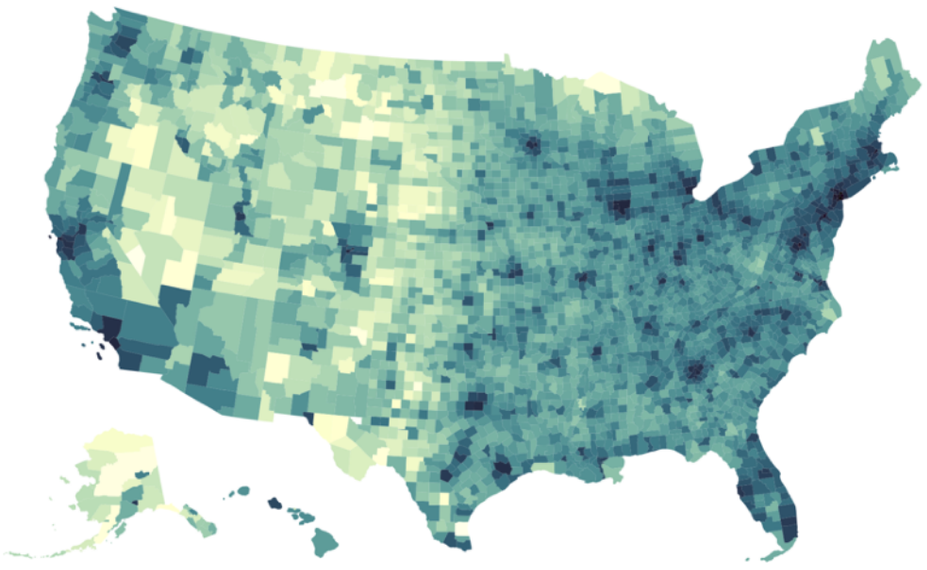

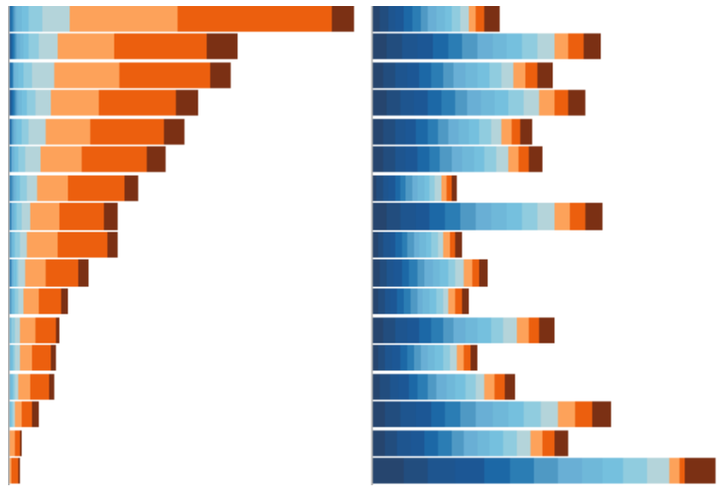

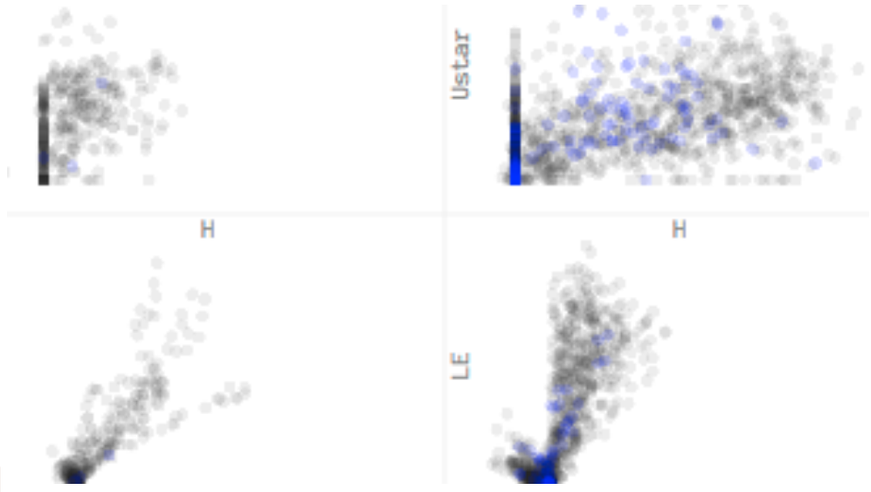

CS 526 Computer Graphics II

Visualization with large displays

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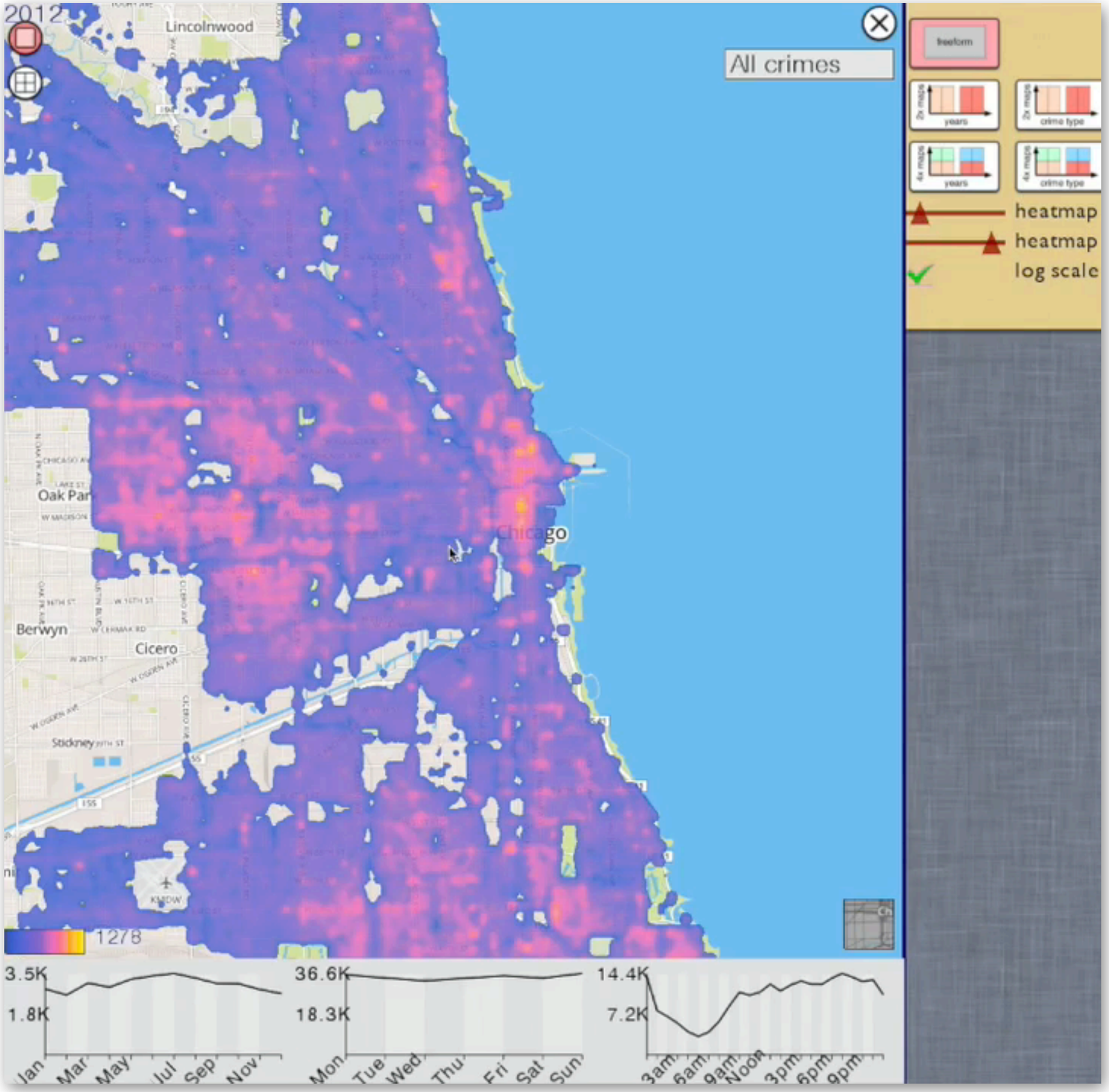
UIC CS

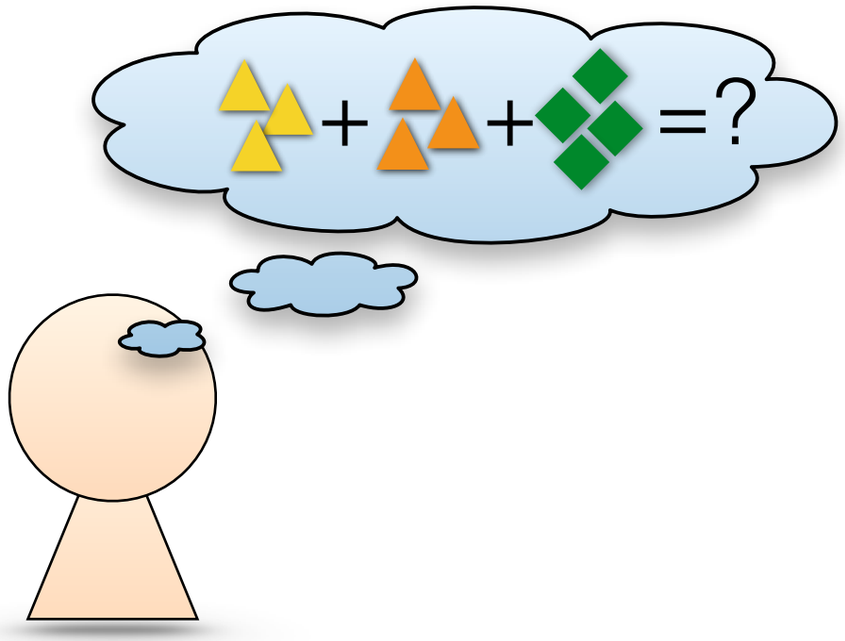
Human Factors in Visual Analytics

Can big large displays amplify people's perception and improve analysis in **big data** scenarios?


2012
Lincolnwood
All crimes
freeform
2x maps
years
2x maps
crime type
4x maps
years
4x maps
crime type
heatmap
heatmap
log scale
Oak Park
Chicago
Berwyn
Cicero
Stickney
1278
3.5K
1.8K
Jan
Mar
May
Jul
Sep
Nov
36.6K
18.3K
Mon
Tue
Wed
Thu
Fri
Sat
Sun
14.4K
7.2K
3am
6am
9am
Noon
3pm
6pm
9pm

information space

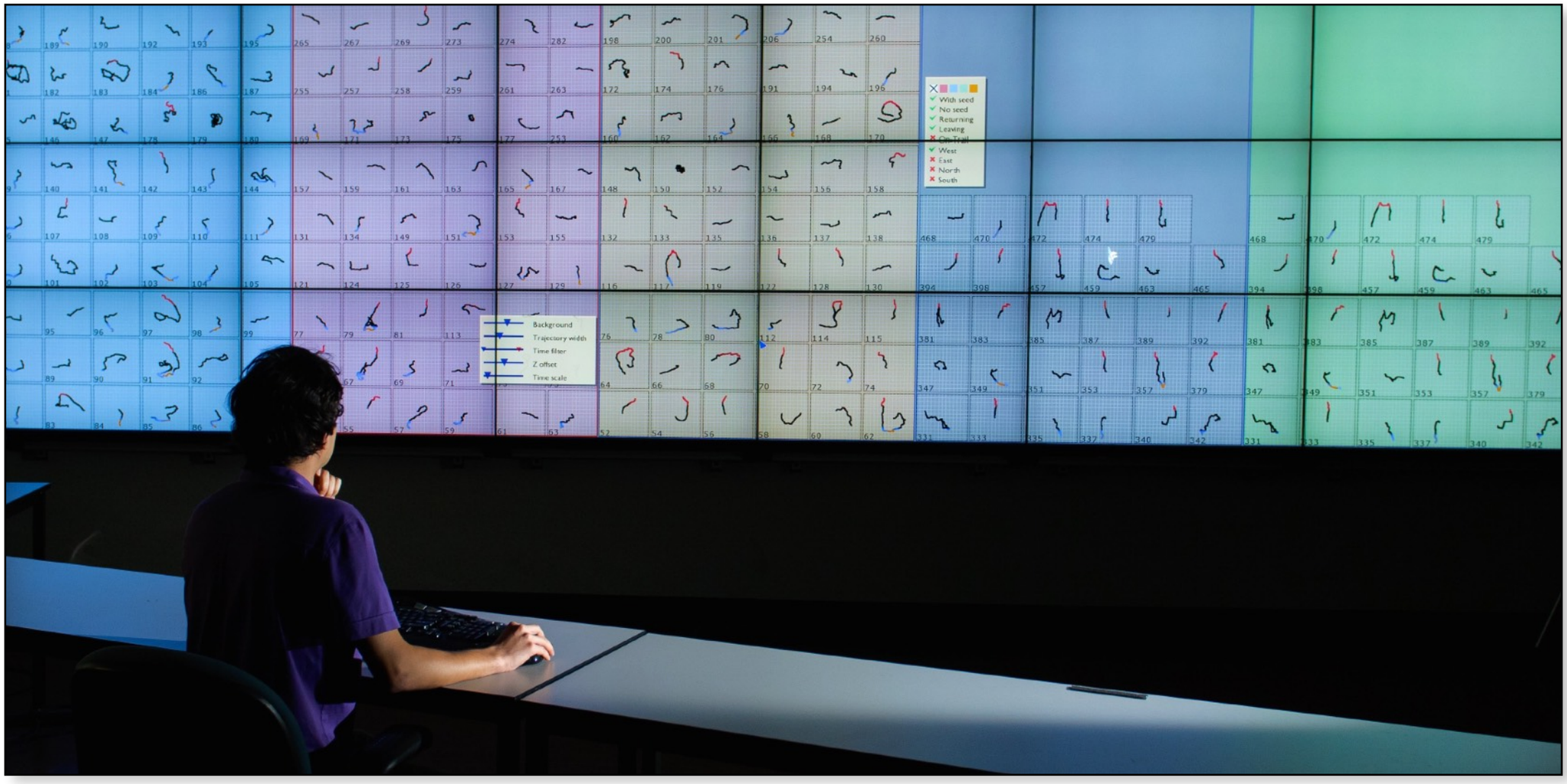
visualization

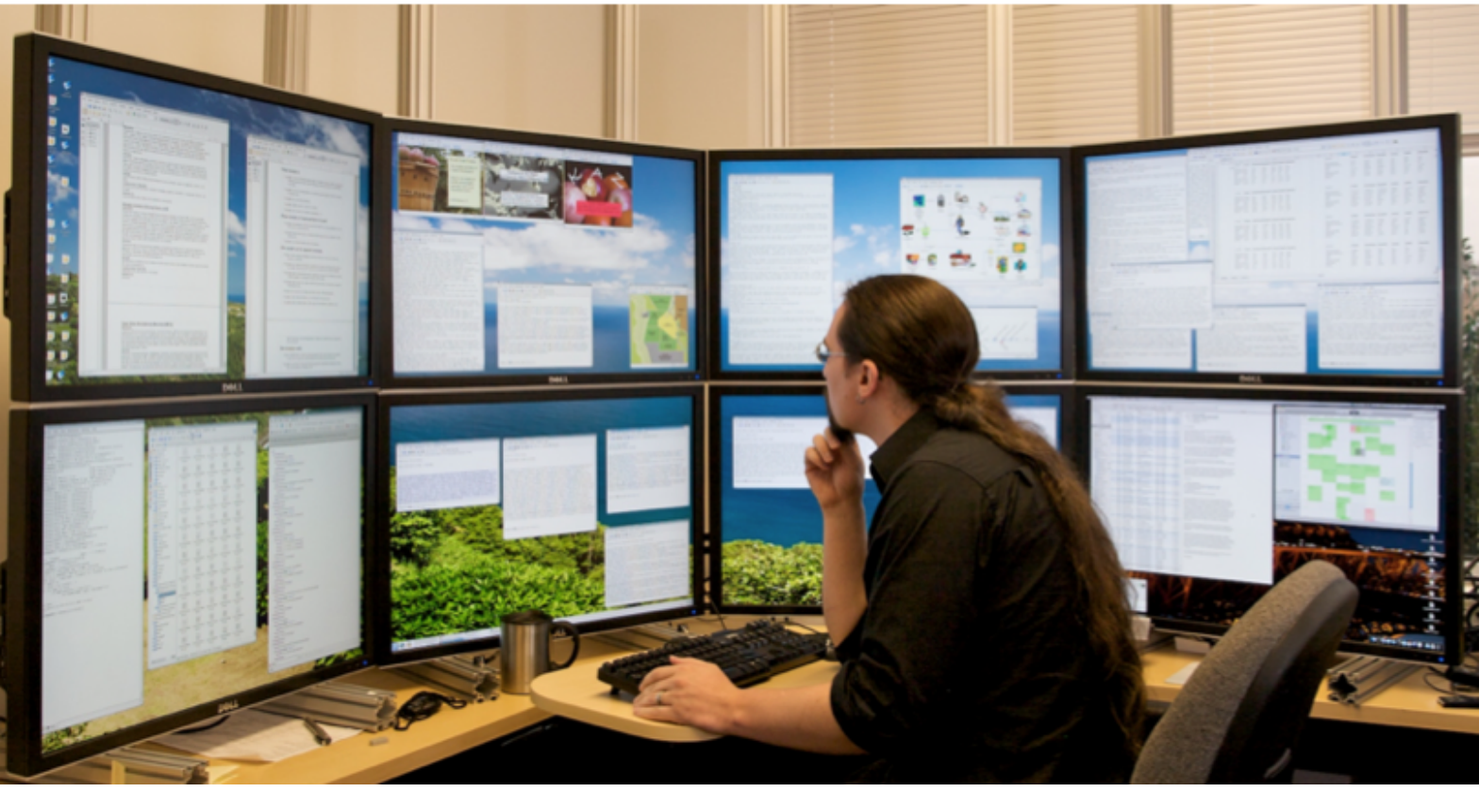


user

Is the **temporal-separation** of information detrimental to visual analysis?

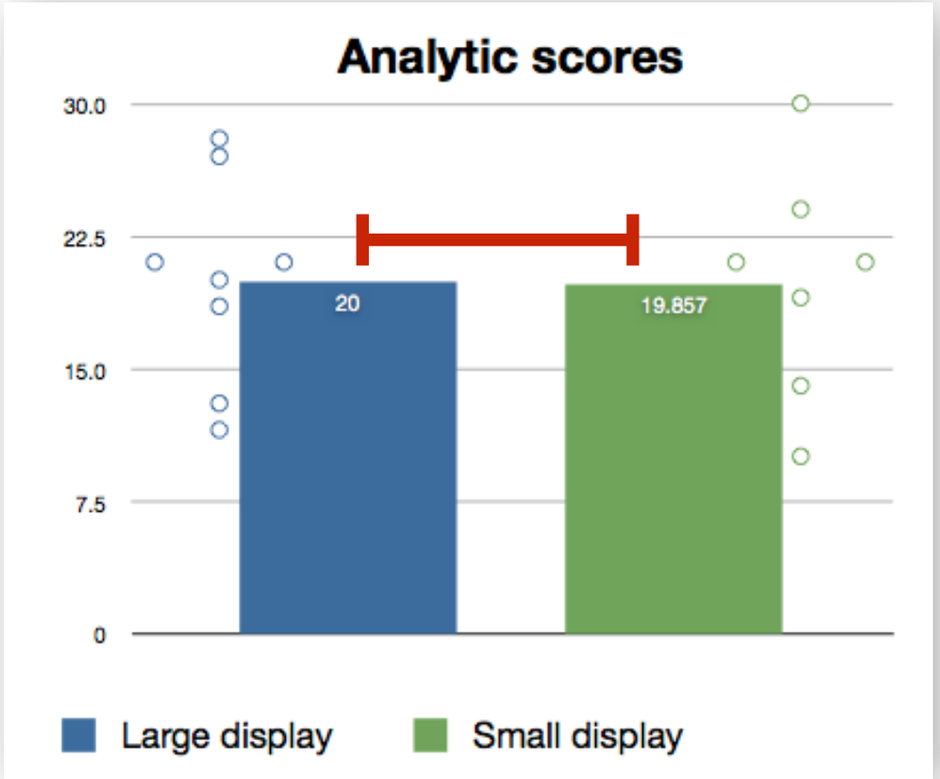
Are people better at analyzing information, when information is **distributed spatially?**

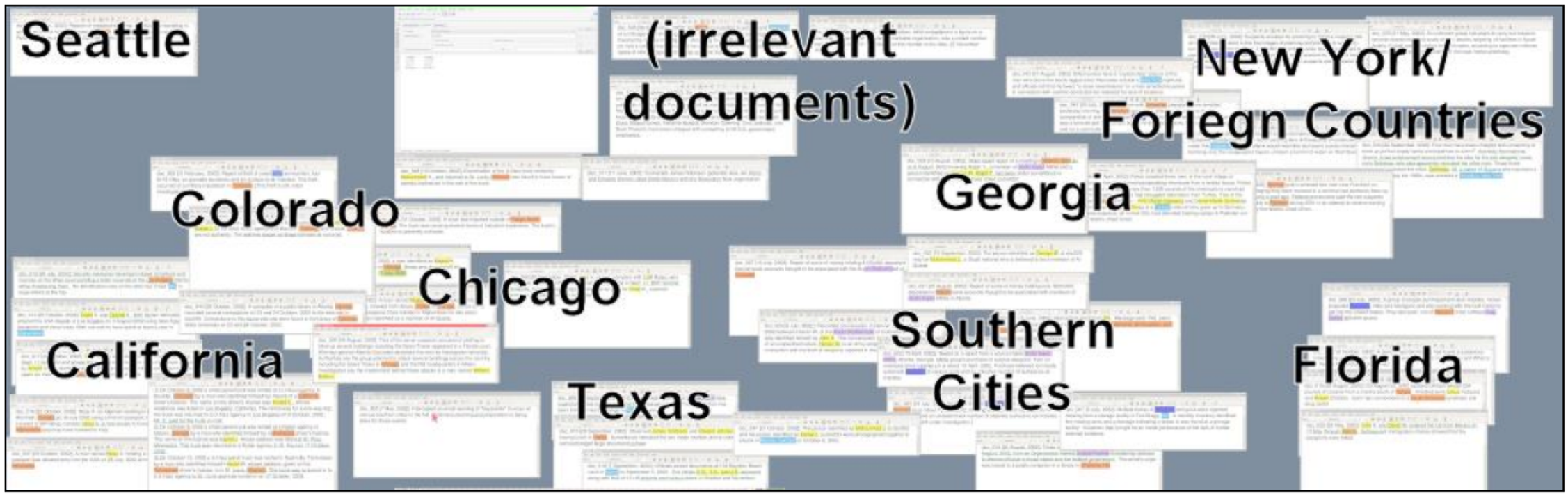




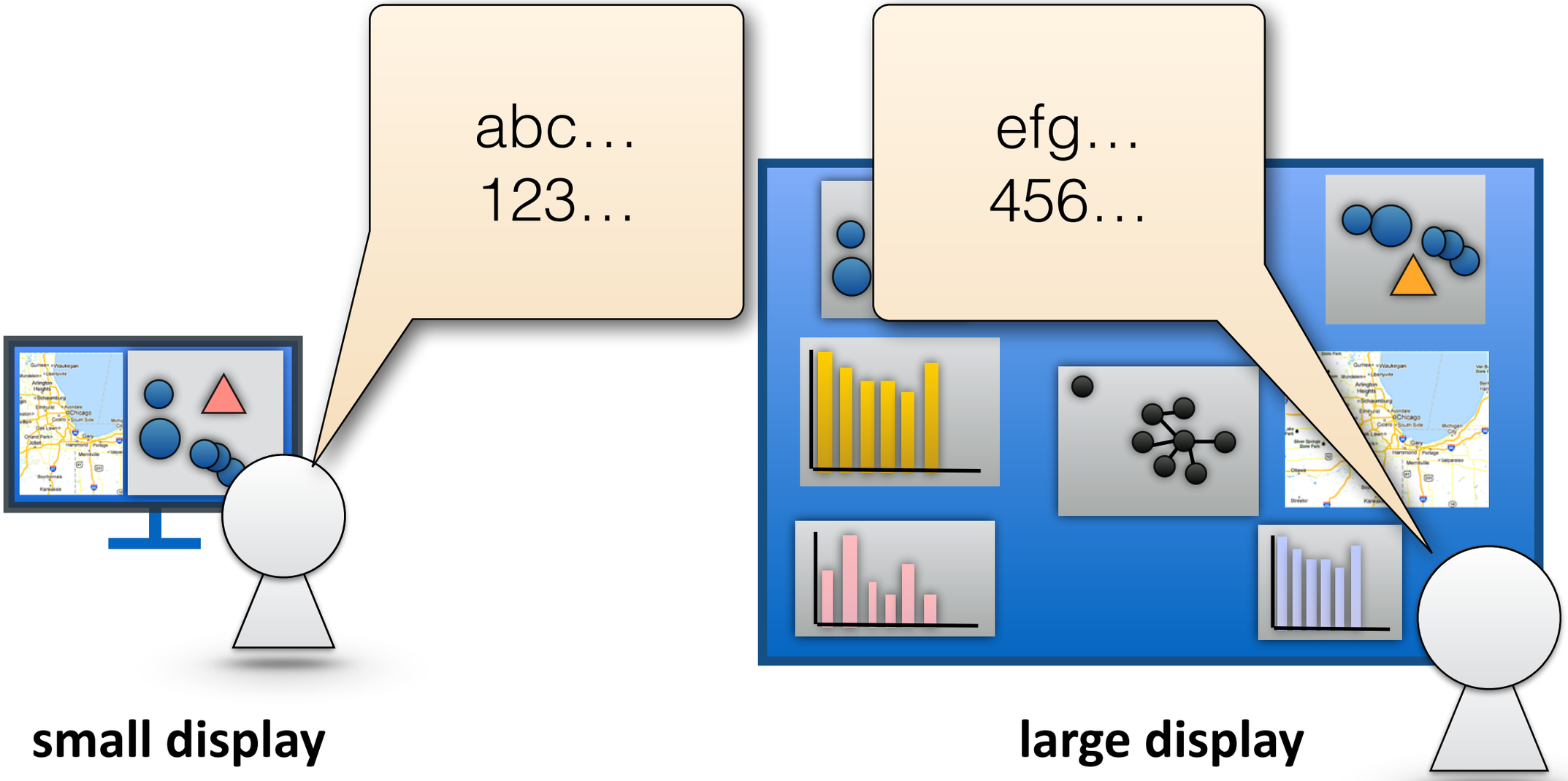
“Space to think”

Andrews et al., CHI’10





How many insights participate come up with?
And what is the nature of these insights?



small display
(temporal-separation)

large display
(spatial-separation)

Study Design

- Volunteer graduate students were recruited to participate. Had basic knowledge in data analysis and experience with big displays

- **Between subject design:** participants split evenly between two conditions (*small* vs. *large*)

- **Task:** visually explore and analyze crime patterns in **Chicago** over the last decade (~ 2.8 million data points)

- **Think-aloud protocol**

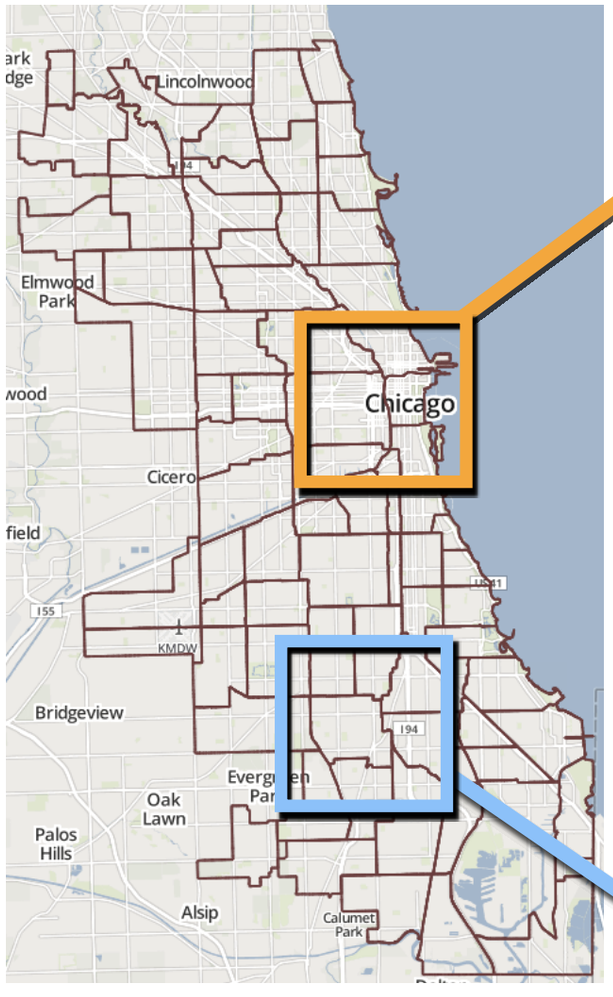
- **Open-ended exploration:** for a maximum of 2.5 hours

Visualization Interface

detail

overview map

magic lenses



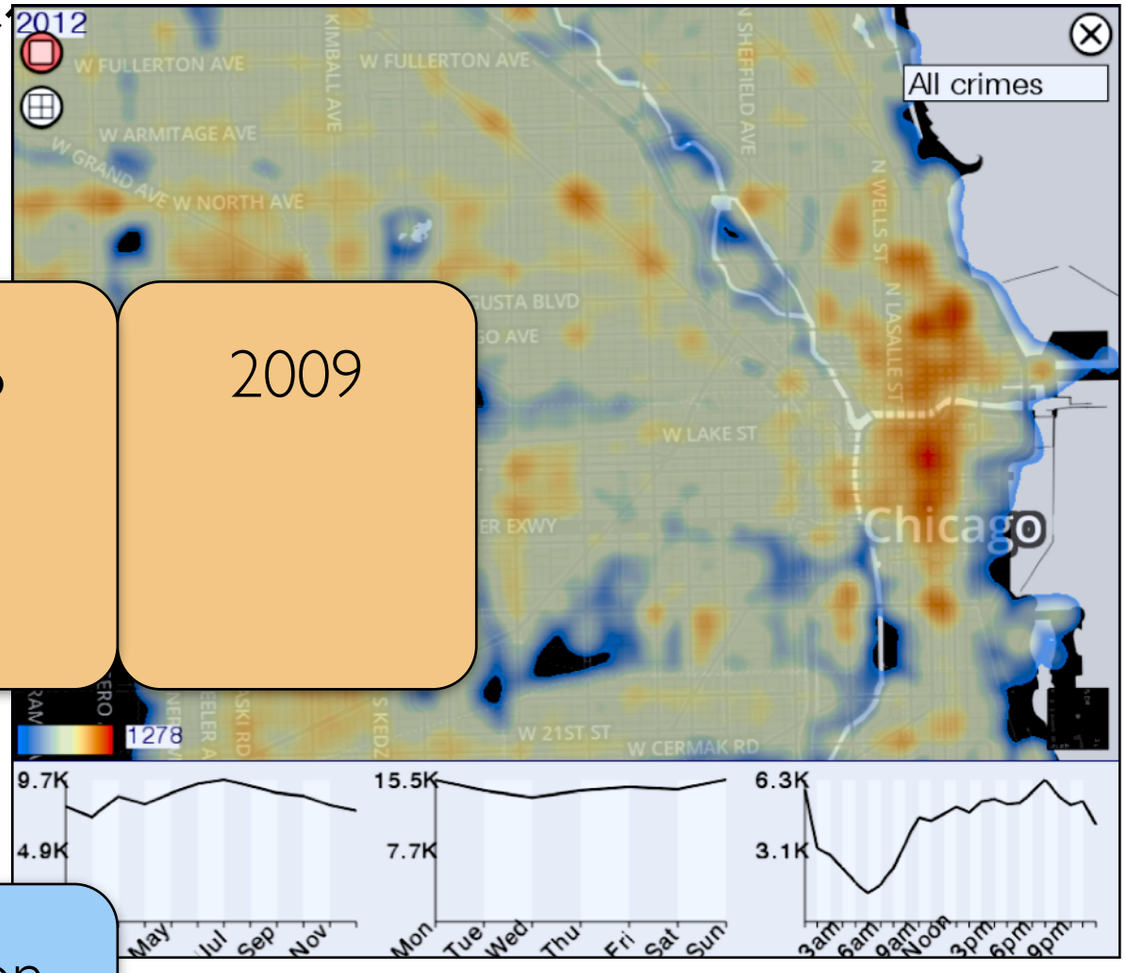
2012

2006

2009

narcotics

weapon violations



Two experimental conditions

small

3 x 4 panels
12 Megapixels
40° FOV

large

13 x 4 panels
54 Megapixels
190° FOV

4.5 X

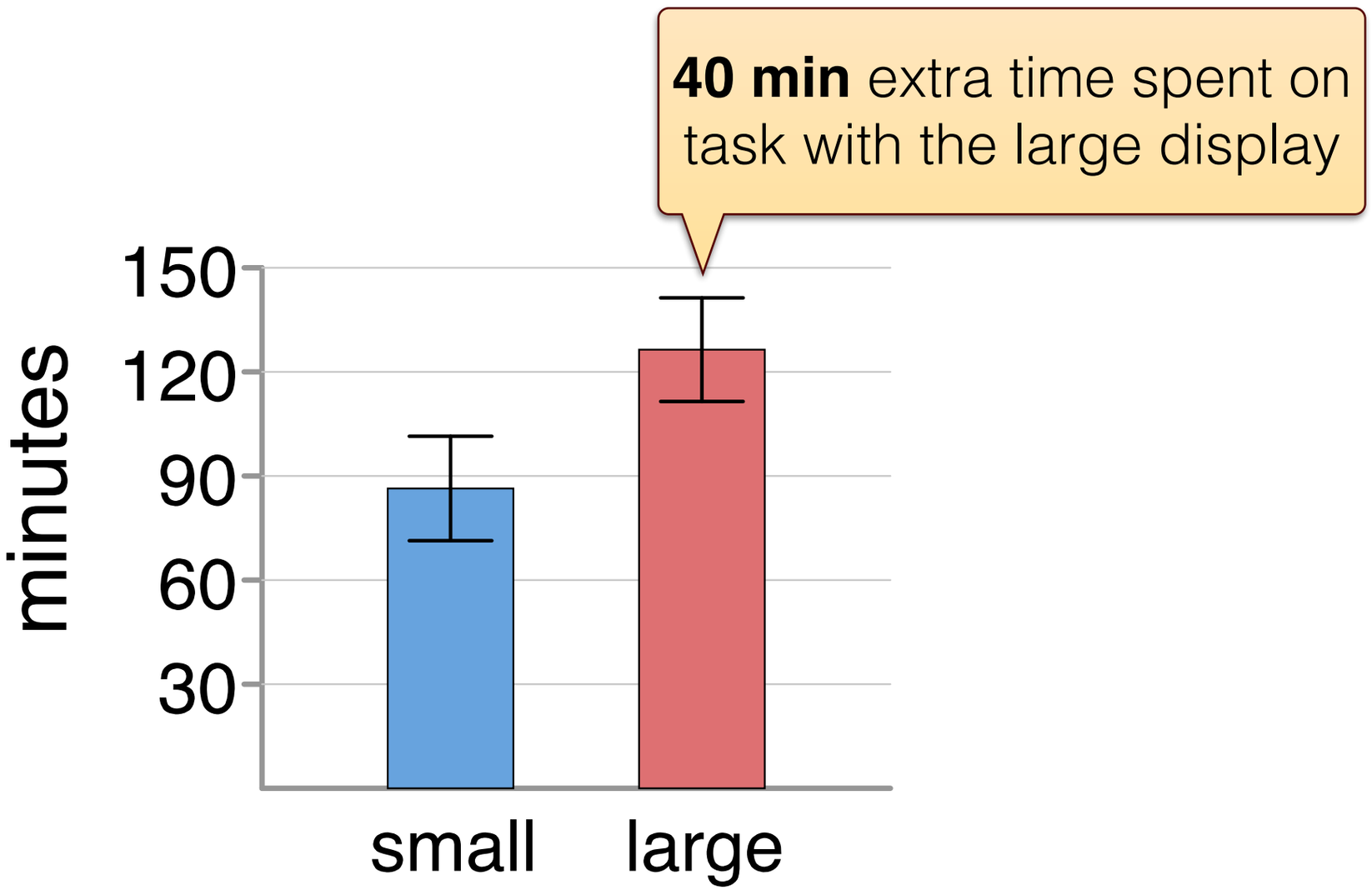
Analysis

- **Insights**
  - Observations
  - Hypotheses
  - Insight ***breadth*** score: ***1 … 5***

    1 — *"I can see a lot of non-serious crimes in downtown Chicago."*

    5 — *"A lot of people in the north-side are doing drugs, but they're not fighting - there are much fewer deaths resulting from the narcotics trade [compared to the south-side]"*
- **Exploration time:** how much time participants choose to spend on the task

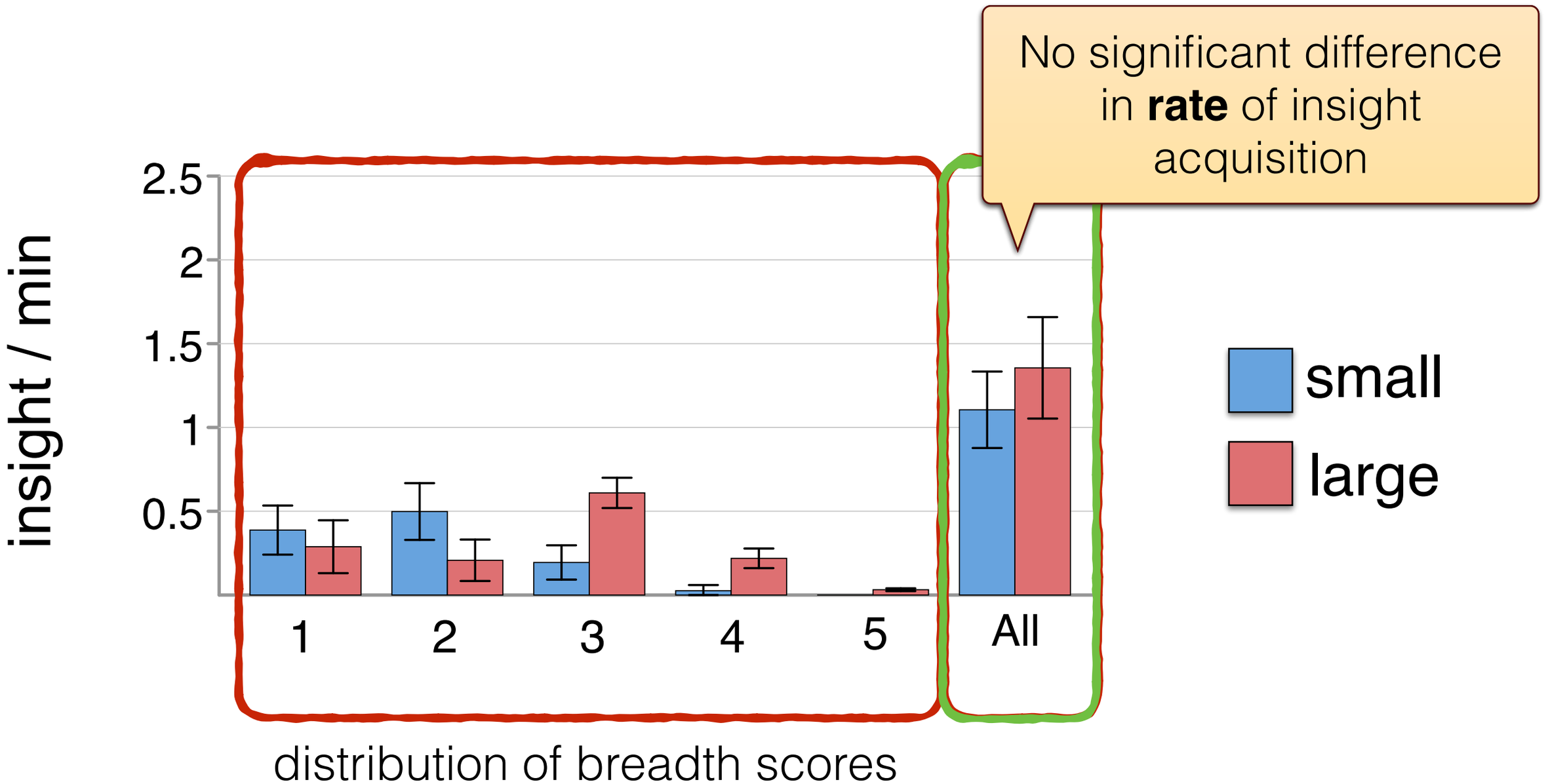
Exploration time



$p < .01$

results

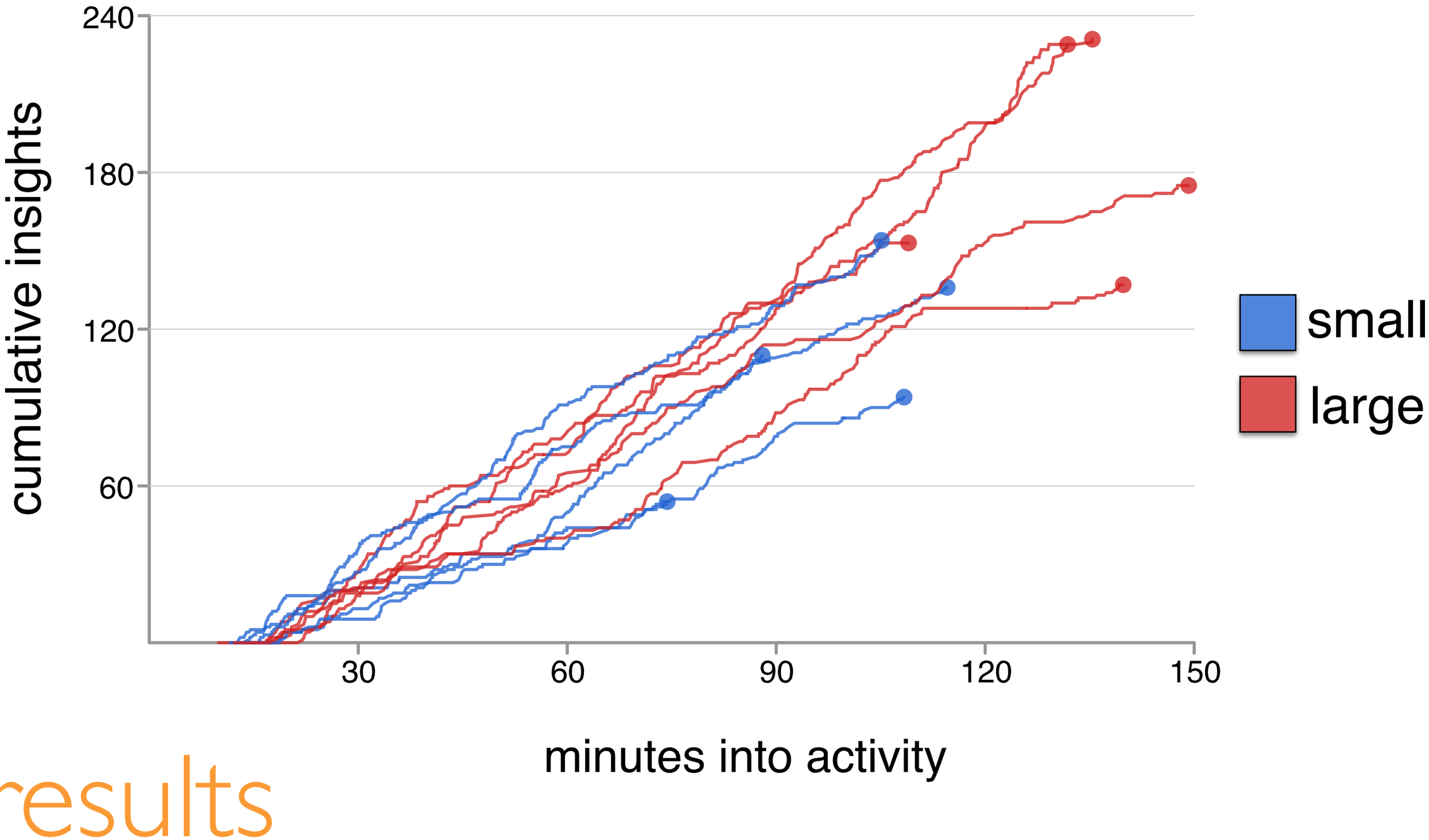
Reported insights



$\chi^2(4,1327) = 263.3,\ p < .001$ $p < .05$

results

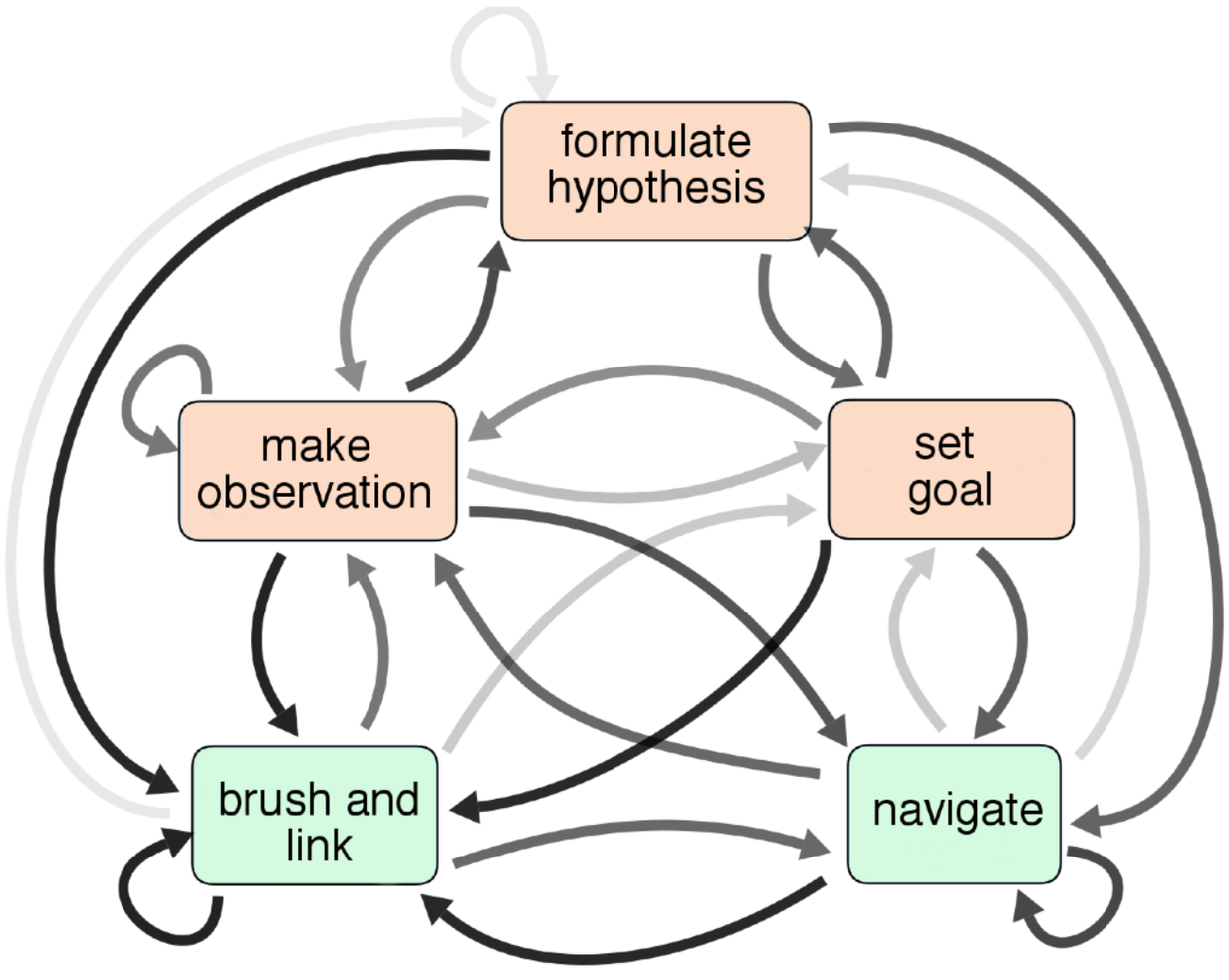
Insights over time

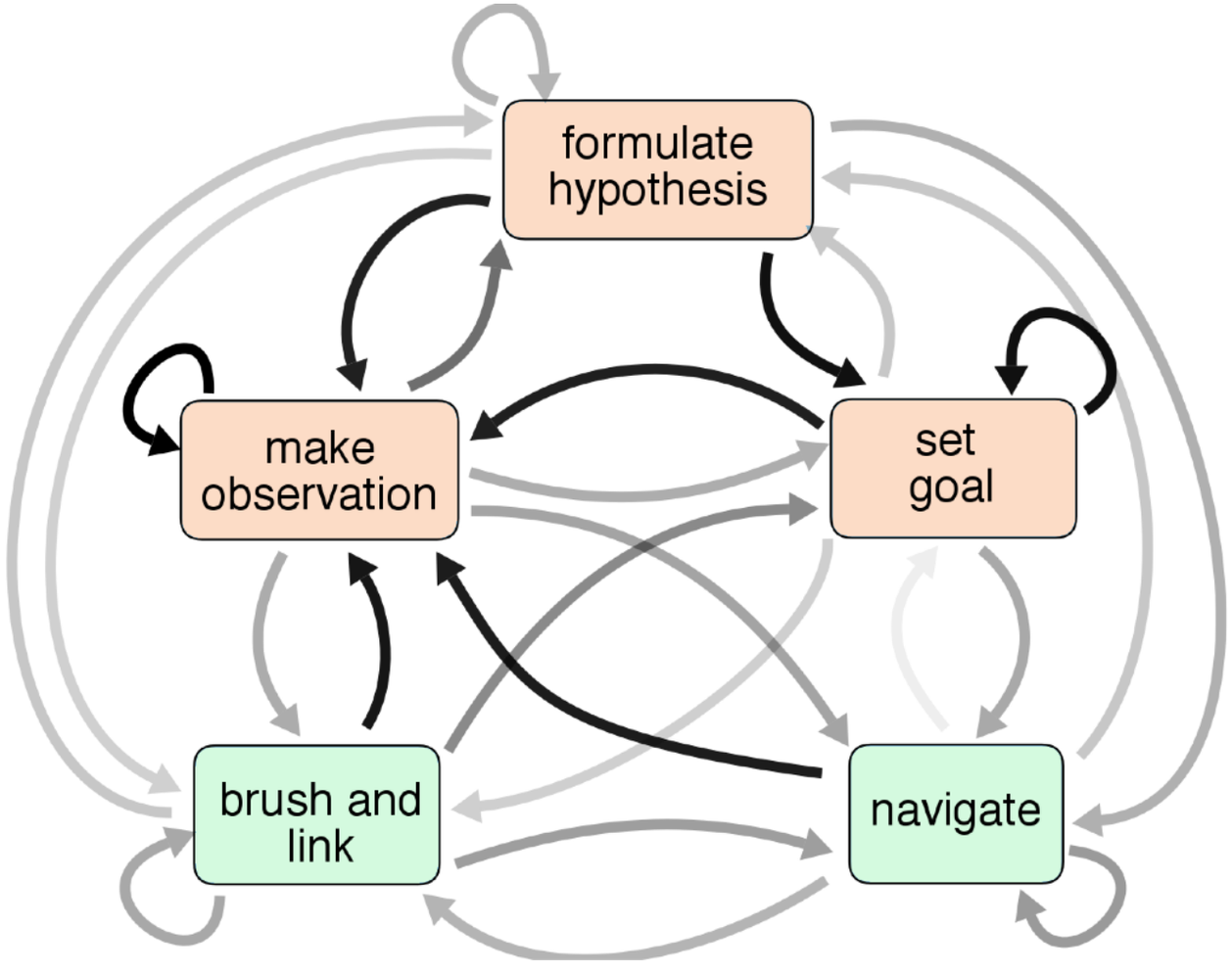


results

small display

large display





results

mental states

interaction states

Are **large displays** better for exploratory data analysis?

Big displays help users…

- discover more insights
- integrate different pieces of information
- engage with and spend more time on the analysis

On the other hand

- Big displays could discourage a narrower, more focused reading of the data
- Big display will decrease the speed of analyses (which maybe a good thing!)