



# Conscious and Unconscious Reward Preference & Choice: A Biometric Experiment

## Introduction

In Fall 2016, the Incentive Research Foundation commissioned Flying Horse Communications along with the help of Steve Genco, author of *Neuroscience for Dummies*, to conduct a first-of-a-kind experiment in the field of rewards and recognition. The experiment used biometric techniques borrowed from the science of neuromarketing. It was designed to test two hypotheses:

- H1) Participants will exhibit a stronger response (attraction) to highly salient non-cash rewards than to cash at *the unconscious level*.
- H2) After participants are given time to examine and consider their non-cash and cash reward options, most will choose a non-cash, hedonic reward over the equivalent cash.

## Background

Academic research from the past three decades has offered evidence that people prefer cash rewards to non-cash rewards (Shaffer, 2009; Jeffrey S, 2009; Dzurainin A, 2013; Kagel & Roth, 2016). The studies find that when people are asked what sorts of rewards they prefer, most choose cash. Many researchers have hypothesized that this is because cash is the most fungible reward. In other words, reward-earners can decide what to spend it on, and, for that reason, can more easily rationalize and justify the choice (Dzurainin, Randolph, & Stuart, 2013; Benjamin, Heffetz, Kimball, & Rees-Jones, 2012; Jeffrey, 2003, 2009; Hein, 1998).

However, the studies these results rely on fail to factor for the known effects of salience and choice among non-cash rewards (Lou, Hsu, & Sajda, 2015). This study may be the first experiment to examine cash vs. non-cash reward preference under conditions of where the subjects were offered the opportunity to choose personally meaningful rewards.

## The Psychology of Preference

Behavior science has taught us that what people say and what they feel are often very different things (Jeffrey S, 2009). Various studies have illustrated this. Perhaps the best-known, and to many, most astonishing finding in choice and preference, is the power of default settings. For example, most adults will make a decision at some point in their lives about whether to select

“organ donor” when they get or renew their driver license. This choice would seem to constitute an important one for most people. Yet in countless studies, the decision appears to come down to which is the default option on their driver license application.

Psychologists argue that because the choice is so fraught, people accept the default option to avoid having to think about it (Davidai, Gilovich, & Ross, 2012; Ariely, 2008). Supporting this hypothesis is the observation that even when people blindly accept the default option, they are able to rationalize it afterward as though they had given it extensive thought (Davidai, Gilovich, & Ross, 2012).

Examples of conflicting preference and choice abound. Research by Daniel Kahneman supports the notion that people often make choices that they think they *should* make, as opposed to what they prefer (Kahneman, 2011). Kahneman and others point out that people do not always make choices consistent with their preferences or with that which motivates them the most. He and others have demonstrated that preferences generally map to “System 1” thinking, (i.e., fast, reflexive, automatic thinking) whereas choice normally invokes “System 2” thinking, (i.e., slow, careful, cognitive thinking).

Kahneman and others have pointed out that System 2 thinking it is not always good at registering emotions; indeed, relying on System 1 might make people happier, more engaged and more

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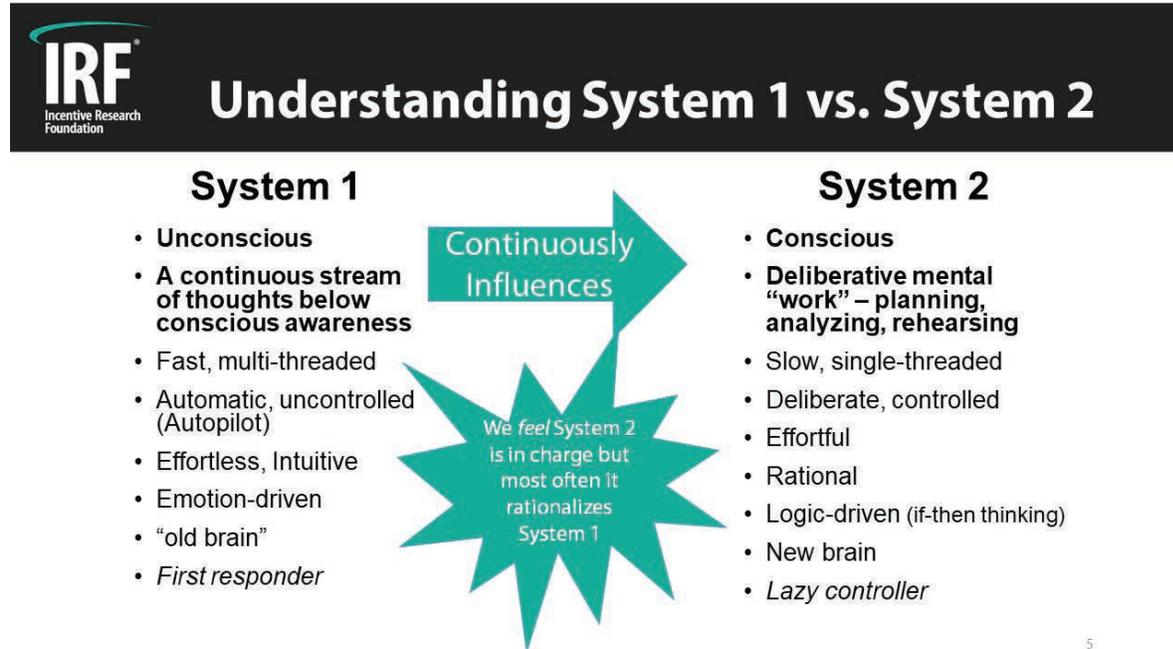
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motivated (Hsee, 1999; Iyengar, 2010; Kahneman, 2013). They have also found that people are often poor judges of what they will most enjoy or use and that also causes them to make choices that counter their preferences (Kahneman & Snell, 1992).



Most motivation professionals and a growing number of researchers argue that aside from pure compensation, cash as a job reward does not work as well as non-cash rewards in driving performance (Jeffrey, 2017, 2009, 2003; Schall & Mohnen, 2015; Kube, Marechal & Puppe, 2012; Mahmood & Zaman, 2010; Jeffrey & Shaffer, 2007; Alonzo, 1996; Heyman & Ariely, 2004). The reasons are numerous, but rest in part on Nobel Laureate Richard Thaler’s theory of mental accounting (Thaler, 1985). Our propensity to mentally place our money into buckets for various purposes means that recipients of cash rewards and bonuses often classify reward money with funds set aside for mundane purposes, such as paying the mortgage and/or utility bills. This makes those rewards far less memorable and impactful than equivalent, hedonic non-cash rewards.

### The Experiments

Though science does not yet fully understand the relationships between the unconscious and conscious minds, (Bargh & Morsella, 2008) we know that much of our thinking and decision-making occurs at the unconscious level (Goleman, 1984; Szegedy-Maszak, n.d; Fannin & Williams, n.d.; Kahneman, 2013). It is valuable, therefore, to gain a better understanding of reward preference at the unconscious level.

In our experiment, the unconscious reward preferences of 42 subjects were assessed using biometric and facial coding techniques ranging from eye tracking and galvanic skin response to fixation time and measures of BIS/BAS.<sup>1</sup> These techniques have been used by scientists for

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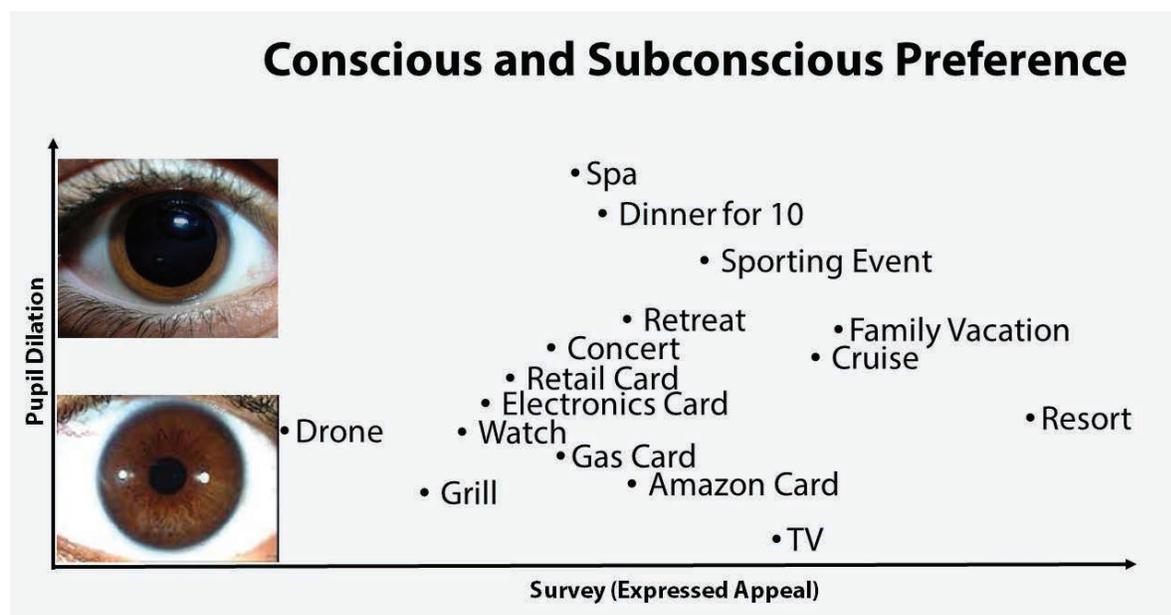
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<sup>1</sup> BIS (Behavioral Inhibition System) / BAS (Behavioral Approach System) refers to the biometric technique of assessing a person’s aversion (BIS) or attraction (BAS) to a stimulus, or in this case, a reward option.

decades and though imperfect, they have gained credibility among researchers in the social sciences where they are commonly used by psychologists to gauge intent, preference and sincerity across a wide range of disciplines (Alsaadi, 2015). More recently, researchers in the field of neuromarketing have used the techniques, to test people’s unconscious reactions to advertising and their preferences for consumer goods.

## Measurements

**Pupil Dilation:** One of the main biometric techniques used in our experiment was measuring pupil dilation, which is an involuntary expansion of the pupils in our eyes. This happens when we move from light to dark but it also correlates so consistently with arousal (interest and anxiety) that researchers use pupil size, or pupillometry, to investigate a wide range of psychological phenomena. Nobel laureate Daniel Kahneman has identified pupil dilation as among the most effective and transparent means of gauging peoples’ “arousal” when presented with challenges or opportunities (Kahneman, 2013).



**BIS/BAS:** Another biometric technique we relied on was the BIA/BAS Scale. Many researchers have confirmed the use of BIS (Behavioral Inhibition System) and BAS (Behavioral Activation System) as among the most widely accepted measures of what causes various behavior (Wikipedia, n.d.). This measurement shows an individuals natural pre-disposition to either be more strongly drawn *toward* positive reinforcement (awards) or *away* from negative reinforcements (punishments).

Our experiment was directed by primary investigator, Steven Genco, a pioneer in the field of neuromarketing. Dr. Genco and his associates selected biometric techniques to fit the intent and constraints of the experiment. Subjects represented multiple genders, ages, and job types (sales/non sales). They were also assessed for personality differences (BIS/BAS). After being prompted with a work reward scenario, their presentation preferences (pupil dilation, eye tracking) and intrinsic reward preferences (facial expressions, eye tracking GSR peaks, and pupil dilation) were measured. The researchers also measured the time it took people to choose their reward (time-to-choice) and conducted qualitative interviews with each to better understand their financial and lifecycle situations, their reward preferences, and why they ultimately chose one type of reward over another.

Our subjects were shown a range of sixteen rewards divided into four categories: “Experience” (sporting event, spa, dinner for ten, concert); “Merchandise” (big screen TV, drone, watch, grill); “Gift Card” (general retail, Amazon, Best Buy, gas), and “Travel” (resort, executive retreat, family vacation, cruise). It is important to remember that subjects in the experiment were repeatedly exposed to digital photographs representing the 16 non-cash rewards and one “cash” reward. Saliency was increased further by immersing subjects in four recorded award presentation scenarios, the results of which are described in Part Two of this paper.

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Subjects were repeatedly reminded that all sixteen rewards and the cash were of equal value. After viewing each option they were asked to choose how appealing each reward was on a 5-point Likert Scale, from “Very Unappealing” to “Very Appealing.” Next, they looked only at their highest rated choice in each category and “cash” was then introduced as a fifth option. The researchers collected biometric data to measure subjects’ emotional engagement throughout.

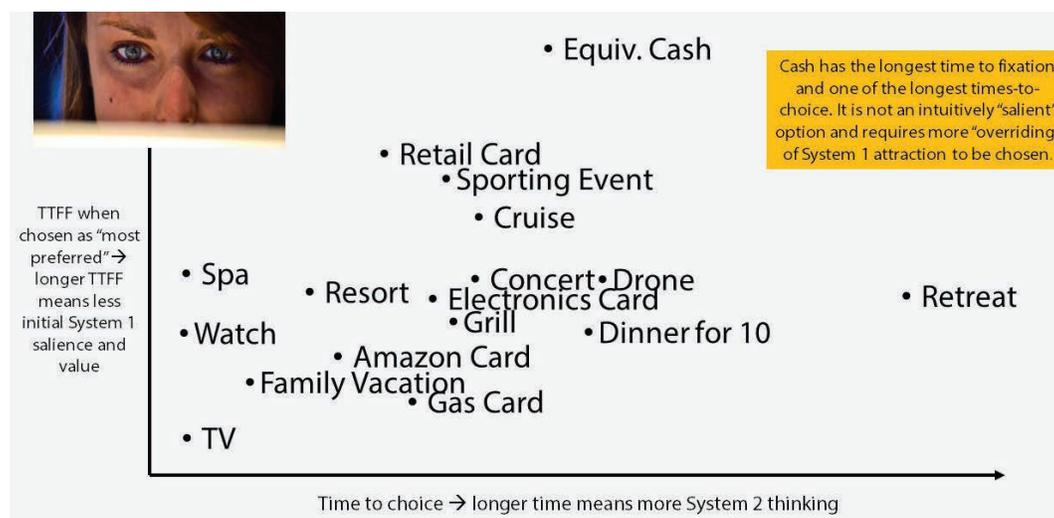
## The Results of the Experiment

### 1. Conscious reward choice does not often match unconscious reward preference.

Subjects were asked to state their preference of non-cash reward and then they were shown images of each reward while tools were used to measure their attention and pupil dilation. Researchers recorded a wide divergence between what people said they wanted and what their unconscious actions suggested they prefer. Again, this supports a large body of past research and evidence that we don’t always verbally choose awards which might be the most engaging and rewarding for us (see “The Psychology of Preference” above).

### 2. At an unconscious, system 1 level, people are overwhelmingly drawn to non-cash rewards over cash.

Another technique our researchers used to measure subjects’ unconscious reaction to reward options was eye tracking, including Time to First Fixation (TTFF). TTFF correlates to initial attraction – the faster the eyes fixate on a reward, the better the indicator of System 1 or automatic, instinctual attraction. Participants in our experiment were more immediately attracted to non-cash rewards than equivalent cash.



**3. Cash was not intrinsically more motivating than other types of chosen rewards.**

Cash has the longest time to fixation and the longest time-to-choice. Thus, it is not an intuitively salient option. It requires more overriding of System 1 to be chosen than non-cash rewards, which appear to have more intrinsic appeal. In other words, subjects were drawn to various non-cash rewards much more frequently than equivalent cash, but as they thought about it, their gazes fixed, ultimately, on the thing they ended up choosing. In this case, for sixteen of our subjects, that choice was cash.

**4. When rewards are made salient and multiple non-cash reward options are made available, a significant majority of people will choose a non-cash reward over an equivalent cash reward.**

62 percent of our subjects ultimately chose a non-cash reward over cash, confirming findings in the IRF's [2015 Landmark Study](#) in which the majority of survey participants stated a preference for non-cash rewards (IRF, 2015).

## Conclusions

The two hypotheses were largely confirmed by the experiment. Biometric techniques used to assess unconscious attraction to a range of rewards demonstrate a preference for non-cash rewards at the unconscious, or System 1 level, offering evidence in support of H1. Almost two-thirds of our subjects chose a non-cash reward after engaging System 2 thinking. This is consistent with H2.

We expect future biometric-based experiments involving a larger number of subjects will bolster our findings with respect to H1. Separate experiments should also test reward preference using salience and/or choice versus control groups that are not offered salience and/or choice to more accurately test H2.

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To view the full study, please visit: <http://theirf.org/research/conscious-and-unconscious-reward-preference-choice-a-biometric-experiment/2328/>

## Works Cited

- Alonzo, V. (1996). The Trouble with Money. *Incentive Journal*, 170(2), 26-31.
- Alsaadi, I. M. (2015, December). Physiological Biometric Authentication Systems, Advantages, Disadvantages And Future Development: A Review. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, 4(12).
- Ariely, D. (2008, May 5). *3 main lessons of Psychology*. Retrieved December 15, 2016, from danariely.com: <http://danariely.com/2008/05/05/3-main-lessons-of-psychology/>
- Bargh, J. A., & Morsella, E. (2008, January 3). The Unconscious Mind. *Perspectives in Psychological Science*, 3(1), 73-79.
- Benjamin, D., Heffetz, O., Kimball, M. S., & Rees-Jones, A. (2012). What Do You Think Would Make You Happier? What Do You Think You Would Choose? *American Economic Review*(5), 2083.
- Davidai, S., Gilovich, T., & Ross, L. D. (2012, September 4). The meaning of default options for potential organ donors. *Proceedings of the National Academy of Sciences USA*, 109(38), 15201-15205.
- Dzurainin A, R. D. (2013, July). Doing More With Less: Using Noncash Incentives to Improve Employee Performance. *Journal of Corporate Accounting & Finance* , 24(5), 75.
- Dzurainin, A. C., Randolph, D., & Stuart, N. V. (2013, July/August). D oing More With Less: Using Noncash Incentives to Improve Employee Performance. *The Journal of Corporate Accounting & Finance*, 7.
- Fannin, J. L., & Williams, R. M. (n.d.). *What Neuroscience Reveals about the Nature of Business*. Center for Cognitive Enhancement.
- Goleman, D. (1984, February 7). *NEW VIEW OF MIND GIVES UNCONSCIOUS AN EXPANDED ROLE*. Retrieved December 20, 2016, from New York Times: <http://www.nytimes.com/1984/02/07/science/new-view-of-mind-gives-unconscious-an-expanded-role.html?pagewanted=all>
- Hein, K. (1998, October). This is what we want!! *Incentive*, 172(10), p. 40.
- Heyman, J., & Ariely, D. (2004). Effort for Payment: A Tale of Two Markets. *Psychological Science*, 15(11), 787-793.
- Hsee, C. K. (1999). Value Seeking and Prediction – Decision Inconsistency: Why don't people take what they predict they'll like the most? *Psychonomic Bulletin & Review*, 6(4), 555-561.
- Iyengar, S. (2010). *The Art of Choosing*. Twelve.
- Jeffrey, S. (2003). *The Benefits of Tangible Non-Monetary Incentives*. Incentive Research Foundation. Incentive Research Foundation.
- Jeffrey, S. A. (2009). Justifiability and the Motivational Power of Tangible Non-Cash Incentives. *Human Performance*, 22(2), 143-155.
- Jeffrey, S. A., & Schaffer, V. (2007). The Motivational Properties of Tangible Incentives. *Compensation and Benefits Review*, pp. 44-50.
- Jeffrey, S., & et, a. (n.d.). *Thanks for the Memories*. Unpublished.
- Kagel, J. H., & Roth, A. E. (2016). *The Handbook of Experimental Economics* (Vol. 2). Princeton University Press.
- Kahneman, D. (2011). *Thinking Fast and Slow*. FSG.
- Kahneman, D., & Snell, J. (1992). Predicting a Changing Taste: Do People Know What They Will Like. *Journal of Behavioral Decision Making*, 187-200.
- Kube, S., Maréchal, M. A., & Puppe, C. (2008). *The Currency of Reciprocity—GiftExchange in the Workplace*. University of Zurich, Institute for Empirical Research in Economics. University of Zurich.
- Lou, B., Hsu, W. Y., & Sajda, P. (2015, Sep). Perceptual Saliency and Reward Both Influence Feedback-Related Neural Activity Arising from Choice. *Journal of Neuroscience*, 35(38), 1601-1615.
- Mahmood, S., & Zaman, A. (2010). Monetary and Non-monetary Gift Exchange. *The Pakistand Development Review*, 49(4), 719-740.
- Shaffer, V. (2009, January 1). Preference reversals in evaluations of cash versus non-cash incentives. *Journal of Economic Psychology*(30), 859-872.
- Szegedy-Maszak, M. (n.d). *Mysteries of the mind: Your unconscious is making your everyday decisions*. Retrieved December 20, 2016, from Auburn.edu: <http://www.auburn.edu/~mitrege/ENGL2210/USNWR-mind.html>
- Thaler, R. H. (1985). Mental Accounting and Consumer Choice. *Marketing Science*, 4(3), 199-214.
- IRF. (2015). *2015 Landmark Study: Participant Award Experience Preferences*. Incentive Research Foundation. Incentive Research Foundation.
- Wikipedia. (n.d.). *Gray's biopsychological theory of personality*. Retrieved from Wikipedia: [https://en.wikipedia.org/wiki/Gray%27s\\_biopsychological\\_theory\\_of\\_personality](https://en.wikipedia.org/wiki/Gray%27s_biopsychological_theory_of_personality)