

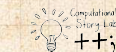
Lexicocalorimeter: Real-time health measurement

Last updated: 2018/04/30, 21:15:23

Complex Networks | @networksvox
CSYS/MATH 303, Spring, 2018

Prof. Peter Dodds | @peterdodds

Dept. of Mathematics & Statistics | Vermont Complex Systems Center
Vermont Advanced Computing Core | University of Vermont



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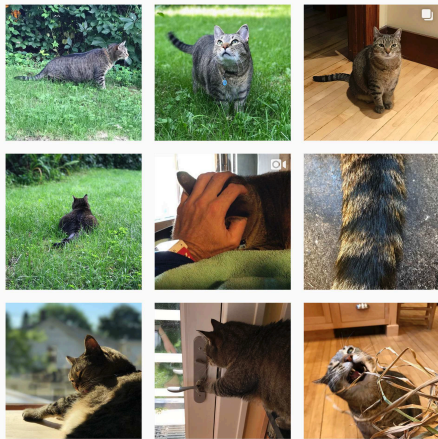
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 On Instagram at [pratchett_the_cat](https://www.instagram.com/pratchett_the_cat) 



Outline

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Panometer.org

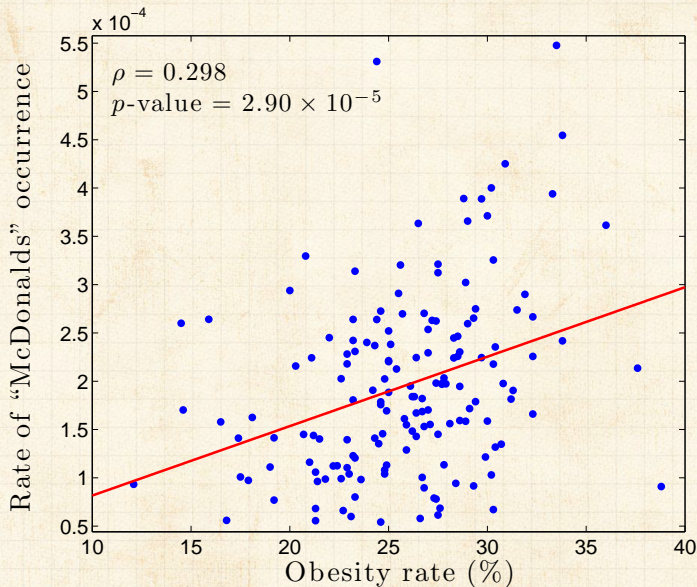
Measuring everything

Coming soon

Obesity and tweets—"McDonalds":

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Lexicalcalorimeter



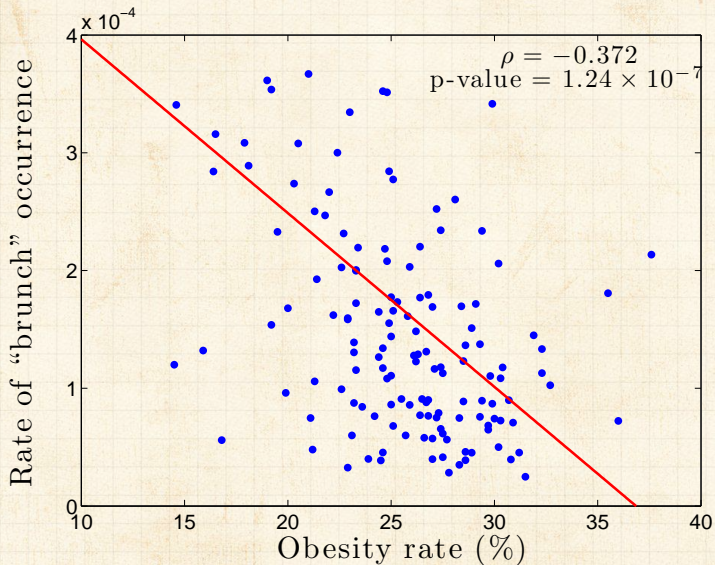
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Obesity and tweets—"Brunch":



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References

Word	ρ	p -value
cafe	-0.509	6.07×10^{-14}
sushi	-0.487	9.93×10^{-13}
brewery	-0.469	8.67×10^{-12}
restaurant	-0.448	8.93×10^{-11}
bar	-0.435	3.59×10^{-10}
banana	-0.434	3.77×10^{-10}
apple	-0.408	5.22×10^{-9}
fondue	-0.403	8.34×10^{-9}
wine	-0.400	1.08×10^{-8}
delicious	-0.392	2.17×10^{-8}
dinner	-0.386	3.85×10^{-8}
coffee	-0.384	4.51×10^{-8}
bakery	-0.383	5.12×10^{-8}
bean	-0.378	7.88×10^{-8}
espresso	-0.377	8.47×10^{-8}
cuisine	-0.376	8.82×10^{-8}
foods	-0.374	1.07×10^{-7}
tofu	-0.372	1.27×10^{-7}
brunch	-0.368	1.79×10^{-7}
veggie	-0.364	2.46×10^{-7}
organic	-0.361	3.13×10^{-7}
booze	-0.360	3.34×10^{-7}
grill	-0.354	5.4×10^{-7}
chocolate	-0.351	6.77×10^{-7}
#vegan	-0.350	7.47×10^{-7}

mcdonalds	0.246	6.18×10^{-4}
eat	0.241	8.22×10^{-4}
wings	0.222	2.13×10^{-3}
hungry	0.210	3.65×10^{-3}
heartburn	0.194	7.37×10^{-3}
ham	0.177	1.45×10^{-2}



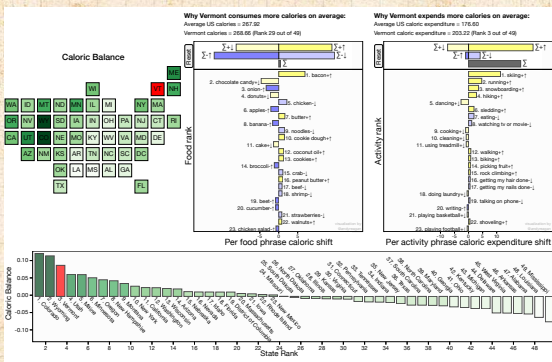


"The Lexicocalorimeter: Gauging public health through caloric input and output on social media"

Alajajian, Williams, Reagan, Alajajian, Frank, Mitchell, Lahne, Danforth, and Dodds. PLoS ONE, 12, e0168893, 2017. [1]

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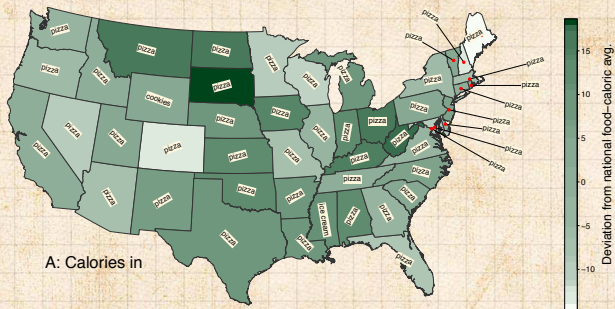
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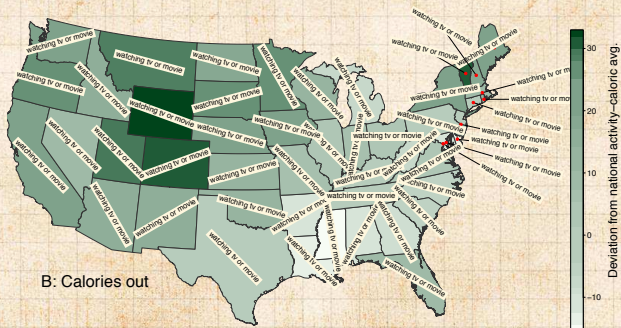
<http://panometer.org/instruments/lexicocalorimeter/>



The Lexicocalorimeter:

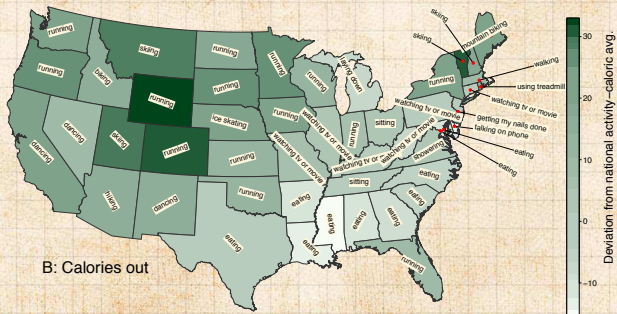
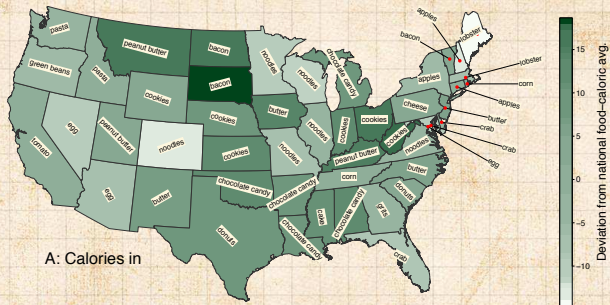


A: Calories in



B: Calories out

The Lexicocalorimeter:



The Lexicocalorimeter:

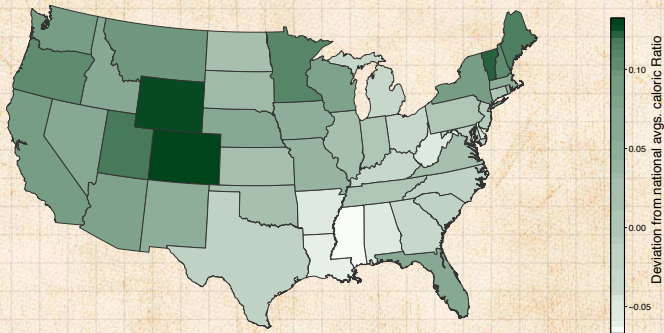
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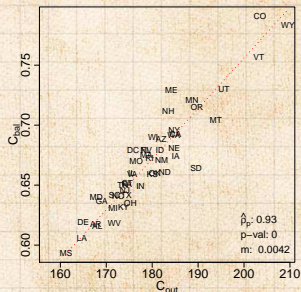
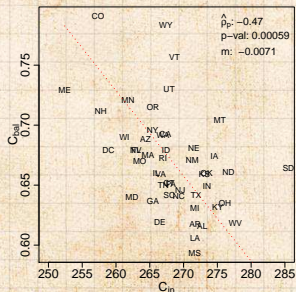
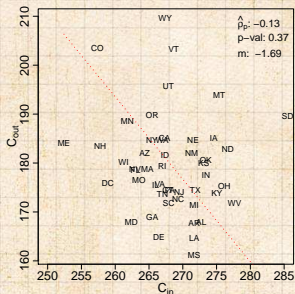
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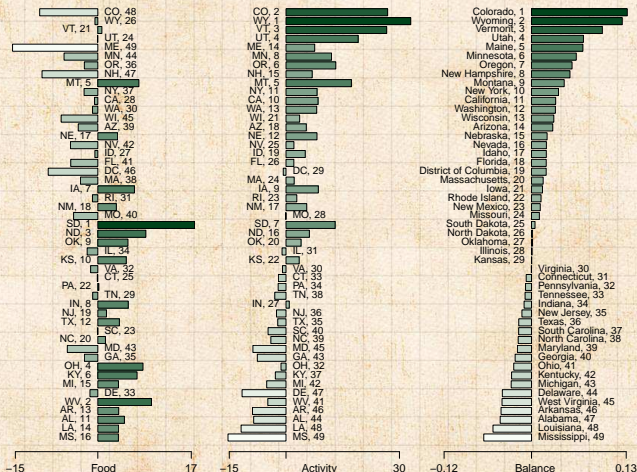
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Deviations from national averages



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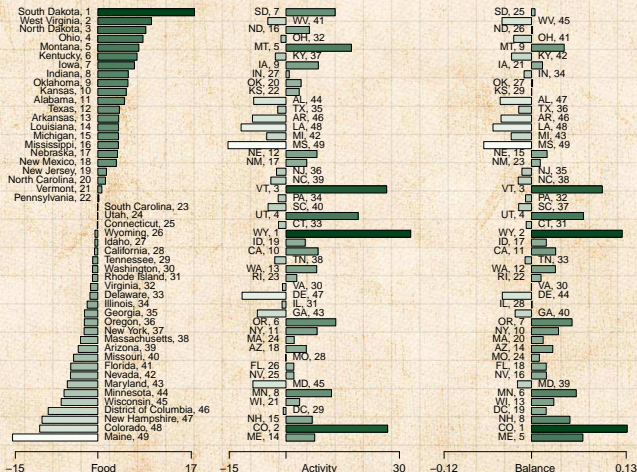
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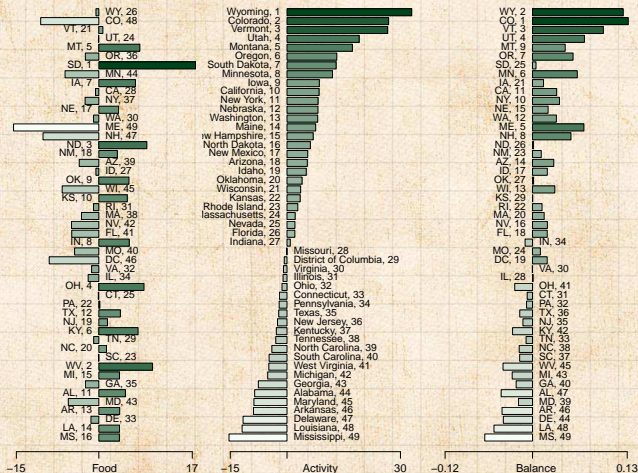
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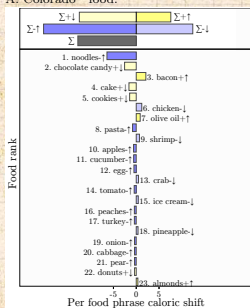
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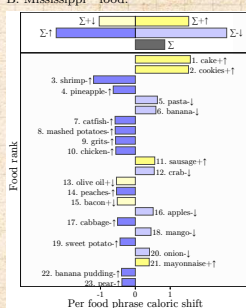


The Lexicocalorimeter:

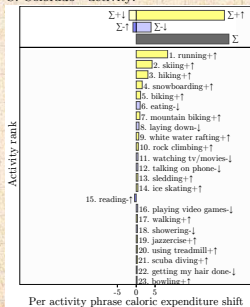
A. Colorado—food:



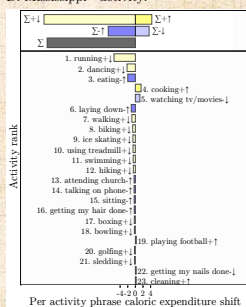
B. Mississippi—food:



C. Colorado—activity:



D. Mississippi—activity:



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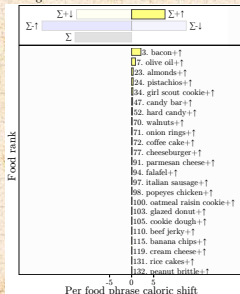
References



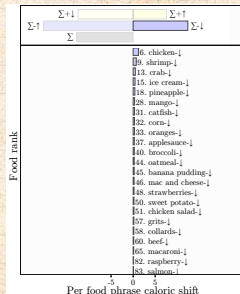
The Lexicocalorimeter:

Four views of food phrase shifts for Colorado

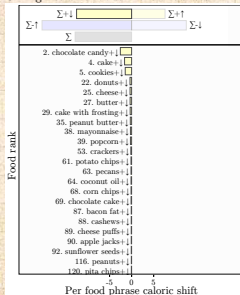
A. High calorie foods mentioned more:



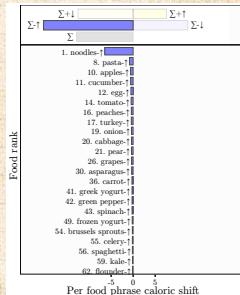
B. Low calorie foods mentioned less:



C. High calorie foods mentioned less:



D. Low calorie foods mentioned more:



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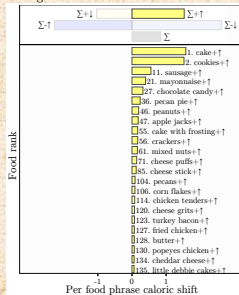
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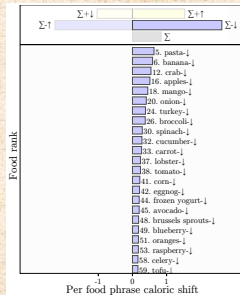
The Lexicocalorimeter:

Four views of food phrase shifts for Mississippi

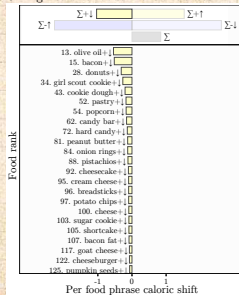
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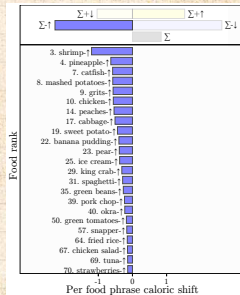
B. Low calorie foods mentioned less:



C. High calorie foods mentioned less:



D. Low calorie foods mentioned more:



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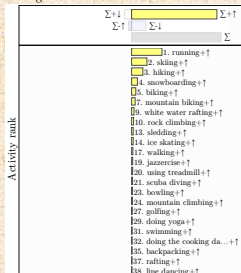
References



The Lexicocalorimeter:

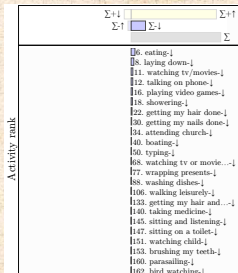
Four views of activity phrase shifts for Colorado

A. High calorie activities mentioned more:



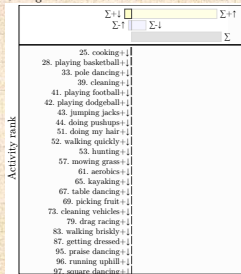
Per activity phrase caloric expenditure shift

B. Low calorie activities mentioned less:



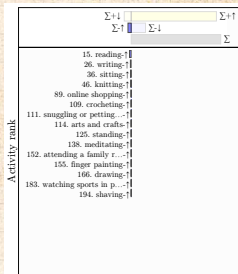
Per activity phrase caloric expenditure shift

C. High calorie activities mentioned less:



Per activity phrase caloric expenditure shift

D. Low calorie activities mentioned more:



Per activity phrase caloric expenditure shift

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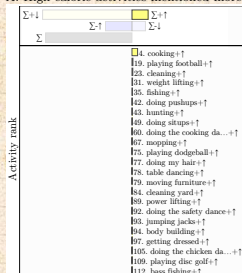
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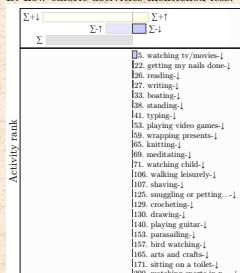
Four views of activity phrase shifts for Mississippi

A. High calorie activities mentioned more:



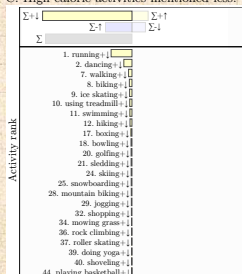
Per activity phrase caloric expenditure shift

B. Low calorie activities mentioned less:



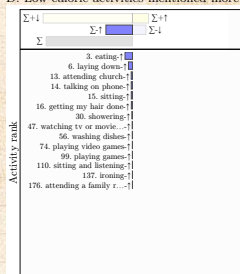
Per activity phrase caloric expenditure shift

C. High calorie activities mentioned less:



Per activity phrase caloric expenditure shift

D. Low calorie activities mentioned more:



Per activity phrase caloric expenditure shift

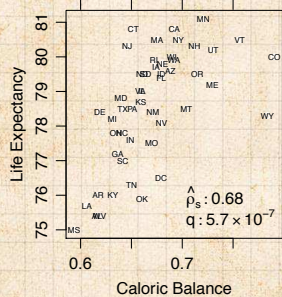
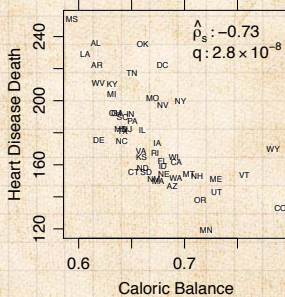
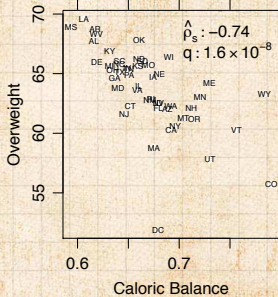
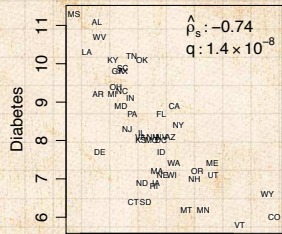
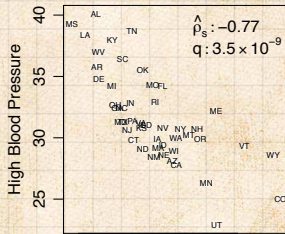
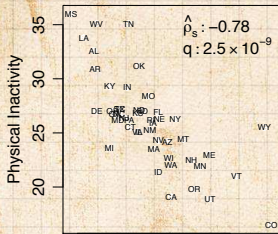
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Health and/or well-being quantity	$\hat{\rho}_s$ for C_{rat}	q-val	$\hat{\rho}_s$ for C_{in}	q-val	$\hat{\rho}_s$ for C_{out}	q-val
1. % no physical activity in past 30 days [24]	-0.78	2.73×10^{-09}	0.58	5.67×10^{-05}	-0.66	1.51×10^{-06}
2. % have been physically active in past 30 days [24]	0.78	2.73×10^{-09}	-0.57	6.53×10^{-05}	0.67	1.24×10^{-06}
3. % high blood pressure [24]	-0.77	2.73×10^{-09}	0.32	4.05×10^{-02}	-0.78	2.73×10^{-09}
4. Adult diabetes rate [25]	-0.76	5.44×10^{-09}	0.29	6.09×10^{-02}	-0.77	2.73×10^{-09}
5. CNBC quality of life ranking [26]	-0.76	6.75×10^{-09}	0.28	7.34×10^{-02}	-0.77	3.60×10^{-09}
6. % adult overweight/obesity [27]	-0.73	3.16×10^{-08}	0.55	1.41×10^{-04}	-0.59	3.07×10^{-05}
7. Heart disease death rate [27]	-0.73	2.50×10^{-08}	0.34	2.80×10^{-02}	-0.73	2.30×10^{-08}
8. % adult obesity [25]	-0.72	4.30×10^{-08}	0.53	2.26×10^{-04}	-0.59	2.96×10^{-05}
9. Gallup Wellbeing score [4]	0.72	4.69×10^{-08}	-0.31	4.43×10^{-02}	0.73	3.99×10^{-08}
10. America's Health Rankings, overall [24]	-0.72	4.10×10^{-07}	0.43	4.74×10^{-03}	-0.67	2.77×10^{-06}
11. Life expectancy at birth [27]	0.68	5.81×10^{-07}	-0.4	6.91×10^{-03}	0.65	2.64×10^{-06}
12. % who eat fruit less than once a day [28]	-0.67	1.20×10^{-06}	0.61	1.39×10^{-05}	-0.51	5.35×10^{-04}
13. % child overweight/obesity [27]	-0.64	3.53×10^{-06}	0.27	7.55×10^{-02}	-0.64	3.20×10^{-06}
14. % who eat vegetables less than once a day [28]	-0.61	1.39×10^{-05}	0.51	5.33×10^{-04}	-0.46	1.57×10^{-03}
15. Median daily intake of fruits [28]	0.6	1.98×10^{-05}	-0.62	8.33×10^{-06}	0.41	5.37×10^{-03}
16. Smoking rate [27]	-0.59	2.96×10^{-05}	0.51	5.26×10^{-04}	-0.48	1.08×10^{-03}
17. Median household income [27]	0.51	5.55×10^{-04}	-0.53	3.27×10^{-04}	0.4	8.38×10^{-03}
18. Median daily intake of vegetables [28]	0.5	6.10×10^{-04}	-0.56	7.44×10^{-05}	0.31	4.36×10^{-02}
19. % high cholesterol [24]	-0.49	8.11×10^{-04}	0.23	1.45×10^{-01}	-0.48	9.05×10^{-04}
20. Brain health ranking [29] (lower is better)	-0.49	8.11×10^{-04}	0.62	1.39×10^{-05}	-0.29	5.70×10^{-02}
21. % with bachelor's degree or higher [6]	0.46	1.57×10^{-03}	-0.54	1.66×10^{-04}	0.33	2.82×10^{-02}
22. Colorectal cancer rate [25]	-0.44	4.09×10^{-03}	0.53	3.59×10^{-04}	-0.27	8.25×10^{-02}
23. US Census Gini index score [30] (lower is better)	-0.42	5.37×10^{-03}	-0.03	8.42×10^{-01}	-0.5	5.55×10^{-04}
24. Avg # poor mental health days, past 30 days [24]	-0.42	5.37×10^{-03}	0.12	4.80×10^{-01}	-0.48	1.06×10^{-03}
25. Neuroticism Big Five personality trait [31]	-0.38	1.09×10^{-02}	0.2	2.03×10^{-01}	-0.37	1.44×10^{-02}
26. Binge drinking rate [24]	0.37	1.46×10^{-02}	-0.15	3.56×10^{-01}	0.41	5.84×10^{-03}
27. Avg # poor physical health days, past 30 days [24]	-0.35	2.34×10^{-02}	0.19	2.19×10^{-01}	-0.38	1.13×10^{-02}
28. Farmers markets per 100,000 in pop. [28]	0.34	2.72×10^{-02}	0.06	7.17×10^{-01}	0.42	5.14×10^{-03}
29. Strolling of the Heifers locavore score (lower is better) [32]	-0.29	5.86×10^{-02}	-0.3	5.41×10^{-02}	-0.45	2.94×10^{-03}
30. Extraversion Big Five personality trait [31]	-0.28	6.94×10^{-02}	0.03	8.42×10^{-01}	-0.29	5.63×10^{-02}
31. % schools offering fruit/veg at celebrations [28]	0.24	1.31×10^{-01}	-0.46	1.96×10^{-03}	0.05	7.90×10^{-01}
32. Openness Big Five personality trait [31]	0.23	1.31×10^{-01}	-0.5	6.11×10^{-04}	0.04	8.10×10^{-01}
33. % cropland harvested for fruits/veg [28]	0.19	2.34×10^{-01}	-0.62	1.37×10^{-05}	-0.04	8.10×10^{-01}
34. Conscientiousness Big Five personality trait [31]	-0.12	4.81×10^{-01}	0.2	2.10×10^{-01}	-0.05	7.93×10^{-01}
35. % census tracts, healthy food retailer within 1/2 mile [28]	-0.03	8.44×10^{-01}	-0.52	3.68×10^{-04}	-0.24	1.31×10^{-01}
36. George Mason overall freedom ranking [33] (lower is freer)	-0.03	8.42×10^{-01}	-0.11	5.15×10^{-01}	-0.1	5.64×10^{-01}
37. Agreeableness Big Five personality trait [31]	-0.01	9.61×10^{-01}	0.22	1.50×10^{-01}	0.08	6.47×10^{-01}

TABLE I. Spearman correlation coefficients, $\hat{\rho}_s$, and Benjamini-Hochberg q -values for caloric input C_{in} , caloric output C_{out} , and caloric ratio $C_{rat} = C_{out}/C_{in}$, and demographic, data related to food and physical activity, Big Five personality traits [31], health and well-being rankings by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio. The two breaks in the table indicate significance levels of 0.01 and 0.05 for the Benjamini-Hochberg q of C_{rat} , corresponding to the first 24 health and/or well-being quantities and then the next four, numbers 25 to 28. The bottom 9 quantities were not significantly correlated with C_{rat} according to our tests. Tabs. S1, S2, and S3 present the same analysis for caloric measures including phrases representing liquids, and for the difference $C_{diff}(\alpha) = \alpha C_{out} - (1 - \alpha)C_{in}$, both without and with liquids included.



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Other lexical meters

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Health and/or well-being quantity	$\hat{\rho}_s$ for C_{rat}	q-val	$\hat{\rho}_s$ for C_{in}	q-val	$\hat{\rho}_s$ for C_{out}	q-val
1. % no physical activity in past 30 days [24]	-0.78	3.07×10^{-09}	0.58	4.91×10^{-05}	-0.66	1.59×10^{-06}
2. % have been physically active in past 30 days [24]	0.78	3.07×10^{-09}	-0.58	5.50×10^{-05}	0.67	1.31×10^{-06}
3. % high blood pressure [24]	-0.77	3.07×10^{-09}	0.39	1.16×10^{-02}	-0.78	3.07×10^{-09}
4. Heart disease death rate [27]	-0.75	1.02×10^{-08}	0.38	1.24×10^{-02}	-0.73	2.07×10^{-08}
5. Adult diabetes rate [25]	-0.74	1.17×10^{-08}	0.34	2.77×10^{-02}	-0.77	3.07×10^{-09}
6. CNBC quality of life ranking [26]	-0.74	1.87×10^{-08}	0.33	3.22×10^{-02}	-0.77	3.60×10^{-09}
7. % adult overweight/obesity [27]	-0.71	1.33×10^{-07}	0.53	3.14×10^{-04}	-0.59	3.56×10^{-05}
8. Gallup Wellbeing score [4]	0.7	3.17×10^{-07}	-0.33	3.38×10^{-02}	0.73	4.35×10^{-08}
9. % adult obesity [25]	-0.69	3.10×10^{-07}	0.52	4.11×10^{-04}	-0.59	3.56×10^{-05}
10. America's Health Rankings, overall [24]	-0.69	1.31×10^{-06}	0.4	9.14×10^{-03}	-0.67	2.65×10^{-06}
11. Life expectancy at birth [27]	0.67	7.92×10^{-07}	-0.36	1.59×10^{-02}	0.65	2.58×10^{-06}
12. % child overweight/obesity [27]	-0.65	2.58×10^{-06}	0.34	2.82×10^{-02}	-0.64	3.06×10^{-06}
13. % who eat fruit less than once a day [28]	-0.65	2.58×10^{-06}	0.57	7.45×10^{-05}	-0.51	5.89×10^{-04}
14. % who eat vegetables less than once a day [28]	-0.61	1.32×10^{-05}	0.53	3.14×10^{-04}	-0.46	1.72×10^{-03}
15. Median daily intake of fruits [28]	0.59	3.56×10^{-05}	-0.59	3.56×10^{-05}	0.41	5.73×10^{-03}
16. Smoking rate [27]	-0.59	3.81×10^{-05}	0.47	1.60×10^{-03}	-0.48	1.24×10^{-03}
17. Median daily intake of vegetables [28]	0.5	7.25×10^{-04}	-0.56	1.03×10^{-04}	0.31	4.09×10^{-02}
18. Median household income [27]	0.48	1.37×10^{-03}	-0.5	8.58×10^{-04}	0.4	9.07×10^{-03}
19. % high cholesterol [24]	-0.48	1.26×10^{-03}	0.24	1.16×10^{-01}	-0.48	1.05×10^{-03}
20. Colorectal cancer rate [25]	-0.47	1.72×10^{-03}	0.56	1.37×10^{-04}	-0.27	8.35×10^{-02}
21. Brain health ranking [29] (lower is better)	-0.46	1.95×10^{-03}	0.55	1.74×10^{-04}	-0.29	5.43×10^{-02}
22. US Census Gini index score [30] (lower is better)	-0.44	3.60×10^{-03}	0.11	5.12×10^{-01}	-0.5	6.22×10^{-04}
23. % with bachelor's degree or higher [6]	0.42	4.86×10^{-03}	-0.43	4.21×10^{-03}	0.33	2.82×10^{-02}
24. Avg # poor mental health days, past 30 days [24]	-0.39	9.87×10^{-03}	0.1	5.31×10^{-01}	-0.48	1.23×10^{-03}
25. Neuroticism Big Five personality trait [31]	-0.37	1.33×10^{-02}	0.23	1.35×10^{-01}	-0.37	1.42×10^{-02}
26. Binge drinking rate [24]	0.34	2.91×10^{-02}	-0.12	4.88×10^{-01}	0.41	6.23×10^{-03}
27. Farmers markets per 100,000 in pop. [28]	0.33	2.96×10^{-02}	-0.01	9.59×10^{-01}	0.42	5.41×10^{-03}
28. Extraversion Big Five personality trait [31]	-0.33	2.83×10^{-02}	0.13	4.13×10^{-01}	-0.29	5.36×10^{-02}
29. Avg # poor physical health days, past 30 days [24]	-0.32	3.81×10^{-02}	0.16	3.32×10^{-01}	-0.38	1.16×10^{-02}
30. Strolling of the Heifers locavore score (lower is better) [32]	-0.31	4.59×10^{-02}	-0.16	3.32×10^{-01}	-0.45	3.16×10^{-03}
31. % schools offering fruit/veg at celebrations [28]	0.25	1.16×10^{-01}	-0.38	1.36×10^{-02}	0.05	7.75×10^{-01}
32. Openness Big Five personality trait [31]	0.23	1.31×10^{-01}	-0.42	5.43×10^{-03}	0.04	7.95×10^{-01}
33. % cropland harvested for fruits/veg [28]	0.18	2.53×10^{-01}	-0.53	2.90×10^{-04}	-0.04	7.95×10^{-01}
34. Conscientiousness Big Five personality trait [31]	-0.1	5.31×10^{-01}	0.14	3.97×10^{-01}	-0.05	7.78×10^{-01}
35. % census tracts, healthy food retailer within 1/2 mile [28]	-0.06	7.47×10^{-01}	-0.39	1.09×10^{-02}	-0.24	1.28×10^{-01}
36. George Mason overall freedom ranking [33] (lower is freer)	-0.02	8.90×10^{-01}	-0.05	7.73×10^{-01}	-0.1	5.58×10^{-01}
37. Agreeableness Big Five personality trait [31]	0	9.95×10^{-01}	0.24	1.26×10^{-01}	0.08	6.41×10^{-01}

TABLE S1. Identical to Tab. I but with liquids included. Spearman correlation coefficients, $\hat{\rho}_s$, and Benjamin-Hochberg q -values for caloric input C_{in} , caloric output C_{out} , and caloric ratio $C_{rat} = C_{out}/C_{in}$ and demographic data related to food and physical activity, Big Five personality traits [31], health and well-being rankings by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio.



The Lexicocalorimeter:

The LCM

Other lexical
meters

References

Health and/or well-being quantity	$\hat{\rho}_s$ for C_{rat}	q-val	$\hat{\rho}_s$ for C_{in}	q-val	$\hat{\rho}_s$ for C_{out}	q-val
1. % no physical activity in past 30 days [24]	-0.78	3.07×10^{-09}	0.58	4.91×10^{-05}	-0.66	1.59×10^{-06}
2. % have been physically active in past 30 days [24]	0.78	3.07×10^{-09}	-0.58	5.50×10^{-05}	0.67	1.31×10^{-06}
3. % high blood pressure [24]	-0.77	3.07×10^{-09}	0.39	1.16×10^{-02}	-0.78	3.07×10^{-09}
4. Heart disease death rate [27]	-0.75	1.02×10^{-08}	0.38	1.24×10^{-02}	-0.73	2.07×10^{-08}
5. Adult diabetes rate [25]	-0.74	1.17×10^{-08}	0.34	2.77×10^{-02}	-0.77	3.07×10^{-09}
6. CNBC quality of life ranking [26]	-0.74	1.87×10^{-08}	0.33	3.22×10^{-02}	-0.77	3.60×10^{-09}
7. % adult overweight/obesity [27]	-0.71	1.33×10^{-07}	0.53	3.14×10^{-04}	-0.59	3.56×10^{-05}
8. Gallup Wellbeing score [4]	0.7	3.17×10^{-07}	-0.33	3.38×10^{-02}	0.73	4.35×10^{-08}
9. % adult obesity [25]	-0.69	3.10×10^{-07}	0.52	4.11×10^{-04}	-0.59	3.56×10^{-05}
10. America's Health Rankings, overall [24]	-0.69	1.31×10^{-06}	0.4	9.14×10^{-03}	-0.67	2.65×10^{-06}
11. Life expectancy at birth [27]	0.67	7.92×10^{-07}	-0.36	1.59×10^{-02}	0.65	2.58×10^{-06}
12. % child overweight/obesity [27]	-0.65	2.58×10^{-06}	0.34	2.82×10^{-02}	-0.64	3.06×10^{-06}
13. % who eat fruit less than once a day [28]	-0.65	2.58×10^{-06}	0.57	7.45×10^{-05}	-0.51	5.89×10^{-04}
14. % who eat vegetables less than once a day [28]	-0.61	1.32×10^{-05}	0.53	3.14×10^{-04}	-0.46	1.72×10^{-03}
15. Median daily intake of fruits [28]	0.59	3.56×10^{-05}	-0.59	3.56×10^{-05}	0.41	5.73×10^{-03}
16. Smoking rate [27]	-0.59	3.81×10^{-05}	0.47	1.60×10^{-03}	-0.48	1.24×10^{-03}
17. Median daily intake of vegetables [28]	0.5	7.25×10^{-04}	-0.56	1.03×10^{-04}	0.31	4.09×10^{-02}
18. Median household income [27]	0.48	1.37×10^{-03}	-0.5	8.58×10^{-04}	0.4	9.07×10^{-03}
19. % high cholesterol [24]	-0.48	1.26×10^{-03}	0.24	1.16×10^{-01}	-0.48	1.05×10^{-03}
20. Colorectal cancer rate [25]	-0.47	1.72×10^{-03}	0.56	1.37×10^{-04}	-0.27	8.35×10^{-02}
21. Brain health ranking [29] (lower is better)	-0.46	1.95×10^{-03}	0.55	1.74×10^{-04}	-0.29	5.43×10^{-02}
22. US Census Gini index score [30] (lower is better)	-0.44	3.60×10^{-03}	0.11	5.12×10^{-01}	-0.5	6.22×10^{-04}
23. % with bachelor's degree or higher [6]	0.42	4.86×10^{-03}	-0.43	4.21×10^{-03}	0.33	2.82×10^{-02}
24. Avg # poor mental health days, past 30 days [24]	-0.39	9.87×10^{-03}	0.1	5.31×10^{-01}	-0.48	1.23×10^{-03}
25. Neuroticism Big Five personality trait [31]	-0.37	1.33×10^{-02}	0.23	1.35×10^{-01}	-0.37	1.42×10^{-02}
26. Binge drinking rate [24]	0.34	2.91×10^{-02}	-0.12	4.88×10^{-01}	0.41	6.23×10^{-03}
27. Farmers markets per 100,000 in pop. [28]	0.33	2.96×10^{-02}	-0.01	9.59×10^{-01}	0.42	5.41×10^{-03}
28. Extraversion Big Five personality trait [31]	-0.33	2.83×10^{-02}	0.13	4.13×10^{-01}	-0.29	5.36×10^{-02}
29. Avg # poor physical health days, past 30 days [24]	-0.32	3.81×10^{-02}	0.16	3.32×10^{-01}	-0.38	1.16×10^{-02}
30. Strolling of the Heifers locavore score (lower is better) [32]	-0.31	4.59×10^{-02}	-0.16	3.32×10^{-01}	-0.45	3.16×10^{-03}
31. % schools offering fruit/veg at celebrations [28]	0.25	1.16×10^{-01}	-0.38	1.36×10^{-02}	0.05	7.75×10^{-01}
32. Openness Big Five personality trait [31]	0.23	1.31×10^{-01}	-0.42	5.43×10^{-03}	0.04	7.95×10^{-01}
33. % cropland harvested for fruits/veg [28]	0.18	2.53×10^{-01}	-0.53	2.90×10^{-04}	-0.04	7.95×10^{-01}
34. Conscientiousness Big Five personality trait [31]	-0.1	5.31×10^{-01}	0.14	3.97×10^{-01}	-0.05	7.78×10^{-01}
35. % census tracts, healthy food retailer within 1/2 mile [28]	-0.06	7.47×10^{-01}	-0.39	1.09×10^{-02}	-0.24	1.28×10^{-01}
36. George Mason overall freedom ranking [33] (lower is freer)	-0.02	8.90×10^{-01}	-0.05	7.73×10^{-01}	-0.1	5.58×10^{-01}
37. Agreeableness Big Five personality trait [31]	0	9.95×10^{-01}	0.24	1.26×10^{-01}	0.08	6.41×10^{-01}

TABLE S1. Identical to Tab. I but with liquids included. Spearman correlation coefficients, $\hat{\rho}_s$, and Benjamin-Hochberg q -values for caloric input C_{in} , caloric output C_{out} , and caloric ratio $C_{rat} = C_{out}/C_{in}$ and demographic data related to food and physical activity, Big Five personality traits [31], health and well-being rankings by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio.



The Lexicocalorimeter:

Health and/or well-being quantity	β_s for C_{diff}	q-val	β_s for C_{in}	q-val	β_s for C_{out}	q-val
1. % no physical activity in past 30 days [24]	-0.78	3.42×10^{-09}	0.58	4.91×10^{-05}	-0.66	1.59×10^{-06}
2. % have been physically active in past 30 days [24]	0.78	3.42×10^{-09}	-0.58	5.50×10^{-05}	0.67	1.39×10^{-06}
3. % high blood pressure [24]	-0.77	3.60×10^{-09}	0.39	1.16×10^{-02}	-0.78	3.42×10^{-09}
4. Heart disease death rate [27]	-0.75	1.09×10^{-08}	0.38	1.24×10^{-02}	-0.73	2.07×10^{-08}
5. Adult diabetes rate [25]	-0.74	1.25×10^{-08}	0.34	2.77×10^{-02}	-0.77	3.42×10^{-09}
6. CNBC quality of life ranking [26]	-0.74	2.07×10^{-08}	0.33	3.22×10^{-02}	-0.77	3.60×10^{-09}
7. % adult overweight/obesity [27]	-0.7	1.48×10^{-07}	0.53	3.14×10^{-04}	-0.59	3.56×10^{-05}
8. Gallup Wellbeing score [4]	0.7	3.08×10^{-07}	-0.33	3.38×10^{-02}	0.73	4.35×10^{-08}
9. % adult obesity [25]	-0.69	3.40×10^{-07}	0.52	4.11×10^{-04}	-0.59	3.56×10^{-05}
10. America's Health Rankings, overall [24]	-0.69	1.39×10^{-06}	0.4	9.14×10^{-03}	-0.67	2.77×10^{-06}
11. Life expectancy at birth [27]	0.67	9.05×10^{-07}	-0.36	1.59×10^{-02}	0.65	2.67×10^{-06}
12. % who eat fruit less than once a day [28]	-0.65	2.67×10^{-06}	0.57	7.45×10^{-05}	-0.51	5.89×10^{-04}
13. % child overweight/obesity [27]	-0.64	3.06×10^{-06}	0.34	2.78×10^{-02}	-0.64	3.06×10^{-06}
14. % who eat vegetables less than once a day [28]	-0.61	1.54×10^{-05}	0.53	3.14×10^{-04}	-0.46	1.69×10^{-03}
15. Median daily intake of fruits [28]	0.59	3.56×10^{-05}	-0.59	3.56×10^{-05}	0.41	5.73×10^{-03}
16. Smoking rate [27]	-0.59	3.77×10^{-05}	0.47	1.60×10^{-03}	-0.48	1.24×10^{-03}
17. Median daily intake of vegetables [28]	0.5	7.64×10^{-04}	-0.56	1.03×10^{-04}	0.31	4.09×10^{-02}
18. Median household income [27]	0.48	1.38×10^{-03}	-0.5	8.58×10^{-04}	0.4	9.07×10^{-03}
19. % high cholesterol [24]	-0.48	1.28×10^{-03}	0.24	1.15×10^{-01}	-0.48	1.05×10^{-03}
20. Colorectal cancer rate [25]	-0.47	1.68×10^{-03}	0.56	1.37×10^{-04}	-0.27	8.35×10^{-02}
21. Brain health ranking [29] (lower is better)	-0.46	1.91×10^{-03}	0.55	1.74×10^{-04}	-0.29	5.43×10^{-02}
22. US Census Gini index score [30] (lower is better)	-0.44	3.41×10^{-03}	0.11	5.12×10^{-01}	-0.5	6.22×10^{-04}
23. % with bachelor's degree or higher [6]	0.42	4.99×10^{-03}	-0.43	4.21×10^{-03}	0.33	2.78×10^{-02}
24. Avg # poor mental health days, past 30 days [24]	-0.39	1.05×10^{-02}	0.1	5.31×10^{-01}	-0.48	1.23×10^{-03}
25. Neuroticism Big Five personality trait [31]	-0.37	1.30×10^{-02}	0.23	1.35×10^{-01}	-0.37	1.42×10^{-02}
26. Extraversion Big Five personality trait [31]	-0.34	2.78×10^{-02}	0.13	4.13×10^{-01}	-0.29	5.36×10^{-02}
27. Farmers markets per 100,000 in pop. [28]	0.33	2.88×10^{-02}	-0.01	9.59×10^{-01}	0.42	5.41×10^{-03}
28. Binge drinking rate [24]	0.33	2.88×10^{-02}	-0.12	4.88×10^{-01}	0.41	6.23×10^{-03}
29. Avg # poor physical health days, past 30 days [24]	-0.32	3.83×10^{-02}	0.16	3.32×10^{-01}	-0.38	1.16×10^{-02}
30. Strolling of the Heifers locavore score (lower is better) [32]	-0.31	4.52×10^{-02}	-0.16	3.32×10^{-01}	-0.45	3.16×10^{-03}
31. % schools offering fruit/veg at celebrations [28]	0.25	1.13×10^{-01}	-0.38	1.36×10^{-02}	0.05	7.75×10^{-01}
32. Openness Big Five personality trait [31]	0.23	1.30×10^{-01}	-0.42	5.43×10^{-03}	0.04	7.95×10^{-01}
33. % cropland harvested for fruits/veg [28]	0.18	2.58×10^{-01}	-0.53	2.90×10^{-04}	-0.04	7.95×10^{-01}
34. Conscientiousness Big Five personality trait [31]	-0.1	5.31×10^{-01}	0.14	3.97×10^{-01}	-0.05	7.78×10^{-01}
35. % census tracts, healthy food retailer within 1/2 mile [28]	-0.06	7.41×10^{-01}	-0.39	1.09×10^{-02}	-0.24	1.28×10^{-01}
36. George Mason overall freedom ranking [33] (lower is freer)	-0.02	8.82×10^{-01}	-0.05	7.73×10^{-01}	-0.1	5.58×10^{-01}
37. Agreeableness Big Five personality trait [31]	0	9.85×10^{-01}	0.24	1.26×10^{-01}	0.08	6.41×10^{-01}

TABLE S3. Identical to Tab. 1 but including liquids and using a caloric difference rather than caloric ratio. Spearman correlation coefficients, β_s , and Benjamin-Hochberg q-values for caloric input C_{in} , caloric output C_{out} , and caloric difference $C_{diff}(\alpha) = \alpha C_{out} + (1 - \alpha)C_{in}$ and demographic data related to food and physical activity. Big Five personality traits [31], health and well-being rankings by state, and socioeconomic status, correlated, ordered from strongest to weakest Spearman correlations with caloric ratio. We chose α so that the average of C_{out} matched the average of C_{in} .

The LCM

Other lexical meters

References

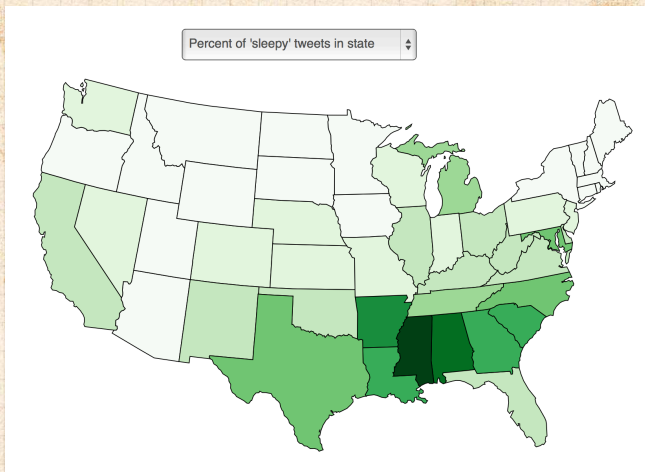


The Insomniometer:

The LCM

Other lexical
meters

References

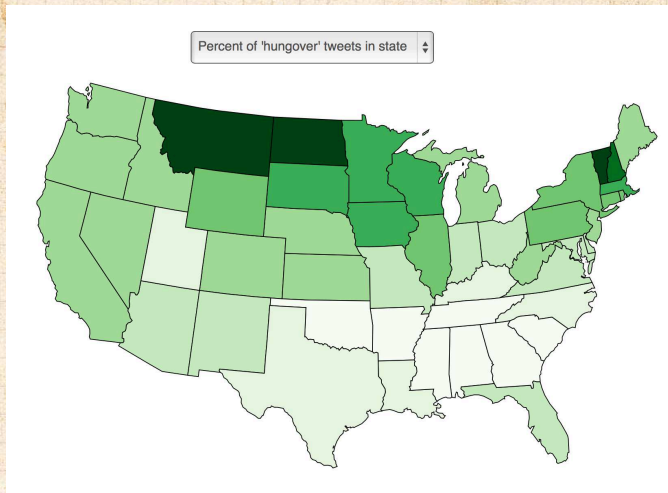


Correlation with CDC's Sleep Insufficiency measure [↗](#):

$$r_s = .48, p = 5.3 \times 10^{-4}.$$



The Hangoverometer:



The LCM

Other lexical
meters

References



Correlation with Binge drinking estimates: $r_s = .72$,
 $p = 5.8 \times 10^{-9}$.



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