Journal of Economic Psychology 55 (2016) 30–50

Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Helping consumers with a front-of-pack label: Numbers or colors? ☆
Experimental comparison between Guideline Daily Amount and Traffic Light in a diet-building exercise

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ARTICLE INFO

Article history:
Received 30 June 2015
Received in revised form 19 February 2016
Accepted 22 March 2016
Available online 24 March 2016

JEL classification:
D12
D18
C91
C93

PsycINFO classification:
3920

Keywords:
Nutritional labels
Food choice
Experimental economics
Guideline Daily Amount
Reference intake
Traffic Lights

ABSTRACT

This paper contributes to the debate on front-of-pack nutritional labels. Because of their dissimilar formats, Guideline Daily Amount (GDA) and Traffic Light (TL) may trigger different responses among consumers. While GDA is comprehensive and cognitively demanding, information is coarser and more salient in TL. We implement an incentivized laboratory experiment to assess the relative performance of GDA and TL labeling schemes in assisting consumers to build a healthy daily menu. Participants must compose a daily menu, choosing from a finite set of products, and are paid a fixed cash amount only if the menu satisfies pre-determined nutritional goals. Goals correspond to achieving the Guideline Daily Amount values of 1 (kcal), 4 (kcal, fat, sugar, salt) or 7 (kcal, fat, sugar, salt, fiber, vitamin C and calcium) different nutritional attributes. Three different labels, GDA, TL and a combined GDATL are provided. Results show that GDA performs better than TL when subjects do not face time constraints. When time is limited however, TL and GDA have identical efficacy with 4 nutritional goals, and TL even outperforms GDA with 7 nutritional goals.

☆ We wish to thank Marie Cronfalt-Godet for excellent research support, Jean-Loup Dupuis for invaluable logistic and IT help in running the experimental sessions, and Mariane Damois for the recruitment campaign. We gratefully acknowledge the financial support of the INRA Metaprogramme DID'IT – project FOODPOL. The paper benefited from comments and insights provided by participants to seminars and conferences in Marseille, York, Lausanne, Grenoble, Naples, Nottingham, Paris and Rennes. All remaining errors are ours.
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http://dx.doi.org/10.1016/j.joep.2016.03.006
0167-4870/

1. Introduction

The growing awareness about the ill effects of unhealthy diets has led to the development of normative front-of-pack labels, to be added to the existing descriptive back-of-pack nutrition panels. Front-of-pack labels aim to help consumers make healthier choices. While several dozens of label formats are already in use (Drichoutis, Nayga, & Lazaridis, 2011, chap. 20), the debate over their relative efficacy mainly focuses on two widespread labeling schemes: *Guideline Daily Amounts* (GDA) and *Traffic Lights* (TL). Both labels give information about the approximate amount of calories, fat, saturated fat, total sugars and salt, per serving or per 100 grams. While GDA express the information as percentage of a recommended daily value, TL display color-coded information using a 3-color scale (green, amber, red) derived from road lights. GDA and TL can be combined; we will refer such label in the following as GDATL. Originally called Daily Guideline Intakes by the British Food Standards Agency (1996), GDA have been recently replaced by *Reference Intake*[1] in the UK. The GDA system has been adopted by the Australian food and beverage industry in 2006 (*Daily Intake Guide*), by the European Union in 2009 as an industry standard and has been introduced in the US following Michelle Obama's initiative in 2012 (*Facts Up Front*). Although widespread, the GDA system may be difficult to understand for many and does not lend to quick comparisons. TL have been proposed by the British Food Standard Agency in order to make the information easily and rapidly understood. While TL are supported by the British Medical Association and welcomed by consumers, the food industry worries that foods marked red would be shunned and qualifies this system as too simplistic, misleading, patronizing and unscientific.

We focus here on the mere efficiency of the label, abstracting away from exposure, perception, taste, understanding, preferences, and actual use (for recent reviews about existing research on several aspects of the relationship between consumers and labels see Grunert & Wills, 2007; Vyth et al., 2012). We implement an incentivized laboratory experiment to assess the relative performance of GDA, TL or GDATL in helping consumers build a healthy daily menu. We give the subjects clear and unambiguous nutritional goals in order to test, in a controlled environment, which label, if any, leads to the most efficient behavior.

Many studies have fueled the debate about what format between GDA and TL should be favored (see Kelly et al. (2009), Moeser, Hoefkens, Camp, & Verbeke (2010), Grunert et al. (2010) for experimental studies and Grunert & Wills (2007), Hawley et al. (2013) for reviews of the literature). While these studies are highly valuable to assess how consumers perceive, understand and use GDA and TL, they suffer from two shortcomings when it comes to the question of the labels performance in assisting the consumer to make healthy food choices.

First, evaluations of performance are based on products rather than diet. The proclaimed objective of GDA and TL is to get consumers overall balance right. Most experimental studies, though, implement simplified choice environments, in which consumers have to rank two or three products according to their perceived healthiness. These exercises are informative, since the aggregation of healthy products results in a healthy diet (the converse is not necessarily true, though). Nonetheless, constructing a healthy diet is a different task than facing binary choices: on a daily basis, consumers must select dozens of food products so that the sum of their nutrients meet predetermined targets. In fact, consumers are asked to perform a sort of algebraic exercise.

Second, a thorough survey of the literature reveals that the *question asked* determines the relative performance of the labeling schemes. Questions seem to favor TL when they are ordinal and involve small choice sets. For instance, when the subjects are asked to rank the products' *relative* healthiness, or to classify them into three-level scales as healthy/medium/unhealthy, TL wins (see, for instance, Borgmeier & Westenhoefer, 2009, Kelly et al., 2009). On the other hand, questions seem to favor GDA when they are cardinal and involve large choice sets. When the subjects are asked to provide *absolute* assessments, i.e. to evaluate how much of a nutrient is present in each product, GDA wins (see Synovate, 2005). This is not surprising: as already noted by Grunert and Wills (2007) labels perform best when the question asked is the one they have been designed to answer.

Our experimental setting directly relates to the labels primary objective: Subjects were asked to build daily menus by choosing from a large set of products and within a predetermined meal structure. Subjects were paid if and only if the chosen menu satisfied a known and well-defined set of nutritional criteria. To guide subjects in their choices, GDA, TL or GDATL were provided. We also varied, within subjects, the number of nutritional goals. The participants faced easy, 1-dimensional tasks, in which the daily menus had to satisfy only an energy constraint; medium, 4-dimensional tasks, in which goals included energy but also limits on the amount of bad nutrients (saturated fat, sugar and salt); and difficult 7-dimensional tasks, in which on top of the above participants had also to maximize the amount of good nutrients, namely vitamin C, calcium and fiber.

The experiment was designed so that GDA and TL are only assessed on their efficacy to help consumers build a healthy daily menu. We abstract away from considerations about the salience and use of the labels in a real shopping environment. In order to observe decisions that are independent of personal taste and preferences, subjects were asked to act as hired nutritionists of a refectory that catered to all sorts of people for the whole day and earned money for each menu created that satisfied the given constraints. The experimental task was also a simplification of the actual consumer problem. Supermarket shelves comprise thousands of products that are competing for the consumers limited attention. Furthermore, consumers

[1] Although the principles behind both are the same, the major difference is that GDA existed for men, women and children; there is only one set of *Reference Intakes* for an average adult.