

Green = Benefit?

Communicating Health Risks with Icon Arrays: The Influence of Color

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50 Years of Research on Human Development

Background

Icon arrays are an effective tool for communicating risk information, enhancing knowledge and reducing common biases (e.g., denominator neglect), particularly for people low in numeracy.

Health websites have adopted icon array displays to communicate health risks, however many different designs exist (e.g., NHS; AOK; arriba).

Icon design has been shown to influence comprehension and risk perception.¹ There have been few studies exploring the influence of icon color.

The present study explored the role of color on the efficacy of icon displays, drawing on literature on cultural and natural correspondences of colors:

Research Questions

(1) Color can be used to *highlight* or focus attention on specific information.

We explore whether people are better able to recall and comprehend the information that is enhanced with colour.

(2) Colors are associated with different culturally correspondent meanings and can influence perceptions (e.g., traffic light food labels).²

We explore whether colors presented as *congruent* with cultural associations (benefit=green; harm=red) influence interpretations compared to *incongruent* presentations (harm=green).

Method & Materials

→ A total of 141 people (mean age 37.6 (SD=12.0), 39% females) were recruited via Amazon MTurk to complete the study.

→ Participants were provided with a hypothetical medical decision scenario about a surgical treatment for knee osteoarthritis. The numerical information was displayed in a color-enhanced icon array.

→ Each participant received the information in one of 6 versions that varied according to the type of information highlighted and the congruence between the color and cultural correspondences:

Highlighting: benefits only, harms only, both
Congruence: incongruent, congruent

The following outcomes were measured:

- 1) Behavioral intention to undergo surgery,
- 2) Risk perception,
- 3) Perceived effectiveness of the treatment,
- 4) Perceived harmfulness of the treatment,
- 5) Risk recall.

We also measured user evaluations (e.g., liking, trustworthiness, usefulness, comprehensibility).

Examples of color used to highlight information in congruent and incongruent displays

Out of 100 people who had a surgical procedure for knee osteoarthritis

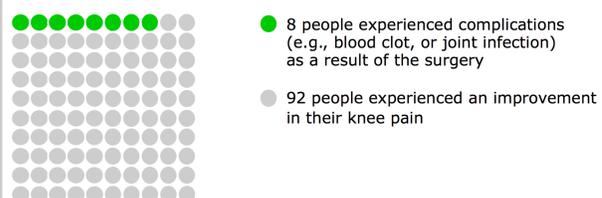


Figure 1. Highlight harm, incongruent

Out of 100 people who had a surgical procedure for knee osteoarthritis

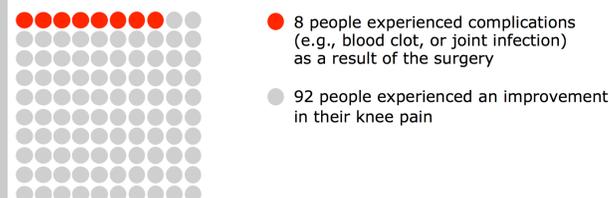


Figure 3. Highlight harm, congruent

Out of 100 people who had a surgical procedure for knee osteoarthritis

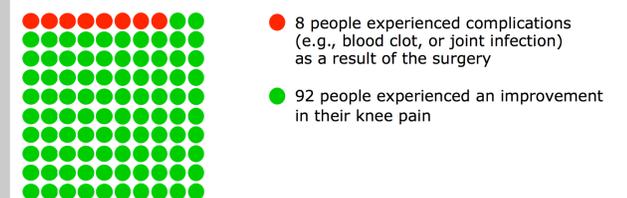


Figure 5. Highlight harm & benefit, congruent

Out of 100 people who had a surgical procedure for knee osteoarthritis

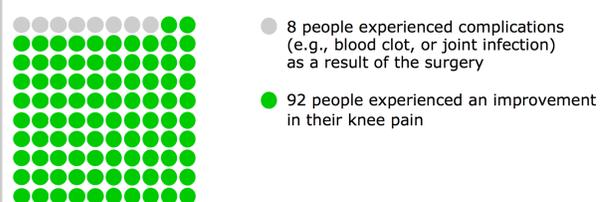


Figure 2. Highlight benefit, congruent

Out of 100 people who had a surgical procedure for knee osteoarthritis

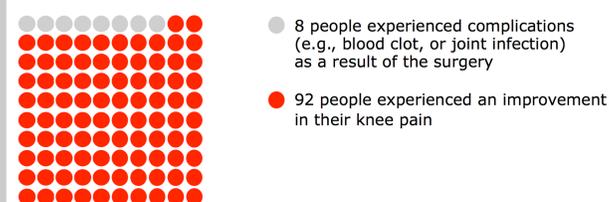


Figure 4. Highlight benefit, incongruent

Out of 100 people who had a surgical procedure for knee osteoarthritis

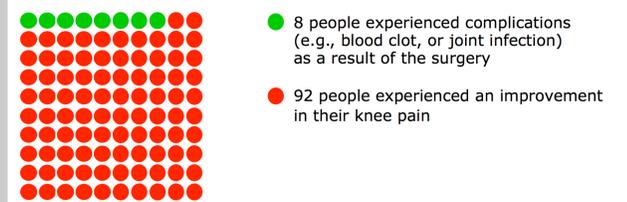


Figure 6. Highlight harm & benefit, incongruent

Results

→ There was no significant main effect of *highlighting* on risk perception, treatment effectiveness and harmfulness, or decision intention.

→ There was no significant main effect of *congruence* on ratings of risk perception, treatment harmfulness, and the decision intention, as well as on ratings of user evaluation of the display (i.e., liking, trustworthiness, and comprehensibility of the presented information).

→ *Congruence* had an effect on evaluations of treatment effectiveness ($F(1,135)=4.27$, $p=.041$, $\eta_p^2=.031$).

Treatment effectiveness was rated higher when *incongruent* colors were used (e.g., red for benefit, green for harm) (Mean 6.14, SD .666) than when colors were congruent (Mean 5.87, SD .844). This was independent of the type of information that was highlighted in the display (benefits, harms, or both).

→ Participants remembered the presented color better when the color was congruent with cultural conventions (e.g., green=benefit).

Discussion

→ Icon arrays are a robust, resilient format for communicating health risks.

→ However, the results suggest that color choice can affect interpretations of treatment effectiveness.

→ Ongoing work is exploring whether the effect is robust against displays that vary in the size of the denominator.

→ The present work hopes to inform guidelines on designing graphical displays in the field of health risk communication.

Literature

- 1.) Zikmund-Fisher, B.J., et al. (2014). Blocks, ovals, or people? Icon type affects risk perceptions and recall of pictographs. *Medical Decision Making*, 34(4), 443-453.
- 2.) Schuldt, J.P. (2013). Does green mean healthy? Nutrition label color affects perceptions of healthfulness. *Health Communication*, 28, 814-821.