

Deciphering Visual Cognition: The Influence of Line Chart Variations on Trust, Trend Perception, and Reproducibility

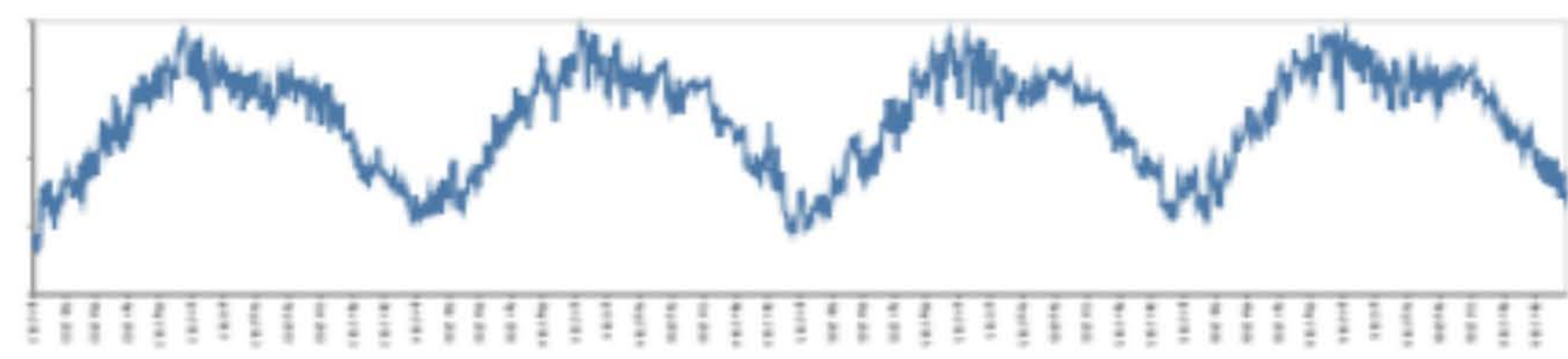
Rifat Ara Prama, Paul Rosen



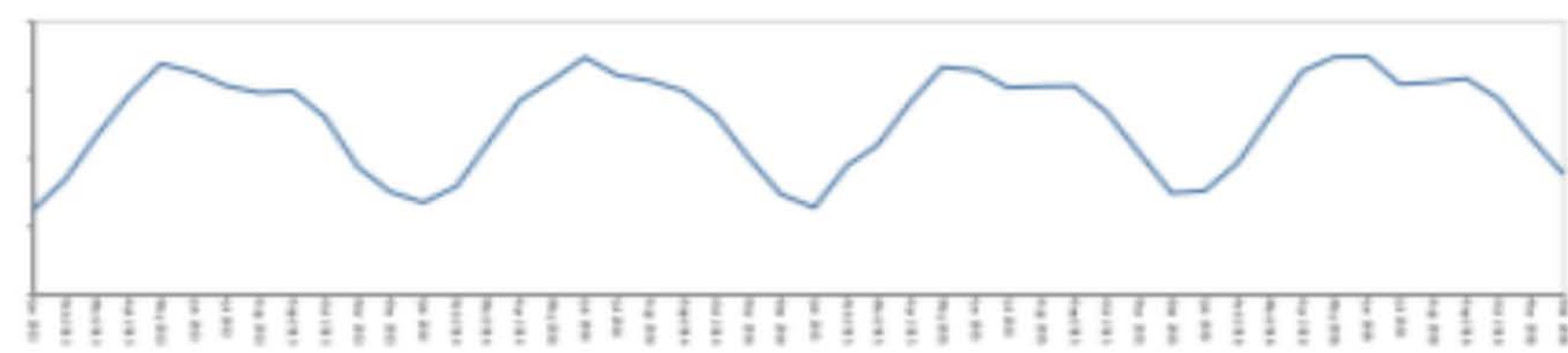
Line charts are a staple in the realm of data visualization. To design line charts that genuinely serve the designer's intent, it is critical to investigate how people discern and engage with these visual elements.



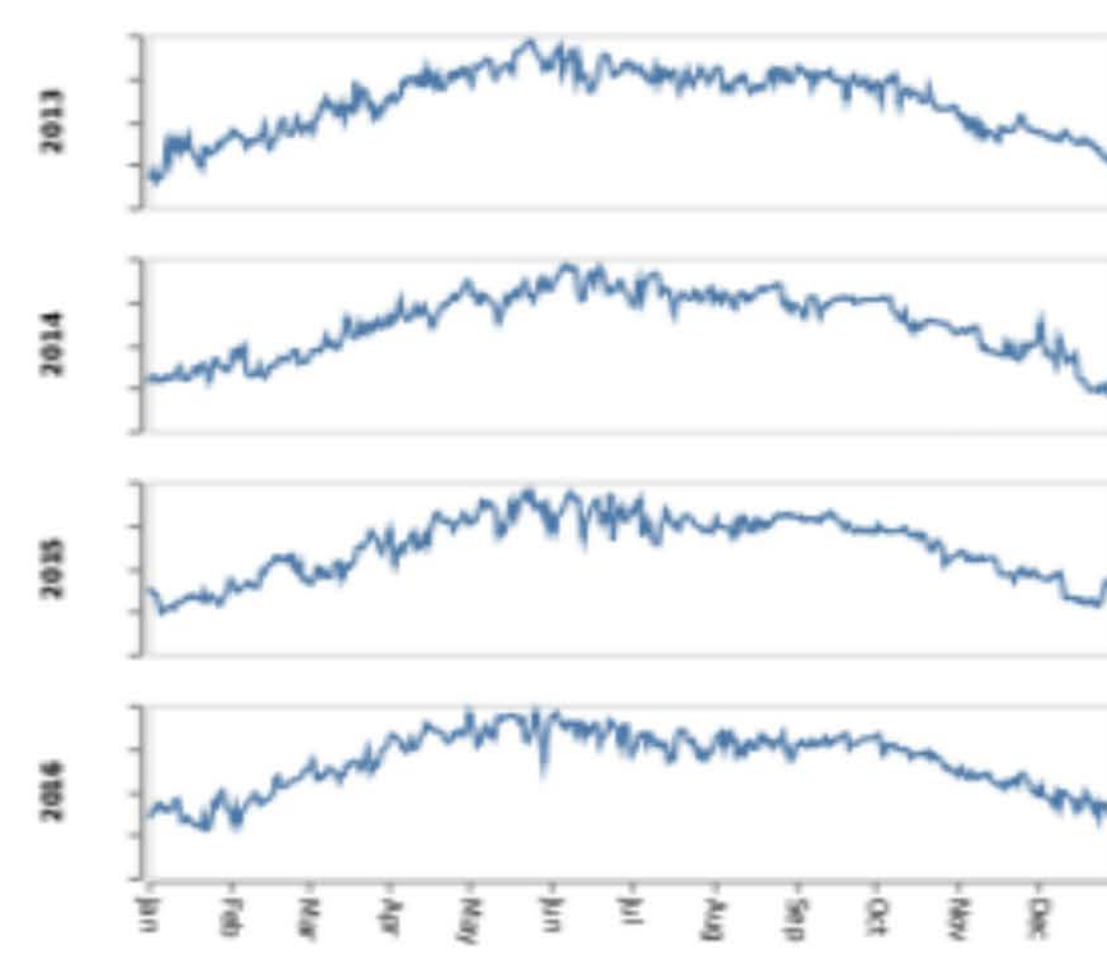
We explore, which **features of line charts viewers identify** and how they use this identification to **predict the future** and inform their **decision-making**.



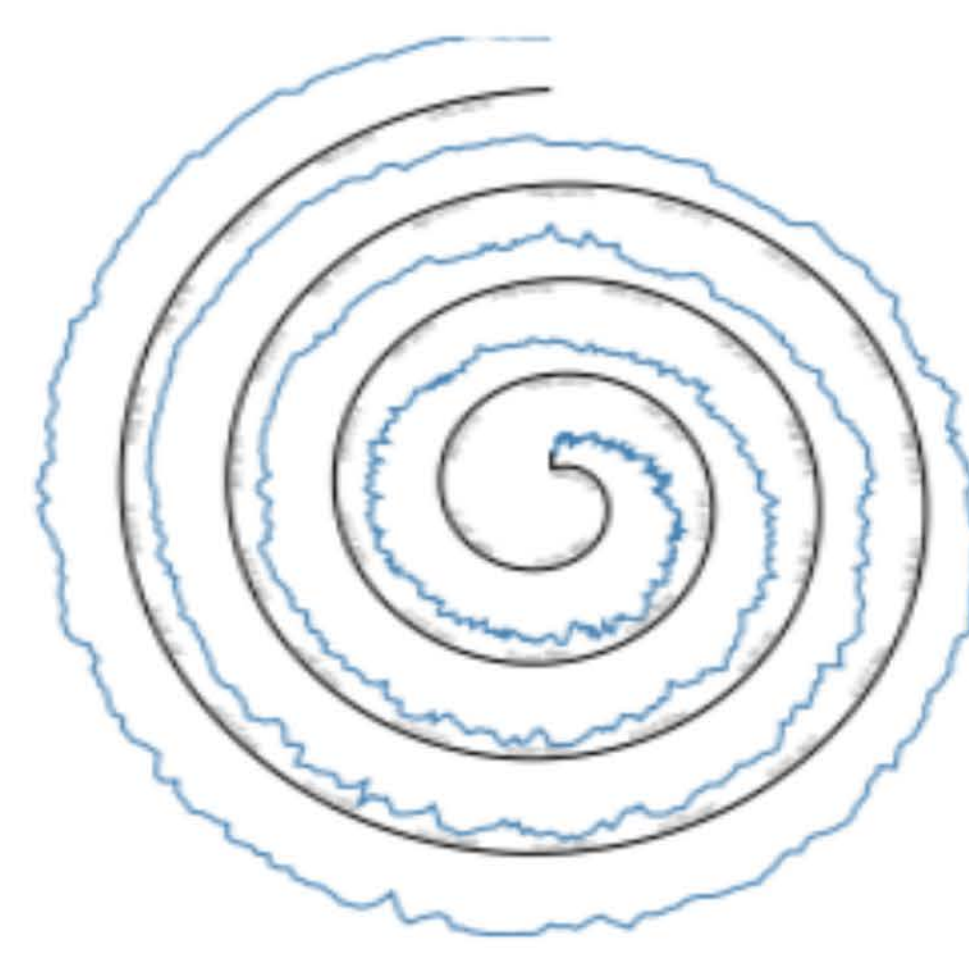
(a) Standard line chart



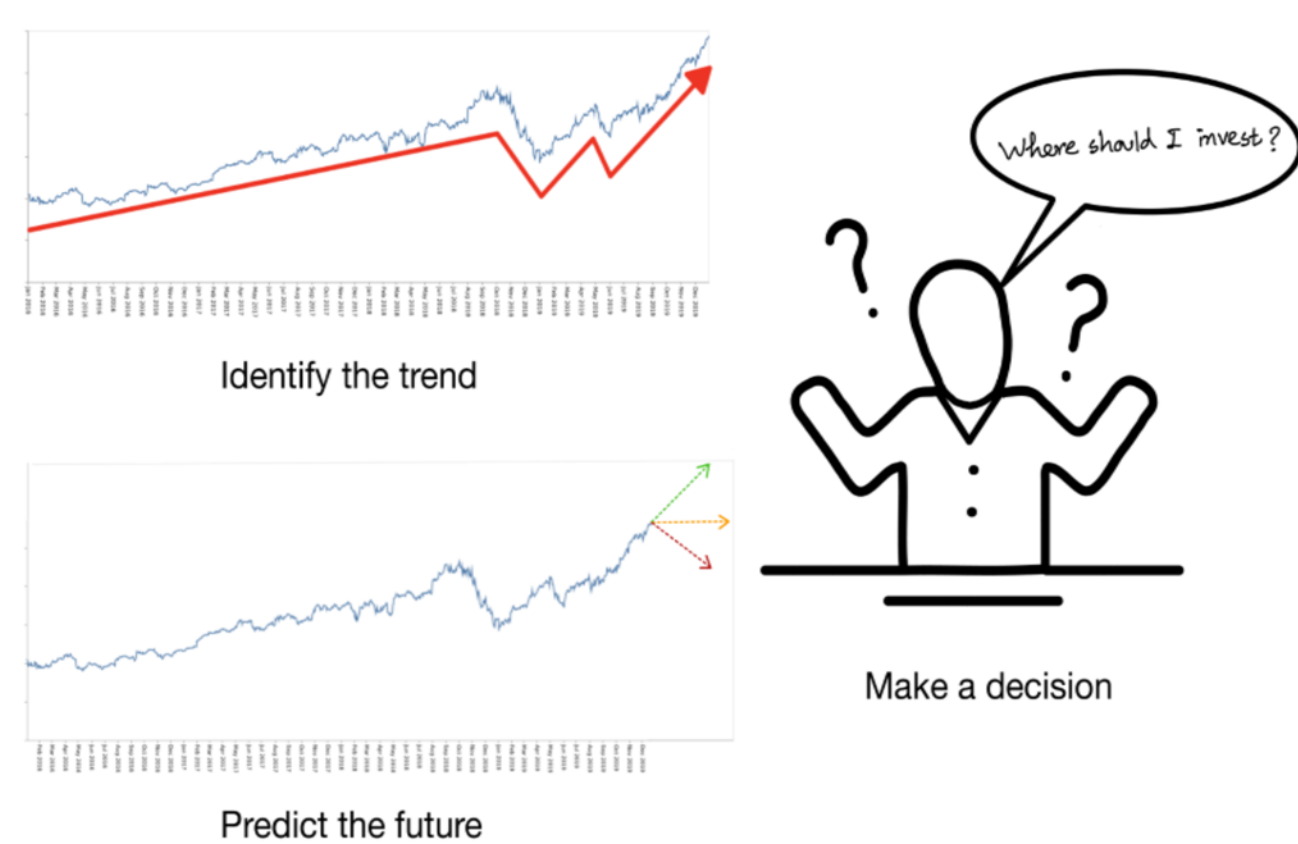
(b) Monthly aggregated chart



(c) Trellis chart



(d) Spiral chart



80 participants were recruited to perform **Trend Identification**, **Prediction Accuracy** and **Decision Making** tasks on different variations of line chart.

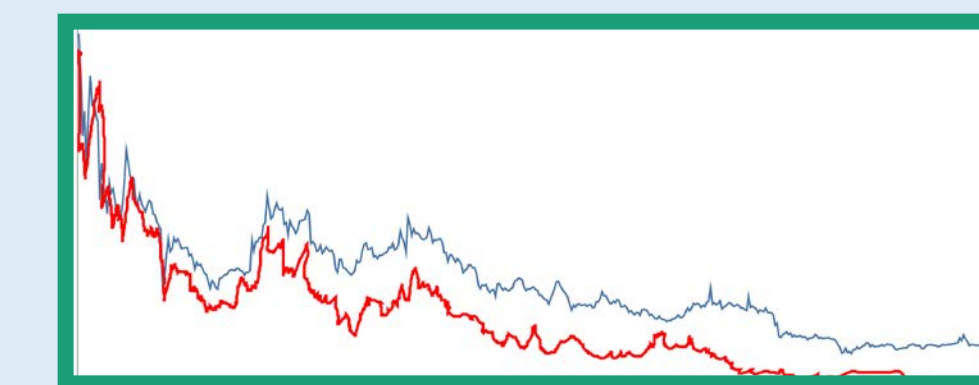
We found that aggregated chart and standard line chart are efficient for identifying trends, accurate predictions and being more trustworthy to users while making decisions compared to trellis and spiral charts.



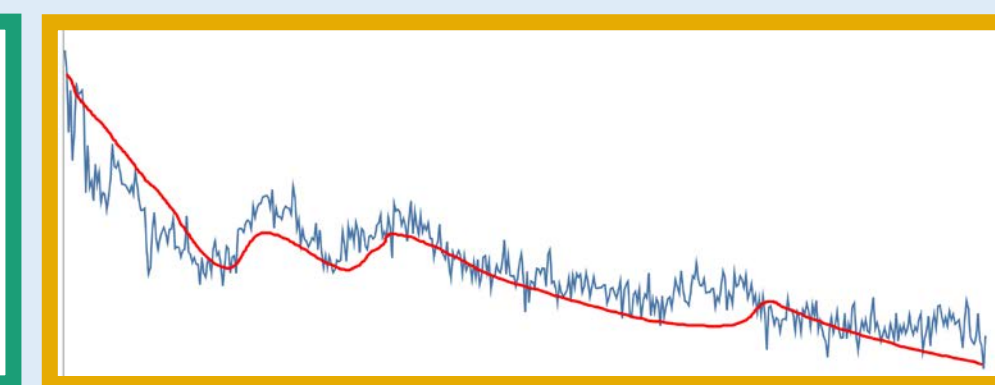
20 participants performed a **Visual Stenography** task where they saw a series of 9 different line charts and re-drew them.

People follow one of three **patterns of behaviors** when they re-draw line charts.

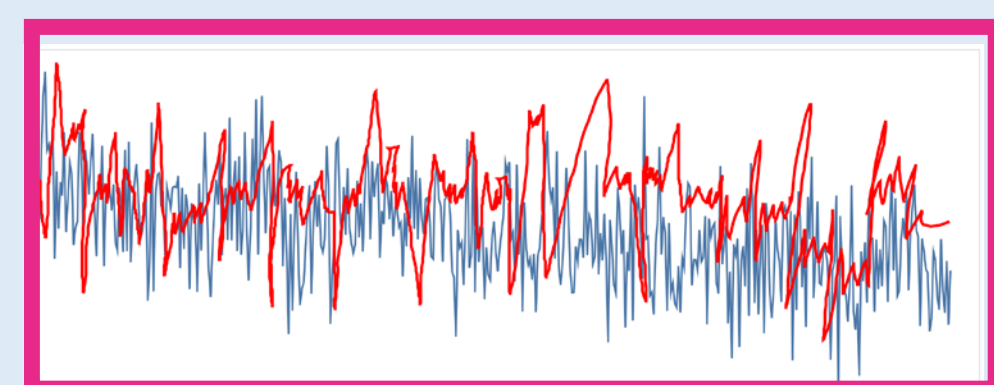
Replicator



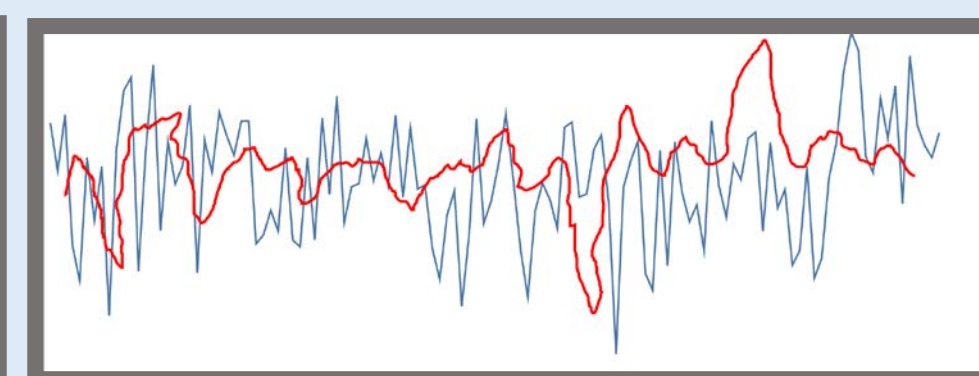
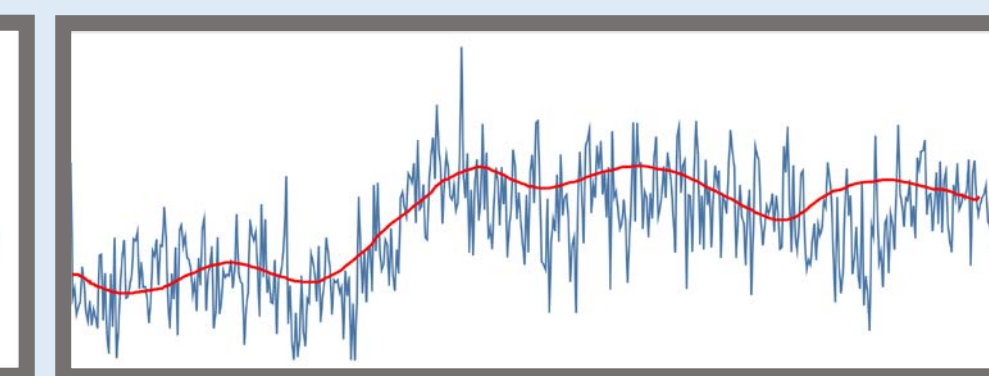
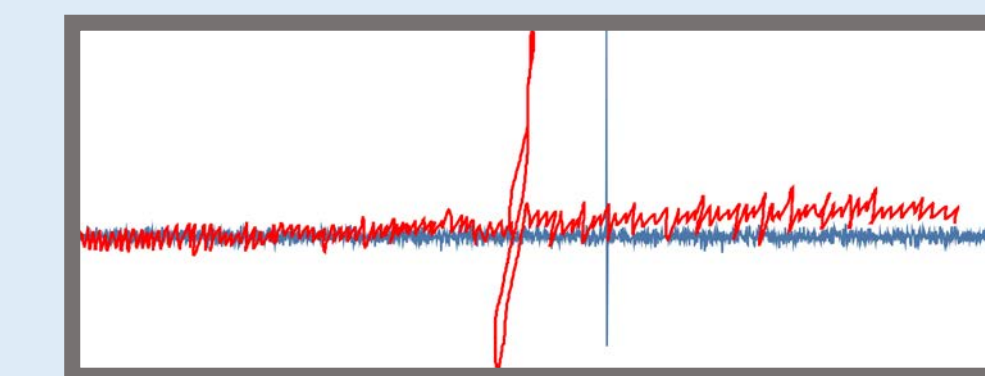
Trend-Keeper



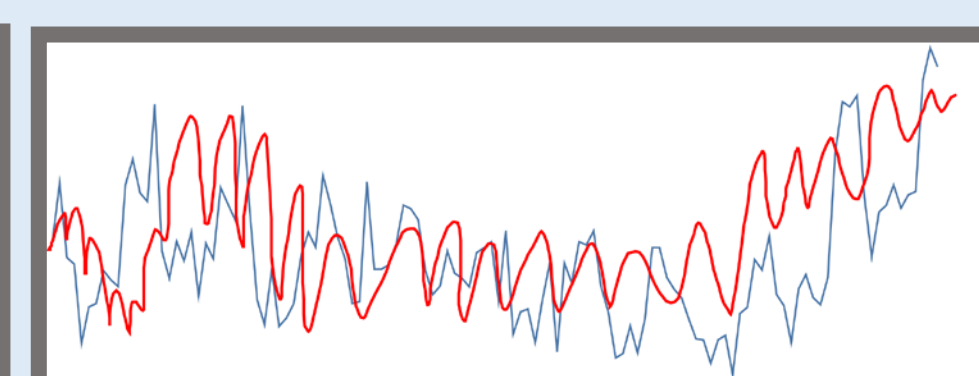
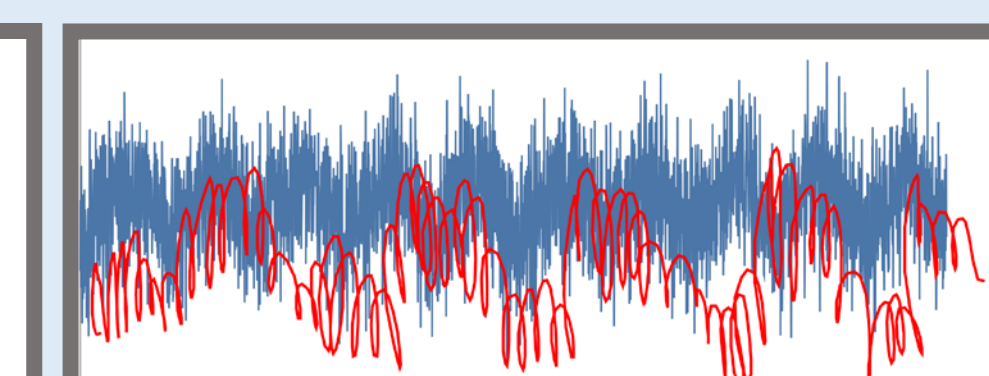
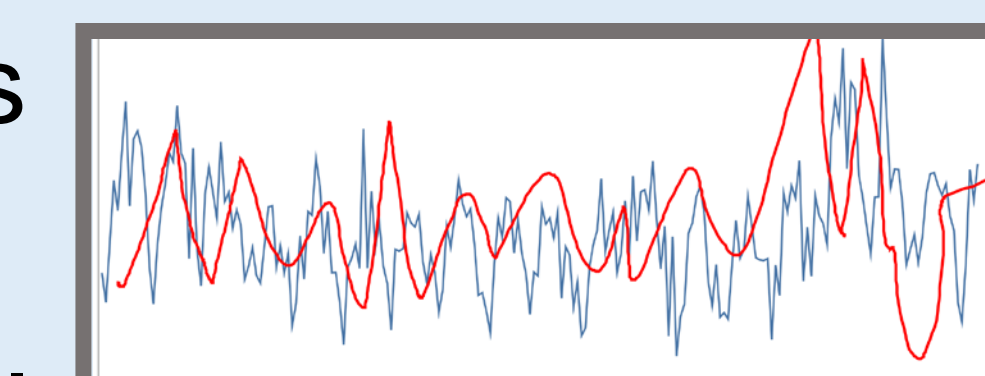
Overwhelmed



Viewers are generally **robust to noise** in terms of identifying trends, periodicity and peaks and valleys.



Periodicity and noisiness is often **represented semantically** in sketches.



These findings suggests that-

- Smoothing may not be necessary for trend identification.
- If a feature is important, annotate it to draw attention to it.