**The Dark/Bright Side of Dark Patterns (depending on study results)**

1. **Background and Motivation**

The ways in which firms exploit consumers’ cognitive biases and limitations to increase profits have been the subject of extensive and wide-ranging studies.[[1]](#footnote-1) Recent evidence suggests that these behaviorally informed marketing techniques may significantly affect consumer behavior and outcomes.[[2]](#footnote-2) In the specific context of online transactions, firms increasingly design their websites in ways that confuse consumers, create dissonances, and undermine consumers’ actual preferences.[[3]](#footnote-3) While evidence of market manipulation abounds, little is known about the effects of these “dark patterns” on vulnerable consumer populations.[[4]](#footnote-4) Do these manipulative market strategies exert greater influence on more vulnerable populations? Are poorer or busier consumers more likely to suffer harm from these practices? It is possible that consumers with limited resources may be more careful with their expenditures, and, consequently, more resilient to market manipulation. However, both time and money scarcity have been found to undermine people’s cognitive capacity and reduce their self-control.[[5]](#footnote-5) Drawing on these findings, we hypothesize that consumers with scarce resources will be significantly more prone to alter their consumption decisions as a result of behaviorally informed online marketing techniques than will consumers with greater resources. In particular, we predict that more financially constrained and busier consumers will be more likely to alter their choices in ways that are inconsistent with their actual preferences as a result of being exposed to “dark patterns.” This outcome can be attributed to the phenomenon of scarcity-related concerns consuming mental bandwidth,[[6]](#footnote-6) thereby reducing consumers’ ability to overcome manipulative marketing techniques.

1. **Design and Conditions**

Participants will be asked to answer a short survey in return for a $1 reward. In addition, they will be informed that, as a bonus, after completing the survey, they will be enrolled in a lottery of their choosing. They will then be asked to indicate which lottery prize they would prefer: a $100 Starbucks gift card or a $100 Target gift card (both with equal winning probabilities).

Subsequently, participants will be randomly assigned into one of three conditions: “money scarcity,” “time scarcity,” and “no scarcity.”

1. *Money Scarcity* – In the “money scarcity” condition, participants will be presented with four hypothetical scenarios. Each scenario will describe a financial problem that participants might encounter. These scenarios have been borrowed from the scenarios used by Mani et al. (2013) in a study about the effects of poverty on cognitive ability.[[7]](#footnote-7) After answering the questions about these scenarios, participants will also be asked to describe a time when they did not have enough money or when financial resources were scarce, and to explain how they felt, what they did, and why.
2. *Time Scarcity* – In the “time scarcity” condition, participants will be presented with four hypothetical scenarios. Each scenario will describe a time-management problem that participants might encounter. The scenarios are similar to the “money scarcity” scenarios, with the difference being that the focus is on the participants coping with limited time.[[8]](#footnote-8) After answering the questions about these scenarios, participants will be asked to describe an instance when they did not have enough time or when they felt time was scarce, and to explain how they felt, what they did, and why.
3. *No Scarcity* – In the “no scarcity” condition, participants will be presented with four scenarios that are not directly related to either money or time scarcity. For example, participants will be asked what they would tell or ask a childhood friend if they happened to now meet them in the street, and how the conversation would make them feel. After answering the questions about these scenarios, participants will be asked to describe a time when they felt that they wanted to celebrate an event with friends. They will then be asked to explain what event they wanted to celebrate and why, how they decided to celebrate, what they did, and why. The scenarios in the “no scarcity” treatment have been drafted in such a way as to be only tangentially related to either money or time, and are unlikely to trigger scarcity-related emotions or concerns.

After completing the survey, participants will be informed of their successful completion and will proceed to choose a lottery prize. Here, again, participants will be randomly assigned into one of two conditions: “dark patterns” and “no dark patterns.”

In the “dark patterns” condition, they will be informed that they were automatically enrolled into a lottery, with a 1/100 probability of winning. Participants will be automatically opted into their *less* desirable prize option: if participants chose the “Starbucks card” preference at the beginning of the survey, they will be enrolled into the “Target card” lottery, and vice versa. Participants will then be subjected to a series of “dark patterns” meant to nudge them to accept the default option, notwithstanding their clear preference for the other option. Participants will read an advertisement suggesting that the default option is a very popular gift card. They will then be asked to select one of two options, with the default card option appearing in large font and automatically checked and the non-default option appearing below it, unchecked, in significantly smaller font. Participants who opt out of the default option will then be asked if they are certain that they do not want to continue being enrolled in the “awesome lottery to win a $100 Starbucks/Target card,” while the “keep me enrolled” option, highlighted and in larger font, will be pre-checked, and an “I’m not that awesome, so I do want additional information” option will appear, unchecked and in small font, below. Those who still opt out of the default option will be asked to follow instructions and answer an additional seven questions before being able to enroll in the lottery of their choosing. Participants who answer all seven questions will be notified that they successfully opted out of the lottery and are now enrolled in their favored lottery option.

In the “no dark patterns” condition, participants will be informed that they successfully completed the study and will be asked to indicate in which lottery they prefer to enroll: that for a Starbucks or that for a Target card.

Finally, all participants will be asked to answer additional questions about their socio-economic status. The responses to these questions will be used to measure how financially constrained and busy participants are. A factor analysis will be used to develop coherent composite time and money scarcity scales.

These last additional questions ask participants to indicate:

1. the highest dollar amount they would be willing to pay for: a. a $100 Starbucks card; b. a $100 Target card (to allow for a “back-of-the-envelope” calculation of the harm to consumers and various consumer populations caused by firms’ use of “dark patterns”);
2. what they thought the study was about (this question will be used to exclude robots from the analysis);
3. how many hours per week they spend online (to measure internet proficiency).
4. **Hypotheses**

This study’s hypotheses are based on the premise that consumers with limited resources will be less likely to insist upon their preferred plan after being subjected to “dark patterns” (such as defaults, social proof, and nagging) than consumers who are less financially constrained or less busy.

**Dependent Variable**: End-of-survey enrollment in the participant’s preferred lottery option.

* H1: Participants will be significantly more likely to enroll in their preferred lottery under the “no dark patterns**”** condition compared to the “dark patterns” condition.
* H2: Within the “dark patterns” treatment, participants assigned into the “money scarcity” condition will be significantly less likely to enroll in their preferred lottery by the end of the survey than participants assigned to the “no scarcity**”** condition
* H3: Within the “dark patterns” treatment, participants assigned into the “time scarcity” condition will be significantly less likely to enroll in their preferred lottery by the end of the survey than participants assigned to the “no scarcity” condition.

H1-H3 should hold both within and between groups of preferred lottery choosers (Starbucks and Target).

* H4: Within the “no scarcity”and“dark patterns” treatment, and controlling for all other demographics, more financially constrained participants (i.e., those experiencing greater scarcity of money) will be significantly less likely to opt for their preferred option at the end of the survey than less financially constrained participants (i.e., those experiencing less scarcity of money). Financial constraint will be measured by a continuous variable based on a composite scale using several items, based on a factor analysis.
* H5: Within the “no scarcity”and“dark patterns” treatment, and controlling for all other demographics, more time-constrained participants (i.e., those experiencing greater scarcity of time, or the busier participants) will be significantly less likely to opt for their preferred option at the end of the survey than less time-constrained participants (i.e., those experiencing less scarcity of time, or those who are less busy). Time constraint will be measured by a continuous variable based on a composite scale using several items, based on a factor analysis.
* H6 (exploratory): There will be an interaction effect between the scarcity manipulation and the money and time constraint measures, such that:

**H6A:** In the “dark patterns” treatment, more financially constrained participants will be significantly more affected by the “money scarcity” manipulation than less financially constrained participants, such that the difference in opt-out rates for more financially constrained participants between the “no scarcity” and “money scarcity” treatments will be greater than the difference in opt-out rates for those less financially constrained (the interaction effect between money scarcity manipulation and participants’ financial conditions).

**H6B:** In the “dark patterns” treatment, more time-constrained participants will be significantly more affected by the “time scarcity” manipulation than less time-constrained participants, such that the difference in opt-out rates for more time-constrained (busier) participants between the “no scarcity” and “time scarcity” treatments will be greater than the difference in opt-out rates for less busy participants (the interaction effect between time scarcity manipulation and participants’ time constraints).

* **H7 (exploratory):** The effect of money and time scarcity manipulations on participants’ likelihood to enroll to their preferred option will be greater under the “dark patterns” condition compared to the “no dark patterns” condition.
1. **Analyses**

Two exploratory factor analyses will be conducted on two sets of items from the survey.

For the “money scarcity” factor, an exploratory factor analysis will be conducted on a set of four items:

1. Annual Household Income [Q123]
2. Perceived Social Class (lower, working, middle or upper class) [Q172]
3. Recent Financial Stress [Q 139]
4. Employment Status [Q124]

For the “time scarcity” factor, an exploratory factor analysis will be conducted on a set of three items:

1. Employment Status [Q124]
2. Responses to the question of what best describes your living experience (with seven sub-items, from “too many things to do, too little time” to “plenty of time to do whatever I want”) [Q142]
3. Responses to the question of how many hours of free time per week do you have [Q143]

The following statistical analyses will then be performed:

1. A logistic regression of preferred lottery enrollment on six experimental conditions (three scarcity conditions multiplied by two “dark patterns”).
2. A logistic regression of lottery enrollment on six experimental conditions and demographic controls (including internet proficiency).
3. A logistic regression of lottery enrollment on six experimental conditions and demographic controls (including internet proficiency), and the interaction effect between the six conditions multiplied by the “time constraint” factor.
4. A logistic regression analysis of lottery enrollment on experimental conditions and demographic controls (including internet proficiency) and the interaction effect between the six conditions multiplied by the “money scarcity” and the “financial constraint” factors will be conducted.

The regression analysis will be supplemented with chi-squared tests of the differences in enrollment across experimental conditions.

1. **Outliers and Exclusions**

All participants who took less than five minutes to complete the survey in all conditions but the “control” condition will be excluded, as will those who took less than two minutes to complete the “control” condition.

1. **Sample Size:** 100 participants for each of the six conditions, for a total of 600 participants.

1. *See, e.g.,* Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, Harvard Law Review 1420–1572 (1999); Oren Bar-Gill, *Seduction by plastic*, 98 Nw. UL Rev. 1373 (2003);Oren Bar-Gill, Seduction by contract: Law, economics, and psychology in consumer markets (2012). [↑](#footnote-ref-1)
2. *See, e.g.*, Richard H. Thaler, *Nudge, not sludge*, 361 Science 431–431 (2018). [↑](#footnote-ref-2)
3. *See, e.g.* Ryan Calo, *Digital Market Manipulation*, 82 Geo. Wash. L. Rev. 995–1051 (2013); Jamie Luguri & Lior Strahilevitz, *Shining a light on dark patterns*, U of Chicago, Public Law Working Paper (2019). [↑](#footnote-ref-3)
4. While this study focuses on online marketing techniques, or “dark patterns,” we acknowledge that other forms of marketing techniques may (or may not) apply differently across different socio-demographic consumer groups. Future research on these issues is warranted. [↑](#footnote-ref-4)
5. Shah et al., *Some Consequences of Having too Little*, 338 Science 682 (2012); Anandi Mani et al., *Poverty Impedes Cognitive Function*, 341 Science 976–980 (2013); Sendhil Mullainathan & Eldar Shafir, Scarcity: Why having too little means so much (2013) (proposing that scarcity of diverse resources, including money and time, can have significant cognitive and behavioral implications); Hamilton et al., *How Financial Constraints Influence Consumer Behavior: An Integrative Framework*, 29 J. of Consum. Psychology 285 (2019). [↑](#footnote-ref-5)
6. *ID.* [↑](#footnote-ref-6)
7. Mani et al., *supra* note 4. [↑](#footnote-ref-7)
8. *Id.* [↑](#footnote-ref-8)