# FACEBOOK SENTIMENT: REACTIONS AND EMOJI

# Emoji factoids

- The word emoji does not derive from emotion

- Loan word from Japan where they originated
  - comes from *e* 'picture' + *moji* 'letter, character'.

- (Emoticon is a contraction of emotion and icon)

# Font effects – from unicode.org/emoji

| Code | Brow. | Chart | Apple | Goog<sup>d</sup> | Twtr. | One | FBM | Wind. | Sams. | GMail |
|------|-------|-------|-------|-------|-------|-----|-----|-------|-------|-------|
| U+1F600 |  |  |  |  |  |  |  |  |  |  |
| U+1F601 |  |  |  |  |  |  |  |  |  |  |
| U+1F602 |  |  |  |  |  |  |  |  |  |  |
| U+1F923 |  |  | — |  |  |  | — |  |  | — |
| U+1F603 |  |  |  |  |  |  |  |  |  |  |

# Font effects

**Dancer**

# Differences can affect emotional readings

# Differences can affect emotional readings

http://grouplens.org/blog/investigating-the-potential-for-miscommunication-using-emoji/
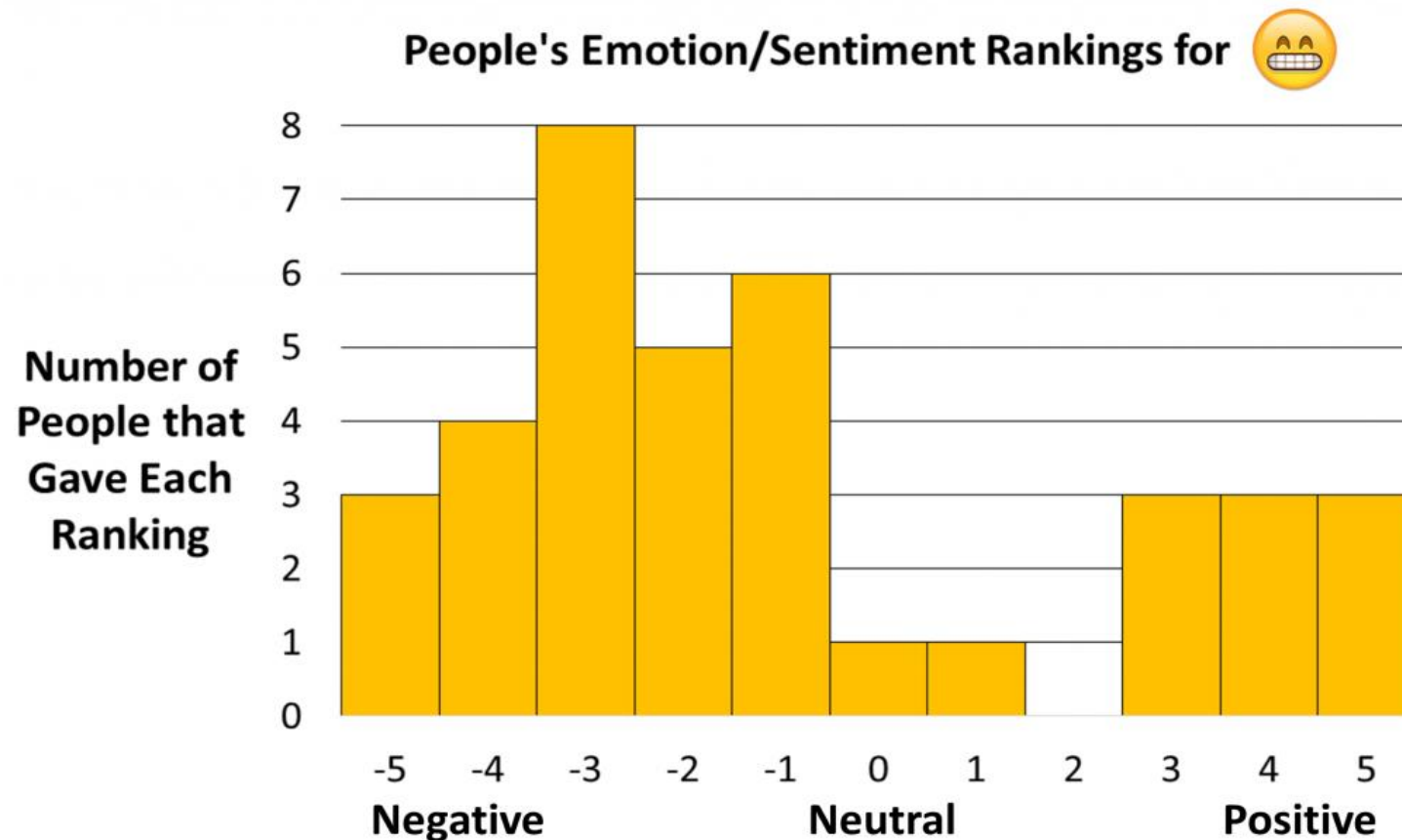
## Same Emoji + Different Smartphone Platform = Different Emotion

For example, if you send the Apple emoji to a Google Nexus, they'll see the Google emoji, and vice versa!

Apple

Samsung    Google

Microsoft    LG

-5    -4    -3    -2    -1    0    1    2    3    4    5

**Negative**
(e.g., sad, mad)

**Neutral**

**Positive**
(e.g., happy, excited)
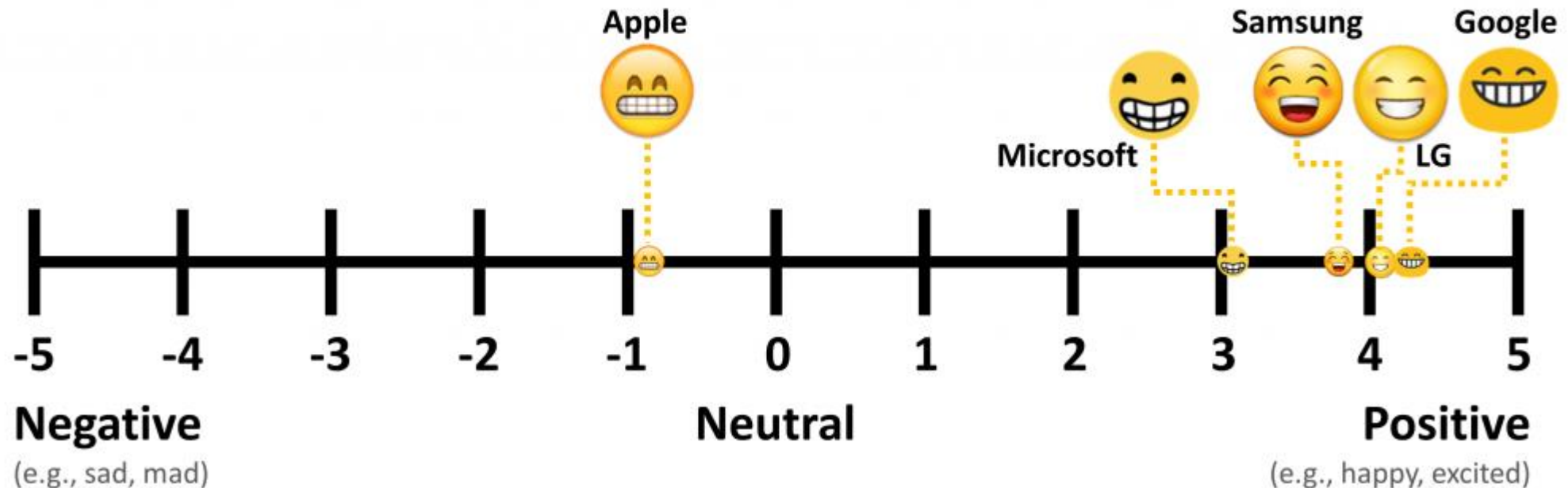
# Potential Confusion

http://grouplens.org/blog/investigating-the-potential-for-miscommunication-using-emoji/
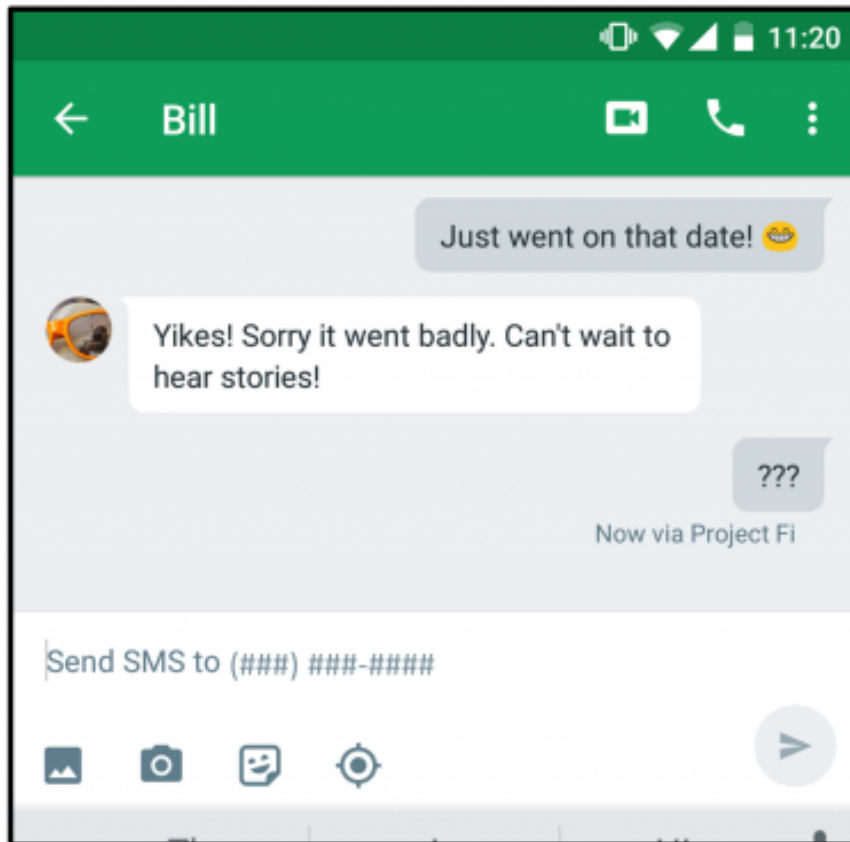
# Sometimes fonts change

Apple, old and new

Microsoft went the other way

# Giving emojis sentiment scores

Novak, P. K., Smailović, J., Sluban, B., & Mozetič, I. (2015). Sentiment of emojis. *PloS one*, *10*(12), e0144296.

- Authors collected 1.6 million tweets across 13 European languages

- Approximately 4% of the tweets contained emoji

- 83 annotators gave ratings of positive, neutral or genitive : {1, 0, -1}

- 751 emoji were used more than 5 times and given a score

- The resulting emoji score ranged between -0.6 and 0.9 with median 0.3

# Facebook reactions


Like  Love  Haha  Wow  Sad  Angry

- Current study: treating facebook reactions to posts as the overall sentiment of the user. Then look at the emoji profiles for each reaction, to evaluate emoji sentiment calculation.

- Collected reactions data from 21,000 posts on media facebook pages (e.g. BBC, CNN, Le Monde) from four countries: UK, US, France and Germany.

- "Like" is the default reaction; it accounted for 80% of the 57 million reactions

# Facebook comments

- Also collected 8 million comments to these posts.

- 6% of the comments contained emojis – higher rate than the PLOS one paper tweets

# Results - Reactions

- Overall 57,444,404 reactions, 8,463,602 comments, 15,273,365 shared.

- Likes >>> Loves > Angrys > Sads = Hahas > Wows

- Comments to reaction ratio: 0.15

- Share to reaction ratio: 0.27

- Slight but statistically significant difference in distributions by countries ($X^2(15) = 554810$, $p<2.2e\text{-}16$)
  - Angry: highest in France (9%), lowest in UK 3%)
  - Love: highest in US (6%), lowest in Germany (2%)
  - Haha: highest in Germany (6%), lowest in UK (3%)
  - No difference in Sads or Wows



Reaction
- num_angrys
- num_hahas
- num_likes
- num_loves
- num_sads
- num_wows
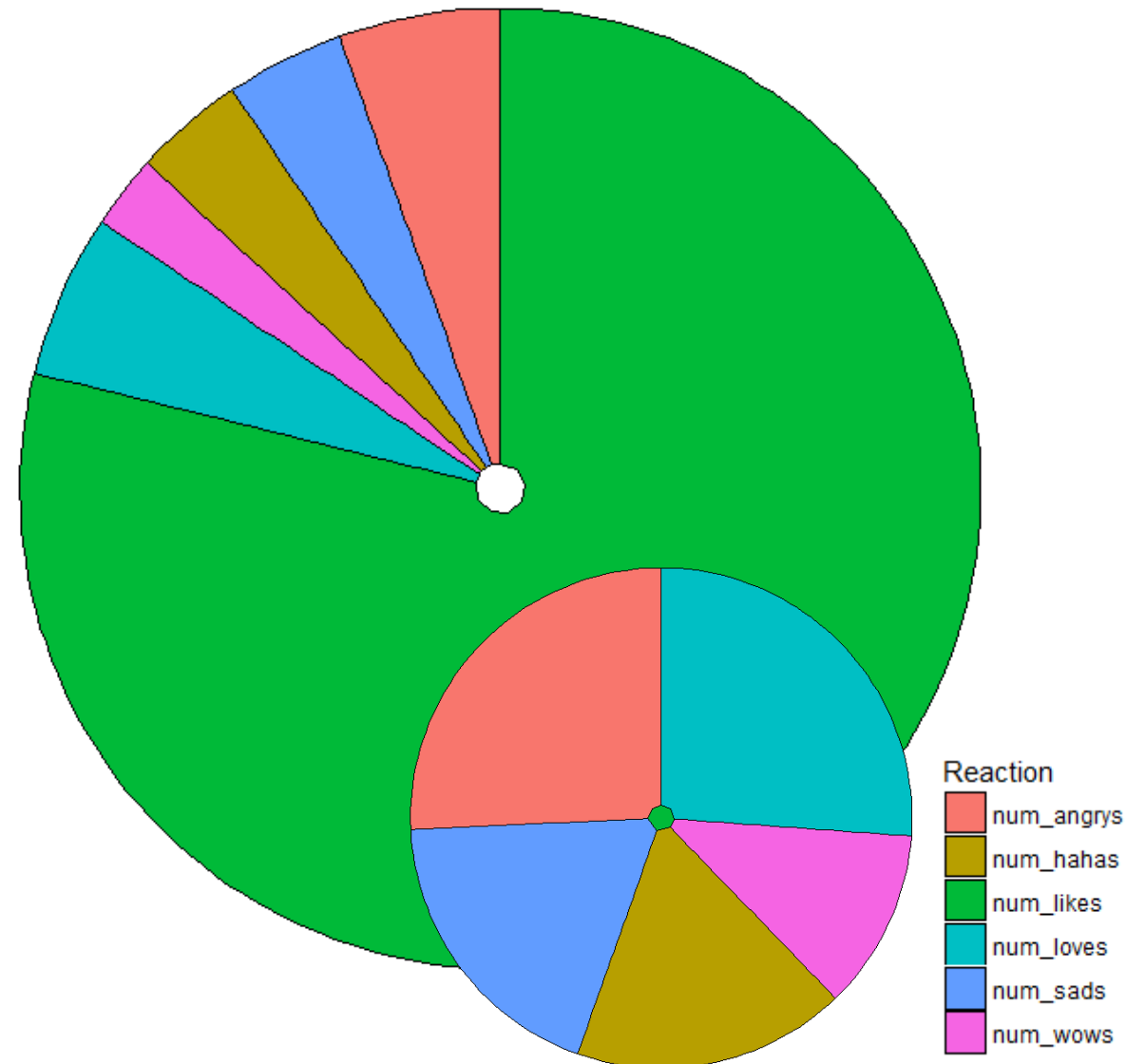
# US most active, right-wing most active (caveat apply ☺ )
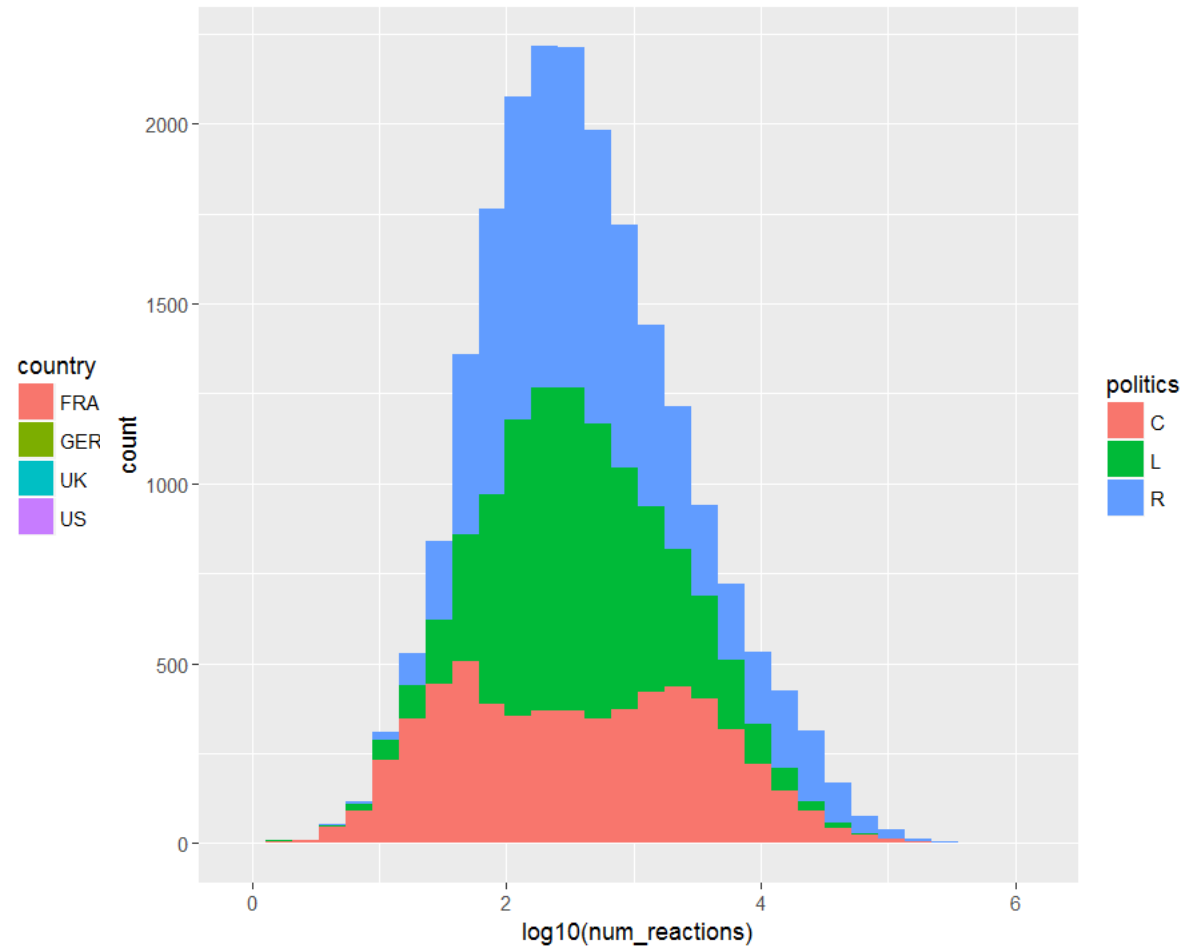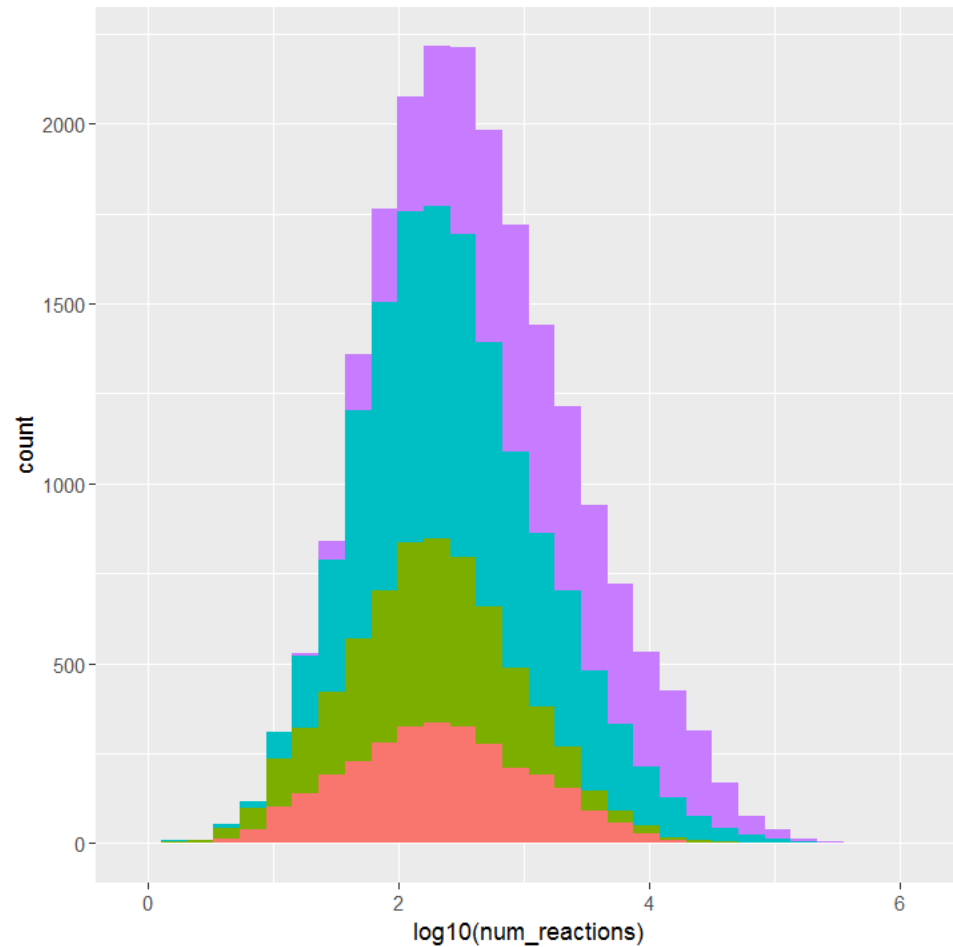
# Results - Reactions

- K-means clustering gives four clusters profiles of reactions.
- People are most likely to share the post when reacted with "anger", and least likely to share with just "likes".
- Statistically significant differences in proportions across clusters ($X^2(15)=185$, $p<2.2e-16$)



size: 4828

size: 2088

size: 943

size:  658

**Share/**
**Reaction:**   **0.16**

**0.24**

**0.33**
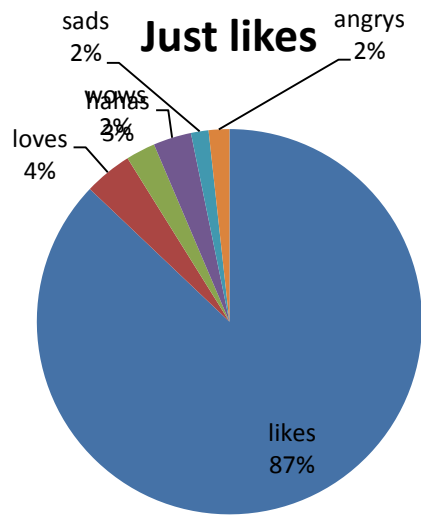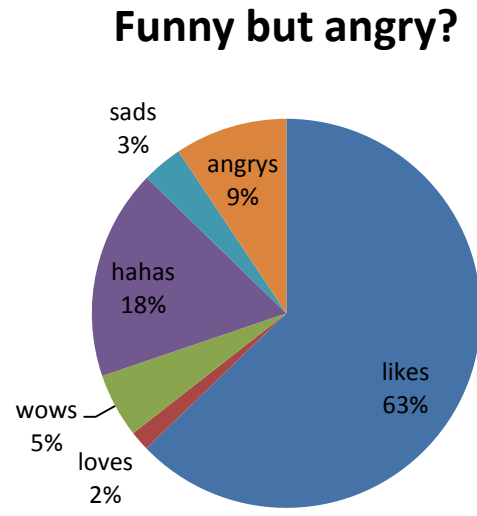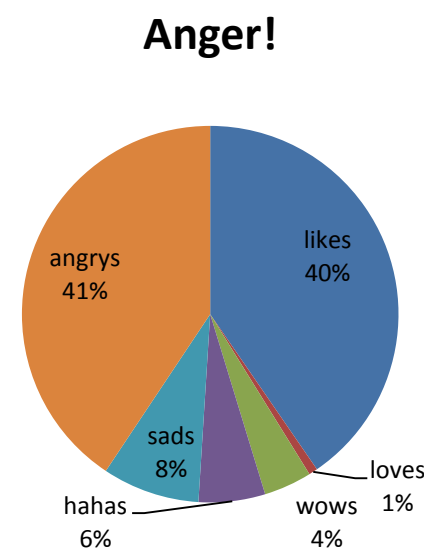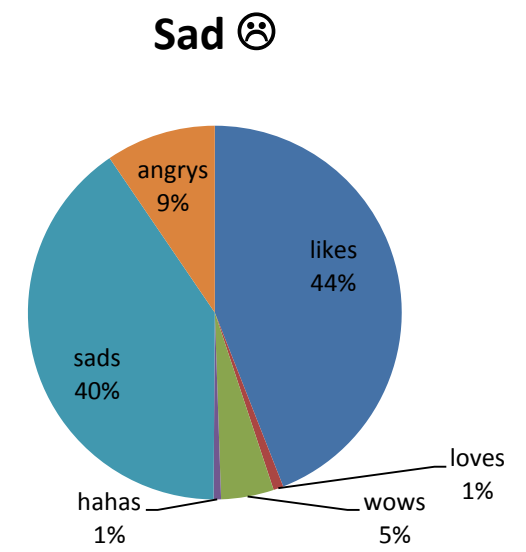
**0.24**

# Results - emoji

- We sampled 100,000 comments that contained emoji, and analysed distributions of emoji and their sentiment.

- Overall, the most frequent emoji were the following: the distribution does not have a Zipfian distribution, unlike words in natural language.
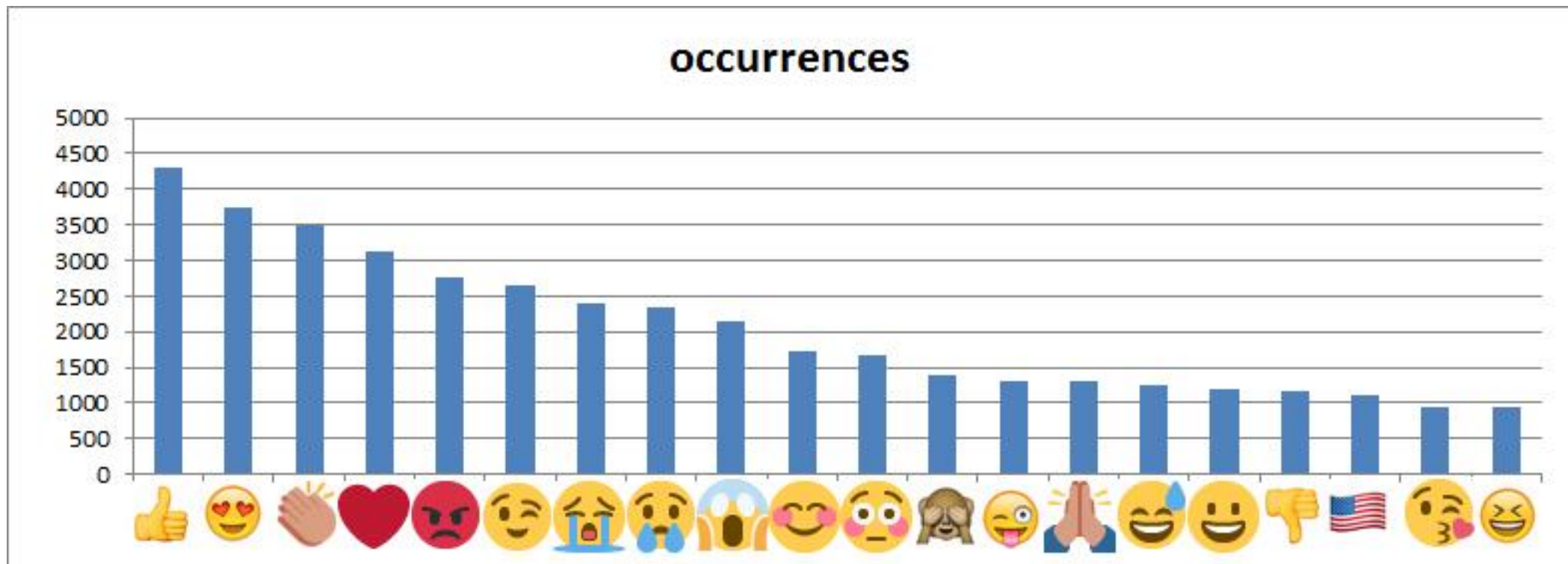
# Emoji in comments to news posts
## *different* from general emoji use

- Data from emojitracker.com, tracks twitter emoji. Laughing with tears No.1 by far.



| | | | | | | |
|---|---|---|---|---|---|---|
| 😂 1464536963 | ❤️ 656462986 | 💌 620754303 | 😍 564477827 | 😭 421360312 | 😊 414935922 | 😔 405147848 |
| 😜 331178034 | 💕 330601127 | 😌 305350214 | 😩 302471401 | 👌 287035839 | 😪 254581355 | 😏 245349478 |
| 😁 239160035 | ♻️ 199172275 | 😞 170822267 | 👍 159397552 | 🙏 155043377 | 😒 154019751 | 〽️ 143409001 |
| 😳 140357183 | 🙌 135949070 | 😢 135421685 | 😎 133391569 | 🙈 131915216 | 👀 131524412 | ✌️ 129038544 |
| 😅 126115518 | ✨ 118434238 | 💔 116908481 | 💜 114474898 | 😴 113989834 | 😀 113365768 | 💯 113233083 |
| 😐 110017251 | 💖 109901075 | 💙 108864587 | 😕 102166548 | 😝 99366737 | 😟 99128615 | 👧 96373615 |
| ⬅️ 95270646 | 😊 95019716 | 😑 91785046 | 😓 91414365 | 👏 89070681 | 💞 88365753 | 💗 85683604 |
| 💓 85099030 | 👳 78237873 | 💋 76858612 | ✋ 76510993 | 👉 75225876 | 🌸 72926204 | 🔥 71885179 |
| 😱 71566206 | 😈 68766996 | 😡 66562848 | 📷 63694379 | 🌹 62515462 | 🎉 62186336 | 😃 61930820 |
| 😫 60630730 | 👊 60380523 | 💀 59242621 | 😛 58456168 | 💪 57910775 | 💛 55859801 | 🌞 54469789 |
| 🌑 54227137 | 😤 53940833 | 😄 53620651 | 😥 51891383 | ✔️ 50364488 | 😻 50217523 | 👇 50162802 |

# Results – Emoji by country

- However, different countries use different emoji:
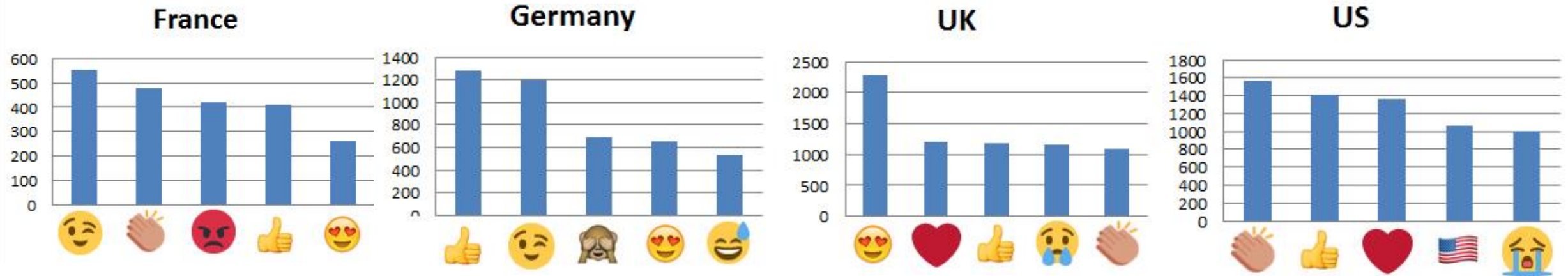
# Results – Emoji by politics

- The distribution of emoji is also different by political stance:
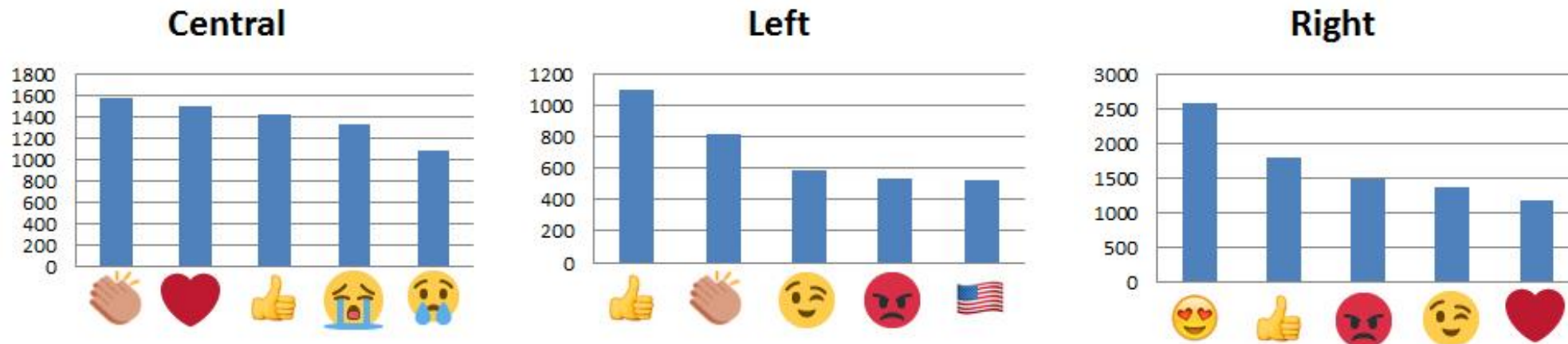
# Results – Emoji vs. Reactions

- Are distributions of emoji different in different reaction profiles? Yes!
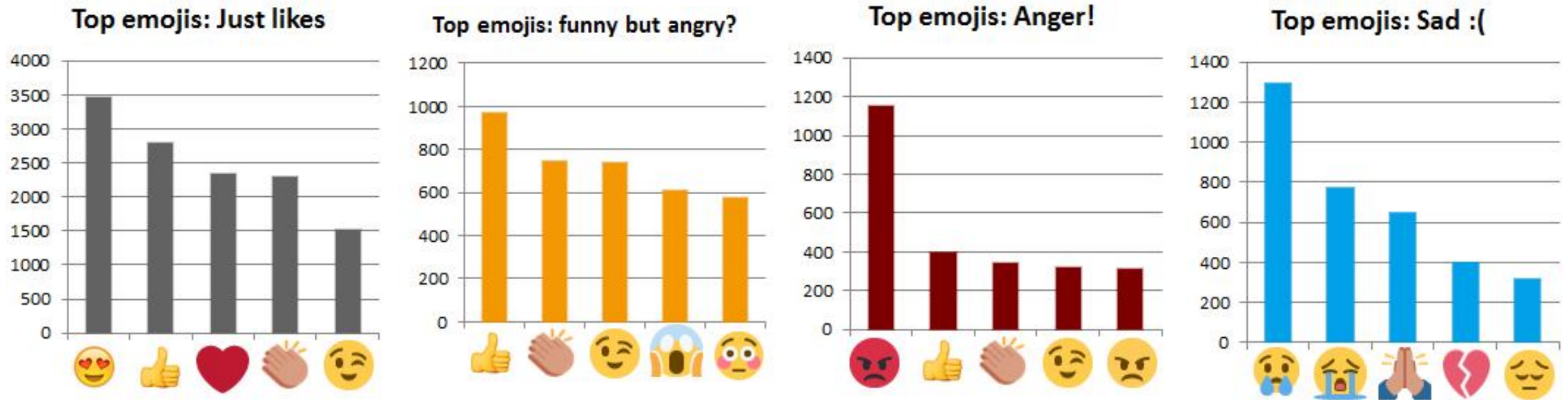
# Results – emoji sentiment

- Using the sentiment score complied for emoji by Novak et al. (2015), we calculated the average emoji-based sentiment score for each posts.

- In each comment containing emoji, the score is calculated as

- $\sum_{1}^{n}(Log(occurrences\ of\ emoji_i)+1)\ *\ sentiment\ score\ of\ emoji_i$

- So that, for example, three hearts in one comments do not count to have three times the sentiment of comments containing only one heart.

- Then the average sentiment for a post is the mean of sentiment of comments (based on emoji) to this post.

# Results: emoji sentiment vs. reactions



**Top emojis: Just likes**
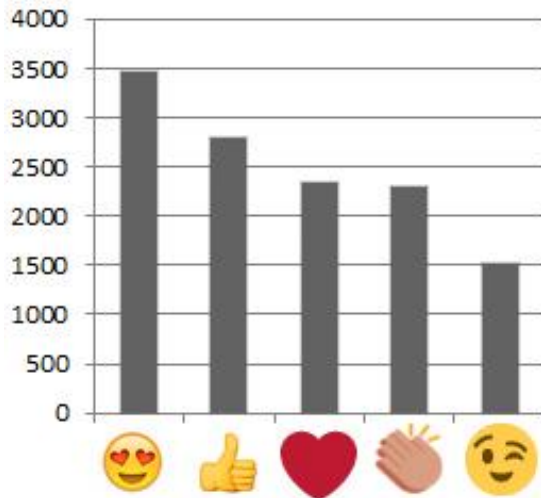
**Top emojis: funny but angry?**

**Top emojis: Anger!**
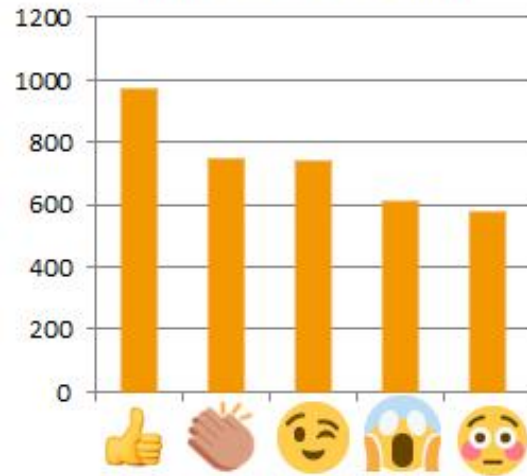
**Top emojis: Sad :(**
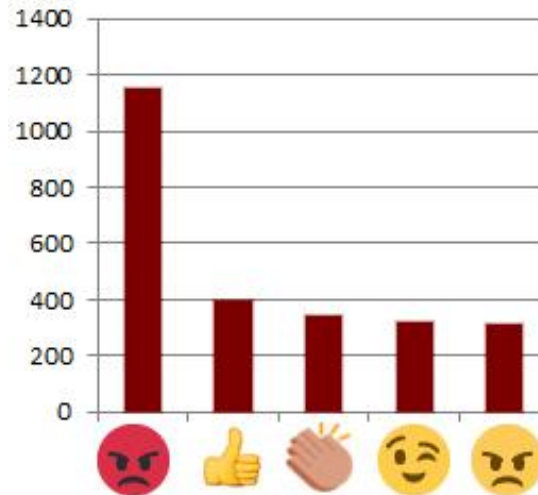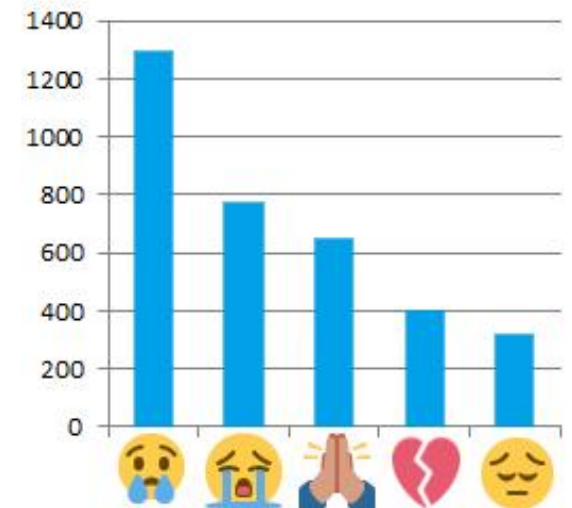
Sentiment
Score:    0.41          0.34          0.24          0.24

# Results: emoji sentiment vs. reactions

- We can see that the average emoji based sentiment score for cluster 3 (angry dominant) and cluster 4 (sad dominant)  are lower than cluster 1 and 2.

- However, the difference is not pronounced, and the emoji based sentiment score for cluster 3 and 4 are still positive. Why?

# Emoji and sentiment

Why is it that in posts with frequent angry reactions and sad reactions still have positive sentiment scores from comments emoji?

- Positive emoji still frequently used in comments relating to angry and sad reaction profiles.

- Positive emoji are sometimes used NOT to express positive emotion, but for politeness. E.g. a smiley face can be used to soften a criticism/ disagreement
  - I don't think you are right ☺

- While negative emoji tend to indicate the global sentiment of the text, positive emoji can have a more local effect, e.g. recognizing something as ridiculous while overall feeling negative.

- Also, positive emojis may often be used ironically, while negative emojis are not (or rarely) used ironically.

# Emoji and sentiment

- Why is it that the average sentiment of profiles 1 is not much higher than profiles 3 and 4?

- Novack et al. (2015) scored sentiment using texts *containing* emoji rather than emoji by themselves.

- While this is a good approach to obtain the overall sentiment of texts containing emoji, it does not separate emotion expression versus politeness uses of positive emoji.

- Therefore, the Novack et al. (2015) sentiment score for, e.g. a smiley face, is likely lower than the perceived sentiment of a smiley face used purely to express emotions.

# Conclusions:

- The current study studied Facebook reactions and emoji in comments to news pages in US, UK, France and Germany.

- Reactions: "like" most frequently (being default, plus the rest recently introduced). Slightly differences across countries and political stances

- However, people are more likely to share when the reaction is something other than "like" >> stronger emotional reaction leads to more sharing

- Four reaction profiles: "Just likes", "Funny but angry?", "Anger!", "Sad ☹". The first cluster is the most frequent.

# Conclusions:

- Emoji: the most frequently used emoji in comments to news posts are DIFFERENT from general uses >> less personal conversations, more discussions.

- Emoji frequencies, unlike words in natural language, do not follow Zipf's law. >> the senses of emoji overlap more than that of words?

- Emoji distribution significantly different in different REACTION profiles. >> if we treat reaction as the overall sentiment, this suggest that emoji are good indicators of users' sentiment.

- However, sentiment score calculated based on Novak et al. (2015) showed less differentiation (low but still positive scores in "Anger!" and "Sad ☹" clusters, not much higher score in the other two).
  - We suggest this is to do with positive emoji sometimes used for politeness reasons or ironically, and the methods of Novak et al. do not address this issue.