

Point Size and Correlation Perception in Scatterplots

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ABSTRACT

Place abstract here.

Index Terms: Human-centered computing—Visualization—Empirical studies in visualization—; Human-centered computing—Human computer interaction (HCI)—Empirical studies in HCI—

1 PLACE INTRO HERE.

2 RELATED WORK

2.1 Correlation Perception

see Strain et al for a brief review of the history of correlation perception testing with scatterplots

2.2 Point Size

Hong et al paper will be useful here

2.3 Dot Pitch and Crowdsourced Experiments

3 METHODOLOGY

3.1 Stimuli

The data used to generate the scatterplots in the current study was identical to that in [?]. They were generated based on 45 uniformly distributed r values between 0.2 and 0.99. Scatterplot points were generated based on bivariate normal distributions with standard deviations of 1 in each direction. Each scatterplot had a 1:1 aspect ratio, was generated as a 1200 x 1200 pixel .png image, and was scaled up or down according to the participant's monitor. See section 2.3 for a more detailed discussion of precise point sizes and dot pitch in crowd-sourced experiments.

As in our previous study [?], we used equation 1 to map residuals to point sizes. We used a scaling factor of 4 and a constant of 0.2 to achieve a minimum point size of 12/13 pixels, which is consistent with the point size on a 1920 x 1080 monitor for both experiments in [?]. Again, see section 2.3 for a discussion of dot pitch. Scripts detailing scatterplot and mask generation can be found in the item preparation folder in the repository linked below.

$$point - size = 1 - b^R \quad (1)$$

3.2 Dot Pitch and Crowdsourced Experiments

3.3 Open Research Statement

The experiment was conducted according to the principles of open and reproducible research. All data and analysis code are available at https://github.com/gjpstrain/size_contrast_and_scatterplots. This repository contains instructions for building a docker image to fully reproduce the computational environment used, allowing for full replications of stimulus

generation, analyses, and the paper itself. The experiment was pre-registered with the OSF (<https://osf.io/k4gd8>).

3.4 Participants

3.5 Design

The experiment used a fully repeated measures, within-participants design, with each participant seeing and responding to each of the 180 scatterplots in randomised order. There were four scatterplots for each of the 45 r values corresponding to the four levels of the size condition, examples of which can be seen in figure ??.

4 RESULTS

include short discussion of modelling paradigm and justification for it

5 DISCUSSION

ACKNOWLEDGMENTS

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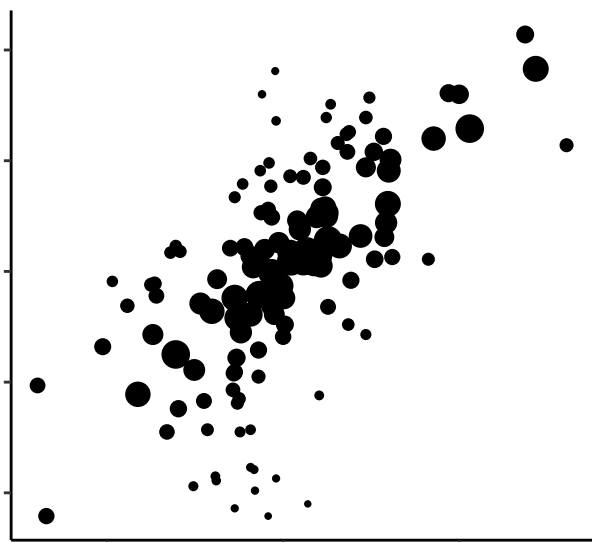
*Gabriel.Strain@manchester.ac.uk

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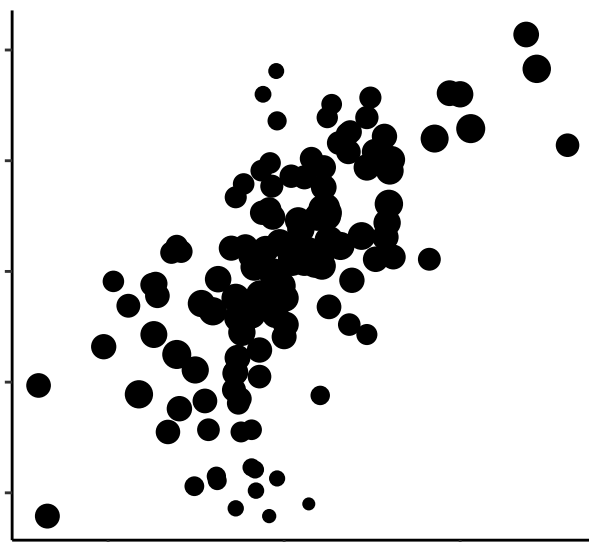
‡Paul.Warren@manchester.ac.uk

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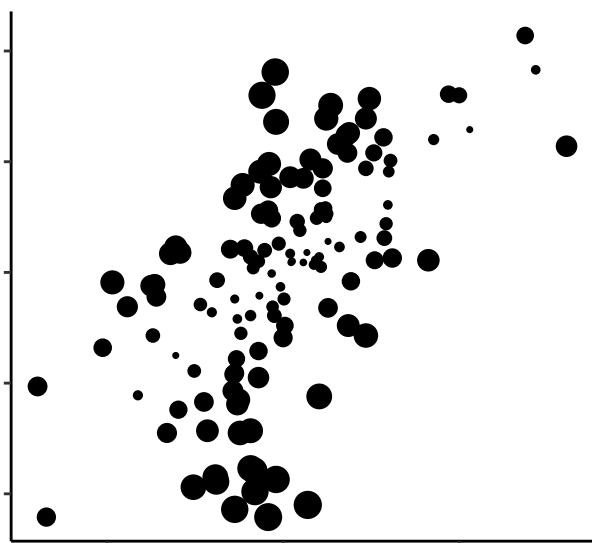
Non-linear Decay ($b = 0.25$)



Linear Decay



Inverted Non-linear Decay



Standard Size

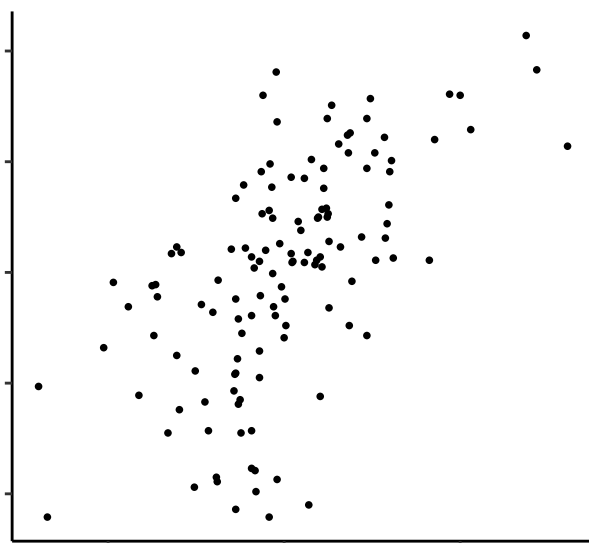


Figure 1: Four levels of the point size condition, demonstrated with an r value of 0.6

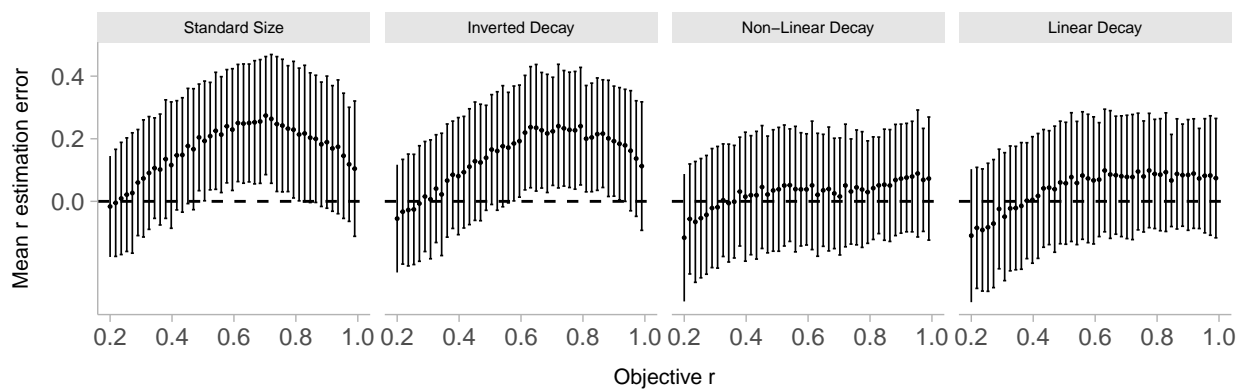


Figure 2: hello

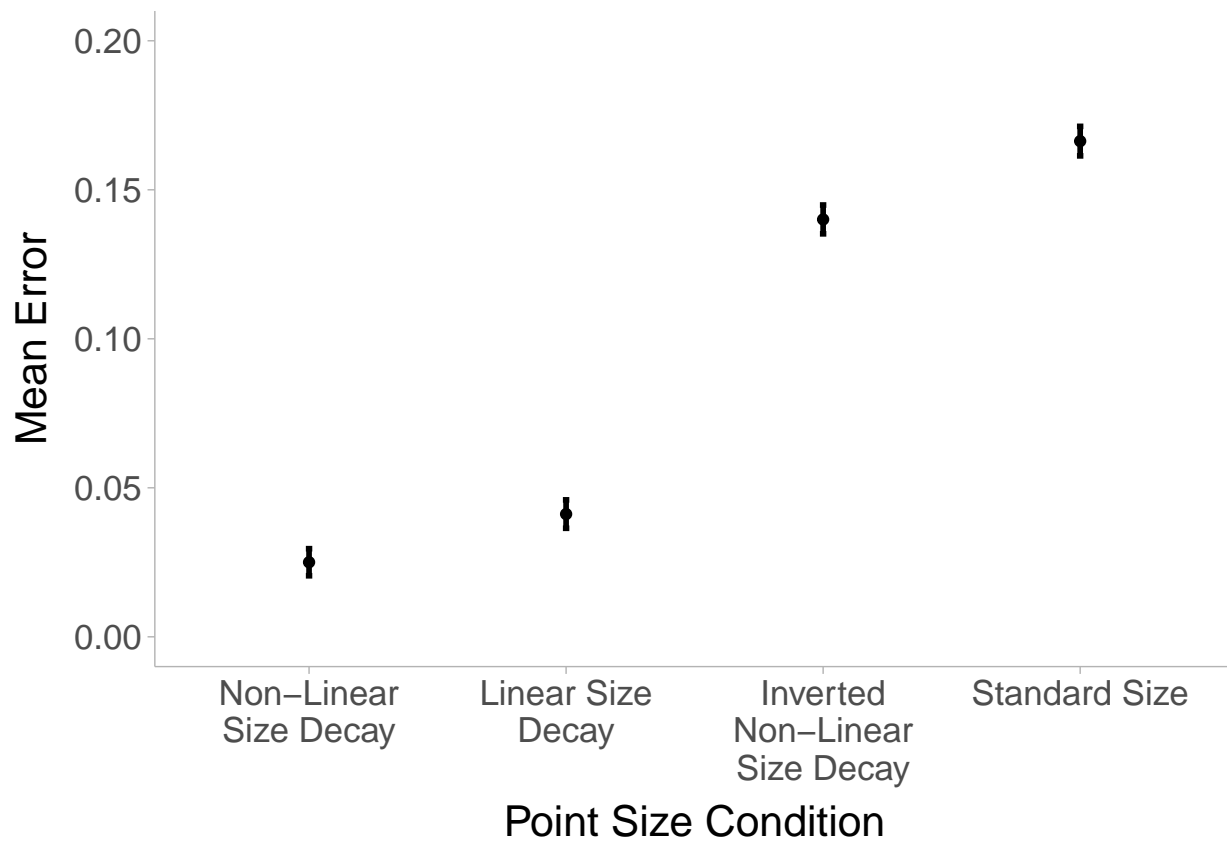


Figure 3: hello