The Meaning of Meaning

Last updated: 2022/04/04, 15:39:57 EDT

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

Outline

The meaning of meaning:

"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. [5]

What does meaning even mean?

- From the smack-tweeting Merriam-Webster:[1]
  "The thing that is conveyed especially by language"
- What are the essential characteristics of meaning?
- Does essential meaning meaningfully span some kind of space?

[1] Life goal: Never get owned by a dictionary on social media

This is not easy:

"Abed's Uncontrollable Christmas"

- Abed searches for the meaning of Christmas (in stop animation)
- Abed Nadir: [opens present] "It's the first season of Lost on DVD."
- Pierce Hawthorne: "That's the meaning of Christmas?"
- Abed Nadir: "It's a metaphor. It represents lack of payoff."

"Introduction to Teaching"

Abed Nadir: "I thought the meaning of people was somewhere in here. Then I looked inside Nicolas Cage and I found a secret—people are random and pointless."

The meaning of pings:

"A factorial study of complex auditory stimuli (passive sonar sounds)"
L. M. Solomon,
Unpublished doctor's dissertation, University of Illinois, , , 1954. [22]

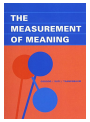
From the introduction:

'This study represents the convergence of three disparate areas of investigation in an attempt to analyze one of the many problems encountered in the study of human factors in undersea warfare. The domains referred to are these:

- naval sonar,
- the nature of "meaning,"
- and multidimensional scaling techniques.

The problem may be stated as follows: In the detection and recognition of underwater sounds by the use of sonar equipment, what are the discriminative cues employed by the sonar operator? More generally, what factors does the operator utilize in decoding the significance of sonar signals?'

From pings to things:



"The Measurement of Meaning"
by Osgood, Suci, and Tannenbaum (1957). [14]

- Osgood et al. used semantic differentials and factor analysis to identify a basis of three variables for meaning-space:
  - Evaluation: bad ↔ good
  - Potency: weak ↔ strong
  - Activity: passive ↔ active
- 100s of students, 10s of things, 50 semantic differentials
- "EPA framework"

Semantic differentials from Osgood et al.: [14]

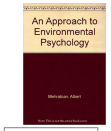
1. pleasant-unpleasant	18. large-small	36. colorful-colorless
2. repeated-varied	19. clean-dirty	37. hot-cold
3. smooth-rough	20. resting-busy	38. rich-thin
4. active-passive	21. dull-sharp	39. obvious-subtle
5. beautiful-ugly	22. deep-shallow	40. wide-narrow
6. definite-uncertain	23. gliding-scraping	41. deliberate-careless
7. low-high	24. familiar-strange	42. happy-sad
8. powerful-weak	25. soft-hard	43. gentle-violent
9. steady-fluttering	26. heavy-light	44. mild-intense
10. soft-loud	27. wet-dry	45. rounded-angular
11. full-empty	28. safe-dangerous	46. slow-fast
12. good-bad	29. concentrated-diffuse	47. rugged-delicate
13. rumbling-whining	30. pushing-pulling	48. simple-complex
14. solid-hollow	31. labored-easy	49. green-red
15. clear-hazy	32. dark-bright	50. masculine-feminine
16. calming-exciting	33. even-uneven	
17. pleasing-annoying	34. loose-tight	
	35. relaxed-tense	

Definitions:

- Ousiometrics: The quantitative study of the essential meaningful components of an entity, however perceived.
- Used in philosophical and theological settings, the word 'ousia' comes from Ancient Greek οὐσία.
- To be distinguished from semantics, semiotics, ...
- οὐσία is the etymological root of the word 'essence'.
- Ousiometry, ousiometer, ousiograms, ...
- Telegnomics: The distant sensing of knowledge (∼ distant reading [13])

Essential dimensions captured by emotion:

- Late 1800s: Three dimensional representation of emotion postulated by Wendt. [23, 17]
- 1970s: Mehrabian and Russell explicitly port EPA framework: [8, 9]
  - Evaluation ∼ Pleasure/Valence (∼ Happiness)
  - Potency ∼ Dominance
  - Activity ∼ Arousal
- VAD has become standard nomenclature even though emotion is less general than meaning.
- Explicit presumption of independence of VAD dimensions, has hardened as fact.
- Intention that VAD ≡ EPA has become lost in literature. [2]



"An Approach to Environmental Psychology." by Mehrabian and Russell (1974). [8]

"The basic emotional impact of environments" Mehrabian and Russell, Perceptual and motor skills, **38**, 283–301, 1974. [9]

"Semantic differential studies, in particular, have shown that human judgments of diverse samples of stimuli can be characterized in terms of three dimensions: evaluation, activity, and potency. We have termed the corresponding emotional responses pleasure, arousal, and dominance."

"Thus, each dimension is, in principle, functionally independent of the other two; none of the three dimensions could be subsumed by the others."

ANEW study: Valence ∼ Happiness:

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

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

  The other end of the scale is when you feel completely unhappy, annoyed, unsatisfied, melancholic, despaired, or bored."
- The Hedonometer was always about essential meaning.

We now know that ANEW is a no-no:

- Problem: Expert-chosen list of ∼ 1,000 words.
- Fine words but poorly cover real texts [16].
- Wrongly suggests Arousal and Dominance are minimal relative to Valence.

NRC VAD study: 20,007 words:

Standard correlations suggests a bit of Barney Rubble:

$$R(V, A) \simeq -0.268$$
$$R(A, D) \simeq 0.302$$
$$R(D, V) \simeq 0.488$$

Major problems with measuring essential meaning:

1. **Scale**: Originally 10s and 100s of words → now 10,000s + online rating.
2. **The focus on types alone and not tokens:** Missing the forest for the book of tree species.
3. **The use of Likert scales for semantic differentials:** Solid but can be improved upon.
4. **Limitations of factor analysis for a large number of categorical dimensions:** Ousiograms will help sort things out.
5. **The misalignment between expert-chosen, end-point descriptors and dimensions of essential meaning:** How to guide raters to score VAD dimensions?

   Solution is to always perform factor analysis (SVD).

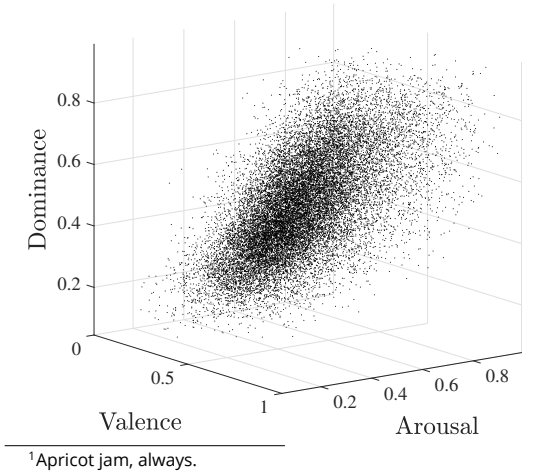
Remeasuring meaning:

"Obtaining Reliable human ratings of valence, arousal, and dominance for 20,000 English words" Saif M. Mohammad, Proceedings of The Annual Conference of the Association for Computational Linguistics (ACL), **38**, , 2018. [11]

Moving beyond Likert scales:

- Best-worst scaling
- Ask raters to examine n things once, and choose the best and worst according to some criterion.
- For $n = 4$, the are 6 pair comparisons of Things.
- Choosing best and worst gives 5 orderings: $\tau_1 > \tau_2, \tau_3 > \tau_4$.
- Things end up with scores in $[0, 1]$.

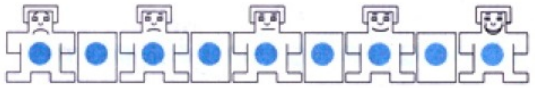
The Delicious English Muffin of Meaning:[1]



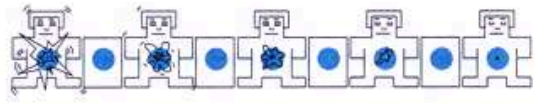
[1] Apricot jam, always.

1999 ANEW study—three 1–9 scales: [4]

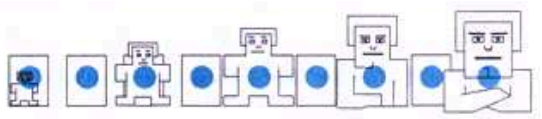
valence:



arousal:



dominance:

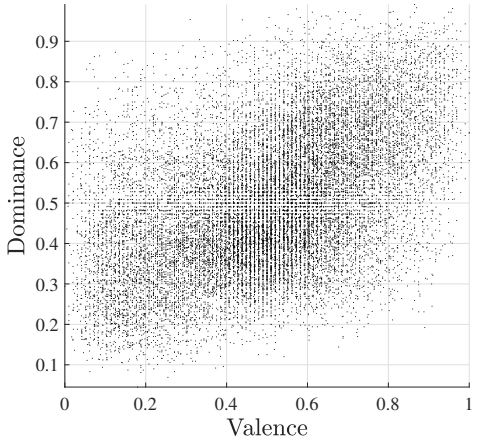


NRC VAD Lexicon [11]

VAD endpoints:	Paradigm words and phrases presented to raters: [12]
highest valence	happiness, pleasure, positiveness, satisfaction, contentedness, hopefulness
lowest valence	unhappiness, annoyance, negativeness, dissatisfaction, melancholy, despair
highest arousal	arousal, activeness, stimulation, frenzy, jitteriness, alertness
lowest arousal	unarousal, passiveness, relaxation, calmness, sluggishness, dullness, sleepiness
highest dominance	dominant, in control of the situation, powerful, influential, important, autonomous
lowest dominance	submissive, controlled by outside factors, weak, influenced, cared-for, guided

Major problem 5: Imposing dimensions through clouds of endpoint descriptors.

$R(D, V) \simeq 0.488$



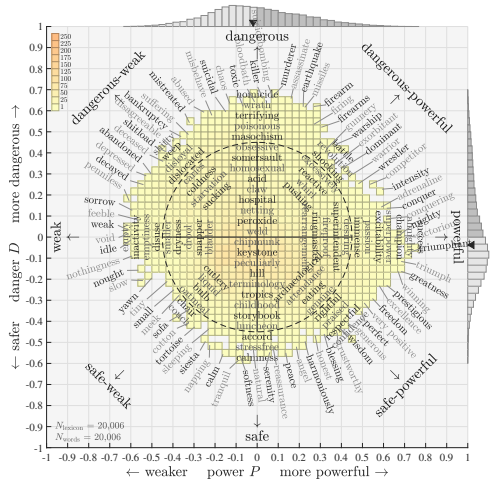
Release the Hounds by which we mean Singular Value Decomposition:

Variance explained:

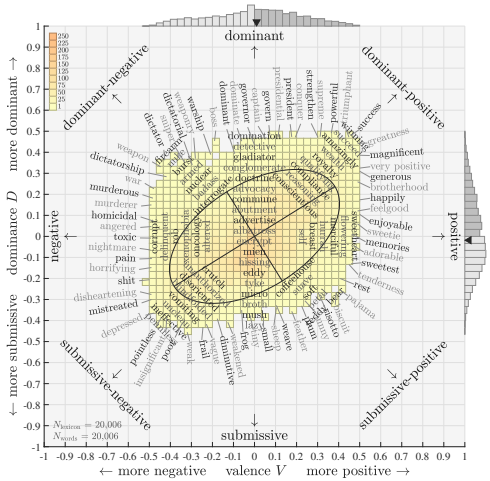
- VAD: 44.4%, 28.0%, and 27.6%.
- Apply SVD.
- Singular values: $\sigma_1 \simeq 34.1$, $\sigma_2 \simeq 27.2$, and $\sigma_3 \simeq 13.8$,
- For what will be Goodness-Energy-Structure (GES): 55.6%, 35.3%, and 9.1%
- Rotate in G-E plane by $\pi/4$ for what will be Power-Danger-Structure (PDS) 45.5%, 45.5%, 9.1%
- Interpretability enhancements: Ousiograms.

Building ousiograms (2021/01/31):

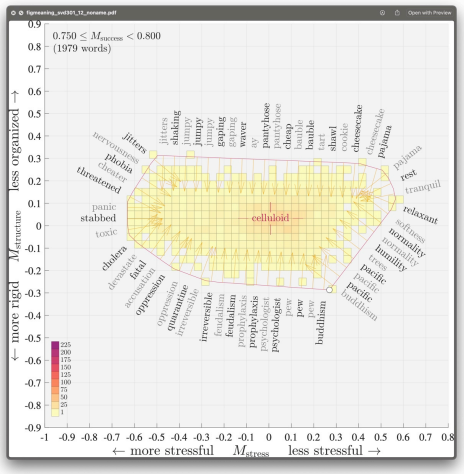
~ power-danger ousiogram for the NRC VAD lexicon ~



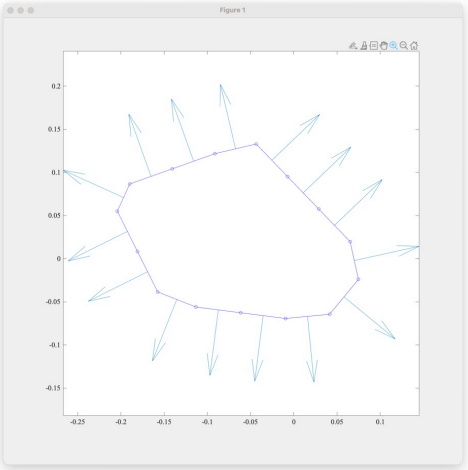
~ valence-dominance ousiogram for the NRC VAD lexicon ~



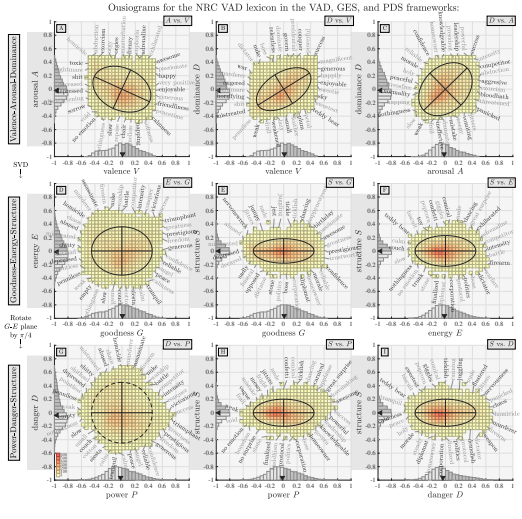
Building ousiograms (2021/01/31):



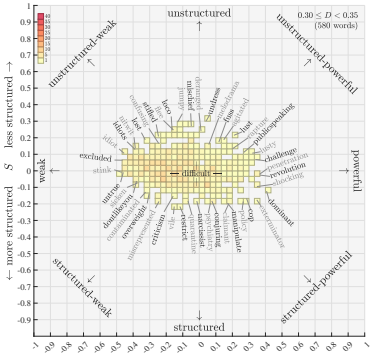
Building ousiograms (2021/01/31):



Ousiograms for the NRC VAD lexicon in the VAD, GES, and PDS frameworks:



Ousiometric slices:



Slices of Structure Flipbook
Slices of Danger Flipbook
Slices of Power Flipbook

Extremonyms: Synousionyms and Antousionyms:

Powerful-Safe (Good) to Weak-Dangerous (Bad) axis:

Synousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
Anchor: wisdom	0.430	-0.198	0.371	0.579	-0.031	-0.158	0.388	-0.432	-0.158
education	0.396	-0.225	0.340	0.539	-0.065	-0.167	0.336	-0.427	-0.167
healthy	0.438	-0.181	0.318	0.558	-0.047	-0.108	0.362	-0.428	-0.108
trustworthy	0.469	-0.185	0.324	0.589	-0.052	-0.100	0.379	-0.453	-0.100
reliable	0.412	-0.259	0.375	0.575	-0.076	-0.202	0.353	-0.460	-0.202
Antousionyms	**Valence**	**Arousal**	**Dominance**	**Goodness**	**Energy**	**Structure**	**Power**	**Danger**	**Structure**
bullshit	-0.458	0.176	-0.317	-0.575	0.046	0.095	-0.373	0.439	0.095
shitty	-0.480	0.179	-0.337	-0.604	0.042	0.100	-0.397	0.456	0.100
nauseate	-0.438	0.160	-0.324	-0.558	0.026	0.101	-0.376	0.413	0.101
weeping	-0.418	0.188	-0.332	-0.549	0.042	0.131	-0.359	0.418	0.131
shame	-0.440	0.170	-0.345	-0.572	0.023	0.120	-0.388	0.421	0.120
diarrhea	-0.408	0.184	-0.357	-0.552	0.023	0.151	-0.374	0.407	0.151

Powerful to Weak axis:

Synousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
Anchor: success	0.459	0.380	0.481	0.571	0.501	0.095	0.758	-0.050	0.095
almighty	0.438	0.374	0.458	0.543	0.487	0.098	0.728	-0.040	0.098
triumphant	0.449	0.337	0.472	0.565	0.462	0.073	0.726	-0.072	0.073
champion	0.390	0.380	0.445	0.494	0.492	0.087	0.698	-0.001	0.087
victorious	0.384	0.386	0.446	0.489	0.499	0.087	0.698	0.007	0.087
Antousionyms	**Valence**	**Arousal**	**Dominance**	**Goodness**	**Energy**	**Structure**	**Power**	**Danger**	**Structure**
sorrow	-0.448	-0.265	-0.336	-0.509	-0.329	-0.127	-0.593	0.127	-0.127
tasteless	-0.354	-0.304	-0.352	-0.430	-0.385	-0.092	-0.576	0.032	-0.092
idle	-0.321	-0.333	-0.388	-0.414	-0.434	-0.068	-0.600	-0.014	-0.068
empty	-0.312	-0.317	-0.419	-0.424	-0.439	-0.033	-0.610	-0.011	-0.033
void	-0.365	-0.337	-0.370	-0.443	-0.420	-0.103	-0.611	0.016	-0.103

Extremonyms: Synousionyms and Antousionyms:

Dangerous-Powerful (High Energy) to Safe-Weak (Low Energy) axis:

Synousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
Anchor: volcanic	-0.156	0.410	0.281	-0.061	0.515	-0.045	0.322	0.407	-0.045
shelling	-0.163	0.417	0.273	-0.072	0.518	-0.039	0.316	0.417	-0.039
artillery	-0.150	0.412	0.294	-0.050	0.523	-0.050	0.335	0.405	-0.050
wild	-0.188	0.422	0.250	-0.105	0.514	-0.032	0.289	0.438	-0.032
rifles	-0.163	0.364	0.265	-0.068	0.470	-0.062	0.284	0.380	-0.062
Antousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
couch	0.094	-0.418	-0.302	-0.002	-0.524	0.025	-0.372	-0.369	0.025
mellow	0.133	-0.431	-0.235	0.066	-0.504	-0.009	-0.310	-0.403	-0.009
pillow	0.163	-0.372	-0.305	0.049	-0.498	0.085	-0.317	-0.387	0.085
tortoise	0.173	-0.422	-0.250	0.092	-0.511	0.025	-0.297	-0.427	0.025
quilt	0.143	-0.377	-0.274	0.048	-0.482	0.052	-0.307	-0.375	0.052
cotton	0.139	-0.429	-0.260	0.059	-0.517	0.012	-0.324	-0.407	0.012

Dangerous to Safe axis:

Synousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
Anchor: homicide	-0.490	0.473	0.018	-0.485	0.478	0.011	-0.005	0.681	0.011
killer	-0.459	0.471	0.043	-0.446	0.485	0.008	0.028	0.658	0.008
psychopath	-0.460	0.443	0.036	-0.446	0.458	-0.003	0.009	0.640	-0.003
bloodshed	-0.452	0.442	0.025	-0.444	0.450	0.008	0.004	0.633	0.008
violate	-0.439	0.470	0.019	-0.440	0.468	0.033	0.020	0.642	0.033
Antousionyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
natural	0.354	-0.382	-0.019	0.354	-0.382	-0.026	-0.020	-0.520	-0.026
tranquil	0.417	-0.406	-0.145	0.351	-0.480	0.078	-0.091	-0.588	0.078
softness	0.375	-0.414	-0.098	0.338	-0.455	0.021	-0.082	-0.561	0.021
serenity	0.400	-0.378	0.057	0.429	-0.345	-0.054	0.060	-0.547	-0.054
comfortable	0.427	-0.337	-0.027	0.406	-0.361	0.039	0.032	-0.542	0.039
calmness	0.434	-0.395	-0.106	0.383	-0.453	0.065	-0.049	-0.591	0.065

From types to tokens: [7]

- Analysis so far is for a lexicon of types: Each word counts once.
- Must consider how words are used in real texts by frequency: Tokens.
- Rebuild ousiograms with usage frequency incorporated.
- A set of distinct corpora:
  - English fiction from Google Books (120 years). [10, 15]
  - Jane Austen's novels.
  - Sherlock Holmes stories.
  - New York Times (20 years). [19]
  - Wikipedia (2019/03). [20]
  - RadioTalk: Transcriptions of talk radio. [3]
  - Twitter through Storywrangler. [1]

Etymological, taxonomic, and nomenclatural madnesses:

- Physics: Power was once sometimes called Activity
- Danger and Dominance trace back to Dominus (~ lord/ruler/person of power)
- Framing words for EPA, VAD, etc., matter greatly.

Other descriptors that don't hold up:

- Success-Stress-Structure.
- Energy/Flourishing/Thriving-Threat
- Power-Order/Chaos-Gravity/Seriousness

After much staring at the ceiling:

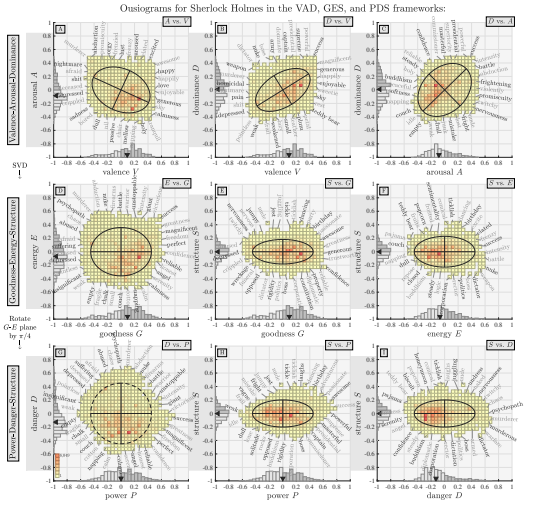
- Goodness-Energy-Structure (GES) (still fails)
- Power-Danger-Structure (PDS) (succeeds)

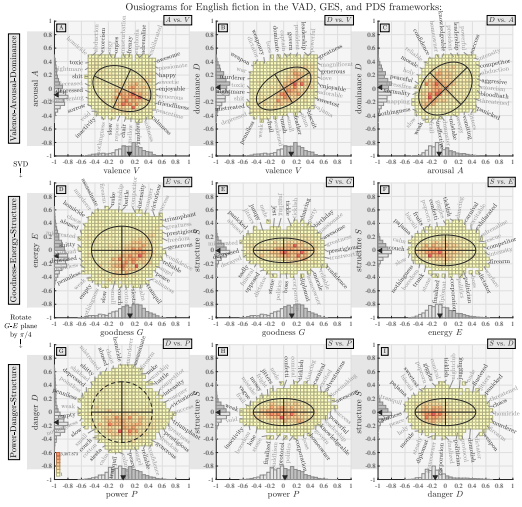
Connections between meaning dimensions:

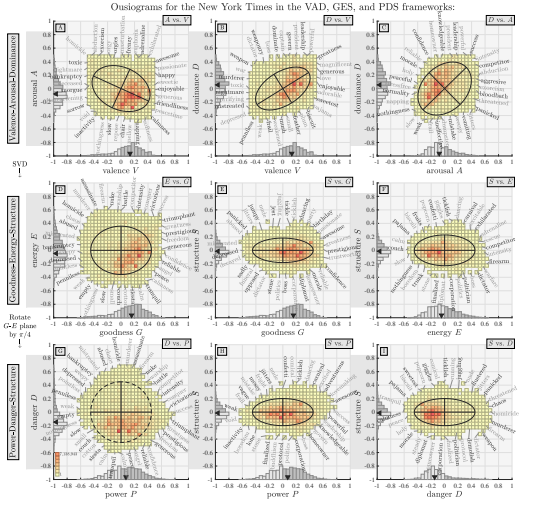
$$\begin{bmatrix} \textbf{Goodness} \\ \textbf{Energy} \\ \textbf{Structure} \end{bmatrix} \simeq \begin{bmatrix} +0.86 & -0.15 & +0.48 \\ -0.16 & +0.83 & +0.54 \\ +0.48 & +0.55 & -0.69 \end{bmatrix} \begin{bmatrix} \textbf{Valence} \\ \textbf{Arousal} \\ \textbf{Dominance} \end{bmatrix}$$

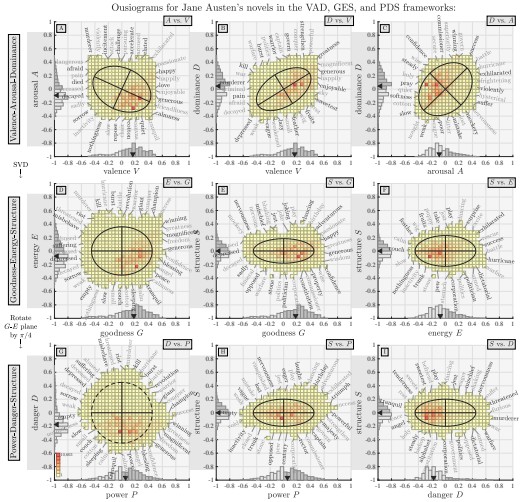
$$\begin{bmatrix} \textbf{Power} \\ \textbf{Danger} \\ \textbf{Structure} \end{bmatrix} \simeq \begin{bmatrix} 0.53 & 0.45 & 0.72 \\ -0.70 & 0.71 & 0.07 \\ 0.48 & 0.55 & -0.69 \end{bmatrix} \begin{bmatrix} \textbf{Valence} \\ \textbf{Arousal} \\ \textbf{Dominance} \end{bmatrix}$$

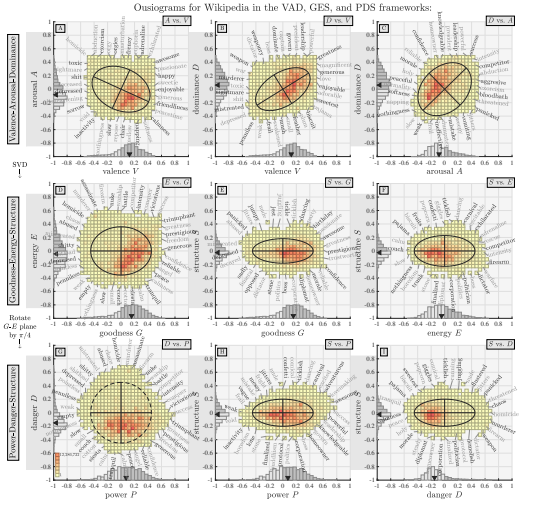
$$\begin{bmatrix} \textbf{Power} \\ \textbf{Danger} \end{bmatrix} = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} \textbf{Goodness} \\ \textbf{Energy} \end{bmatrix} \quad (1)$$

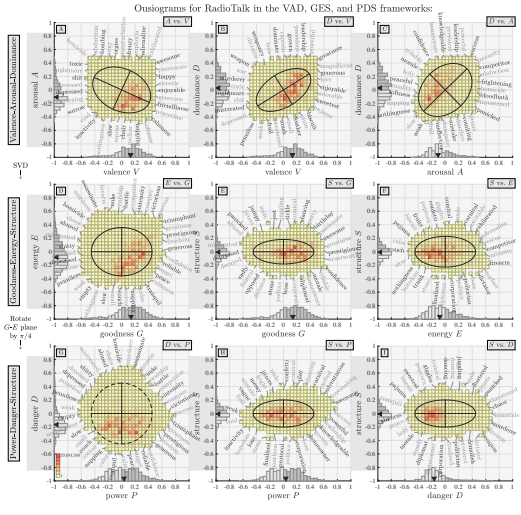


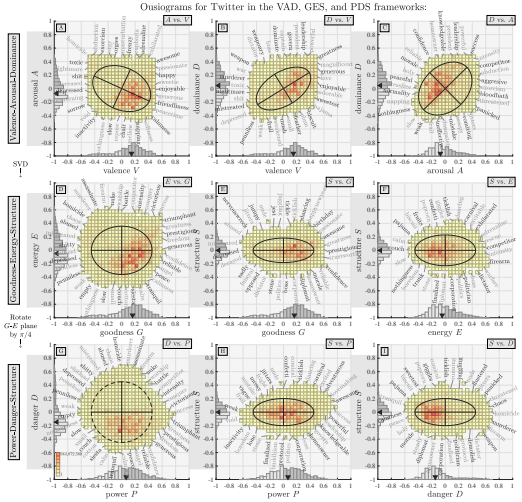


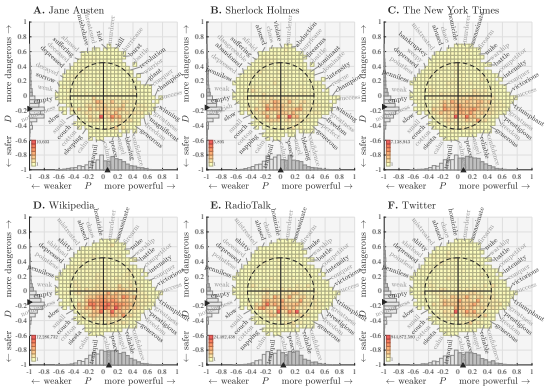






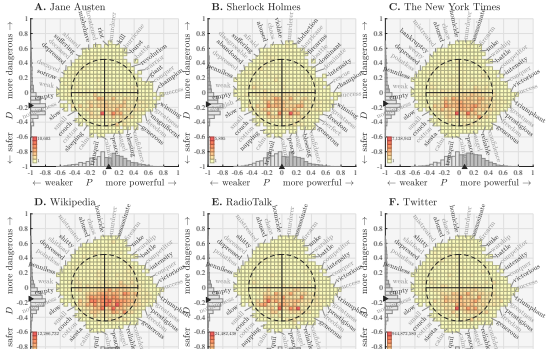




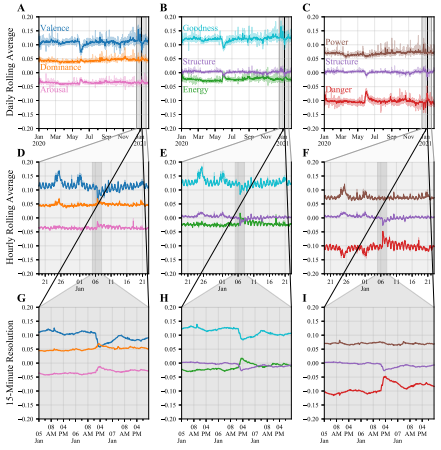


A special thing has happened:

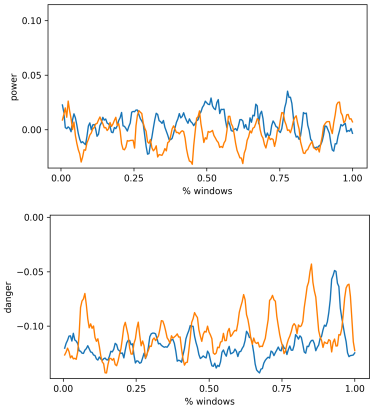
- The PDS framework emerged only from analyzing a lexicon (types).
- Applying PDS framework to disparate corpora (tokens) reveals a linguistic ‘safety bias’.



Prototype ousiometer—Twitter:

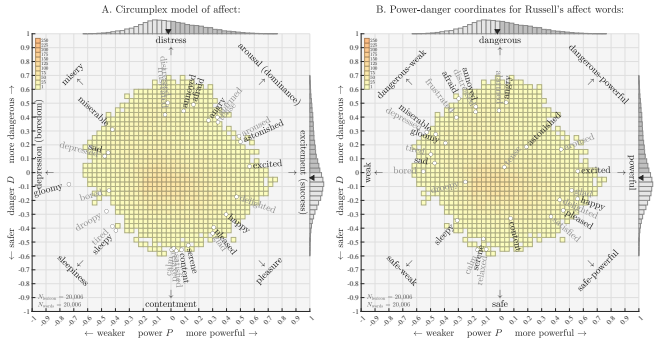


Prototype ousiometer—Harry Potter:



Blue: Harry Potter and the Half-Blood Prince
Orange: Harry Potter and the Deathly Hallows

- Rough agreement with Russell’s circumplex model, [18] which itself doesn’t disagree with a 2-d orthogonal framework.



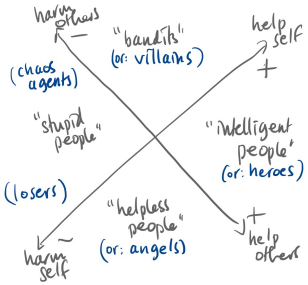
Dungeons & Dragons—Two alignment axes for character:

Law–Chaos (vertical) and Good–Evil (horizontal).

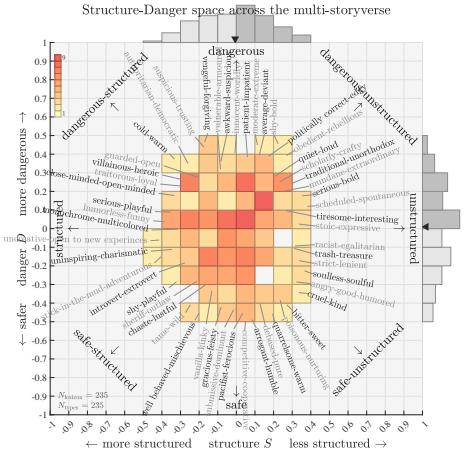
[1] From this Reddit thread, where, naturally, the choices are enthusiastically debated.

lawful-good ~ structured-powerful-safe	neutral-good ~ neutral-powerful-safe	chaotic-good ~ unstructured-powerful-safe
lawful-neutral ~ structured-neutral	(true) neutral	chaotic-neutral ~ unstructured-neutral
lawful-evil ~ structured-dangerous	neutral-evil ~ neutral-dangerous	chaotic-evil ~ unstructured-dangerous

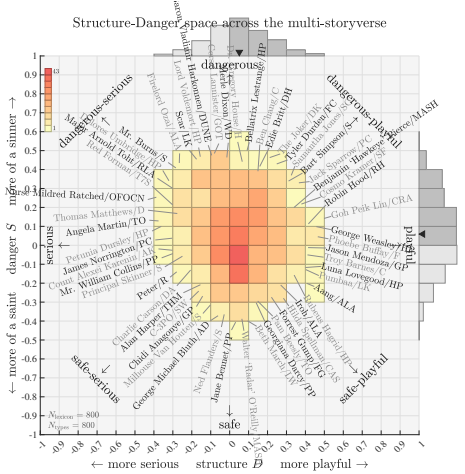
Cipolla's Basic Law's of Human Stupidity:



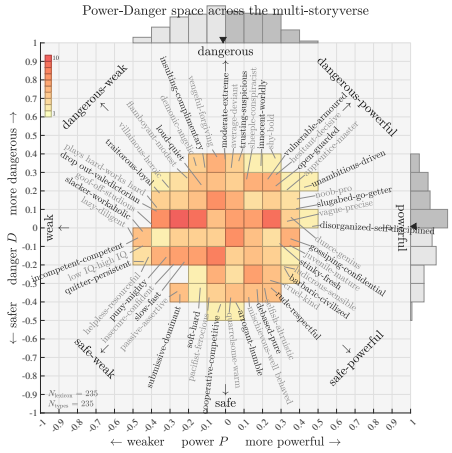
800 characters, 200+ semantic differentials:



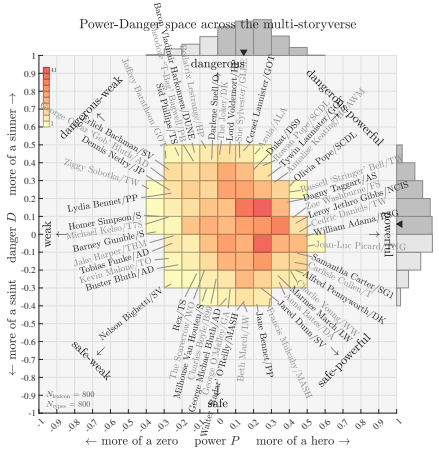
800 characters, 200+ semantic differentials:

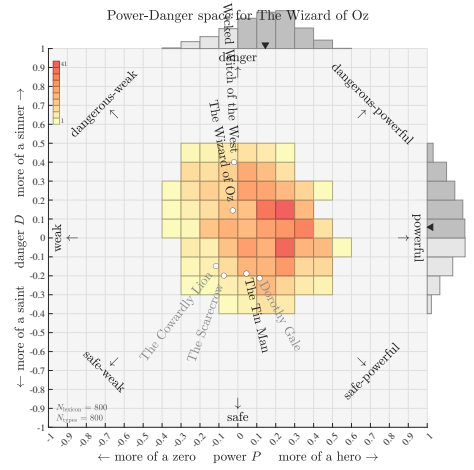


800 characters, 200+ semantic differentials:

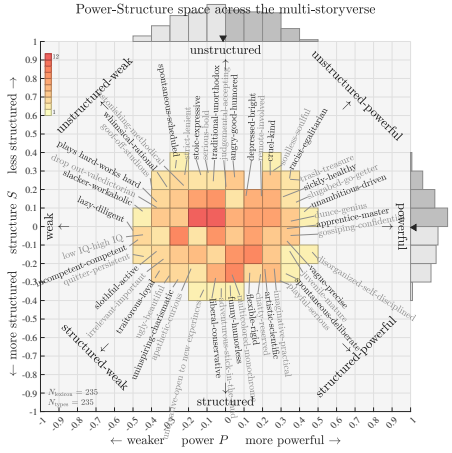


800 characters, 200+ semantic differentials:

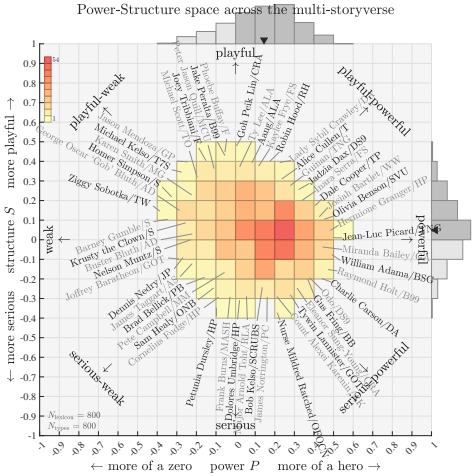


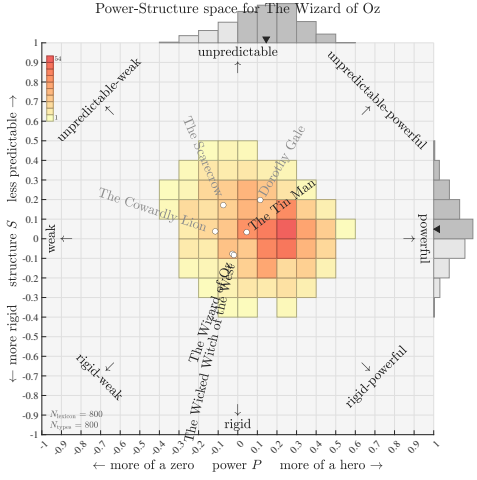


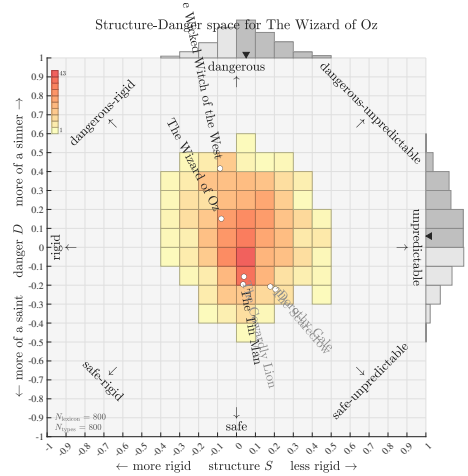
800 characters, 200+ semantic differentials:

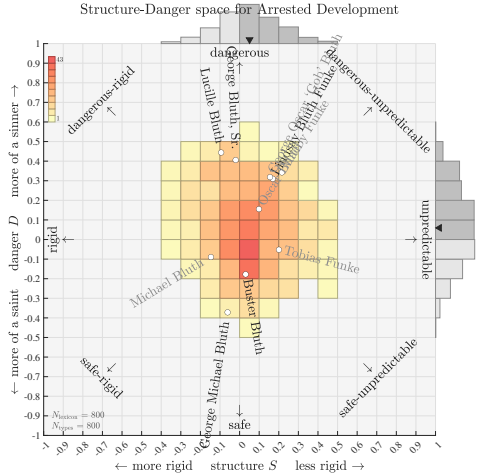


800 characters, 200+ semantic differentials:

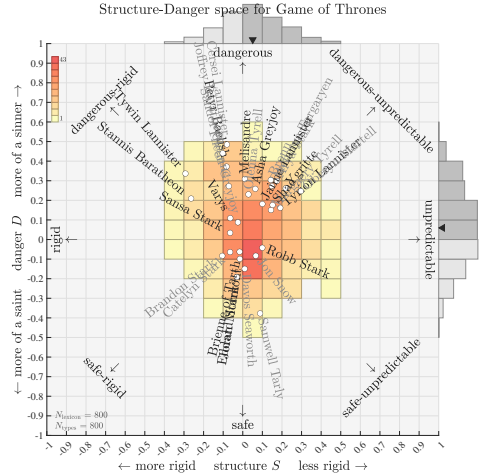




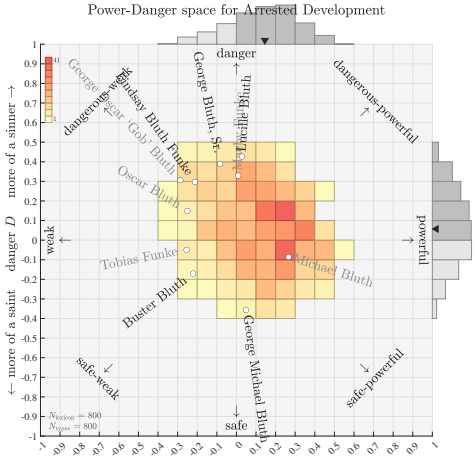




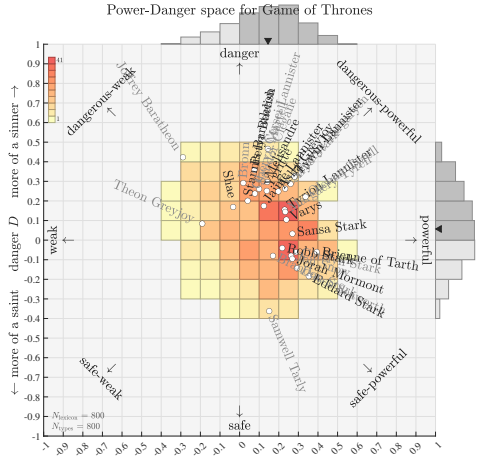
PoCS
@pocsvox
Meaning



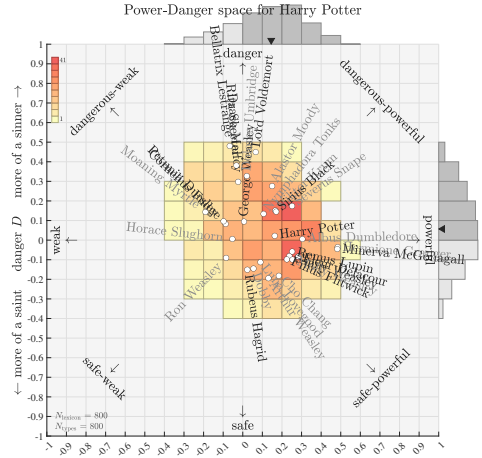
PoCS
@pocsvox
Meaning



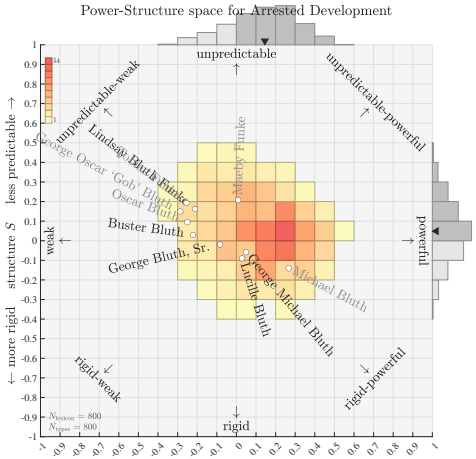
PoCS
@pocsvox
Meaning



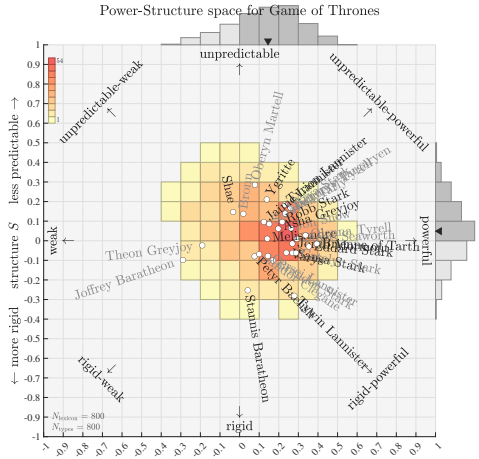
PoCS
@pocsvox
Meaning



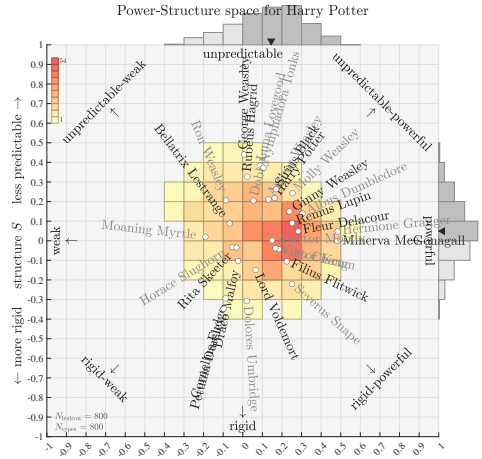
PoCS
@pocsvox
Meaning

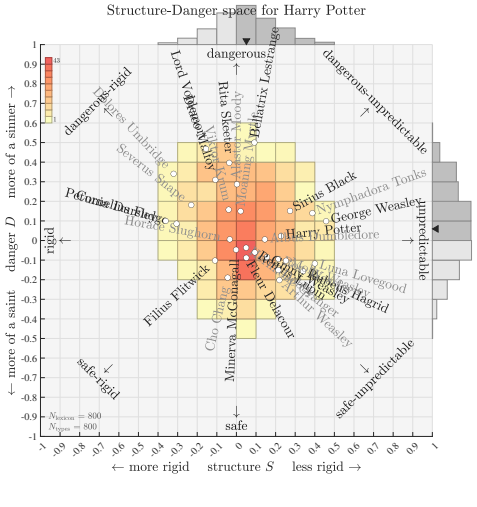


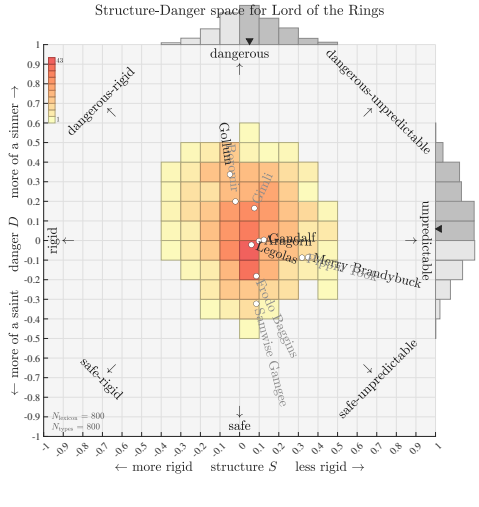
PoCS
@pocsvox
Meaning

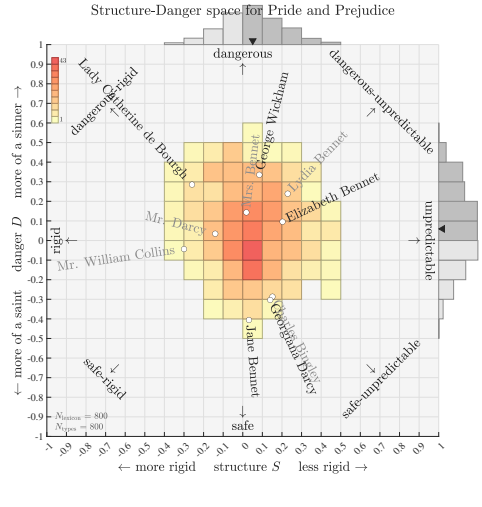


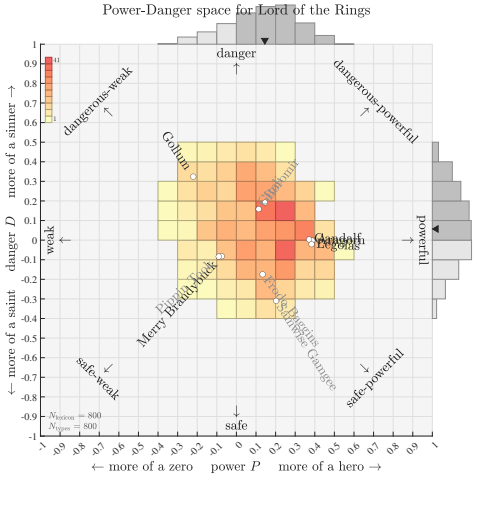
PoCS
@pocsvox
Meaning

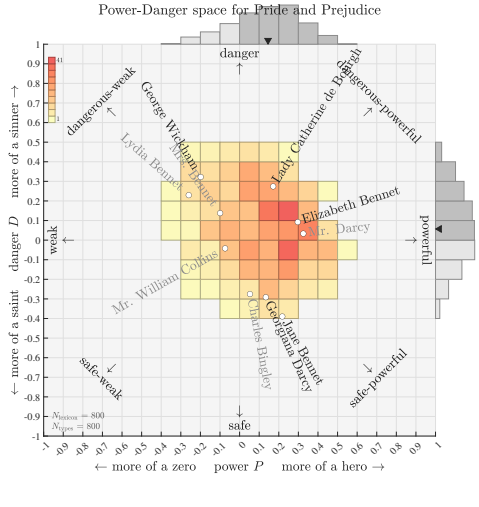


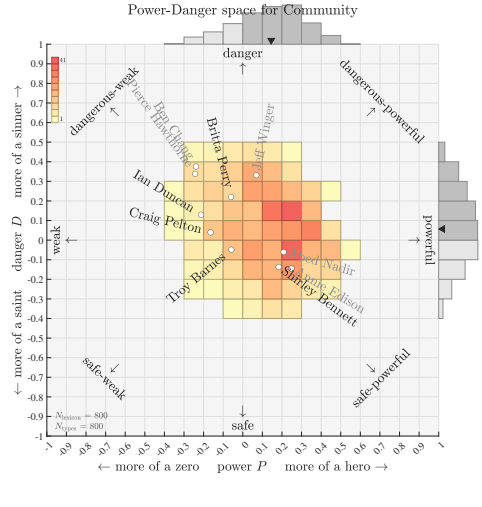


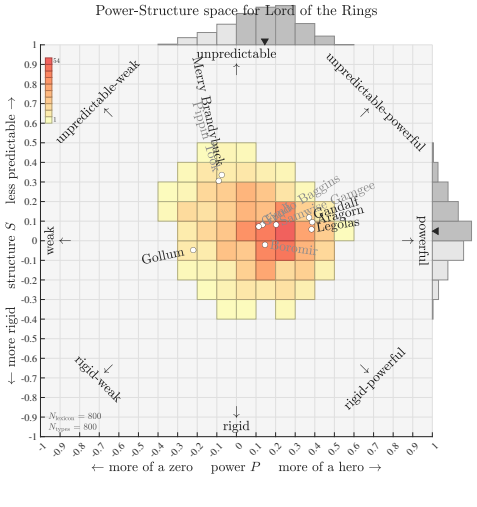


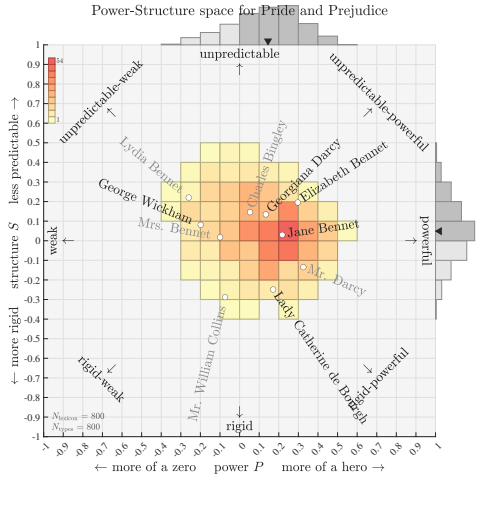


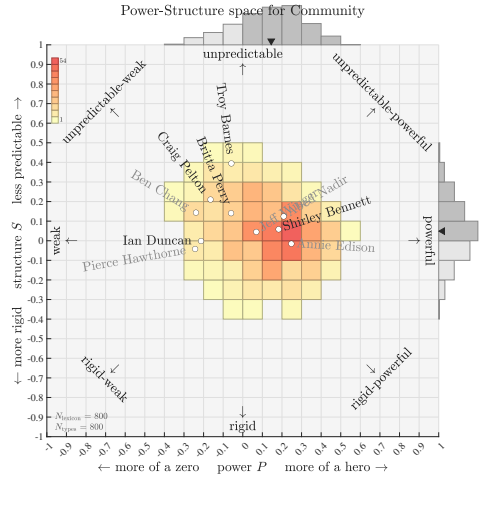












PoCS @pocsvox

Meaning

Measuring essential meaning
- History
- Definitions
- Emotions

Problems

Remeasuring meaning

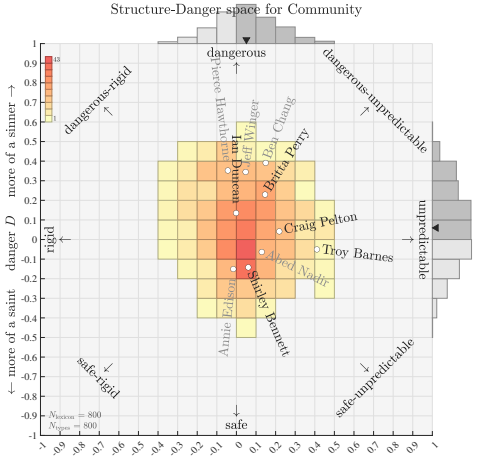
Ousiograms
- Extremousionyms
- Dimension names

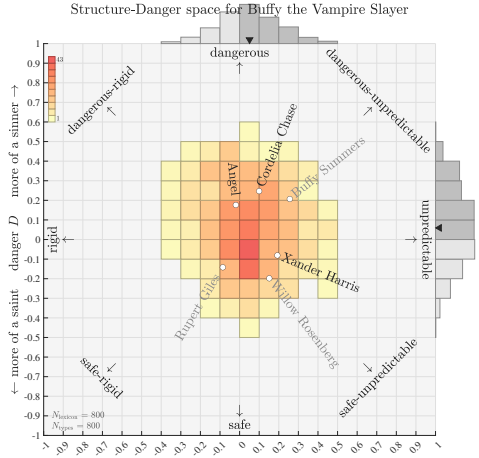
Safety bias

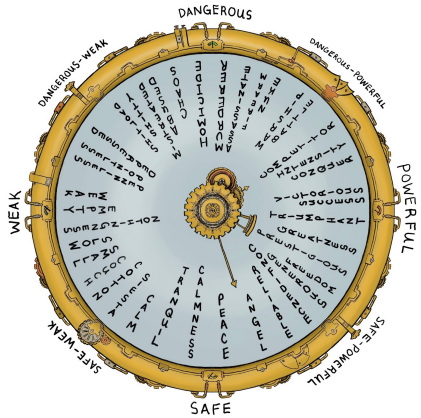
Applications
- The Ousiometer
- Correspondences
- Trait space
- Character space
- Nutshell

Extra

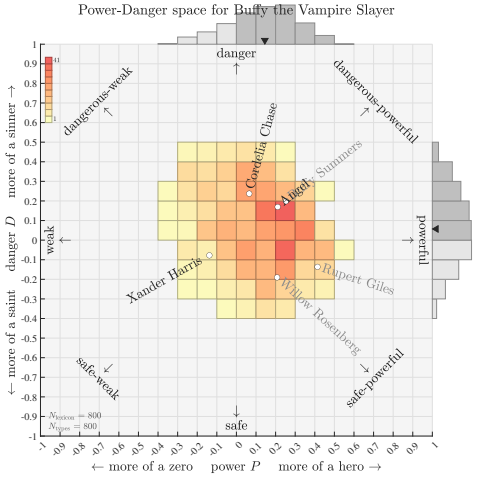
References



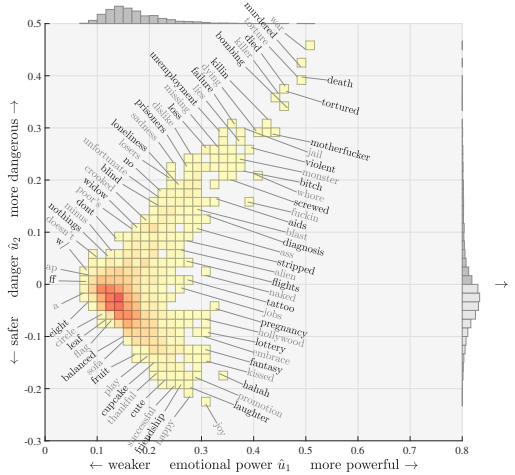


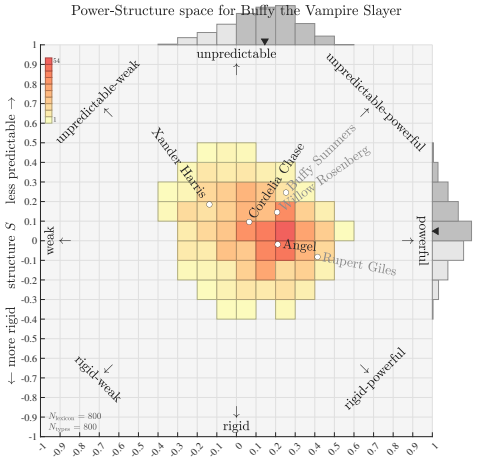


Online appendices: Paper(s), extra figures, flipbooks, code.
https://storylab.w3.uvm.edu/ousiometrics



Six emotions, collapsed:





Findings, observations, possibilities:

- Power-danger-structure framework emerges in distinct settings, fitting types and tokens.
- Safety bias of communication refines Pollyanna Principle of positivity
- Happiness/Goodness = Power + Safety
- Ousiometer can be improved and refined.
- Possible: Emotions map onto powerful-safe and danger axes.
- Power-danger framework for survival.
- Possible: Telegnomics for stories—Measuring character arcs, plots.
- Complement to information theory which is meaning-free. [21]

See concluding remarks in the foundational paper. [5]

Synonyms	Valence	Arousal	Dominance	Goodness	Energy	Structure	Power	Danger	Structure
happy	0.50	0.24	0.27	0.53	0.26	0.18	0.57	-0.16	0.18
delighted	0.44	0.16	0.18	0.44	0.17	0.17	0.44	-0.18	0.17
excited	0.41	0.43	0.21	0.39	0.40	0.29	0.56	0.04	0.29
astonished	0.01	0.28	0.07	0.00	0.27	0.10	0.18	0.19	0.10
aroused	0.21	0.45	0.17	0.19	0.43	0.23	0.43	0.19	0.23
tense	-0.10	-0.06	0.15	-0.01	0.05	-0.19	0.03	0.04	-0.19
alarmed	-0.31	0.32	-0.01	-0.32	0.31	0.03	-0.03	0.45	0.03
angry	-0.38	0.33	0.10	-0.33	0.39	-0.07	0.02	0.51	-0.07
afraid	-0.49	0.28	-0.26	-0.59	0.17	0.09	-0.32	0.52	0.09
annoyed	-0.40	0.28	-0.16	-0.46	0.21	0.07	-0.19	0.47	0.07
distressed	-0.36	0.27	-0.18	-0.43	0.19	0.10	-0.19	0.43	0.10
frustrated	-0.42	0.15	-0.25	-0.50	0.06	0.05	-0.33	0.38	0.05
miserable	-0.44	-0.04	-0.31	-0.52	-0.13	-0.02	-0.47	0.26	-0.02
sad	-0.28	-0.17	-0.35	-0.38	-0.28	0.02	-0.47	0.05	0.02
gloomy	-0.39	-0.09	-0.21	-0.43	-0.13	-0.09	-0.40	0.20	-0.09
depressed	-0.48	-0.05	-0.36	-0.58	-0.17	-0.01	-0.54	0.27	-0.01
bored	-0.35	-0.33	-0.30	-0.40	-0.38	-0.14	-0.55	-0.02	-0.14
droopy	-0.06	-0.15	-0.20	-0.13	-0.22	0.03	-0.25	-0.08	0.03
tired	-0.38	-0.18	-0.31	-0.45	-0.26	-0.07	-0.50	0.11	-0.07
sleepy	0.10	-0.37	-0.25	0.03	-0.46	0.02	-0.29	-0.36	0.02
calm	0.37	-0.40	-0.22	0.28	-0.51	0.11	-0.14	-0.56	0.11
relaxed	0.36	-0.41	-0.12	0.32	-0.46	0.03	-0.08	-0.56	0.03
satisfied	0.46	0.01	0.18	0.48	0.04	0.10	0.38	-0.30	0.10
at ease	—	—	—	—	—	—	—	—	—
ease	0.30	-0.11	-0.01	0.27	-0.15	0.09	0.10	-0.29	0.09
content	0.26	-0.20	0.06	0.29	-0.18	-0.03	0.09	-0.33	-0.03
serene	0.30	-0.37	-0.13	0.25	-0.42	0.03	-0.10	-0.48	0.03
glad	0.44	0.26	0.24	0.45	0.27	0.19	0.52	-0.10	0.19
pleased	0.44	0.05	0.29	0.51	0.13	0.03	0.47	-0.25	0.03

"Semantic differential profiles for 1,000 most frequent English words."
David R. Heise,
Psychological Monographs: General and Applied, **79**, 1, 1965. [6]

Dimension	Scale
Evaluation	Good-Bad
	Pleasant-Unpleasant
Activity	Active-Passive
	Lively-Still
Potency	Strong-Weak
	Tough-Tender
Stability	Rational-Emotional
	Tamed-Untamed

Remeasuring meaning:

Confusion and Conflation:

"Pleasure, arousal, dominance: Mehrabian and Russell revisited"
Bakker et al.,
Current Psychology, **33**, 405–421, 2014. [2]

- Test whether EPA and VAD match.
- Explore historical problems of defining end point descriptors for meaning dimensions.

References I

[1] T. Alshaabi, J. L. Adams, M. V. Arnold, J. R. Minot, D. R. Dewhurst, A. J. Reagan, C. M. Danforth, and P. S. Dodds.
Storywrangler: A massive exploratorium for sociolinguistic, cultural, socioeconomic, and political timelines using Twitter.
Science Advances, 7:eabe6534, 2021. pdf

[2] I. Bakker, T. Van Der Voordt, P. Vink, and J. De Boon.
Pleasure, arousal, dominance: Mehrabian and Russell revisited.
Current Psychology, 33:405–421, 2014. pdf

References II

[3] D. Beeferman, W. Brannon, and D. Roy.
RadioTalk: A large-scale corpus of talk radio transcripts.
arXiv preprint arXiv:1907.07073, 2019. pdf

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

[5] P. S. Dodds, T. Alshaabi, M. I. Fudolig, J. W. Zimmerman, J. Lovato, S. Beaulieu, J. R. Minot, M. V. Arnold, A. J. Reagan, R. Harp, and C. M. Danforth.
Ousiometrics and Telegnomics: The essence of meaning conforms to a two-dimensional powerful-weak and dangerous-safe framework

References III

with diverse corpora presenting a safety bias, 2021. pdf

[6] D. R. Heise.
Semantic differential profiles for 1,000 most frequent English words.
Psychological Monographs: General and Applied, 79(8):1, 1965. pdf

[7] G. Herdan.
Type-Token Mathematics: A Textbook of Mathematical Linguistics.
Mouton, The Hague, Netherlands, 1960.

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

References IV

[9] A. Mehrabian and J. A. Russell.
The basic emotional impact of environments.
Perceptual and motor skills, 38:283–301, 1974. pdf

[10] J.-B. Michel, Y. K. Shen, A. P. Aiden, A. Veres, M. K. Gray, The Google Books Team, J. P. Pickett, D. Hoiberg, D. Clancy, P. Norvig, J. Orwant, S. Pinker, M. A. Nowak, and E. A. Lieberman.
Quantitative analysis of culture using millions of digitized books.
Science Magazine, 331:176–182, 2011. pdf

References V

[11] S. M. Mohammad.
Obtaining reliable human ratings of valence, arousal, and dominance for 20,000 English words.

In Proceedings of The Annual Conference of the Association for Computational Linguistics (ACL), Melbourne, Australia, 2018. pdf

[12] S. M. Mohammad.
Word affect intensities.
In Proceedings of the 11th Edition of the Language Resources and Evaluation Conference (LREC-2018), Miyazaki, Japan, 2018. pdf

[13] F. Moretti.
Distant Reading.
Verso, New York, 2013.

References VI

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

[15] E. A. Pechenick, C. M. Danforth, and P. S. Dodds.
Characterizing the Google Books corpus: Strong limits to inferences of socio-cultural and linguistic evolution.
PLoS ONE, 10:e0137041, 2015. pdf

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

References VII

[17] R. Reisenzein.
Wundt's three-dimensional theory of emotion.
Poznan Studies in the Philosophy of the Sciences and the Humanities, 75:219–250, 2000.

[18] J. A. Russell.
A circumplex model of affect.
Journal of Personality and Social Psychology, 39:1161, 1980. pdf

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

References VIII

[20] I. Semenov.
Wikipedia word frequency, 2019.
https://github.com/IlyaSemenov/wikipedia-word-frequency, accessed 2021/04/02.

[21] C. E. Shannon.
A mathematical theory of communication.
The Bell System Tech. J., 27:379–423,623–656, 1948. pdf

[22] L. M. Solomon.
A factorial study of complex auditory stimuli (passive sonar sounds).
Unpublished doctor's dissertation, University of Illinois, 1954. pdf

References IX

[23] W. M. Wundt.
Grundriss der Psychologie.
Kröner, 1922.