Gestalt visualization proposal

Information visualization concerns itself with presenting data so as to facilitate interpretation of it. This still leaves open how one should evaluate such a visualization. Should the main factor be usability, but if so then usability for what purpose? Do attractiveness and memorability play a role? Thus, the question of how aesthetics influences user interactions with and reactions to a given visualization is a core question in this field.

A basic assumption of that question is that it is known what it means for something to be aesthetically pleasing. In fact, this is the topic of much research in the area of gestalt psychology. There, many principles have been identified and investigated that help something to be perceived as a unified whole, or gestalt, more than the simple sum of its parts. For example, the principle of similarity states that people tend to perceive similar objects as parts of a whole (see Fig. 1). It makes sense to build upon this research in asking how the individual gestalt principles contribute to a "better" graph visualization. Our hypothesis is that gestalt principles contribute to aesthetic appeal and analytic performance in force directed layout networks.

The plan is to design and conduct a survey which will present subjects with graph embeddings following various gestalt principles to varying degrees and then ask users to perform tasks and provide preferences. We will use these responses to evaluate which graphs are more aesthetically appealing and/or usable, and thus whether and which gestalt principles had the most impact. The generation of these graphs will require an extensive literature survey to match gestalt principles to the layout heuristics, such as minimizing edge crossings, which have tended to be the focus of previous graph visualization research. We will perform this survey of the literature with the aid of the StarVis system (?), which allows sources to be tagged and searched in an intuitive manner (cite). Once the matchings between heuristics and gestalt principles have been identified, we can design and then carry out the user study.
(Add something about making the literature survey available, or is it just for us?)

Figure 1: "The example above (containing 11 distinct objects) appears as a *single unit* because all of the shapes have *similarity*." (reproduced from Spokane Falls GD, cite!)

We have yet to decide whether the user study will be conducted in person or, for example, via Amazon's Mechanical Turk. In either case, as we would prefer a between user study, the length and thus the number of test factors will need to be limited in order to retain the interest of our subjects.
Actually, there are a lot of "survey design heuristics"—is it really worth listing them? I can go back and do more if necessary.

So...anything left to discuss?

1 Syllabus

1.1 Aspirational learning outcomes

Gain skills in:

1. Research methods/processes
2. Reading papers
3. Designing/carrying out a survey
4. Compiling results into a paper
5. Steps involved in publishing a paper

1.2 Expected work

Phase 1

1. Survey of gestalt/graph vis papers (Scan papers, decide most relevant, read those more in depth, discuss with Stephen and compare)
2. Use StarVis to compile/organize what's there/what's relevant
3. Update gestalt-heuristics matchings

Phase 2

1. Make a poster
2. Use phase 1 work to update hypotheses/survey goals
3. Program visualizations, etc, to spread over factors want to test
4. Design survey to gather that info

Phase 3

1. Conduct prototype study as test run and make any necessary modifications (make sure likely to collect the data we're looking for)
2. Run full user study

Phase 4

1. Analyze data (correlations, confoundings, etc)
2. Come to conclusions (yes/no to Hs?)
3. Write up paper/make pretty figures

1.3 Expected meetings

1. At least once a week (on skype, after no longer in same country)
2. Plus email
3. Plus anything else that comes up?

1.4 Expected product(s)

1. Survey of existing lit(?)
2. Framework to generate survey graphs(?)
3. Data from survey
4. Research paper

1.5 Criteria for evaluation

1. Work completed with reasonable thoroughness, best practices
2. Completed on reasonable timeline (Note: phases not entirely sequential), for example:
   (a) Phase 1 by mid July (3 weeks)
   (b) Phase 2 by first week of August (3 more)
   (c) Phase 3 by early Sept (4 weeks)
   (d) Phase 4 by end Sept (2.5?) (two possible conference deadlines)
3. ???