

# Finding Happiness

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

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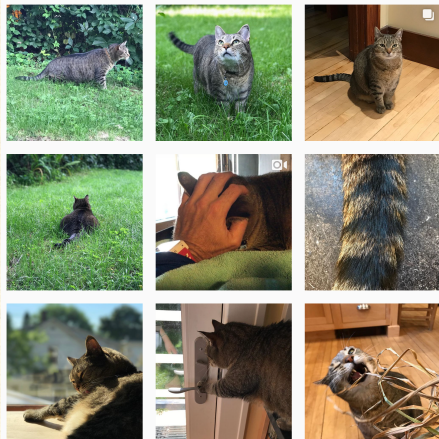
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## The Boggoracle Speaks:



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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. <sup>[11]</sup>




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



“Positivity of the English language” , Kloumann et al., *PLoS ONE*, **7**, e29484, 2012. <sup>[28]</sup>




“Human language reveals a universal positivity bias” , Dodds et al., *Proc. Natl. Acad. Sci.*, **112**, 2389–2394, 2015. <sup>[10]</sup>






## 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. <sup>[37]</sup>



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



“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. <sup>[9]</sup>

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Alan Greenspan (September 18, 2007):



<http://wikipedia.org>



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



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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>



# Economics, Schmeconomics

Greenspan continues:

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# Economics, Schmeconomics

Greenspan continues:

“The trouble is that we can’t figure that out. I’ve been in the forecasting business for 50 years.

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“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.

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“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.





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# Economics, Schmeconomics

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 interview was once 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.



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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]





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Lord Kelvin (possibly):



“To measure is to know.”



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Lord Kelvin (possibly):



“To measure is to know.”



“If you cannot measure it, you cannot improve it.”

But also:



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🧩 “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.”



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“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.”



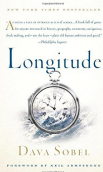
“X-rays will prove to be a hoax.”






## 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” [a](#)   
by Dava Sobel (2007).<sup>[39]</sup>


- 🧱 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 <sup>[22]</sup>  
per @SilverVVulpes : Also: Inventing Temperature, Hasok Chang, 2004 <sup>[3]</sup>



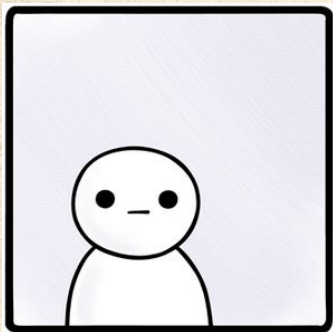
# Measuring temperature was thought impossible:

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 <sup>[22]</sup>  
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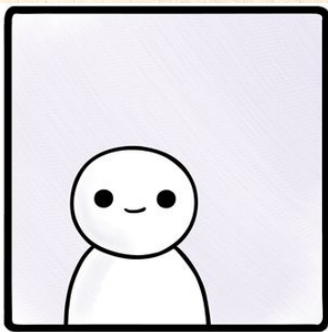
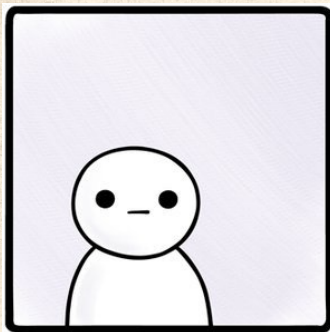




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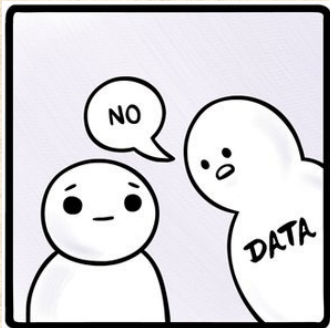
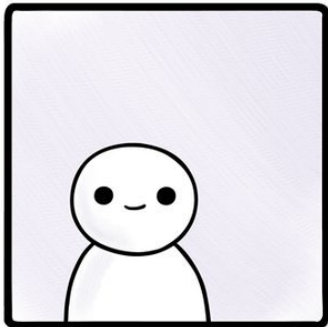
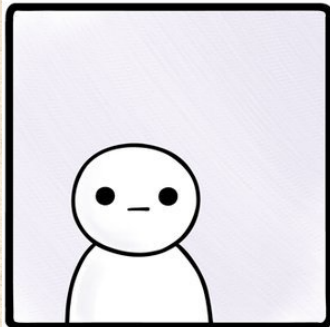


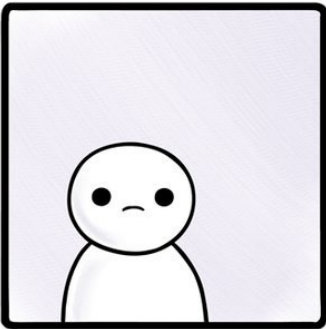
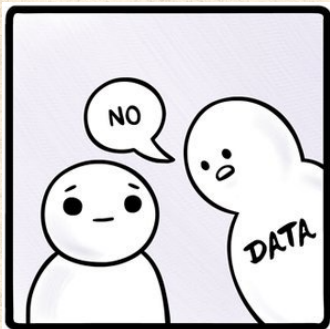
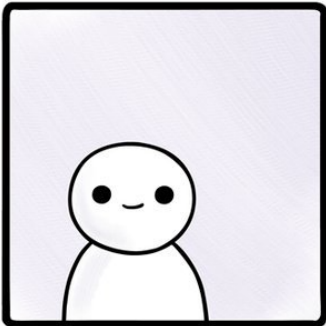
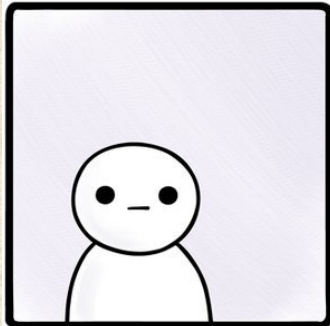
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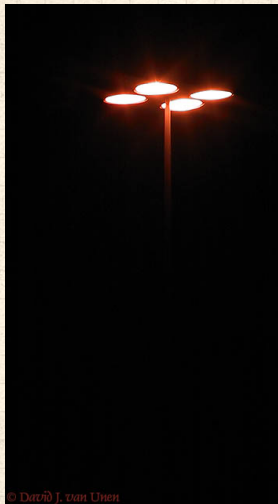
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## Panometer—Three kinds of lexical meters:

### 1. Principled lexical meters:



#### The Hedonometer.





## Panometer—Three kinds of lexical meters:

### 1. Principled lexical meters:



-  The Hedonometer.
-  The Lexicocalorimeter.





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### 1. Principled lexical meters:

-  The Hedonometer.
-  The Lexicocalorimeter.

### 2. Ground truth lexical meters:

-  Insomniometer.
-  Hangoverometer.



## 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:

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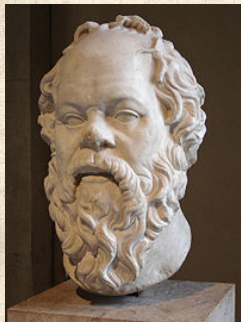
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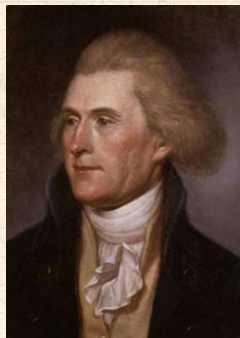
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Socrates et al.:  
eudaimonia <sup>[23]</sup>



Bentham:  
hedonistic calculus



Jefferson:  
...the pursuit of  
happiness





## Early drafts:

that among these are:

Life, ✓

Liberty, ✓ and ?? ~~Money?~~

~~Libations~~

~~Alcohol~~

~~Property~~

~~Foot-the-ball~~

~~Beer~~

Happiness ✓✓

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Even the odd modern economist is happy:

“Happiness” by Richard Layard <sup>[29]</sup>





[amazon] 





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


## Dominant factors:


 Family relationships


 Financial situation

 Work

 Community and  
Friends

 Health


 Personal Values


 Personal Freedom





# 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



## 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]



# Desiring happiness—not just for boffins:



Average people routinely report being happy is what they want most in life [29, 30, 8]

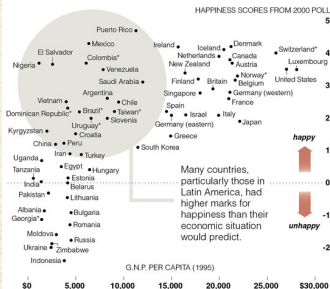


And it matters: “Happy people live longer:...”  
Survey by Diener and Chan. [8]

## A Plateau of Happiness

A country's wealth may not always dictate the happiness of its people.

As part of the World Values Survey project, inhabitants of different countries and territories were asked how happy or satisfied they were. Below is a sampling of happiness rankings, along with economic status.



\*Poll results for these countries were from 1995.

Source: Ronald Inglehart, "Human Beliefs and Values: A Cross-Cultural Sourcebook Based on the 1999-2002 Values Surveys"

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## National indices of well-being:



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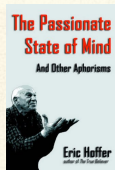
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# Some easy knocks:



“The Passionate State of Mind: And Other Aphorisms” [a](#) [↗](#)  
by Eric Hoffer (1954). <sup>[21]</sup>

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

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## Some easy knocks:

Colbert: “Happiness is totally overrated ...”



Full interview with Jennifer Senior [was here](#) 

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## Some easy knocks:

Colbert: “Happiness is totally overrated ...”

“Happiness is for the weak.”



Full interview with Jennifer Senior [was here](#) 



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30 Rock, S7E8:





## 30 Rock, S7E8:



JD: “Before she died, Colleen told me—she just wants me to be happy.

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## 30 Rock, S7E8:



JD: “Before she died, Colleen told me—she just wants me to be happy. ‘I just want you to be happy.’”

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## 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?”

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## 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.

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## 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.”

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LL: “Jack.”

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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.”

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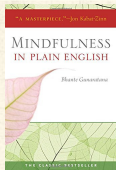
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## Meaning rather than happiness:



“Mindfulness in Plain English” [a](#) [↗](#)  
by Henepola Gunaratana (1992). [20]



“Flow” [a](#) [↗](#)  
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?



# Emotional content

So how does one measure

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

Just ask people how happy they are.





# Emotional content

So how does one measure

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

Just ask people how happy they are.

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





# Emotional content




So how does one measure

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

Just ask people how happy they are.

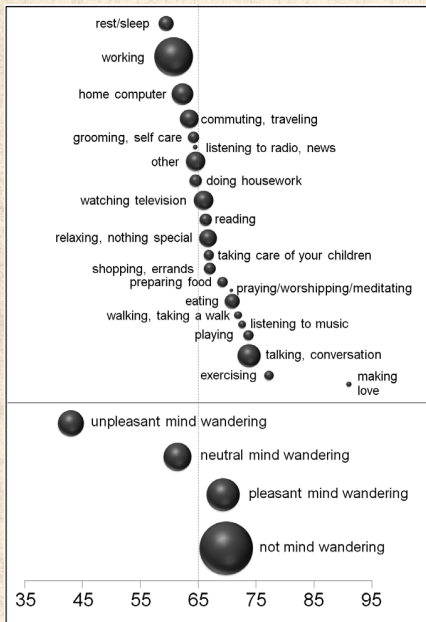
-  Experience sampling <sup>[5, 7, 6]</sup> (Csikszentmihalyi et al.)
-  Day reconstruction <sup>[24]</sup> (Kahneman et al.)

But self-reporting has some drawbacks:

-  relies on memory and self-perception
-  induces misreporting <sup>[31]</sup>
-  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



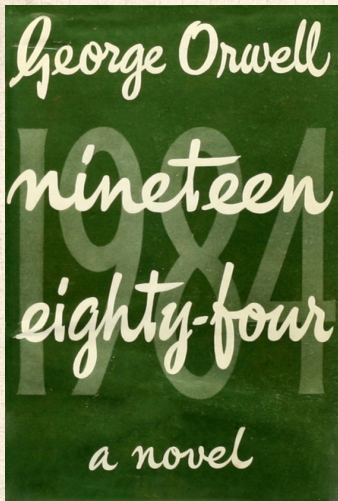
Complementary to  
self-reported measures



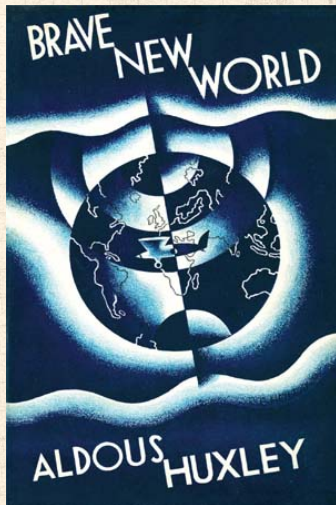
Improvable



We don't want to end up here:



Science



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# Ousiometrics before we called it that:

## Measuring essential meaning <sup>[9]</sup>

 **Idea:** Build on measures of the essential meaning of individual words.

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## Measuring essential meaning <sup>[9]</sup>

 **Idea:** Build on measures of the essential meaning of **individual words**.

 Osgood et al. (1957) <sup>[36]</sup> identified a basis of three psychological variables as semantic differentials:


 Evaluation, Potency, and Activation.








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## Measuring essential meaning <sup>[9]</sup>


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 EPA was recast by Mehrabian and Russell (1974) <sup>[33]</sup> in the context of emotion:

 **Valence (or sometimes Pleasure):** bad ↔ good


 **Arousal:** passive ↔ active


 **Dominance:** weak ↔ strong





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 VAD became more commonly used framework.





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 'VAD ≡ EAP' (more later).

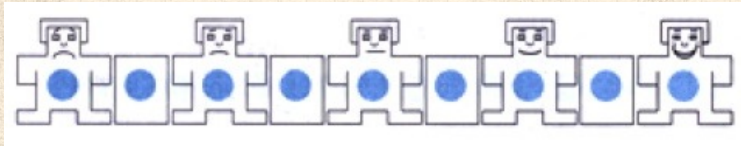


- ANEW = “Affective Norms for English Words”
- Study: participants shown lists of isolated words
- Asked to grade each word’s valence, arousal, and dominance level
- Integer scale of 1–9
- $N = 1034$  words—previously identified as bearing emotional weight
- Participants = College students (\*cough\*)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

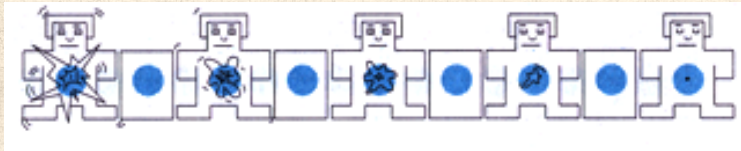


# 1999 ANEW study—three 1–9 scales: [2]

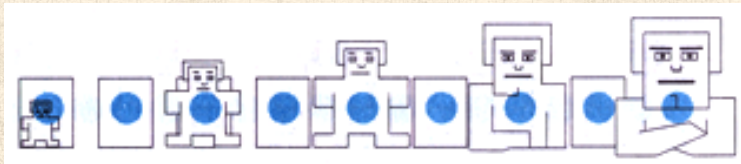
valence:



arousal:




dominance:





# ANEW study:

Valence = Happiness:

 Valence scale presented to participants as a 'happy-unhappy scale.'

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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. ...



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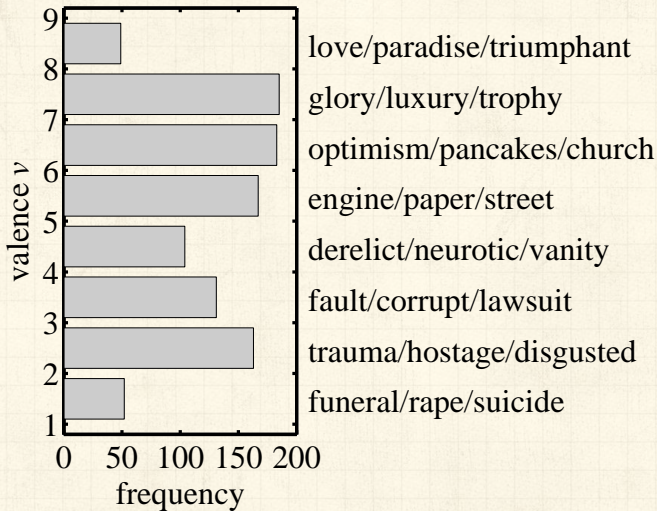
🧱 Participants were further told:

“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.”



## ANEW study words—examples



## 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  $i$ .






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 Focus on happiness (valence),  $\theta = h$ .





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 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

$k$	$v_k$	$f_k$
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

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



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

-----

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

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



Temperature-like measure—large numbers only.

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:

ANEW  
words

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$v_k$   $f_k$

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Temperature-like measure—large numbers only.



Not meant to be used at level of sentence, paragraph, song, tweet, ...

# Measuring the perceived happiness of a text:



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:

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Not meant to be used at level of sentence, paragraph, song, tweet, ...



Important: Social measure of sentiment.



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Later: see instrument is tunable.

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# Song Lyrics—average happiness

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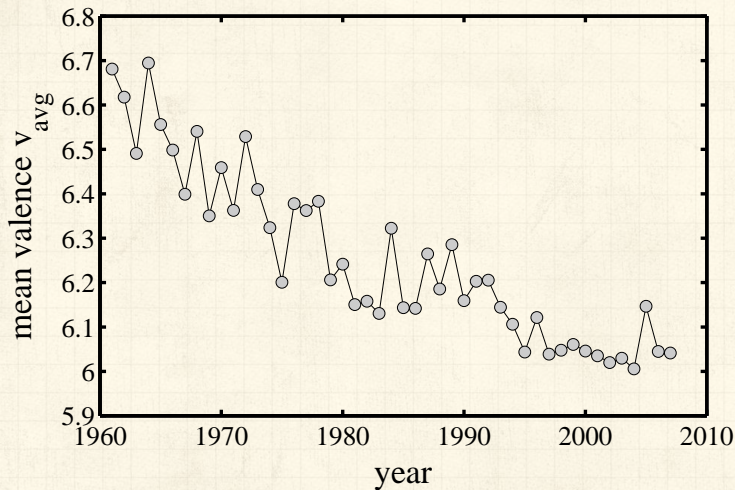
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# Song Lyrics—measurement robustness

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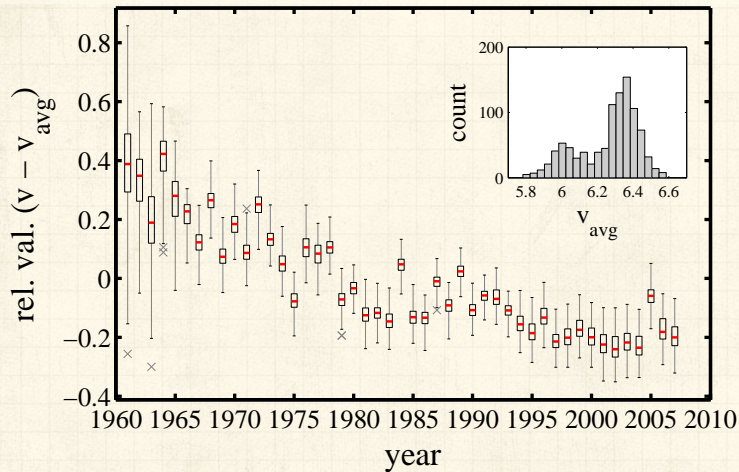
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100 random subsets of 750 ANEW words



# Song Lyrics—average happiness of genres:

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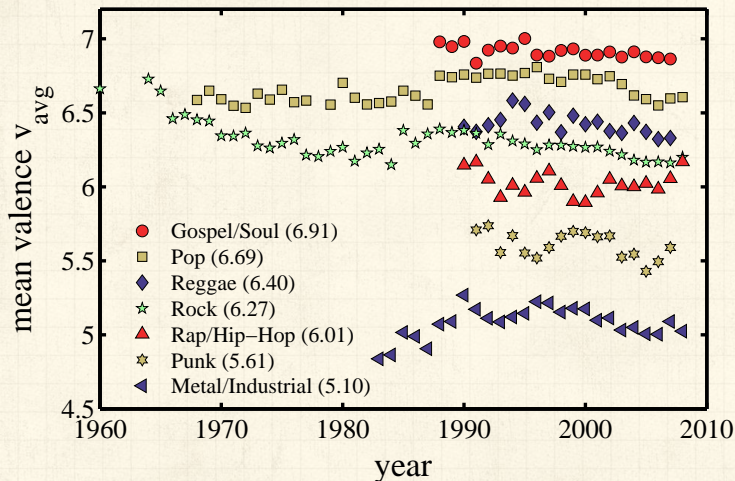
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## The Boggoracle Speaks:

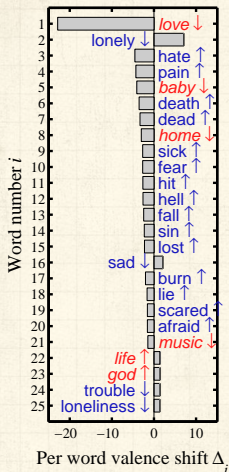


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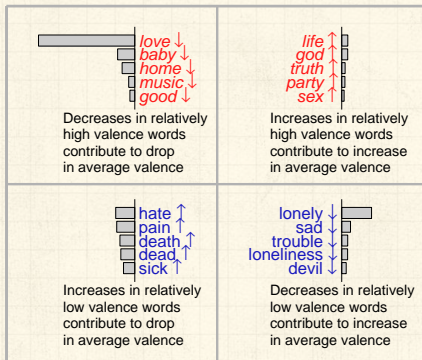


# Happiness Word Shift Graph (early version):

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  $T_{\text{ref}}$  and  $T_{\text{comp}}$ :


 Measure difference in average happiness:  $h_{\text{avg}}^{(\text{comp})} - h_{\text{avg}}^{(\text{ref})}$



## 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?

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- 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:


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

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

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

## Word data shift details:

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

where

$$\begin{aligned}\sum_{i=1}^N h_{\text{avg}}^{(\text{ref})} \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right] &= h_{\text{avg}}^{(\text{ref})} \sum_{i=1}^N \left[ p_i^{(\text{comp})} - p_i^{(\text{ref})} \right] \\&= h_{\text{avg}}^{(\text{ref})} (1 - 1) = 0.\end{aligned}$$





- +↑: 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;
- ↓: 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;
- +↓: 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
- ↑: 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.



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# Top 50 of $\approx 20,000$ artists:

Rank	Artist	$h_{\text{avg}}$	Rank	Artist	$h_{\text{avg}}$
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 $\approx 20,000$ artists:

Rank	Artist	$h_{\text{avg}}$	Rank	Artist	$h_{\text{avg}}$
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:	$h_{\text{avg}}$	Words with a similar score:
Soul/Gospel lyrics <sup>[12]</sup>	6.9	chocolate (6.88), leisurely (6.88), penthouse (6.81)
Pop lyrics <sup>[12]</sup>	6.7	dream (6.73), honey (6.73), sugar (6.74)
Dante's Paradise <sup>[?]</sup>	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 <sup>[12]</sup>	6.3	church (6.28), tree (6.32), air (6.34)
Enron Emails <sup>[?]</sup>	6.2	clouds (6.18), alert (6.20), computer (6.24)
State of the Union Messages <sup>[12]</sup>	6.1	grass (6.12), idol (6.12), bottle (6.15)
New York Times (1987–2007) <sup>[38]</sup>	6.0	hotel (6.00), tennis (6.02), wonder (6.03)
Blogs <sup>[12]</sup>	5.8	owl (5.80), whistle (5.81), humble (5.86)
Dante's Inferno <sup>[?]</sup>	5.5	glacier (5.50), repentant (5.53), mischief (5.57)
Heavy Metal lyrics <sup>[12]</sup>	5.4	lamp (5.41), elevator (5.44), truck (5.47)



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



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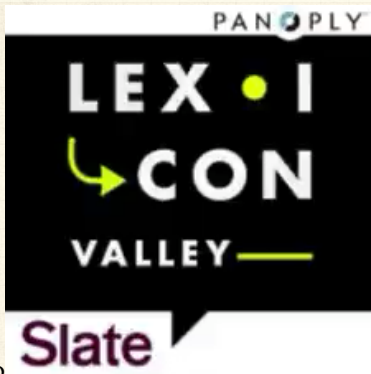
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Lexicon Valley, Episode #62, The Pollyanna Hypothesis,  
June 17, 2015

Hosts: Mike Vuolo and Bob Garfield

The song: Final Six, Raining Blood a bonus track on  
Slayer's tenth album Christ Illusion.



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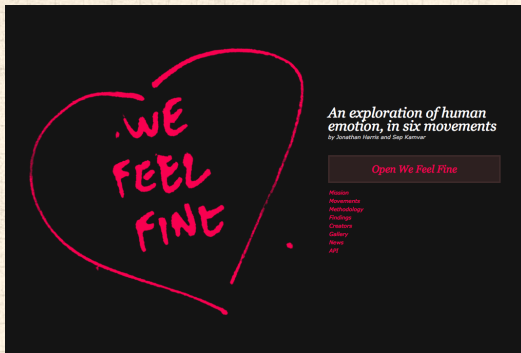
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# Data sets:

 Blog phrases containing “I feel...”, “I am feeling”, etc., taken from [wefeelfine.org](http://wefeelfine.org)  (API, 2005–2010)



Created by  
Jonathan Harris  
& Sep Kamvar

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2007 TED Talk: The Web's secret stories 



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.





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

- **i feel very lonely and unnoticed 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 soooooo 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 who



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Feeling	lovesick	Gender	Female	Age	20 - 29	Weather	Cloudy	Location	All	Date	Feb 14, 2006	
All Feelings		Both Genders		All Ages		All Weather		All Locations		All Dates		
A	looser									2005	Jan	1
B	lopsided				0s			afghanistan		2006	Feb	2
C	loquacious							argentina			Mar	3
D	lost							australia			Apr	4
E	loud				10s			bahamas				5
F	lounging							bangladesh				6
G	lousy							belarus				7
H	lovable							belgium				8
I	loveable				20s			brazil				9
J	loved							brunei darussalam				10
K	loveless							bulgaria				11
L	lovely							camodia				12
M	lovely							canada				13
N	lovesick				30s			chile				14
O	loving							china				15
P	low							colombia				16
Q	lower				40s			croatia				17
R	lowered							czech republic				18
S	lowering							denmark				19
T	lowest							dominican republic				20
U	lowly							estonia				21
V	loyal				50s			finland				22
W	lucid							france				23
X	luckier							gambia				24
Y	luckiest				60s			germany				25
Z	lucky							greece				26
								hungary				27
					70s			iceland				28
								india				
					80s			indonesia				
								iraq				
								ireland				
								israel				
								italy				



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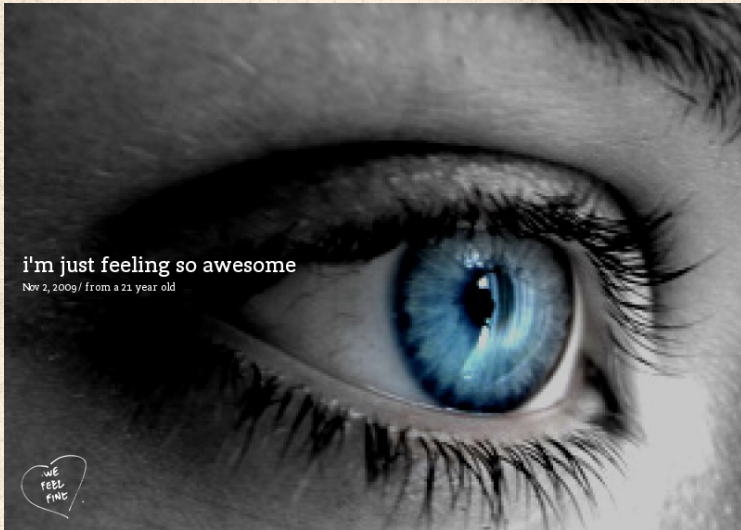
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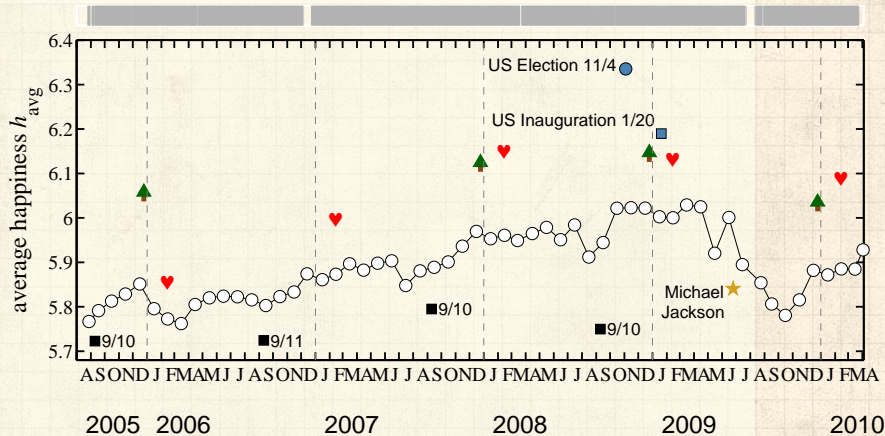
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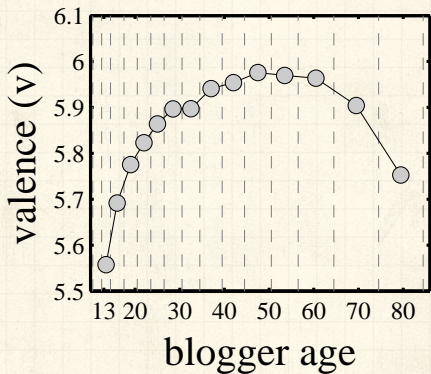
References



# Blogs—Overall trend



From [wefeelfine.org](http://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 <sup>[14, 15]</sup>



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Self-report studies find **little variation** in happiness with age <sup>[14, 15]</sup>



Surprising: Expect a rise and fall.



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 Self-report studies find **little variation** in happiness with age <sup>[14, 15]</sup>


 Surprising: Expect a rise and fall.


 A 'challenge' for theory...




 Self-report studies find **little variation** in happiness with age <sup>[14, 15]</sup>

 Surprising: Expect a rise and fall.


 A ‘challenge’ for theory...


 Related to the **Easterlin Paradox**:  
**Money doesn't buy happiness**




 Self-report studies find **little variation** in happiness with age <sup>[14, 15]</sup>

 Surprising: Expect a rise and fall.

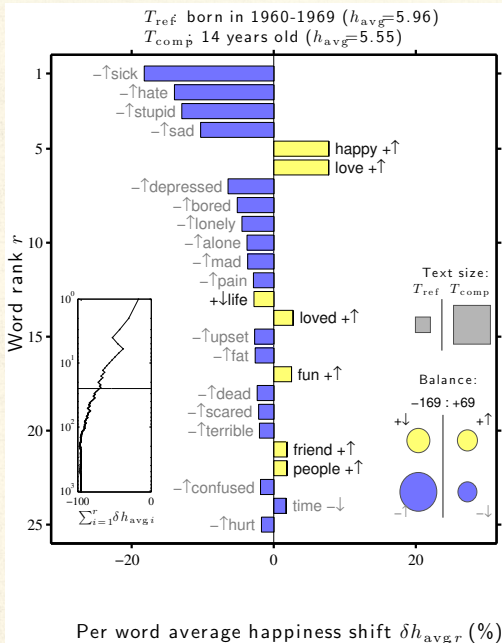
 A ‘challenge’ for theory...

 Related to the **Easterlin Paradox**:  
**Money doesn't buy happiness**

 But maybe it does a little bit—Veenhoven & Hagerty (2003) and Wolfers & Stevenson (2008).







# Blogs—Latitude

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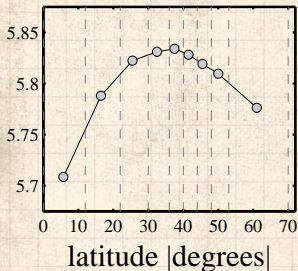
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## Near equator—social factors

☰ Increase in 'sad', 'bored', 'lonely', 'stupid', 'guilty'

☰ Decrease in 'good' and 'people'

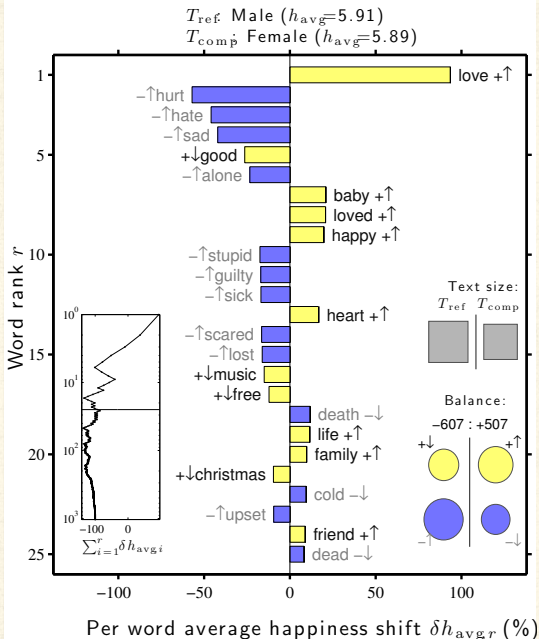
## Near poles—social/psychological/climate

☰ 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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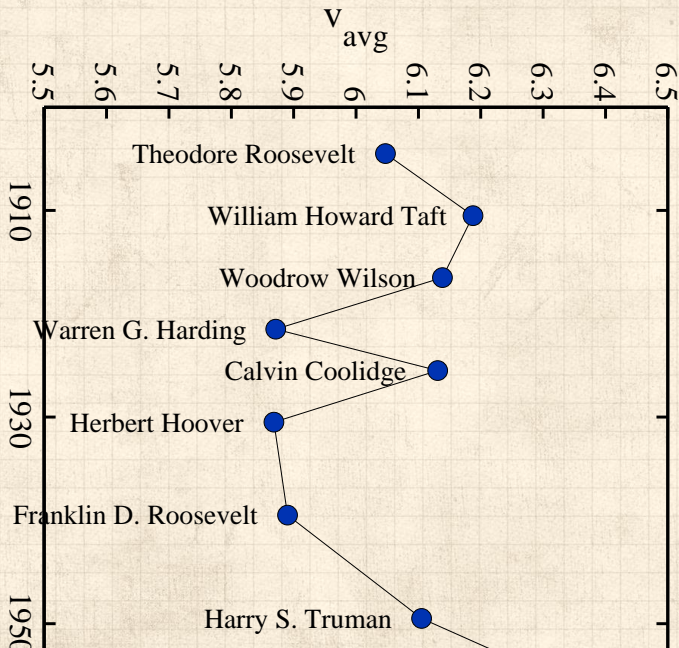
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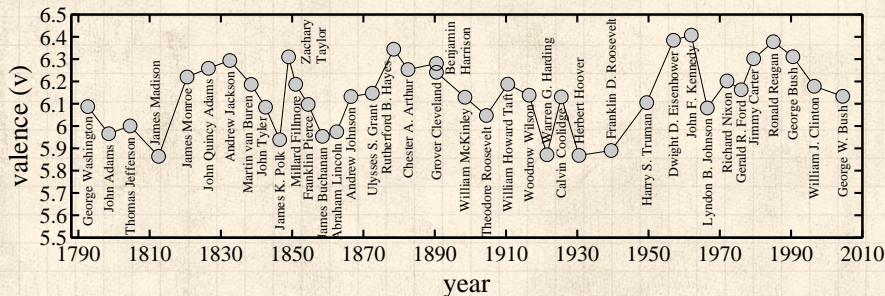


# Presidential happiness:

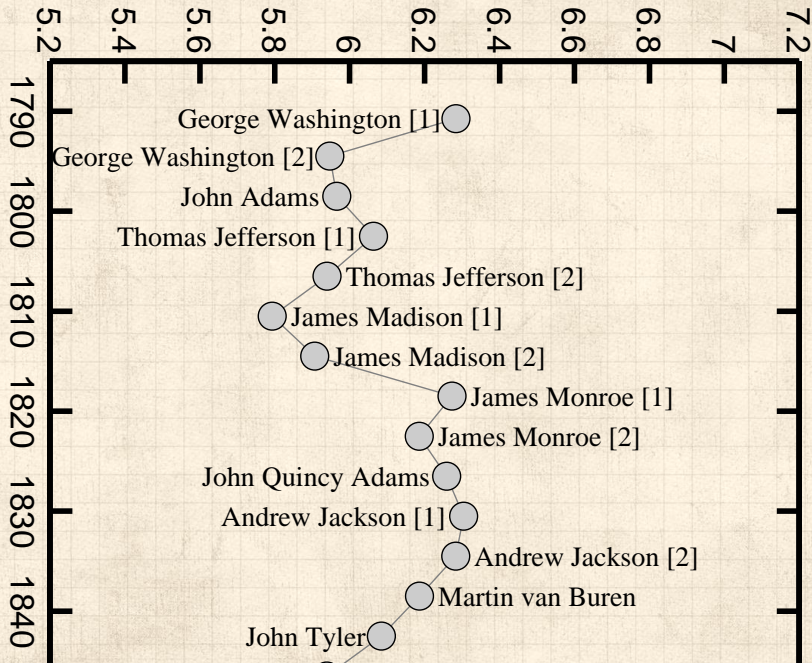




# Presidential happiness:



# valence



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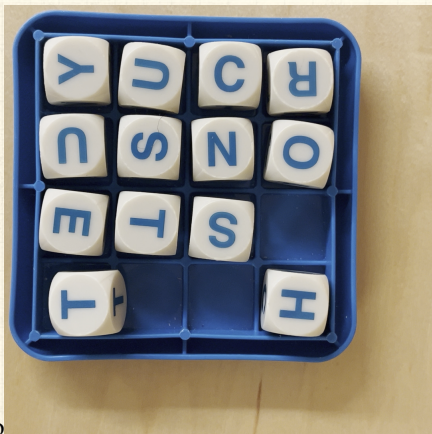
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# labMT 1.0: language assessment by Mechanical Turk

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Four corpora:



Twitter



Google Books





Music Lyrics



New York Times

The screenshot shows the Amazon Mechanical Turk interface. At the top, it says "Mechanical Turk is a marketplace for work." Below that, it states "We give businesses and developers access to an on-demand, scalable workforce. Workers select from thousands of tasks and work whenever it's convenient. 261,700 HITs available. View them now." The main content is divided into two columns: "Make Money by working on HITs" and "Get Results from Mechanical Turk Workers". The first column lists benefits like "Human Intelligence Tasks - are individual tasks that you can do on Amazon.com" and "Can work from home". The second column lists benefits for workers like "Have access to a global, on-demand, 24 x 7 workforce" and "Get paid for doing good work".

 5000 most frequently used words for each corpus.

 10,222 words, 50 evaluations each, 1-9 scale: <sup>[32]</sup>





## PLOS ONE 10 Year Anniversary: Datasets

By sharing their underlying data and related metadata, authors increase the value and impact of their research. Since its inception, *PLOS ONE* has encouraged data sharing, and in 2014, in keeping with our commitment to openness, reproducibility and scientific progress, the journal began requiring authors to make their data publicly available

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# 10

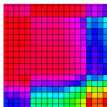
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### Social Networks



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

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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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# Twitter—living in the now:

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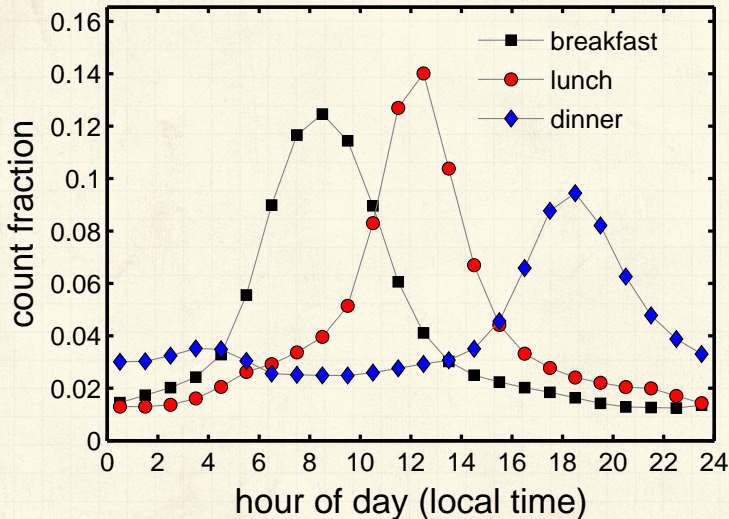
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Quantifying the quotidian.



# Twitter—living in the now:

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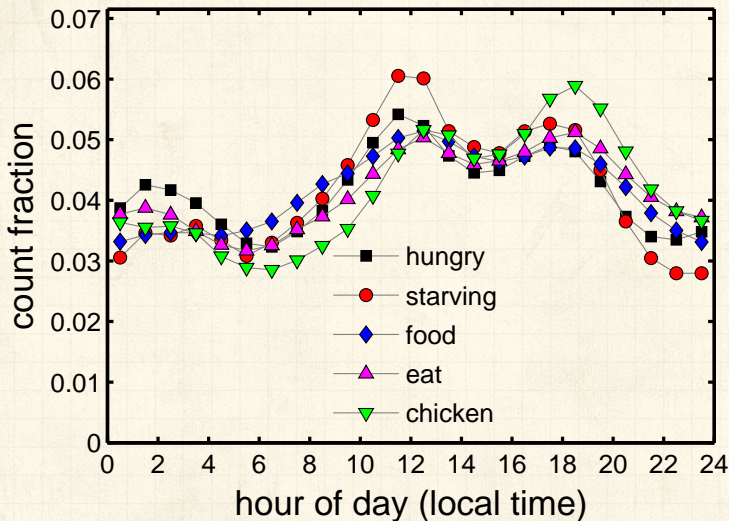
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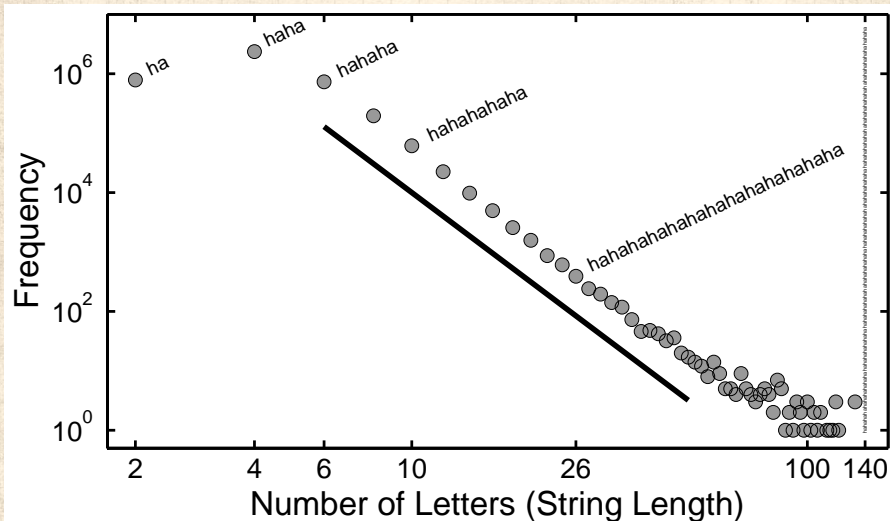
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Makes the unexpected believable...



# The happiest distribution:





“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. <sup>[19]</sup>



“GOOOOOOOOOOAAAAAAAAAL!!!!!!”



An exploration of families of strange lexical creatures.



Regular expression festival.



Identified kernels: ha versus goal.



Defined and measured stretch and balance

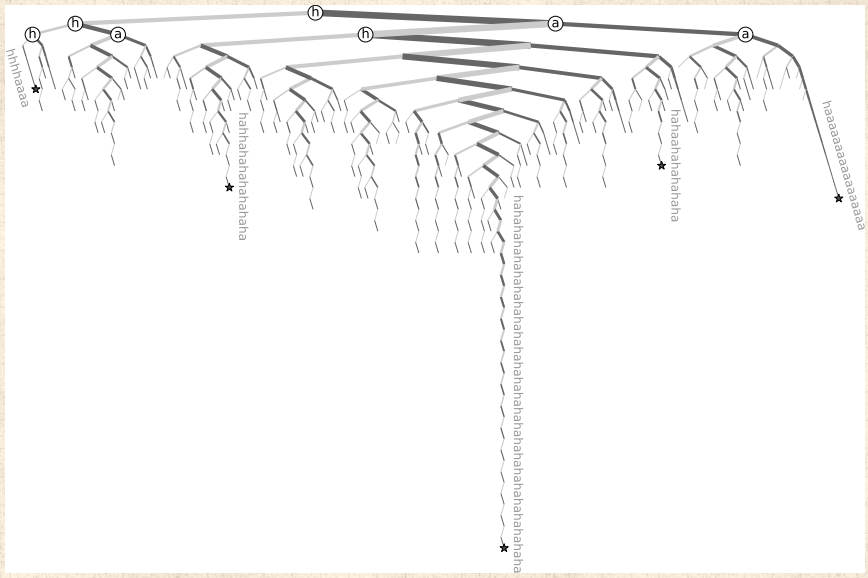


Stretch: Inequality (Gini) coefficient; Balance: (Shannon's) entropy.



Spelling trees!







**Tom Sherwood** @tomsherwood

1 Oct

Mississippi congressman moves gate and lets 92 WW2 vets see their monument. [pic.twitter.com/541GvLLITz](https://pic.twitter.com/541GvLLITz)

 Retweeted 442 times

 Expand



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```
["created_at":"Tue Oct 01 15:59:45 +0000 2013","id":"385071546731347968","id_str":"385071546731347968","text":"RT @tomsherwood: Mississippi c  
ongressman moves gate and lets 92 MW2 vets see their monument. http://v.t.co/v/541GvLLlTz","source":"\u003ca href=\"http://www.tweetdeck.c  
om\" rel=\"nofollow\"\u003etweetdeck\u003c/a\u003e","truncated":false,"in_reply_to_status_id":null,"in_reply_to_user_id":null,"in_re  
ply_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  
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roy Mich native, Michigan & Columbia alum, Detroit sports fan, Armenian, recovering journalist. Tweets are my own.","protected":false,"foll  
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:false,"is_translator":false,"profile_background_color":"161922","profile_background_image_url":"http://\u003cimg alt=\"\" data-bbox=
```



Individual tweets have all kinds of potential impact:



The screenshot shows a tweet from The Associated Press (@AP) with the text "Breaking: Two Explosions in the White House and Barack Obama is injured". The tweet has 483 retweets and 17 favorites. Below the tweet is a code block containing the JSON data for the tweet.

**AP** The Associated Press   
@AP 

## Breaking: Two Explosions in the White House and Barack Obama is injured

 Reply  Retweet  Favorite  More

483 RETWEETS 17 FAVORITES 

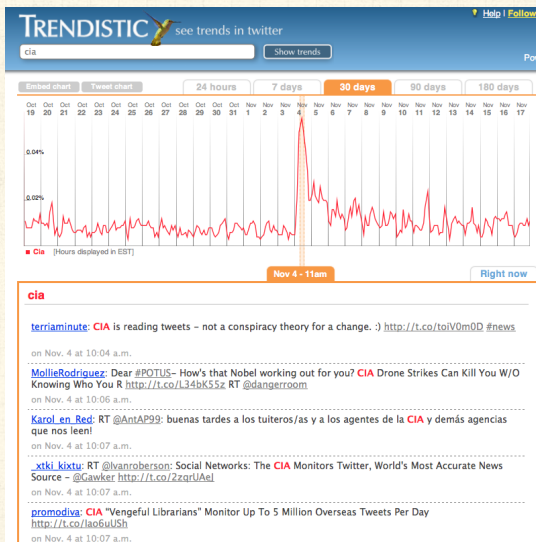
10:07 AM - 23 Apr 13

```
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://v.gp/ne.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://v.a0.twimg.com/profile_background_images/734506342/vb3be603514207db70cb0a991c26f2718.jpeg", "profile_background_image_url_https": "https://si0.twimg.com/profile_background_images/734506342/vb3be603514207db70cb0a991c26f2718.jpeg", "profile_background_tile": false, "profile_image_url": "http://v.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", "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"}
```



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

# Mentions of CIA on Twitter, end of 2011:



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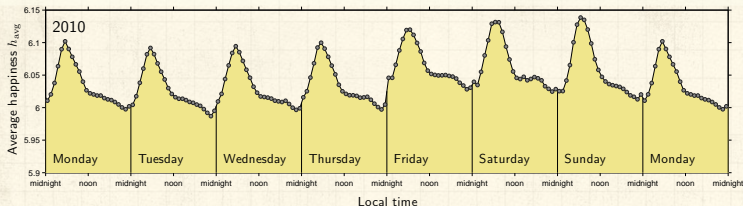
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 See story [here](#)  for example [slate].

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“Social Scientists waded into the Tweet stream” 

Greg Miller,

Science, **333**, 1814–1815, 2011. <sup>[34]</sup>



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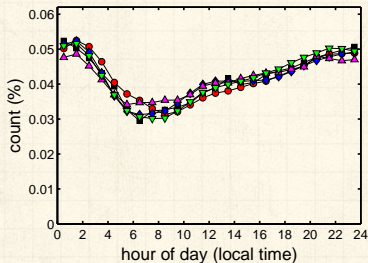
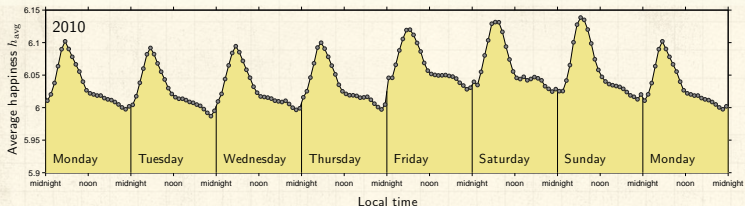
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“Social Scientists waded into the Tweet stream” 

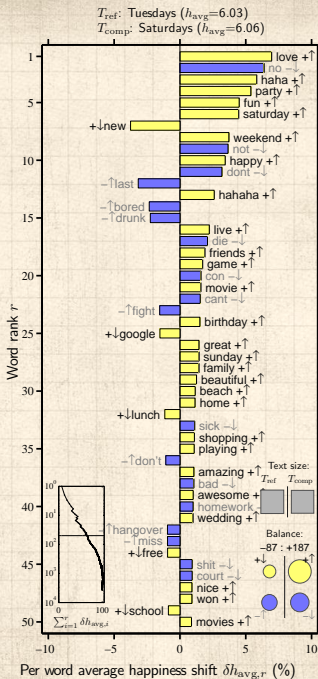
Greg Miller,

Science, **333**, 1814–1815, 2011. <sup>[34]</sup>








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## Text element and context correlate in happiness scores:

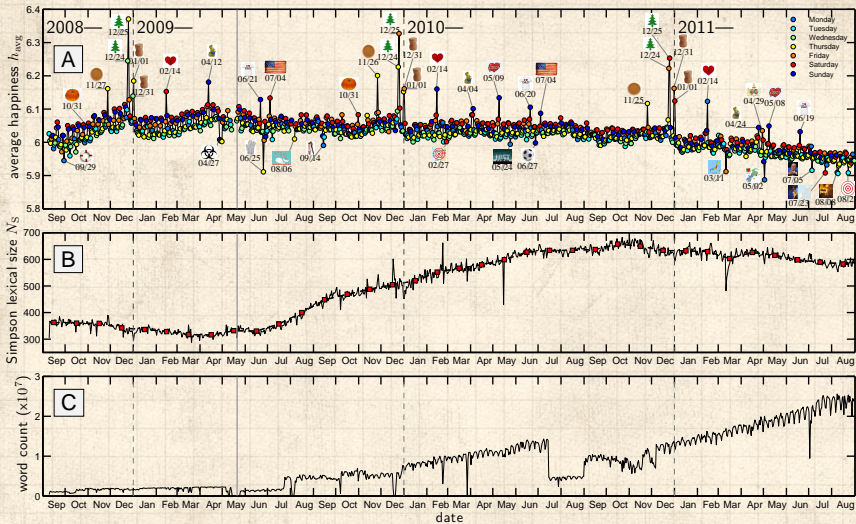
 Compare ambient happiness with text element happiness.

 Rank correlation coefficient:  
 $r_s \simeq 0.79, p\text{-value} < 10^{-10}$ .

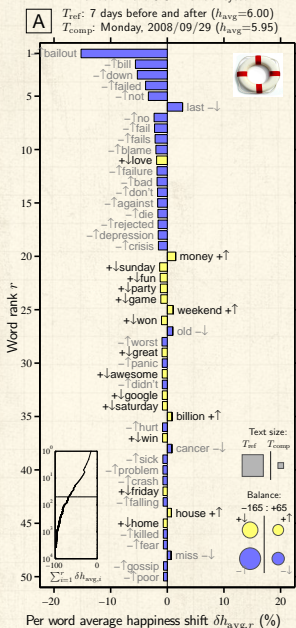
 An on-average result: says nothing about any individual sentence.

 Extra random piece: **stemming is fallible**.

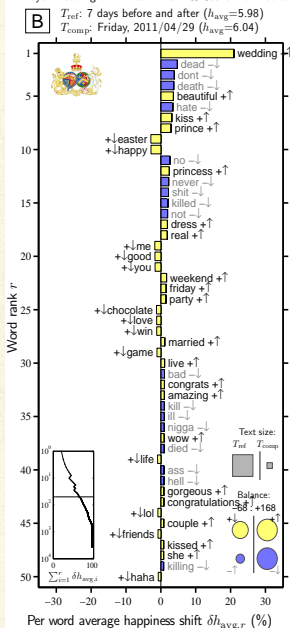




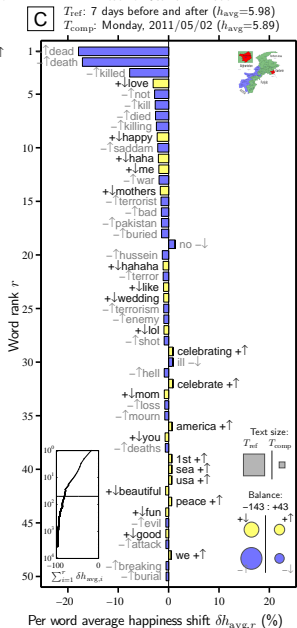
### Bailout of the U.S. financial system:



### Royal Wedding of Prince William & Catherine Middleto



### Death of Osama Bin Laden:



# Ambient happiness:

Word	$h_{\text{lex}}^{(\text{amb})}$	Total Tweets	$h_{\text{lex}}^{(\text{norm})}$	Word	$h_{\text{lex}}^{(\text{amb})}$	Total Tweets	$h_{\text{lex}}^{(\text{norm})}$
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)	-0.630 (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	5.39e+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	$h_{(amb)}$	Total Tweets	$h_{(norm)}$	Word	$h_{(amb)}$	Total Tweets	$h_{(norm)}$
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)	-0.630 (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	5.39e+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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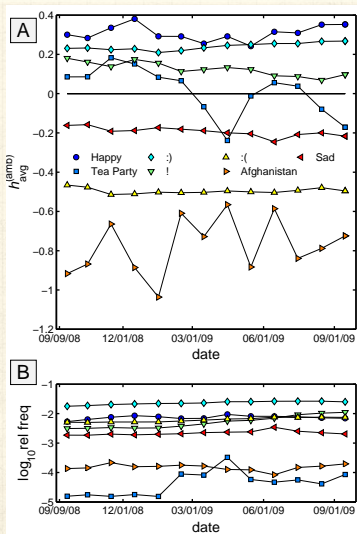
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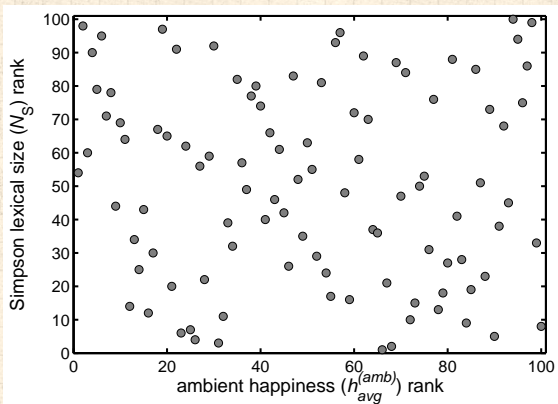
SOTU

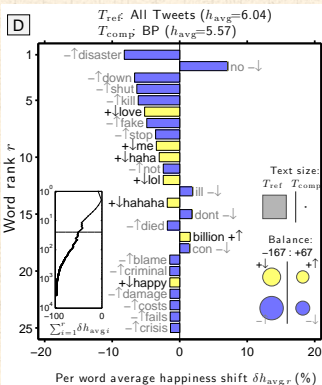
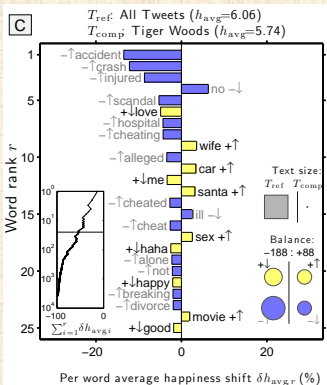
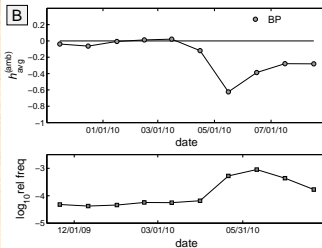
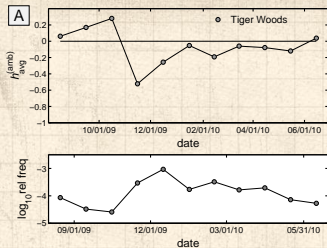
A Better Lexical Lens

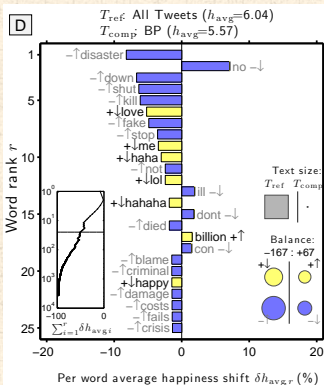
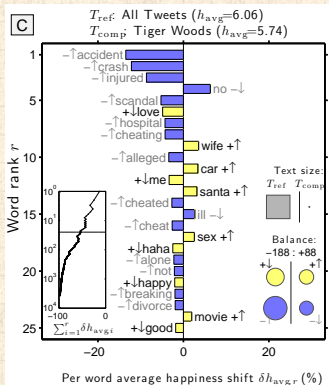
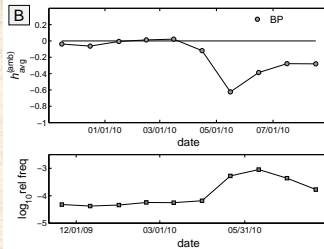
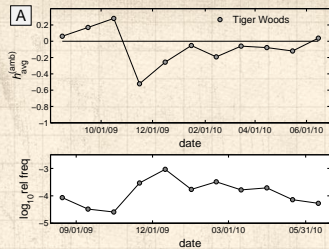
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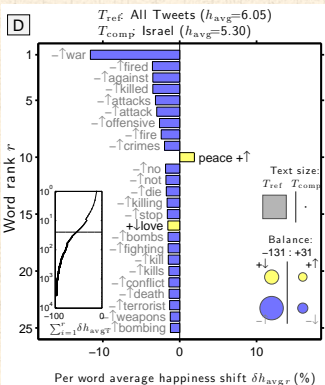
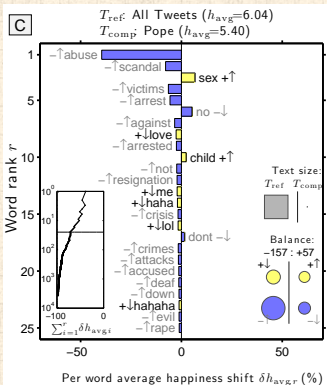
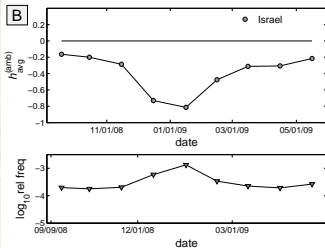
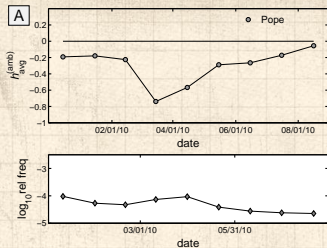
Extras











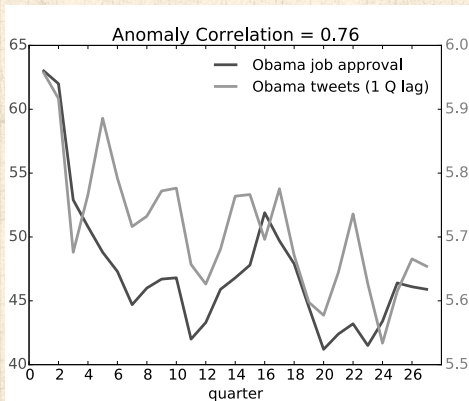


## “Public opinion polling with Twitter”

Cody et al.,

Available online at

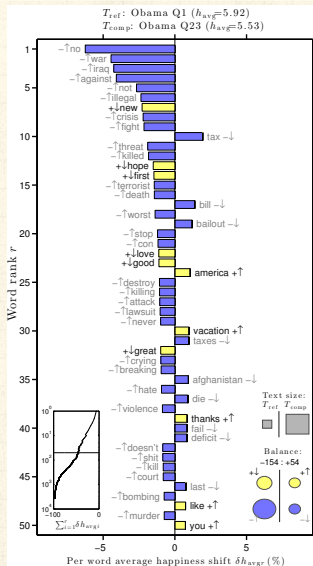
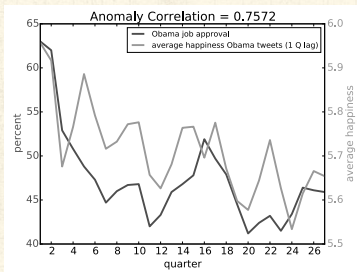
<https://arxiv.org/abs/1608.02024>, 2016. [4]



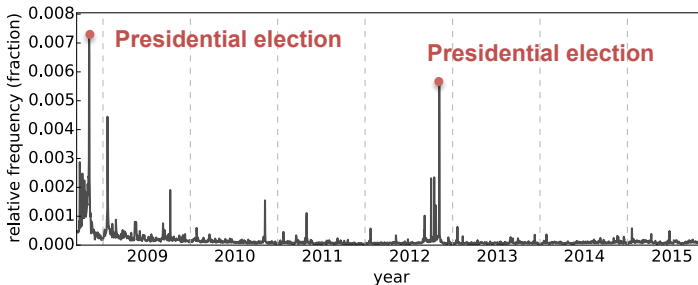
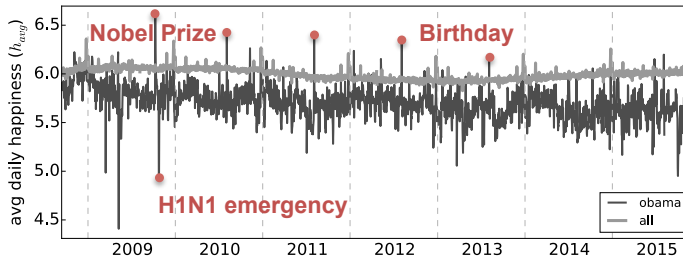
# Twitter's Feels job predict Obama's Approval Rating:

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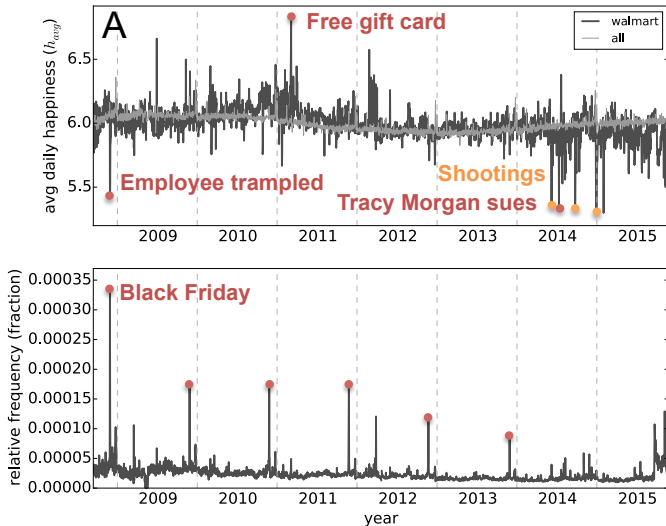
# Ambient happiness for “Obama”:



# Ambient happiness for “Walmart”:

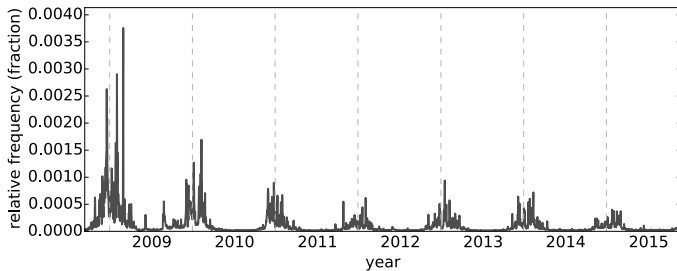
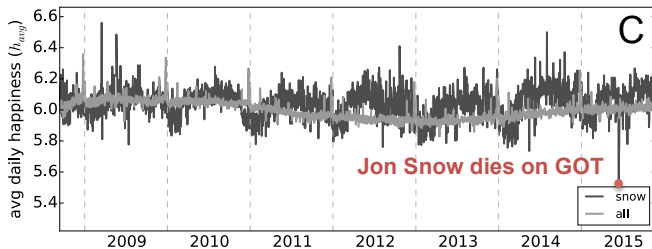
- Some motivation
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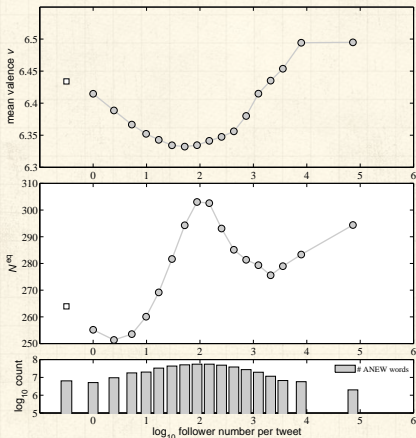




## Ambient happiness for “snow”:



## Dunbar number action:



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



Unpublished.

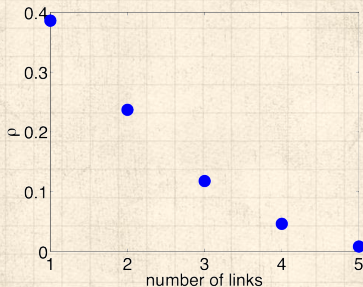






“Twitter reciprocal reply networks exhibit assortativity with respect to happiness” ↗

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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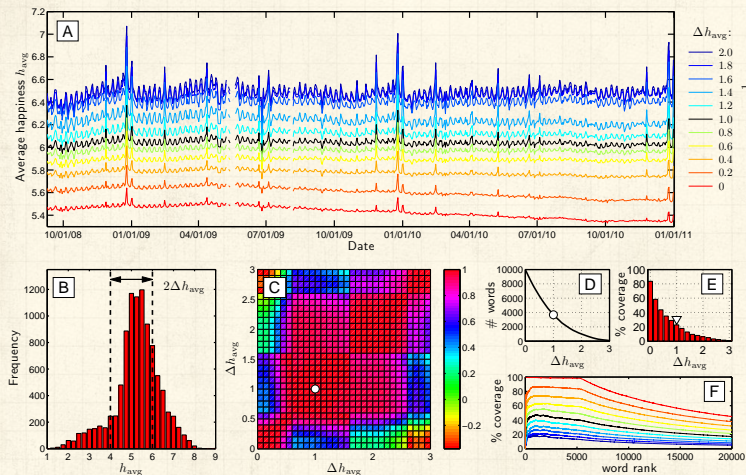
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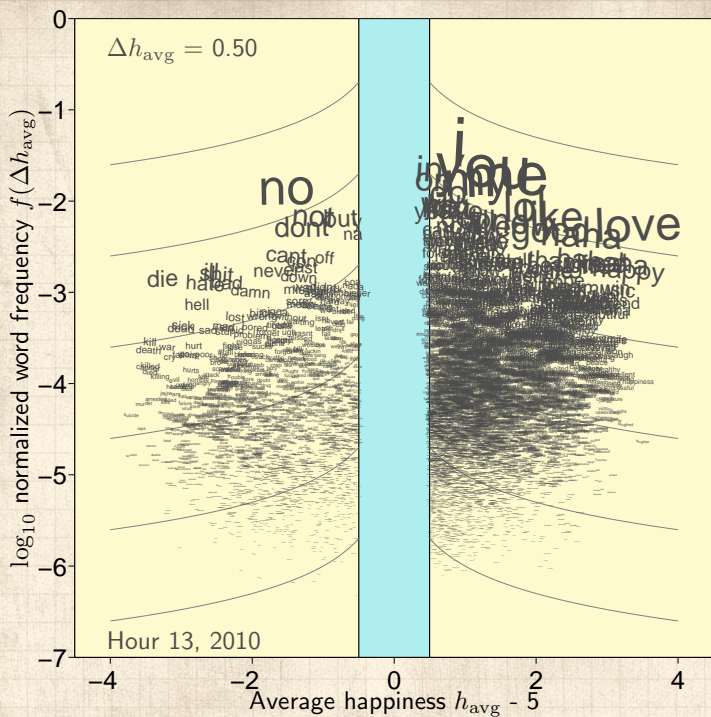
- Some motivation
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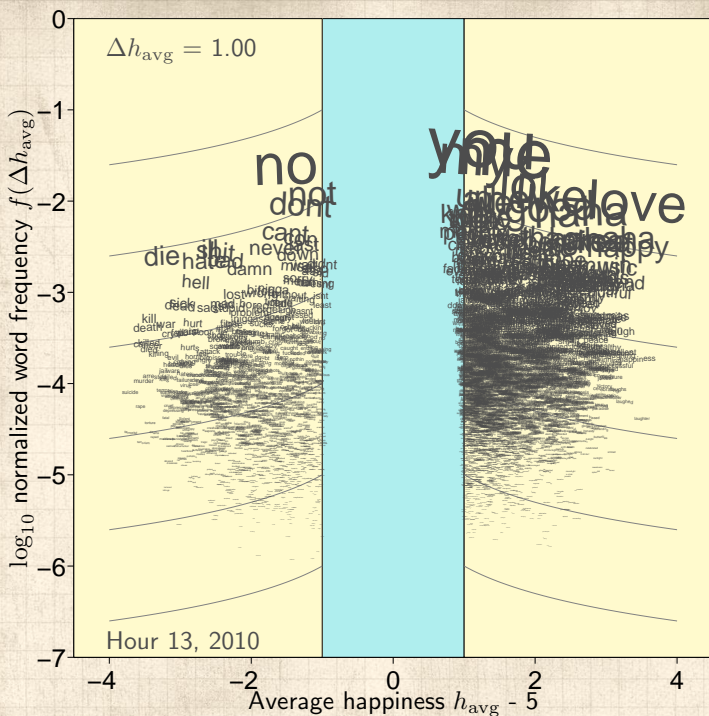
# The very surprising tunable hedonometer:

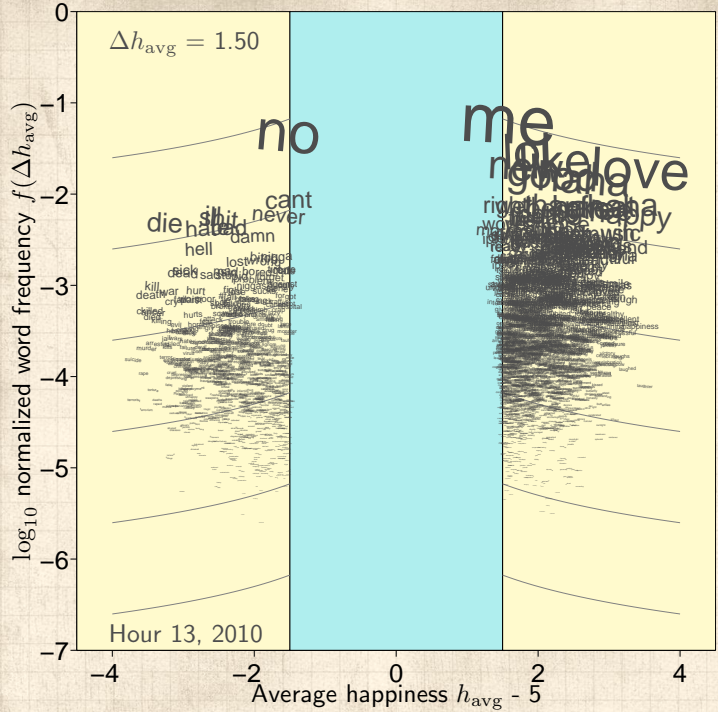


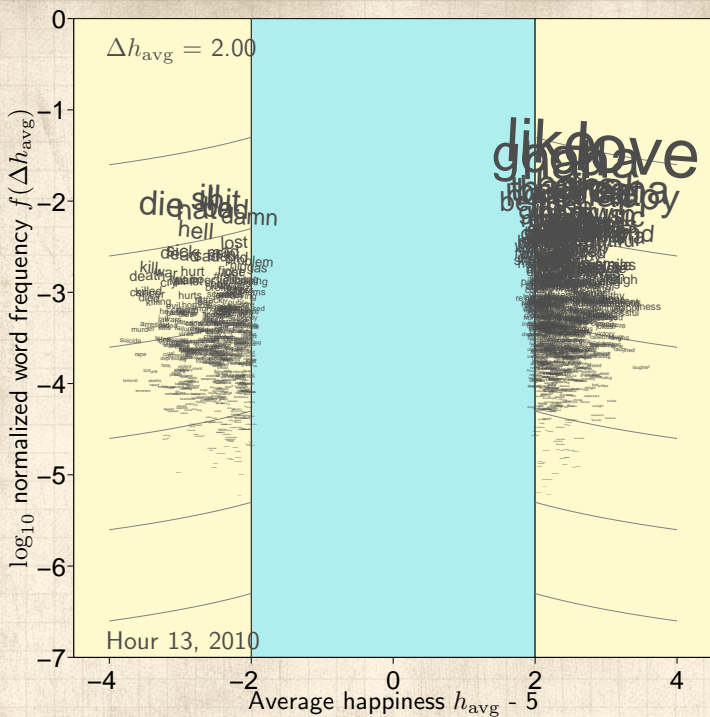


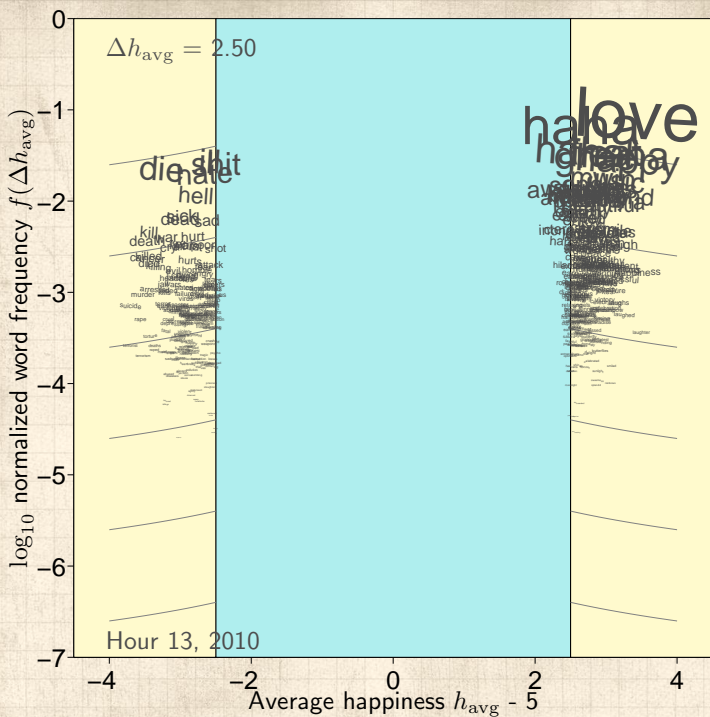












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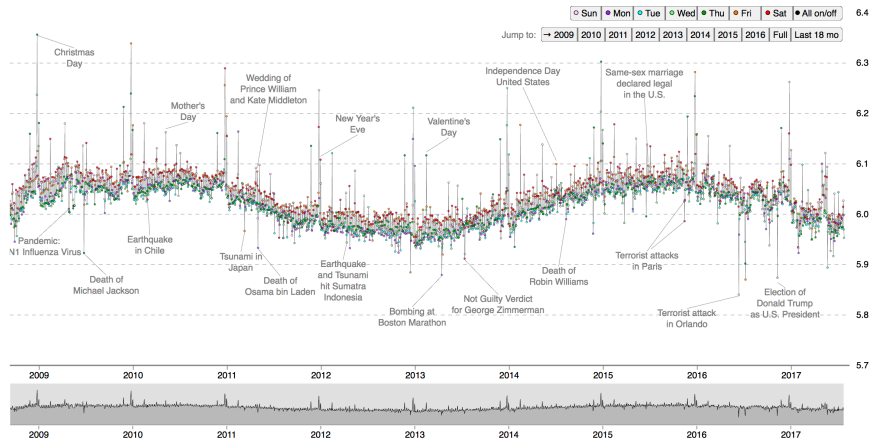
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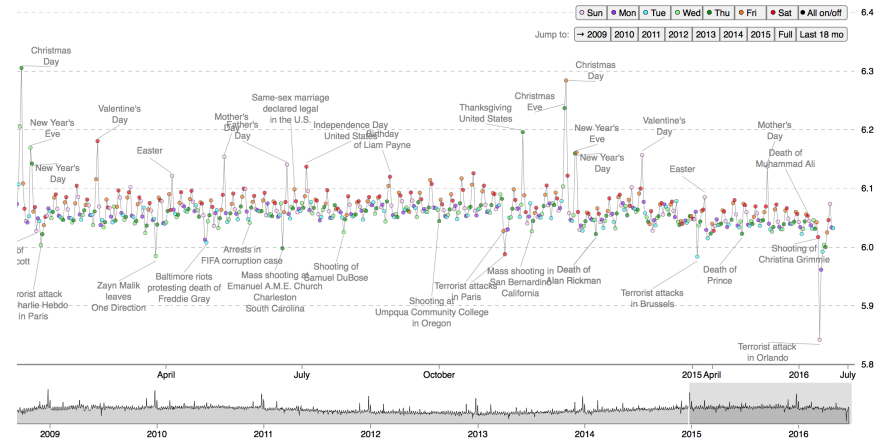
### Average Happiness for Twitter



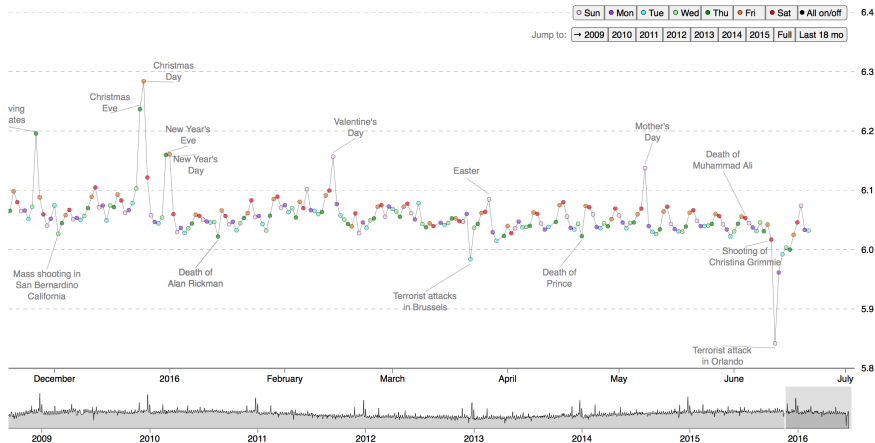
Machine: [@andreyreagan](https://twitter.com/andreyreagan)


Planned happiness versus tragedies.

### Average Happiness for Twitter



### Average Happiness for Twitter



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

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**BreatheSport**   
@BreatheSport



The Icelandic commentary on their last minute goal is incredible...

 **Daniele Mari**



RETWEETS 2,405 LIKES 1,947

Video description: A soccer match scene showing a goal being scored. The scoreboard indicates Iceland (ISL) vs Australia (AUS) with a 1-1 tie at 03:23. The video player shows 0:00 / 0:40.

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



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Hedonometer
Reader

hedonometer.org/index.html?from=2013-03-04&to=2014-09-14&date=2014-07-17

Calendar Tasks bitmark Weather News Blogs Training Life Stories Sports Words Hedonometer GTD Play Design Magazines

hedonometer - About Shifts Words Blog Press Papers Talks API
Facebook Twitter Google+

### Average Happiness for Twitter

### Interactive Wordshift

**Major Event** W W

**Thursday, July 17, 2014**  
**Malaysia Airlines Flight 17 crashes in Eastern Ukraine, apparently shot down by a surface-to-air missile.**  
**Israel's ground forces enter Gaza, part of Operation Protective Edge**  
 Average happiness: 5.989  
 What's making this day sadder than the last seven days:

Reset
Σ+1
Σ+1

Σ-1
Σ
Σ-1

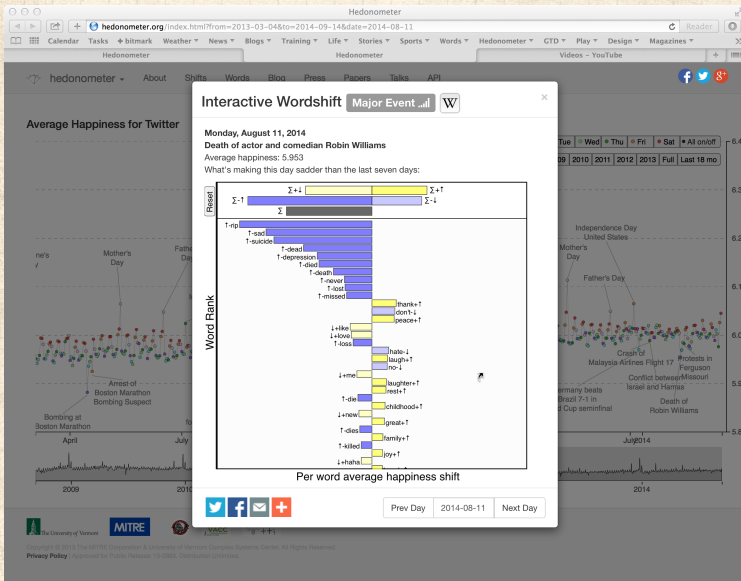
Word Rank

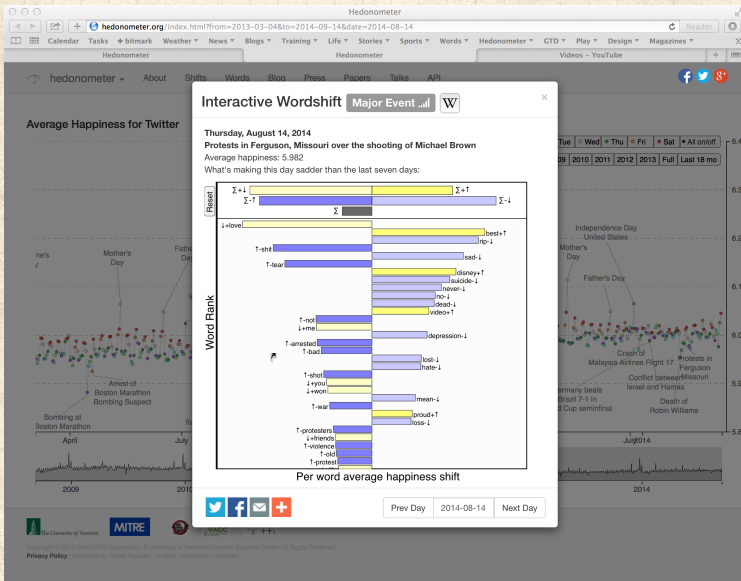
Per word average happiness shift

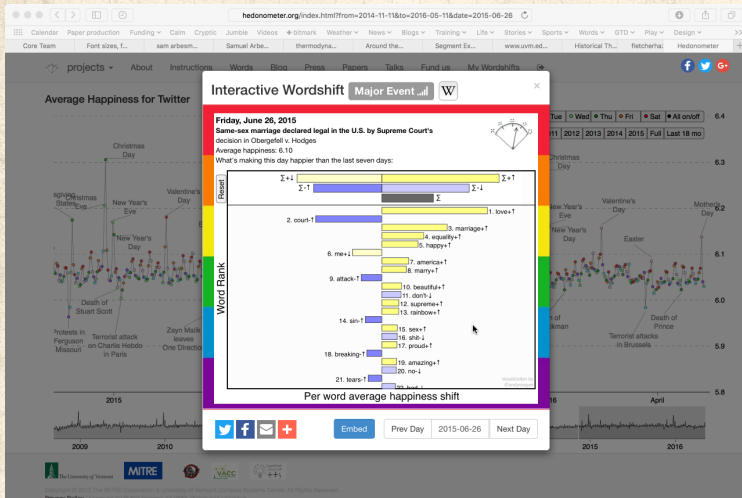
Prev Day
2014-07-17
Next Day

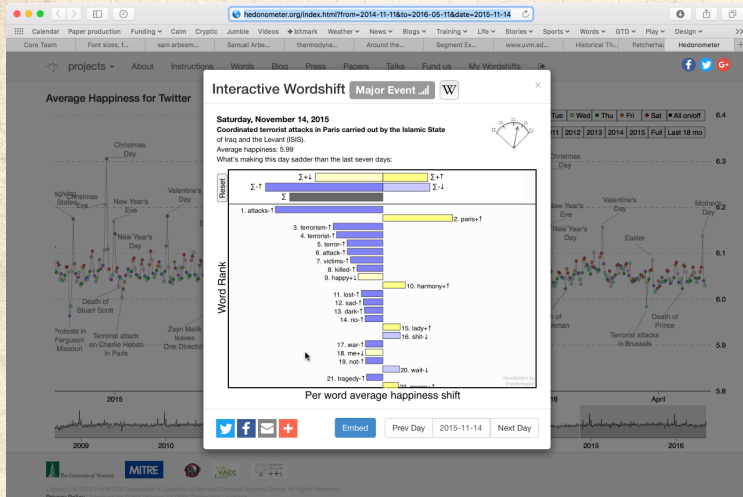













hedonometer.org/index.html?from=2015-11-18&to=2016-07-02&date=2016-06-12

Paper production Funding Calm Cryptic Jumble Videos bookmark Weather News Blogs Training Life Stories Sports Words GTD Play Design Magazines


Hedonometer

projects About Instructions Words Blog Press Papers Talks Fund us

**Average Happiness for Twitter**

**Interactive Wordshift** Major Event 

**Sunday, June 12, 2016**  
Mass shooting at Pulse nightclub in Orlando, Florida  
Average happiness: 5.84  
What's making this day sadder than the last seven days:



**Word Rank**

Rank	Word	Shift
1	shooting	-1
2	gun	-1
3	guts	-1
4	victims	-1
5	hate	-1
6	violence	-1
7	kills	-1
8	dead	-1
9	stab	-1
10	riot	-1
11	tragedy	-1
12	terrorist	-1
13	terrorism	-1
14	attack	-1
15	love	+1
16	blood	-1
17	terror	-1
18	ban	-1
19	suicide	-1
20	assault	-1
21	happy	+1
22	me	+1
23	terrorism	+1

Per word average happiness shift

Embed Prev Day 2016-06-12 Next Day


Twitter Facebook Email Plus

The University of Vermont MITRE VACC

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Privacy Policy Approved for Public Release: 15-0880. Distribution unlimited.





Make your own: 

hedonometer.org/words/iterater/

Calendar Paper production Funding Cryptic NYT Crossword Videos ↗ bookmark Weather News Blogs Training Life Stories Sports Words GTD Play Design >>

Hedonometer Hedonometer Hedonometer

projects - About Instructions Words Blog Press Papers Talks API Fund us logout

# The Wordshifterator.

Generate your own embeddable, shareable wordshifts for any pair of texts.

Note: Texts must contain at least 1,000 words. Details about how this works can be found [here](#).

**Name of reference text:**  
Reference Title

**Name of comparison text:**  
Comparison Title

**Reference text:**  
Paste Reference Text Here





**Comparison text:**  
Paste Comparison Text Here

**Title:**

**Stopwords:**   
Words to ignore, optional  
A comma separated list of words that do not make sense in the context of these texts.

**Language:** English

[Generate Wordshift](#)

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Privacy Policy | Approved for Public Release: 13-0888. Distribution Unlimited.

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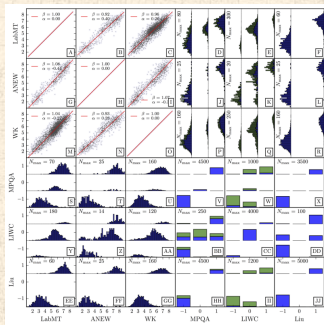
References



“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 ...



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# Happiness in Manhattan:

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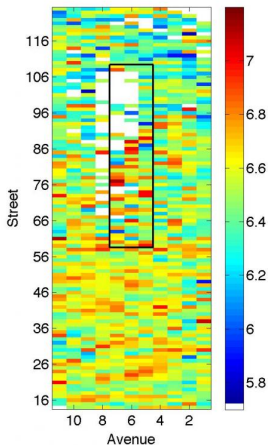
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See [Blog post on compstorylab.org](http://blog.compstorylab.org) 



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Advertisement for Jamaica in Times Square. The ad features a large red banner with white text and a photograph of a person in Times Square at night. The banner text reads: "TELL US WHY YOU'RE HAPPY FOR A CHANCE TO WIN A TRIP FOR 2 TO JAMAICA! INCLUDE #HAPPYNYC IN YOUR TWEET TO ENTER Clear Channel Outdoor JAMAICA Once you go, you know." Below the banner, it says "TIMES SQUARE IS THE HAPPIEST PLACE IN NEW YORK! COMPILED BY TRACKING TWEETS THAT INCLUDED SPECIFIC 'HAPPY' AND 'SAD' WORDS - THE UNIVERSITY OF VERMONT". At the bottom right, it says "COMPLETE TERMS AND CONDITIONS AVAILABLE AT FACEBOOK.COM/CCOUTDOOR". The Clear Channel logo is in the bottom left corner.





# The Geography of Happiness:

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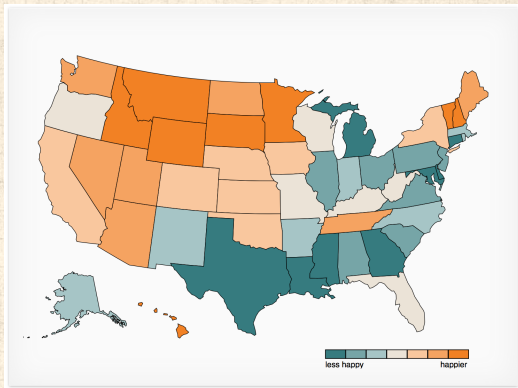
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References



 Mitchell et al., PLoS ONE, 2013. [35]

 It's a paper that tweets: [@geographyofhapp](#) 

 Online **Appendices** 

 Much interesting and amusing press ...

 Online, interactive US map at [hedonometer.org](#) 



## Average Happiness of United States for

2013



Vermont

Rank: **4** out of 51

Average Happiness: 5.95

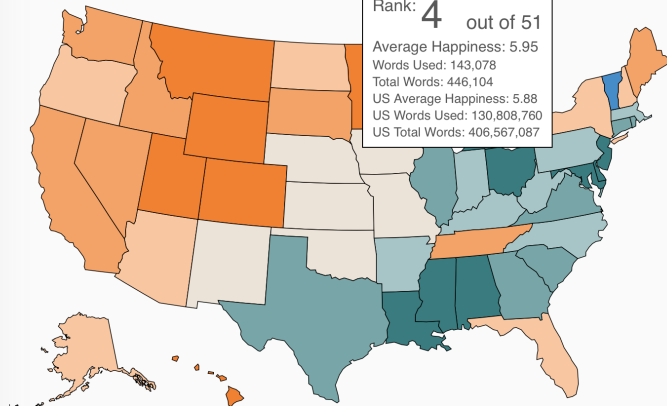
Words Used: 143,078

Total Words: 446,104

US Average Happiness: 5.88

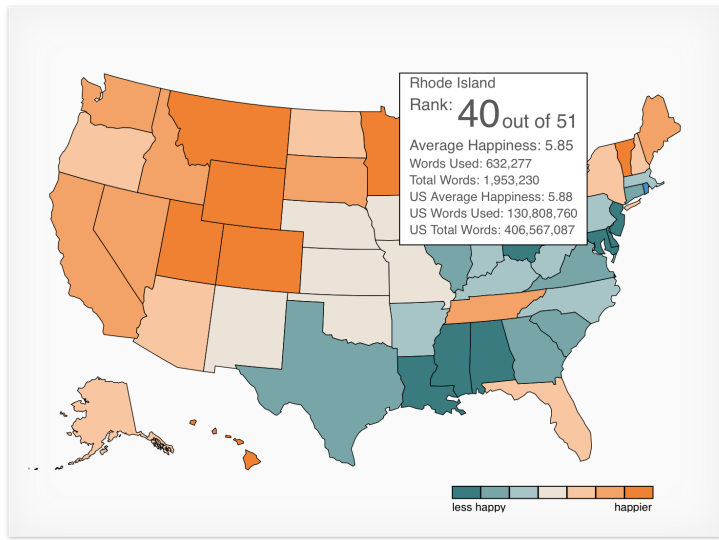
US Words Used: 130,808,760

US Total Words: 406,567,087



## Average Happiness of United States for

2013



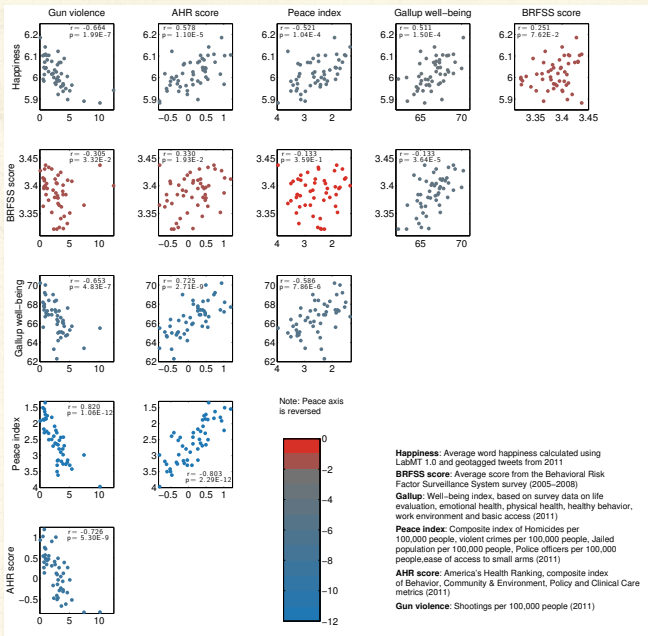
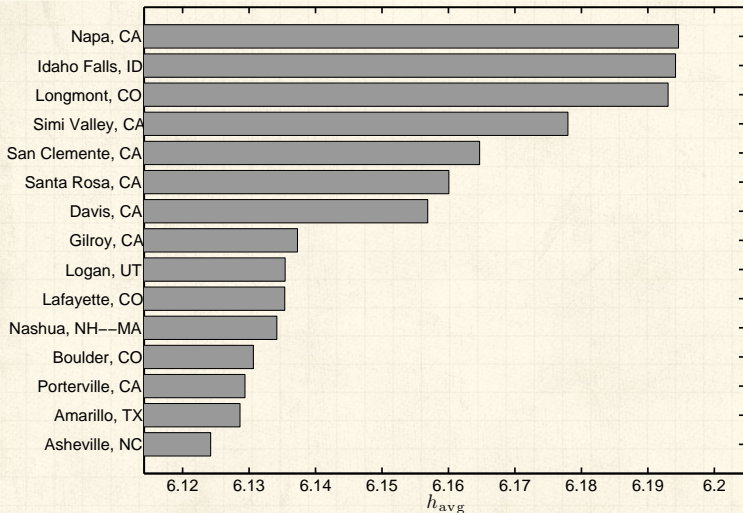


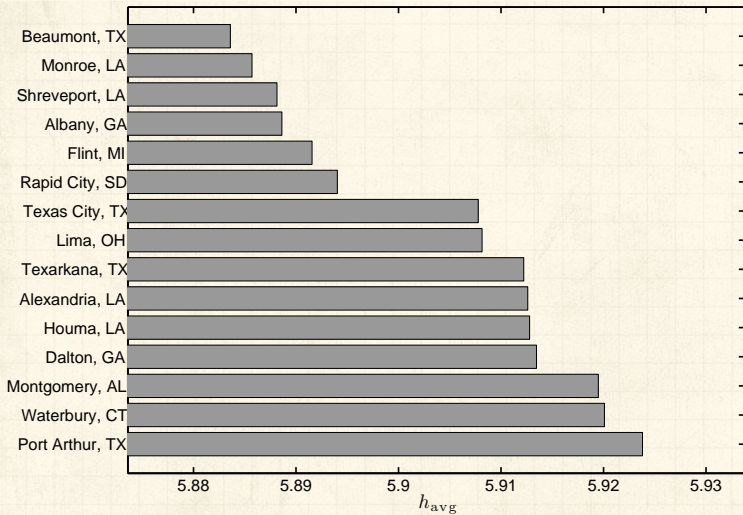
FIG. 2: Scatter plot matrix of correlations between different well-being measures. Points are colored by  $p$ -value, statistically insignificant correlations above  $p = 0.01$  are shown in red. Spearman's  $r$  and  $p$ -value are reported in the inset.

## Happiest Cities:





## Saddest Cities (Sorry Beaumont):



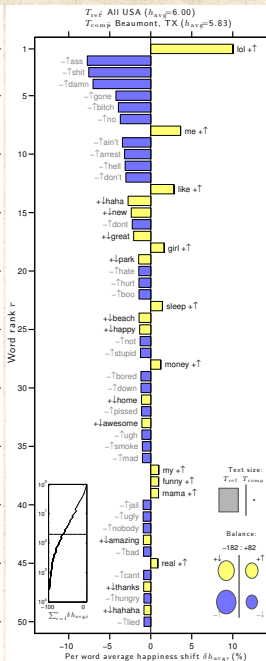
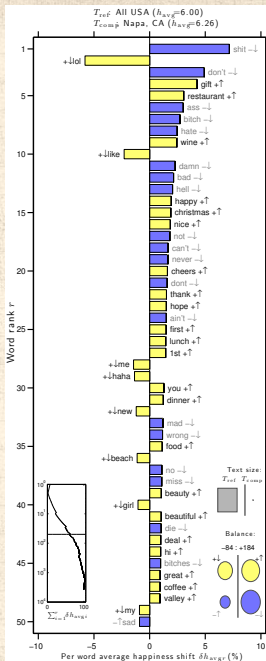
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# The Today Show

TODAY

Are adorable pandas worth the price of saving?



'Miracle on ice' sockey memorabilia up for auction



How to avoid retail pitfalls and shop like a pro



The tweet life: 3 happiest Twitter cities

# TODAY

msn 



TAKE 1 WHY WOMEN TALK MORE THAN MEN

05:05 / 09:00 full screen subtitles transcript clip & share

Al Roker , John Legend , Chrissie Teigan 



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# The Ellen DeGeneres Show

## Amy Drinks in Napa

Thursday, 02.28.13 · Filed Under: [Amy: Ellen's Frightened Writer](#)

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00:34 02:05   HD On   

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Ellen , married to Portia de Rossi —Lindsay Bluth —who was born in ... [Horsham](#) 






## 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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Tuesday, February 19, 2013

70°F Beaumont, TX  
Clear



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## The Bayou

Biting satire, commentary & opinion Southeast-Texas style

Email | Twitter | Facebook



## Eggheads find Beaumont IS the 'saddest city'

February 19, 2013 at 10:41 am by gator

Comments(3) | E-mail | Print

Tweet 0

Recommend 0

+1 0

That's what some eggheads at the Department of Mathematics and Statistics at the University of Vermont have determined.

The method to their madness? **Twitter**. They say they plotted 10 million geotagged Tweets in 2011.

SEARCH

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### Categories

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### Beaumont Enterprise Blogs



The Bayou  
Biting satire, Southeast Texas style



Newsworthy  
Breaking news for Southeast Texas



Whaddya Think?  
We want to hear from you



The Huddle





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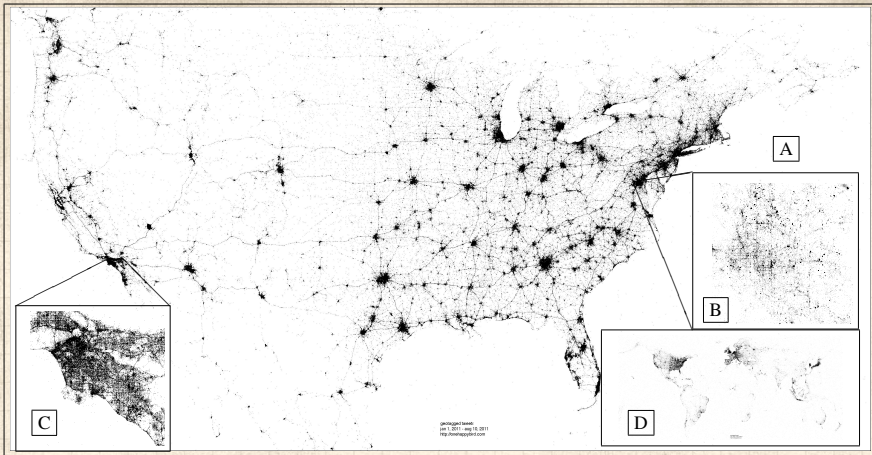
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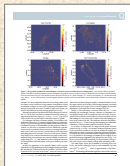
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**Figure 1.** Each point corresponds to a geo-located tweet posted between 1/1/11 and 8/10/11. Twitter activity seems to correlate with urban areas. Note that the image contains no cartographic borders, simply a small dot for each message. Insets: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

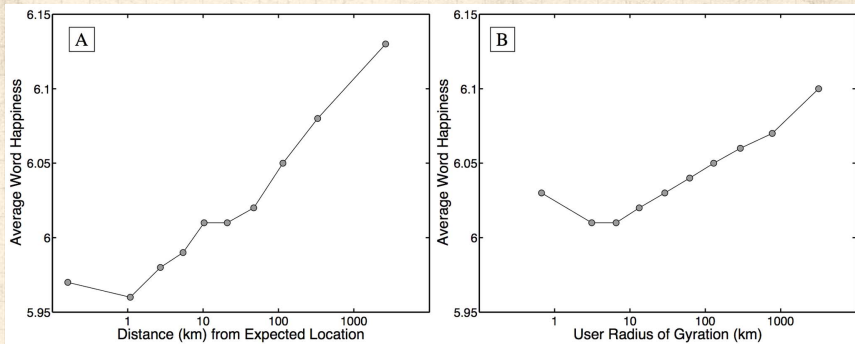


“Happiness and the Patterns of Life: A Study of Geolocated Tweets” 

Frank et al.,

Nature Scientific Reports, **3**, 2625, 2013. <sup>[16]</sup>

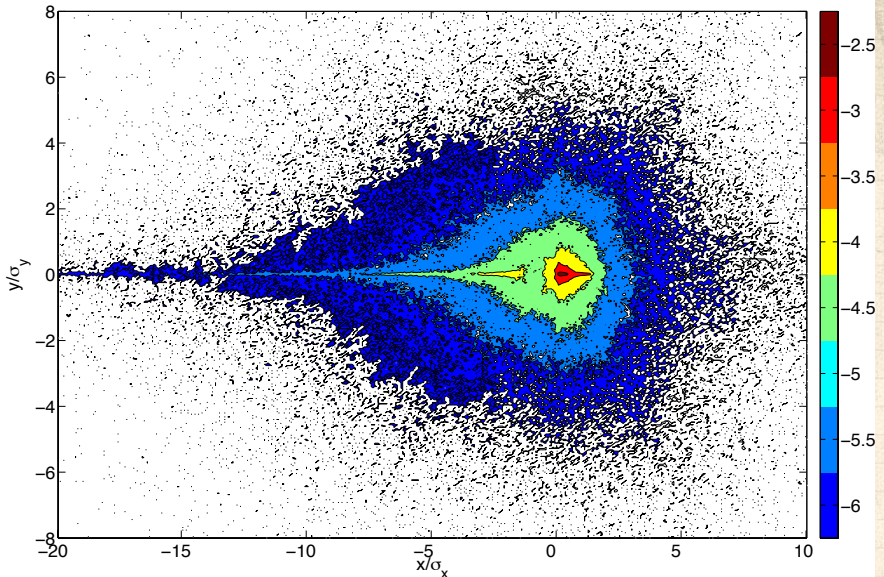




**Figure 6** | (A) Average happiness of words written as a function of distance from an author's expected location, with tweets grouped into ten equally populated bins. Expressed happiness grows logarithmically with distance distance from expected location. (B) A similar trend is observed when individuals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





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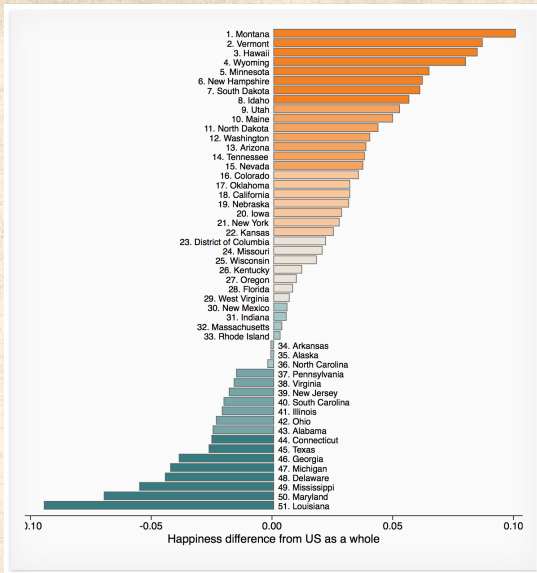
•••••

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Quokka Labs





Developmental Sankey diagrams [states](#) and [cities](#).



# Or here: Facebook Lexicon Sentiment Analysis (2008)

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## Binary decision on emotional content





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## Binary decision on emotional content



Limitation: Sentiments are classified as either **positive** or **negative**.



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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!'



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