



**University of
Zurich^{UZH}**

University Research Priority Program Ethics

The influence of color-manipulation on data interpretation in neuroimaging and geographic information visualization

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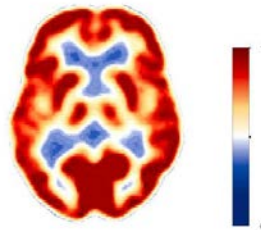
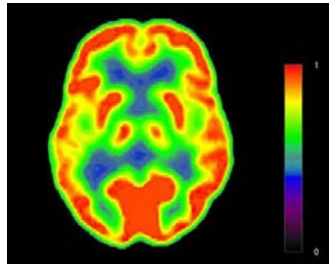
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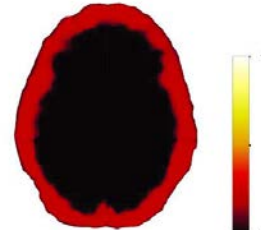
Method (1): 2 paradigms with 8 conditions (4 scales & 2 backgrounds). 1 randomized condition each per participant. Between-group design with matched pairs (age, gender, experience).

The Question:

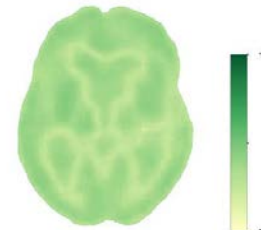
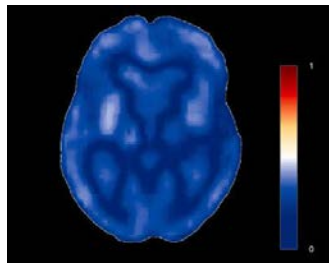
Does mapping from data to color space matter for data interpretation?



“Healthy Brain”

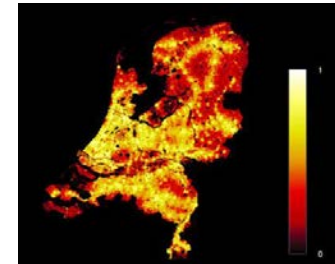
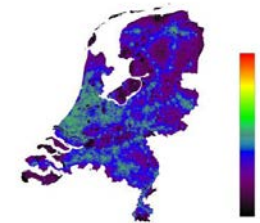
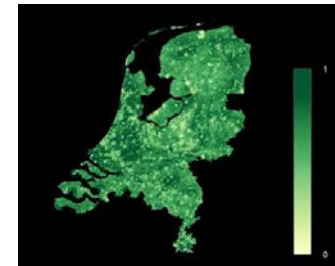


“Brain Death”



“Vegetative State”

Second Paradigm: Climate change model matching brain states



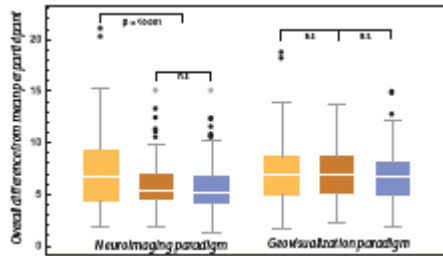
Hypothesis: Domain experts are least influenced by color manipulation



Method (2): We measured interpretation variability per paradigm by taking the total mean over all conditions for a single state as reference and then calculated the absolute of the difference between the total mean and the rating of an individual.

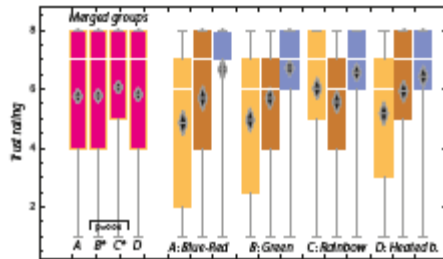
The Results:

- Neuroimaging experts
- Geovisualization experts
- Laypeople



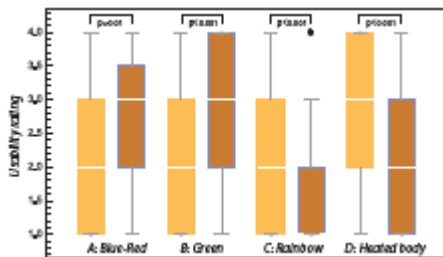
Neuroimaging experts are most strongly influenced by changes in color scales in their own domain (similar effects for geovisualization experts).

Opinions regarding the general paradigms (brain death / climate change) do matter regarding trust ratings.



Images using the rainbow scale receive the highest trust ratings despite known perceptual shortcomings.

In selected cases, image background has a significant effect on the trustworthiness of images.



The usability ratings of geovisualization experts are in line with standards on perceptual usability of scales.

Neuroimaging experts express higher confidence in imaging production software and internal lab-rules.

We need awareness on the potential influence of data visualization on data interpretation, in particular amongst the domain experts.