Trying Harder and Doing Worse: How Grocery Shoppers Track Their In-Store Spending

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Although one in three American households shops on a budget, it remains unclear whether and how shoppers track their in-store spending to stay within budget. A pilot study shows that budget-constrained grocery shoppers predominantly use mental computation strategies to track their in-store spending. Two lab experiments demonstrate that shoppers adapt their mental computation strategy to the dominant range of price endings in the basket and their motivation to be accurate based on cost-benefit analyses. A final field study demonstrates that shoppers underestimating the total basket price are more likely to spend more than their budget, which negatively influences store satisfaction.

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EXTENDED ABSTRACT

Introduction
An estimated one in three American households has to carefully plan their budgets and spend accordingly. Budget-allocation and spending-behavior models often implicitly assume that budget-constrained shoppers are knowledgeable about the total price of their shopping basket as they shop (Bénabou and Tirole 2004). Because shoppers’ price estimates of their shopping baskets mediate the relationship between budget allocation and actual in-store spending, it is critical to understand whether and how shoppers determine the total price of their baskets. Inaccuracies in their estimates likely have implications for consumer welfare (Heath and Soll 1996) and retail performance (Gómez, McLaughlin, and Wittink 2004).

Despite the importance of understanding how budget-constrained shoppers estimate the total price of their baskets while shopping, it remains largely unclear whether, when, and how they keep track of their in-store spending.

Pilot Study: Do Grocery Shoppers Track Their In-Store Spending?
To assess whether, when, and how budget-constrained grocery shoppers keep track of how much they are spending while shopping, a field study was conducted that involved 293 shoppers who were intercepted at the end of their shopping trip in one of two supermarkets: one located in a lower ($22,540/yr) and one located in a higher household income area ($46,478/yr). We find that 84.6% of the 293 participants claim to keep track of how much they are spending while shopping for groceries. By far the most dominant reason for tracking their in-store spending is having budget constraints (87.6%). Three distinct tracking strategies are identified: mental computation strategies (57.4%), calculators (26.4%), and shopping lists (14.5%). Of those who rely on mental computation strategies, 92.3% predominantly add prices up on a price-by-price basis: 45.2% round prices up before adding them, 24.0% round prices up and down to $0.00, $0.10, and $0.25, 14.4% add the exact price of each item, and 11.5% focus only on the dollar amount, ignoring the dollar-cents. The results also show that shoppers who have to pay more than expected based on their own estimate attribute this to the retailer, which in turn negatively influences store satisfaction.

While the pilot study established the relevance of in-store tracking and the predominant reliance on mental computation strategies, the results also raise questions. For instance, why is the rounding strategy the seemingly dominant mental computation strategy? To answer this and other questions, we first discuss the relevant literature and then present the results of two lab studies.

Computational Estimation Strategies
To avoid the stress associated with calculating the exact total basket price, shoppers are proposed to estimate the approximate total basket price using computational estimation strategies—strategies to find an approximate answer to arithmetic problems without actually calculating the exact answer (Dowker 1992; Reys 1986). The most common computational estimation strategies are: a) Front-end Estimation Strategy. A front-end strategy would lead shoppers to estimate the total price of their shopping basket based on the left, front-end dollar digits, ignoring the right-most digits, the dollar-cents (Lemaire et al. 2000). b) Rounding Estimation Strategy. The rounding strategy involves rounding numbers up prior to adding them (Lemaire and Lecacheur 2002). c) Compatible Numbers Estimation Strategy. The compatible numbers strategy involves organizing numbers into groups of compatible numbers to make the computation easier (Dowker 1992). d) Special Numbers Estimation Strategy. The special numbers strategy involves identifying numbers near “special” values that are easy to compute with (Reys 1986), such as those that are powers of ten or common fractions and decimals, including $0.00. e) Clustering Strategy. The clustering strategy is a non-additive strategy that estimates the total basket price by multiplying the number of products in the basket by the estimated median price of the items in the basket.

To gain a better understanding about how people estimate the total price of their baskets using mental computation strategies, we explore if shoppers are adaptive estimators who weigh the importance of being accurate against the cognitive effort they can and are willing to invest and select the strategy that is perceived to offer the best combination of accuracy and complexity given the estimation conditions (Johnson and Payne 1985).

Lab Experiments
To examine the adaptivity of estimators, we take an experimental approach to manipulate specific context and task variables of the estimation task: price endings of the basket items, motivation to be accurate, and estimation task experience. We measure 1) which estimation strategies shoppers rely upon under which conditions, 2) their estimation accuracy, and 3) the perceived task complexity.

We demonstrate that short-term memory constraints prevent shoppers to effectively rely on the calculation strategy to estimate the exact total price of shopping baskets. Reliance on the calculation strategy results in more biased, less accurate estimates than reliance on computational estimation strategies. These results explain why estimation performance reduces with shoppers’ motivation to be accurate–motivated consumers are willing to incur more cognitive cost to achieve a higher estimation performance by relying on the calculation strategy. Although motivation has a counterproductive effect on the estimation performance among inexperienced consumers, it improves estimation performance among experienced consumers. We further demonstrate that shoppers adapt their strategy to different price-ending conditions based on the perceived cognitive complexity and accuracy, which explains why shoppers in the pilot study predominantly rely on the rounding strategy to estimate the total price of their shopping baskets.

Field Study
To provide evidence for the assumption that shoppers’ estimates influence actual in-store spending, another field study was conducted involving 46 grocery shoppers. The results demonstrate that estimation biases relate to spending biases, putting shoppers underestimating the total price of their basket at risk of spending more than they budgeted for.
Conclusion

Because shoppers’ price estimates of their shopping baskets mediate the relationship between budget allocation and actual in-store spending, it is critical to understand whether and how shoppers determine the total price of their shopping baskets. Understanding which estimation strategy is most efficient and accurate in which specific context, among others, allows for more effective consumer education, which in turn may help improve consumer welfare as well as retail performance.

References


