Teaching Information Visualization: A Playground for Classroom Response Systems and Declarative Programming Projects

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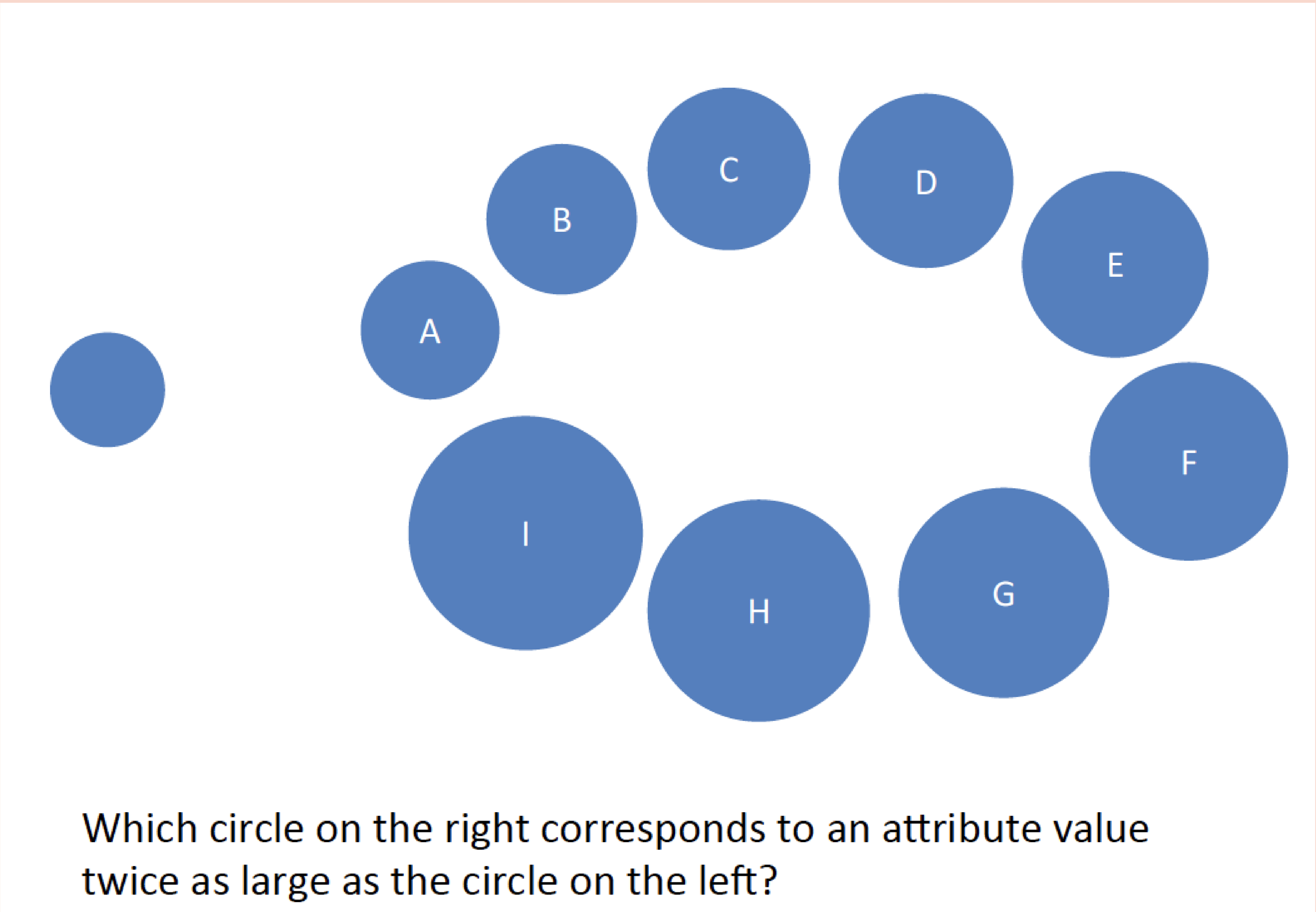
Course Schedule

- Concepts common to information and scientific visualization
  - visual perception, data representation, interpolation
  - color mapping, contouring
- Information visualization techniques
  - focus+context, tree and graph drawing, glyphs
  - fundamentals of human computer interaction
- Scientific visualization techniques
  - volume rendering, flow visualization

Classroom Response Systems (CRS)

- Traditional use: ConcepTests
  - prior knowledge and misconceptions
  - understanding of concepts taught in lecture
- Our additional approach:
  - interactive demonstration of perception phenomena
  - test of efficiency of visualization concepts
  - evaluation of visualization solutions

CRS Perception Phenomenon: Steven's Law

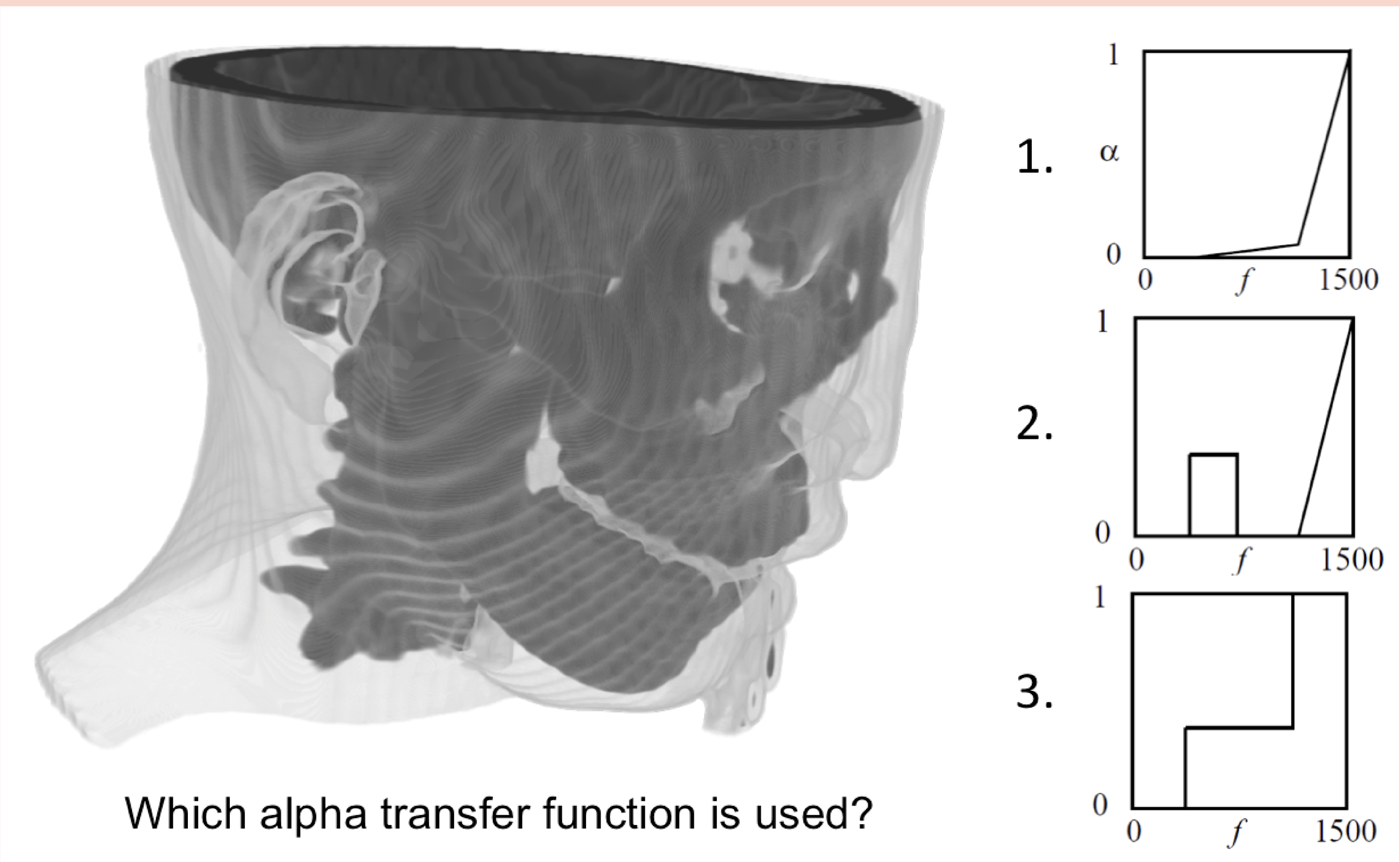


Classroom response:

Answer option	A	B	C	D	E	F	G	H	I
Frequency ($N = 12$)	0	0	4	2	3	1	0	1	1

Steven's law: $p(x) = c\,x^{\beta}$ with typical $\beta \approx 0.7$
$\rightarrow$ areas are underestimated

CRS ConcepTest: Volume Rendering



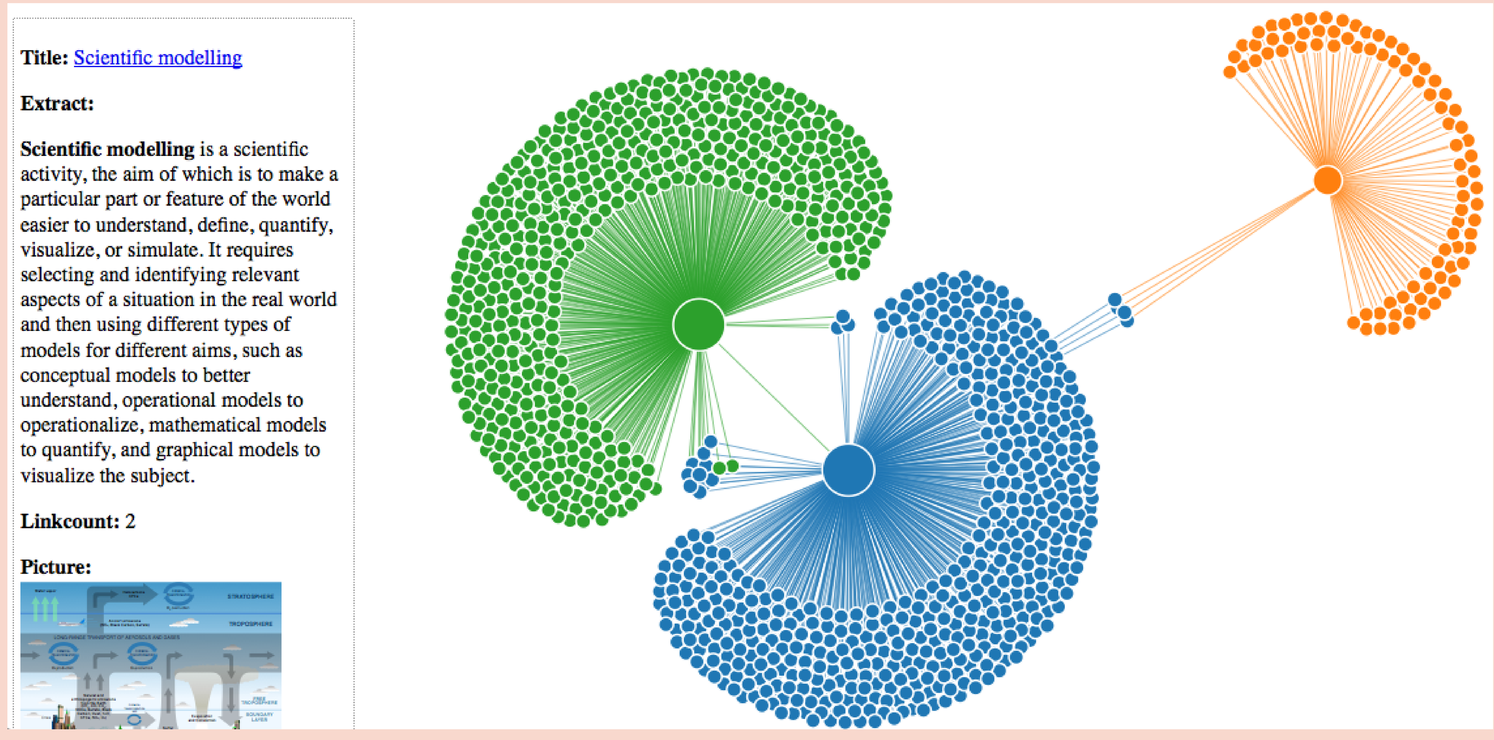
Classroom response:

Answer option	1	2	3
Frequency ($N = 13$)	2	6	5

Declarative Programming Projects

- Aim: put learned techniques into practice
  - get a feeling for good visualizations and for the benefit of interactivity
- Terms and conditions
  - second half of semester (7 weeks)
  - teams of two to three students
  - subject, data, and visualization approach of students' own choice
  - recommended use of D3.js $\longrightarrow$ get to know declarative programming

Student Project: Wikipedia References




```
node.filter(function(d) {
      return d.level == loadLevel - 1; })
  .append("svg:circle")
  .attr("r", function(d) {
      return rScale(d.weight); })
  .style("fill", function(d) {
      return nodeColors(d.level); });
```

Simon Beckstein, Julian Scheichel, Dominik Schöner (1st year master)

Work in Progress

- Make use of personalization functionality of CRS
  - connections between answers of each student to different questions
  - let students create multivariate data
- Show immediate effect on visualization
  - parallel coordinates, scatter plots
  - graph drawing

Evaluation

- Evaluation in 1st year master classes
- Main observations:
  - Using CRS in innovative ways enhances the understanding of perception phenomena and visualization concepts, which manifests itself in more knowledgable use of visualization techniques.
  - D3 has a motivating effect due to its declarative programming model unknown to most students.

References

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