**EXAMPLES AND QUESTIONNAIRE MODULE**

**Project title**: Visualizing Uncertainty with Chromatic Aberration

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**Questionnaire Setup and Arrangement:**

The existing evaluation of uncertainty representation named VSUP used grid-chart method with a custom color set. We will be comparing VSUP with Chromatic Aberration (CA)using both a grid-chart and bubble-chart. So, the questionnaire arrangement is made with the following sections:

* A: CA + Bubble
* B: CA + Grid
* C: VSUP + Bubble
* D: VSUP + Grid

To make the comparison fair, we have grouped our uncertainties to 4 levels since VSUP also uses four levels of uncertainties. In our case, we have quantized our CA data and made four equidistant values of [33, 52, 71, 90] to draw the aberration in both circles and rectangles. In addition, to fill the circles and rectangles of CA, we have used the eight standard VSUP colors to make the evaluation consistent.

We have also implemented counter balancing in the questionnaire presentation. That means every four users will see the questionnaire by the following orders:

**Would be best to use Balanced Latin Squares:**

**https://www.yorku.ca/mack/RN-Counterbalancing.html**

Shape

Description automatically generated with medium confidence

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | D |
| B | C | D | A |
| C | D | A | B |
| D | A | B | C |

Every section consists of eight questions, but the order of the questions is randomly chosen by the system. So, the number of questions and the content of the questions will remain the same but in a different order for different participants.

So, at the first place when participant will navigate to the given URL of our online application, they will see the following screen to provide their email address:

**Graphical user interface, application

Description automatically generated**

After providing the email address, the user will see one of the four sections. The layout of the questionnaire design will be as follows:

**<NOTE: change “Lookup Legend Area” to just “Legend Area”>**

**Graphical user interface, application, PowerPoint

Description automatically generated**

At the beginning of every section, the bottom-right part the of the UI will show the Session description. The researcher will describe the features (chart, legend and how question will be asked and what does that mean, etc.). After completion of explanation, the participant is asked to hit ‘Start’ button as the following screen:

**Graphical user interface, text, application

Description automatically generated**

Once she or he presses the ‘Start’ button, the questionnaire will be started immediately and will present one question at a time. For example:

**Text

Description automatically generated with low confidence**

The user then needs to select a cell (bubble or rectangle) from the chart based on the provided Value and Uncertainty/CA combination. After a cell is selected by the user, the next question will appear at the same place until it reaches to eighth question of the section.

Since the bubble chart and the grid chart are components of evaluation criteria, we have presented the subsequent portions of the examples and questionnaires in the following sequences:

**< if this is always the order doesn’t this contradict the counter balancing you discussed earlier?>**

1. Examples of CA in Bubble Charts
2. Questionnaire Section-1: CA + Bubble
3. Questionnaire Section-2: VSUP + Bubble
4. Example of Grid Chart
5. Questionnaire Section-3: CA + Grid
6. Questionnaire Section-4: VSUP + Grid

**Examples of CA in Bubble Charts:**

**Rest of content will continue…**