Lexicocalorimeter: Real-time health measurement

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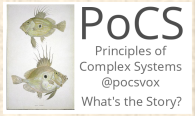
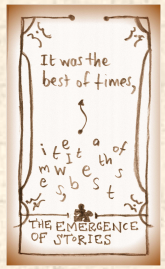
Principles of Complex Systems, Vols. 1 & 2
CSYS/MATH 300 and 303, 2021–2022| @pocsvox

Prof. Peter Sheridan Dodds | @peterdodds

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





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The LCM

Other lexical meters

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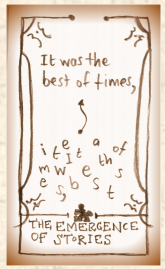

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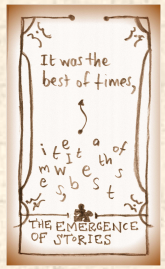

Outline

The LCM

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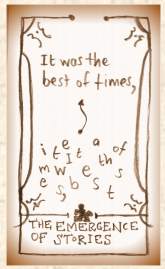
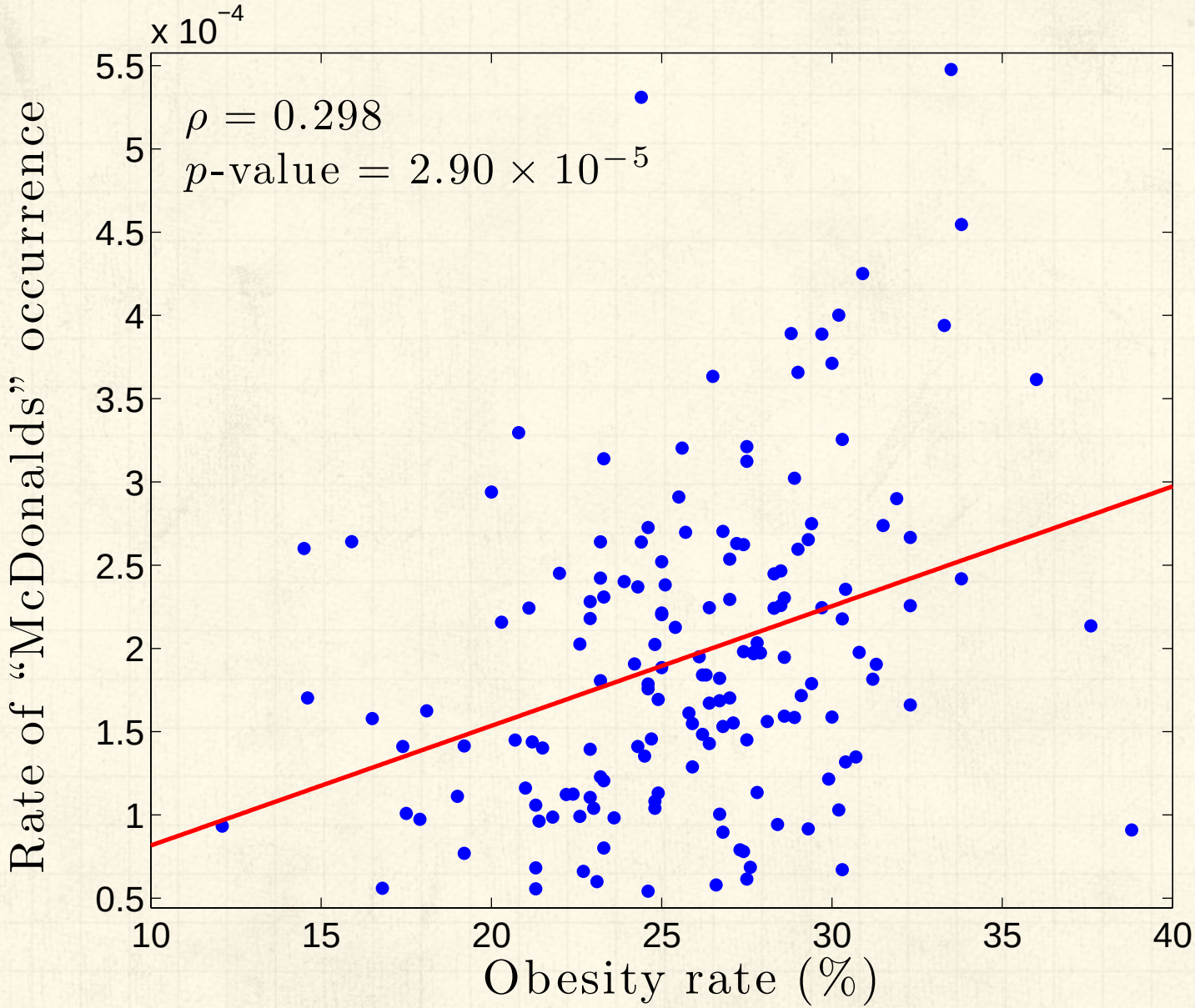


Panometer.org

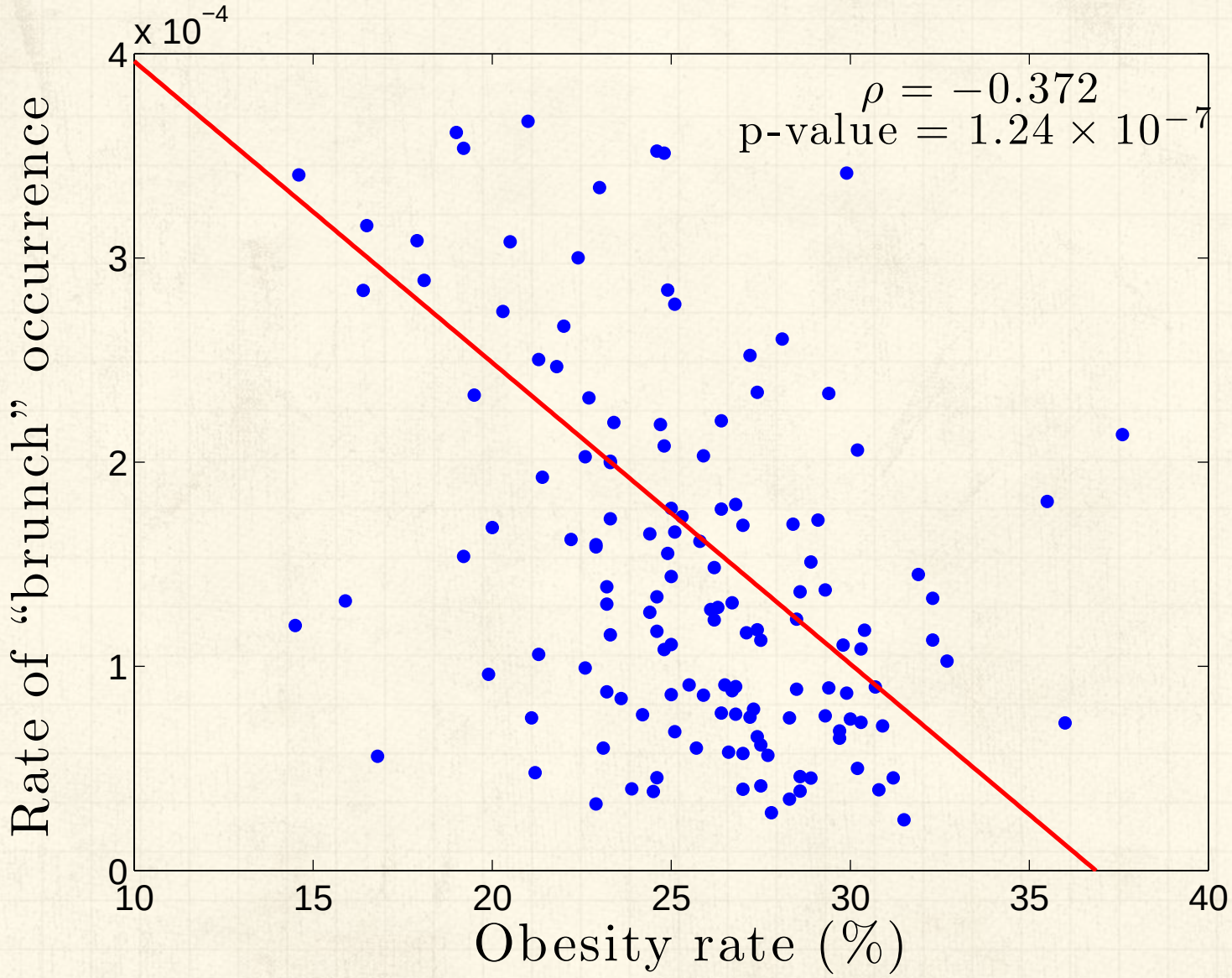
Measuring everything

Coming soon

Obesity and tweets—"McDonalds":



Obesity and tweets—“Brunch”:

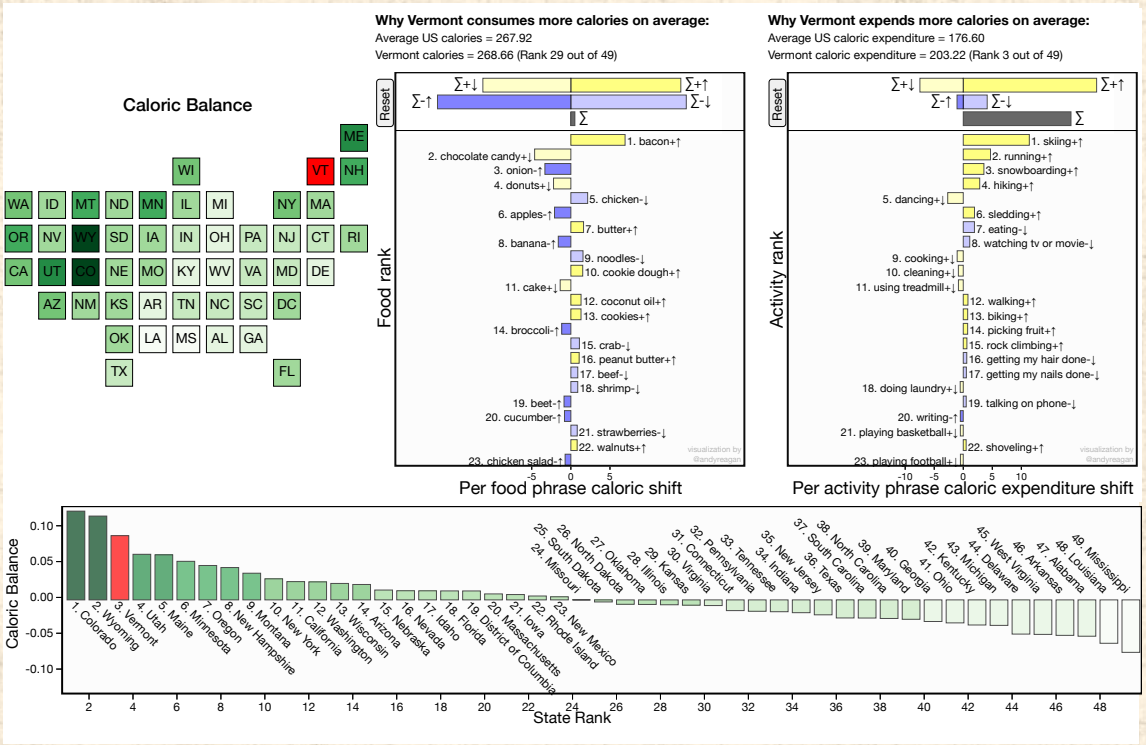


Word	ρ	p-value
cafe	-0.509	6.07×10^{-14}
sushi	-0.487	9.93×10^{-13}
brewery	-0.469	8.67×10^{-12}
restaurant	-0.448	8.93×10^{-11}
bar	-0.435	3.59×10^{-10}
banana	-0.434	3.77×10^{-10}
apple	-0.408	5.22×10^{-9}
fondue	-0.403	8.34×10^{-9}
wine	-0.400	1.08×10^{-8}
delicious	-0.392	2.17×10^{-8}
dinner	-0.386	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}

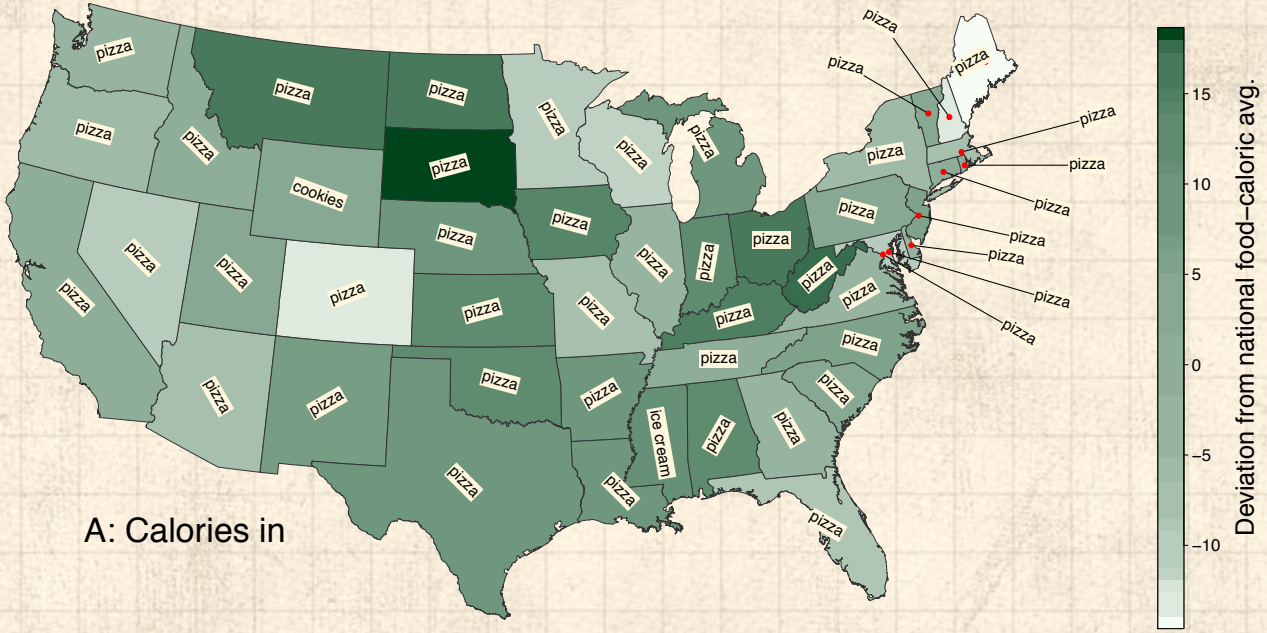
"The Lexicocalorimeter: Gauging public health through caloric input and output on social media"

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

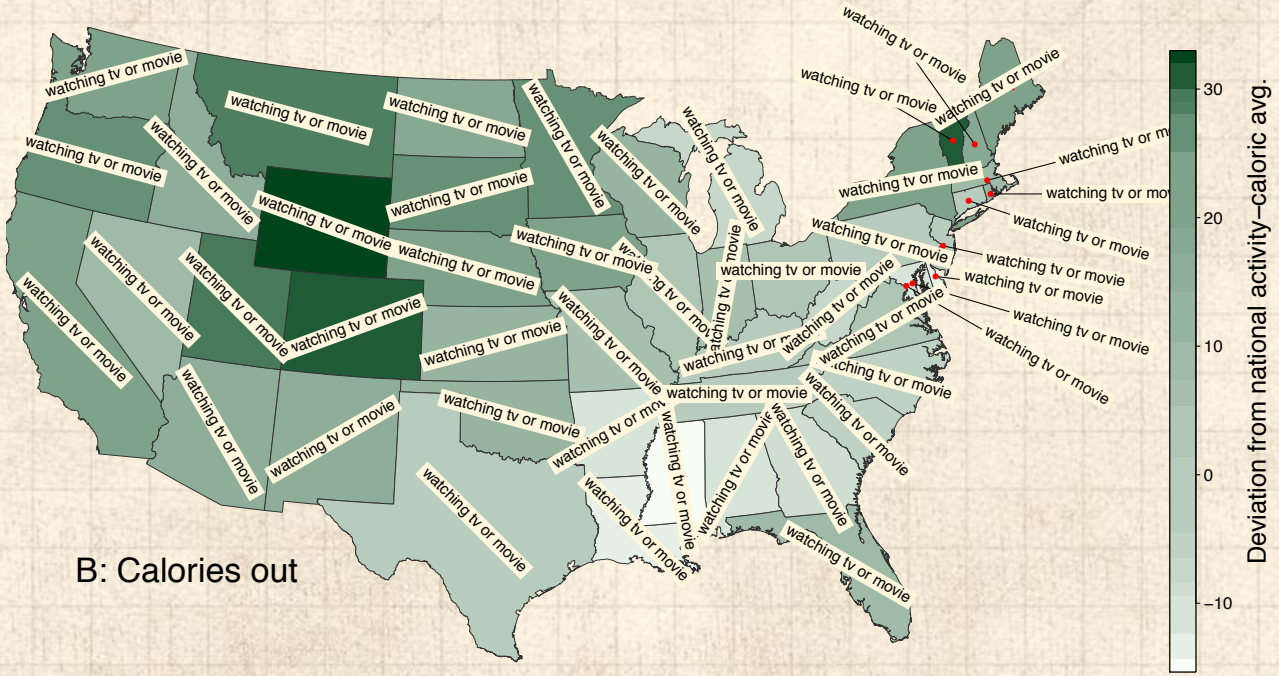


http://panometer.org/instruments/lexicocalorimeter/

The Lexicocalorimeter:

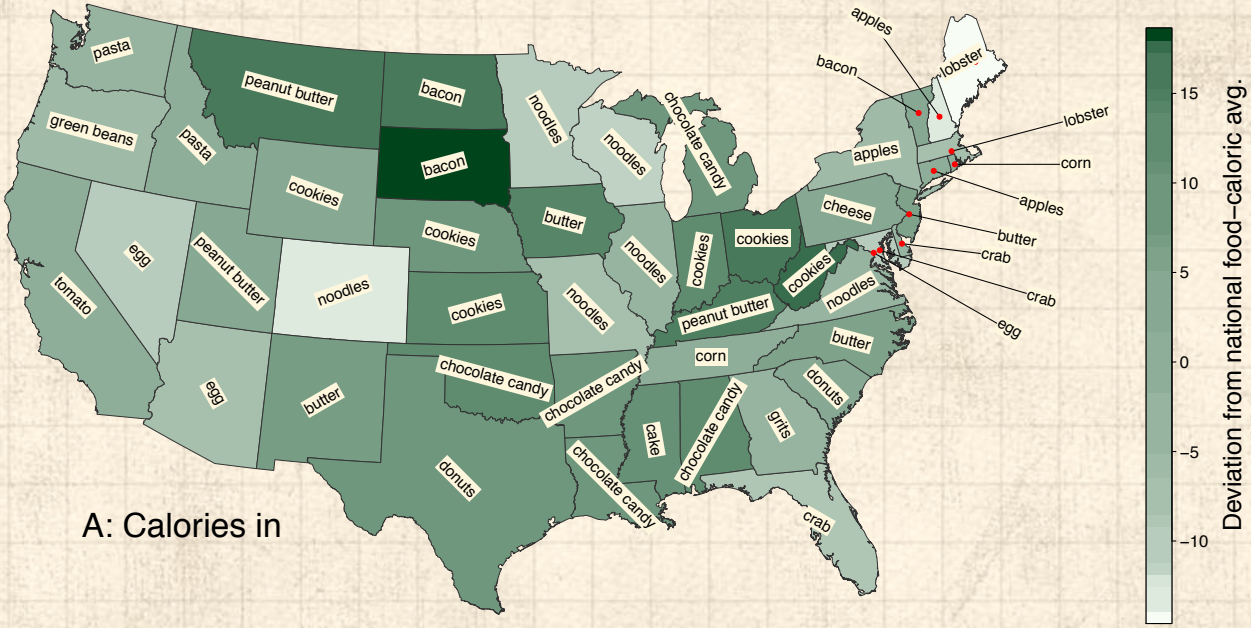


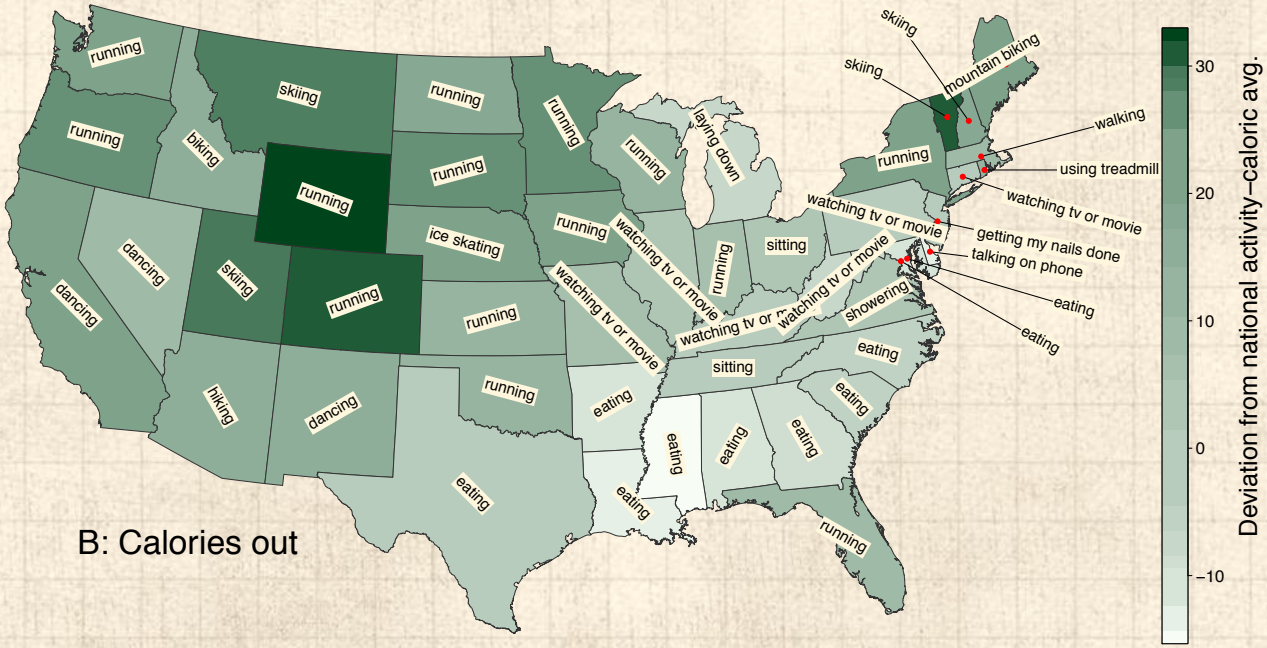
A: Calories in



B: Calories out

The Lexicocalorimeter:





The Lexicocalorimeter:

The LCM
Other lexical meters
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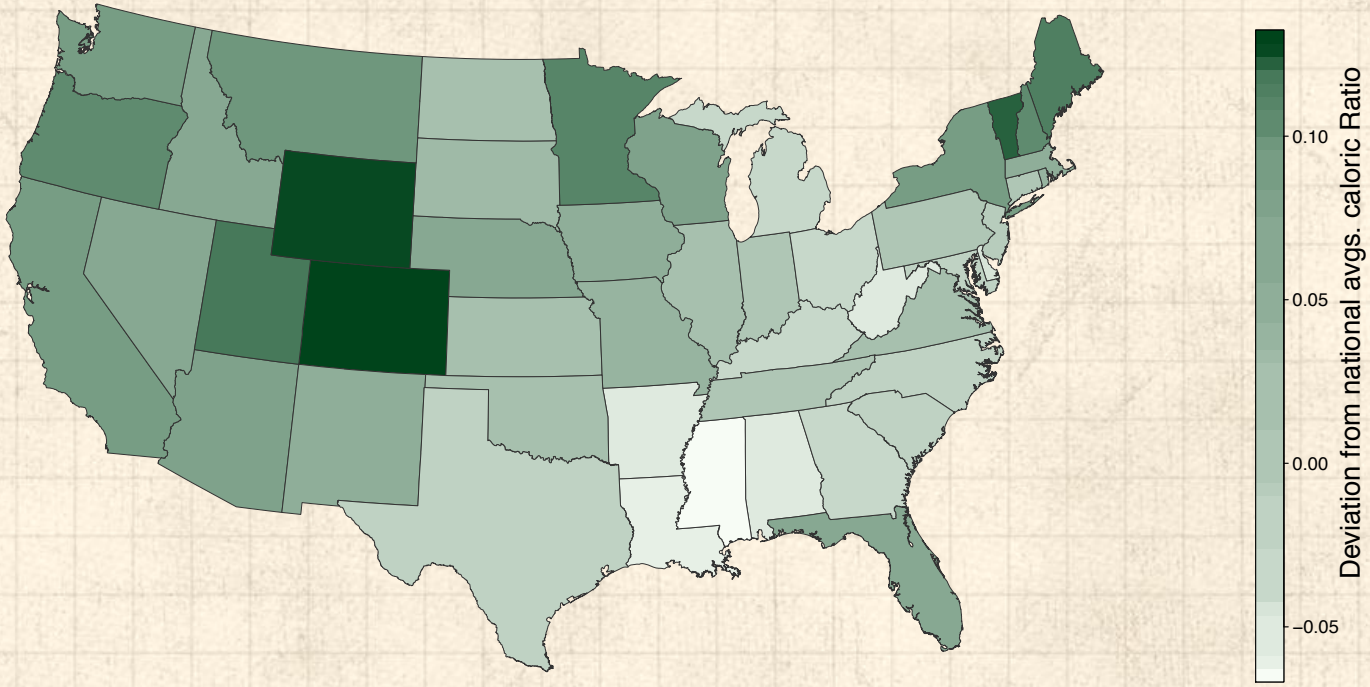

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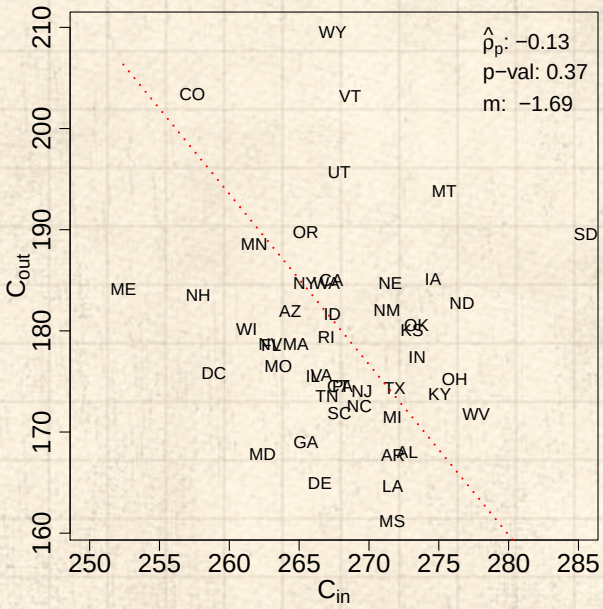

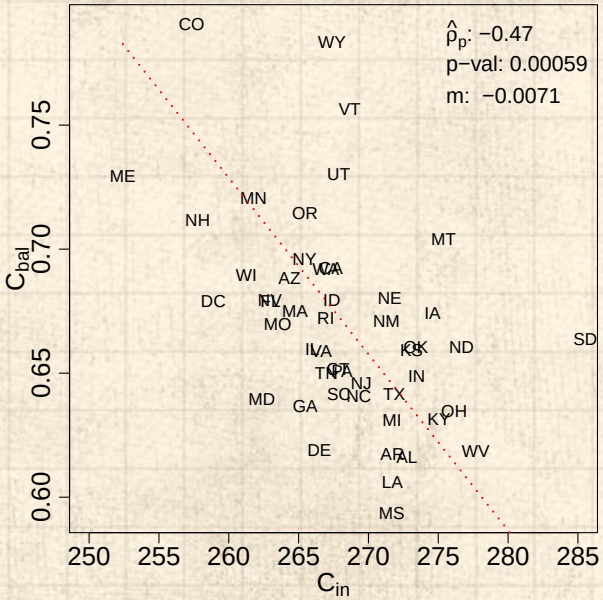

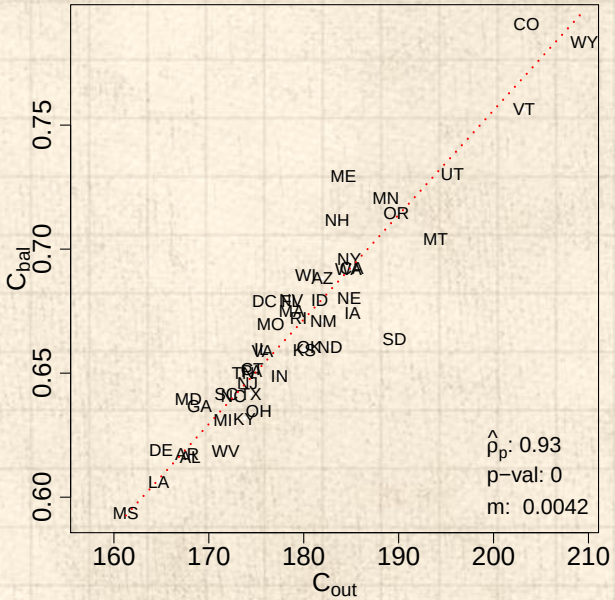

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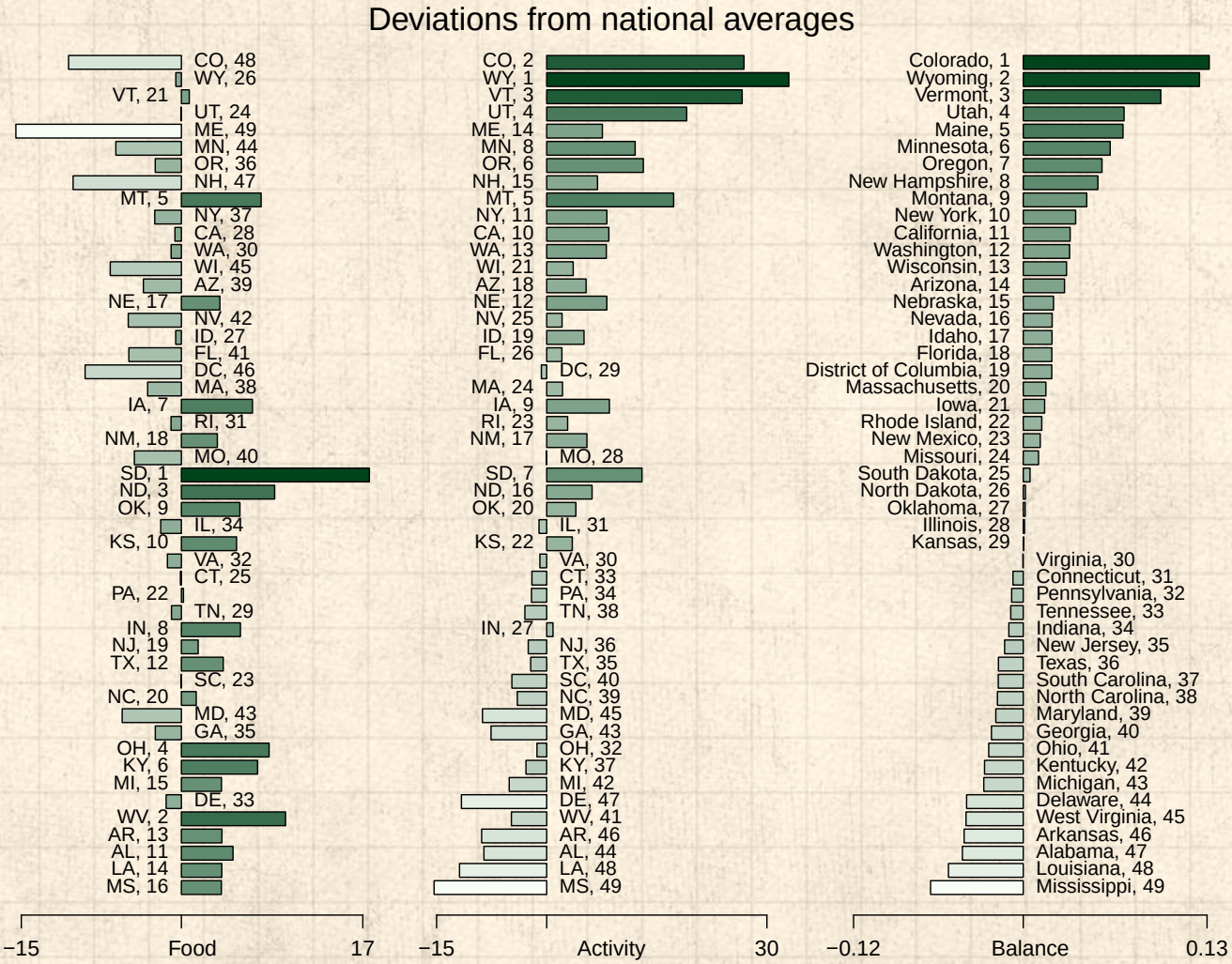

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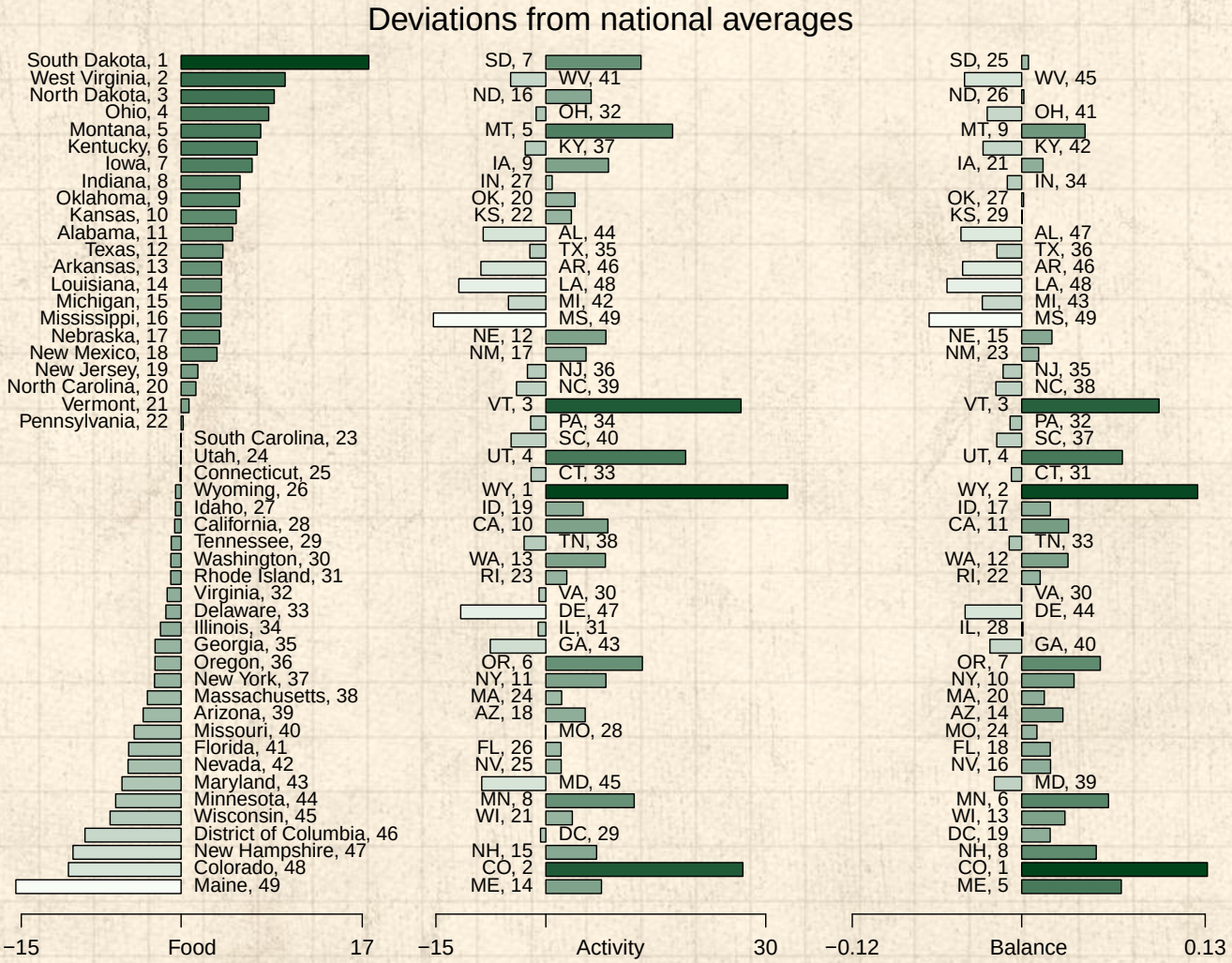

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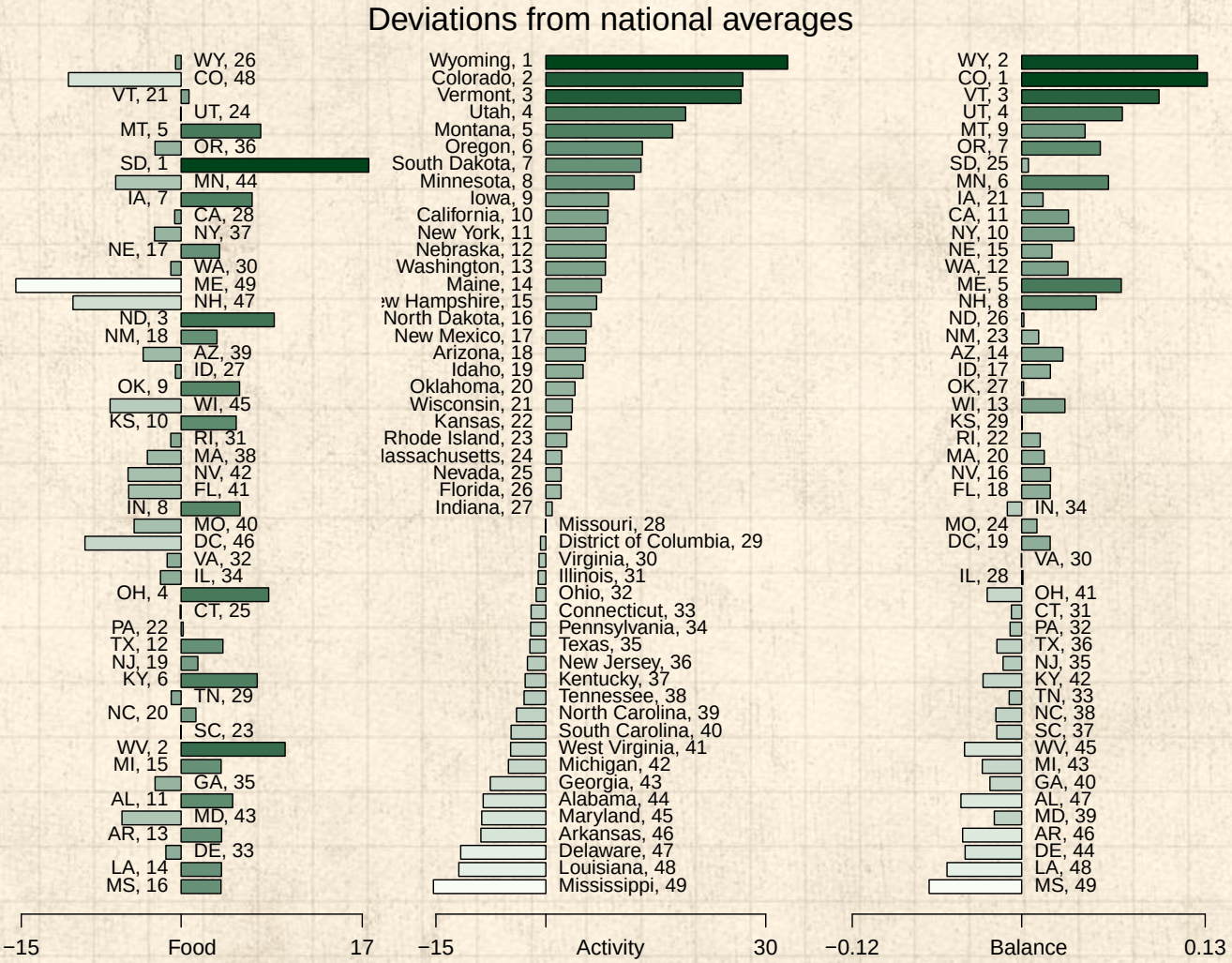

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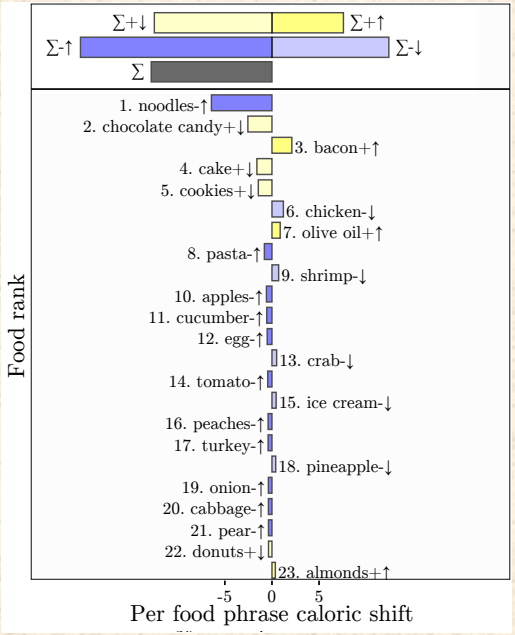
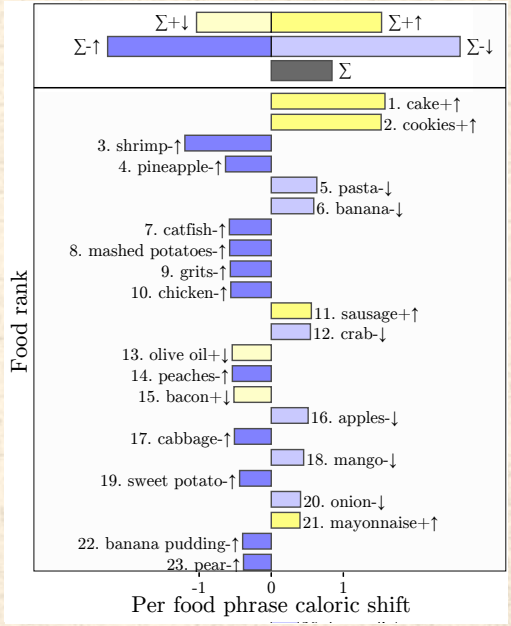
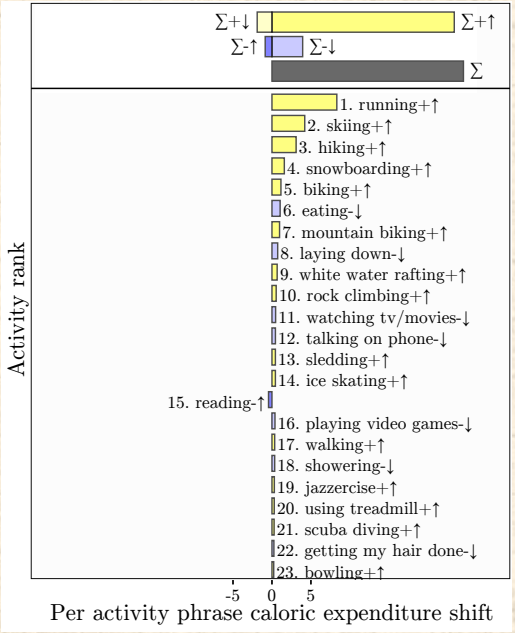
A. Colorado—food:



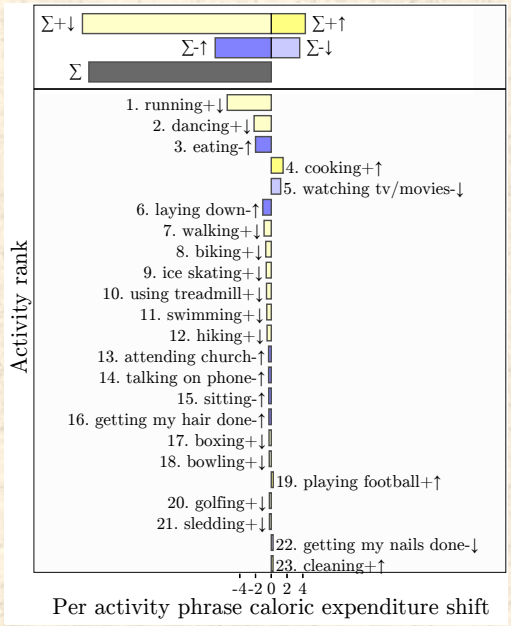
B. Mississippi—food:



C. Colorado—activity:



D. Mississippi—activity:



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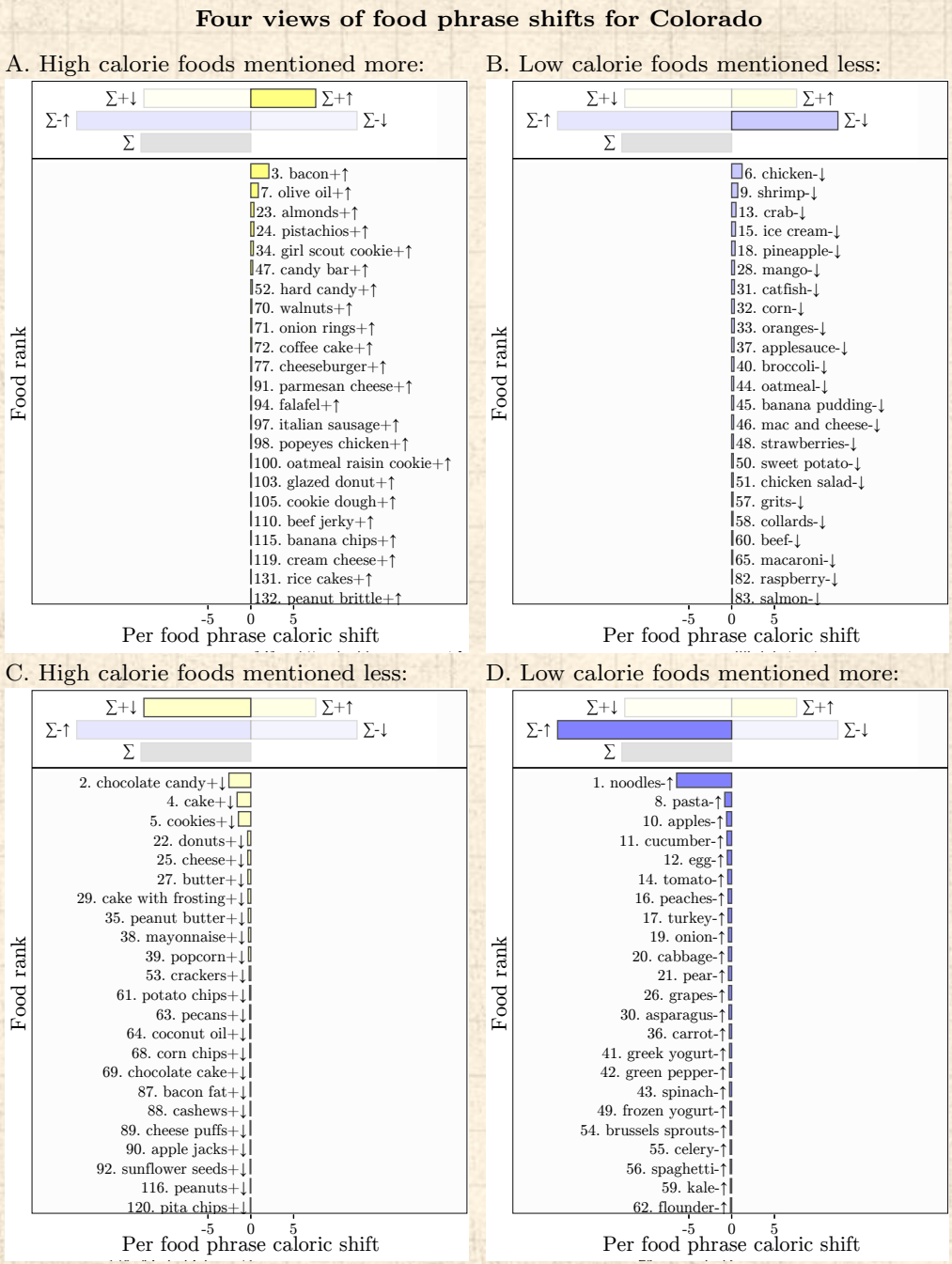

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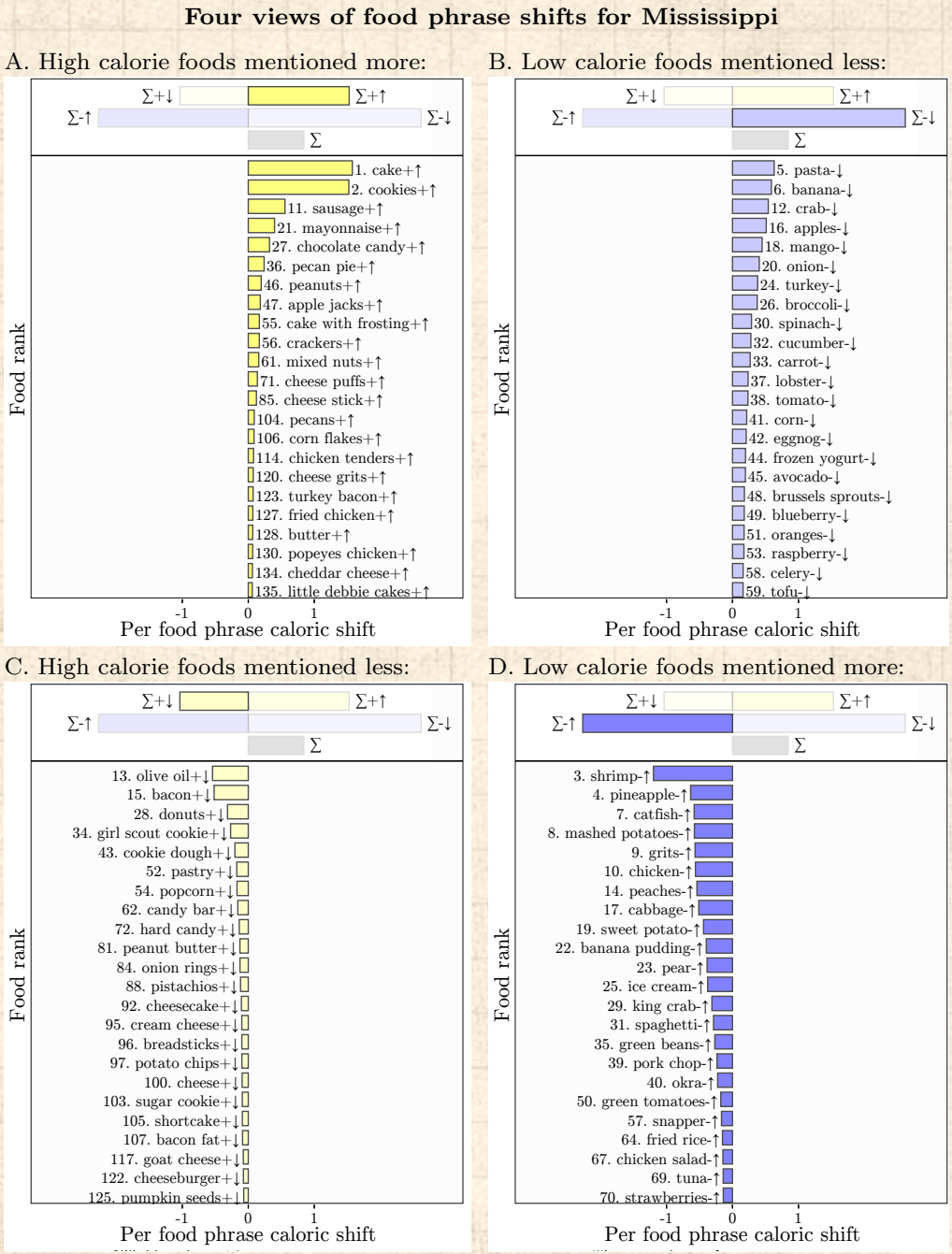

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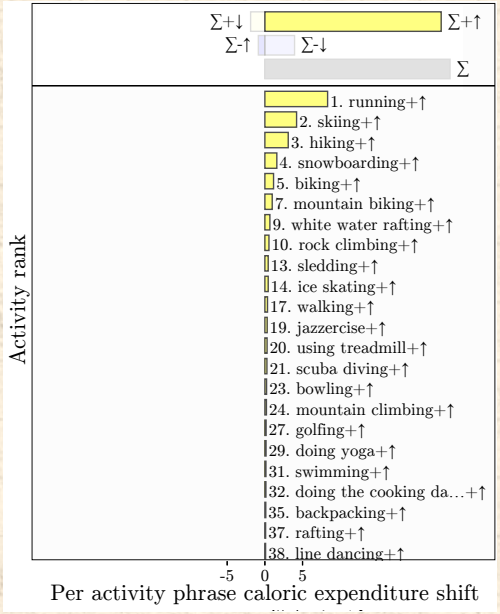
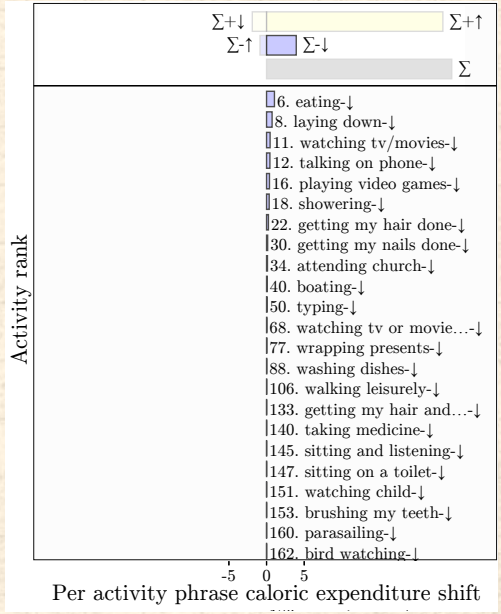
Four views of activity phrase shifts for Colorado

A. High calorie activities mentioned more:



B. Low calorie activities mentioned less:



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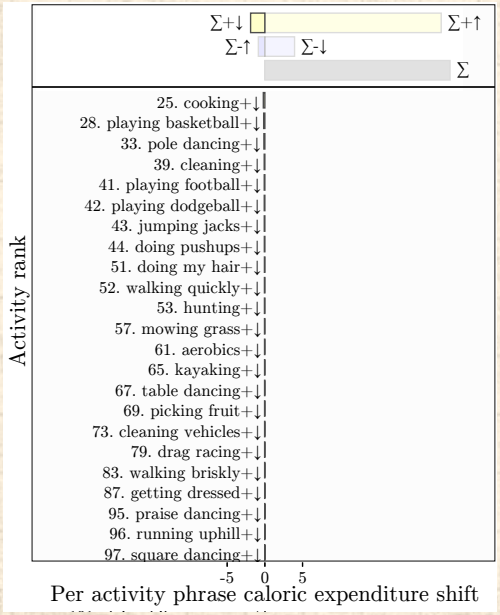

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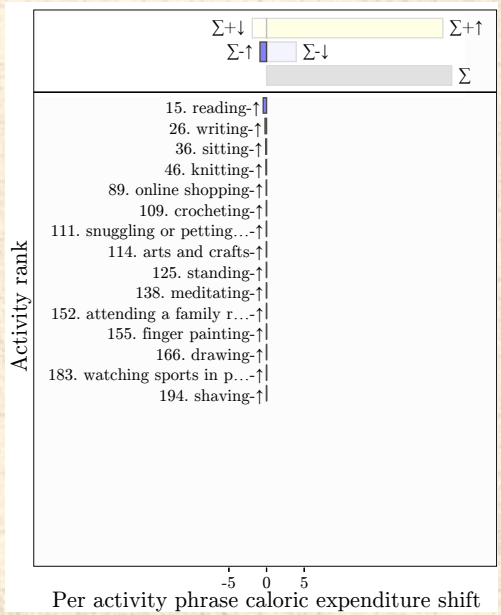

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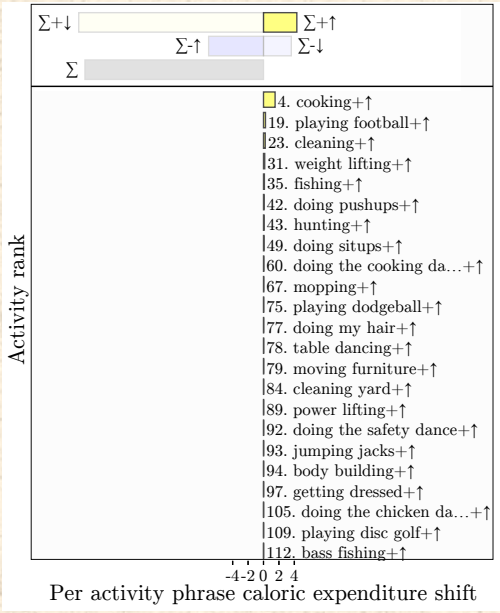

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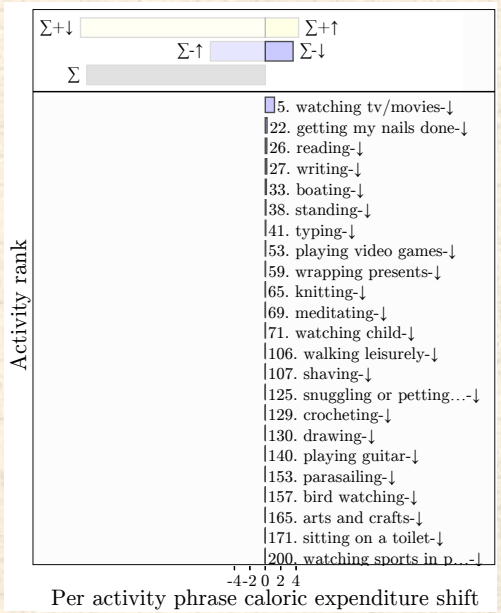

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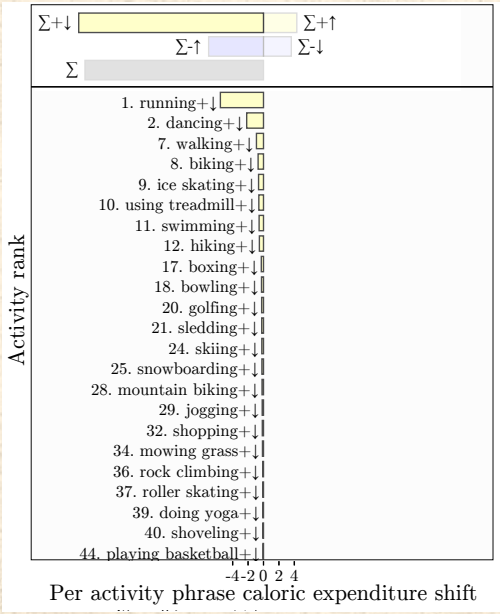

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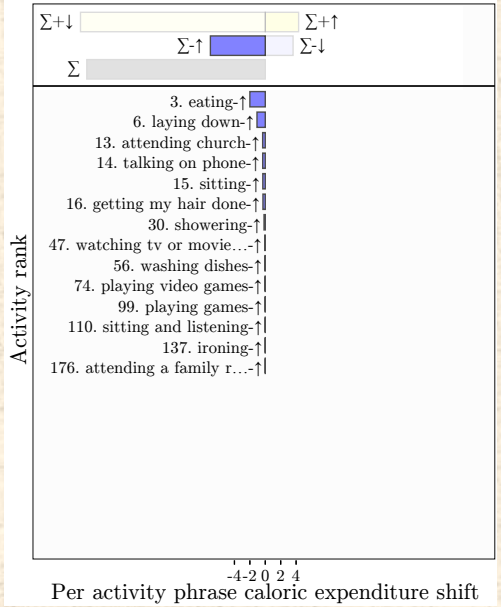

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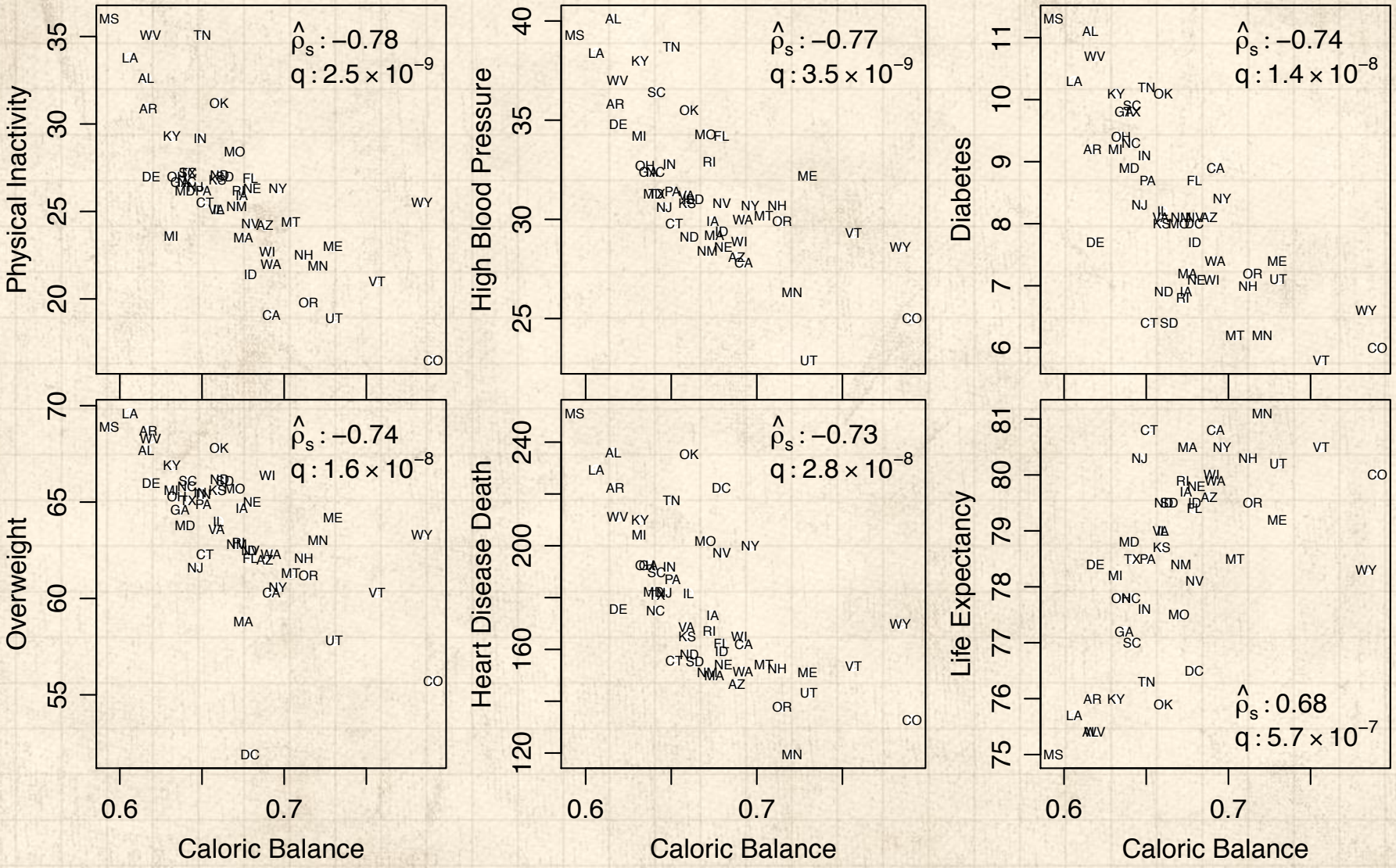


The Lexicocalorimeter:

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.

The Lexicocalorimeter:

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 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 Lexicocalorimeter:

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}

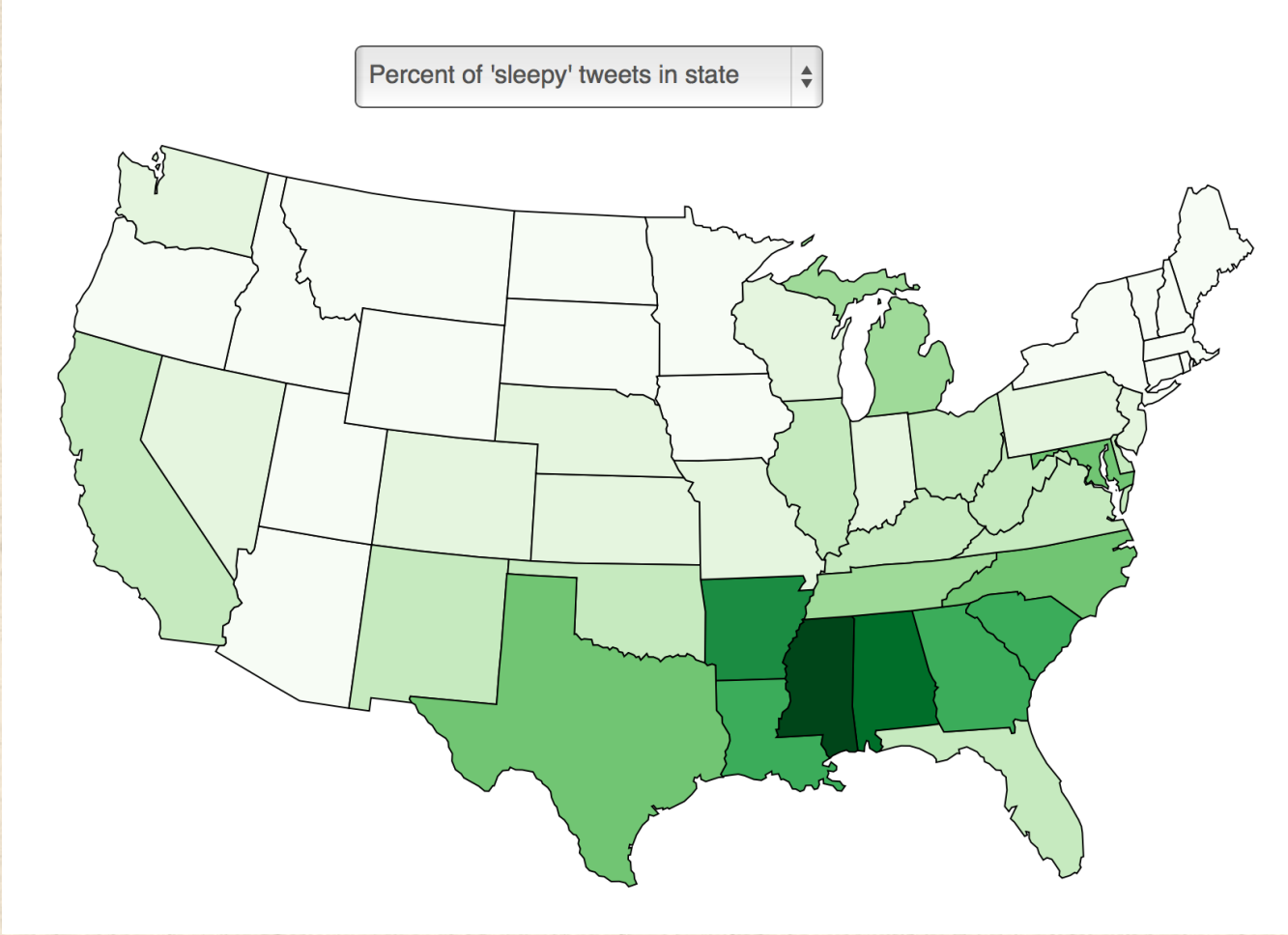
TABLE S1. Identical to Tab. I but with liquids included. Spearman correlation coefficients, $\hat{\rho}_s$, and Benjamini-Hochberg q-values for caloric input C_{in}, caloric output C_{out}, and caloric ratio $C_{rat} = C_{out}/C_{in}$ and demographic data related to food and physical activity, Big Five 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 Lexicocalorimeter:

Health and/or well-being quantity	$\hat{\rho}_s$ for C_{diff}	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	3.42×10^{-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}

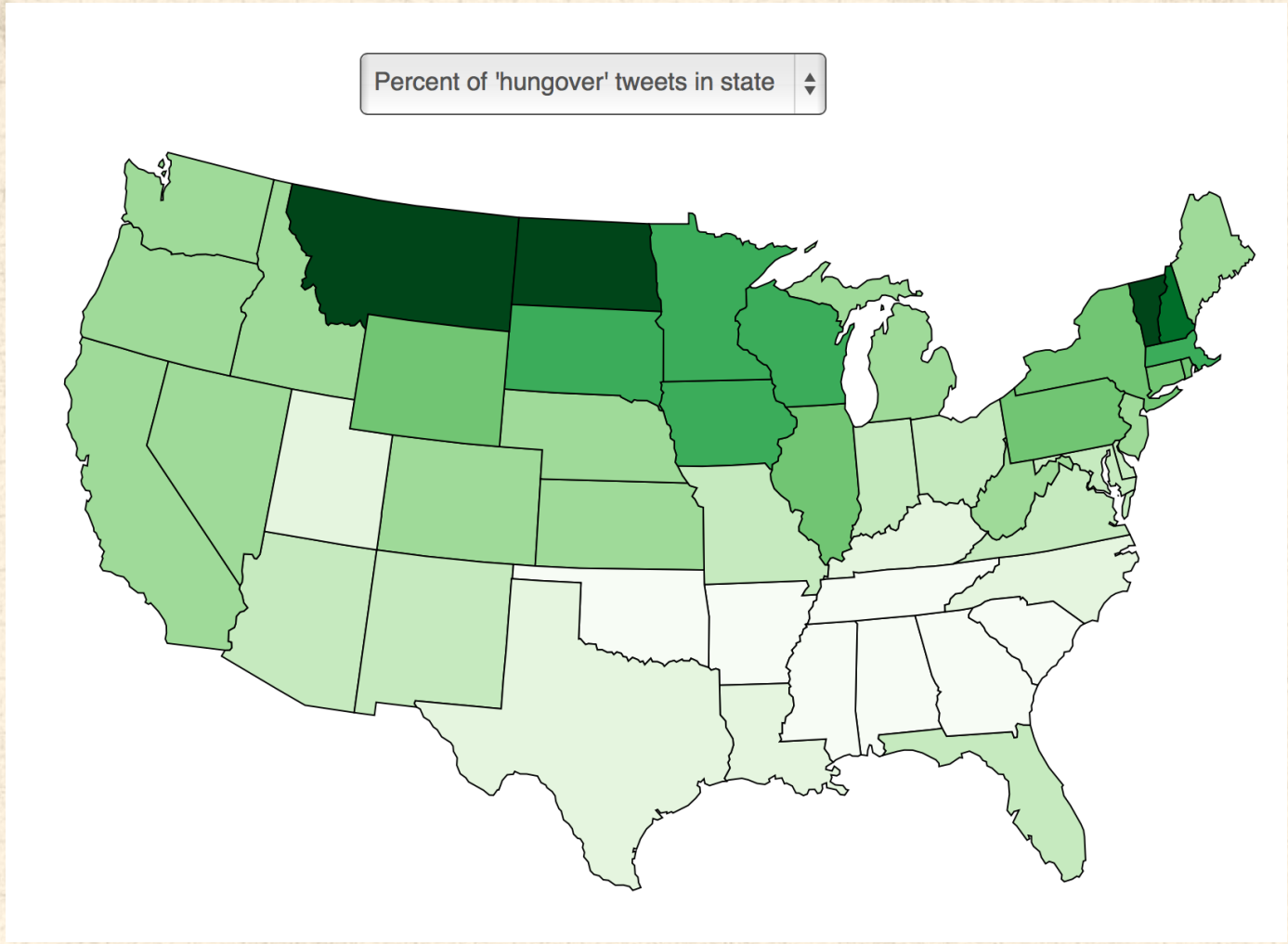
TABLE S3. Identical to Tab. I but including liquids and using a caloric difference rather than caloric ratio. Spearman correlation coefficients, $\hat{\rho}_s$, and Benjamini-Hochberg q-values for caloric input C_{in}, caloric output C_{out}, and caloric difference $C_{diff}(\alpha) = \alpha C_{out} + (1-\alpha)C_{in}$ 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 αC_{in}.

The Insomniometer:



Correlation with CDC's Sleep Insufficiency measure:
$r_s = .48$, $p = 5.3 \times 10^{-4}$.

The Hangoverometer:



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

References I

[1] S. E. Alajajian, J. R. Williams, A. J. Reagan, S. C. Alajajian, M. R. Frank, L. Mitchell, J. Lahne, C. M. Danforth, and P. S. Dodds.
The Lexicocalorimeter: Gauging public health through caloric input and output on social media.
PLoS ONE, 12:e0168893, 2017.
arXiv version available at http://arxiv.org/abs/1507.05098. pdf