0. SECTIONS

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1. PROJECT

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Title: Robust Assessment and Communication of Environmental Risk (RACER) under the Probability, Uncertainty & Risk in the Environment (PURE) Consortium

Dates: 5 October 2015—31 March 2017

Funding organisation: NERC

Grant no.: NE/J017221/1

2. DATASET

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Title: Eye Tracking of Vegetable Shipping Line Graph Testing Survey

Description: Eye-tracking and survey results a survey designed to determine if how uncertainty information was displayed changed users’ decisions from and interpretations of the data. Participants for the survey were 65 students from the University of Reading. Participants were recruited by email. They received £10 for participating in the experiment.

Creator(s): Kelsey J. Mulder, Louis Williams, Matthew Lickiss, Alison Black, Andrew Chalton-Perez, Rachel McCloy, Eugene McSorley

Organisation(s): University of Reading

3. TERMS OF USE

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4. CONTENTS

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2017\_01\_13\_Fixation\_Location\_data.csv

These were data from the eye-tracking experiment showing the locations of the fixations. Because each participant had multiple eye fixations within each question and each graphic type, there are multiple rows for each participant. The column headings are as follows:

**Major**: what degree program the respondent studied.

**Recording: t**he major and participant number (which can also be found in the survey response data file below (2017\_01\_13\_survey\_response\_data.csv).

**Image:** Structured by graphic type (boxplot, fan, spaghetti, median—also known as the deterministic line forecast), question number (1: ship decision, 2: confidence, 3: best-guess, 4: maximum ice thickness, 5: minimum ice thickness), probability (30, 50, 70), and whether or not there was a median line on the plot (only noted if there was no median line). For example, if the image was fan4\_30\_no\_median.PNG, it corresponds to the fan plot, maximum ice thickness, 30% forecast with no median.

**Trial\_Label:** Order in which each respondent received that particular image.

**CURRENT\_FIX\_X:** X location of the eye fixation in pixels. The 0,0 point is the top left corner of the screen with increasing x and y values down the screen and to the right.

**CURRENT\_FIX\_Y:** Y location of the eye fixation in pixels. The 0,0 point is the top left corner of the screen with increasing x and y values down the screen and to the right.

**Type of graph:** 1 for boxplot, 2 for fan plot, 3 for deterministic line, 4 for spaghetti.

**Median:** 1 for median line, 2 for deterministic forecast (there had to be a median line), 3 for no median line.

**Question:** 1 for ship decision, 2 for confidence, 3 for best-guess, 4 for maximum ice thickness, 5 for minimum ice thickness.

**Fixations outside box plot:** FALSE for if fixations were inside the box plot area, 1 for if fixations were outside the box plot area.

**Fixations outside fan (med):** Same as above for fan plot area with median.

**Fixations outside fan (no med):** Same as above for fan plot area without median.

**Fixation outside spag (med):** Same as above for spaghetti plot area with median.

**Fixations outside spag (no med):** Same as above for spaghetti plot area without median.

**Fixation deviation (boxplot-med)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (boxplot-no med)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (fan- med)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (fan- no med)** : number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (spag- med)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (spag- no med)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

**fixation deviation (median plot)**: number of pixels the y-location of the fixation deviated from the location of the median line, FALSE if outside the plot area or if the type of plot was different.

2017\_01\_13\_Plot\_Key\_Fixation\_data.csv

These were data from the eye-tracking experiment showing whether the fixations were located within the area of the plot keys. Because each participant had multiple eye fixations within each question and each graphic type, there are multiple rows for each participant. The column headings are as follows:

**Major**: what degree program the respondent studied.

**Recording: t**he major and participant number (which can also be found in the survey response data file below (2017\_01\_13\_survey\_response\_data.csv).

**Trial:** Order in which each respondent received that particular image.

**Image:** Structured by graphic type (boxplot, fan, spaghetti, median—also known as the deterministic line forecast), question number (1: ship decision, 2: confidence, 3: best-guess, 4: maximum ice thickness, 5: minimum ice thickness), probability (30, 50, 70), and whether or not there was a median line on the plot (only noted if there was no median line). For example, if the image was fan4\_30\_no\_median.PNG, it corresponds to the fan plot, maximum ice thickness, 30% forecast with no median.

**IA\_LABEL:** List of all the types of keys (they each had different extents on the visualisations the participants saw, therefore they have different dimensions.) This column was used when determining if the fixation was within the key. If the value in *image* does not match the value in *IA\_LABEL*, then the data in the row is not meaningful.

**TRIAL\_FIXATION\_COUNT:** Total number of eye fixations in the trial, regardless of their location.

**TRIAL\_DWELL\_TIME:** Total amount of time (in milliseconds) the participant took to complete the trial.

**IA\_FIXATION\_COUNT:** Total number of fixations within the key. This value is meaningless unless the value in *image* matches the value listed in *IA\_LABEL*.

**IA\_DWELL\_TIME:** Total amount of time (in milliseconds) participant fixated within the key. This value is meaningless unless the value in *image* matches the value listed in *IA\_LABEL*.

**IA\_FIRST\_FIXATION\_TIME:** Amount of time (in milliseconds) that elapsed before the participant first looked at the key. This value is meaningless unless the value in *image* matches the value listed in *IA\_LABEL*.

**IA\_FIRST\_FIXATION\_DURATION:** Amount of time (in milliseconds) that elapsed before the participant first looked at the key. This value is meaningless unless the value in *image* matches the value listed in *IA\_LABEL*.

**IA\_RUN\_COUNT:** Number of times the participant returned to the key after fixating elsewhere.

**Type of Graph:** 1 for boxplot, 2 for fan plot, 3 for deterministic line, 4 for spaghetti.

**Median present:** 1 for median line, 2 for deterministic forecast (there had to be a median line), 3 for no median line.

**Question:** 1 for ship decision, 2 for confidence, 3 for best-guess, 4 for maximum ice thickness, 5 for minimum ice thickness.

2017\_01\_13\_survey\_response\_data.csv

Survey results. The data in each row is for a different, anonymised survey respondent, randomly numbered in the column “Participant”. The degree program is also noted. The remainder of the data includes the ship decision (0 for small ship, 1 for large ship), confidence in decision (out of 10), best-guess ice thickness forecast, maximum ice thickness forecast, and minimum ice thickness forecast. This is completed for every figure type (box with median line, box without median line, fan with median line, fan without median line, spaghetti with median line, spaghetti without median line, and deterministic line) and for every probability tested (30%, 50% and 70% likelihood of ice thickness exceeding 1-meter).

Consent\_Form.pdf

Consent form filled out by the respondents

Eye\_Tracking\_Survey.docx

The survey instrument

Information\_Sheet.pdf

Information sheet given to respondents

5. METHOD and PROCESSING

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Survey results were recorded manually into 2017\_01\_13\_survey\_response\_data.csv. Any outliers were removed in data post-processing, not provided here. Therefore, any user of this data will need to remove outliers themselves.

Eye-tracking methods:

Participants were fitted with an Eye link II tracker headset (sampling rate 500Hz), which recorded eye movements of the right eye as they completed the survey on a 21-inch colour desktop PC (refresh rate of 75Hz). A chin rest was used to constrain any head movements and participants were placed in a set position. The distance between the monitor and participant was 57 cm. In this study, we monitored the location and duration of eye fixations, defined as a maintained gaze (the eye was still, i.e. no saccades were detected) on one location. A standard 9-point grid was used to calibrate eye movements at the beginning of the study. All participants calibrated successfully and calibration was maintained for each question using a drift correct.

Any further queries about the data may be sent to k.mulder@reading.ac.uk.