

Personality Driven Differences in Paraphrase Preference

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Joint work with

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Motivation

User attribute prediction from text is successful:

- ▶ **Age** (Rao et al. 2010 ACL)
- ▶ **Gender** (Burger et al. 2011 EMNLP)
- ▶ **Location** (Eisenstein et al. 2010 EMNLP)
- ▶ **Personality** (Schwartz et al. 2013 PLoS One)
- ▶ **Impact** (Lampos et al. 2014 EACL)
- ▶ **Political Orientation** (Volkova et al. 2014 ACL)
- ▶ **Mental Illness** (Coppersmith et al. 2014 ACL)
- ▶ **Occupation** (Preoțiuc-Pietro et al. 2015 ACL)
- ▶ **Income** (Preoțiuc-Pietro et al. 2015 PLoS One)

Stylistic differences

We need to be aware of **style** differences, rather than topical

Not useful for many practical applications that adapt to traits:

- ▶ machine translation (Mirkin et al. 2015 EMNLP, Rabinovich et al 2017 EACL)
- ▶ agents (e.g. customer service, tutoring)
- ▶ controlling for gender or racial bias



Stylistic differences

One type of stylistic difference is **phrase choice** in context.

Splendid
Excellent
Remarkable



Source: <https://wikispaces.psu.edu/display/P5PFL/TRAIT+Theory+Page>

Openness

Magnificent
Fabulous
Tremendous



Source: <http://inwilmingtonde.com/events/thanksgiving-eve-karaoke>

Extraversion

We study the Big Five personality traits:

- ▶ 115,312 Facebook users
- ▶ Personality scores obtained through the MyPersonality app (Kosinski et al, 2013)
- ▶ For each trait, take top and bottom 20% of users

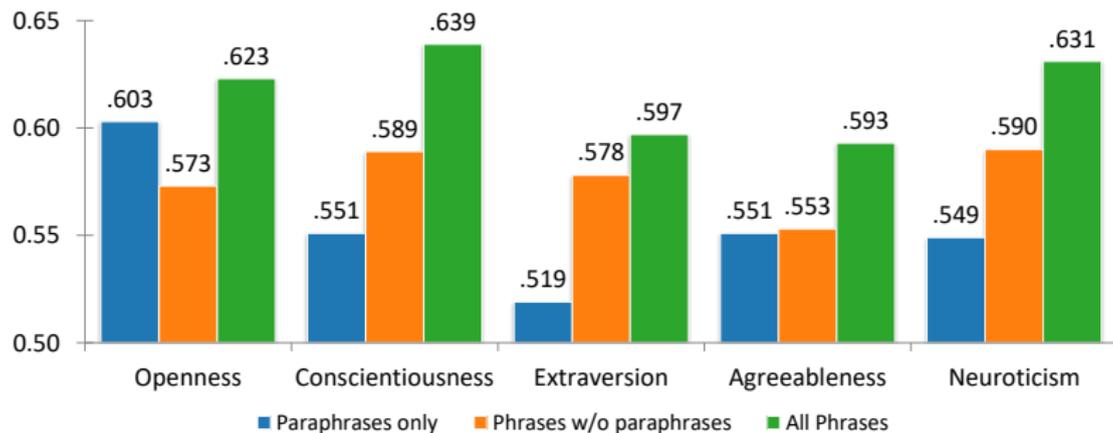
Paraphrasing

Paraphrases – alternative ways to convey the same information

Paraphrase Database (PPDB) 2.0 (Pavlick et al. 2015 ACL):

- ▶ annotated with type and confidence (filter ‘equivalent’ paraphrases with $>.2$ confidence)
- ▶ $>6M$ automatically derived paraphrase pairs
- ▶ we use only 1–3 grams
- ▶ difference in a pair more than just change of stopwords or root form of word

Prediction



Accuracy, Naive Bayes, 90-10 training-testing, balanced data

Quantifying Preference

Straightforward measure:

$$\text{Extraversion}(w) = \log\left(\frac{\text{Extravert}(w)}{\text{Introvert}(w)}\right) \quad (1)$$

Within a paraphrase pair (w_1, w_2) , the difference $\text{Extraversion}(w_1) - \text{Extraversion}(w_2)$ is the stylistic distance.

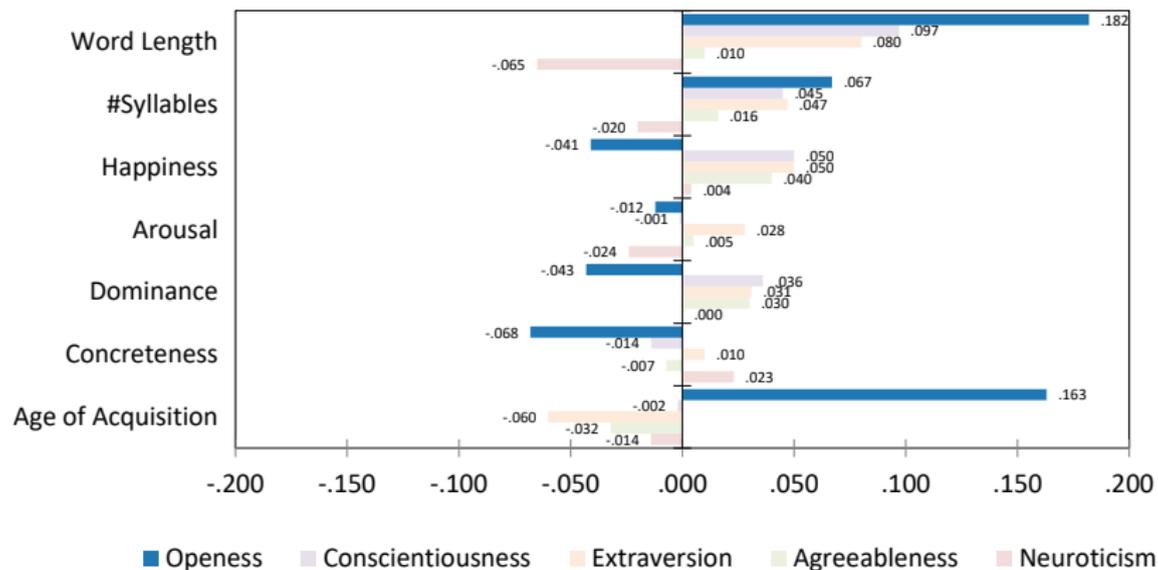
Used previously to study paraphrase preference across age, gender and occupational class (Preoțiuc-Pietro, Xu & Ungar, AAAI 2016).

Linguistic Theories

Study which attributes of words in a pair are preferred by one group:

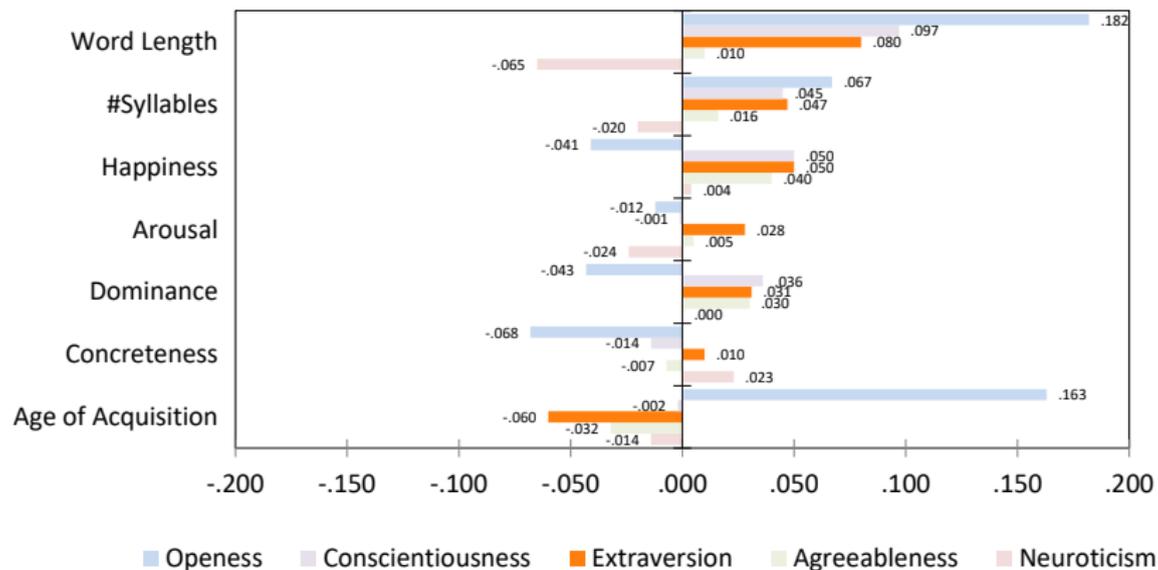
- ▶ Word Length in Characters
- ▶ Word Length in Syllables
Simple proxies for word complexity
- ▶ Affective Norms: Valence, Arousal, Dominance
14k rated words
Valence: suicide (0.15) → bacon (0.70) → laughter (1)
- ▶ Concreteness
40k rated words: spirituality (1) → morning (3.44) → tiger (5)
- ▶ Age of Acquisition
30k rated words: great (5.05) → splendid (7.22) → tremendous (10.63)
- ▶ More in the paper ...

Linguistic Theories



Correlation coefficients between paraphrase pair preference and user group usage.

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Take Aways

- ▶ Stylistic difference between user groups have important applicability
- ▶ Paraphrase choice contains valuable information
- ▶ Shed light on psycholinguistic theories
- ▶ Potential way to generate text perceived to be from a different user trait

See our EMNLP 2017 paper (Preoțiuc-Pietro, Guntuku, Ungar - Controlling Human Perception of Basic User Traits)

Thank you!

Questions?