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# SOCIAL NETWORK VISUALIZATION



## Research Review

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**Christopher G. Healey**

Department of Computer Science

North Carolina State University

[healey@ncsu.edu](mailto:healey@ncsu.edu)

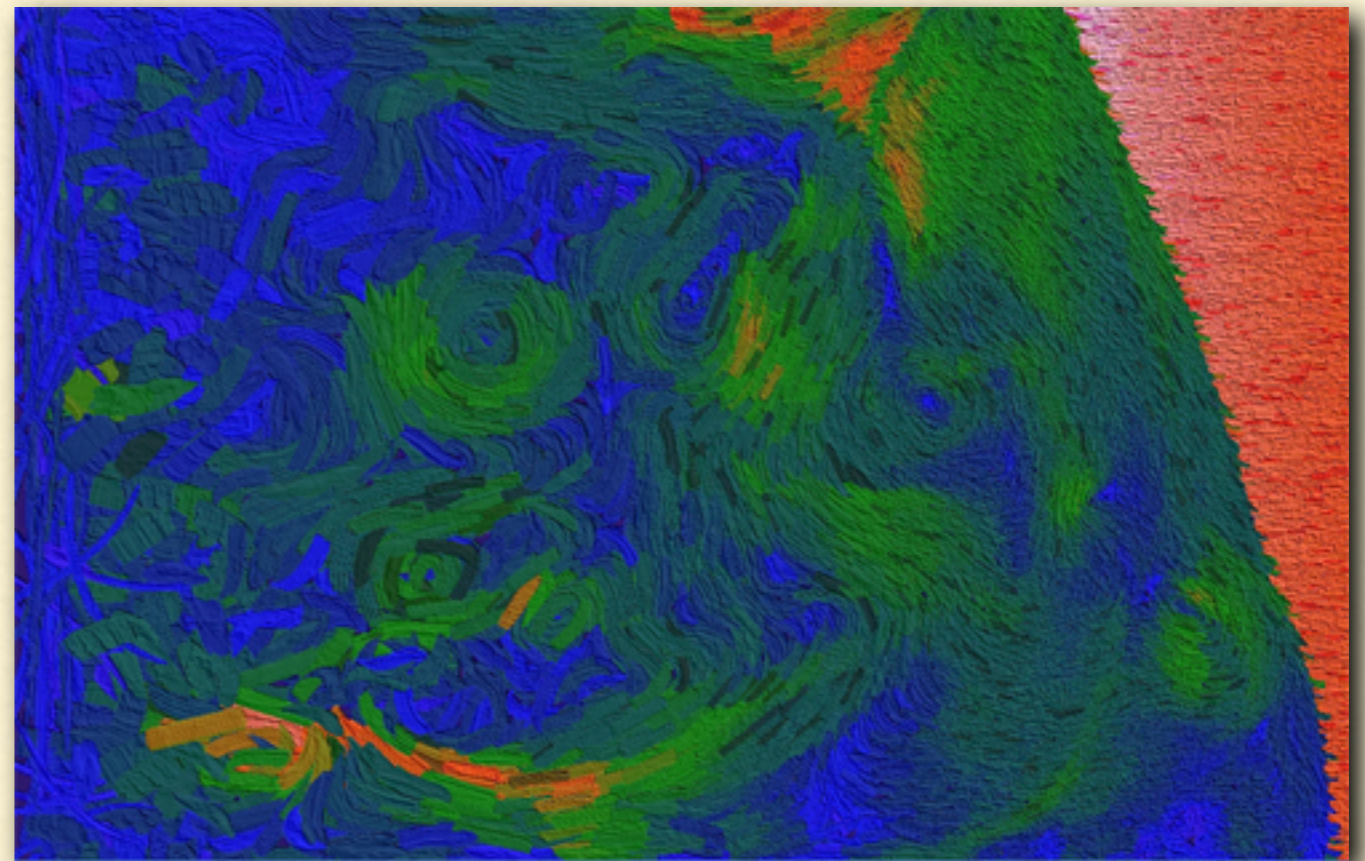
<http://www.csc.ncsu.edu/faculty/healey>

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# PERCEPTUAL VISUALIZATION

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- Harness human visual system
- Layer data in “intelligent” ways
- Direct focus of attention
- Avoid perceptual blindness
- Build “optimal” visualizations semi-automatically



Painterly visualization of a slice through a simulated supernova collapse: *pressure* → luminance, *velocity* → hue, *flow direction* → orientation

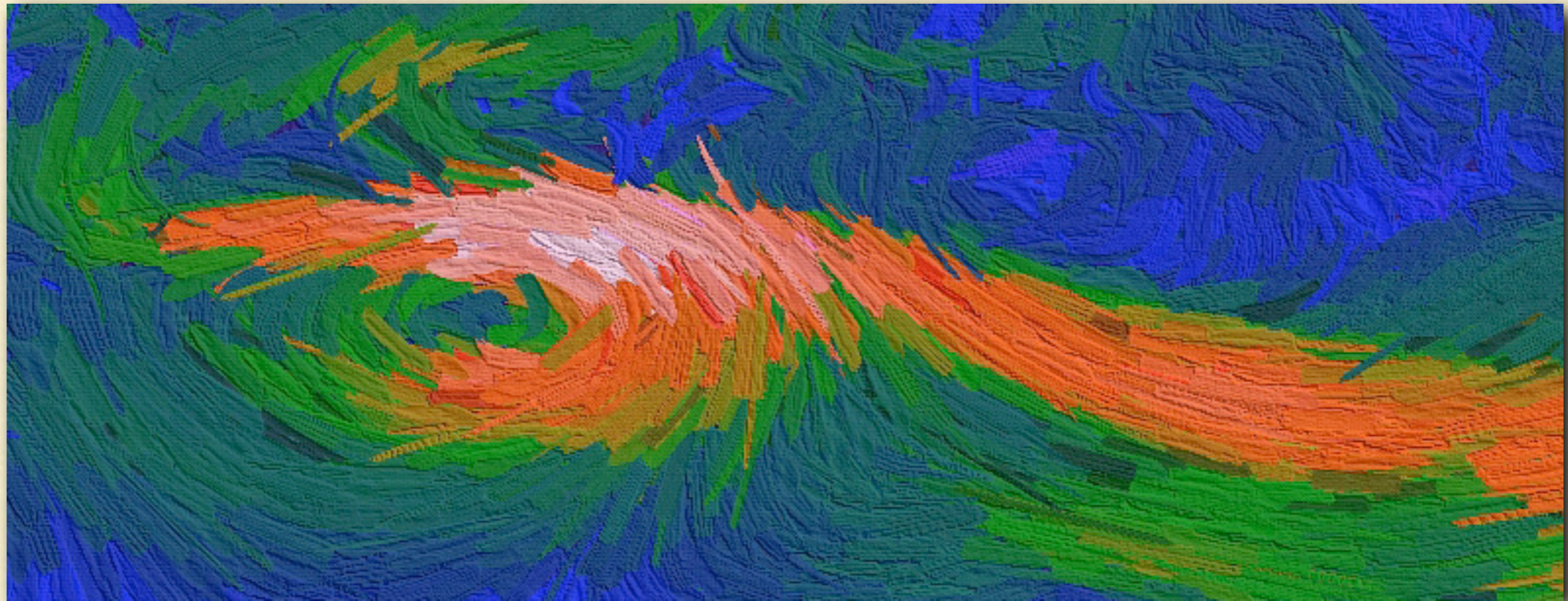
Data courtesy Dr. Jon Blondin, Astrophysics, NCSU

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# PAINTERLY VISUALIZATION

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Painterly visualization of a slice through a simulated supernova collapse:  
*pressure* → luminance, *velocity* → hue, *flow direction* → orientation

Data courtesy Dr. Jon Blondin, Astrophysics, NCSU

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# ENSEMBLE VISUALIZATION

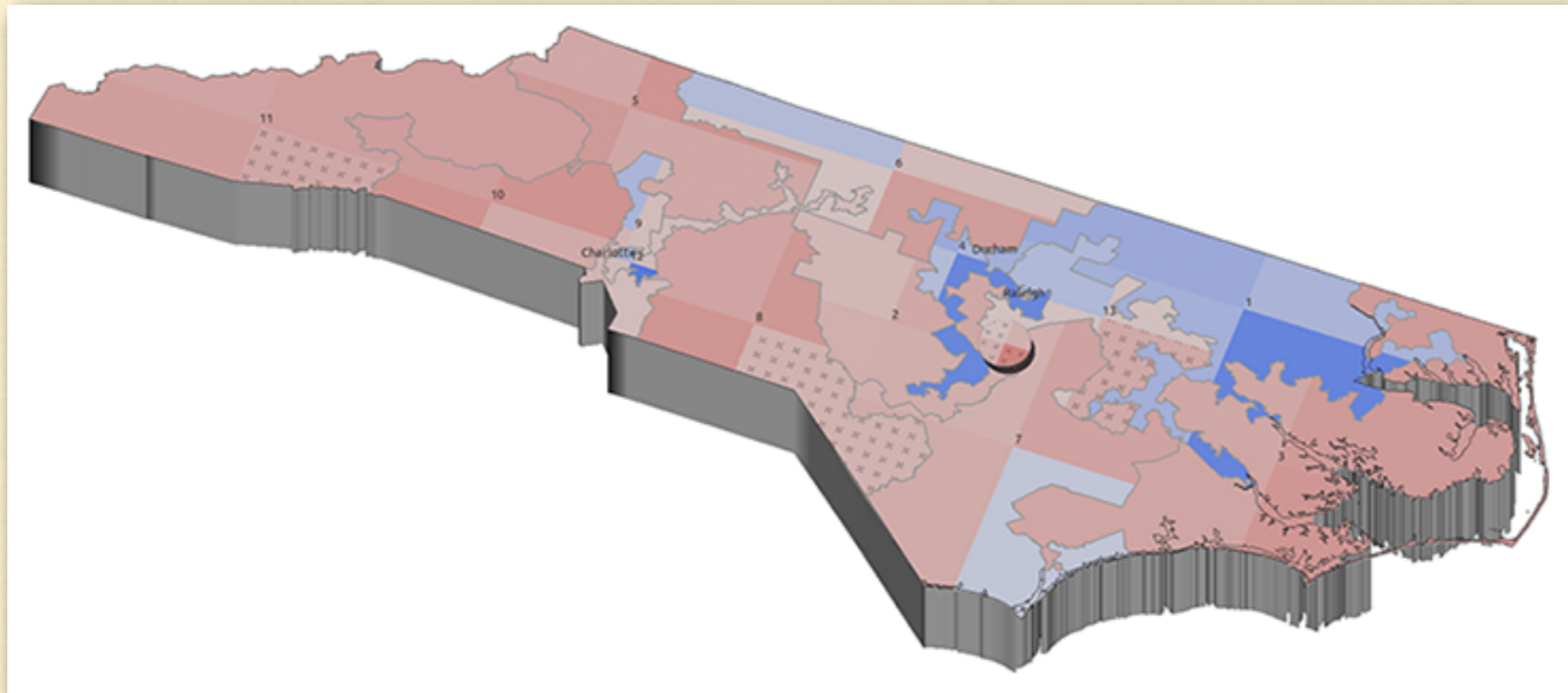
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Visualization of relativistic gold-on-gold collision:  
*pressure* → luminance, *velocity* → hue, *flow direction* → orientation

Data courtesy Dr. Steffen Bass, Nuclear Physics, Duke University

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# ELECTION VISUALIZATION



Visualization of voting patterns for President, U.S. Senate, U.S. House, and state Governor elections:  
*winning party* → hue, *winning percentage* → saturation, *incumbent loss* → texture, *electoral college votes* → height

[http://www.csc.ncsu.edu/faculty/healey/US\\_election](http://www.csc.ncsu.edu/faculty/healey/US_election)

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# CHANGE BLINDNESS

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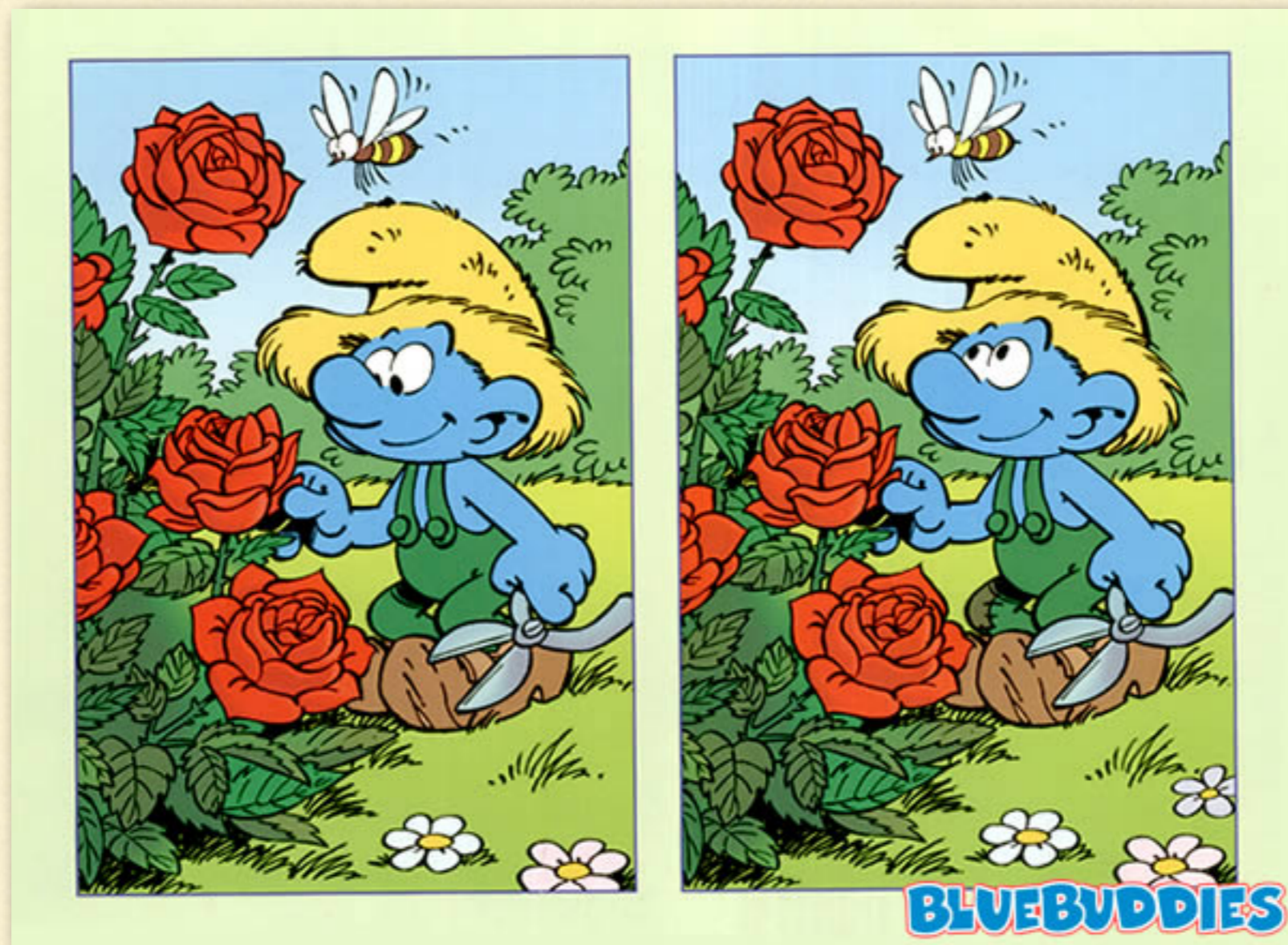
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# CHANGE BLINDNESS

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# FIND FIVE DIFFERENCES

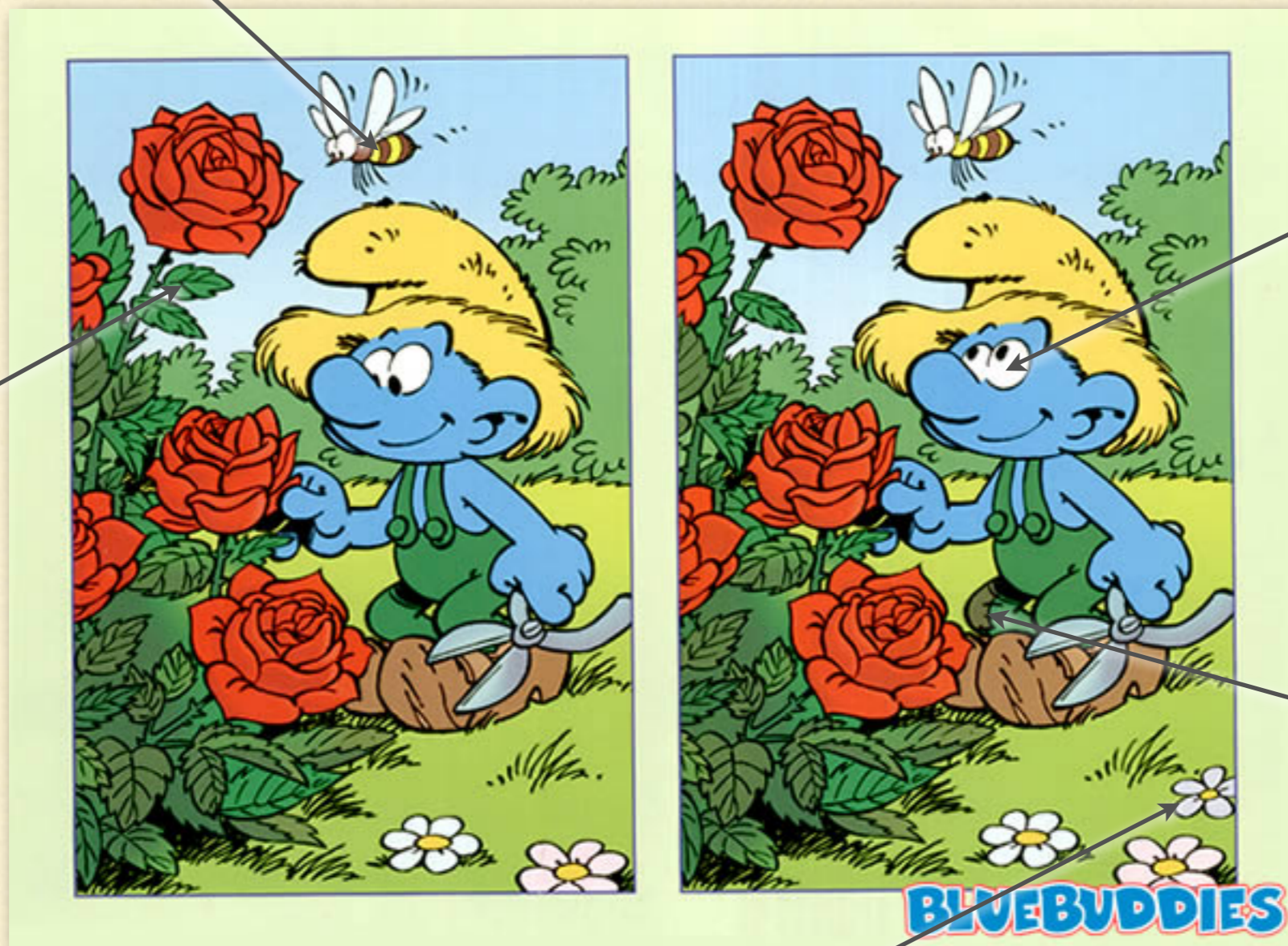




# FIND FIVE DIFFERENCES

bee's stripe colours reversed

extra leaf



eyes tilted up

patch on knee

extra flower

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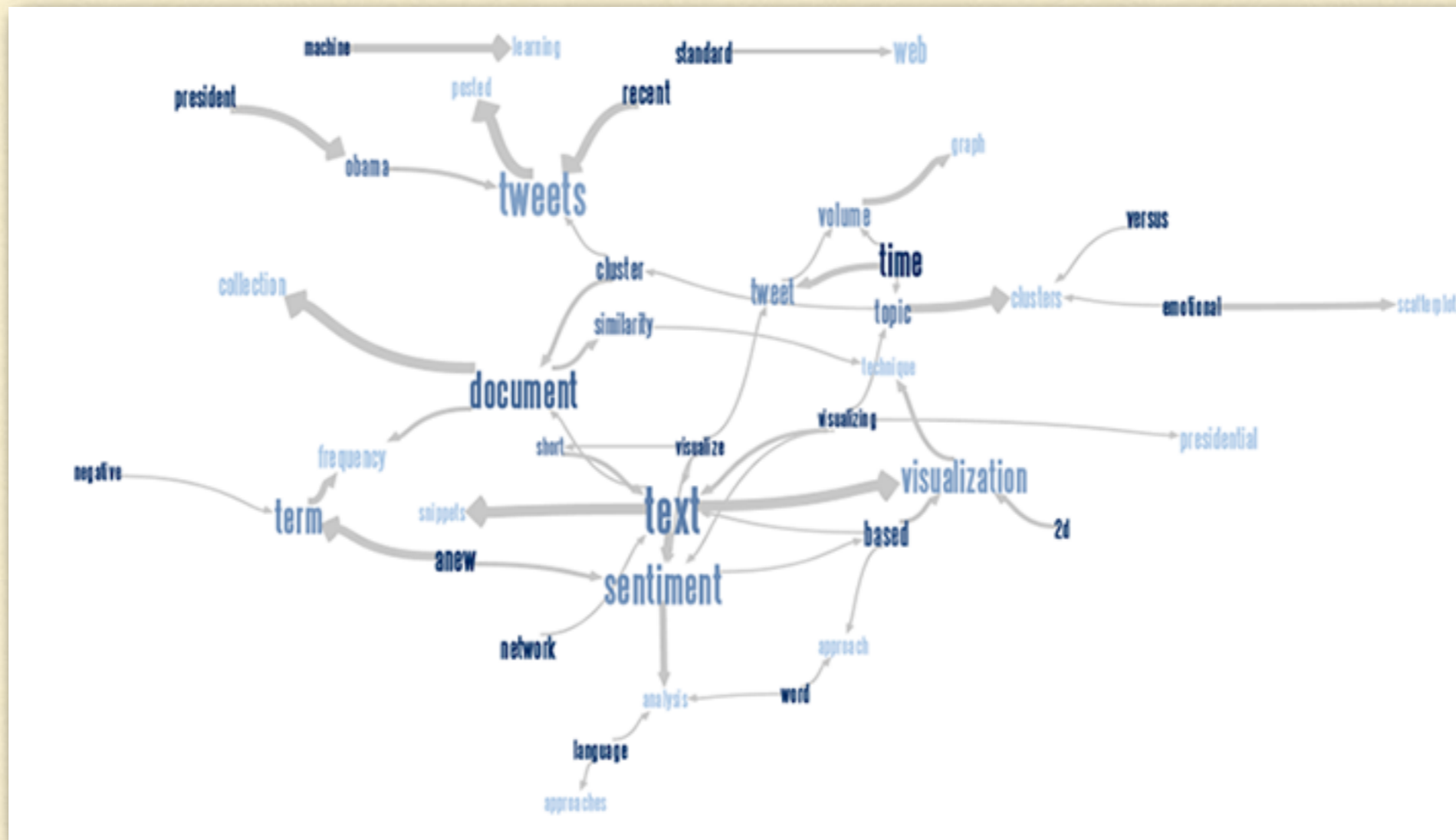
# MOTIVATION

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1. Visualizing short text snippets
    - Facebook wall posts, SMS text messages, tweets
  2. Estimating and visualizing sentiment
    - Emotional scatterplot, topic clusters, overview+detail volume graph
  3. Web-based visualization
    - Distribution to the general public
  4. Twitter
    - Popular social network
    - Timely perspectives on world events
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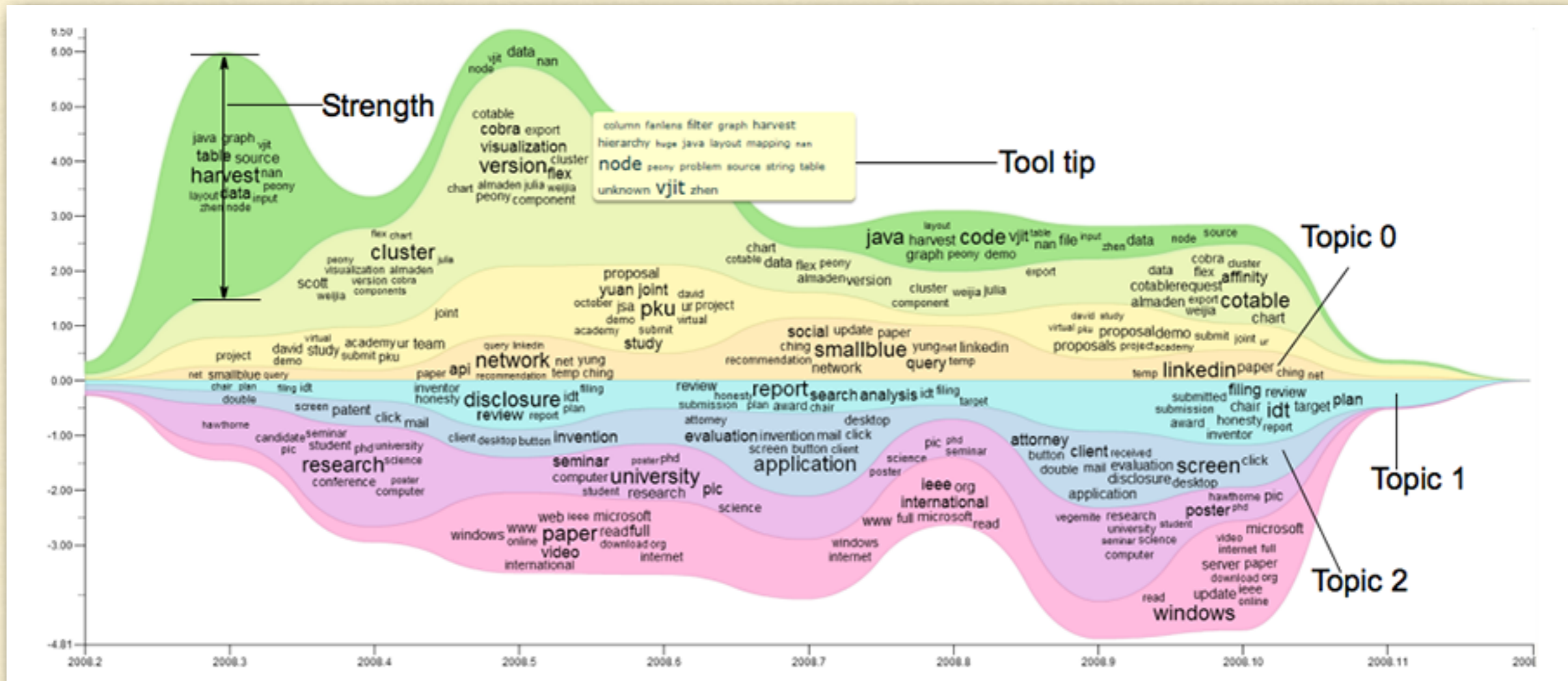
# PHRASE NET



Phrase net: *term frequency* → size, *links* → neighbour relationship

<http://www-958.ibm.com/software/analytics/manyeyes/>

# THEME RIVER



Interactive, topic-based visual text summarization and analysis.  
S. Liu, M. X. Zhou, S. Pan, W. Qian, W. Cai, and X. Lian. CIKM '09, pp 543–552.

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# SENTIMENT

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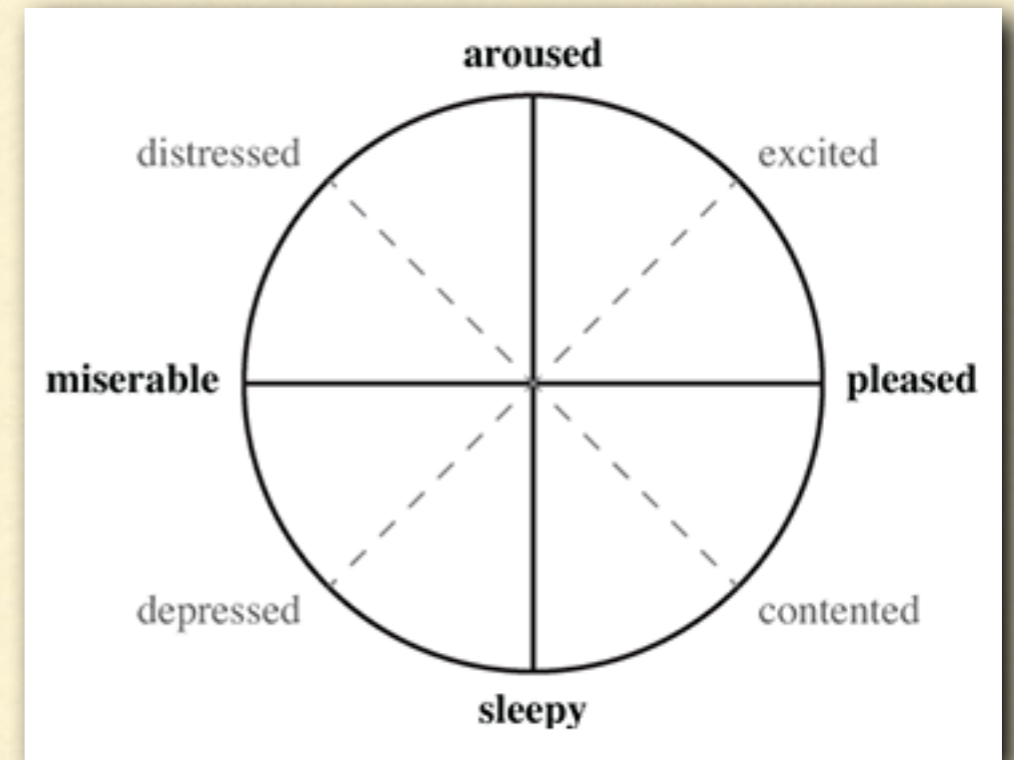
- “An attitude, thought, or judgment prompted by feeling”
  - Natural language processing (NLP) approaches
    - Subjectivity classification, machine learning, semantic orientation
  - Sentiment dictionaries
    - Profile of mood states (POMS): tension–anxiety, depression–dejection, anger–hostility, fatigue–inertia, vigor–activity, confusion–bewilderment
    - Affective Norms for English Words (ANEW): valence, arousal, dominance
    - SentiStrength: 298 positive terms, 465 negative terms, support for social network text
    - SentiWordNet: Sentiment scores for WordNet synsets
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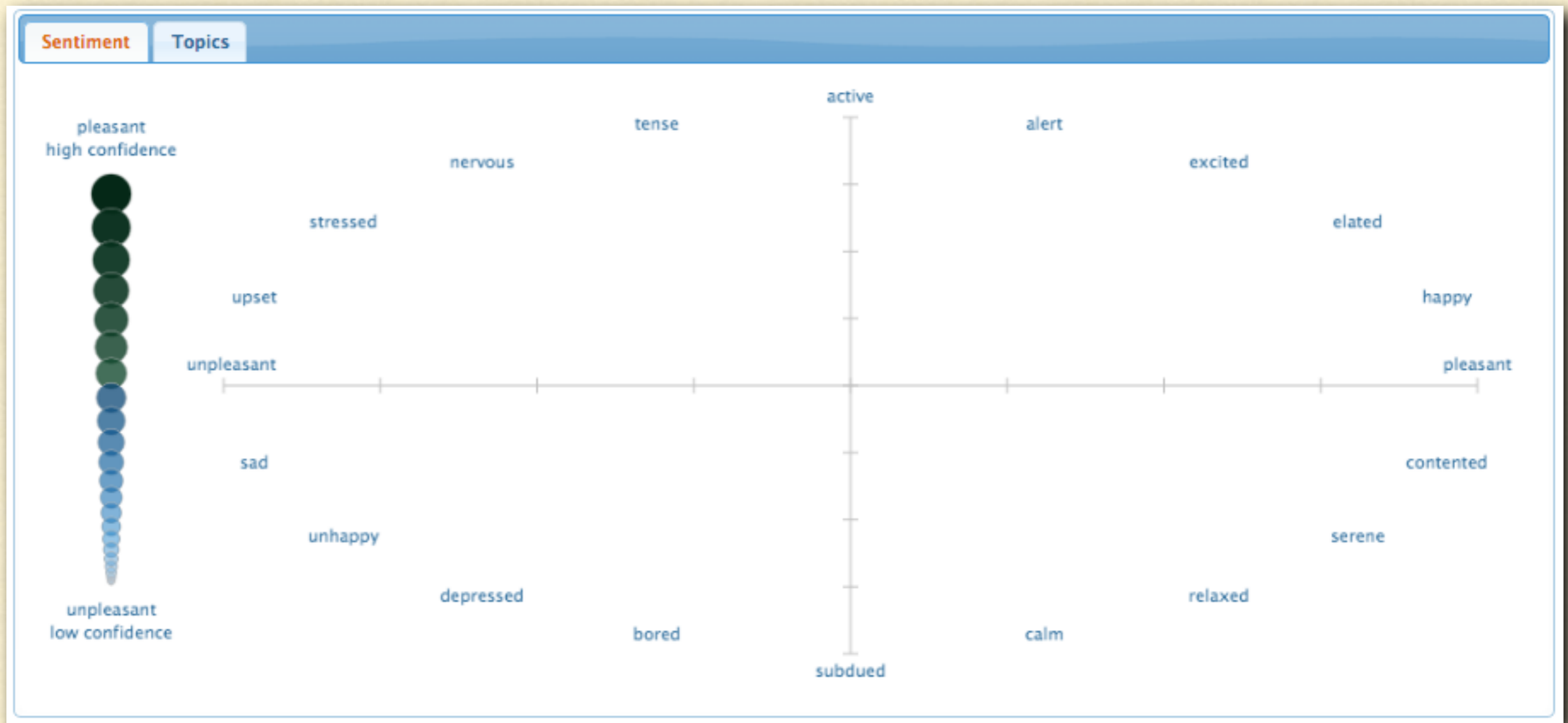
# EMOTIONAL SCATTERPLOT

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- Psychological models of emotion
  - Russell's emotional circumplex, with orthogonal valence and arousal axes
- Emotional scatterplot
  - 2D scatterplot with valence and arousal as horizontal and vertical axes
  - Intermediate regions indicate emotions like upset, stressed, nervous, tense



# EMOTIONAL SCATTERPLOT



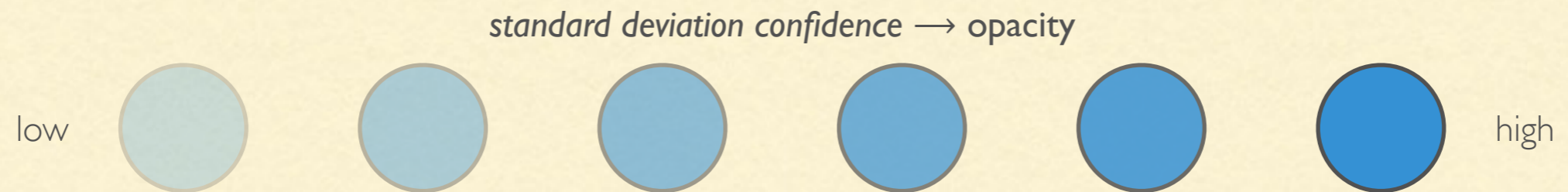
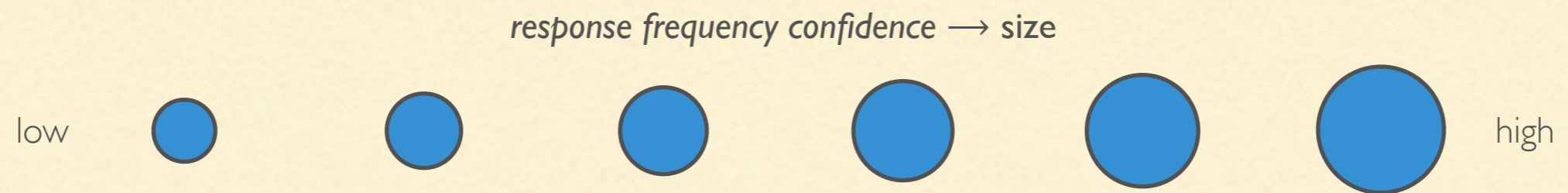
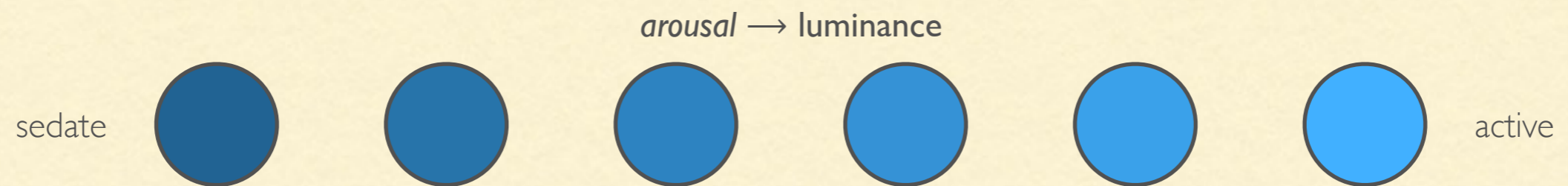
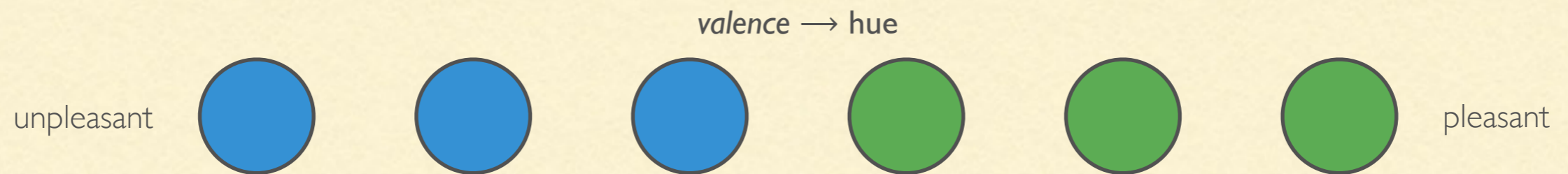
Emotional scatterplot: *valence* → X-axis, *arousal* → Y-axis



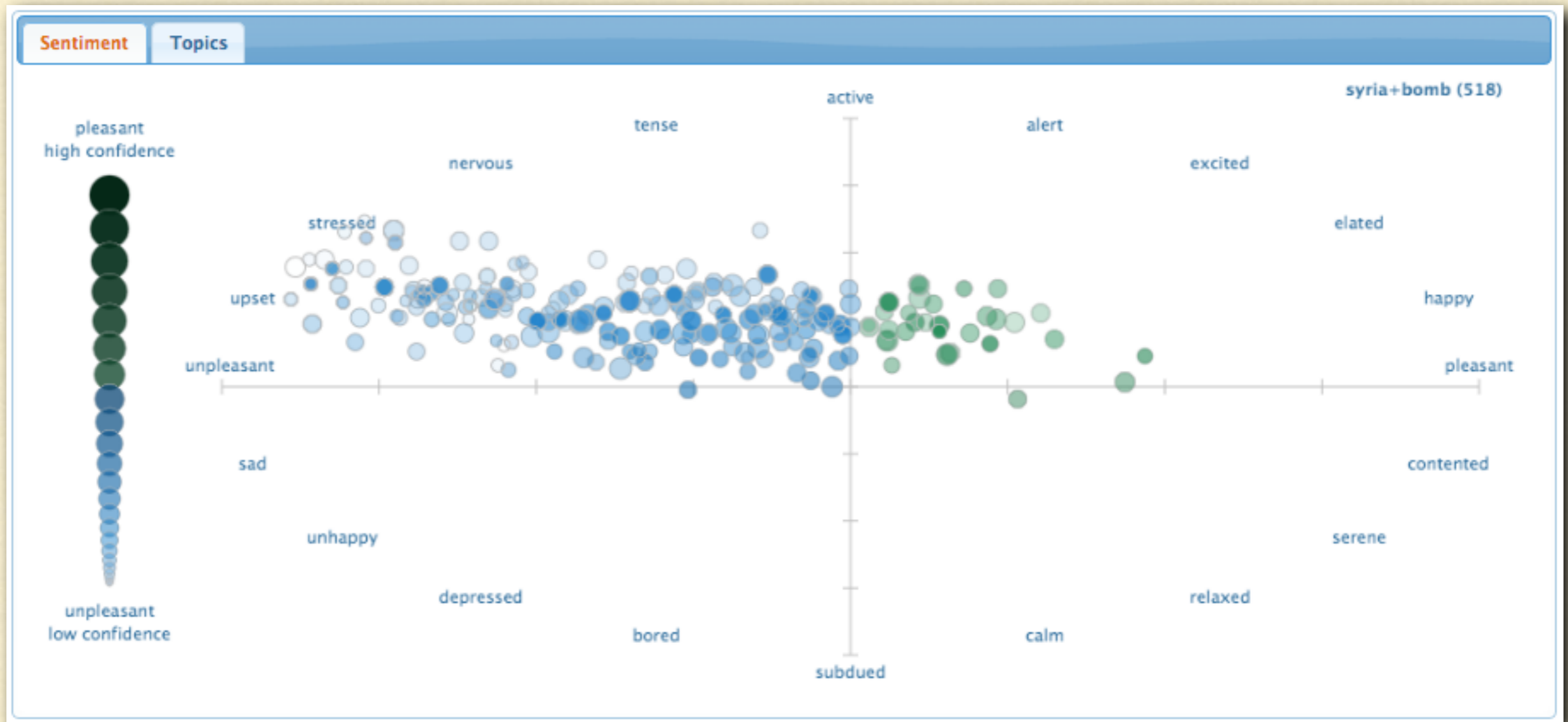
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# TWEET GLYPHS

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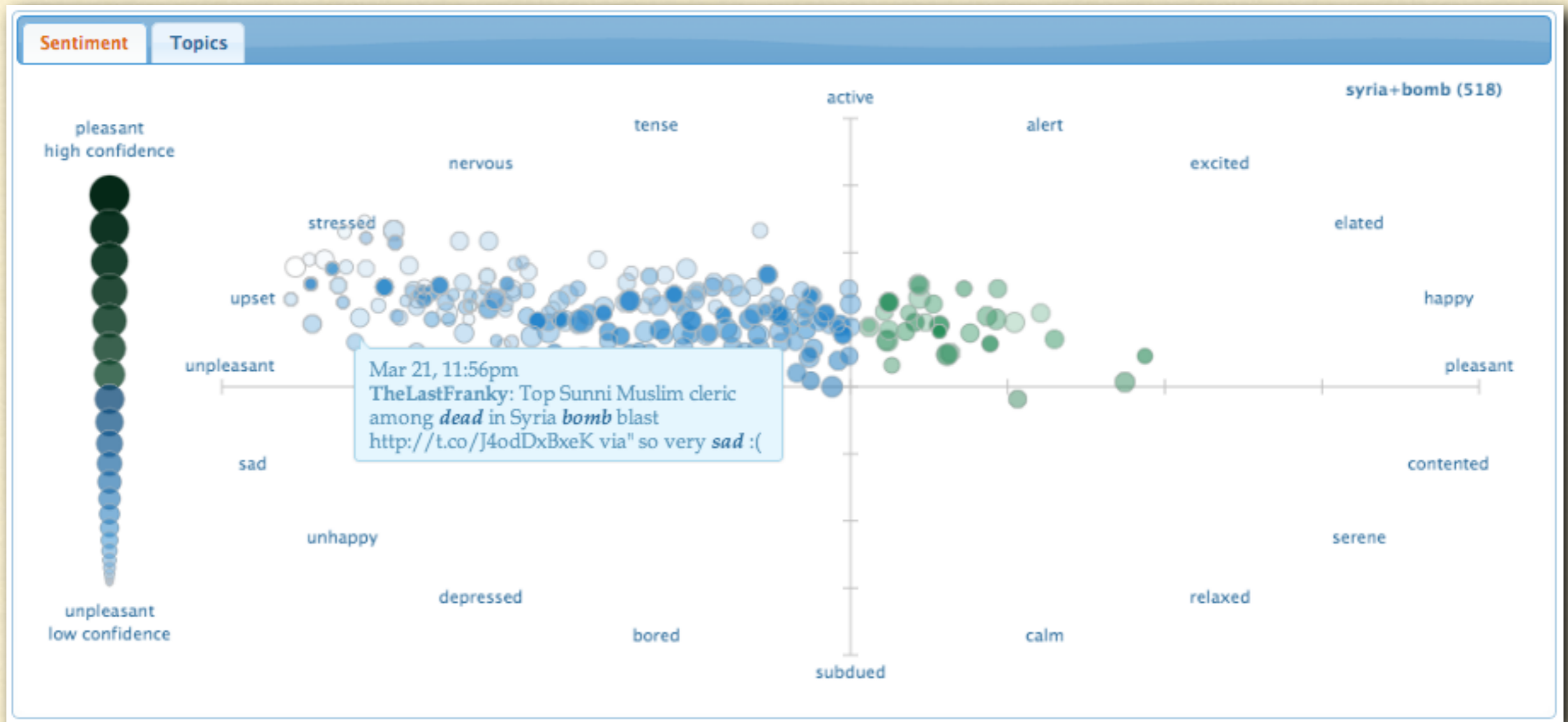


# SYRIA + BOMB



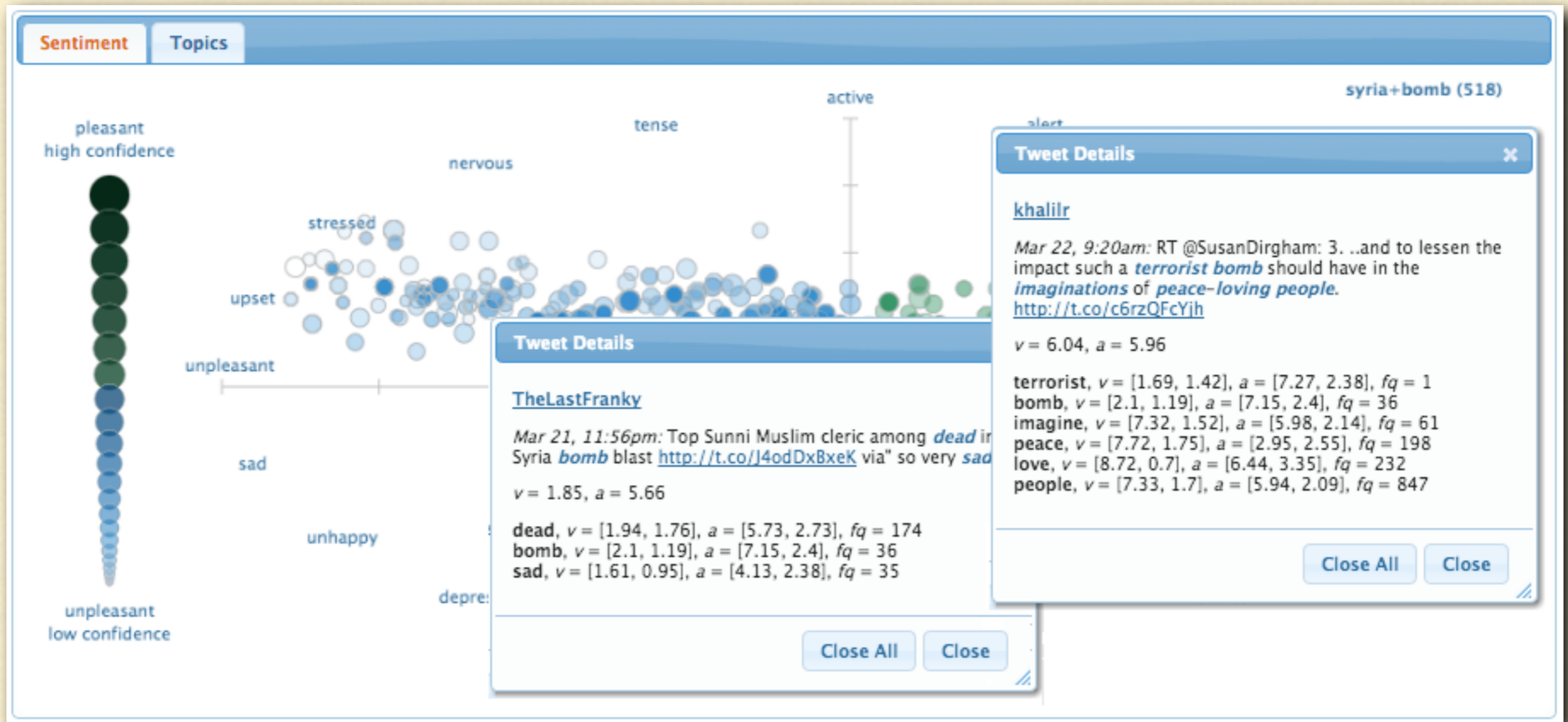
Emotional scatterplot of tweets for keywords "Syria + bomb"  
*valence* → hue, *arousal* → luminance, *response confidence* → size, *standard deviation confidence* → opacity

# TWEET DETAILS



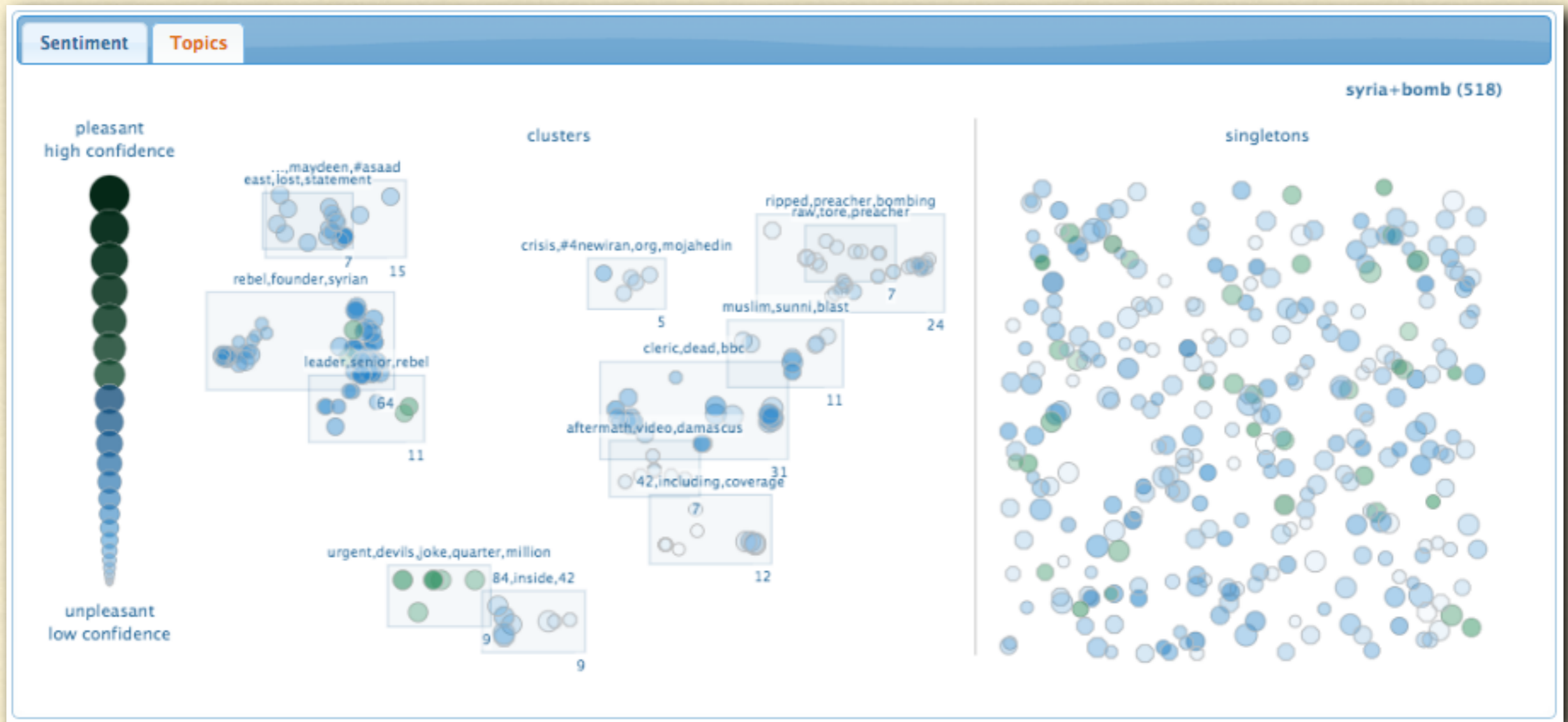
Emotional scatterplot of tweets for keywords "Syria + bomb"  
*valence* → hue, *arousal* → luminance, *response confidence* → size, *standard deviation confidence* → opacity

# TWEET DIALOGS



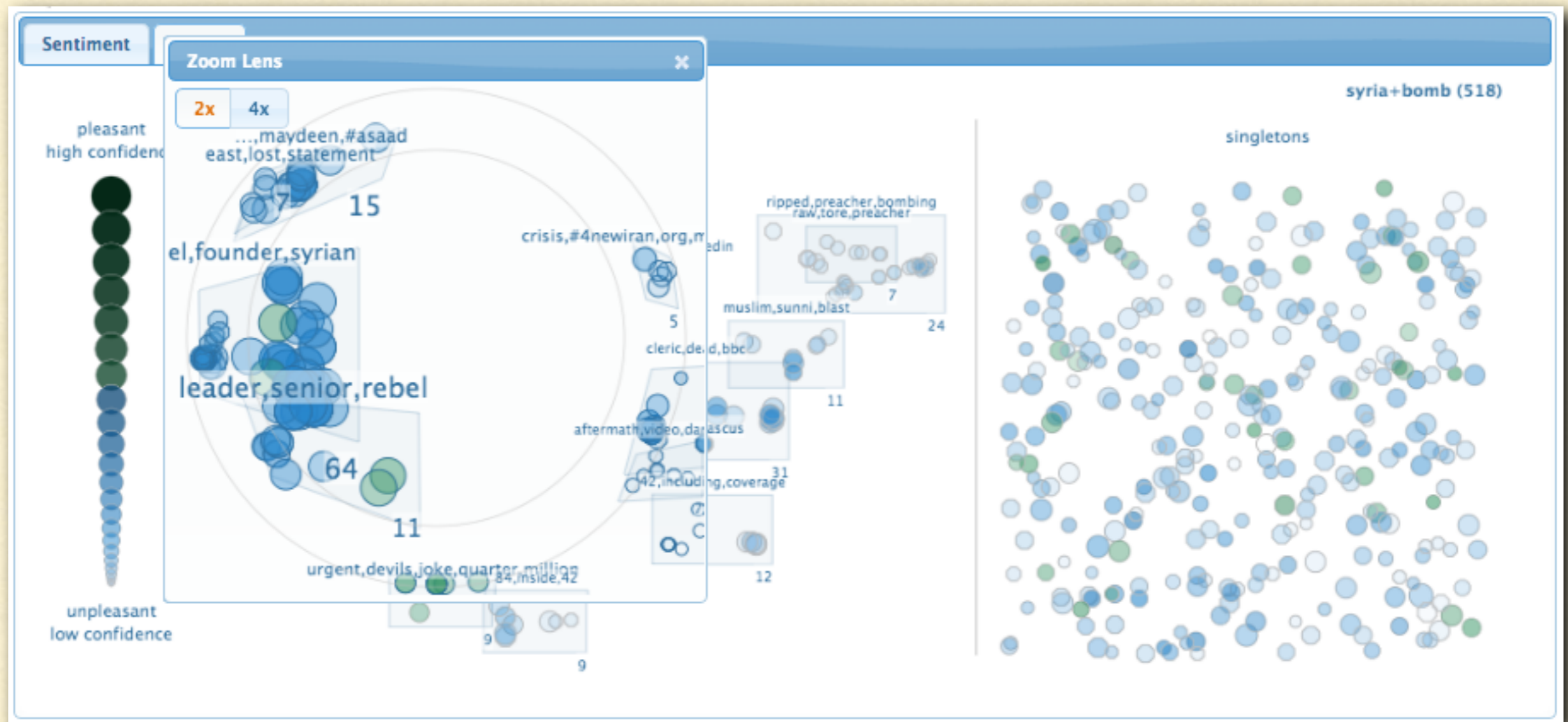
Emotional scatterplot of tweets for keywords "Syria + bomb"  
 $valence \rightarrow$  hue,  $arousal \rightarrow$  luminance,  $response\ confidence \rightarrow$  size,  $standard\ deviation\ confidence \rightarrow$  opacity

# TOPIC CLUSTERS



Emotional scatterplot of tweets for keywords “Syria + bomb”  
*valence* → hue, *arousal* → luminance, *response confidence* → size, *standard deviation confidence* → opacity

# LENS ZOOMING



Emotional scatterplot of tweets for keywords "Syria + bomb"  
*valence* → hue, *arousal* → luminance, *response confidence* → size, *standard deviation confidence* → opacity

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# CONCLUSIONS

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- Text sentiment is a promising way to summarize text collections
    - Emotional scatterplot, topic clusters, volume graph
  - HTML5, CSS3, and JavaScript can support sophisticated 2D sentiment visualizations
    - Web visualizations offer effective dissemination to general public
  - Ongoing collaborations
    - Presidential debates with WRAL
    - Wildfire community sentiment with School of Public Policy
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# CONTACT INFORMATION

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## **Christopher G. Healey**

healey@ncsu.edu

<http://www.csc.ncsu.edu/faculty/healey>

## **Special Thanks**

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Branda Nowell (School of Public and International Affairs)

Jason Priebe (WRAL TV)

Adam Marrs, Kalpesh Padia, Siddarth Ramaswamy

