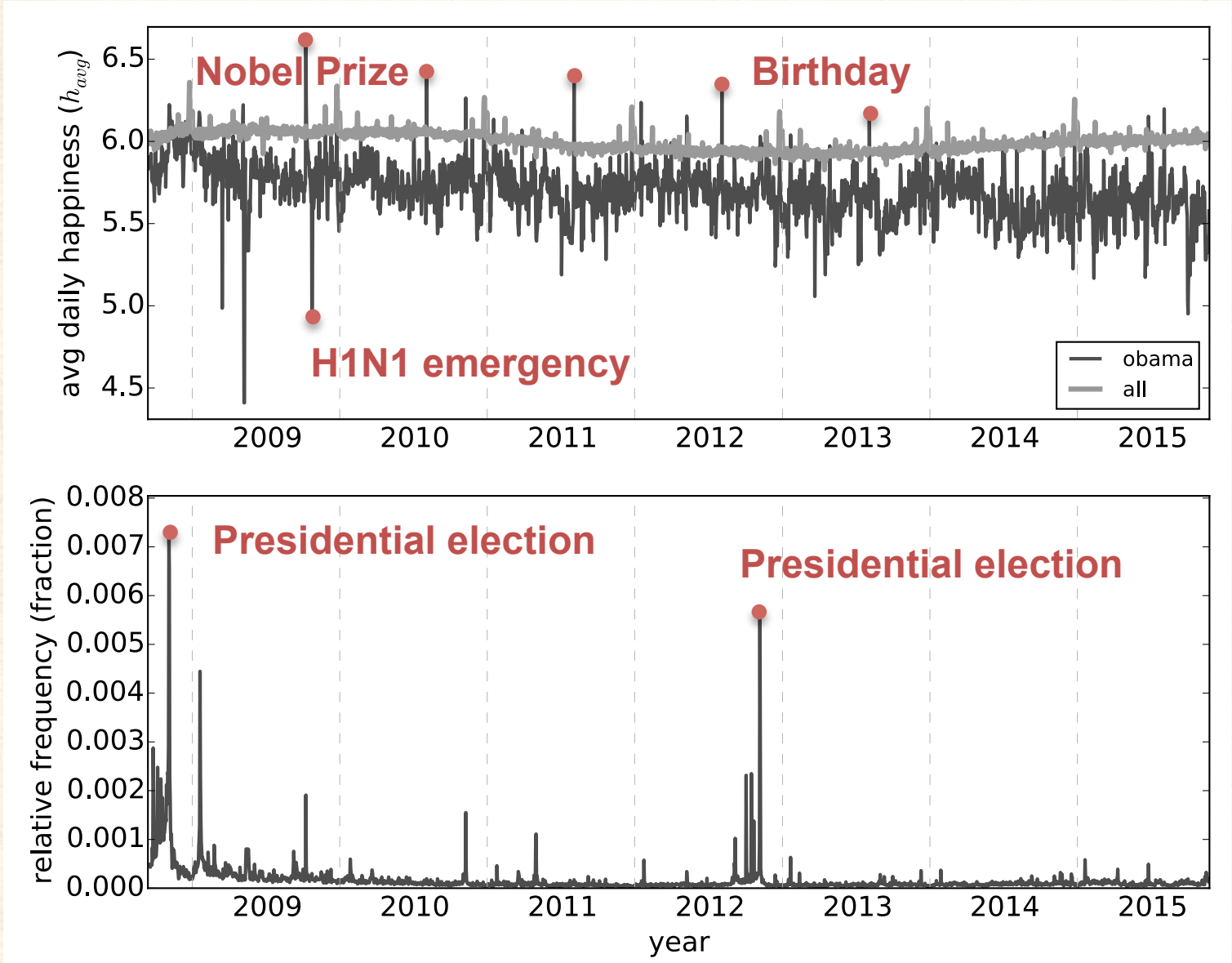
Ambient happiness for “Obama”:



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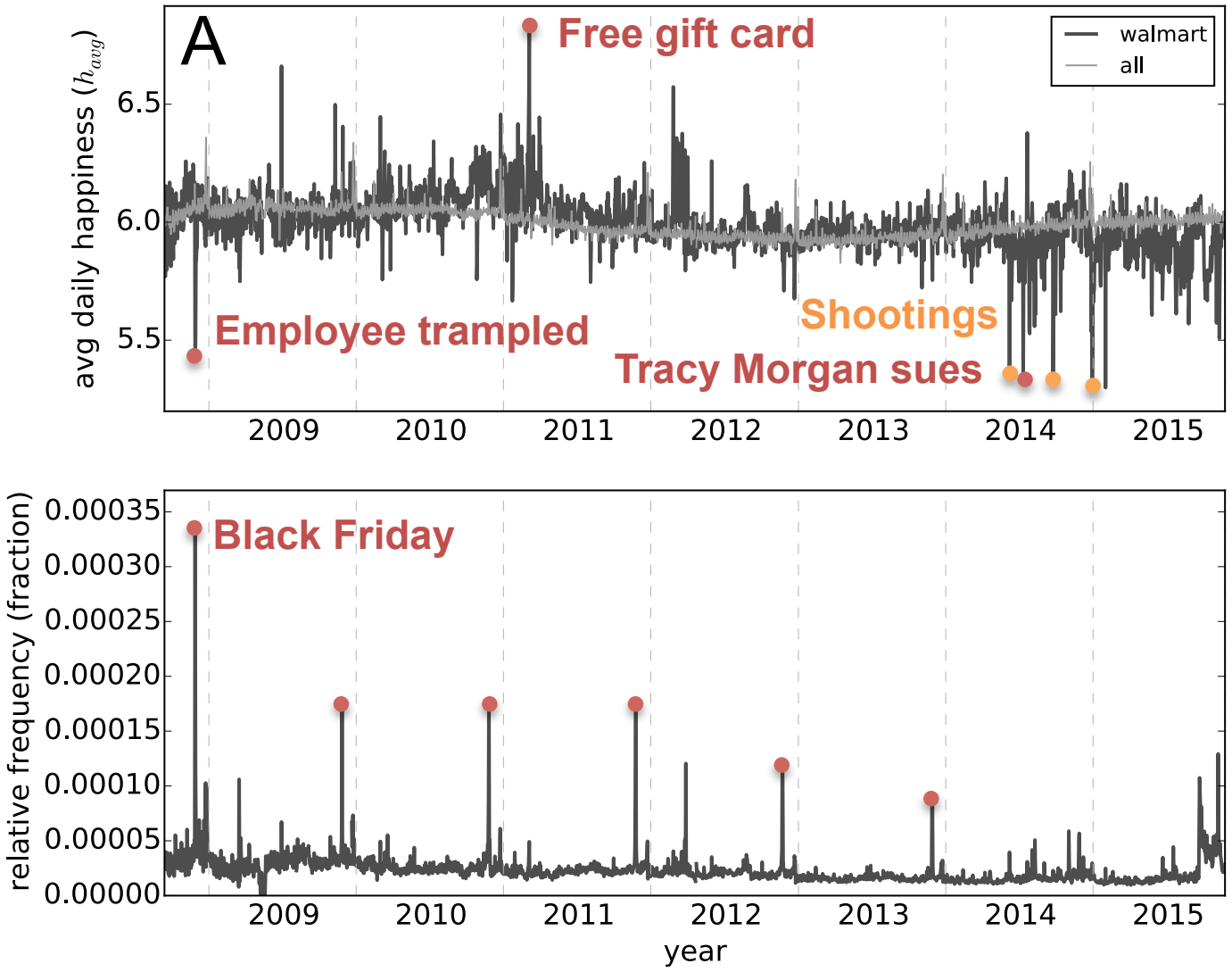
Ambient happiness for “Walmart”:



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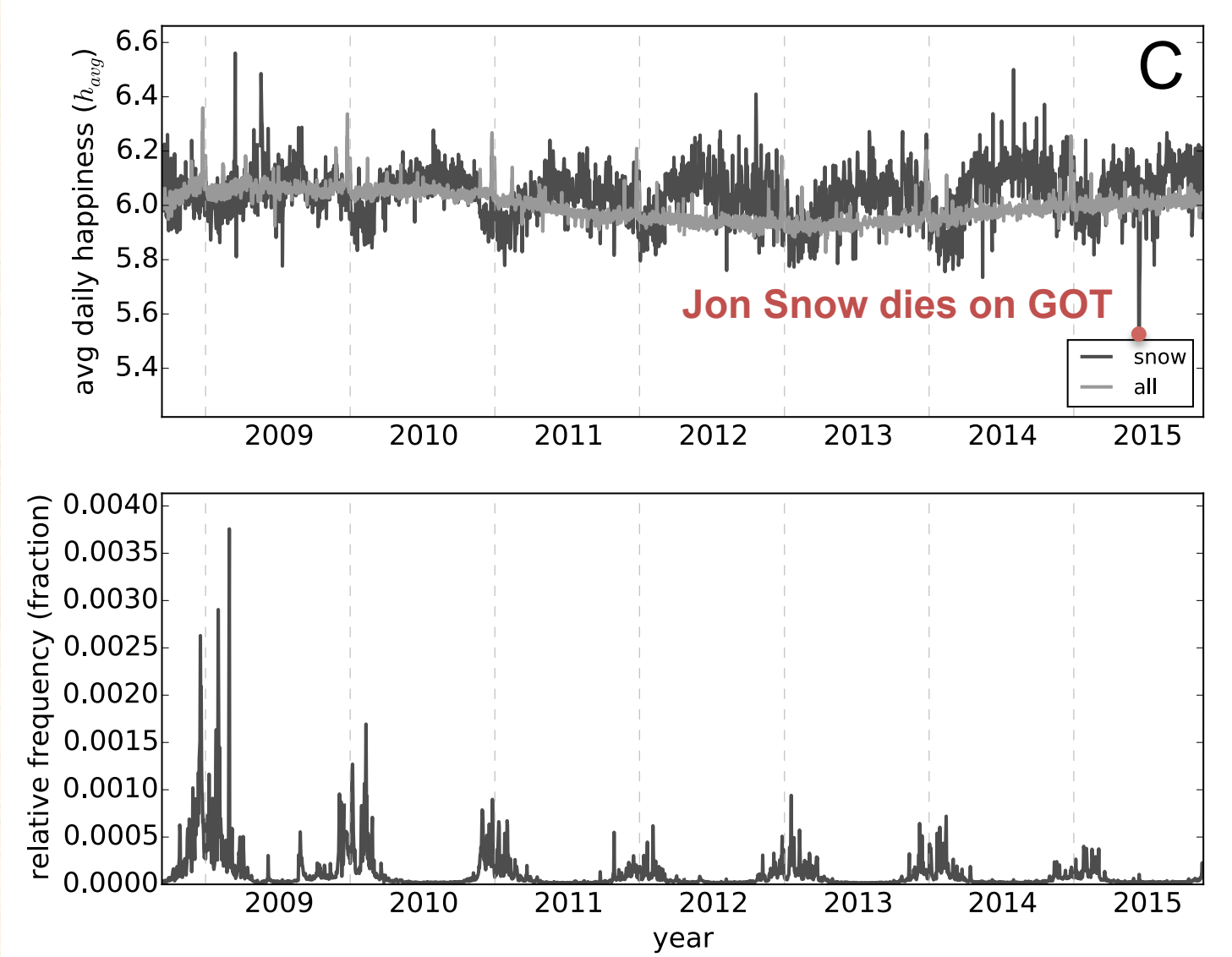
Ambient happiness for “snow”:



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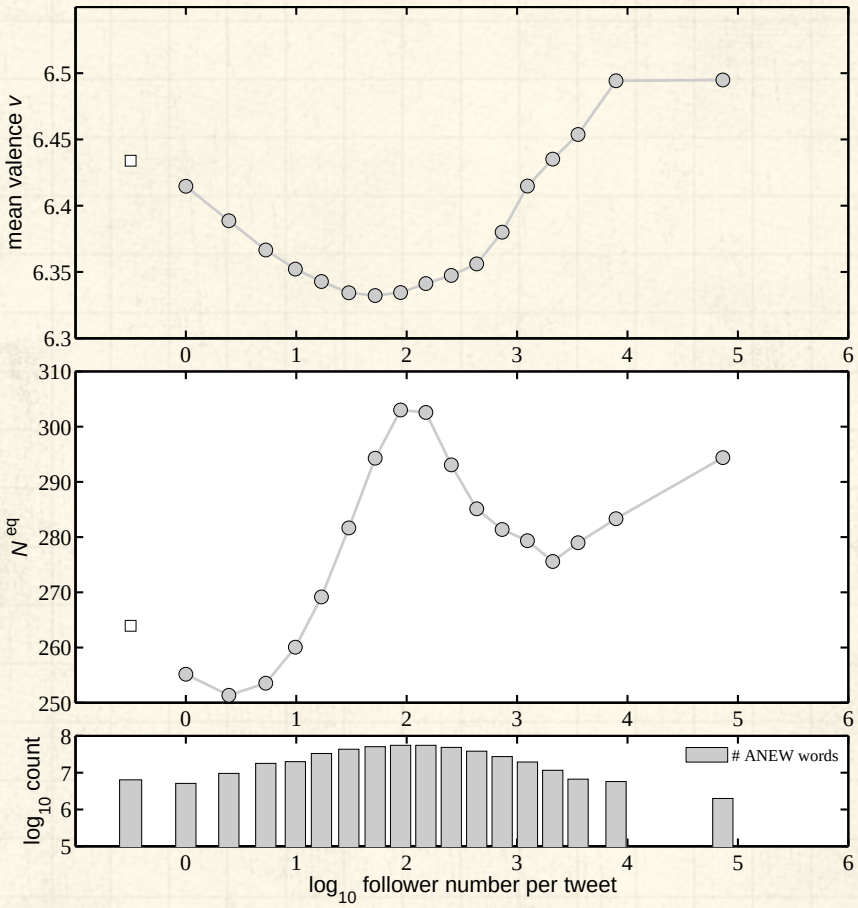
Dunbar number action:



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

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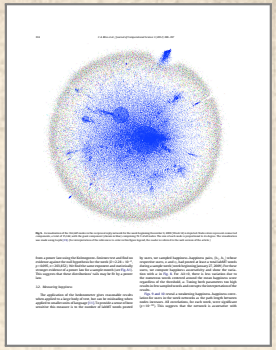
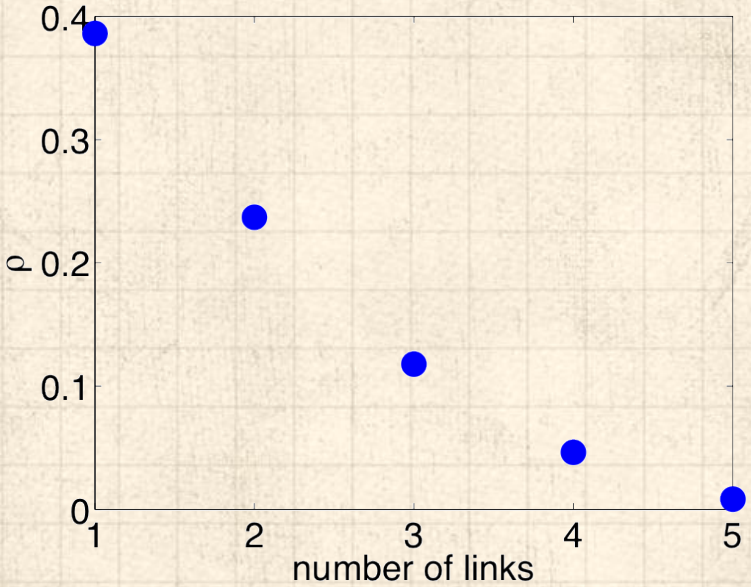


“Twitter reciprocal reply networks exhibit assortativity with respect to happiness”

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



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

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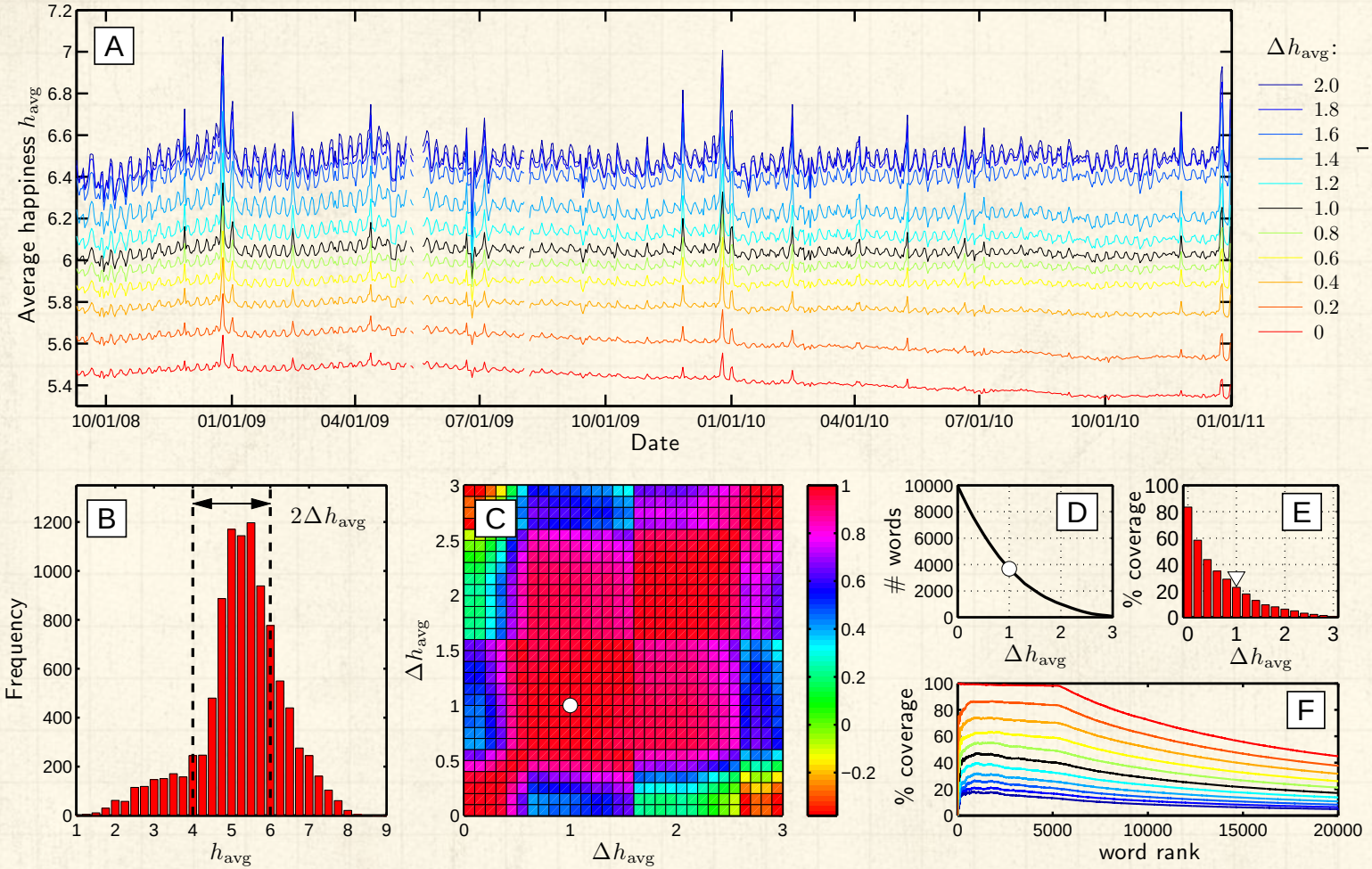
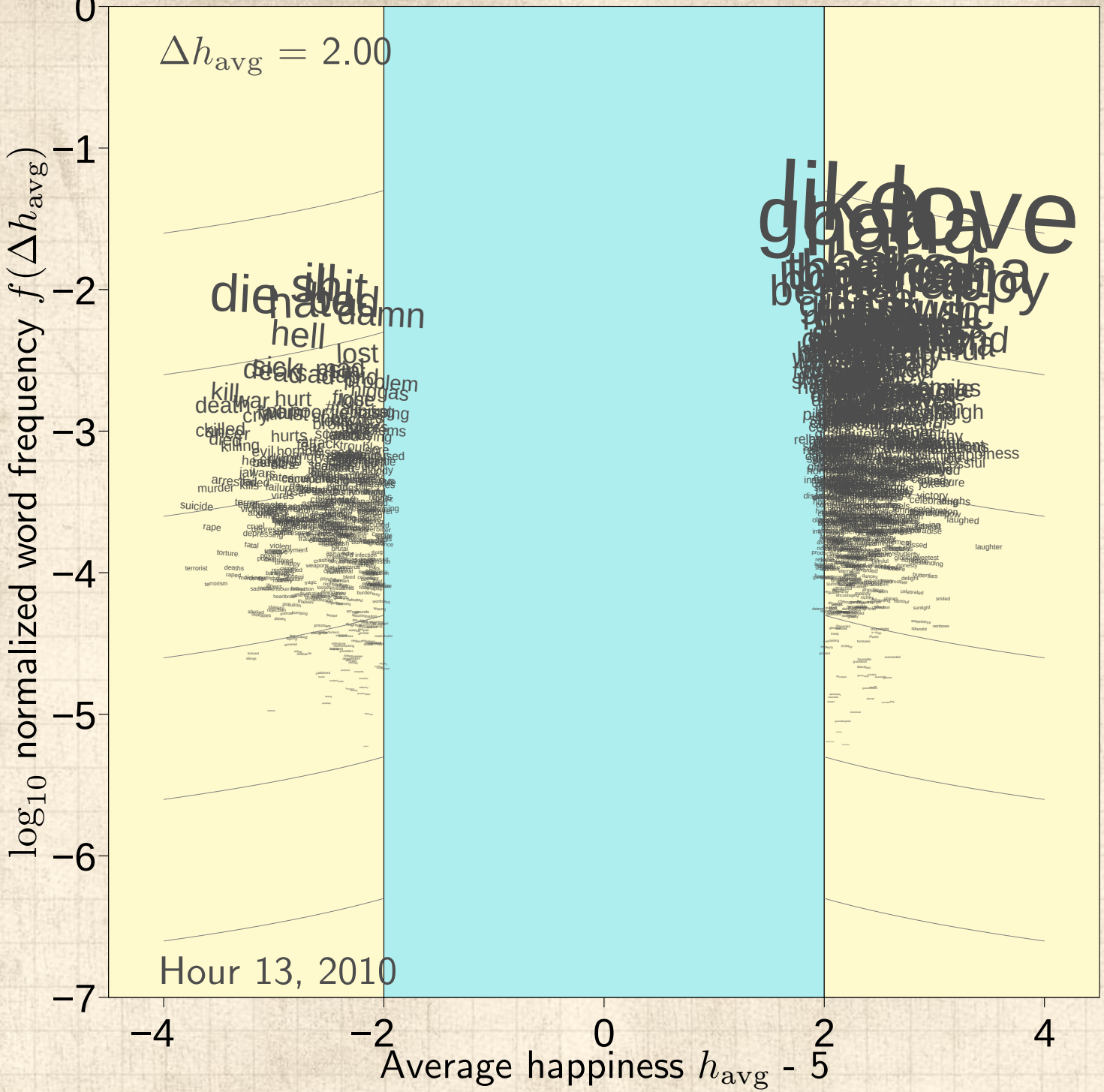
The very surprising tunable hedonometer:





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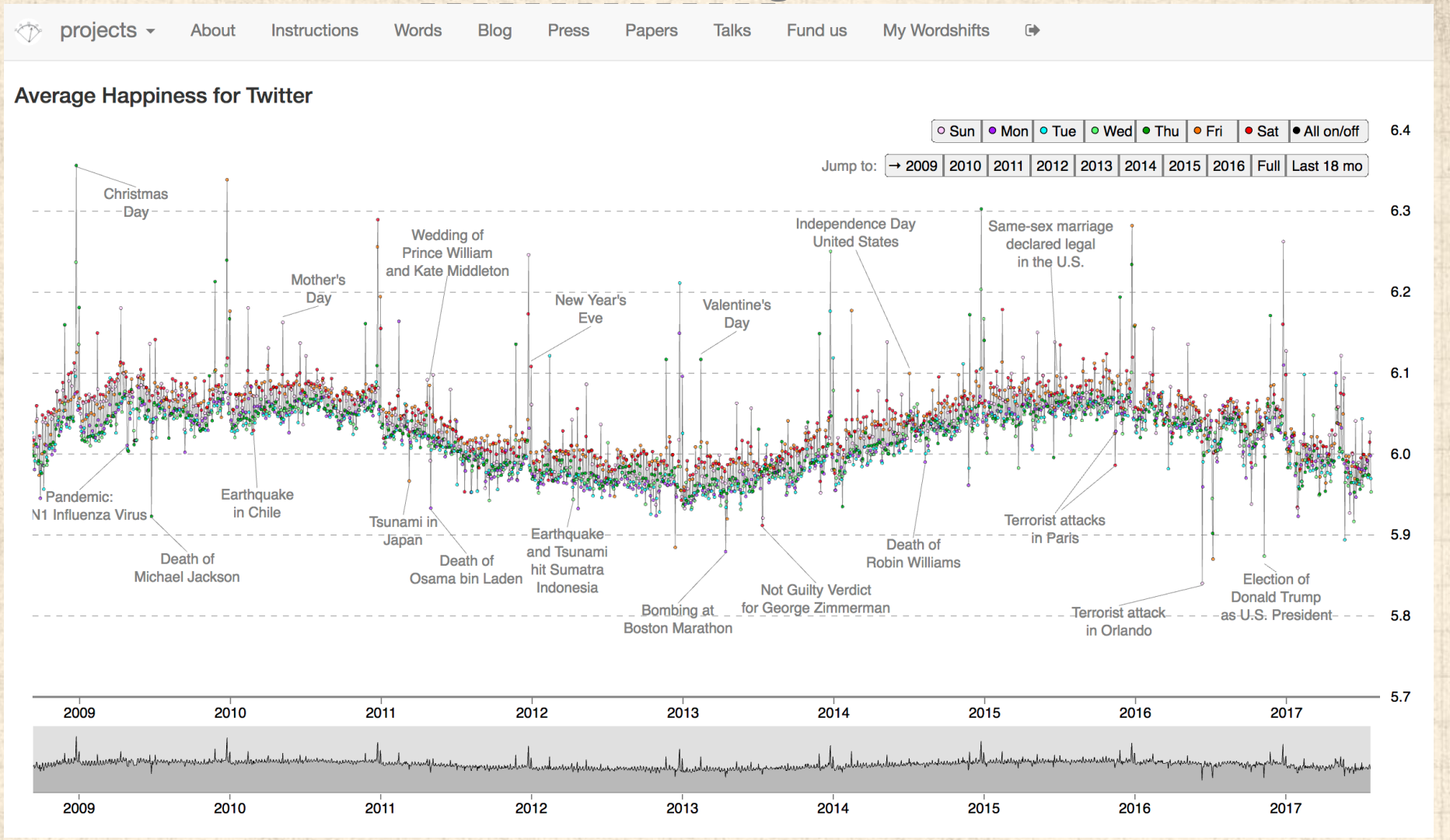
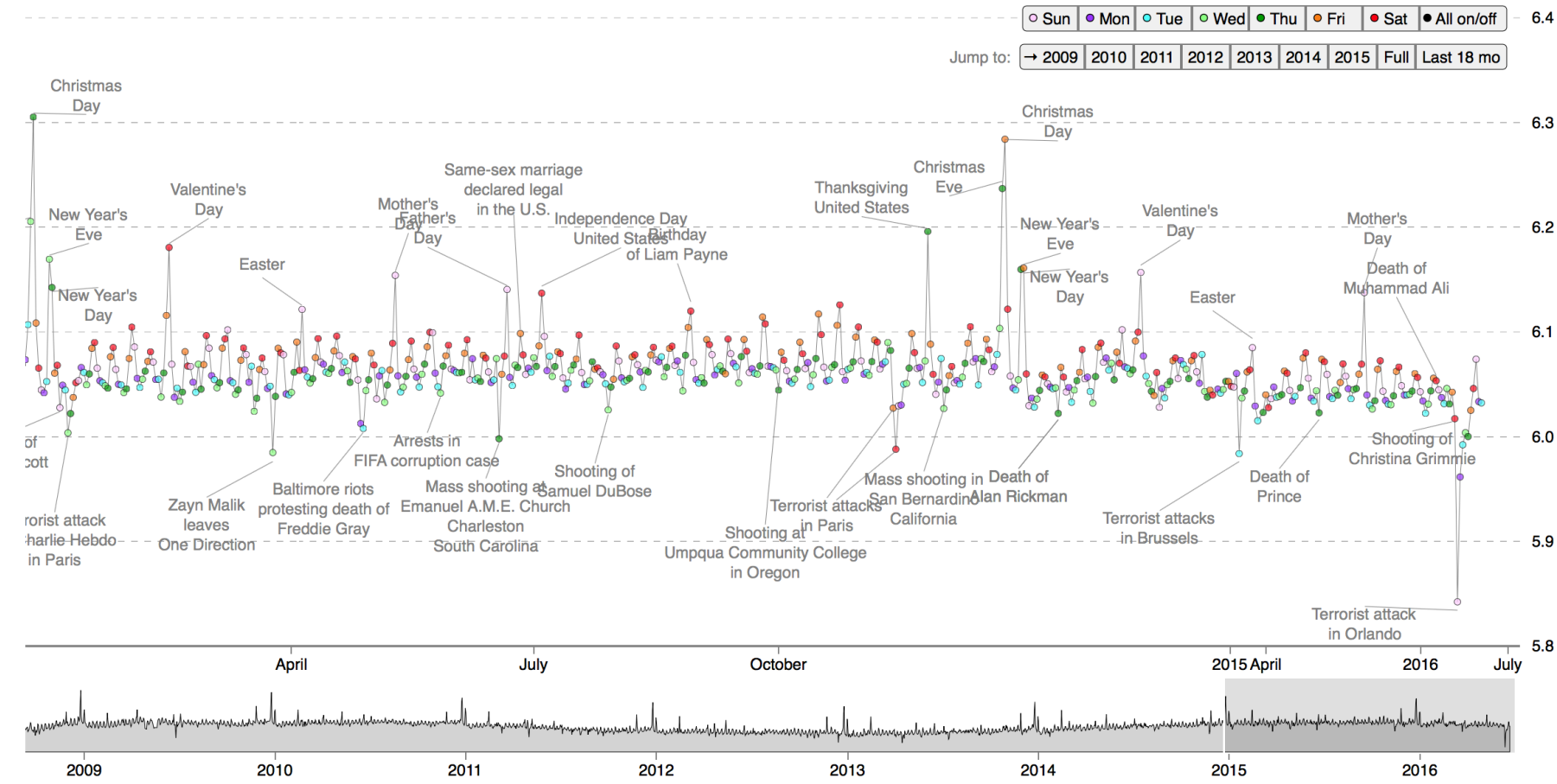
Online instrument: hedonometer.org



- Machine: @andyreagan
- Planned happiness versus tragedies.

hedonometer.org

projects About Instructions Words Blog Press Papers Talks Fund us



Machine: @andyreagan

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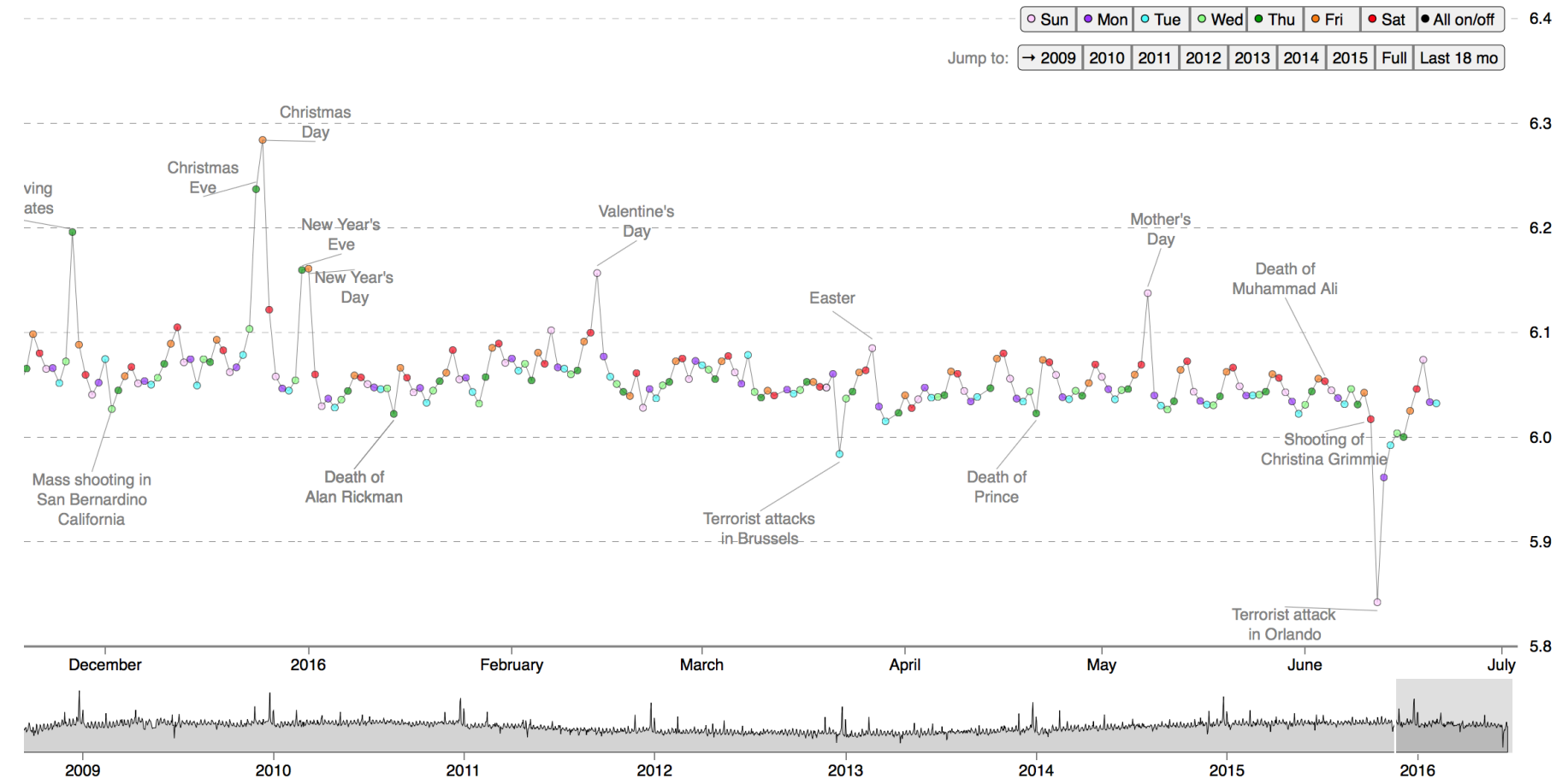

Machine: @andyreagan

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

Original tweet

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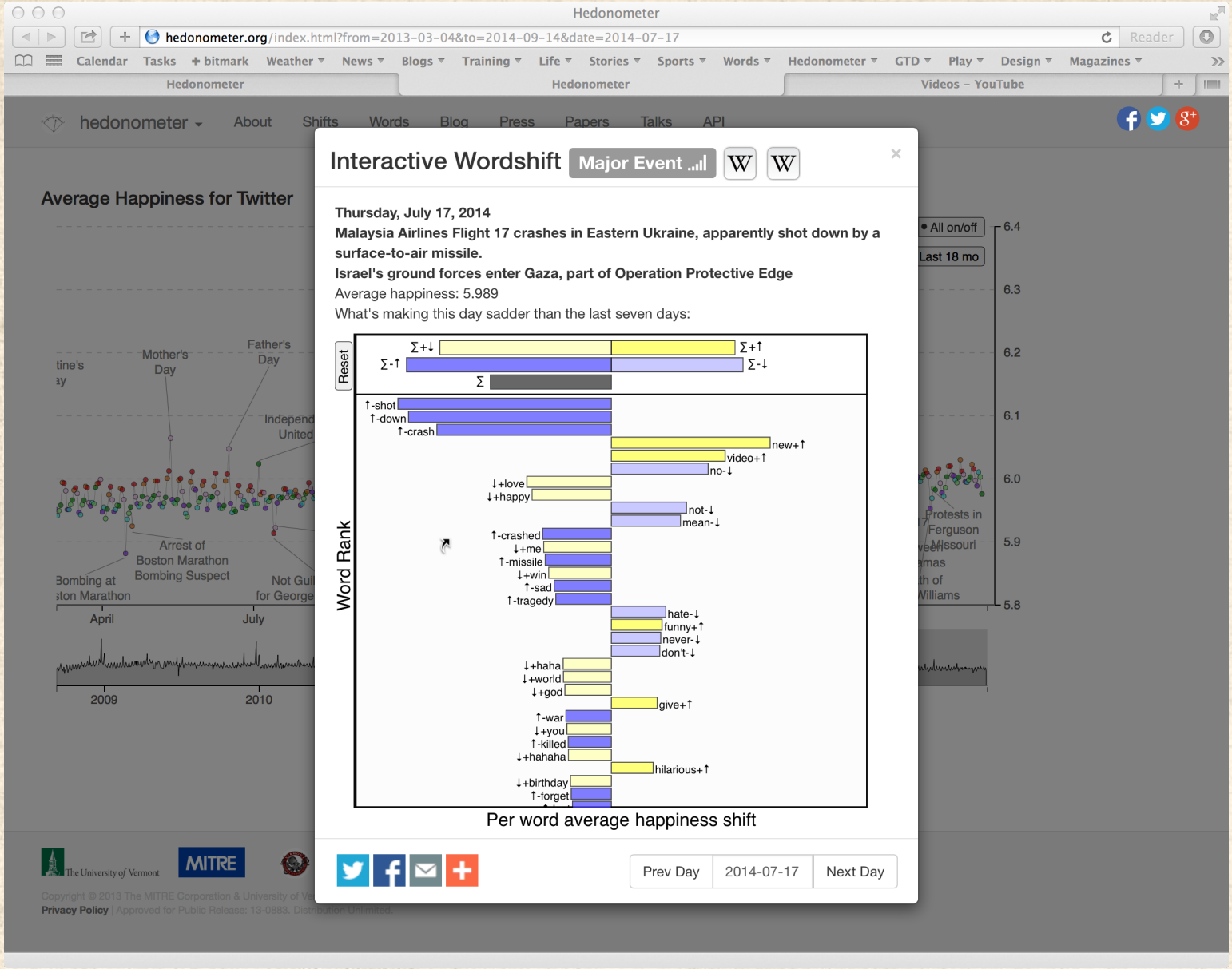
hedonometer.org—word shifts:



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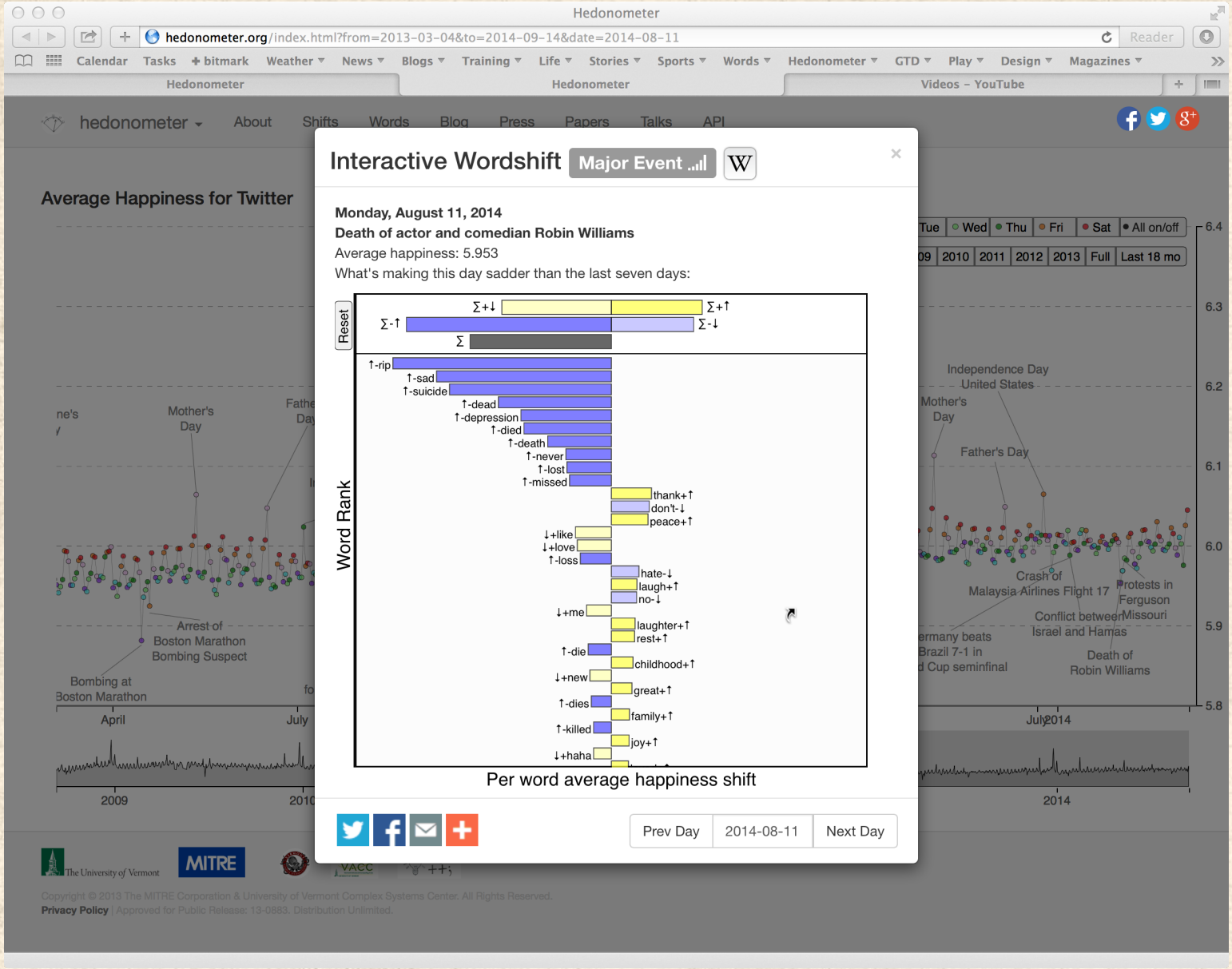

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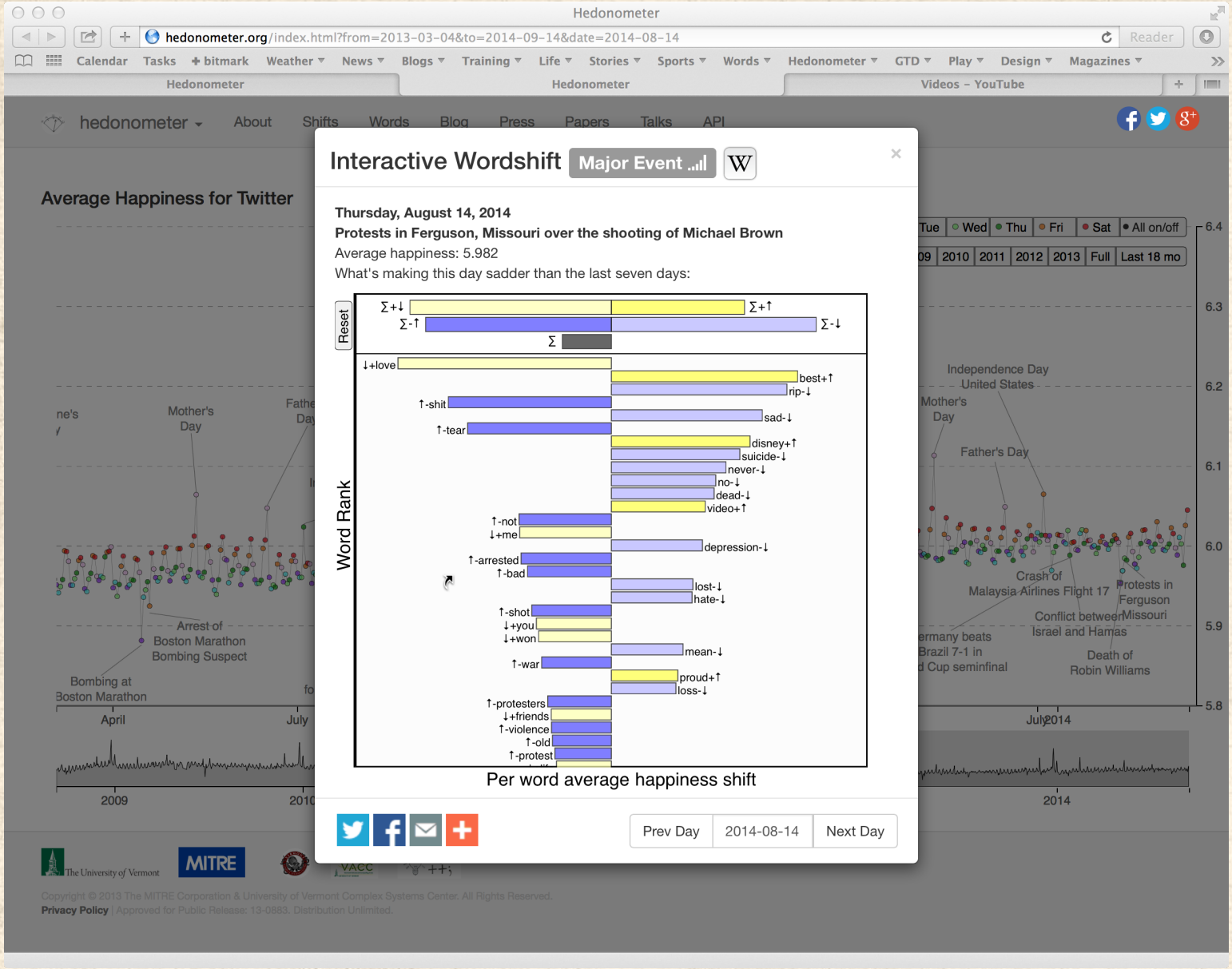

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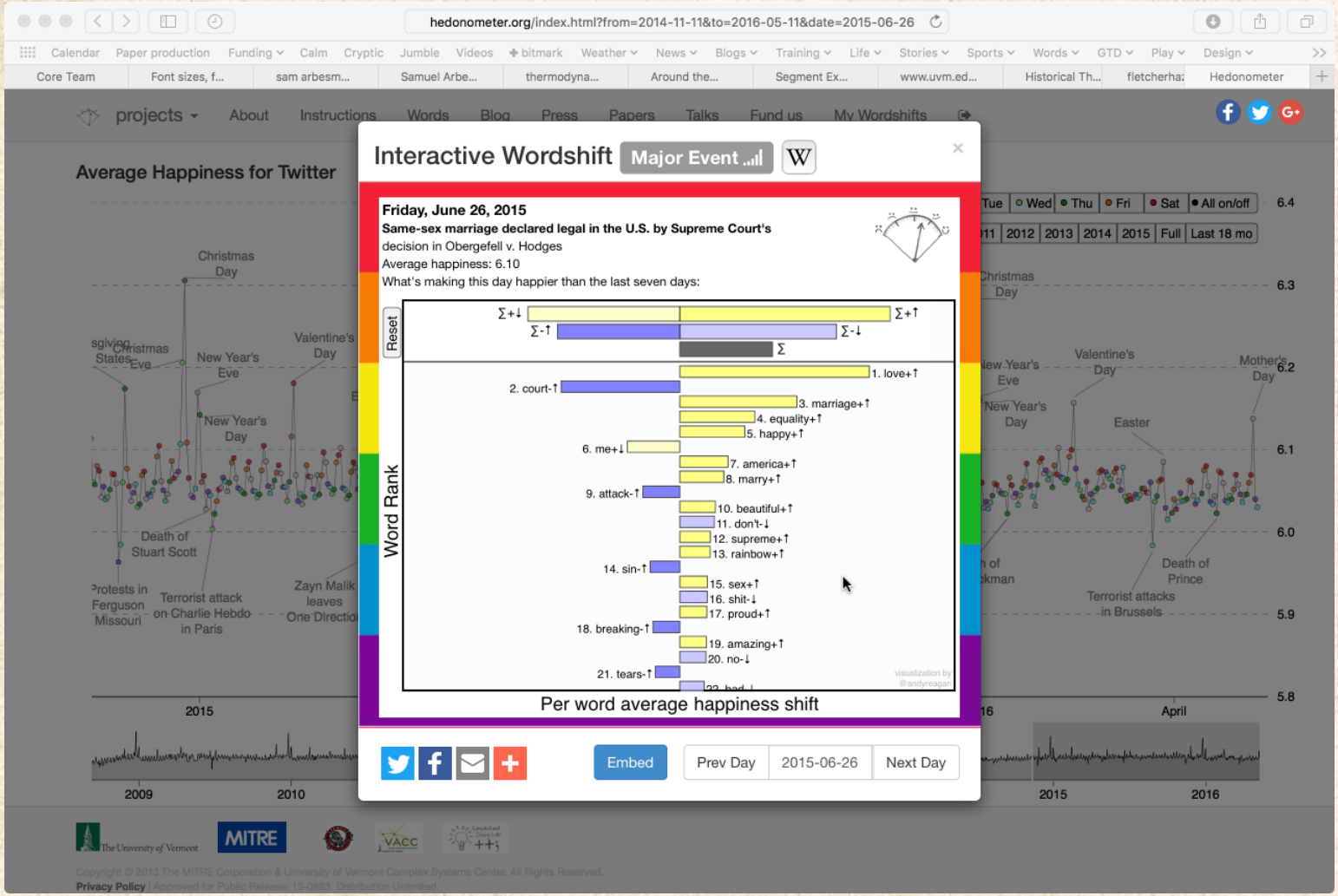

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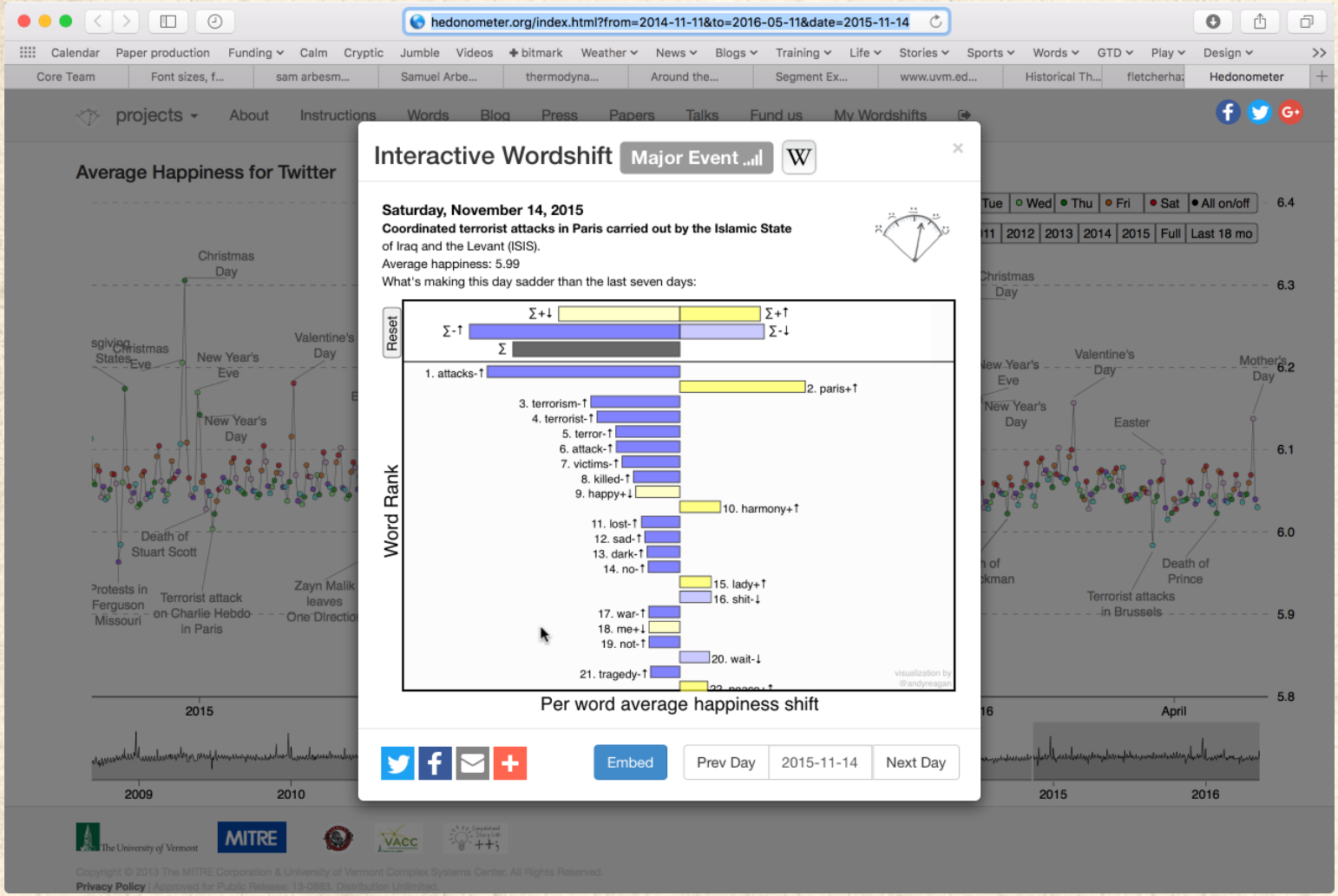

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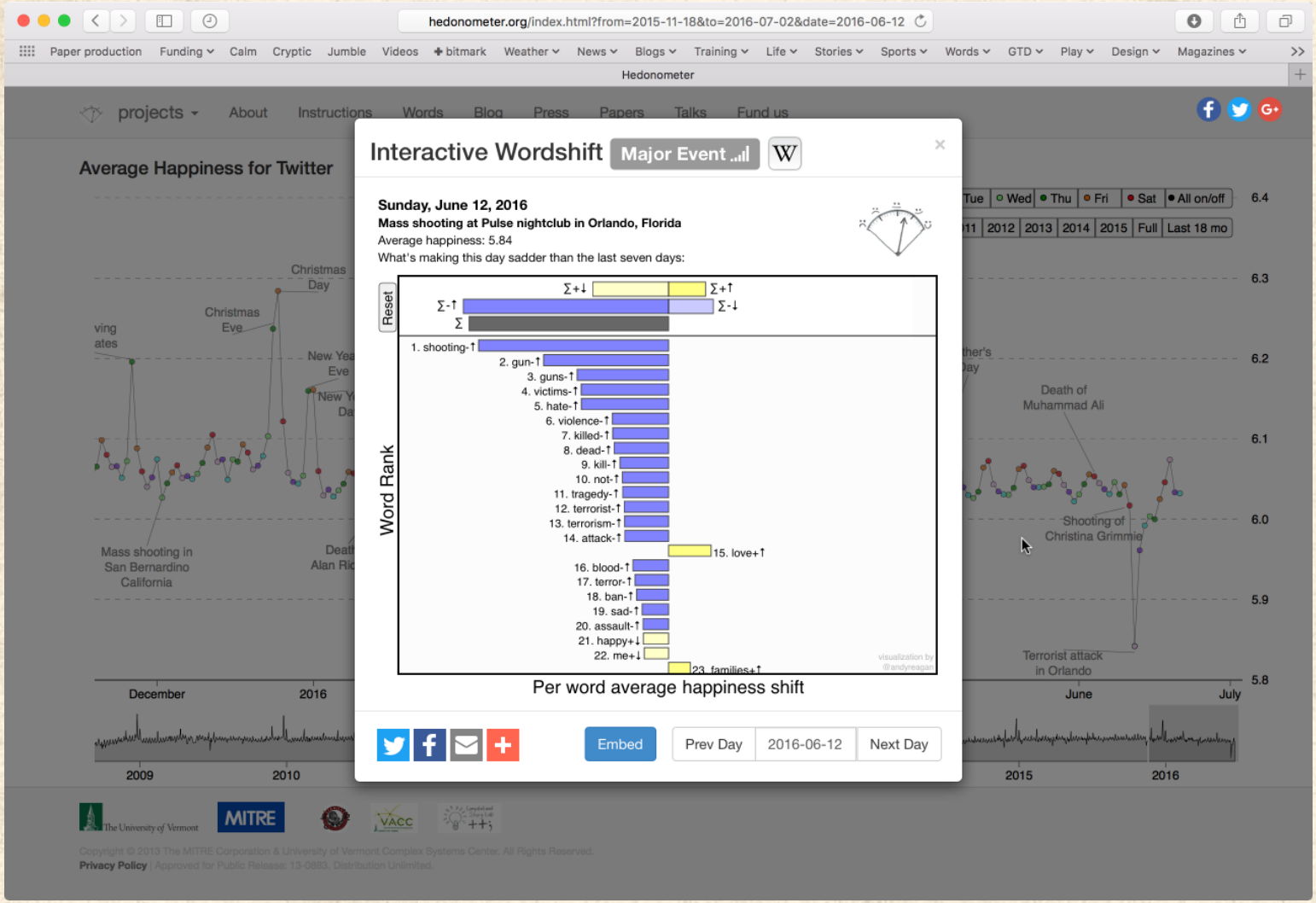

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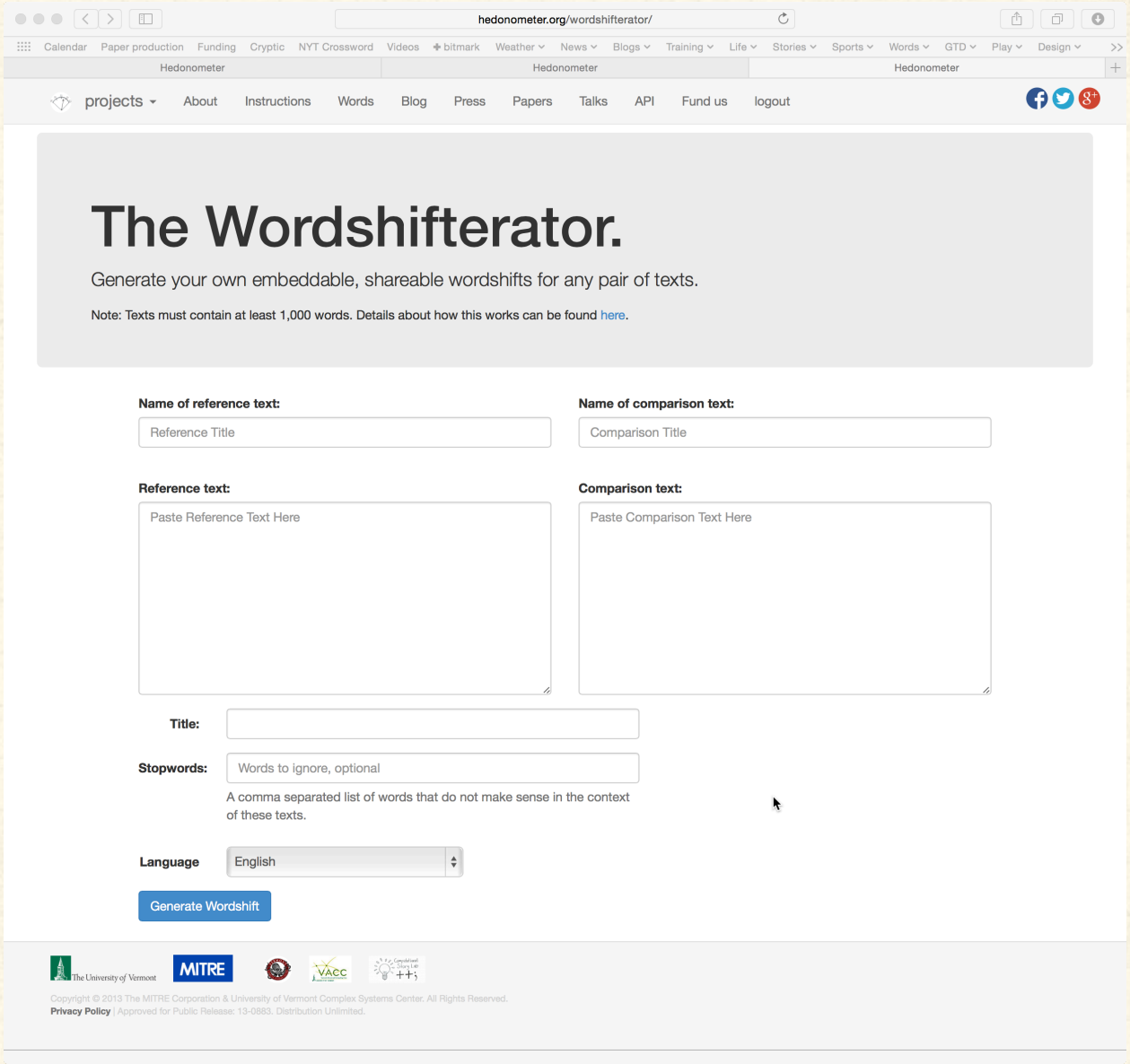
Make your own:



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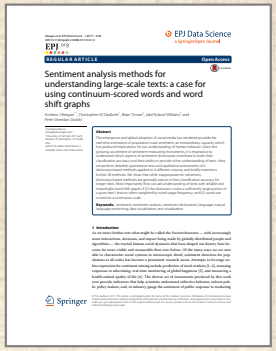
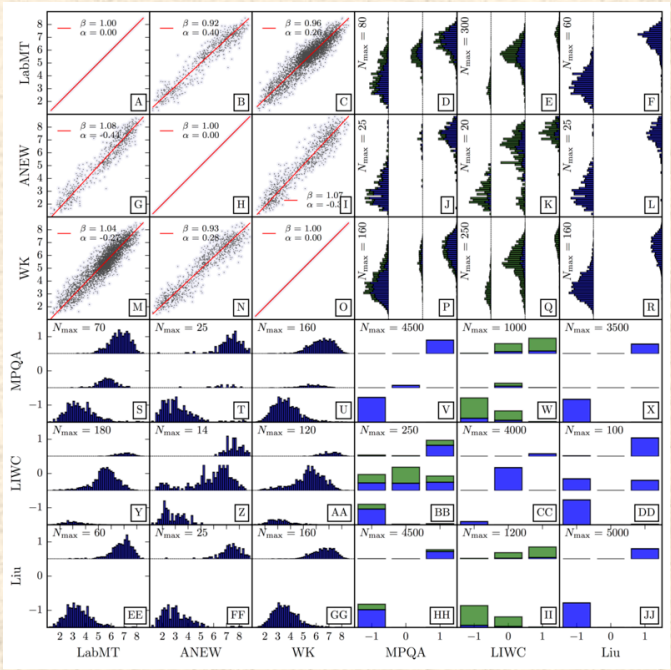
Quokka Labs



"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 ...

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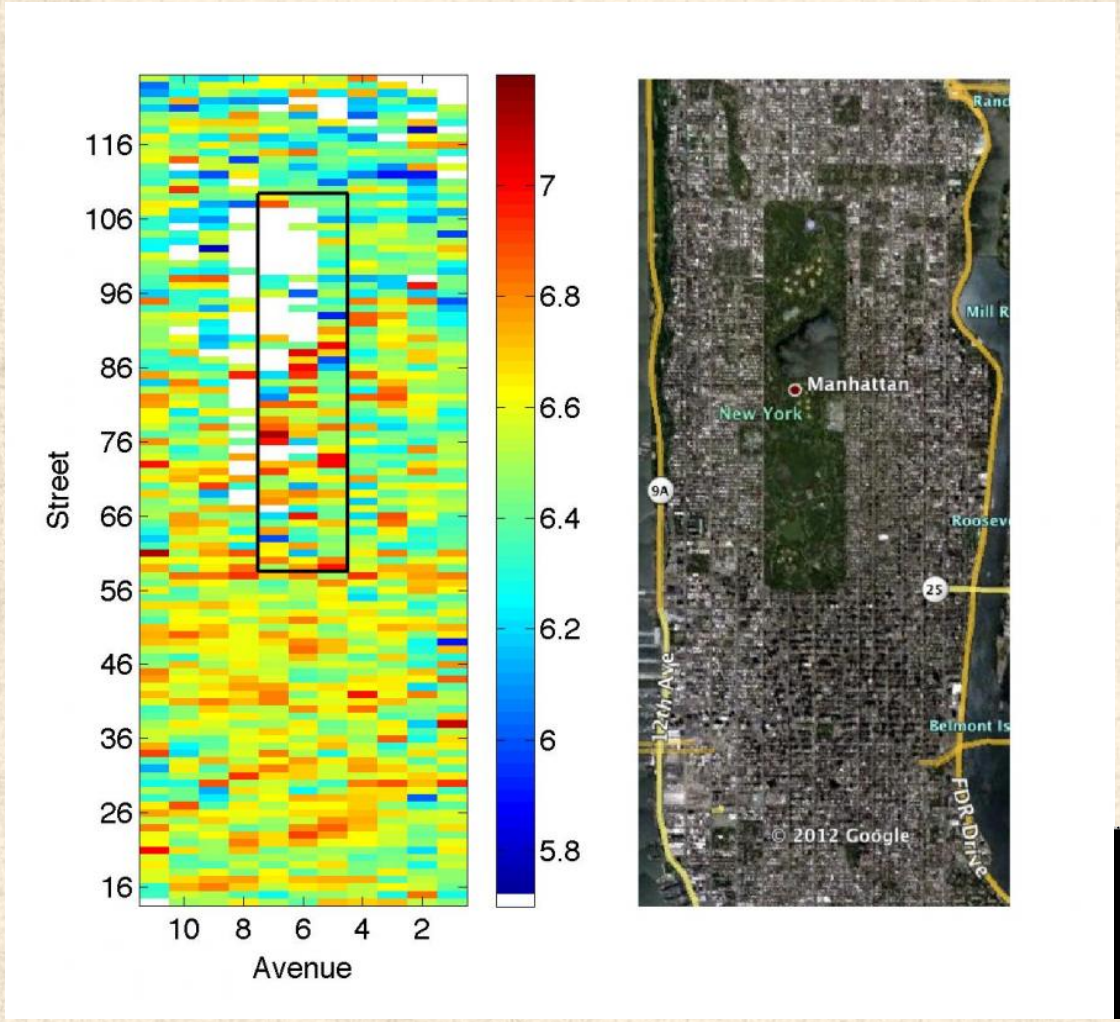
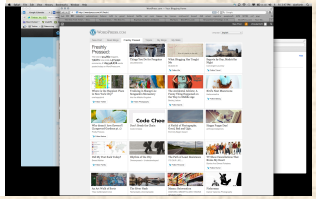
Happiness in Manhattan:





See Blog post on compstorylab.org

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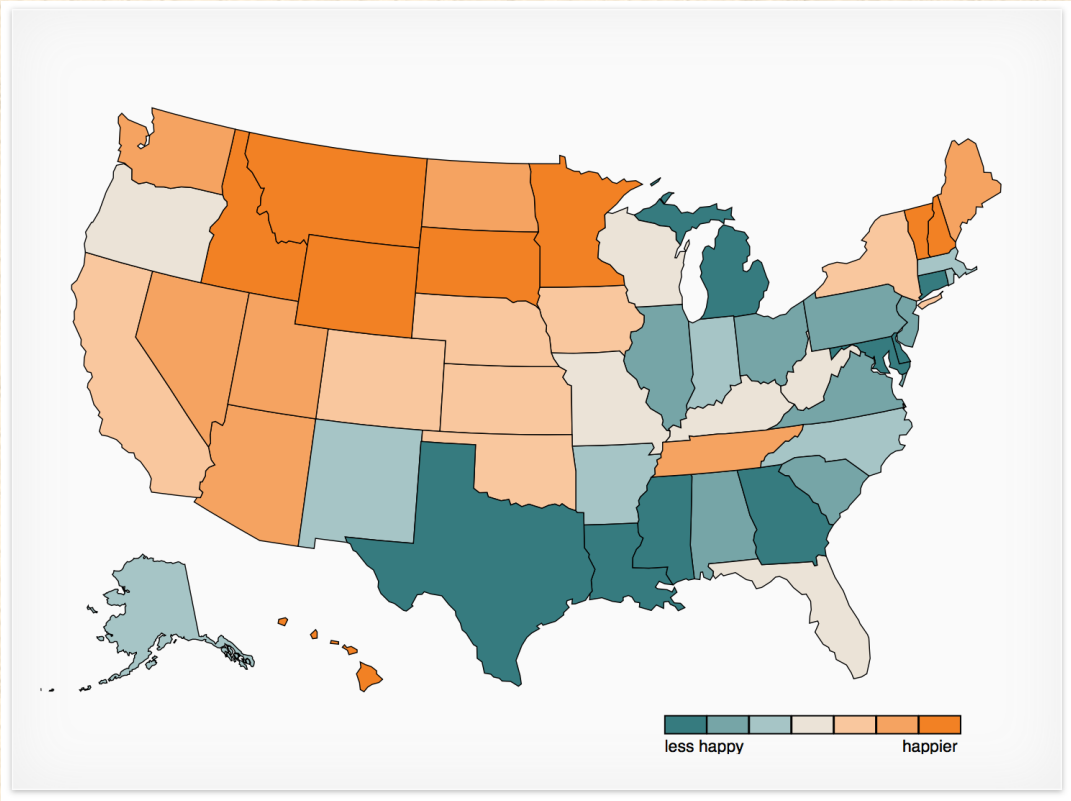
The Geography of Happiness:



- 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

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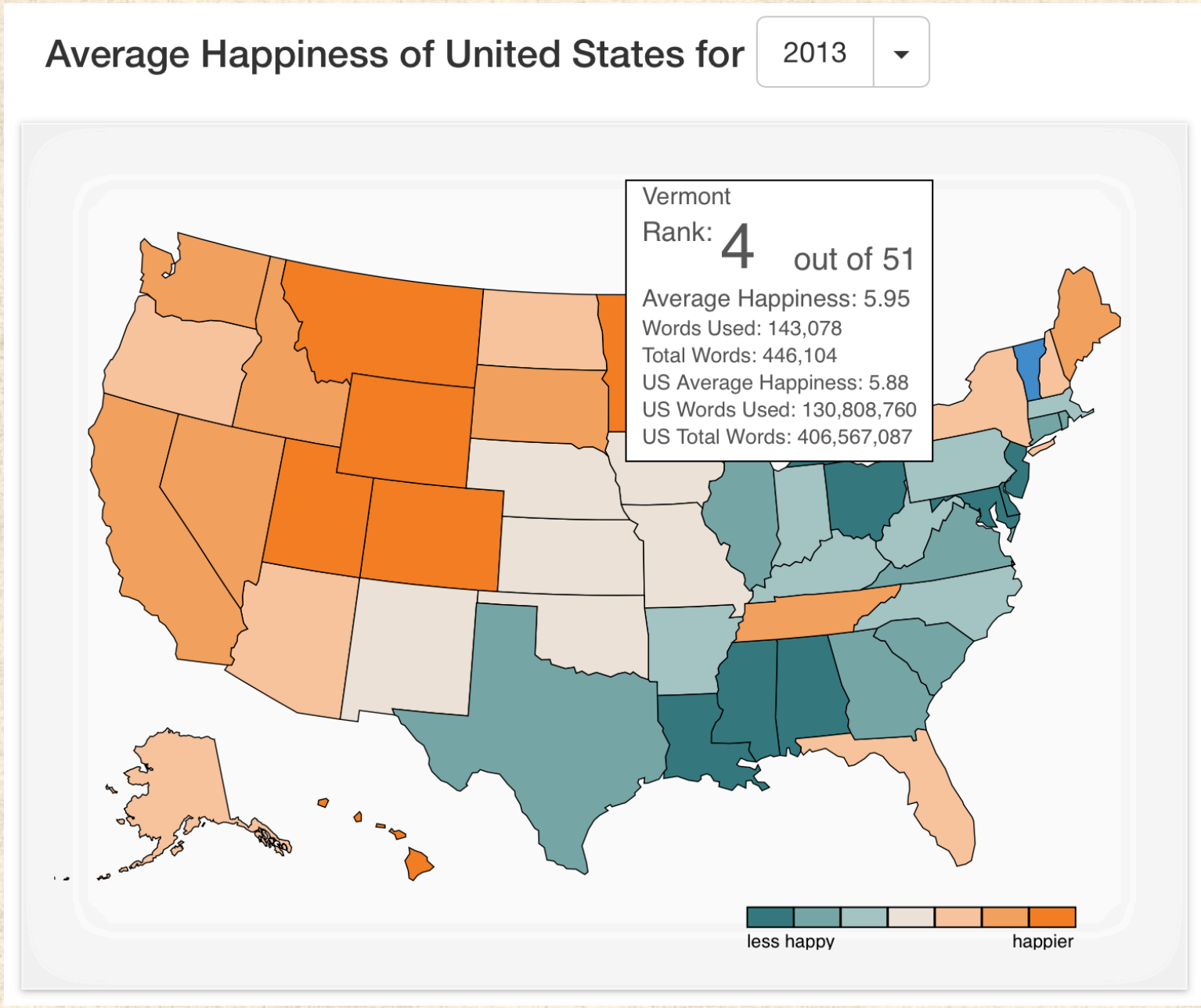

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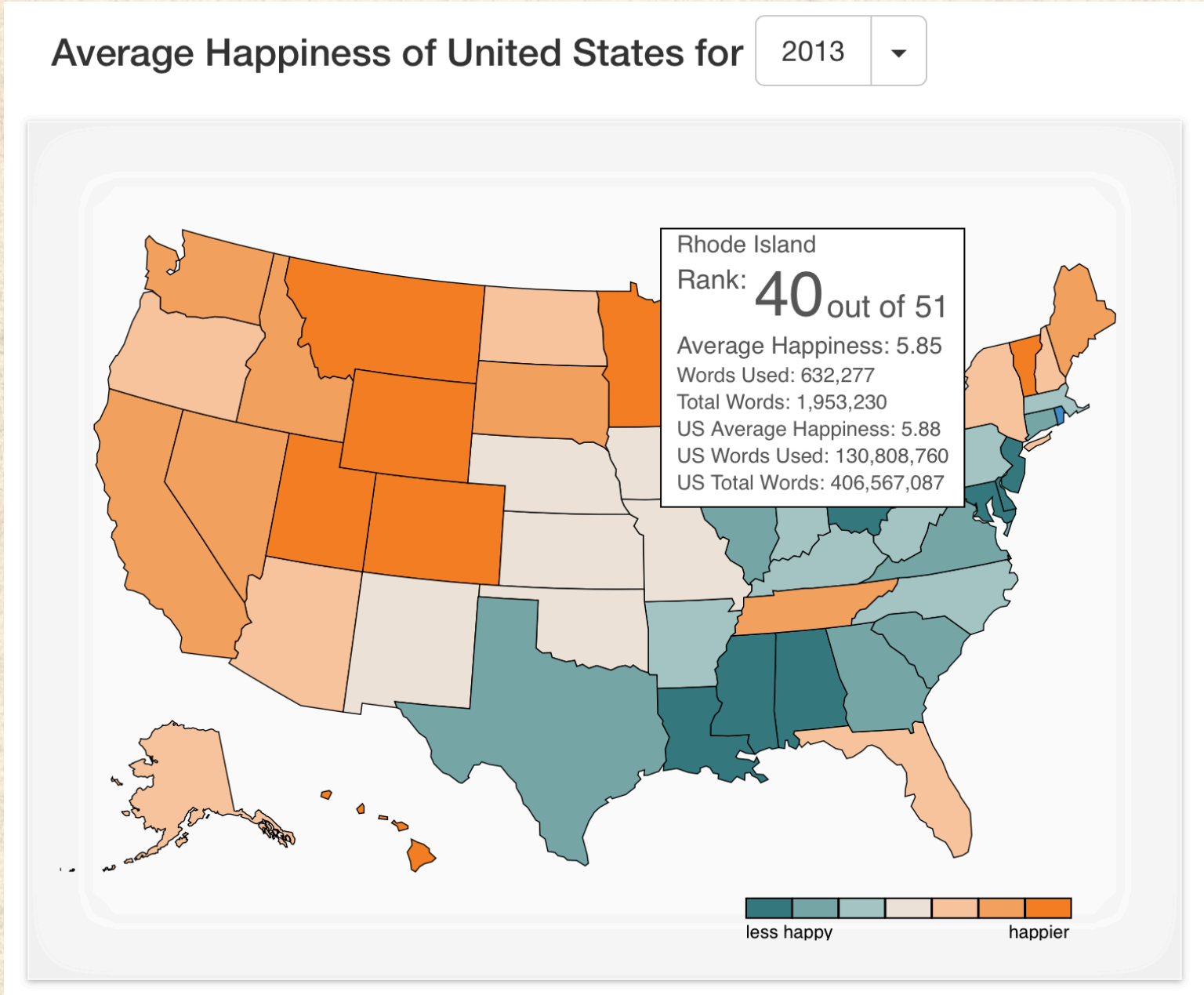

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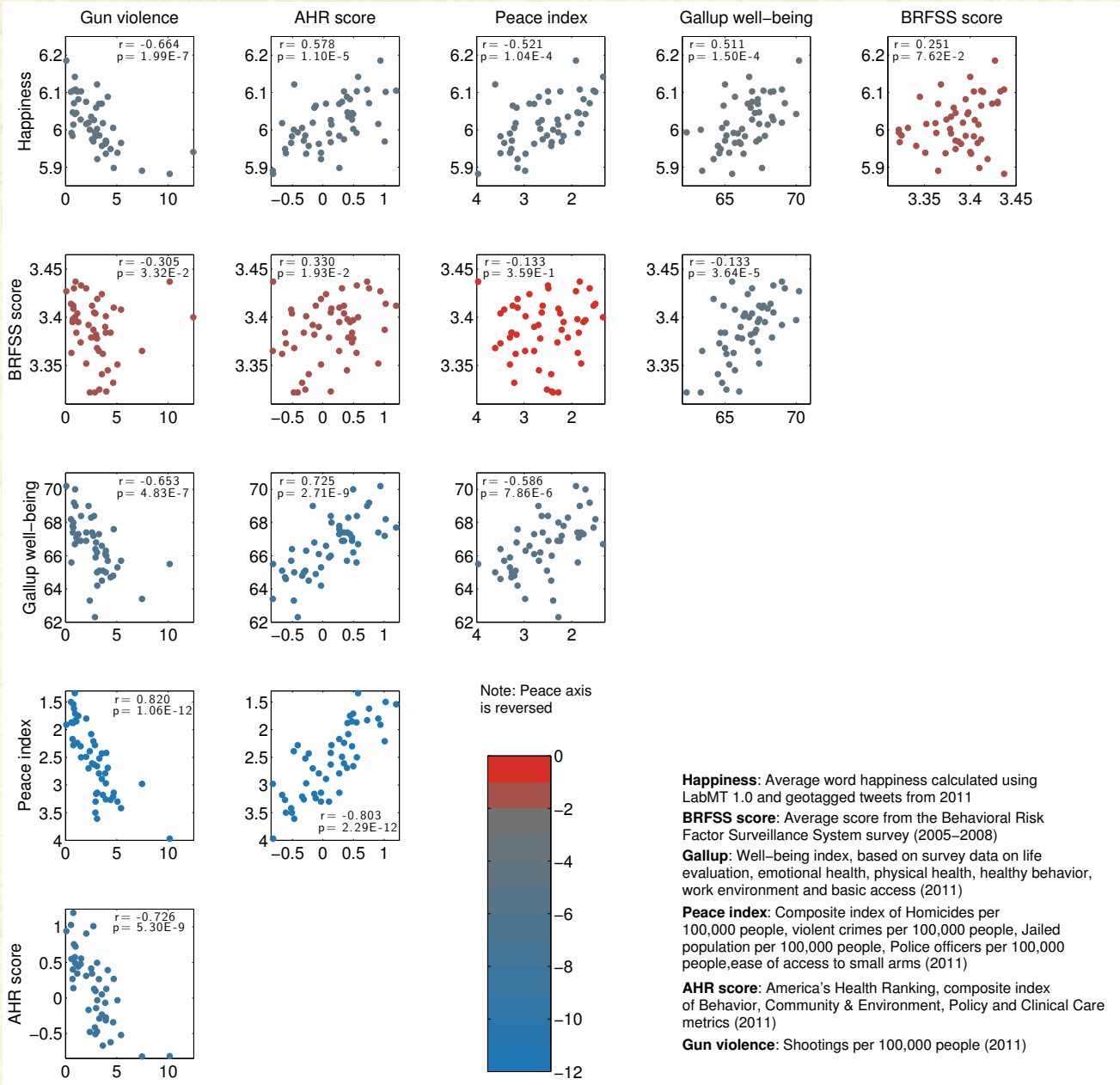

FIG. 2: Scatter plot matrix of correlations between different well-being measures. Points are colored by p-value, statistically insignificant correlations above $p = 0.01$ are shown in red. Spearman's r and p-value are reported in the inset.

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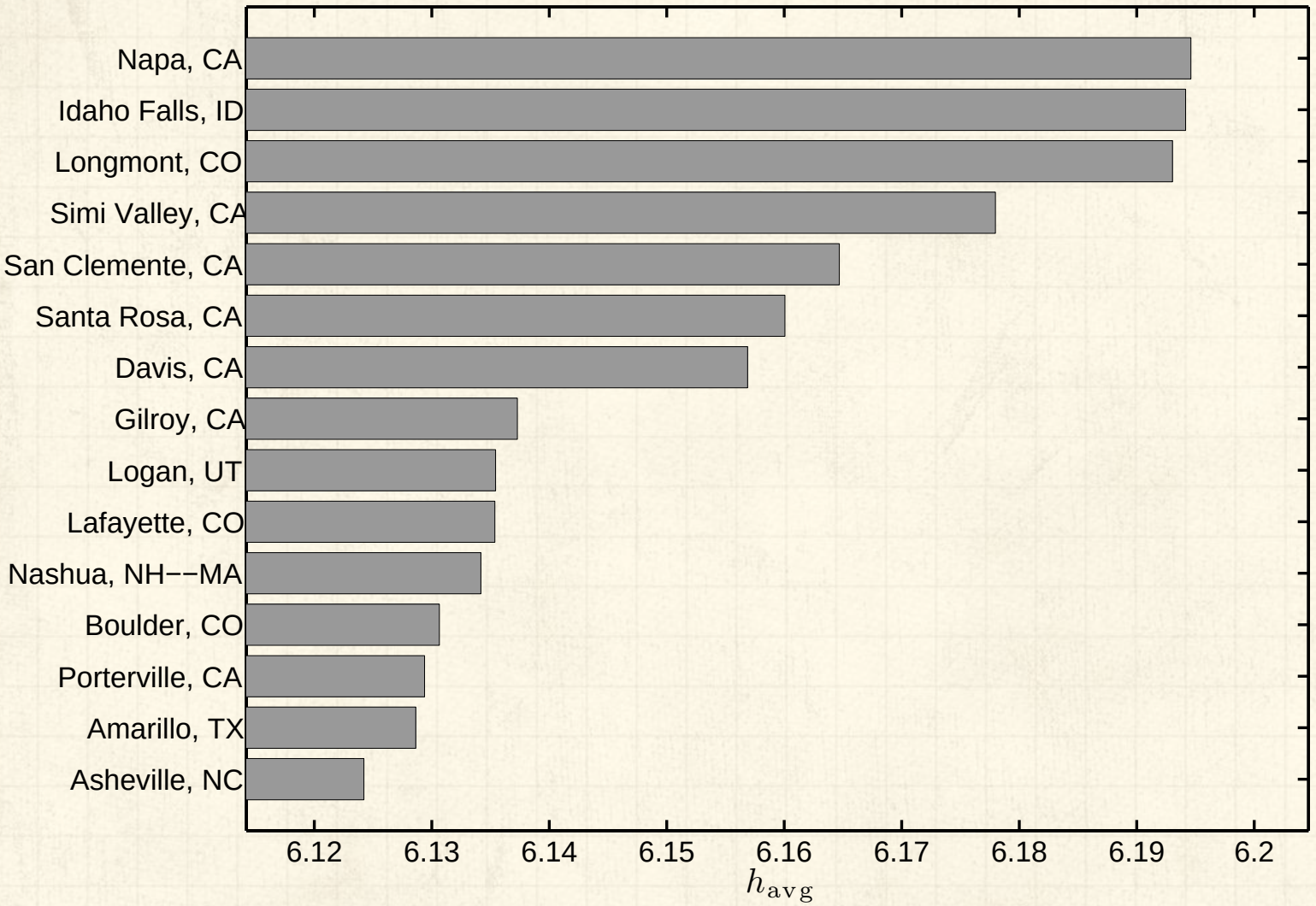
Happiest Cities:



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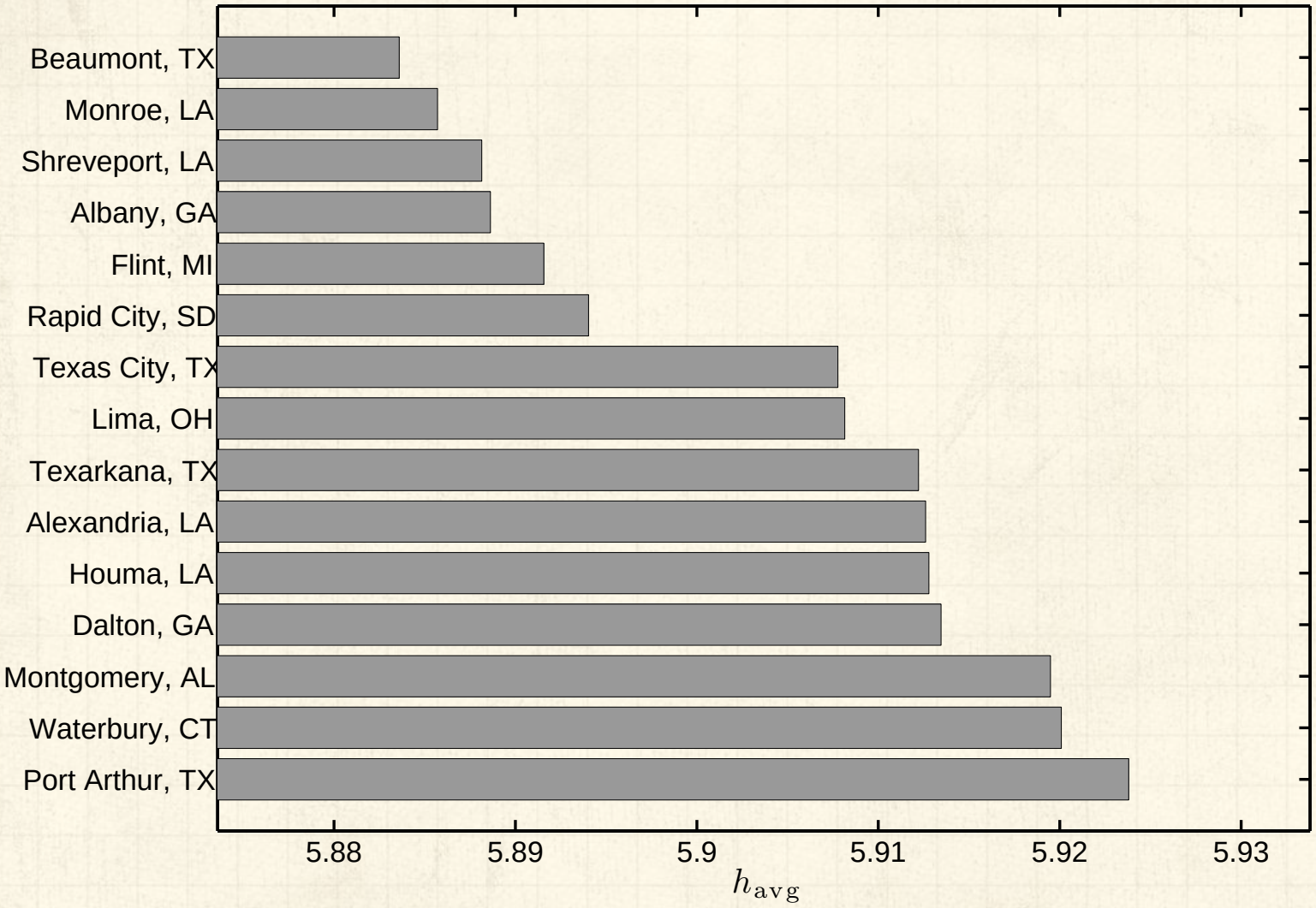
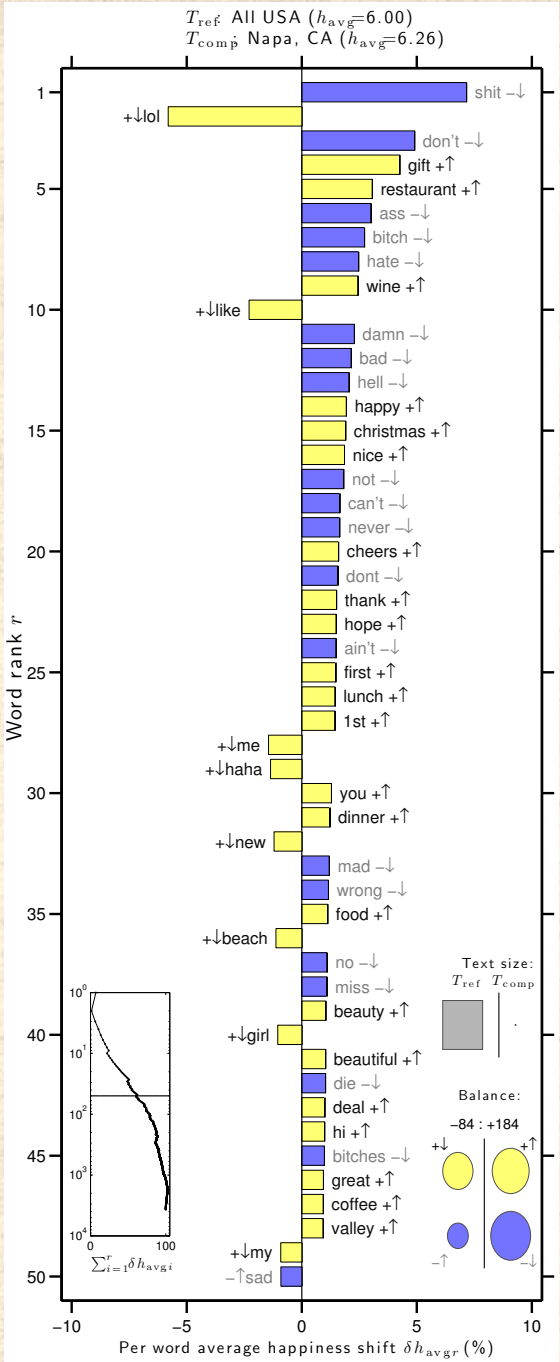
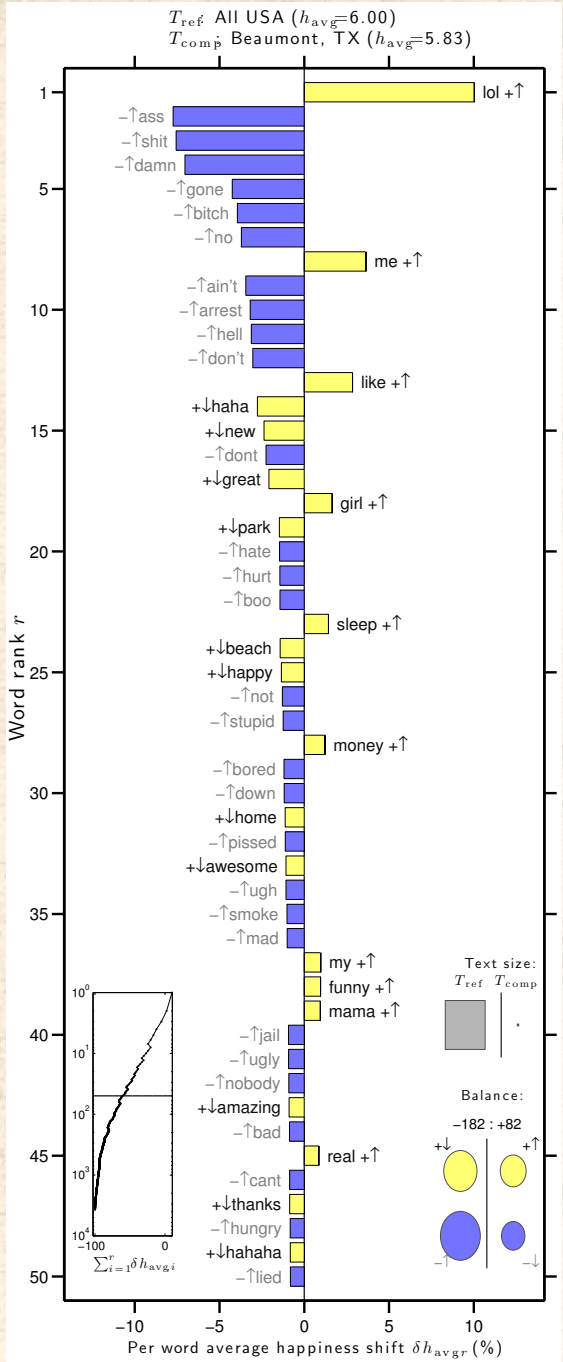
Saddest Cities (Sorry Beaumont):







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rednnneecckckkkkkkkk

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?

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ONE WAY
Beaumont
is
not
sad

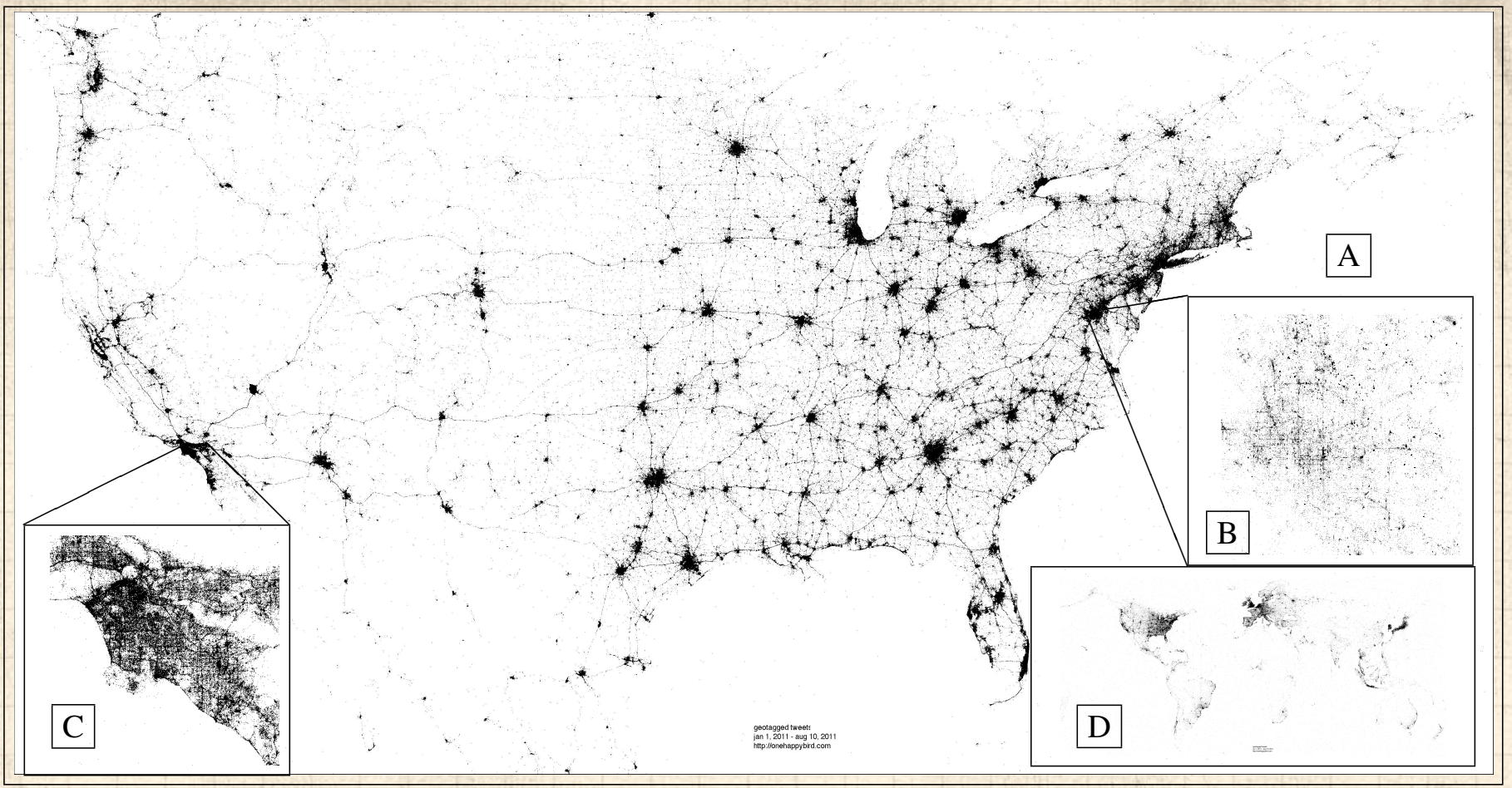
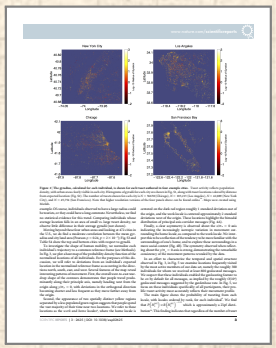


Figure 1. Each point corresponds to a geo-located tweet posted between 1/1/11 and 8/10/11. Twitter activity seems to correlate with urban areas. Note that the image contains no cartographic borders, simply a small dot for each message. Insets: **A** (U.S.), **B** (Washington, D.C.), **C** (Los Angeles,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

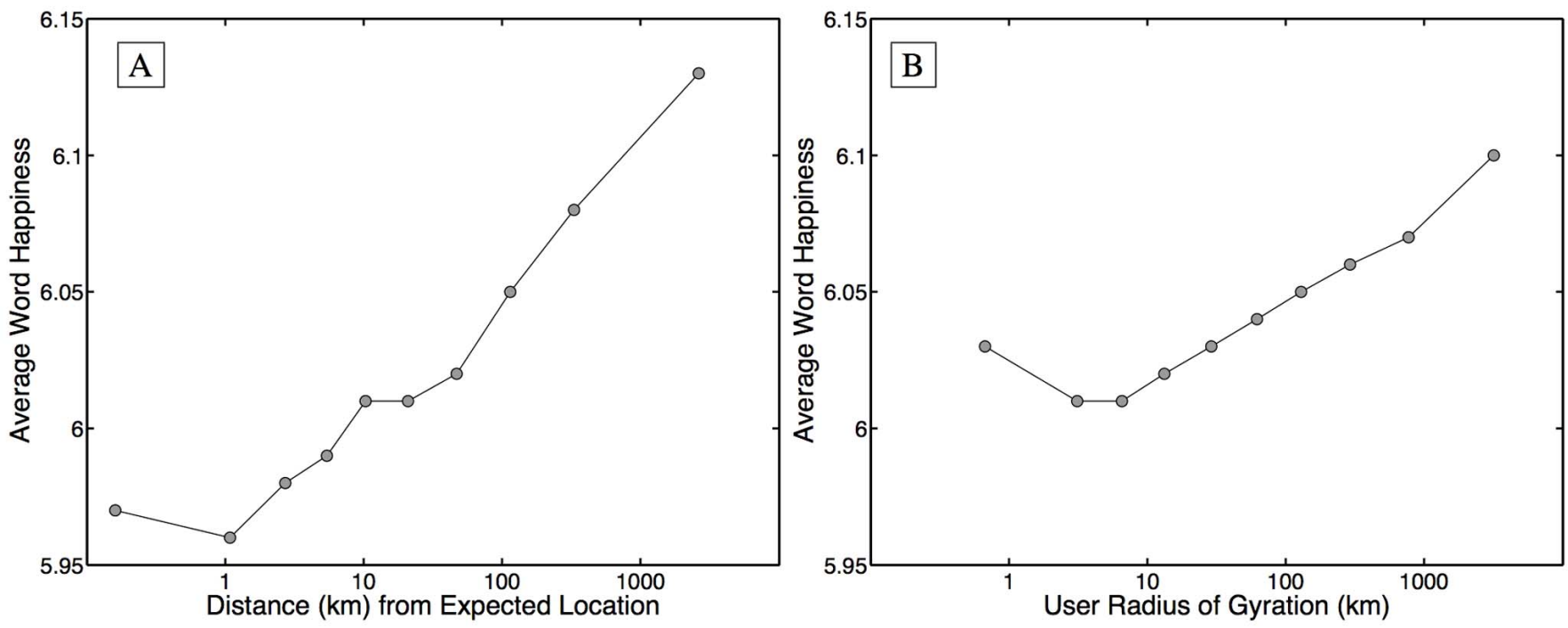
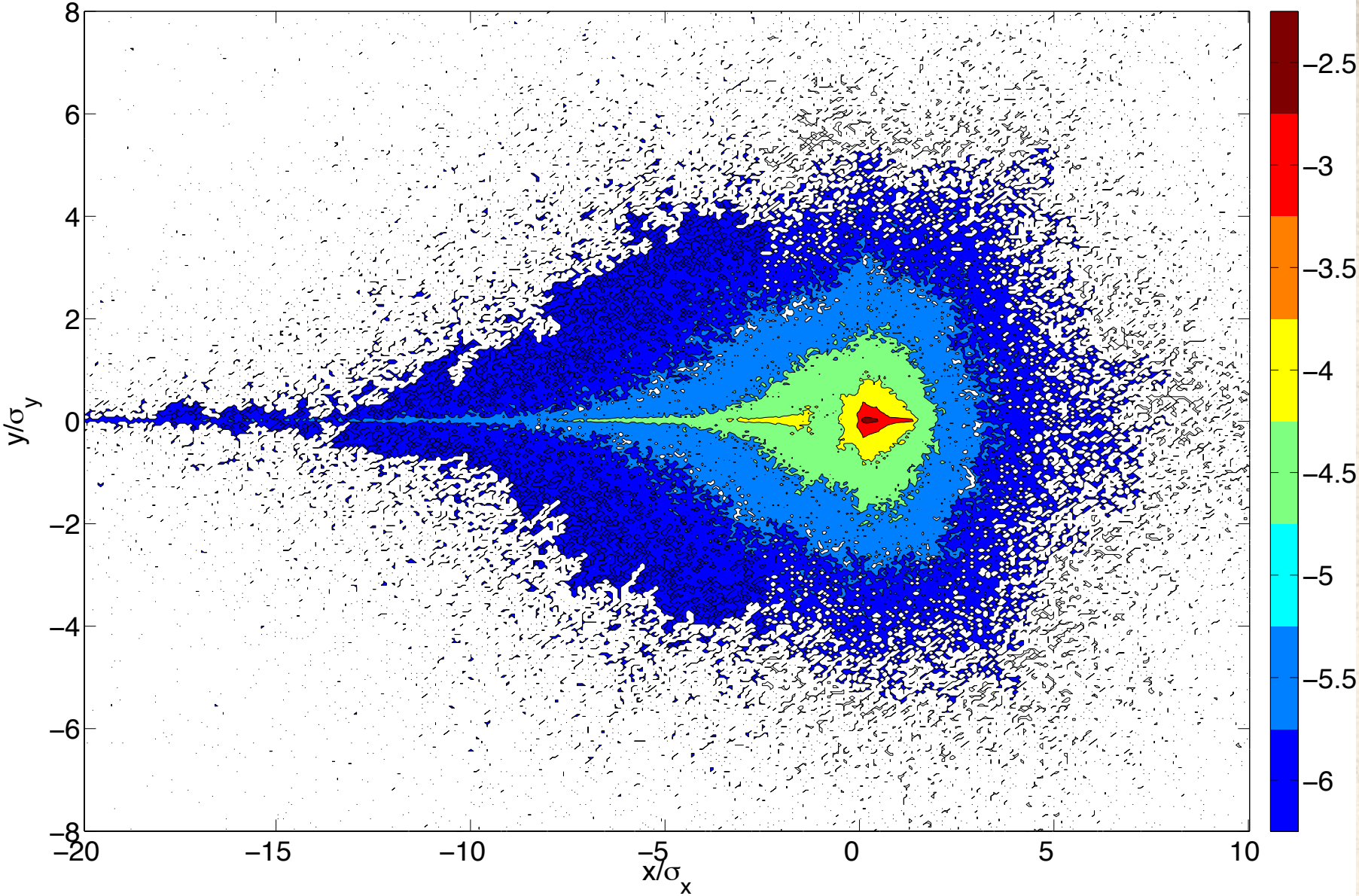


Figure 6 | (A) Average happiness of words written as a function of distance from an author's expected location, with tweets grouped into ten equally populated bins. Expressed happiness grows logarithmically with distance distance from expected location. (B) A similar trend is observed when individuals 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.



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