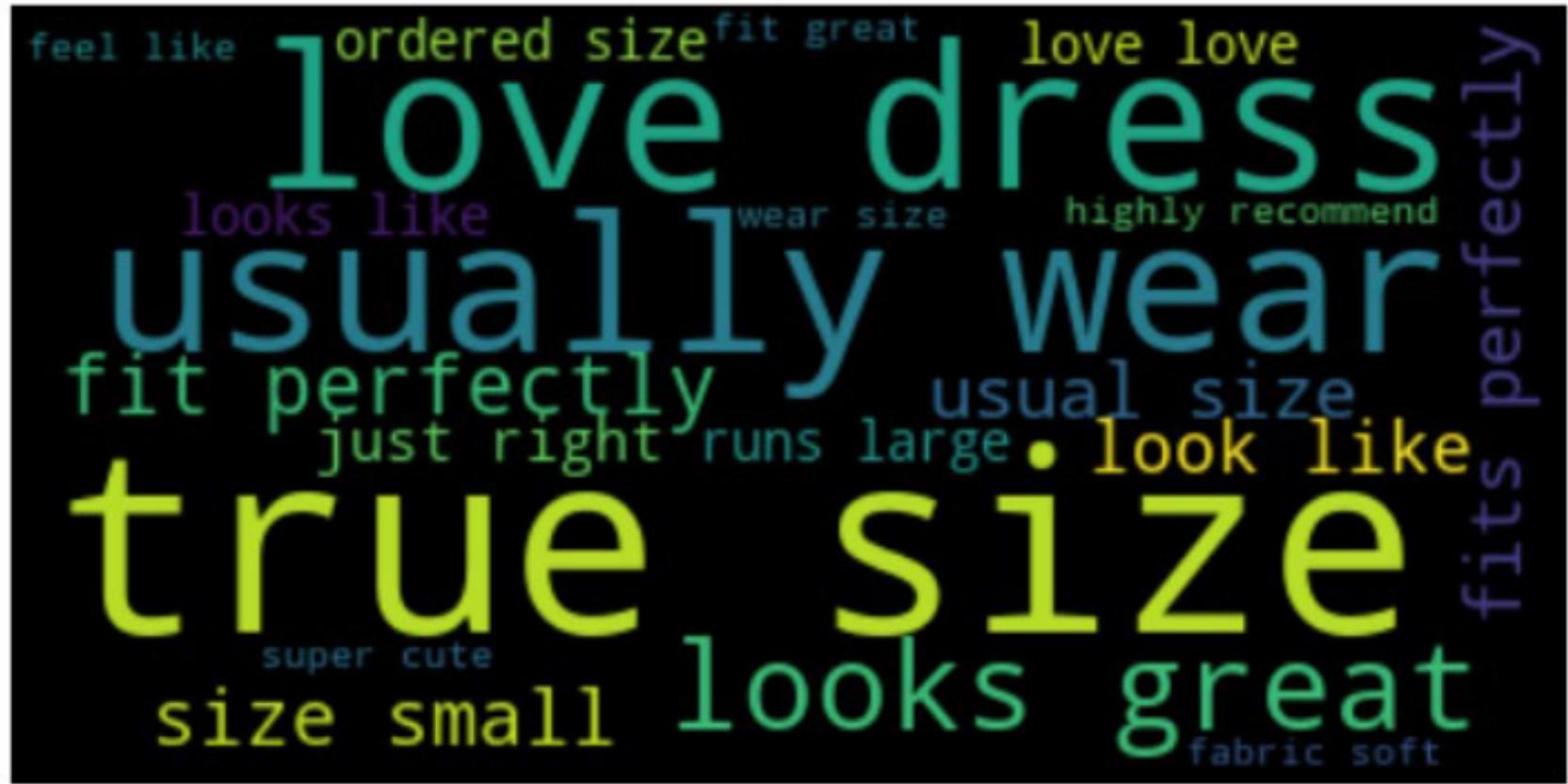


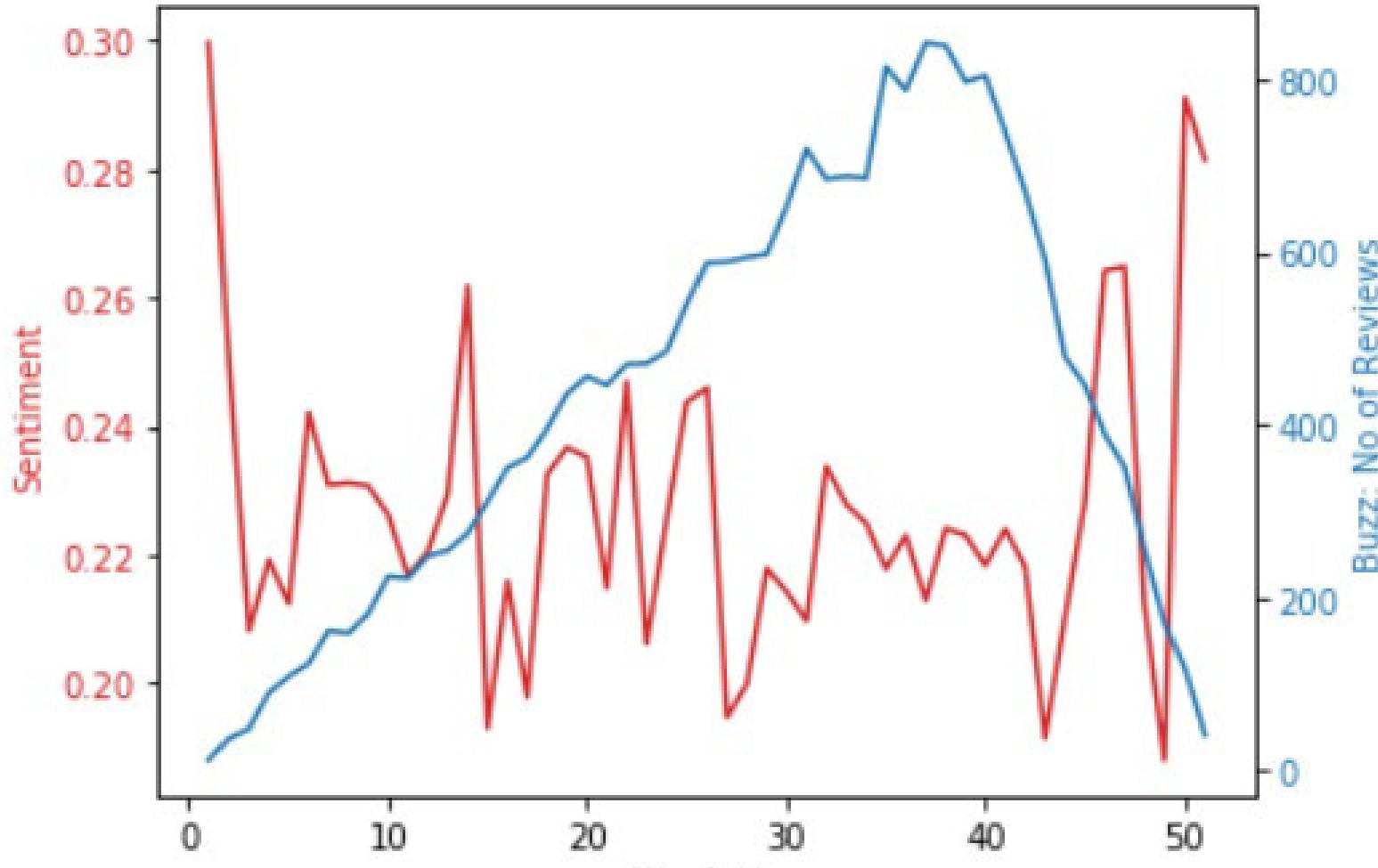
Word Clouds

- Visualizes the most common words in comments. Can be a prelude to using PMI or most associated aspect words to entities



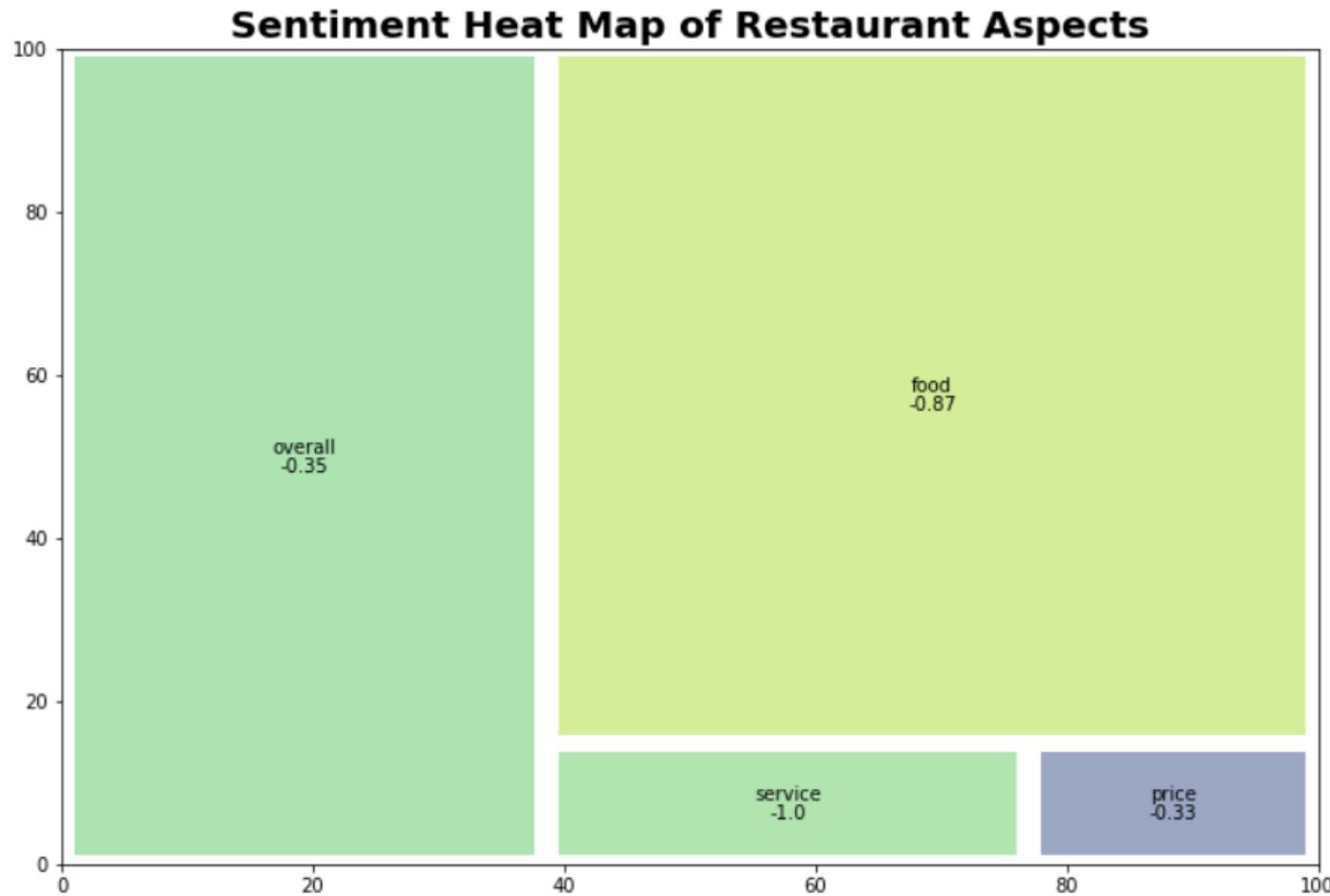
Time series of sentiment

- Plotting sentiment and buzz. (note in this case, the buzz is simulated data)



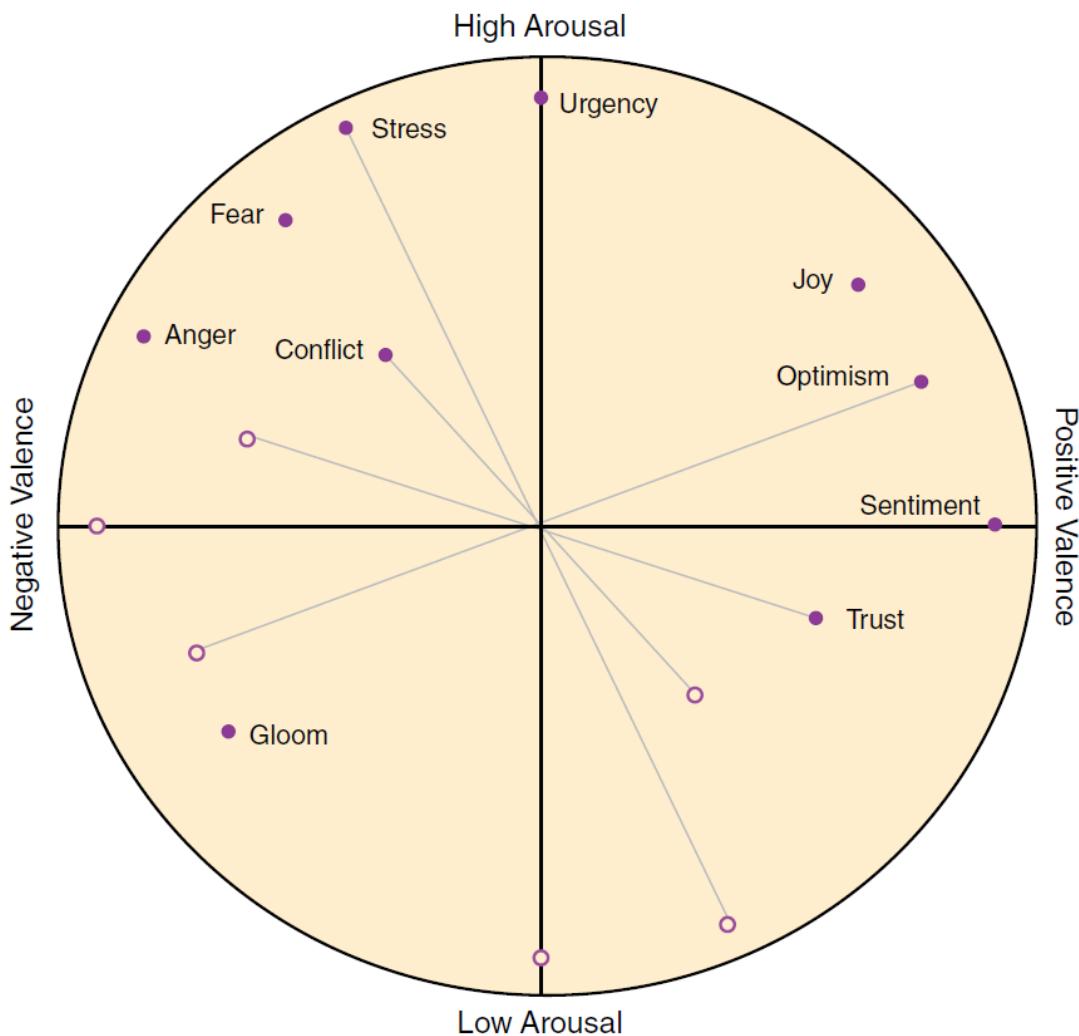
Sentiment Heat-Map

- Allows view of most commonly talked about topic (aspects) and the sentiment score.



Sentiment as an emotion

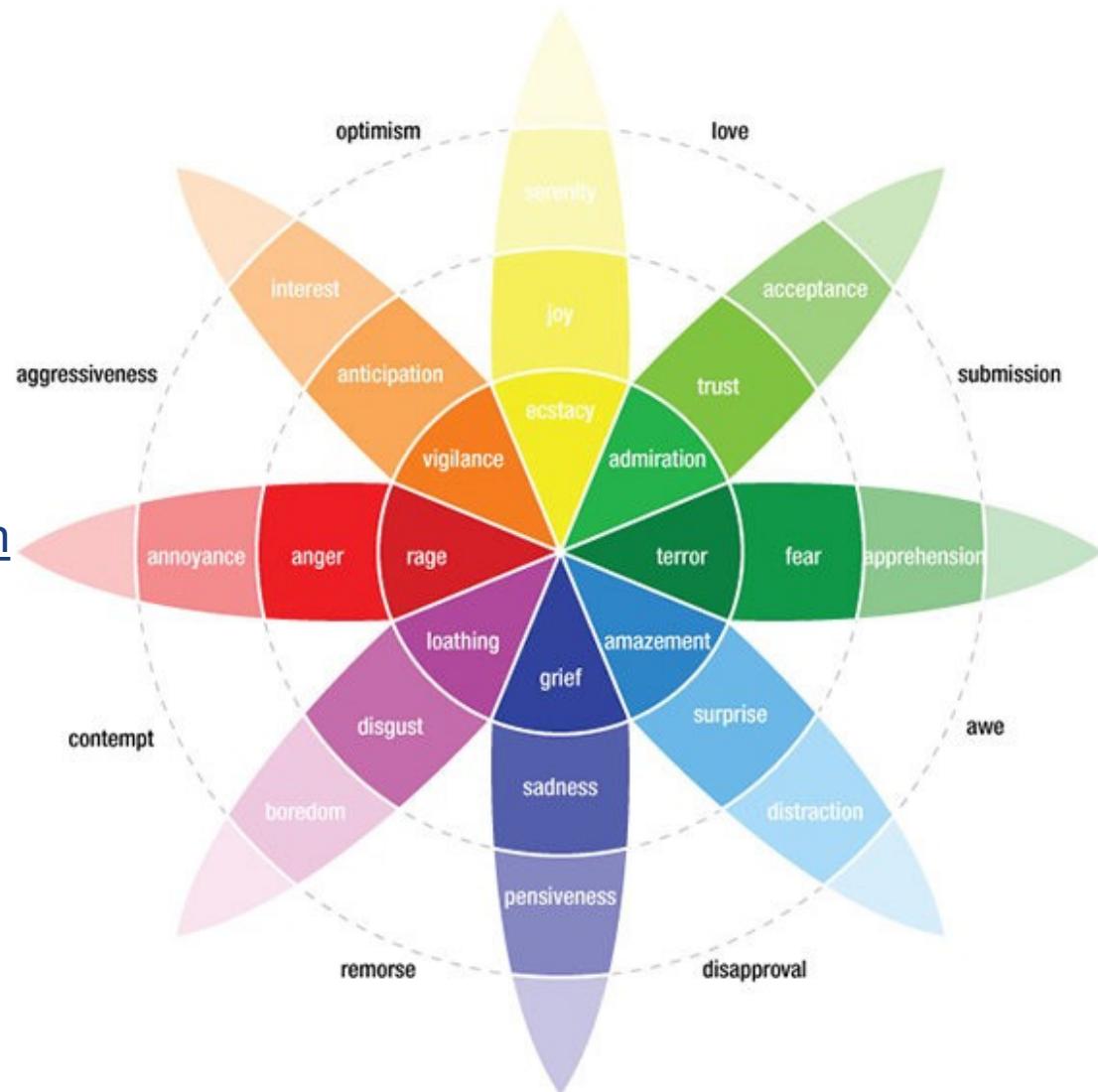
- Sentiment is an emotion
 - **Ekman** : 6 basic emotions
 - **Valence**: Positive or negative affectivity
 - **Arousal**: Intensity of the emotion, normally generates an action



Affective circumplex - how emotions vary

Sentiment as an emotion

- Ekman's six basic emotions,
- Plutchik's eight basic emotions,
- Profile of Mood States (POMS) six mood states.
- [Twitter Emotion Detection Lib](#)
- [Train your own model](#)



References

- <https://www2.slideshare.net/isabelleaugenstein/introduction-to-natural-language-processing-for-the-semantic-web>
- <https://www2.slideshare.net/Staano/ss-patterns-iswc2014v03slideshare>
- <https://monkeylearn.com/sentiment-analysis/>
- [https://www.researchgate.net/publication/330014159 Sentiment Analysis on IMDb Movie Reviews Using Hybrid Feature Extraction Method](https://www.researchgate.net/publication/330014159_Sentiment_Analysis_on_IMDb_Movie_Reviews_Using_Hybrid_Feature_Extraction_Method)
- <https://www.iflexion.com/blog/sentiment-analysis-python>
- <https://towardsdatascience.com/evolution-of-language-models-n-grams-word-embeddings-attention-transformers-a688151825d2>

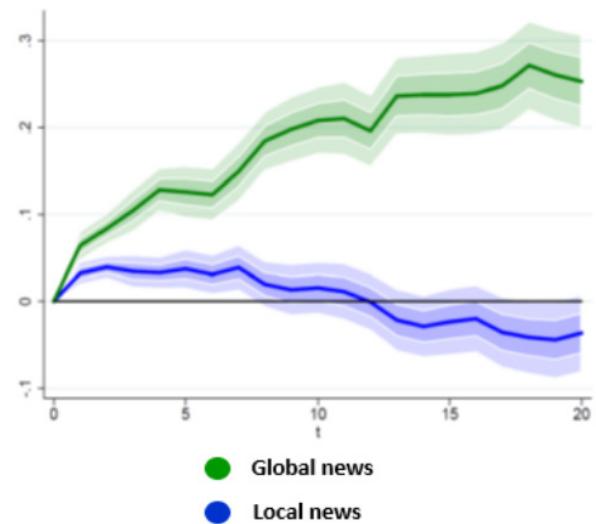
References

- Tham, Eric, Prospect Theory. The Unbearable Lightness of Expectations of the Chinese Investor (November 5, 2015). Handbook of Sentiment Analysis in Finance (2015) . Available at
- SSRN: <https://ssrn.com/abstract=3168041>
 - 5 Ways To Grab Your Customer's Attention In A Distracted World
- <https://www.braze.com/blog/5-ways-grab-customers-attention-distracted-world/>
- The Rising Cost of Consumer Attention: Why You Should Care, and What You Can Do about It
- http://www.hbs.edu/faculty/publication%20files/14-055_2ef21e7e-7529-4864-b0f0- c64e4169e17f.pdf
 - In Search of Attention
- <https://onlinelibrary.wiley.com/doi/10.1111/j.1540-6261.2011.01679.x>

Class Demo

- Rules based method
- ML based method
 - Using BOW and TF-IDF – using NLTK and Scikit learn
 - Using word embedding's (Glove) – using Spacy
- Some way to handle emoji's & emotions
- Some ways to visualize results

Sentiment analysis in Financial & Marketing



Sentiment and financial markets I

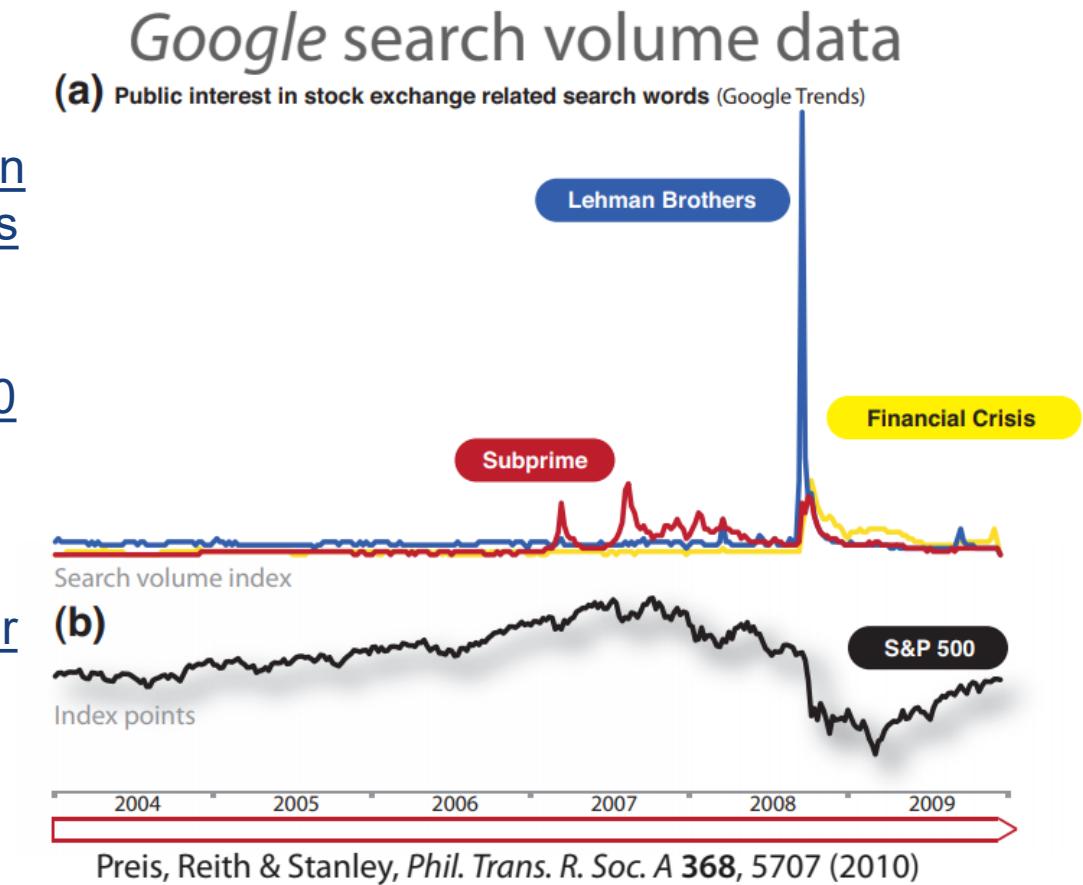
- The financial markets are driven by 2 forces –fundamentals and behavior
- Behavior is in turn driven by market sentiment. *Robert J. Shiller 2013 Nobel Prize*
- Studies have shown that news media impact markets.
 - [Link to paper](#)
- Tetlock(2007) measured the frequency of positive and negative words on WSJ. Negative words in the Harvard psychosocial dictionary include:
 - “fear,” “worry,” “disappoint,” “collapse,” “flaw,” and “ruin”.
- *Stock price drops correlated with negative words.*

Sentiment and financial markets II

- Can Google predict the stock market? Developed trading strategy in paper based on volume of search. Tobias (2012)

<https://www.ecb.europa.eu/events/pdf/conferences/140407/presentations/panel1/Preis-Tobias-Preis-ECB-Frankfurt.pdf?1ac7136314e7e06115cb456003c36c74>

<http://www.pnas.org/content/early/2014/07/23/1324054111>

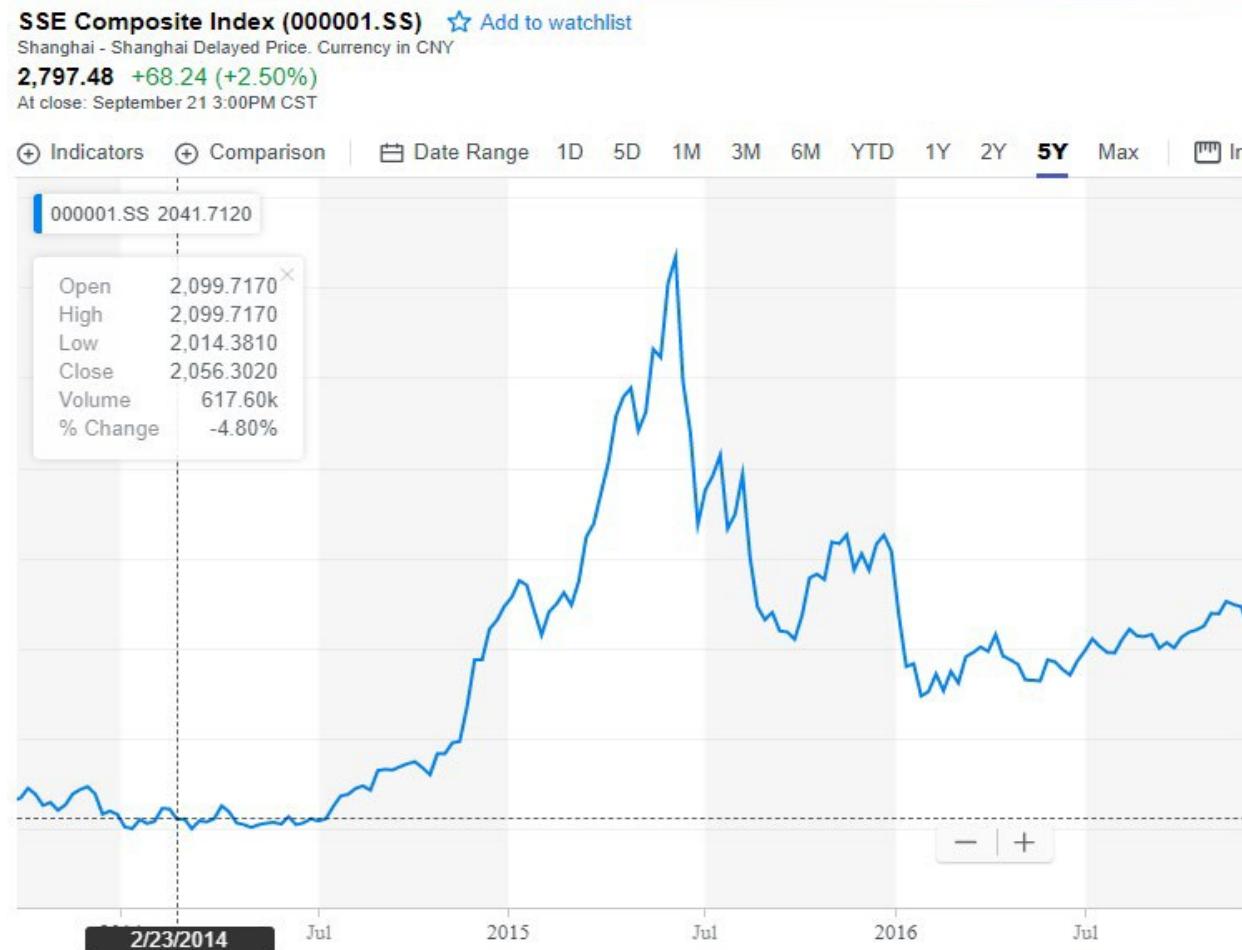


Behavioural finance

- Generally, the public react to news by:
 - **Under-reaction**: to key important news that are ‘boring’. Eg. routine earning news.
 - **Over-reaction**: to sensationalized news that are in headlines. Eg. bankruptcy etc.
- This asymmetry to news reaction is due to the deluge of news everyday made worse by ‘Big Data’.
- Investors’ **attention** is limited. They tend to focus on the headlines. But how many news can be on the headlines or even get to the news daily?

China equity market

- The rise and fall of the China stock indices was driven by retail investor sentiment in 2015. Dramatic – 2000 to 5000 in 6 months.



Creation of financial index I

- Creation of portfolio index. For eg. STI, SSE, HKEX etc. Read white papers in [public drive](#)
- Two indices that sentiment created:
 - Momentum strategy
 - Reversion strategy
- Momentum is really a ***uprising sentiment***.
 - Much researched topic in finance. One of few ‘facts’ in finance that have stood the test of time and across countries
 - Defined as:
 - Returns of top decile stocks *risen* the most over last 12 months – Returns of bottom decile stocks *fallen* the most over last 12 months

Financial events

LISTENING TO THE FINANCIAL CROWD

Who is talking about: **Keppel**

SGX:BN4 | 7.03 SGD (+3.38%) ⓘ



Updated 4 mins ago | Terms of use

[See discussion](#)



<https://www.businesstimes.com.sg/companies-markets/keppel-looking-into-possible-transaction-involving-keppel-tt-interest-also>

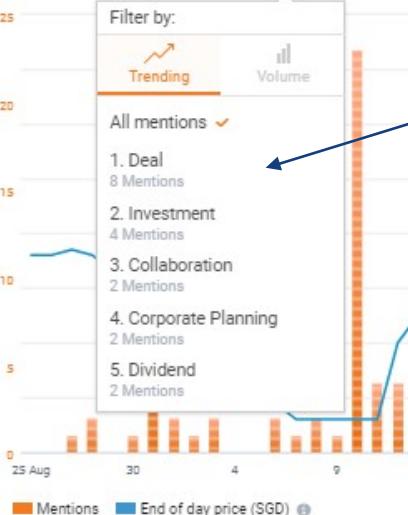


Keppel (SGX:BN4)

Crowdsourced and artificial intelligence based insights

Just now

MARKET ATTENTION ⓘ All mentions ⓘ



TWEETS, NEWS & BLOGS
ALL MENTIONS

last 30 days

Influencer score 99/100



businesstimes

Stocks to watch: Keppel, Keppel T&T, SPH, M1, Wheelock, Creative, Keppel KBS-US Reit - 8:48 AM THE following companies saw new developments which may affect trading of their shares on Monday: Keppel Corp, Keppel T&T: Keppel Corp is considering a possible transaction involving

08:56 - Mon, Sep 24, 2018

Influencer score 99/100



businesstimes

Keppel looking into possible transaction involving Keppel T&T interest; also considering M1 stake with SPH - - 7:25 AM KEPPEL Corp is considering a potential transaction of its stake in logistics and data centre arm Keppel Telecommunications & Transportation (Keppel T&T) and has asked Singapore Press ...

07:35 - Mon, Sep 24, 2018

Event types = firm aspects

Conclusion

- The financial markets are driven by 2 key factors
 - Fundamentals
 - Behavioral
- Behavioral factors are driven by market sentiment.
- Social and the new media have revolutionized the transmission of information in the markets, and in turn trading prices/ liquidity.

Reference:

- Trading on Sentiment: The Power of Minds Over Markets (Wiley Finance) Richard L. Peterson.
<https://www.amazon.com/Trading-Sentiment-Power-Markets-Finance/dp/1119122767> (let me know if you want a pdf copy)
- Handbook of News analytics in Finance. Gautam Mitra and Leia Mitra https://www.amazon.com/Handbook-News-Analytics-Finance-Wiley-ebook/dp/B0062O8V68/ref=sr_1_1?keywords=news+analytics+in+finance&dpID=51k00FJKlsL&preST=_SY445_&sr=1-1
- [QL70 &dpSrc=srch](#)
- Handbook of sentiment analysis in Finance. Gautam Mitra and Xiang Yu. https://www.amazon.com/Handbook-Sentiment-Analysis-Finance-Gautam-ebook/dp/B01I9K293S/ref=sr_1_1?keywords=sentiment+analysis+in+finance



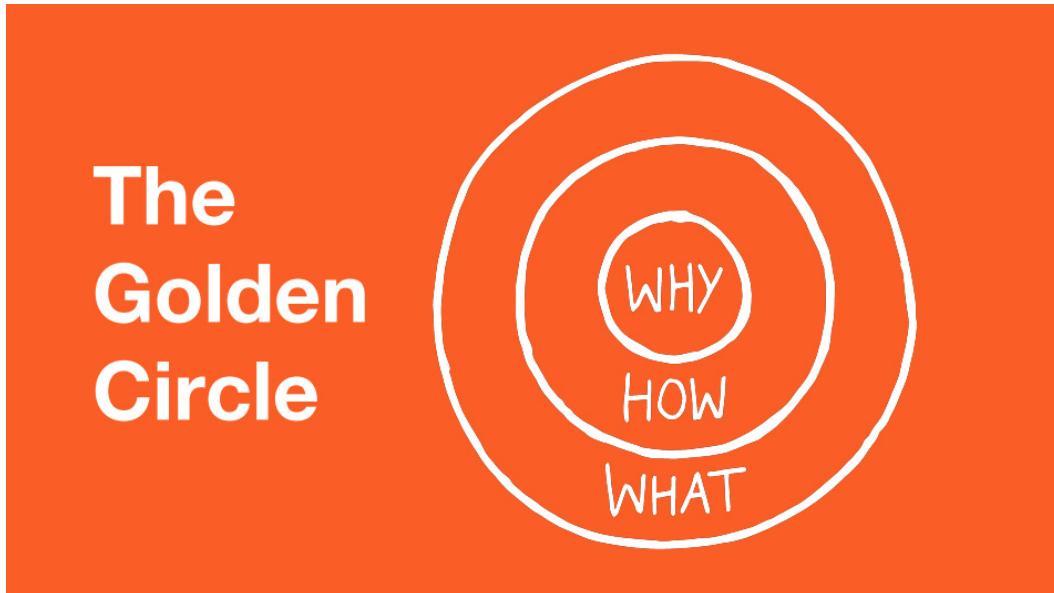
FANS vs CUSTOMERS vs LOYALTY

- What separates them all : **Different Human Emotions**

- | | | |
|--|--|--|
| <input type="checkbox"/> Admiration | <input type="checkbox"/> Confusion | <input type="checkbox"/> Interest |
| <input type="checkbox"/> Adoration | <input type="checkbox"/> Craving | <input type="checkbox"/> Joy |
| <input type="checkbox"/> Aesthetic
Appreciation | <input type="checkbox"/> Disgust | <input type="checkbox"/> Nostalgia |
| <input type="checkbox"/> Amusement | <input type="checkbox"/> Empathetic pain | <input type="checkbox"/> Romance |
| <input type="checkbox"/> Anxiety | <input type="checkbox"/> Entrancement | <input type="checkbox"/> Sadness |
| <input type="checkbox"/> Awe | <input type="checkbox"/> Envy | <input type="checkbox"/> Satisfaction |
| <input type="checkbox"/> Awkwardness | <input type="checkbox"/> Excitement | <input type="checkbox"/> Sexual desire |
| <input type="checkbox"/> Boredom | <input type="checkbox"/> Fear | <input type="checkbox"/> Sympathy |
| <input type="checkbox"/> Calmness | <input type="checkbox"/> Horror | <input type="checkbox"/> Triumph |

People buy WHY not WHAT

- People don't buy what you do; they buy why you do it
- The goal is not to do business with everybody who needs what you have
- The goal is to do business with people who believe what you believe
- Sentiment a key foundation and why we act



“

**People don't buy WHAT
you do, they buy WHY
you do it.**

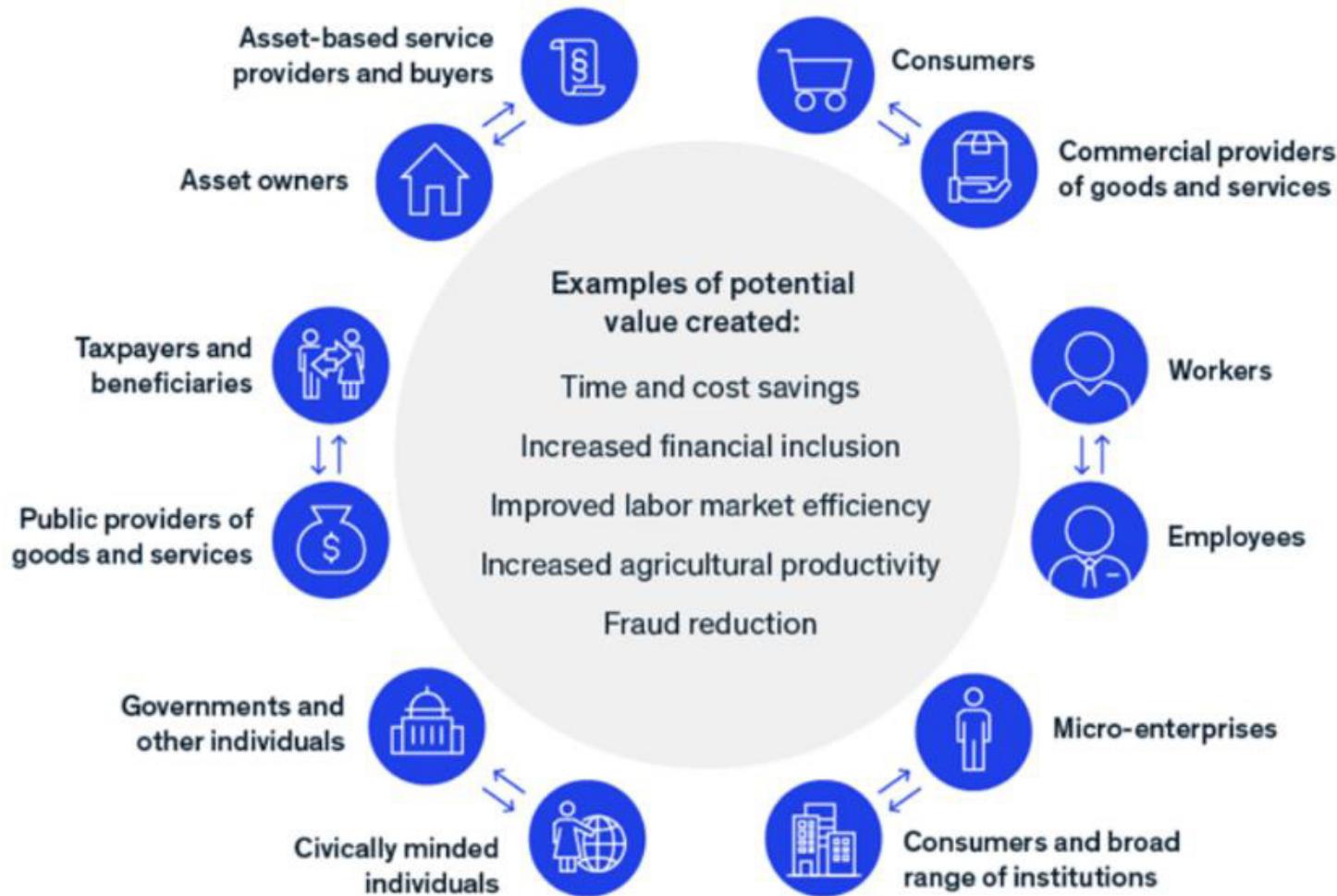
- Simon Sinek

”

Value of Sentiment

- “WHAT” does not drive behavior -Communicating from the outside in, people can understand vast amounts of complicated information like features and benefits and facts and figures
- “WHY” drives behavior -Communicating from the inside out, we're talking directly to the part of the brain that controls behavior, and then we allow people to rationalize it with the tangible things we say and do.
- e.g. It just does or doesn't feel right -This is where gut decisions come from

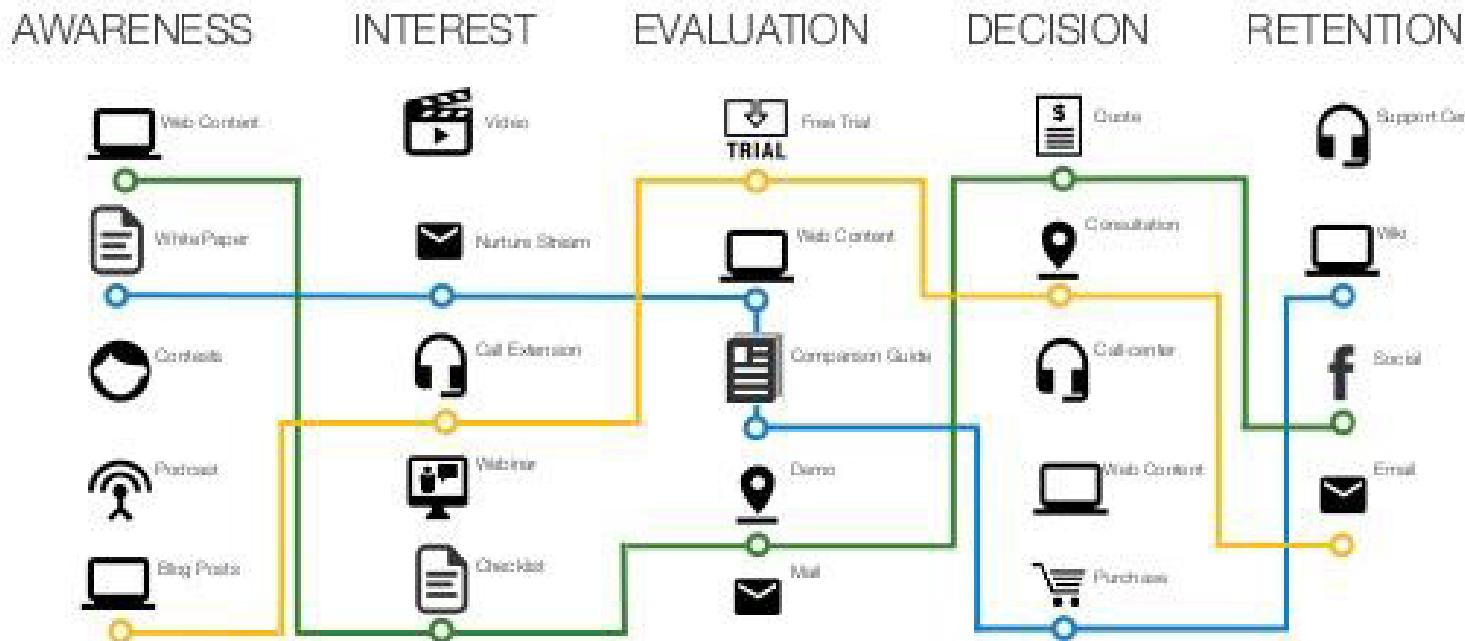
Interactions



6 key types
of key
interactions
between
individuals
and
companies

Today's Customers Journey

Customer Journey *Today's Funnel Looks Like...*



Other Key Considerations/Challenges

- Rapid Rise of Deep Fake
- Digital Identity
- Privacy/GDPR
- Risk Management
- Security



<https://youtu.be/gLoI9hAX9dw>

Other Key Considerations/Challenges

- Rapid shift in how we communicate
 - Examples: Gifs & active Emoji's in text for communication

