



# Not All Moods are Created Equal!

## Exploring Human Emotional States in Social Media

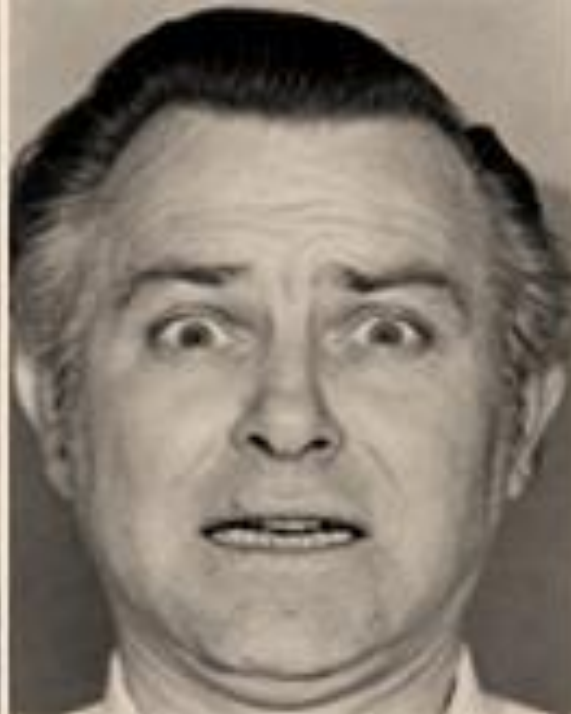
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[Ekman, 1973]



anger



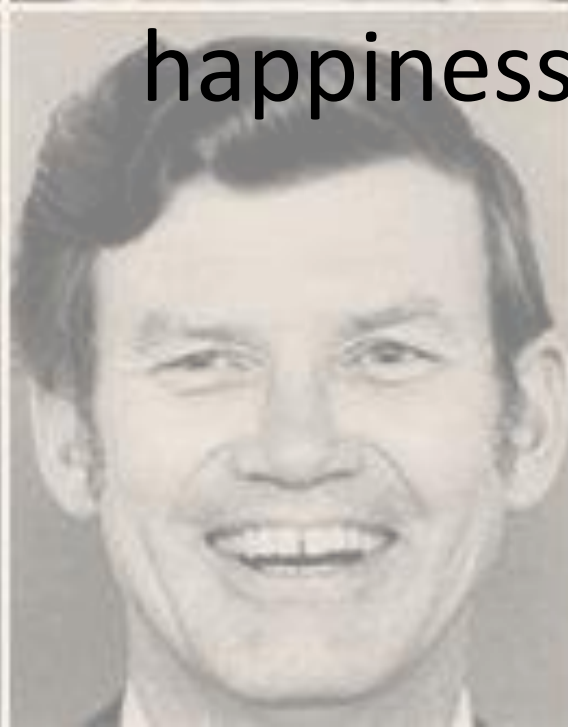
fear



disgust



surprise



happiness



sadness



# What are moods, after all?

Moods are complex psychophysiological experience of an individual's state of mind as interacting with biochemical (internal) and environmental (external) influences [Kleinginna et al., 1981]







ICWSM 2012



Twitter is a powerful  
tool to measure our  
emotional  
experiences





# Our Goal

Understand the mood landscape on social media, in the light of individuals' behavioral and social attributes





What has been  
done?

## ■ Affect and behavioral analysis in social media

- Prediction of mood levels in LiveJournal [Mishne, 2006]
- Examining positive and negative mood trends on Facebook – Gross National Happiness [Kramer, 2010]
- Analysis of mood trends in light of a variety of social, political and economic events discussed on Twitter [Bollen, 2011]
- Analysis of temporal mood variation on Twitter across seasons and culture [Golder & Macy, 2011]



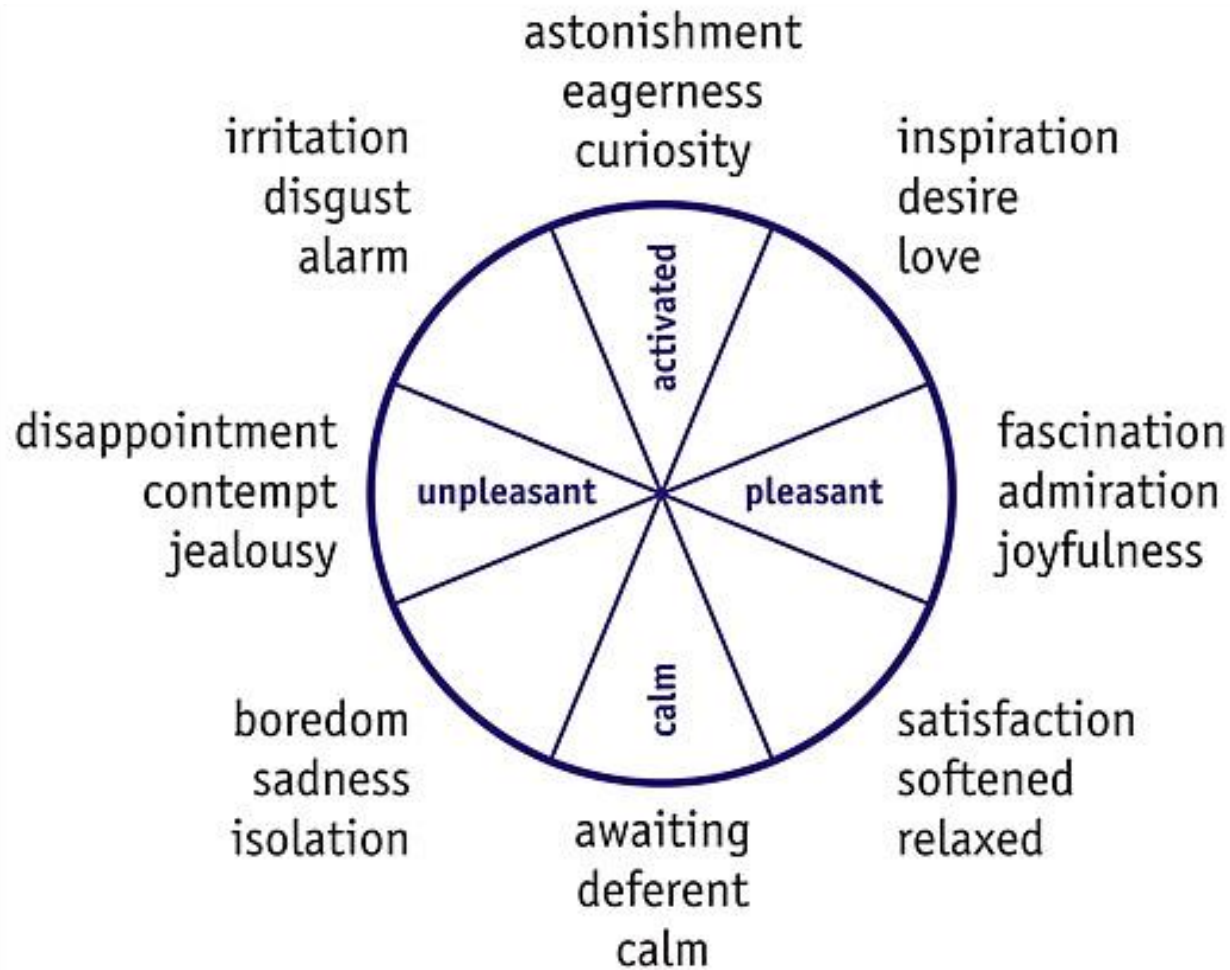
Positive and  
Negative Affect are  
**not enough**

## ■ Emotion and human behavior studies in psychology

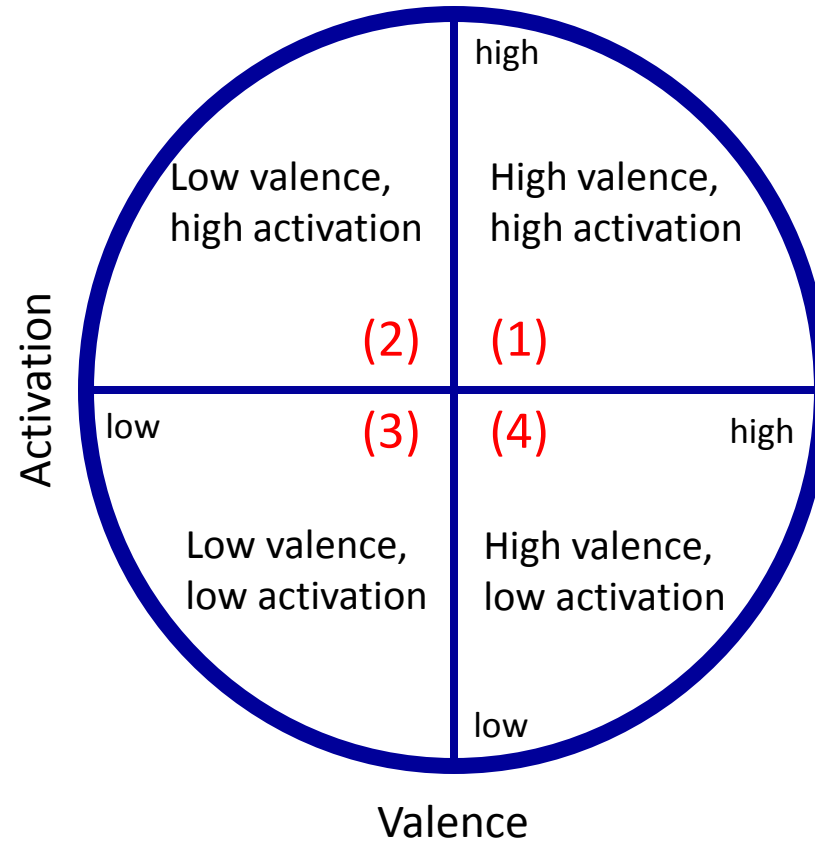
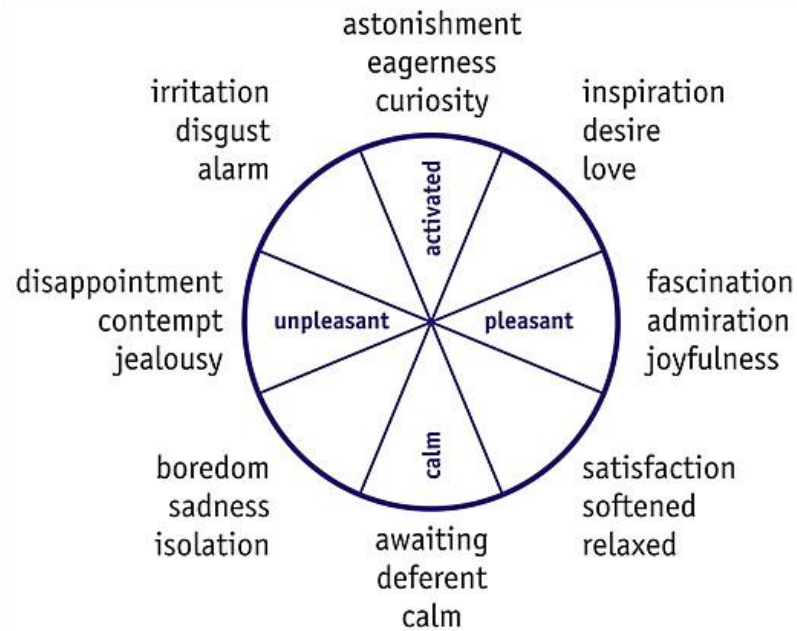
- Study of facial expressions of emotions [Ekman, 1973]
- **Profile of mood states (POMS)** [Pollock, 1979]
  - anxiety, depression, anger, fatigue, vigor, confusion
- **PAD emotional state model** [Mehrabian, 1980]
  - Pleasure-displeasure, arousal-nonarousal, dominance-submissiveness
- **Circumplex** of valence and arousal [Russell, 1980]



# Circumplex model - [Russell, 1980]



# Circumplex model



Valence dimension measures how pleasant a mood may be.  
Activation dimension measures the intensity of a mood.



But what are  
representative  
moods?

# Identifying human moods

- Various psycholinguistic sources:
  - ANEW, Affective Norms for English Words [Bradley and Lang, 1999]
  - LIWC (Linguistic Inquiry and Word Count) <http://www.liwc.net>
    - Sentiment indicative categories: positive / negative emotions, anxiety, anger and sadness
  - List of basic emotions by [Ortony and Turker, 1990]
  - Emotion Annotation and Representation Language (EARL) dataset
  - List of moods from the blogging website LiveJournal





# Crowdsourcing study:

Rated 203 moods for their valence and activation



# Data

## Hashtags and emoticons as indicators of sentiment [Davidov et al., 2010]

	<b>Scott Franklin</b> @LifeOfChemistry 2h There was an alarm clock somewhere in the house that went off at 6.30am and nobody answered it. #grumpy #tired Expand
	<b>Krystle Sherrell</b> @KrystleSherrell 1h I cannot wait until Friday! My daddy, uncle, @chooks30 & @theREALeli_ will be here!!!! #excited Expand
	<b>Bria Jones</b> @JonesSodaaa 5m I wish I had telekinetic powers because I would totally float a piece of cake up to my room from the kitchen right now. #lazy Expand
	<b>Jeff Gordon</b> @JeffGordonWeb 6h Hope everyone has a great Memorial Day. Thanks to all of our service men & women. Freedom is ours because of your sacrifice. #grateful Expand
	<b>Kimmy Cakes</b> @kmr386 22 May NEVER use @BlueWhaleMovers. A box of \$400 worth of pots & pans was stolen from me & I have yet to receive a call-back about it! #infuriated Expand

#grumpy

#excited

#lazy

#grateful

#infuriated



But do hashtagged  
mood words *really*  
indicate user's  
emotional state?



- Another crowdsourcing study utilizing Amazon's Mechanical Turk interface
  - Multiple choice question (yes/no) to rate whether the hashtagged mood indicated the user's actual emotional state
  - Majority rating used as final decision (Fleiss Kappa 0.68)
- 83% accuracy / against 58% in naïve mood spotting exercise

	<b>Re'Jnae ( Ree-Nay ]</b> @_KingsQueen_ 5h I woke up wishing it was football Sunday! Please please please let football season hurry up back! <a href="#">#Anxious</a> Expand
	<b>Nia Hypnotherapy</b> @NiaHypnotherapy 2h <a href="#">#Feeling</a> <a href="#">#anxious?</a> You are not <a href="#">#alone</a> <a href="http://niahypnotherapy.co.uk/Anxiety(220031...">niahypnotherapy.co.uk/Anxiety(220031...</a> Expand

English tweets; Nov 1, 2010 – Oct 31, 2011; 10.6M tweets, 4.1M users





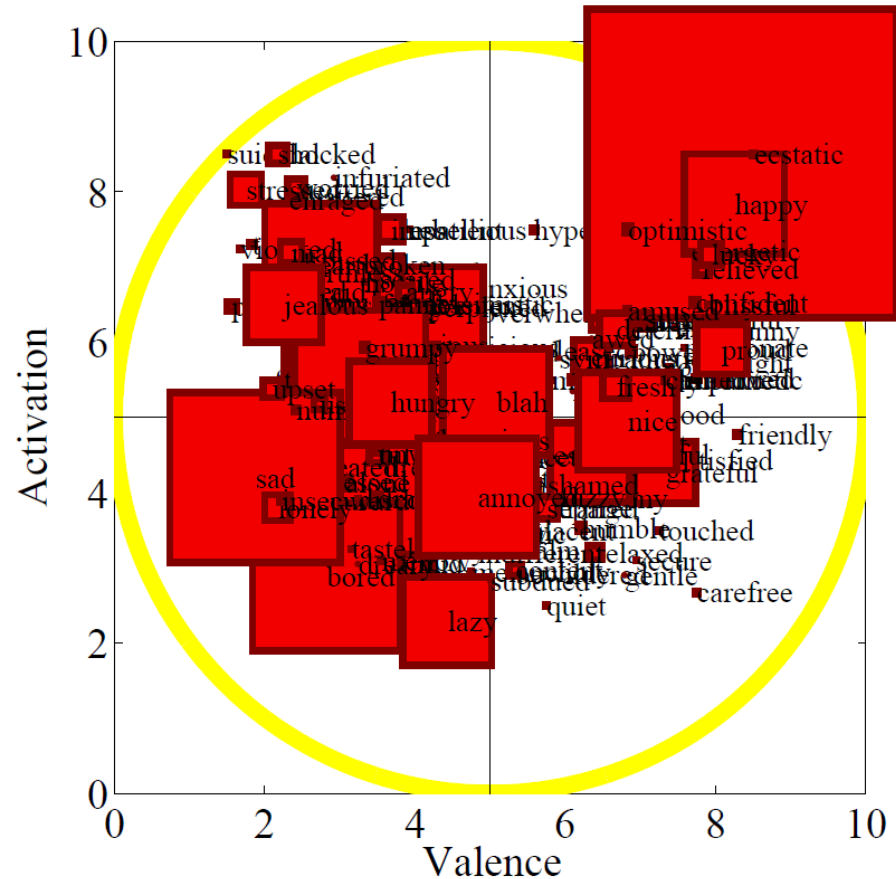
How do we make  
sense of our  
collective behavior  
from these moods?



# Study I

# How do people share moods?

- Negative, low to moderate activation moods are most used
- A few positive, high activation moods also show considerable usage
- Broadcasting bias?



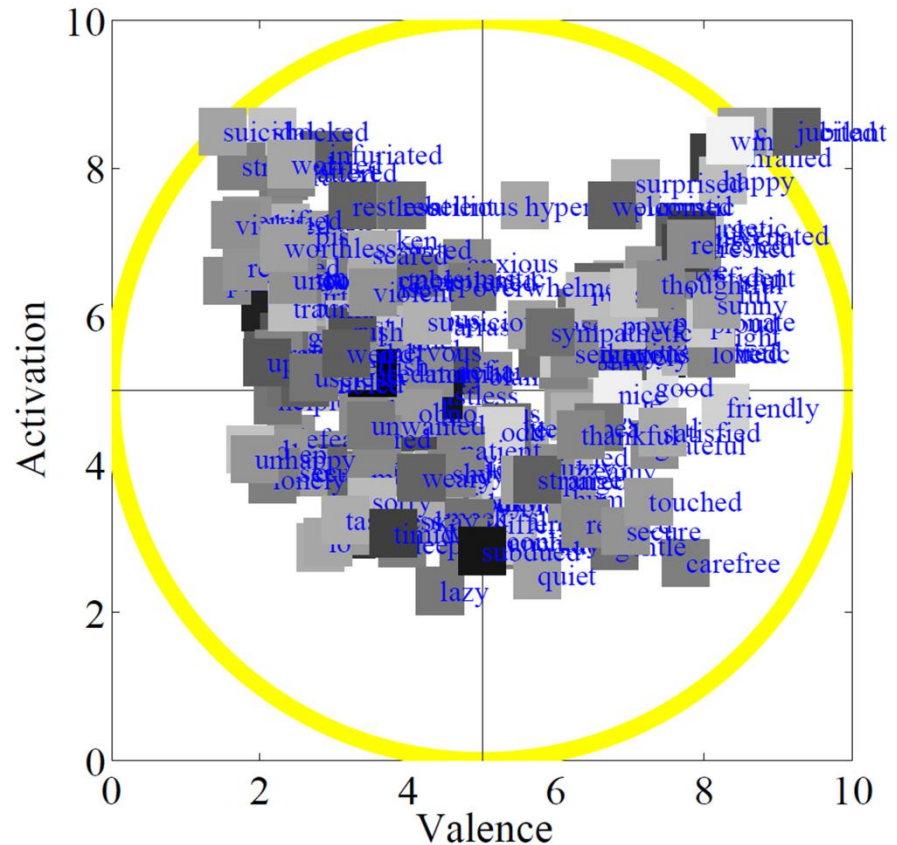


Individuals tend to  
express more negative  
and low intensity moods  
in social media



# How do people share moods?

- Linguistic entropy associated with mood usage
- Positive moods tend to be used in a wide variety of linguistic contexts
- Negative moods tend to be associated with fewer limited contexts





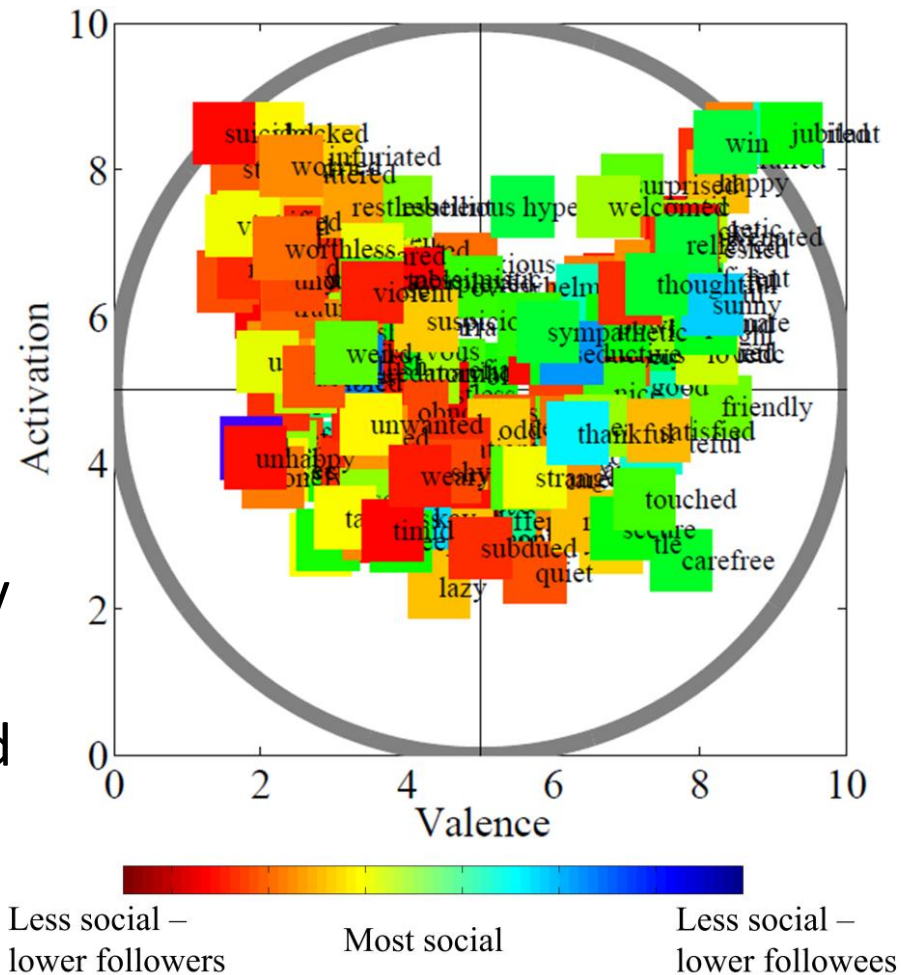
Happy moods span over  
many topical contexts



# Study II

# Are more social people happier?

- Positive moods appear to be used by individuals whose sociality ratio is  $\sim 1$
- Negative moods tend to be from individuals with sociality ratio  $\ll 1$
- Individuals with sociality ratio  $\gg 1$  (aka, celebrities) show limited mood expression







More social, more active  
individuals tend to be  
happier

[Averill, 1976; Clark et al., 1988]



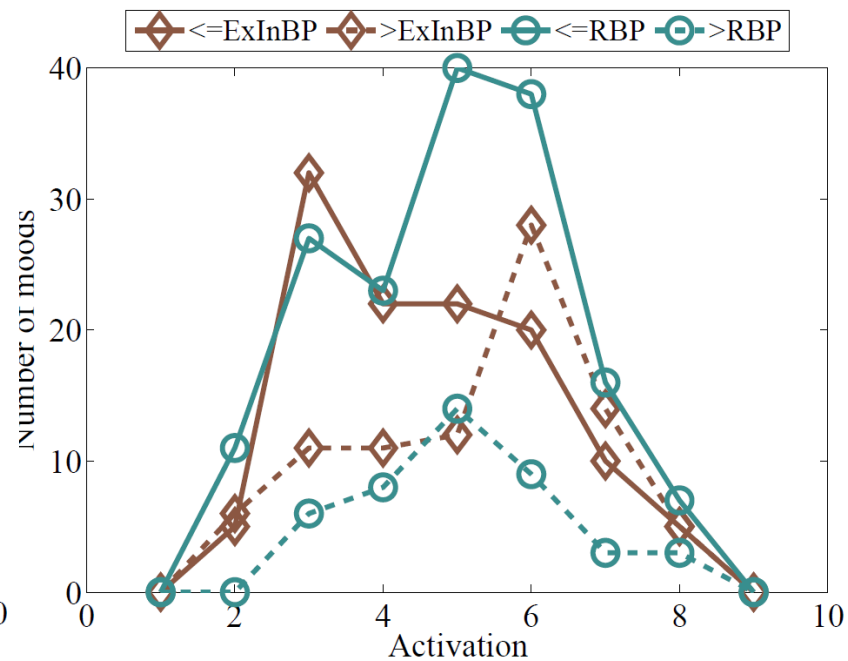
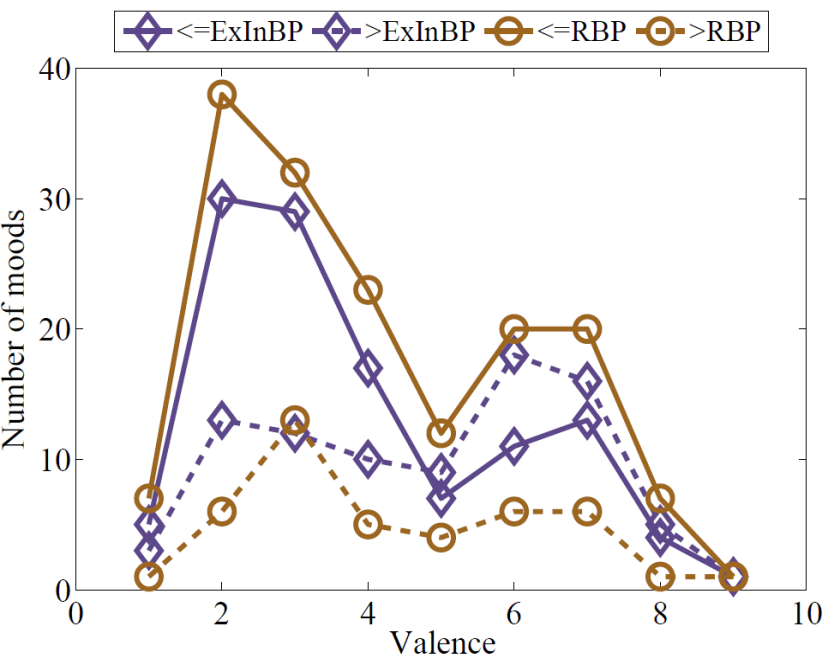


# Study III

# How does social engagement relate to moods?

- Social engagement measures through
  - External information sharing/propagation (via links)
  - Conversational interaction (via @-replies)
- We intend to compare
  - Mood expression in link bearing/@-reply posts, with reference to the background probability of link occurrence/@-reply in any post
  - These experiments will reveal to what extent any mood is shared in a post with a link/@-reply, compared to posts that do not contain mood

# How does social engagement relate to moods?





Information sharing  
bears more positivity 😊

[Lykken, 2000]



# Conversations are less emotional!

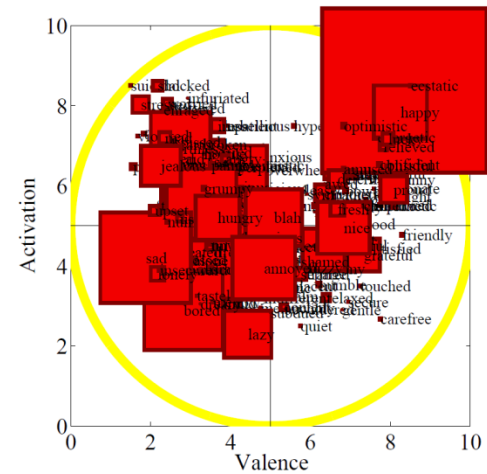
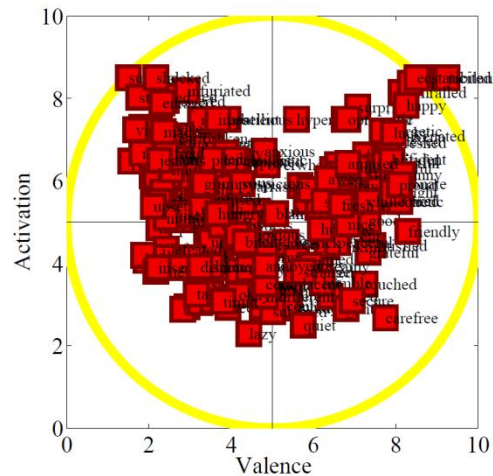
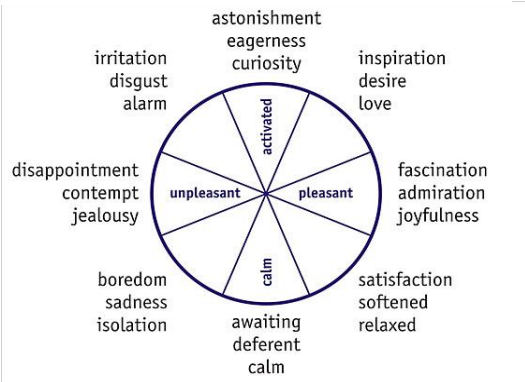
contradicts prior observations?  
[Buck, 1984; Mehl et al., 2010]



# Conclusions



- More than 200 moods studied in the context of social media
- At-scale study to understand how mood dynamics of individuals relate to their behavioral and social attributes
- Insights into existing conceptualizations of human moods, in social media contexts





... and tweet away your *moods*!

Also Microsoft Research feature article: [bit.ly/TwMoods](http://bit.ly/TwMoods)

# Thanks!

Questions and concerns?

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