Using AI, Fintech, Big Data and Behavioral Finance to Cope with Limited Attention and to Reduce Overdraft Fees

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An overdraft occurs when a withdrawal transaction in an individual's bank account leads to a balance below zero. Banking systems around the world offer different services for dealing with the event of overdraft by their customers. Within the US and Canada a common service for large bank customers is called "*Overdraft Protection"* service. As part of this service, the bank will cover certain transactions in cases that they trigger an overdraft, mostly for a fee named "overdraft fee" or "Non-Sufficient Funds" (NSF) fee. The fee amount is usually ranging between $24-35 and paid for each transaction that leads to an overdraft. In addition to the NSF fee, banks usually charge a daily fee or interest rate for the negative balance amount remaining.

In this research, we study Mint, a web-based personal financial management application in an attempt to learn how to reduce over daft fees to its customers. The application enables full monitoring of the bank's operations, credit cards, investments, loans, and transactions. The app's customers connect their credit cards and their bank accounts to the application and the app produces an integrative personal interface. It offers advanced services such as personal financial insights, recommendations, and budget planning. Mint has more than 20 million users within the US and Canada.

One of the services that Mint provide called Overdraft prediction (ODP). ODP is a machine learning algorithm that computes the likelihood of individual to enter the "negative zone", below zero, in his or her balance account. The algorithm produces a score and if the score exceeds a certain threshold, it sends an e-mail message (see Figure 1, base case) to the user to increase her attention. The algorithm calculation uses

a set of features that can be conceptually divided into three groups; User Profile (e.g. number of accounts, credit score, user periodic income), Balance Related (e.g. cashflow behavior and balance trends) and Transaction Related (e.g. previous NFSs, number of small debit and credit transactions, frequency of purchases).

Within the framework of our experiment, we explore via field experiment whether sending the remainders messages causes change in the costumer's behavior and whether changing the structure of the remainders sent by Mint to its customers makes a difference. We examine several behavioral concepts: simplicity, negative vs positive and the use of call to action in order to learn about their effect on the user's attention and the possible reduction in the number of NSFs fees.

The experiment was carried out over one month during 2018. The framework included two main stages. First, Mint OverDraft Prediction algorithm calculates a score for Mint users. When the algorithm score exceeded a certain threshold, the user entered the second stage – the releasement of one of five possible treatments. The treatment groups were (1) Holdback group - users do not receive any attention massage. (2) Base group which receive the original massage, (3) Simplified group which received a message with simplified and negative utterance framing, (4) Simplified Save (Save) group, which received a remainder with simplified positive utterance framing and (5) Simplified Transfer (Transfer) group, with simplified call to action utterance. After receiving a treatment, users were registered so that they will not receive additional massages, at least not during the following week. In addition, if one's received another attention message, it was the same type as they received in the first time. 39,897 unique users participated in the experiment.

Our results suggest that simplicity makes a significant difference in reducing fees (compare with the holdback group and the base group).