

INTRODUCTION

Numerous interconnected factors have an impact on the intricate habit of deciding what to eat [1]. There are many options within each food group and a large variety of foods that may be acquired in the contemporary developed world with little to no effort [2]. In this scenario, it is essential to draw consumers' attention to food labels and provide them with information that affects their expectations and influences their purchasing decisions. Food nutrition labeling on the front page is becoming more and more important [3]. The aim of this research is to determine which of these items are more likely to assist consumers in deciding which of them best fits into a healthier lifestyle because there are numerous varieties of FoPs (Front-of-Pack labels) on packaging. Three different types of FoP (Nutri-Score, Guided Daily Amount, and Multiple Traffic Light) and five different breakfast cereals were measured. An eye tracker was used to record eye movements.

RESULTS

For the label, the FD, FC, DD, and DC all showed a significant effect (Tab 1). The GDA label consistently attracted the most visual attention for those characteristics where a substantial difference was seen. The GDA and MTL labels, however, did not significantly vary for any of the eye-tracking measures. It is clear from the statistical analysis of all the metrics that the NS label attracted the least visual attention. This further supports the idea that whereas NS has a low information content and requires just brief visual attention, the GDA and MTL labels need more time to comprehend their higher information content and hence receive greater visual attention.

The part-worth utility values derived from the CBCA are displayed in Table 2. According to the findings, GDA (L3) and MTL (L2) have the highest part-worth-utility values for the front label. P1 and P4 are the products with the highest part-worth-utility values, respectively. P3 is last in terms of products.

As shown in Table 3, the outcomes of the various techniques were compared for labels and products. Similarities may be seen in the eye-tracking, ranking, and conjoint analysis characteristics. The GDA (Guided Daily Amount) FoPL was ranked highest for all labels with the exception of one eye-tracking parameter (FFD). Participants believed the NS (Nutri-Score) label to be the least informative. P4 was selected as the most healthy product based on the ranking and analysis of the majority of eye-tracking metrics, while P1 was considered the most healthy product based on the conjoint analysis. These goods came in second place as well. According to respondents, P5 is the cuisine least conducive to leading a healthy lifestyle.

Table 3. Rankings are used to compare the label and product performance across all techniques

Rank method	Part-worth utilities	Ranking score	FC	FD	DC	DD
1	L3	L3	L3	L3	L3	L3
2	L2	L2	L2	L2	L2	L2
3	L1	L1	L1	L1	L1	L1
1	P1	P4	P4	P4	P4	P4
2	P4	P1	P1	P1	P1	P1
3	P2	P3	P2	P2	P2	P3
4	P5	P2	P3	P3	P3	P2
5	P3	P5	P5	P5	P5	P5

Abbreviations: TFFF: Time To First Fixation; FFD: First Fixation Duration; FC: Fixaton Count; FD: Fixation Durtaion; DC: Dwell Count; DD= Dwell Duration; GDA = Guided Daily Amount; MTL = Multiple Traffic Light; NS = Nutri-Score, L = label, P = product. L1 = Nutri-Score (NS) label, L2 = Multiple Traffic Light (MTL) Label, L3 = Guided Daly Amount (GDA) label.

MATERIALS

- **Place of measurement:** Buda Campus of the Hungarian University of Agriculture and Life Sciences.
- **Participants:** the study included a total of 33 participants (16 male, 17 female), but 3 participants were dropped from the study because of the poor eye sampling quality (<80%).
- **ET & software:** Tobii Pro Nano eye-tracker (Fig. 1) and Tobii Pro lab v.1.171 software (Tobii Pro AB, Danderyd, Sweden).
- **Visual stimuli:** 5 breakfast cereals (Fig. 2) and 3 types of front-of-pack labels (Nutri-Score, GDA, MTL, Fig. 3) were used for each of the five products, giving 15 product variations to test.
- **Data analysis:** ranking, rating, ANOVA, CBCA (Choice – based Conjoint analysis).



Figure 1. The eye-tracker used for the measurement

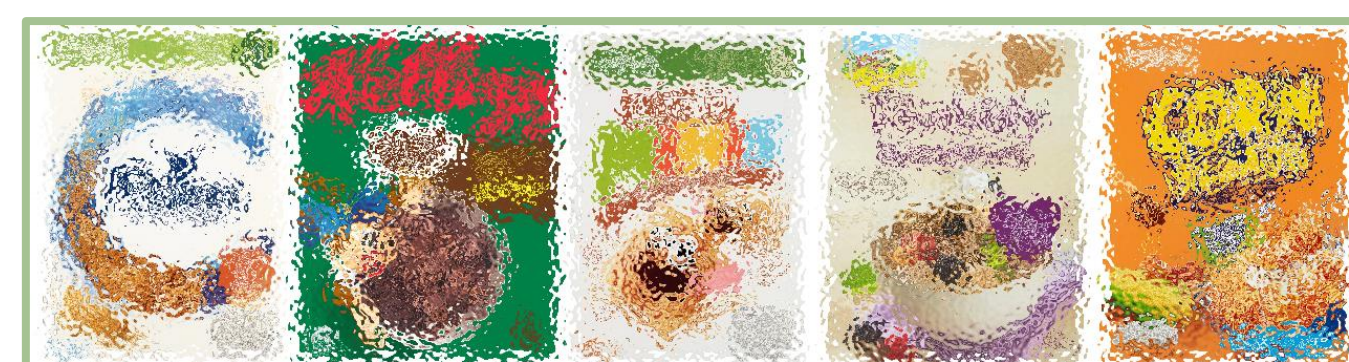


Figure 2. The five presented products

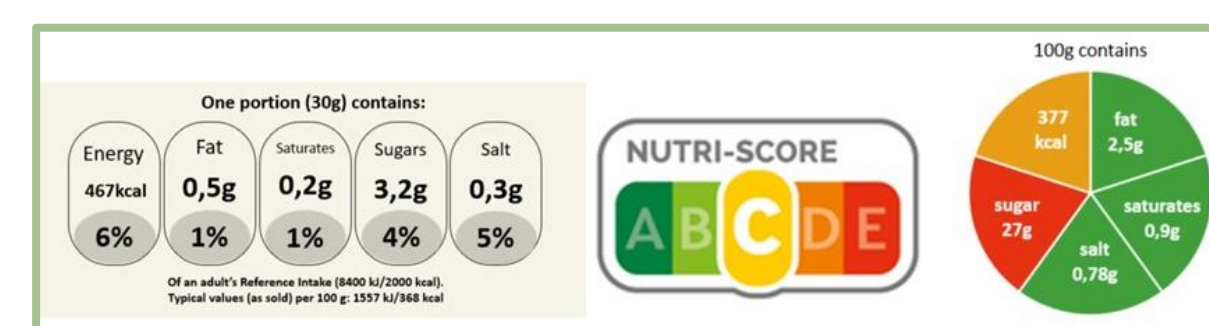


Figure 3. Examples of the three front-of-pack labels

Table 1. ANOVA findings for the labels of the visual parameters

	FD	FC	TFFF	FFD	DD	DC
GDA	4,004 ^b	7,441 ^b	2,134 ^a	0,663 ^a	4,130 ^b	3,549 ^b
MTL	3,355 ^b	7,074 ^b	2,110 ^a	1,164 ^a	3,442 ^b	3,495 ^b
NS	1,605 ^a	4,087 ^a	2,006 ^a	0,334 ^a	1,584 ^a	2,796 ^a
Pr > F	<0.0001*	<0.0001*	0,847	0,477	<0.0001*	0,014*

Bold and* indicates effect of a significant level of $p < 0.05$. TFFF: Time To First Fixation; FFD: First Fixation Duration; FC: Fixaton Count; FD: Fixation Durtaion; DC: Dwell Count; DD= Dwell Duration; GDA = Guided Daily Amount; MTL = Multiple Traffic Light; NS = Nutri-Score.

Table 2. Results of the conjoint analysis for labels and products

	L1.	L2.	L3.	P1.	P2.	P3.	P4.	P5.
-0.002909	0.825416	1.577450	1.051825	-1.940835	-3.0524418	0.825378	-2.469662	

Abbreviations: L = label, P = product. L1 = Nutri-Score (NS) label, L2 = Multiple Traffic Light (MTL) Label, L3 = Guided Daly Amount (GDA) label.

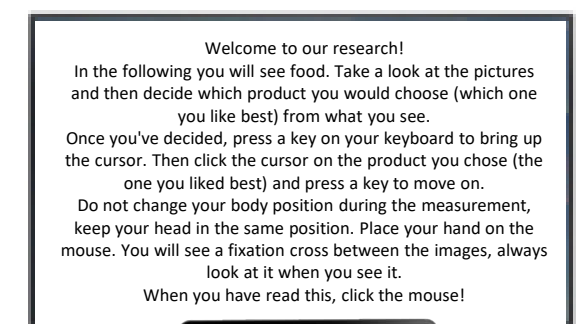
REFERENCES

- [1] Köster, E. P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food Quality and Preference*, 20(2), 70–82. <https://doi.org/10.1016/j.foodqual.2007.11.002>
- [2] Rozin, P. (2005). The meaning of food in our lives: A cross-cultural perspective on eating and well-being. *Journal of Nutrition Education and Behavior*, 37(SUPPL. 2). [https://doi.org/10.1016/S1499-4046\(06\)60209-1](https://doi.org/10.1016/S1499-4046(06)60209-1)
- [3] Hodgkins, C., Barnett, J., Wasowicz-kirylo, G., Stysko-kunkowska, M., Gulcan, Y., Kustepeli, Y., Akgungor, S., Chrysochoidis, G., Fernández-celemin, L., Storcksdieck, S., Gibbs, M., & Raats, M. (2012). Understanding how consumers categorise nutritional labels : A consumer derived typology for front-of-pack nutrition labelling q. *APPETITE*, 59(3), 806–817. <https://doi.org/10.1016/j.appet.2012.08.014>

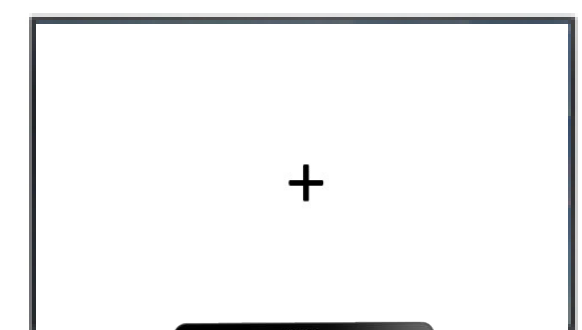
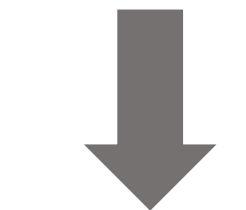
ACKNOWLEDGEMENTS

DSz thanks the support of the Doctoral School of Economic and Regional Sciences, Hungarian University of Agriculture and Life Sciences. AG thanks the support of the János Bolyai Research Scholarship of the Hungarian Academy of Sciences. DR and AG thanks the support of the National Research, Development, and Innovation Office of Hungary (OTKA, contracts No FK 137577 and K 134260). Supported by the ÚNKP-21-5 New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund.

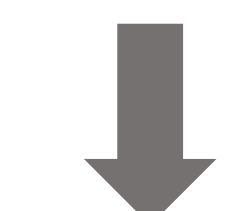
PROCESS



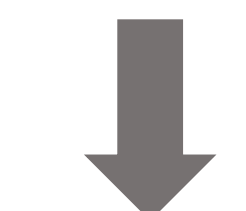
Description of the task



Fixation cross



Viewing visual stimuli



Choose one product