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Research report

A lack of appetite for information and computation. Simple heuristics in food choice ☆

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ABSTRACT

The predominant, but largely untested, assumption in research on food choice is that people obey the classic commandments of rational behavior: they carefully look up every piece of relevant information, weight each piece according to subjective importance, and then combine them into a judgment or choice. In real world situations, however, the available time, motivation, and computational resources may simply not suffice to keep these commandments. Indeed, there is a large body of research suggesting that human choice is often better accommodated by heuristics—simple rules that enable decision making on the basis of a few, but important, pieces of information. We investigated the prevalence of such heuristics in a computerized experiment that engaged participants in a series of choices between two lunch dishes. Employing MouselabWeb, a process-tracing technique, we found that simple heuristics described an overwhelmingly large proportion of choices, whereas strategies traditionally deemed rational were barely apparent in our data. Replicating previous findings, we also observed that visual stimulus segments received a much larger proportion of attention than any nutritional values did. Our results suggest that, consistent with human behavior in other domains, people make their food choices on the basis of simple and informationally frugal heuristics.

Introduction

The US stock trader Ivan Frederick Boesky is known not only for being the person who inspired the fictional character Gordon Gekko in the Oliver Stone movie *Wall Street* (Pressman & Stone, 1987), but also for his eccentric food choice habits. According to Stewart (1992), at a lunch meeting in the Café des Artistes, a high-end restaurant in Manhattan, Boesky ordered every single entrée on the menu. When the food arrived, the waiter set up a second table and Boesky looked carefully at all eight dishes, took one bite of each, chose one dish, and sent the rest back.

Whether or not one perceives this to be a decadent way of choosing food, it is certainly costly, and is hardly practicable in the many food choices people make on a daily basis. Unless attending a buffet dinner, consumers cannot generally afford to sample all dietary options before making a final choice. Thus, pieces of information other than actual taste need to be considered. These can be retrieved from the external environment or from memory, and may include brand information (Jacoby, Szybillo, & Busato-Schach, 1977), nutritional values (Higginson, Rayner, Draper, & Kirk, 2002; Van Herpen & Van Trijp, 2011), price (De Irala-Estevez et al., 2000; Drewnowski & Specter, 2004), and attributes such as fair trade and animal welfare (Zander & Hamm, 2010).

A key question in research on food choice is how people use this wealth of information when choosing between dishes (Scheibehenne, Miesler, & Todd, 2007; Wansink, Just, & Payne, 2009). Much like Boesky wanted to sample all available entrées, decision makers obeying the commandments of rational choice are assumed to *sample all* available information first and then to *combine* it into an overall evaluation. Indeed, the prevalent view on how people make food choices today predicts such weighting and integrating approaches, in implicit or explicit form (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Rappoport, Peters, Downey, McCann, & Huff-Corzine, 1993). Acknowledging the constraints of time, knowledge, and computational power under which humans make choices and decisions, Simon (1955, 1990a)

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offered an alternative vision of how the human mind operates. Given these limitations, humans 'must use approximate methods to handle most tasks' (Simon, 1990b, p. 6). These methods include simple heuristics that guide search, determine when it ends, and make use of the information obtained without processing it in a complex way (Gigerenzer, Hertwig, & Pachur, 2011; Gigerenzer, Todd, & The ABC Research Group, 1999; Hertwig, Hoffrage, & The ABC Research Group, 2012; Payne, Bettman, & Johnson, 1993; Todd, Gigerenzer, & The ABC Research Group, 2012).

Transferring these findings to the choice of a lunch dish, we can distinguish two classes of choice strategies that people may apply to their meal choices: *compensatory strategies* (e.g., sample all nutritional and price information and combine that knowledge into a choice), or *simple heuristics* that limit search to one or a few important pieces of information (e.g., decide based on a dish's price or how attractive it looks), forgo complex computations, and make no or only simple trade-offs.[1] In what follows, we briefly review past work to gauge which of these two classes of strategies may be more prevalent in food choice and then turn to the hypotheses and methodology that guide our investigation.

Food choice: compensatory or non-compensatory?

Scheibehenne et al. (2007) investigated the extent to which people rely on simple heuristics or compensatory strategies in food choice. To this end, they had people repeatedly choose between pairs of lunch dishes. Using the Food Frequency Questionnaire (Steptoe, Pollard, & Wardle, 1995), they probed individual importance weights of food-related information based on price, sensory appeal, convenience, health, weight control, natural content, mood, familiarity, and ethical concerns. Employing these factor ratings for each person and each lunch dish, they then predicted which dish a person would prefer. Specifically, they pitted the weighted additive strategy (WADD; weighting all attributes and comparing options based on the summed weights; Payne et al., 1993) against a heuristic called the lexicographic decision rule (LEX). A person applying LEX compares the options' attributes, one at a time, choosing the option with the more attractive value on the most important attribute (e.g., selecting the dish with the lowest calories).

In Scheibehenne et al.'s (2007) investigation, LEX and WADD scored nearly equally well in predicting people's choices, making 72% and 73% correct predictions, respectively. This near identical performance suggests that a simple heuristic, relying on one important attribute, describes human food choice as well as does a compensatory strategy that requires the combination of several factors. What might explain the two strategies' similar descriptive performance? First, simple and complex strategies—despite substantial differences in information search and combination of information (or lack thereof)—often result in identical observable choices. Second, Scheibehenne et al. focused on just two strategies; it may be that other compensatory or non-compensatory strategies capture food choice even better. Indeed, research has repeatedly shown that different people tend to use different heuristics (Gigerenzer & Gaissmaier, 2011; Pachur & Bröder, 2013; Payne et al., 1993).

In summary, based primarily on outcome data and considering a small set of strategies, Scheibehenne et al. (2007) provided an existence proof that a heuristic that limits search can explain food choices as well as a compensatory strategy can. The goal of our investigation, going beyond an existence proof, is to examine the cognitive processes that underlie food choices, thus making it possible to differentiate between strategies leading to identical observable choices. In addition, we investigate a wider set of cognitive strategies that people may use to choose between foods.

Process tracing: gaining a window on search and attentional processes

Compensatory and non-compensatory strategies involve markedly different information search processes (Pachur, Hertwig, Gigerenzer, & Brandstätter, 2013). The non-compensatory LEX, for instance, assumes a sequential, attribute-based information-sampling process that is terminated as soon as a discriminating attribute is found. In the fastest case, LEX looks up both options' values on the most important attribute, chooses the option that best satisfies this highest ranked attribute, and ignores all other information. Search is thus limited and occurs between options. The compensatory strategy WADD, in contrast, considers all values on all attributes and renders a choice based on this overall evaluation. Search is thus complete and proceeds within options.

This qualitative difference in search processes can be exploited to identify which strategy a person applies—provided that the process of information acquisition can be made observable. Process-tracing methods do exactly that: they offer a window onto the cognitive processes that result in a preference or an inference (Schulte-Mecklenbeck, Kühberger, & Ranyard, 2011a, 2011b). Process-tracing methods come in many different forms, including thinking-aloud protocols (Ericsson & Moxley, 2011), information boards (Willemsen & Johnson, 2011), eye tracking (Russo, 2011), and mouse tracking (Schulte-Mecklenbeck, Murphy, & Hutzler, 2011). All of these methods aim to enable researchers to infer a person's choice strategies from pre-decisional information search and acquisition patterns.

The process-tracing tool used in this study is MouselabWeb (Willemsen & Johnson, 2011). Additionally to choices, it records how often an attribute is inspected. Frequency of inspection is a proxy measure for the amount of attention and, by extension, the weight of importance an attribute receives. Furthermore, MouselabWeb records how search for attributes unfolds. In this study, we combine process and outcome data (ratings of attributes) to investigate the following hypotheses.

Hypotheses: how do people choose in the food domain?

1. Strategy Hypothesis: Compensatory strategies demand substantial investment in information search and computation to render a choice. In many real world contexts, people rely—for various reasons (Gigerenzer et al., 2011)—on strategies that limit search and computation. To the extent that the domain of food choice obeys the same regularity, we hypothesize that people are more likely to rely on strategies that limit search and computation than on compensatory strategies. We test this hypothesis by mapping search direction, completeness of search, and weighting of attributes onto eight different strategies.

In addition to this central hypothesis, we aim to replicate results from the literature concerning the attention paid to visual stimuli by utilizing more precise measurements:

2. Visual Dominance Hypothesis: Past research has demonstrated that the weight given to visual information in choices and judgments about food (Scheibehenne, Todd, & Wansink, 2010; Wansink, Painter, & North, 2005) is higher than, for instance, that given to nutritional information (Aikman, Min, & Graham, 2006). In line with these findings, we hypothesize that consumers rely on visual information more than on any other type of available information when choosing between dishes.

[1] Apart from guiding search for information about the food items themselves, heuristics can also guide search in the social environment. For instance, a person may apply the imitation heuristic (Hertwig et al., 2012) and choose what either her companion orders or the majority of people at her table order (McFerran, Dahl, Fitzsimons, & Morales, 2010; see Todd and Minard (in press) for additional social heuristics). Alternatively, a person could order the default option (Downs, Loewenstein, & Wisdom, 2009; Johnson & Goldstein, 2003).