Using Audio Augmented Reality to Support Decision Making

Poster

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ABSTRACT

Audio augmented reality (AR) is becoming increasingly popular as a medium for communicating additional layers of information about a user's environment. This extended abstract reports the preliminary results of a study examining the impact of an audio AR enabled mobile decision aid, FoodGlance, on users' decision quality as well as their overall experience of the decision-making process. Research shows that people often find nutrition facts labels confusing and difficult to use [1]. FoodGlance was designed to make it easier for people to choose healthy products based on their dietary needs and preferences. FoodGlance uses OCR technology to extract textual information from nutrition fact labels and then translates it into simple feedback [2]. In this study, the feedback was provided in three different ways: audio AR, visual, and the combination of the two. Audio AR was provided via Bose glasses. Visual feedback, consistent with our previous study, was displayed as a pop-up on the smartphone showing thumbs up (good amount) or thumps down (bad amount) for sugar, fat, and protein separately [2]. For this study we used the FDA's 5-20 percent daily value rule to design feedback. The feedback engine in FoodGlance, however, is not limited to this rule and can be modified by users.

The data for 17 male and female university students with an average age of 25 was used for the preliminary results reported in this abstract. Each participant completed the same decision task twice, each time under a different treatment (completing the decision task with or without FoodGlance). Using a scenario, the task required participants to choose the healthiest option (low in sugar and fat; high in protein) among 4 anonymous products in the same food category (e.g., breakfast cereal). All products in the set had the same nutrients but they differed in the amount of nutrients. Latin Square was used to design the order of treatments for each participant. Two different product sets were used in the experiment. These sets were assigned randomly to treatments to ensure that participants did not use the same product set in the two back to back treatments. The treatment that used FoodGlance, was further divided into three different conditions by translating nutrition information into 1) audio AR, 2) visual feedback, or 3) combination of audio AR and visual feedback. Results showed that without FoodGlance only 29% of participants were able to find the healthiest option. When they used FoodGlance, however, regardless of the feedback type, 76% of participants were able to make the healthiest selection. Table 1 (FG=FoodGlance) displaying self-reported results shows that participants found it significantly easier to detect healthy options with FoodGlance (Task Difficulty, 1=extremely difficult, 7= extremely easy). They also found that overall decision making experience was significantly better with FoodGlance (five-point star rating system). We used ANOVA to compare the differences in user reactions among the three feedback types provided by FoodGlance (Table 2, AF=Audio AR Feedback, VF=Visual Feedback, AVF=combination of audio AR and visual feedback).

User Reactions	Mean No FG	Mean FG	p-value
Task Difficulty	3.12	5.76	0.01
Overall Experience	3.18	4.12	0.01

Table 1. Results of paired t-test for FG vs. no FG treatments

User Reactions	Mean AF	Mean VF	Mean AVF	p-value
Task Difficulty	5.40	5.80	6.20	0.71
Overall Experience	4.30	3.40	4.60	0.03

Table 2. Results of ANOVA comparing feedback types

The single-factor ANOVA test (Table 2) shows that differences in task difficulty were not significant among the three feedback types. The overall experience, however, was significantly different. Individual t-tests for overall experience show that audio AR was rated more favorably ($p=0.04$) than visual feedback (pop-up). The overall experience of the combined feedback (AR and Visual feedback) was not significantly better than the AR feedback ($p=0.42$). However, the combination feedback provided significantly better overall experience than the visual feedback ($p=0.01$). While larger sample sizes are needed to increase confidence in the generalizability of these findings, the results together suggest that FoodGlance improved decision quality and decision-making experience significantly. In particular, the combination of audio AR and visual feedback provided a much better experience than each feedback mechanism alone.

SELECTED REFERENCES

[1] Temple, N. J., & Fraser, J. (2014). Food labels: A critical assessment. Nutrition, 30(3), 257–260.

[2] Jain, P., & Djamasbi, S. (2019). Transforming User Experience of Nutrition Facts Label - An Exploratory Service Innovation Study. HCIBGO, LNCS, 225–237.