

# Information Visualization Tutorial

WS 2009 / 2010

- \* Paperdiskussion

- \* Current Trends in InfoVis

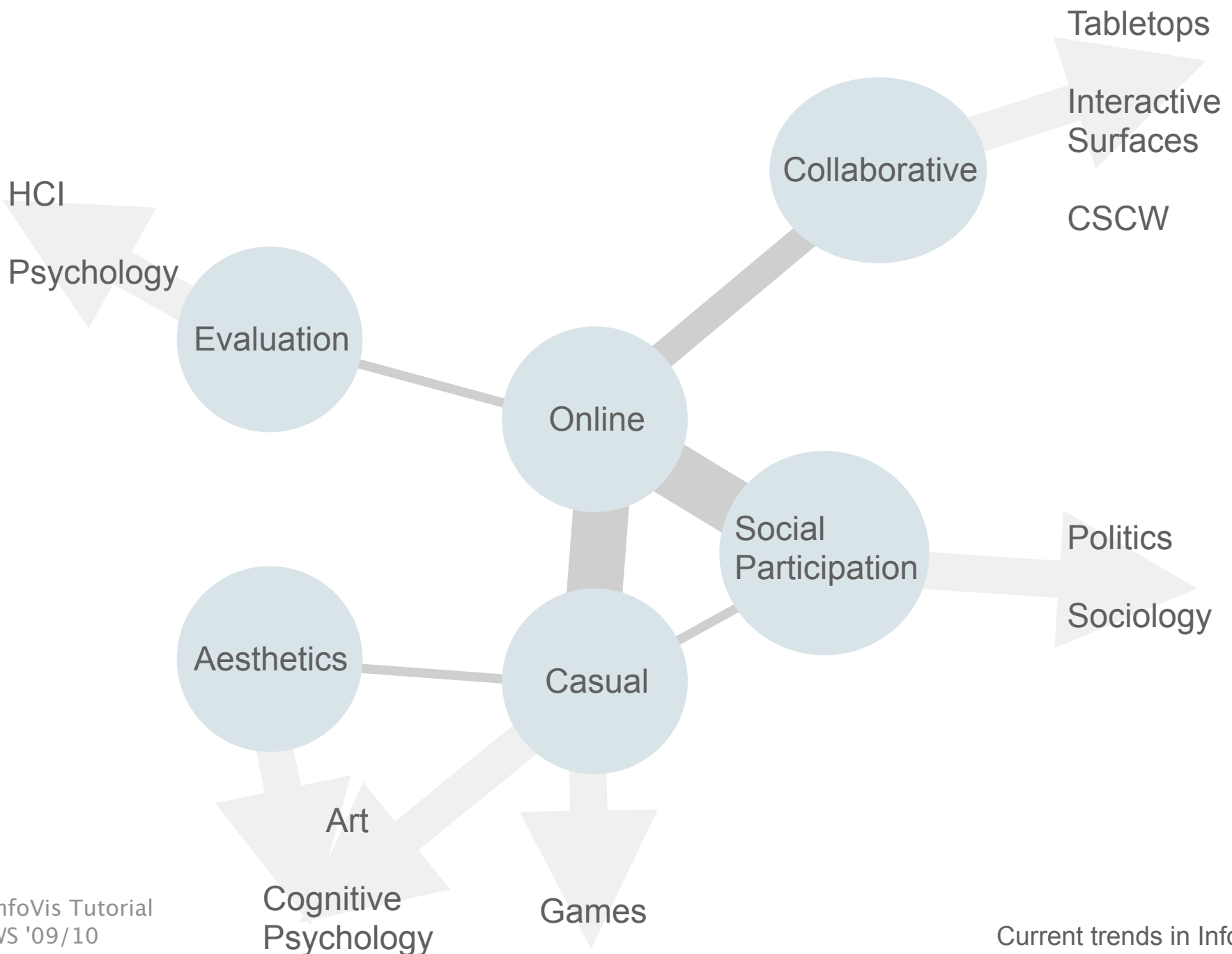
# Paperdiskussion

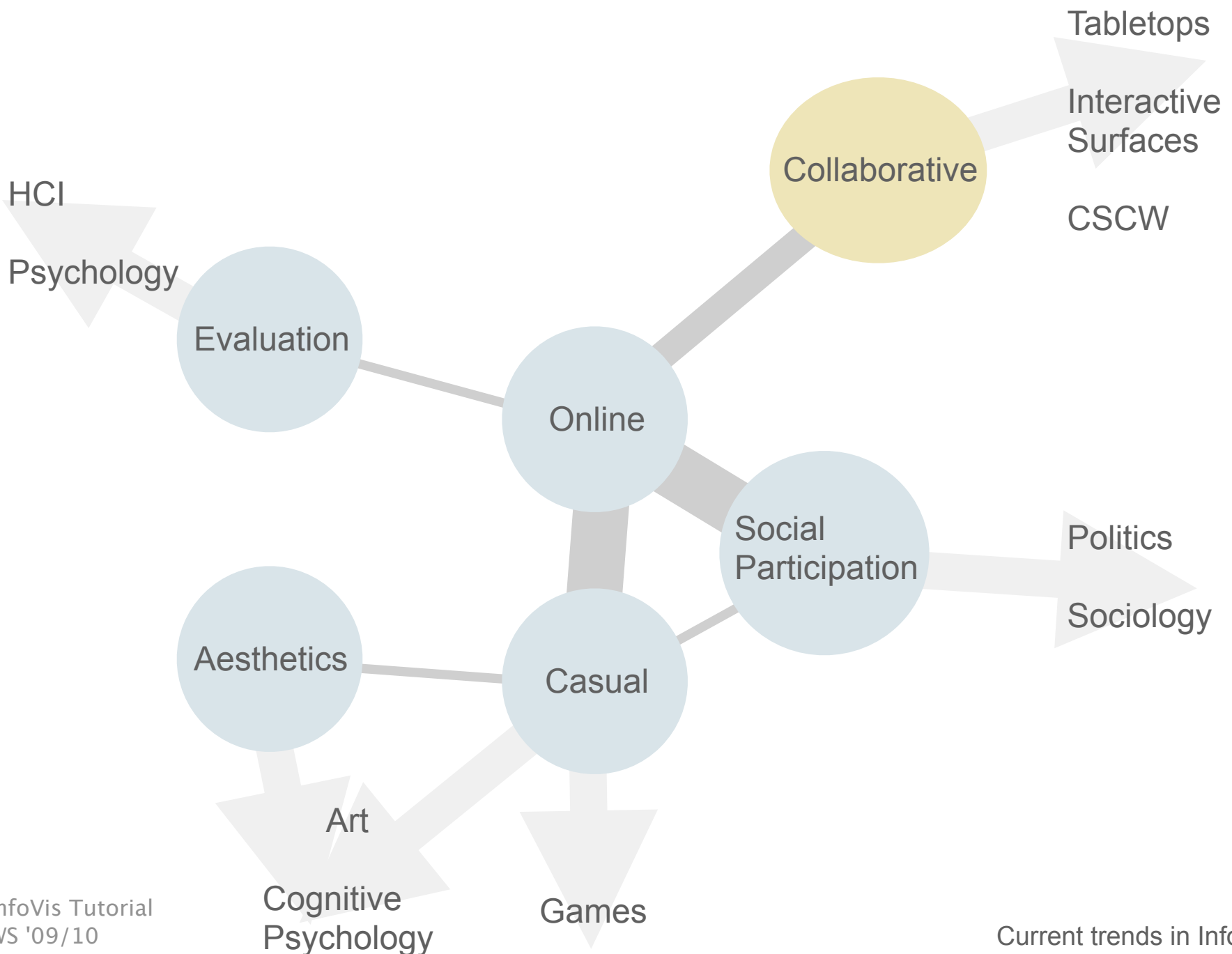
\* Viégas et al.: “Participatory Visualization with Wordle”

# Current Trends in InfoVis

# Current trends in InfoVis?

- \* Collaborative
- \* Online
  - \* Casual
  - \* Social Participation
- \* Aesthetics
- \* Evaluation





# Analysis is mostly a collaborative process

- \* InfoVis and Visual Analytics produce analysis tools
- \* Still, the analysis process happens at desktop PCs => bad for collaboration
- \* Collaborative (Co-located) InfoVis: Merging CSCW principles with InfoVis

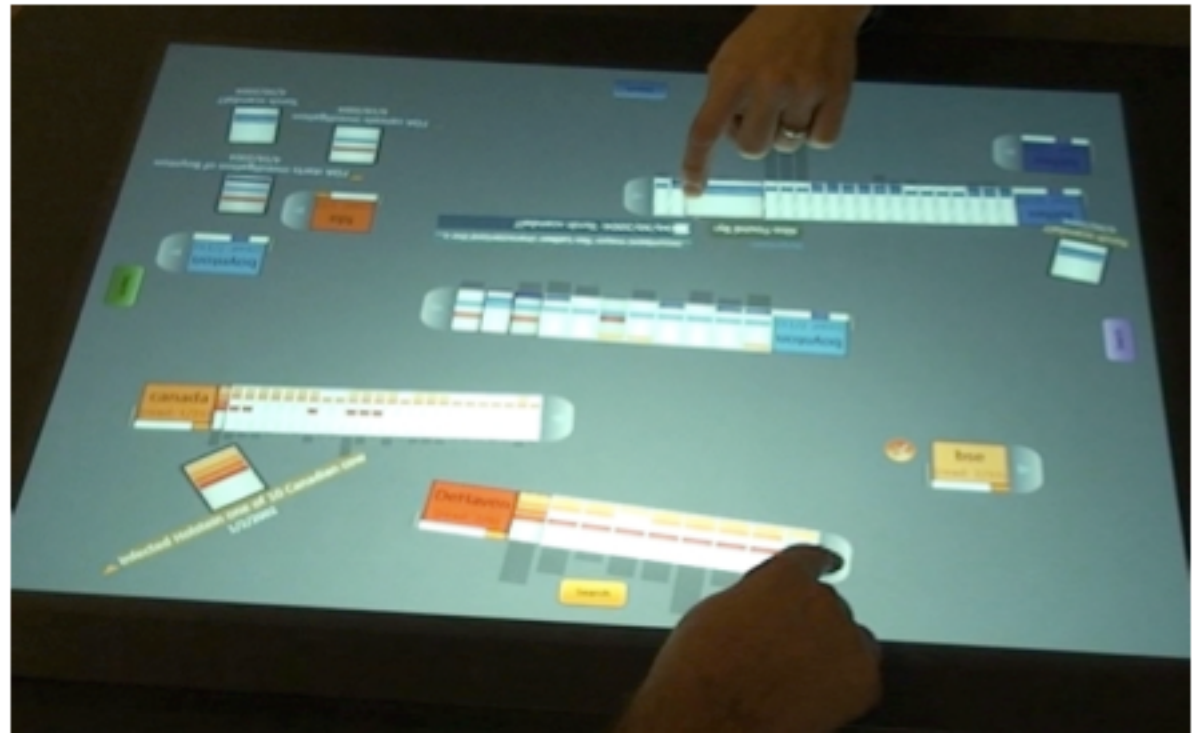
## Important labs/people:

- \* InnoVis (University of Calgary)
- \* Petra Isenberg



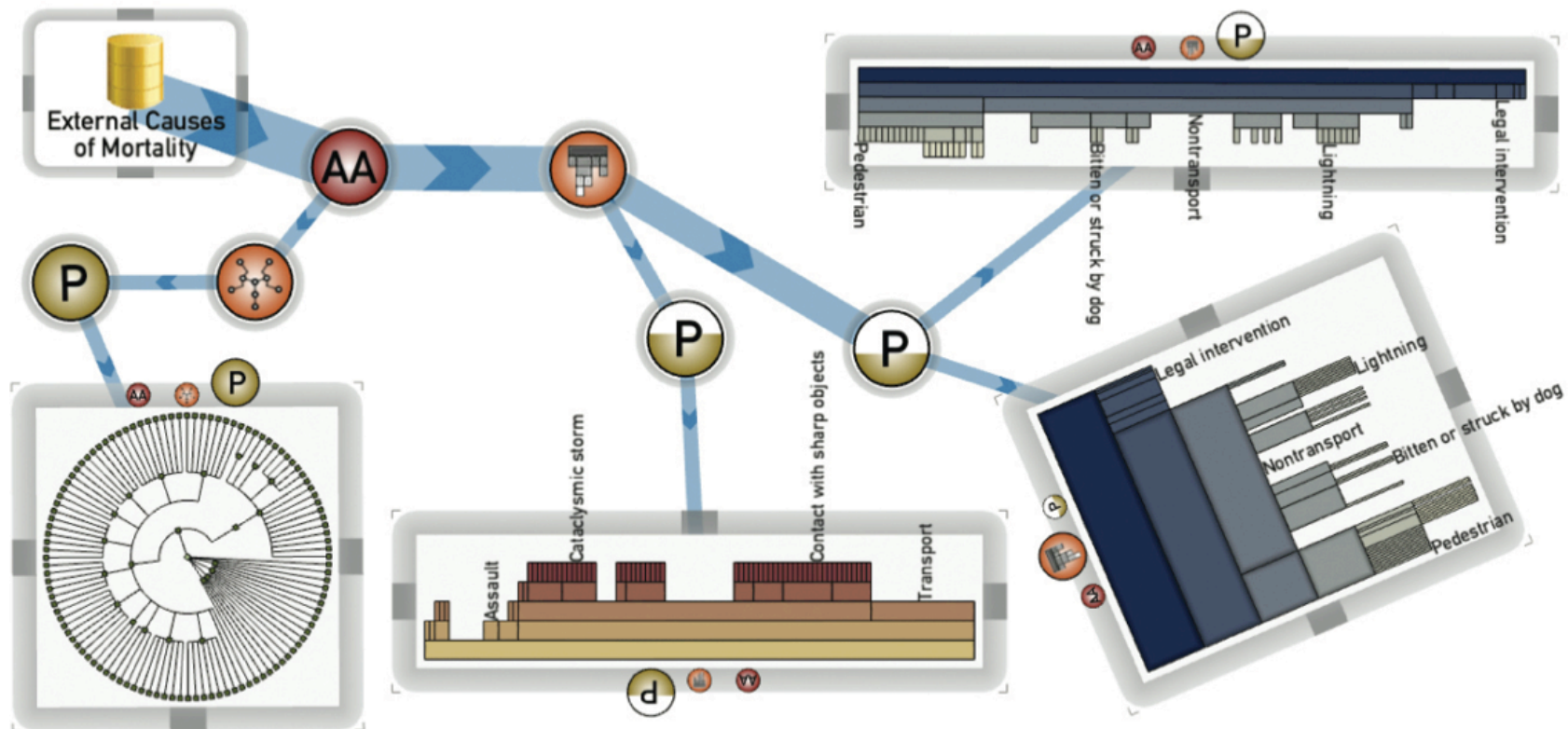
# Isenberg, Fisher: Canbierra: Collaborative Brushing and Linking for Co-Located Visual Analytics of Document Collections (EuroVis 2009)

- \* Text analysis on a Tabletop display
- \* “Collaborative Brushing and Linking”

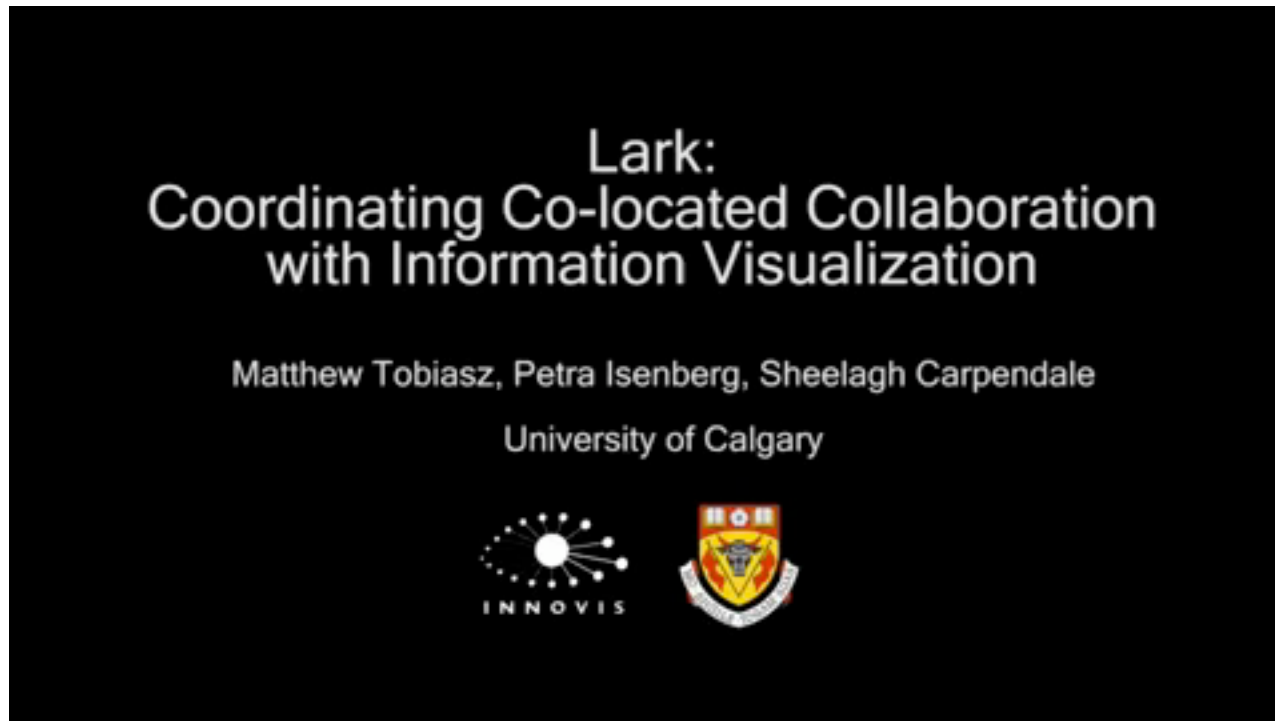


# Tobiasz, Isenberg, Carpendale: Lark: Coordinating Co-Located Collaboration with Information Visualization (InfoVis 2009)

- \* Temporal, Spatial Flexibility, Changing Collaboration Styles
- \* Visual pipelines from data to views

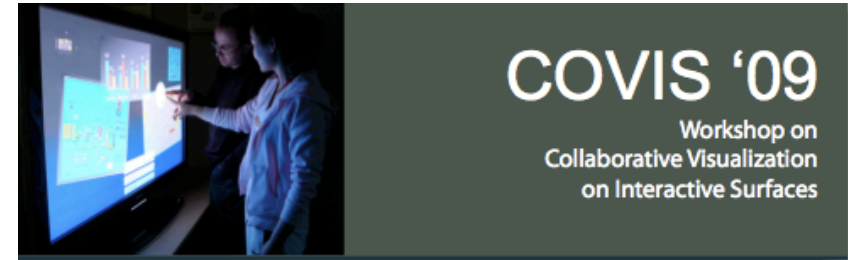


Tobiasz, Isenberg, Carpendale: Lark: Coordinating Co-Located Collaboration with Information Visualization (InfoVis 2009)



<http://www.youtube.com/watch?v=WPPvSIXT94s>

# Isenberg et al.: CoVIS'09 - Workshop on Collaborative Visualization on Interactive Surfaces (InfoVis 2009)



In conjunction with VisWeek 2009 (Vis, InfoVis, VAST)  
Atlantic City, NJ, USA

The design of digital systems for collaboration around visualization and visual analytics systems poses additional challenges: we need to understand how people collaboratively work with visual representations of data, which methods they use to solve information analysis tasks as a team, and what the exact design requirements are for collaborative visual analysis scenarios.

*In this workshop we will discuss the challenges & the role of interactive surfaces as an emerging technology for supporting collaborative visualization and visual analytics settings*

Topics of interest include, but are not limited to:

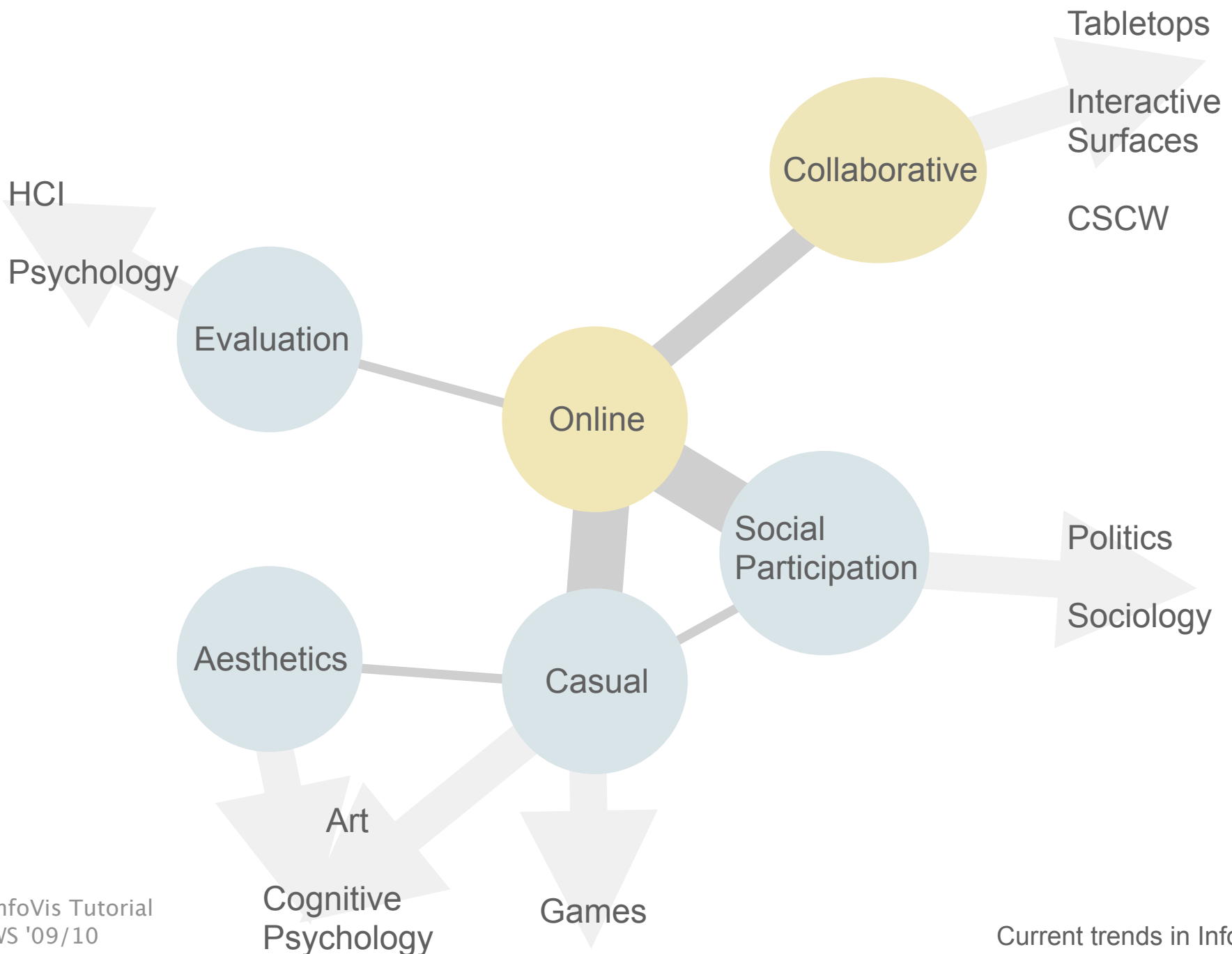
- interfaces and environments for co-located collaborative work,
- interactive visualizations on interactive surfaces,
- social components in collaborative visual analysis environments,
- cognition in multi-user analytics,
- evaluation of collaborative analysis systems,
- multiple and coordinated views for collaborative visualization,
- design of multi-display environments for information analysis,
- collaborative visualization and visual analytics applications,
- collaborative sensemaking, and
- traditional collaboration in information and data intensive fields.

- Petra Isenberg
- Michael Sedlmair
- Andreas Butz
- Dominikus Baur
- Tobias Isenberg



For more information:  
<http://www.mimuc.de/covis09>

Submission deadline: August 1st, 2009  
Notification of acceptance: August 26th, 2009  
Camera ready submissions: September 14th, 2009  
Workshop: TBD – approx. October 11th, 2009



## Analysis isn't always co-located

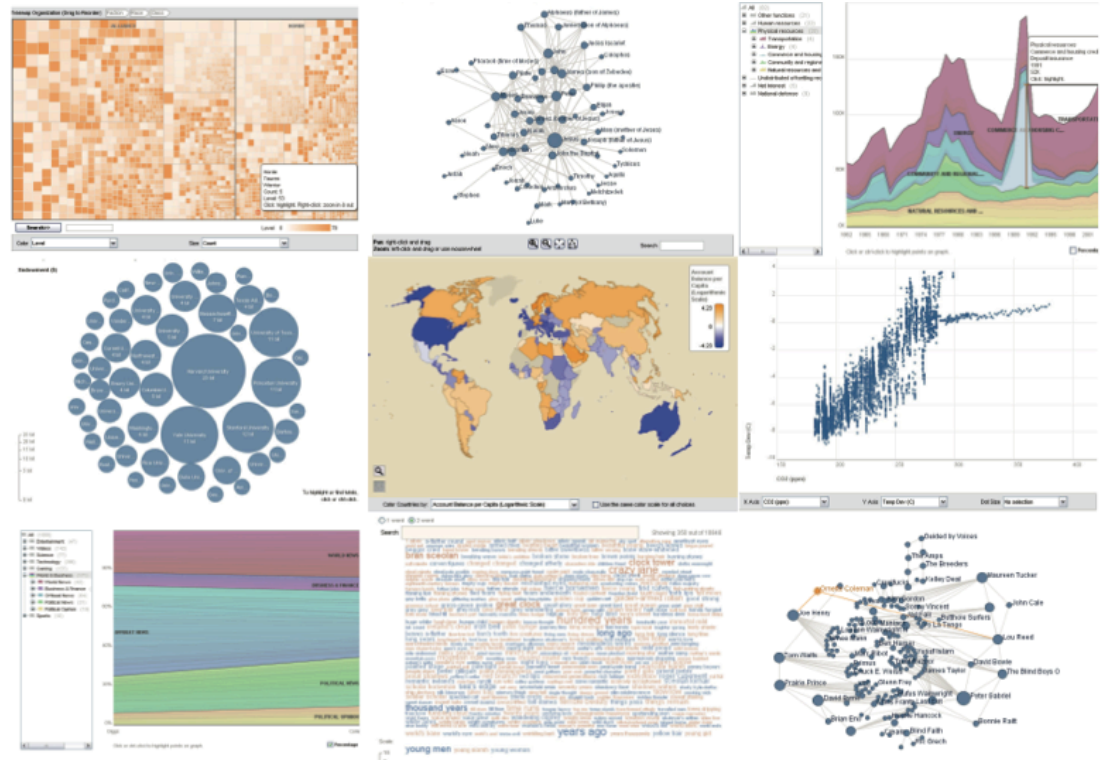
- \* Online visualization provides great chances for collaboration
- \* Collaborative (Online) InfoVis: Putting visualization online, enabling thousands of people to work together

### Important labs/people:

- \* Visual Communication Lab (IBM Research)
- \* Fernanda Viégas
- \* Martin Wattenberg

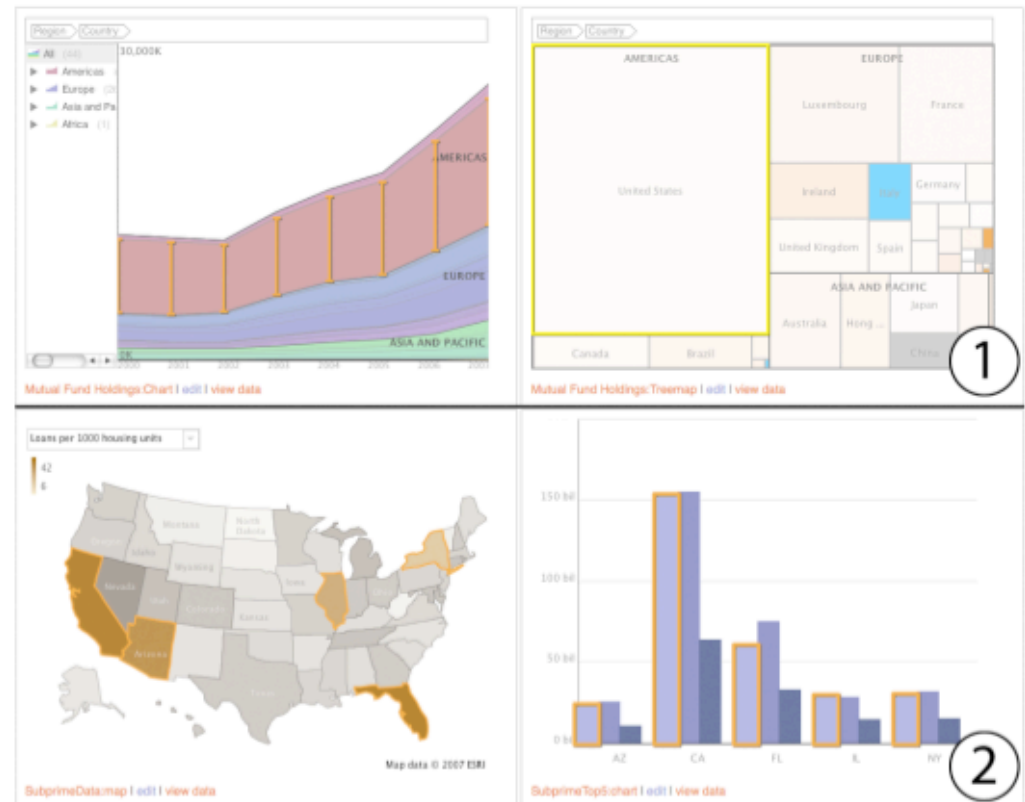
# Viégas et al.: Manyeyes: A site for visualization at internet scale (InfoVis 2007)

- \* Webpage for uploading data sets and creating interactive visualizations
- \* Emphasis on discussion between users

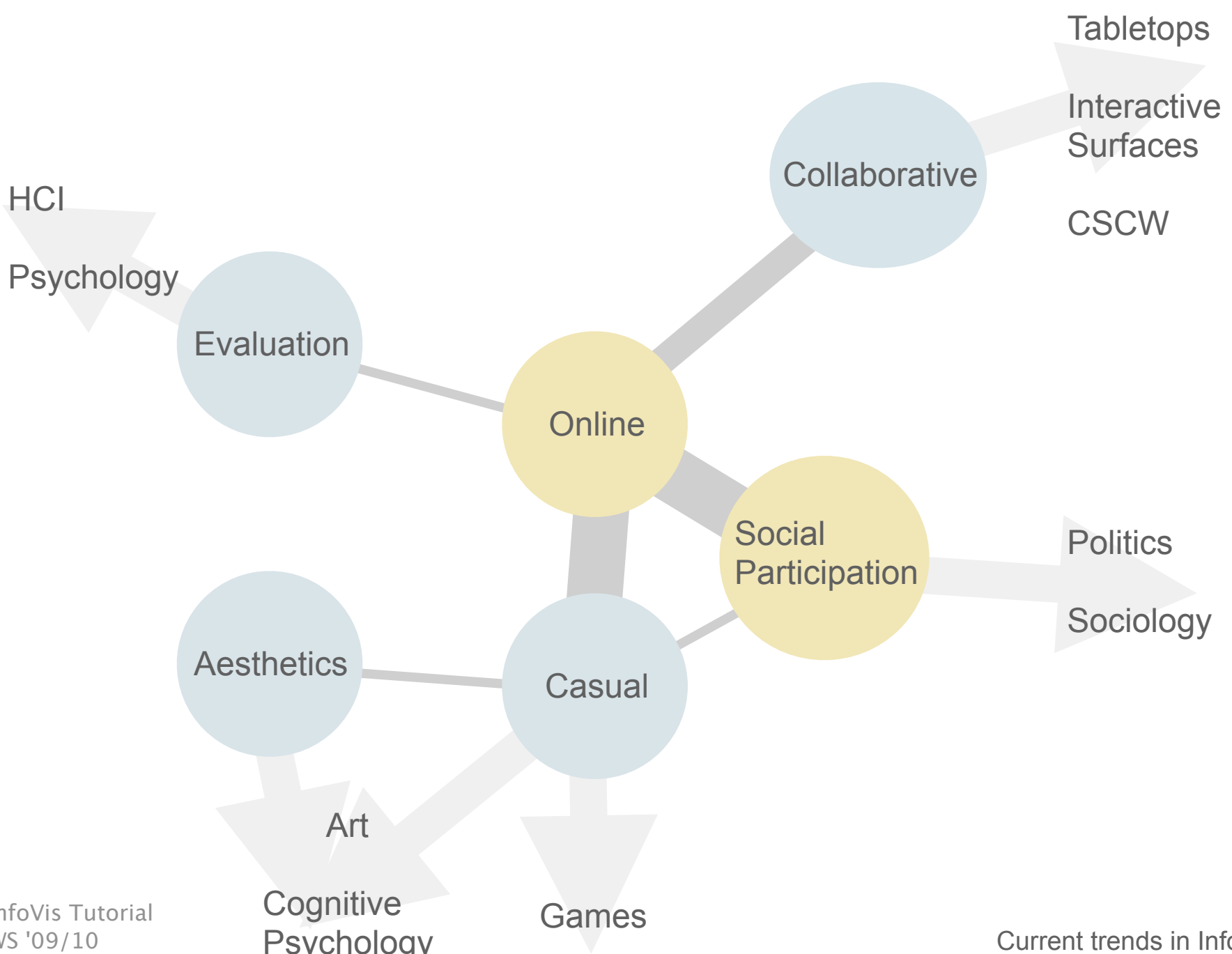


# McKeon: Harnessing the Web Information Ecosystem with Wiki-based Visualization Dashboards (InfoVis 2009)

- \* Collaborative creation of visualization “dashboards”
- \* Quick visualization of live data







## Available data and visualization can lead to social insights

- \* Open databases of governmental data allow in-depth-analysis that was previously only possible for experts
- \* The web provides the means for analysis and coordination

### Important labs/people:

- \* Gapminder Foundation (Hans Rosling)
- \* Ben Shneiderman

# Rosling: [Gapminder.org](http://Gapminder.org) (TED)

\* Visualizing environmental and humanitarian data



Unveiling the beauty of statistics for a fact based world view.

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**NEWS!**  
New: Country graphs in Google search



[\(Read more\)](#)

## Explore the world



### [Gapminder World »](#)

See countries change in ways that challenge old myths. You choose from the best statistics.

## Explore gaps within countries:



### Gaps within US

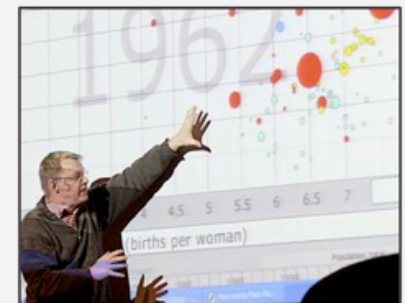
Compare US states with the countries of the world.



### Gaps within China

Compare China's provinces with the countries of the world.

## See myths get demolished



### [Videos »](#)

Videos that debunk myths about Bangladesh, CO2 emissions, urbanization and more.

## Latest videos:



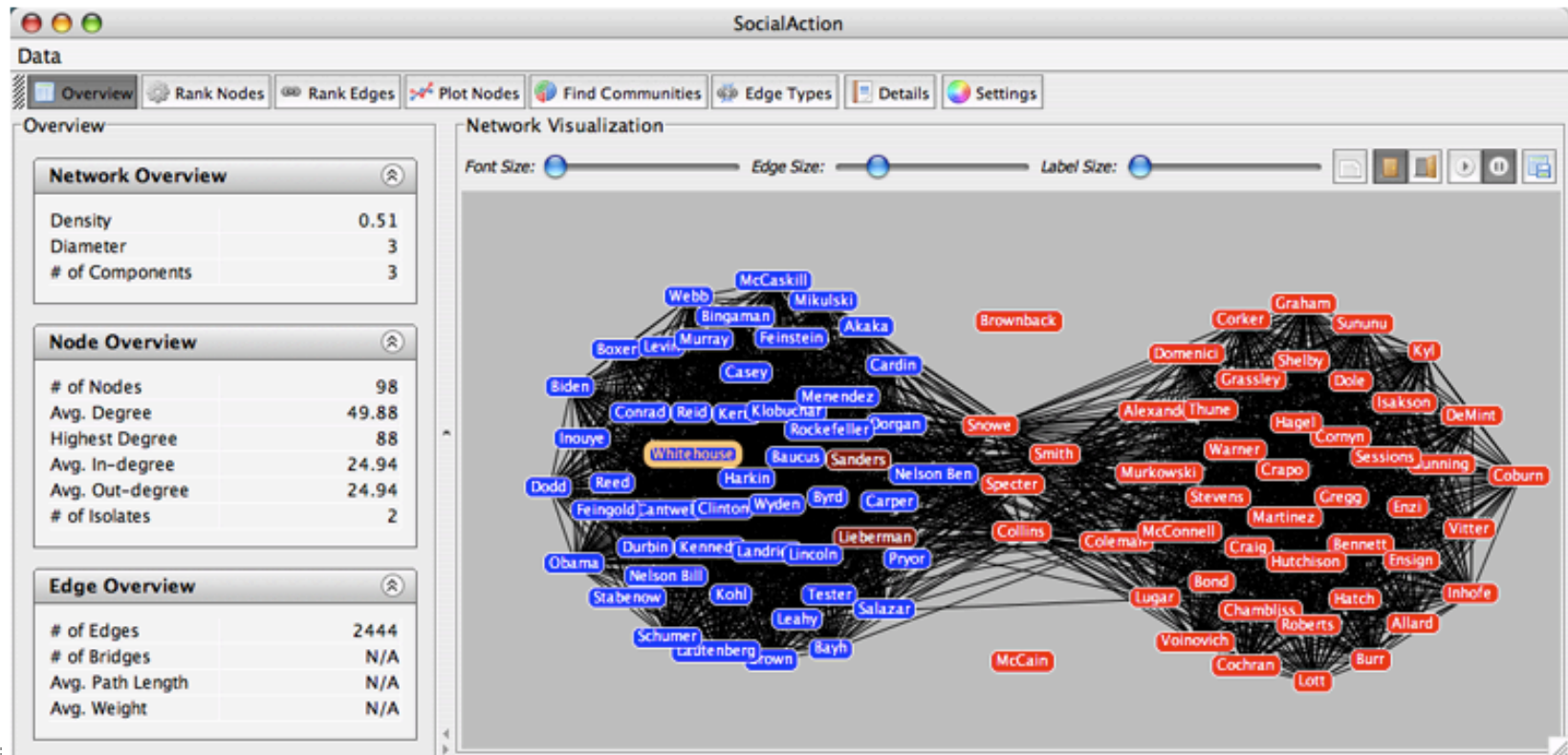
**Hans Rosling: Asia's rise – how and when (TEDIndia)**  
Posted November 23, 2009



**TED and Reddit's 10 questions to Hans Rosling**  
Posted September 11, 2009

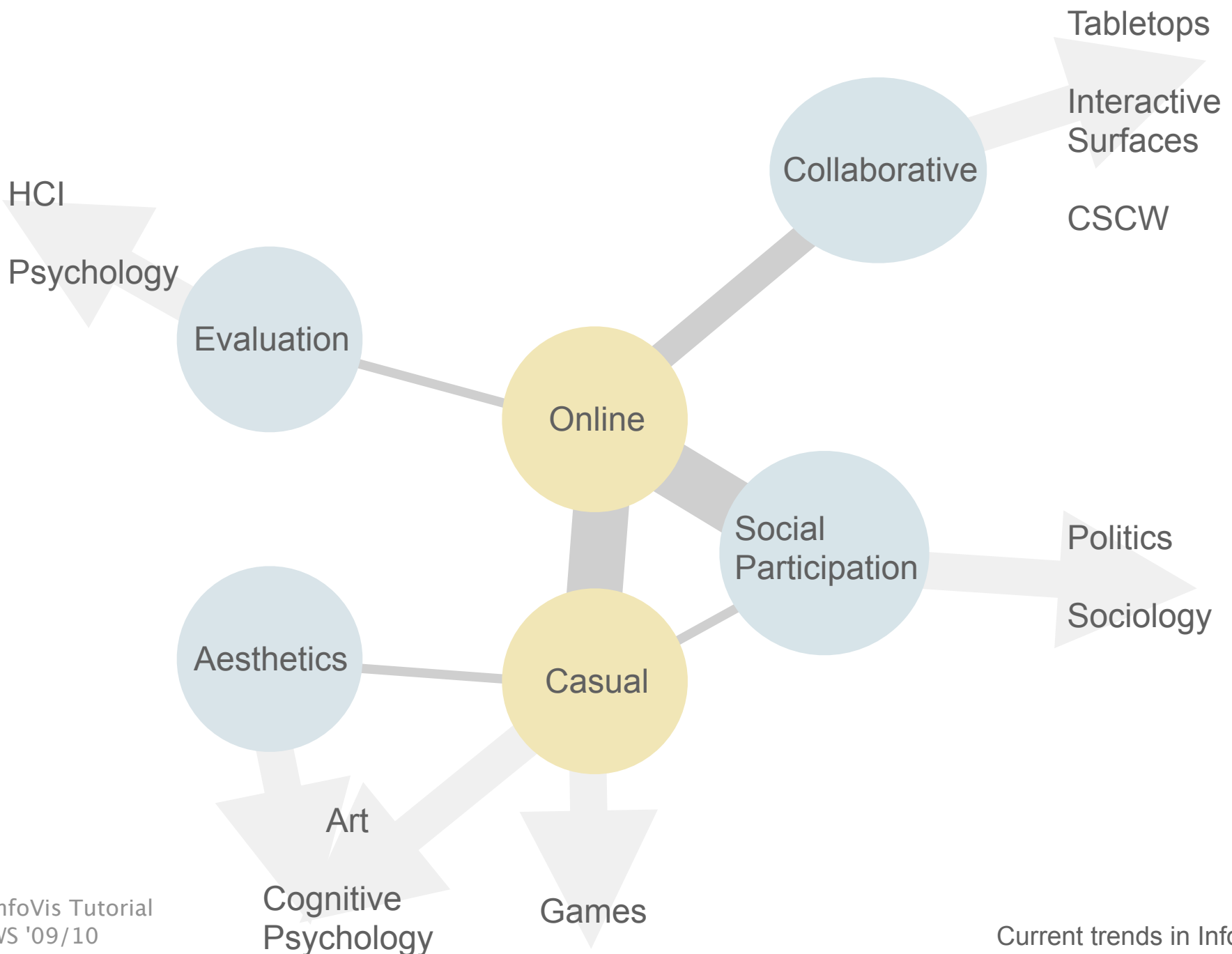
# Perer, Shneiderman: Integrating Statistics and Visualization: Case Studies of Gaining Clarity during Exploratory Data Analysis (CHI 2008)

\* Social network analysis in the context of politics, counter-terrorism etc.



## Shneiderman et al.: National Initiative for Social Participation

- \* Use web 2.0 tools for helping with national priorities like health, energy, education, disaster response etc.
- \* Data from social networks and life tracking sites is used to find working cures for diseases
- \* Early disaster or terrorism warnings can be spread through social networks
- \* A nation-wide neighborhood watch program helps prevent crime



With visualization on the web, out-of-box usability becomes important

- \* Visualizations are less complex and more approachable
- \* Users want an immediate benefit and are no analysis experts

Important labs/people:

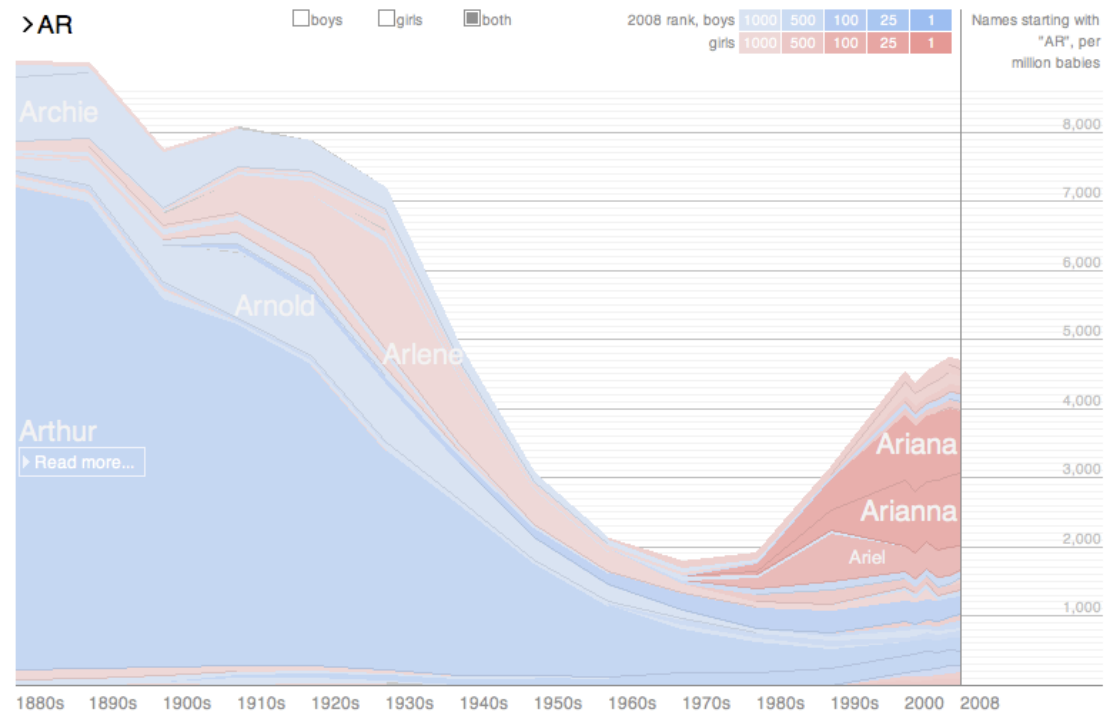
- \* Visual Communication Lab (IBM Research)
- \* Martin Wattenberg
- \* Fernanda Viégas
- \* Frank van Ham



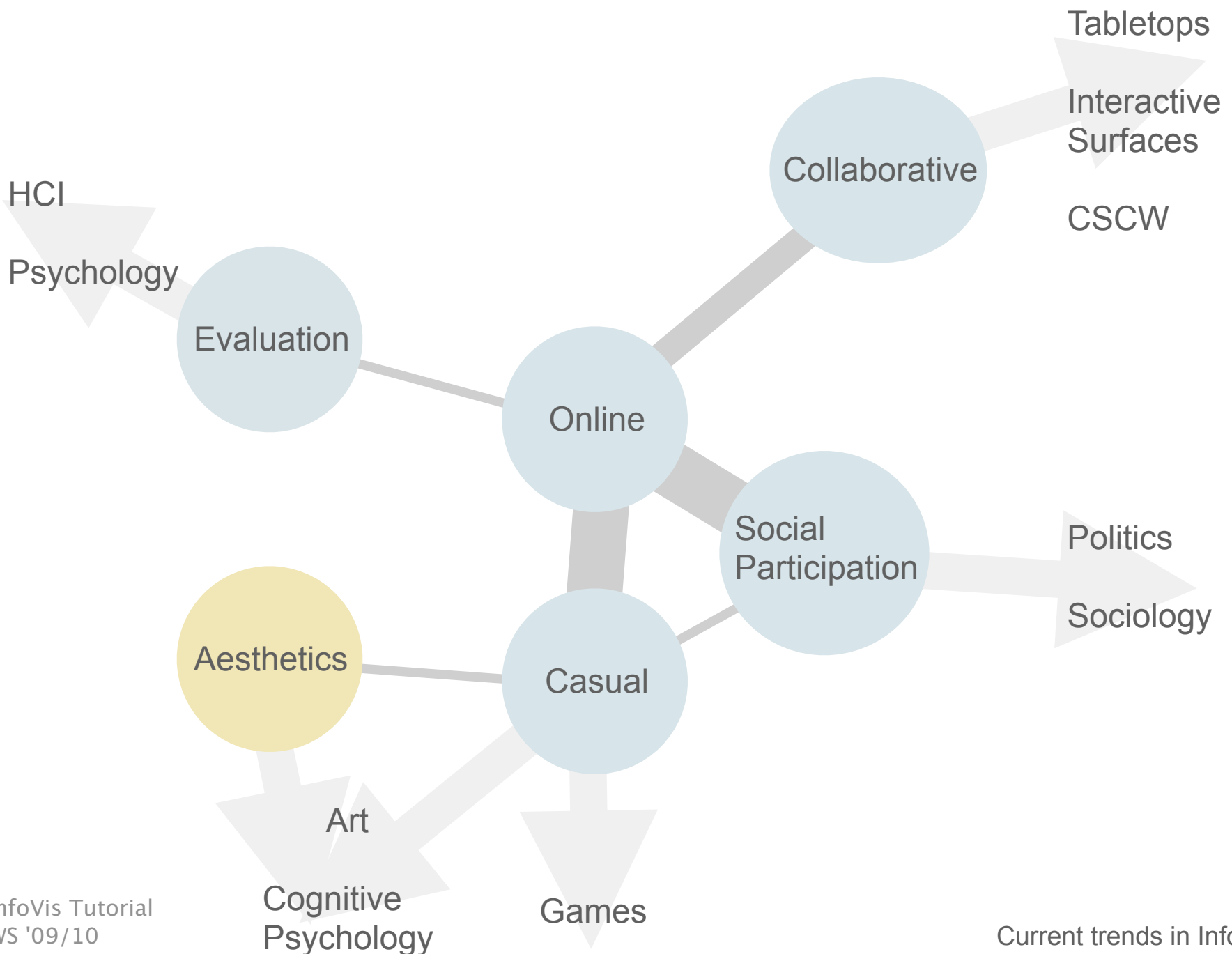


# Wattenberg et al.: Designing for Social Data Analysis (InfoVis 2006)

- \* Easy-to-use visualization of popular names of the last 120 years
- \* Application of Bartle's MUD-player categories to user base







# Aesthetics and human perception are important aspects of visualization in general

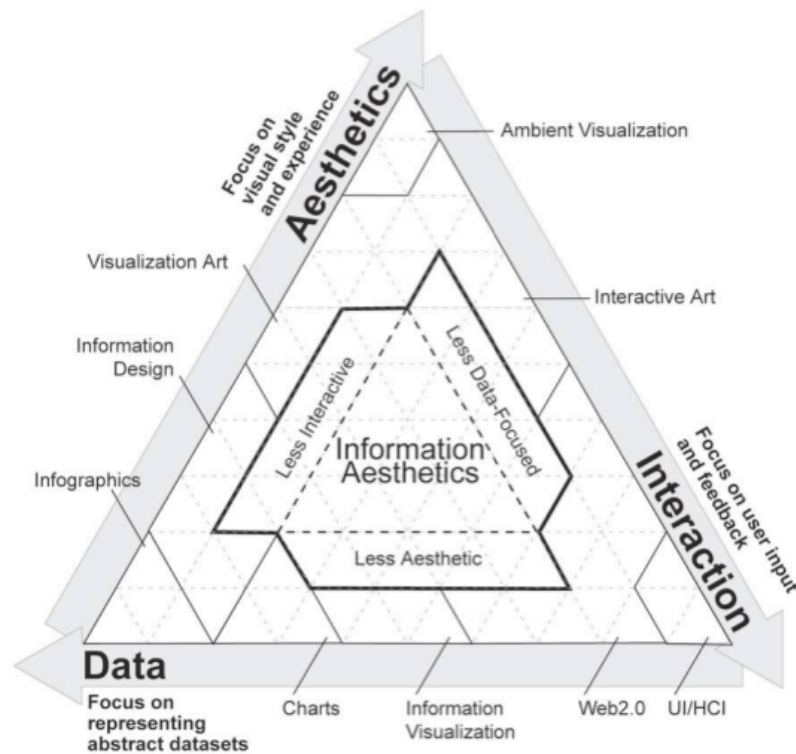
- \* Most aesthetics in InfoVis are based on rules-of-thumb or gut feelings
- \* Cognitive psychology provides information about the human perceptual system

## Important labs/people:

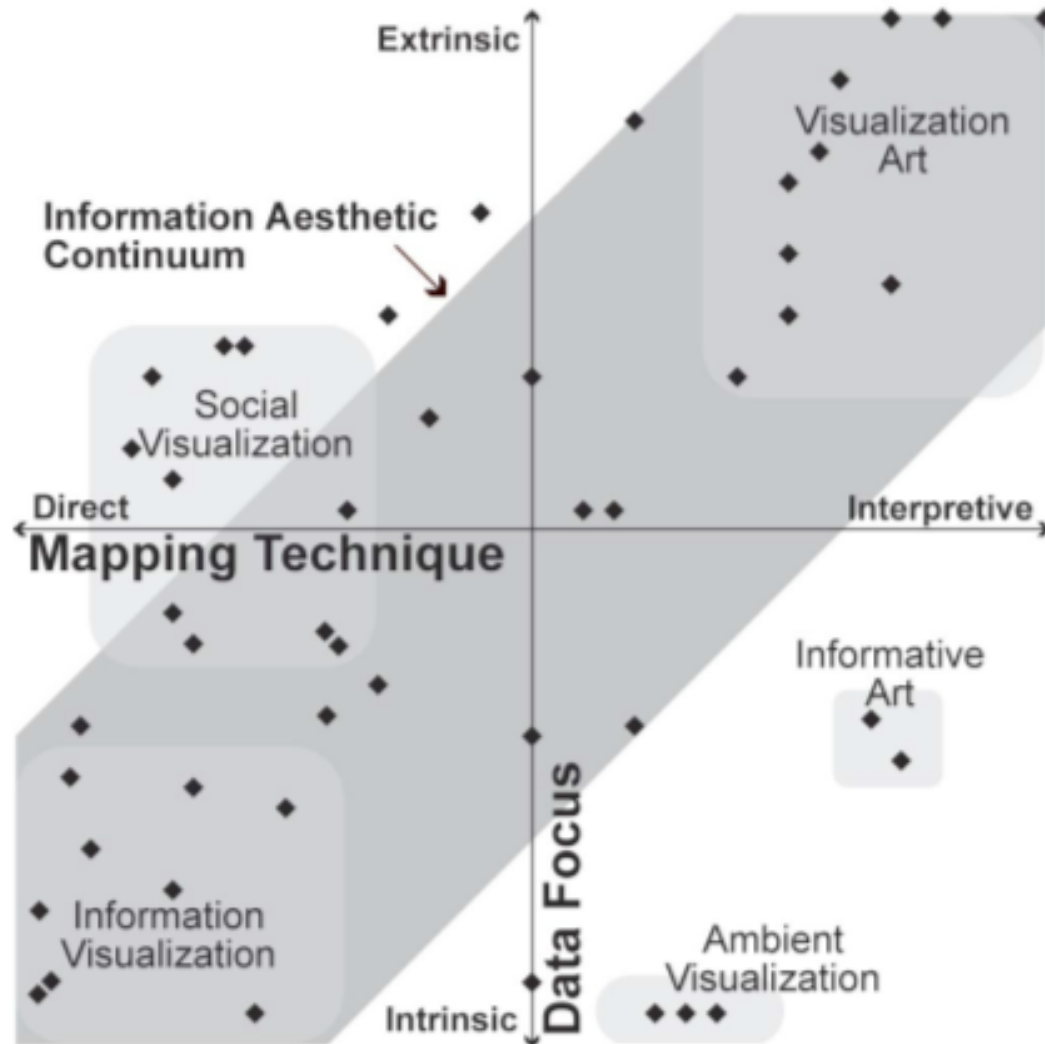
- \* Andrew Vande Moere (infosthetics)
- \* Colin Ware

# Lau, Vande Moere: Towards a Model of Information Aesthetics in Information Visualization (IV 2007)

- \* Literature survey of 47 previous infovis papers
- \* Dimensions: Data Focus and Mapping Technique



# Lau, Vande Moere: Towards a Model of Information Aesthetics in Information Visualization (IV 2007)



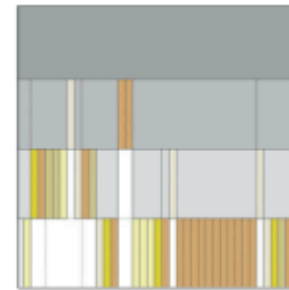
# Cawthon, Vande Moere: The Effect of Aesthetic on the Usability of Data Visualization (IV 2007)

\* Online study comparing task time and (perceived) aesthetics of 11 visualizations

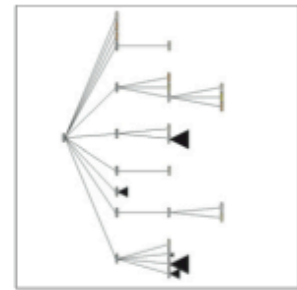
\* Result: Inverse correlation between task abandonment, response time and aesthetics



*TreeMap*



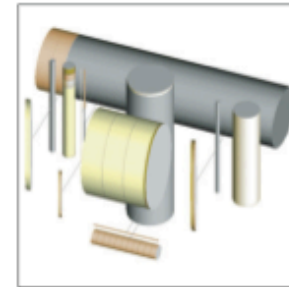
*IcicleTree*



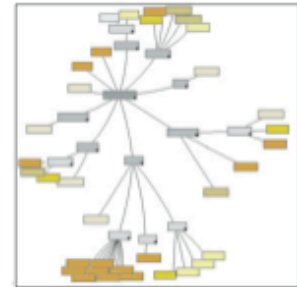
*SpaceTree*



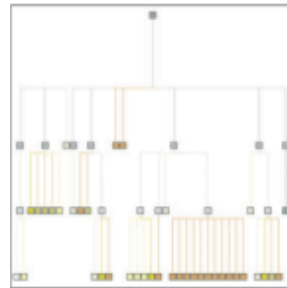
*Windows Explorer*



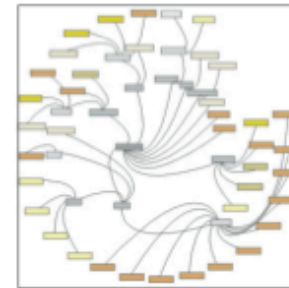
*BeamTrees*



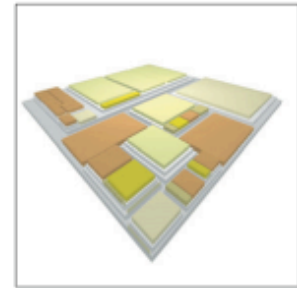
*StarTree*



*Dendrogram Tree*



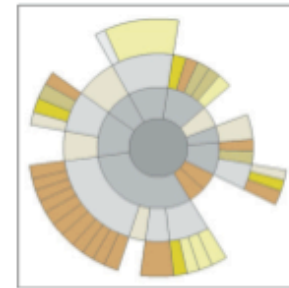
*Polar View*



*StepTree*



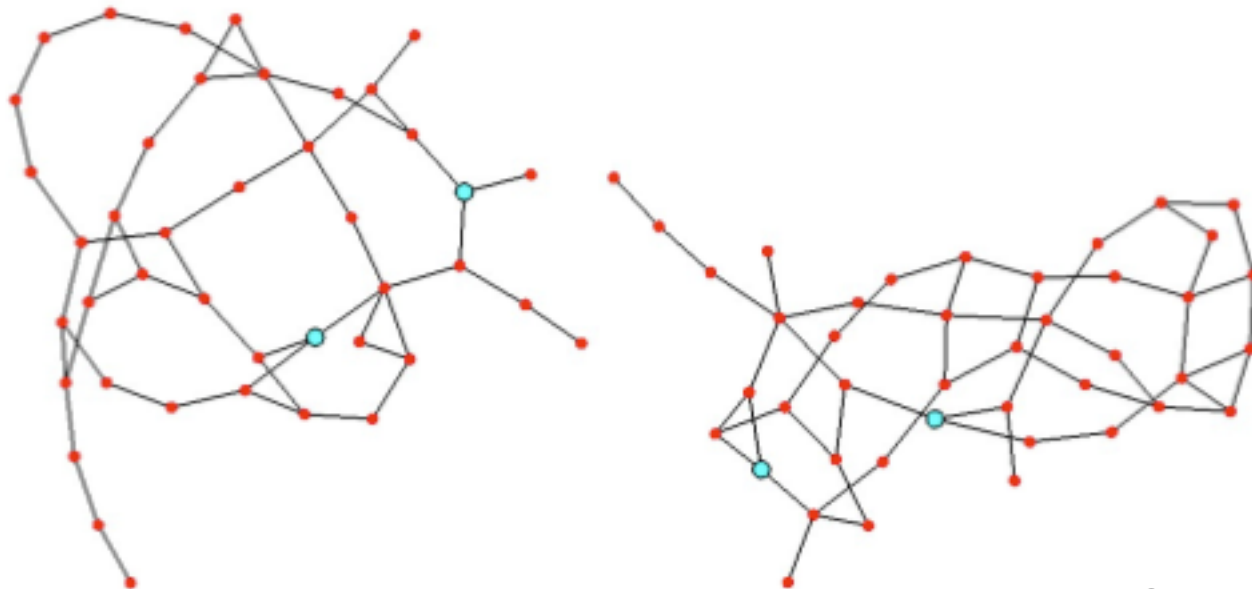
*Botanical Viewer*



*Sunburst* Aesthetics >> Current trends in InfoVis

# Ware et al.: Cognitive Measurements of Graph Aesthetics (Information Visualization 2002:1(2))

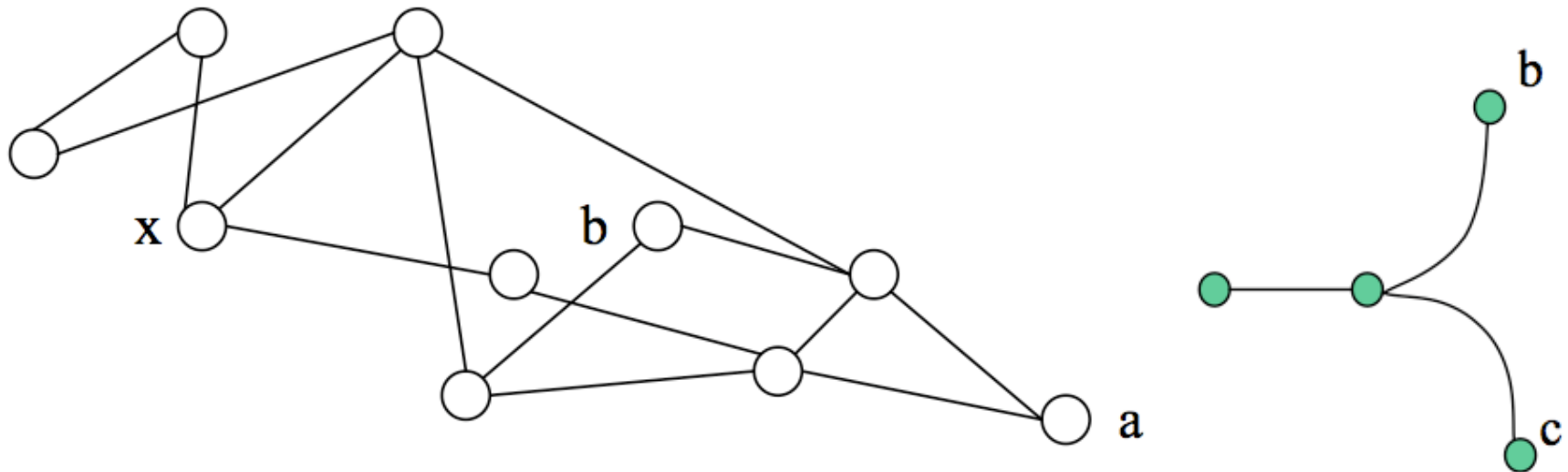
- \* Online study on the rules of graph drawing: Minimize edge crossings, sum of edge lengths, etc.
- \* Task: Find the shortest path between two nodes





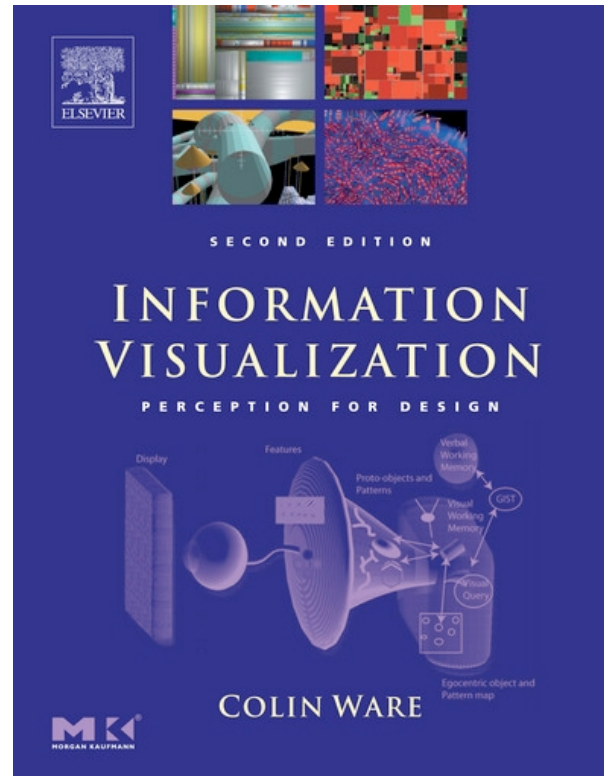
# Ware et al.: Cognitive Measurements of Graph Aesthetics (Information Visualization 2002:1(2))

- \* Results: Continuation of paths is very important
- \* Can be accomplished through avoiding zigzag patterns and using curved edges



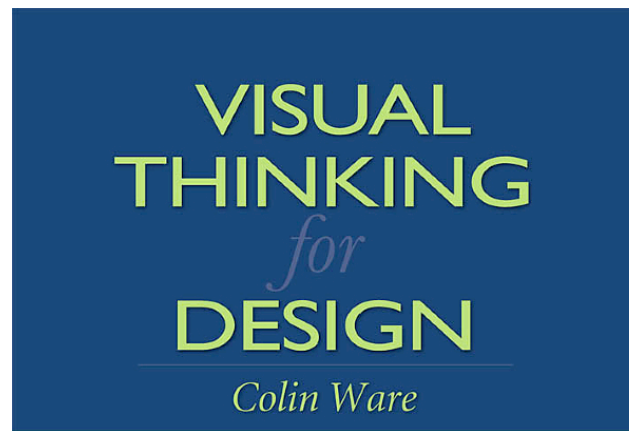
# Ware: Information Visualization - Perception for Design

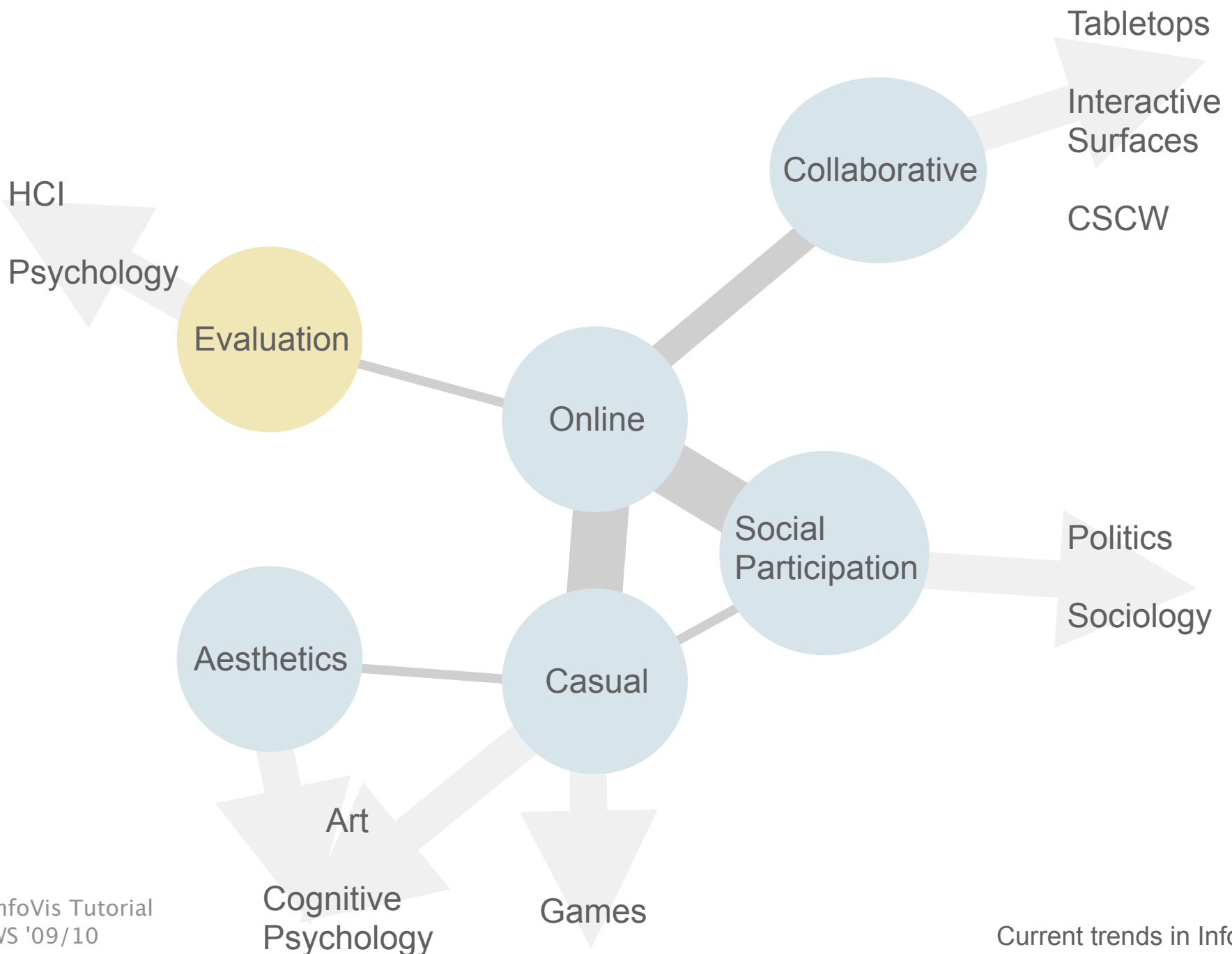
- \* Principles of human perception
- \* Application to InfoVis: Highlighting, Space perception, Interaction



# Ware: Visual Thinking for Design

- \* Human perception mechanisms applied to analytical tasks
- \* More practical advice and howtos for analytical processes





# Evaluating information visualization is an active topic in the community

- \* It is still unclear how to measure insight or evaluate InfoVis applications in general
- \* Long-term approaches in close collaboration with actual users seem promising

## Important labs/people:

- \* BELIV Workshop
- \* Catherine Plaisant (University of Maryland)

# Plaisant: The Challenge of Information Visualization Evaluation (AVI 2004)

- \* Call to arms for more evaluation in InfoVis
- \* Motivation: Lack of industry adoption despite maturing of field
- \* Plead for more user involvement, more real world studies
- \* Several success stories

## Shneiderman, Plaisant: Strategies for Evaluating Information Visualization Tools: Multi-dimensional In-depth Long-term Case Studies (BELIV 2006)

- \* (Very) historical overview of evaluation strategies
- \* Argumentation: InfoVis tools are so complex that simple comparisons or short laboratory experiments lead to nothing
- \* Proposes: MILCs, long term studies with domain experts
- \* Gives advice on how to plan and perform MILCs

# Yi et al.: Understanding and Characterizing Insights: How Do People Gain Insights Using Information Visualization? (BELIV 2008)

- \* Approach: Ignore types of insight, look at HOW people are gaining insight
- \* Identified types throughout literature:
  - *Provide Overview*
  - *Adjust* (Filter, Select, Change Level of Abstraction)
  - *Detect Pattern*
  - *Match Mental Model* (Reduce cognitive load)



