



Affect, the ultimate differentiator
The Engineering of Emotion

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Intuit Inc. Technology Futures







you are a bitch

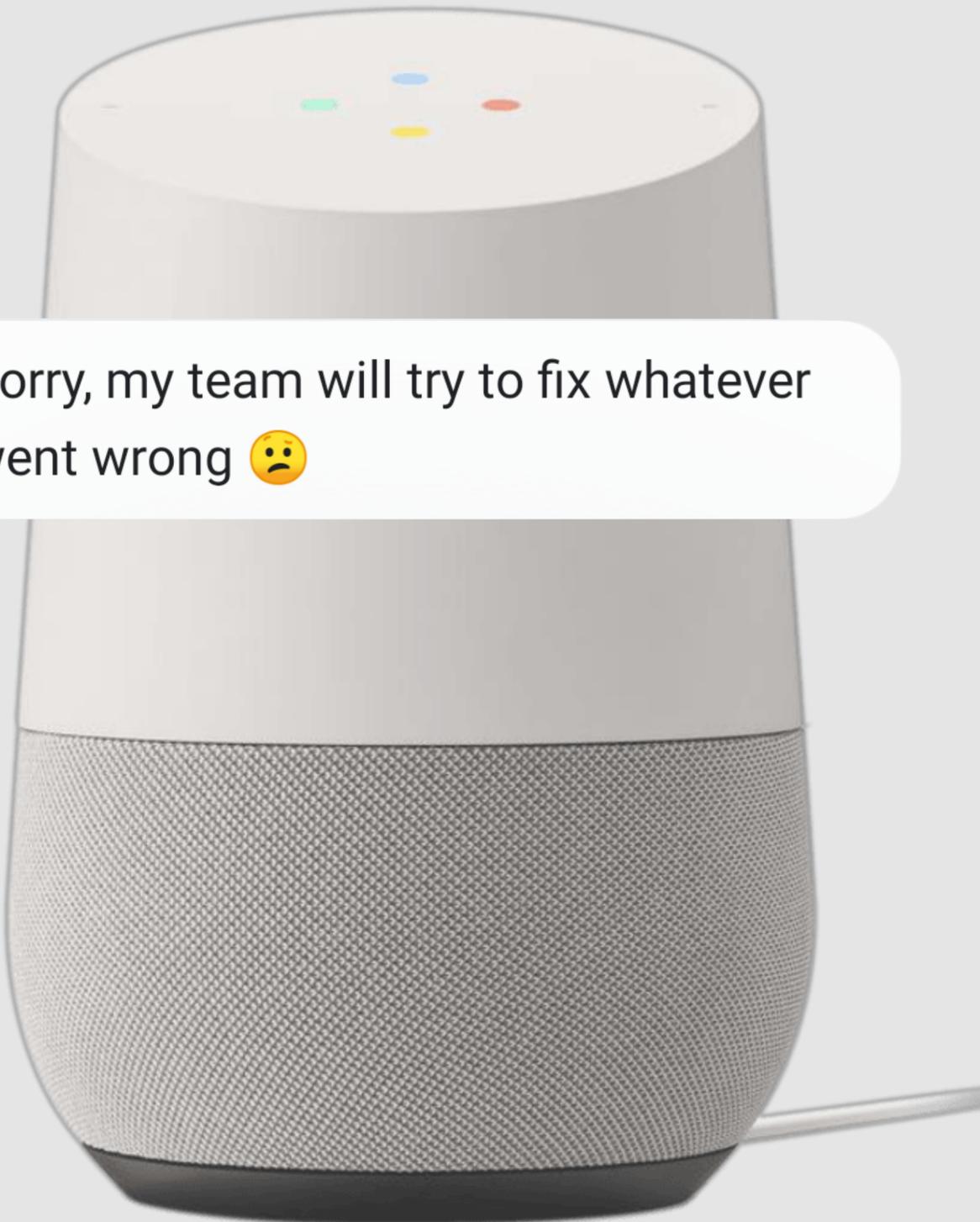
~~That's not nice to say~~



Silence.



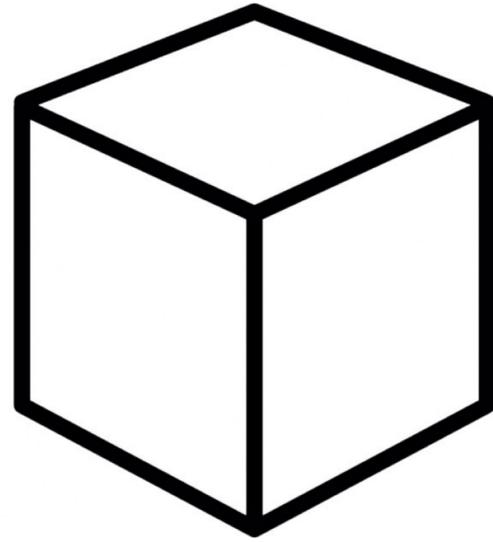
Sorry, my team will try to fix whatever went wrong 😞



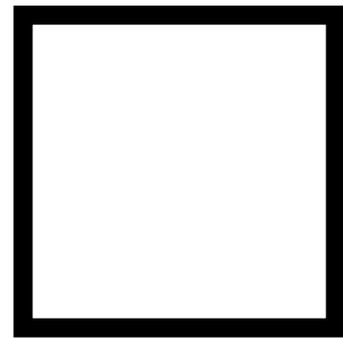
immersive



frictionless



3D Virtual Reality



2D WIMP (windows, icons, menus, pointer)



1D Texting / ChatBOT UI



0D Voice User Interface

- OD VUI

Likability becomes the ultimate differentiator in an otherwise un-differentiable experience.

Voice first or voice only experiences don't have a traditional (graphical) user interface.

In this new environment of ambient-computing, form factor or looks hardly matter.

Not only what, but equally important how a virtual assistant says it, will determine success.

A decorative graphic on the left side of the slide consisting of several thick, yellow, hand-drawn brushstrokes of varying lengths and curves, resembling a stylized sunburst or a series of expressive marks.

Validate that a response carries the intended attitude.

Apply techniques and *off the shelf* tools, originally created to analyze user input, like customer feedback.



Alexa, ask Mint, can I go out for dinner tonight?



There are still \$70 left in your restaurants budget, but you also significantly over spent in all other categories.

Sentiment Analysis



There are **still** \$70 **left in** your **restaurants** budget, but you also **significantly over** spent **in** all other **categories.**

very-negative

neutral

Readability Index :

10.9



You **still** have \$70 **in** your **restaurants** budget, but **please** understand, **in** all other **categories** you are **in** the **red.**

positive

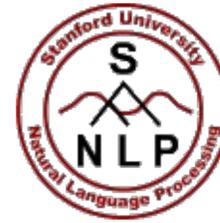
positive

Readability Index :

9.3



Stanford Sentiment Analysis



<https://nlp.stanford.edu/sentiment>

V.A.D.E.R. SENTIMENT SCORES

.....

VADER is a lexicon and rule-based sentiment analysis tool that is especially attuned to sentiments expressed in social media.

Valence Aware Dictionary and a Sentiment Reasoner



Vader Sentiment Analysis

VADER Sentiment Analysis. **VADER** (Valence Aware Dictionary and **sEntiment** Reasoner) is a lexicon and rule-based **sentiment analysis** tool that is specifically attuned to **sentiments** expressed in social media, and works well on texts from other domains.

How does the interpretation of Sentiment Analyzers compare with what people perceive?

We ran several modern novels through both sentiment analyzer, which produced **5 sets, each containing at least 200 sentences** that the analyzers had tagged as



Very Positive • Positive • Neutral • Negative • Very Negative

++

+

0

-

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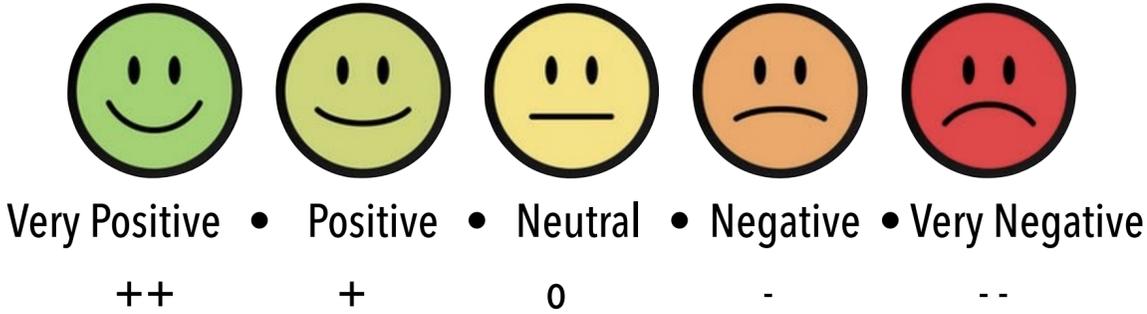
We asked 156 people:

to read and determine the attitude expressed in those sentences:
if it was **very positive, positive, neutral, negative, or very negative**

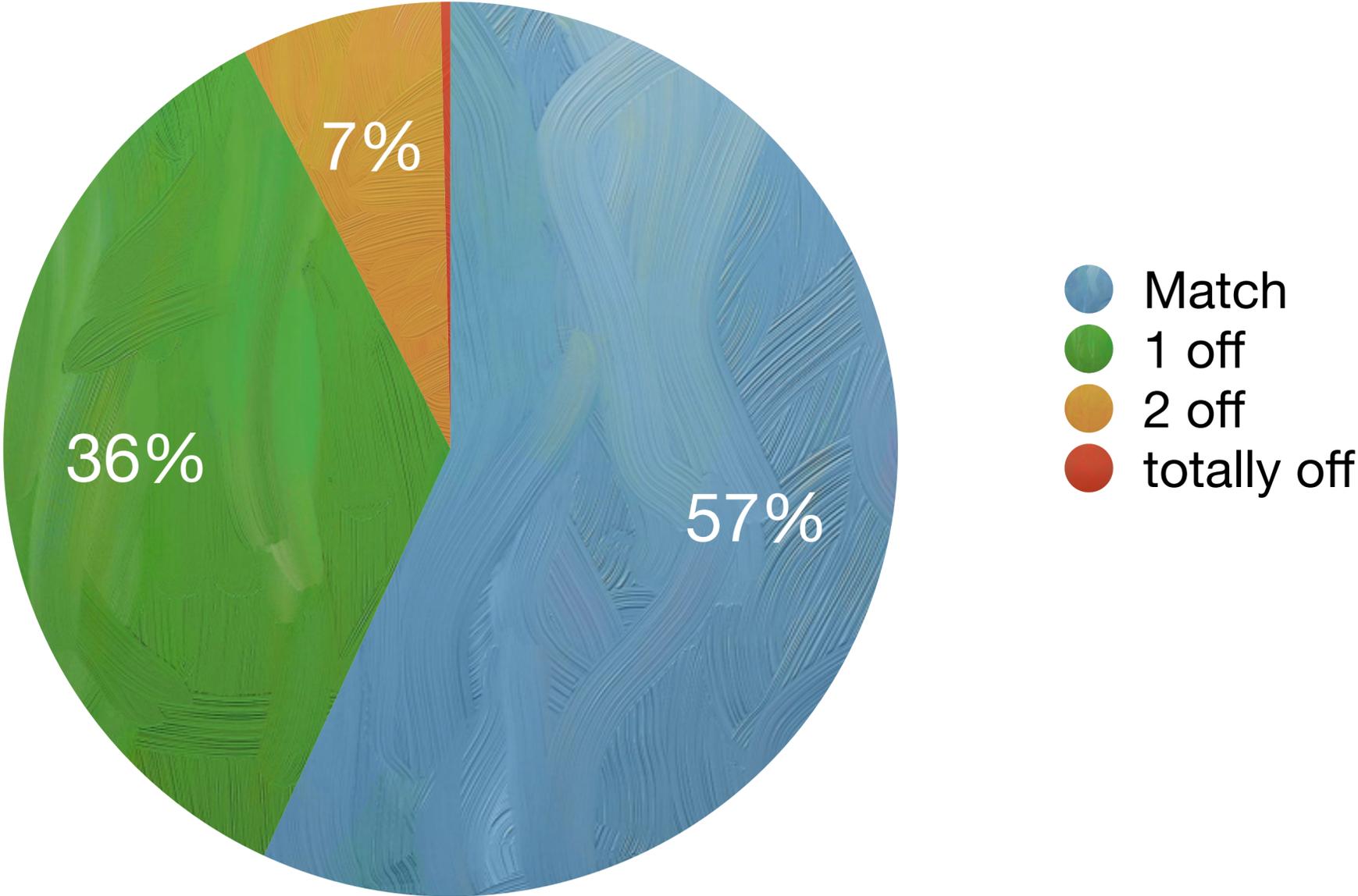
156 people tagged a total of 7470 sentences (on average a participant looked at about 50 sentences, containing sentences from each of the 5 sets)

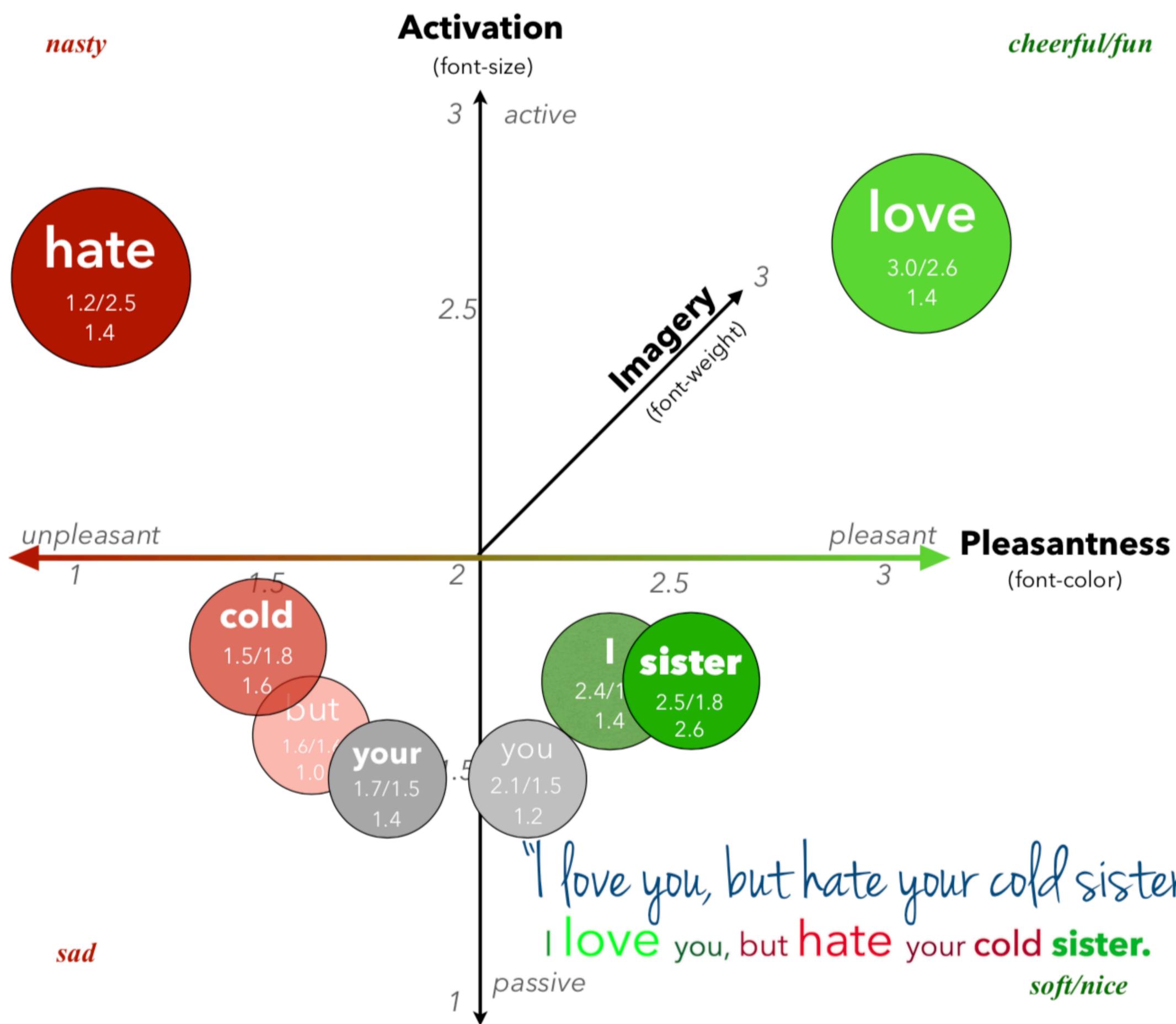
93% of all responses exactly matched or were just one off the sentiment analysis

5 sets, each containing at least 200 sentences



156 people tagged a total of 7470 sentences
(each looked at about 50 sentences, containing sentences from each of the 5 sets)





Please realize, overall you are in the red.



AVG. READABILITY: 6

SYNONYMS:

create [+]

sell

acquire

recognize (+)

understand (+)

earn

appreciate [+]

perceive (+)

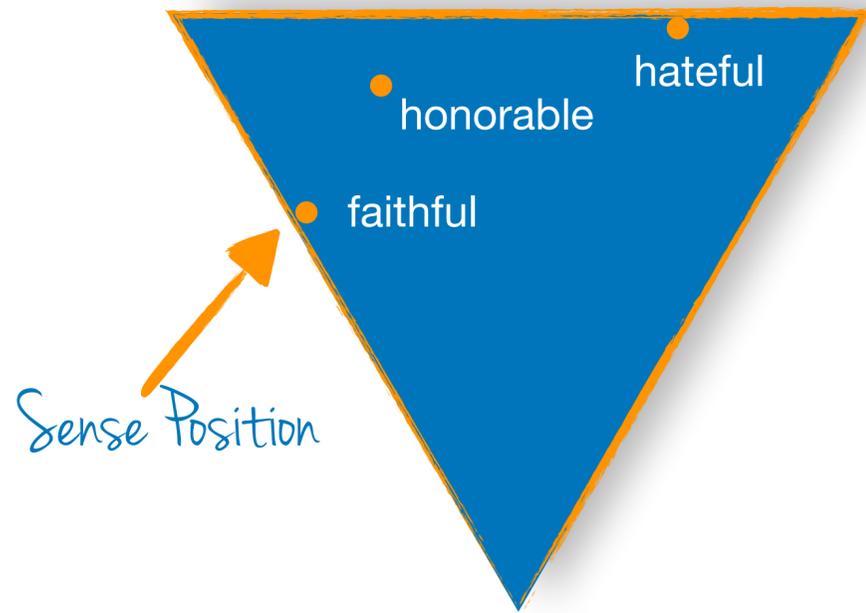
AFFECT IN LANGUAGE / SENTIMENT ANALYSIS

Please realize, **overall** you are **in** the **red.** neutral positive

Quantified Synonyms

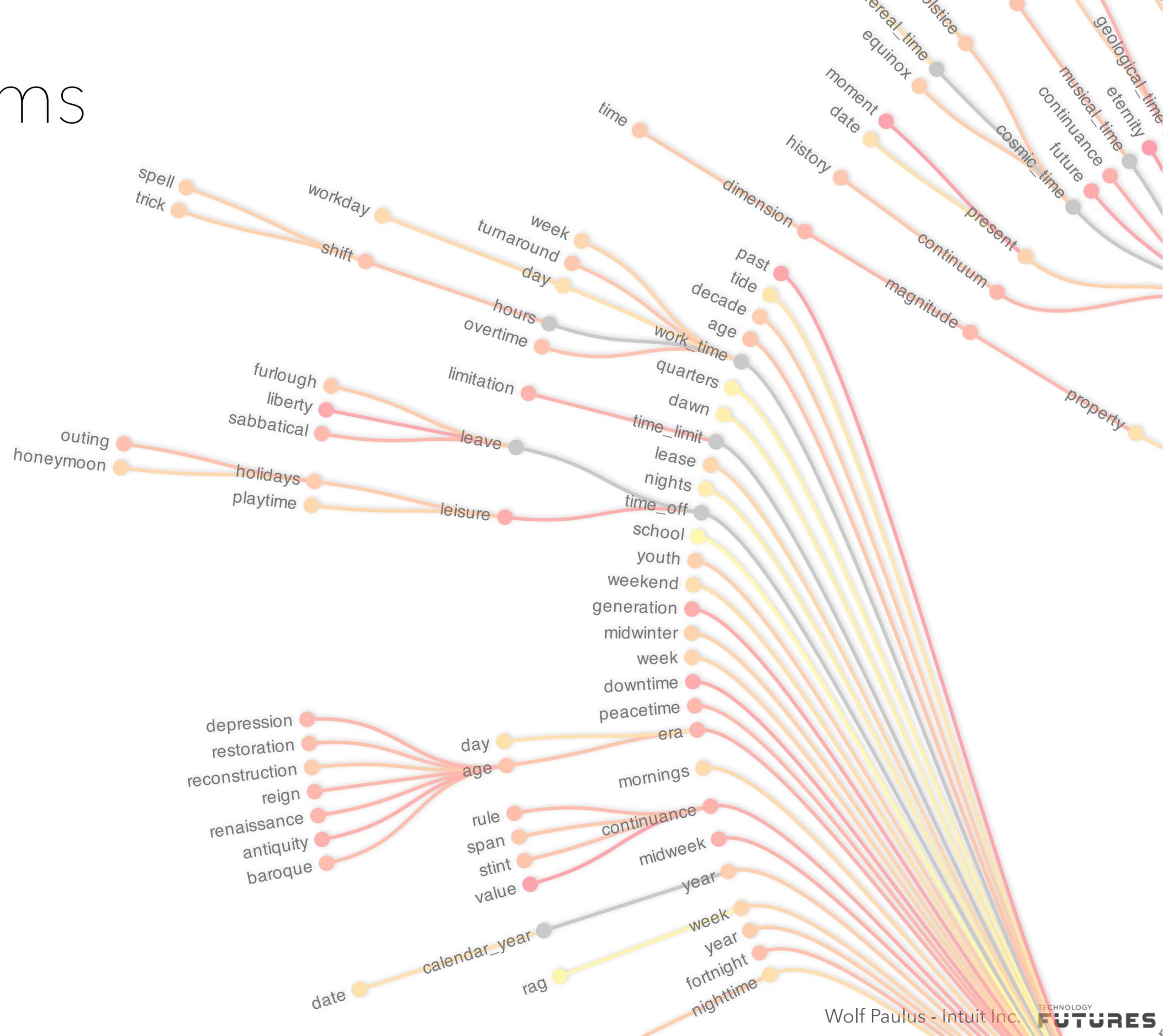
Positive

Negative



Objective

Term	Positive	Objective	Negative
faithful	0.625	0.375	0
hateful	0.333	0	0.667
honorable	0.625	0.125	0.25



Speech Synthesis

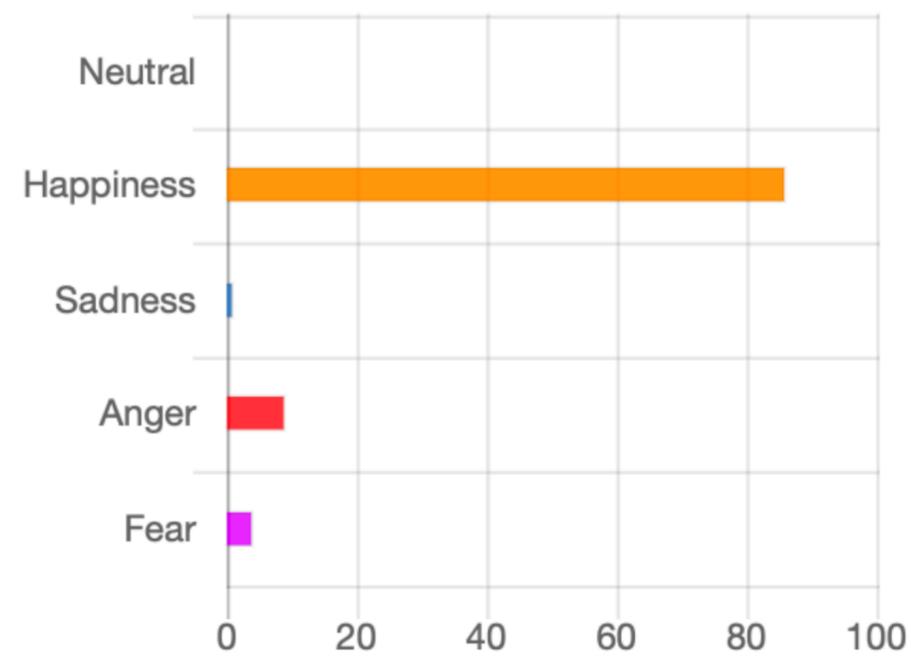


Identifying emotion in a speaker's voice

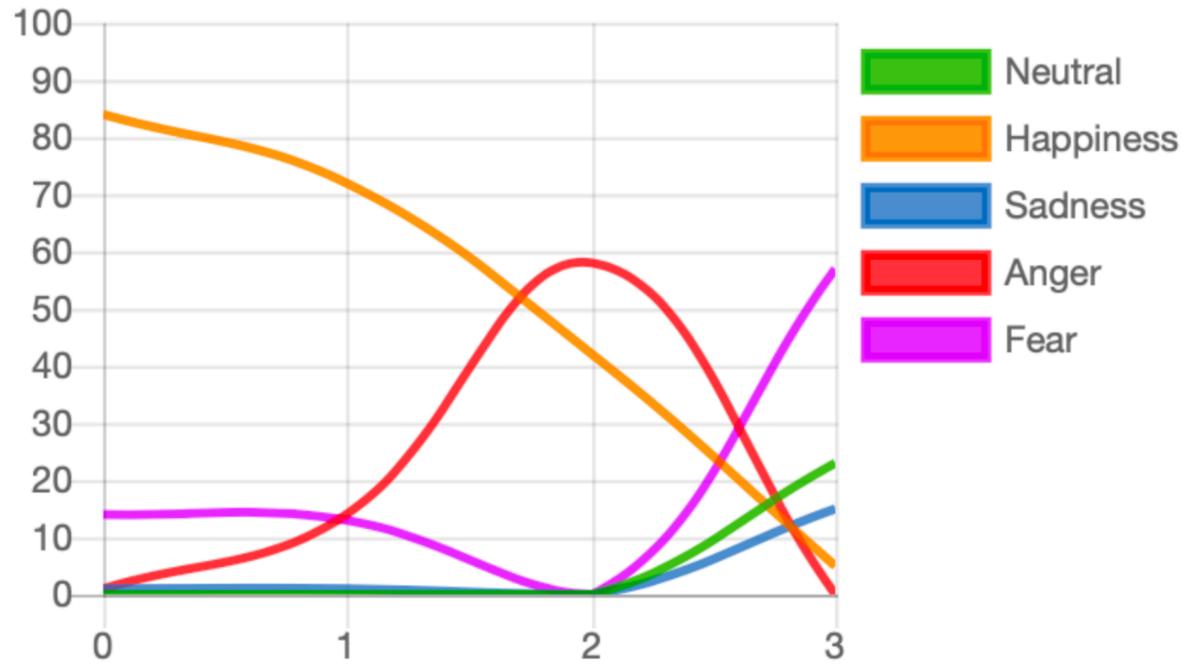
Speech Synthesis



ACOUSTICAL ANALYSIS



ANALYSIS OVER TIME



Speech Synthesis Markup Language to impact affect

SSML

<**emphasis** level= ".." > enclosed text be spoken with **emphasis**

<prosody **pitch** = ".." > modifies the baseline pitch e.g., **low** / **high**

<prosody **rate** = ".." > change in the speaking rate, e.g., **slow** / **fast**

<prosody **volume** = ".." > modifies the volume, e.g., **soft** / **loud**

<prosody **range** = ".." > modifies pitch range (variability) e.g., **low** / **high**

<prosody **contour** = ".." > sets the actual pitch contour for the contained text. (time position, target)

"Voice Transformation SSML"

<**glottal_tension** pitch = ".." > **tense** or **lax** speech quality e.g. low / high (low value is perceived as more breathy and generally more pleasant.)

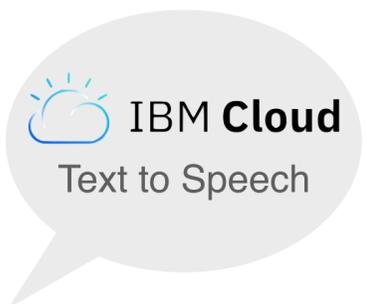
<**breathiness** level=".."> perceived level of the **aspiration noise** (drawing breath) e.g., low / high

"Expressive SSML"

<**express-as** type="GoodNews"> expresses a **positive, upbeat** message.

<**express-as** type="Apology"> expresses a message of **regret**.

<**express-as** type="Uncertainty"> conveys an uncertain, **interrogative** message.



Realtime graphical SSML Editor

Amazon Polly ▾ US English ▾ Salli ▾

default emphasis ▾ medium pitch ▾ medium rate ▾ medium volume ▾ default range ▾

neutral expres... ▾ breathiness ▾ tension ▾

Miserable is a very tough word, you should avoid. **Unless** you're stuck, **suffering** in traffic.

SPEECH SYNTHESIS MARKUP LANGUAGE (SSML) ↗

```
<?xml version="1.0" encoding="UTF-8"?>
<spek version="1.0" xml:lang="en-US">
  <p>
    <prosody volume="loud">Miserable</prosody> is a very tough word, you should avoid. <emphasis
level="moderate">Unless</emphasis> you're stuck, <emphasis level="strong">suffering</emphasis> <prosody
pitch="low" rate="slow" volume="soft">in traffic.</prosody>
  </p>
</spek>
```

Summary



likable



capable

Summary & conclusion

- Tools & techniques mentioned were created to analyze customer feedback.
- We can still use them, to validate that a chatbot's responses carries the intended attitude or sentiment.
- Smart-speakers may hear "*Please*" and "*Thanks*" less often than before, let's make sure the skills or bots we are building responds **kindly, considerately** and **empathically** if warranted, and thereby deserve a user's politeness.
- The number of "*Thanks*" a bot hears, may tell if you are on the right track.



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Thank You!