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# Theoretical and experimental investigation of an individual search problem and the consequences of regret

Michela Chessa<sup>\*†1</sup>, Imen Bouhlel<sup>\*‡1</sup>, Eric Guerci<sup>\*1</sup>, and Agnès Festre<sup>\*1</sup>

<sup>1</sup>Groupe de Recherche en Droit, Economie et Gestion (GREDEG) – CNRS : UMR7321, Université Nice Sophia Antipolis (UNS), Université Nice Sophia Antipolis [UNS] – 250, Rue Albert Einstein 06560 Valbonne, France

## Abstract

Information search and opinion formation are central aspects of decision making in consumers choices. Indeed, before taking a decision, the alternatives among which the "rational" choice will be made should be clearly valued. In standard economic theory, the search dynamics is mainly neglected because the process is assumed to be carried out without any cost or without spending time. However, whenever only a significative collection of experience can provide the bulk of relevant information to make the best choice, as it is the case for experience goods (Nelson, 1970), some engendered costs in collecting such information might be considered.

Our paper lies on the conceptual framework for the analysis of an individual search task related to the consumption of an experience good. We bring the example of a customer looking for a high quality restaurant in the city, but we aim at modeling a large set of real-world decision making processes. In our model, we suppose that a best choice exists among a set of alternatives and the customer is willing to locate it. The total amount of time for searching is finite and the customer aims at maximizing the expected payoff given by an exploration-exploitation compromise: a first phase for exploring new goods, during which she gets rewarded by the uncertain quality of the trials, and a second phase for exploiting her past collected experience, choosing between the observed goods the one with the highest quality. Given the finite horizon of time, we observe that the optimal stopping time depends on the observations but is, in general, relatively short: a customer is expected to start exploiting her acquired knowledge pretty soon, giving up looking for the best and being happy with a suboptimal choice. This is what is called a satisfying behavior (Simon, 1956). In our example, in order to maximize her utility, the customer should be satisfied of a good quality restaurant as soon as she finds one, better than risking experiencing very bad dinners while looking for the best restaurant of the city.

In the first part of our work, we theoretically model our situation as a class of stopping rule problems, where the quality of the goods is given by some random variables whose joint distribution is known and that the customer can sequentially observe. At each time, given the past draws, the customer has to choose whether to stop or to continue observing, in order to

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\*Speaker

†Corresponding author: [michela.chessa@unice.fr](mailto:michela.chessa@unice.fr)

‡Corresponding author: [imen.bouhlel@gredege.cnrs.fr](mailto:imen.bouhlel@gredege.cnrs.fr)

maximize her utility. The different problems we model differ because of two parameters: the "recall" and the "discount" factors. The recall provides the probability of having a recalled good still available after a certain amount of time since it was last observed. The discount deals with the decrease of the expected quality of a good as the last observation becomes far in time. By making different choices of the parameters, we are able to perform a theoretical analysis which embeds a large class of "traditional" (Seale & Rapoport, 1997; Zwick & al., 2003) and "new" (Eriksson & Strimling, 2010; Sang & al., 2011) optimal stopping problems.

In the second part of our work, we test the analytical results experimentally at the LEEN Lab of the Université Côte d'Azur. The basic protocol is a repeated game, which consists on drawing some playing cards with hidden payoffs. By clicking on a card, the participant discovers and obtains its payoff. Their objective is to maximize the sum of the stream of payoffs from the first to the last click for some different recall and discount factors. We compare the observed behaviors to the theoretical optimal stopping time. We study the learning dynamics and propose a possible interpretation in terms of regret in decisions.

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