Scale-Score: Food Label to Support Nutritious and Sustainable Online Grocery Shopping - Extended Abstract

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Abstract

To empower online grocery shoppers in making nutritionally and environmentally informed decisions, we investigate the efficacy of the Scale-Score, a label combining nutritional and environmental information to highlight a product's benefit to both the consumer's and the planet's health, without obscuring either information. We conducted an experimental study in a mock online grocery environment, and assessed label efficacy. We find that the Scale-Score supports nutritious purchases, yet needs improving regarding sustainability support. Our research shows first insights into design considerations and performance of a combined yet disjoint food label.

Keywords

Sustainable HCI, persuasive technology, sustainability communication, personal informatics

1. Introduction

Labels support consumers in making nutritious and sustainable decisions by transforming complex information about food e.g., nutritional values, animal welfare standards, or environmental aspects, into simple logos or diagrams [1]. Food-label technology and personal informatics thereby both use similar techniques to motivate users [2], such as providing information, enabling comparison, and giving feedback [3]. Several studies within the HCI discipline investigated labels as a means of providing education tailored to users' own context and choices; addressing health- and environmental challenges separately, although they are closely intertwined (e.g. sustainability: Envirofy [4], Nu-Food [5]; nutrition: BetterChoice [6], FLICC [7]).

Our research focuses on the design space of labels which comprise of both, health and environmental information; when it matters most, *while* online grocery shopping [8, 9]. We describe a study which tested the impact of presenting the *Scale-Score* (Figure 1, right) on the nutritional quality and environmental impact of the consumers' food choices, compared to the effects of both Nutri-Score and Eco-Score labels, and no persuasive technology. We found the Scale-Score improved nutritional quality of purchases, however surprisingly, it performed worse

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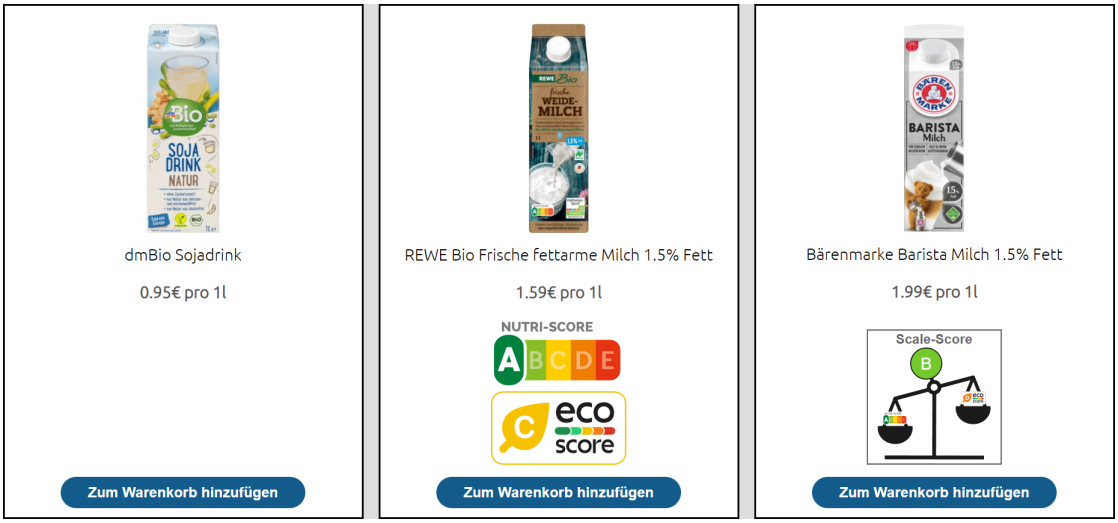

Figure 1: Scale-Score (right) provides high level information about the nutritional and sustainable value of foods, yet gives additional information to allow for individual prioritisation of health or environment. In a mock-up online supermarket we tested three conditions (left: no labels, middle: Nutri- and Eco-Score, right: Scale-Score) showing that the Scale-Score supports nutritious purchase decisions, yet needs improving regarding sustainability support.

in terms of environmental impact, compared to Nutri-Eco and baseline condition. This paper contributes first evidence in support of using a joint yet disjoint nutritional and ecological label to encourage transitions towards healthier and more sustainable diets, when online shopping.

2. Experimental Research

2.1. Scale-Score

The Scale-Score (Figure 1, right) combines Nutri- and Eco-Scores into a single label represented by a classic beam scale. It also shows an overall rating based on the product's Nutri- and Eco-Scores by computing their mean value; in case of an uneven result, we opted to go in favour of the Nutri-Score, prioritising nutrition over sustainability, in accordance with previously gathered user requirements.

2.2. Methods & Participants

We employed a within-subjects design with a single independent variable, visualisation, and three factors, Scale-Score, Nutri-/Eco-Score, and baseline with no visualisation. Dependent variables (i.e., shopping behaviour) were: 1) average environmental value of chosen products (based on Eco-Score calculations) and 2) average nutrition value of chosen products (based on Nutri-Score calculations). In each condition, participants shopped according to a shopping list with three items (cereal, milk, and peanut butter). Participants were entered into a random draw to win their shopping basket, as an incentive to encourage normal purchase decisions.

The study lasted one hour.

We recruited 12 participants (5f, $\mu = 39$ years, $\sigma = 22.9$ years) through our institution's forums. Regarding demographics, all participants stated having seen the Nutri-Score prior; the Eco-Score was seen by 16.7 % prior.

2.3. Results

We used a one-way ANOVA with post-hoc Tukey-tests via IBM SPSS Statistics (v. 28.0.1.0). For this study an alpha (α) of 0.05 was used.

There was no statistically significant difference between the conditions on 'nutrition' as determined by one-way ANOVA ($F(2.35) = 0.8p = 0.458$). However, a Tukey-post-hoc-test revealed that Scale- and Nutri-/Eco-Score means did not differ from each other (p-value = 0.994), but both Nutri-/Eco-Score (p-value = 0.557) and Scale-Score (p-value = 0.496) differed compared to no score. Looking at the descriptive statistics, Scale-Score resulted in lower nutrition values (mean = 2.89) compared to Nutri-/Eco-Score (mean = 3.06) and no score (mean = 4.78).

There also was no statistically significant difference between the conditions on 'sustainability' as determined by one-way ANOVA ($F(2.35) = 1,301p = 0.286$). Tukey-post-hoc-test revealed a non-significant difference between Nutri-/Eco-Score (p-value = 0.595) and Scale-Score (p-value = 0.810) compared to no score. Looking at the descriptive statistics, Scale-Score resulted in lowest sustainability values (mean = 53.11), Nutri-/Eco-Score in highest (mean = 59.78) and no score in intermediate (mean = 55.69).

3. Discussion and Conclusions

To achieve a global and successful transition to healthy and sustainable diets, systems and tools are needed to support consumers in this. We designed Scale-Score, a label that displays nutritional and environmental information.

We did not find significant differences in support provision of either visualisation compared to baseline, however there is a trend showing the Nutri- and Eco-Score combination may support consumers in sustainable and healthy decision making. The Scale-Score may support nutritious choices compared to no visualisation, however, worsened environmental impact of the basket compared to baseline. First, this may be due to the make-up of the Scale-Score: nutritional aspect weighted more into the final score. Consequently, a product that is marked with a good Scale-Score rating (e.g. B) may well contain an environmental 'D' rating. As a result, the average sustainability score was worse compared to Nutri- and Eco-Score representation, resulting in Scale-Score's poor environmental performance. Second, participants may have ignored the multi-level information provided, given the small sizes of Nutri- and Eco-Score labels within the Scale-Score, contributing further to the de-valuation of environmental information.

In future, we plan to re-design the label taking advantage of the interaction modalities available in web-based interfaces, where meta *and* multi-level information can effectively support sustainable and nutritious grocery shopping. At ICT4S, we hope to inspire and engage in conversations on user-centred food label designs embedded in personal informatics.

References

[1] D. Lemken, A. Zühlsdorf, A. Spiller, Improving consumers' understanding and use of carbon footprint labels on food: Proposal for a climate score label, EuroChoices 20 (2021) 23–29. doi:https://doi.org/10.1111/1746-692X.12321.

[2] K. Sauvé, S. Bakker, S. Houben, Econundrum: Visualizing the climate impact of dietary choice through a shared data sculpture, in: Proceedings of the 2020 ACM Designing Interactive Systems Conference, DIS '20, Association for Computing Machinery, New York, NY, USA, 2020, p. 1287–1300. doi:10.1145/3357236.3395509.

[3] J. Froehlich, L. Findlater, J. Landay, The design of eco-feedback technology, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '10, Association for Computing Machinery, New York, NY, USA, 2010, p. 1999–2008. doi:10.1145/1753326.1753629.

[4] G. Shakeri, C. H. McCallum, Envirofy your shop: Development of a real-time tool to support eco-friendly food purchases online, in: Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems, CHI EA '21, Association for Computing Machinery, New York, NY, USA, 2021. doi:10.1145/3411763.3451713.

[5] L. A. Panzone, A. Ulph, D. J. Zizzo, D. Hilton, A. Clear, The impact of environmental recall and carbon taxation on the carbon footprint of supermarket shopping, Journal of Environmental Economics and Management 109 (2021) 102137. doi:10.1016/j.jeem.2018.06.002.

[6] K. L. Fuchs, J. Lian, L. Michels, S. Mayer, E. Toniato, V. Tiefenbeck, Effects of digital food labels on healthy food choices in online grocery shopping, Nutrients 14 (2022). doi:10.3390/nu14102044.

[7] R. A. Harrington, P. Scarborough, C. Hodgkins, M. M. Raats, G. Cowburn, M. Dean, A. Doherty, C. Foster, E. Juszczak, C. Ni Mhurchu, N. Winstone, R. Shepherd, L. Timotijevic, M. Rayner, A pilot randomized controlled trial of a digital intervention aimed at improving food purchasing behavior: The front-of-pack food labels impact on consumer choice study, JMIR Form Res 3 (2019) e9910. doi:10.2196/formative.9910.

[8] J. L. Zapico, C. Katzeff, U. Bohné, R. Milestad, Eco-feedback visualization for closing the gap of organic food consumption, in: Proceedings of the 9th Nordic Conference on Human-Computer Interaction, NordiCHI '16, Association for Computing Machinery, New York, NY, USA, 2016. doi:10.1145/2971485.2971507.

[9] L. Luo, B. Li, S. Berkovsky, I. Koprinska, F. Chen, Online engagement for a healthier you: A case study of web-based supermarket health program, in: Proceedings of the 26th International Conference on World Wide Web Companion, WWW '17 Companion, International World Wide Web Conferences Steering Committee, Republic and Canton of Geneva, CHE, 2017, p. 1053–1061. doi:10.1145/3041021.3055129.

A. Online Resources

Longer version of this submission is available on http://oops.uni-oldenburg.de/5512 (German). Source code for the online supermarket is available via GitHub.