Is Paying Painful?: Neuropsychological Underpinnings of Abstract and Somatosensory Costs During Consumer Decision Making

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Although much is known about how the human brain encodes the decision utility of objects for purchase, little is known about how costs are incorporated. We investigated this question using fMRI while subjects made purchasing decisions in exchange for either money or electric shocks.

[to cite]:

[url]:
http://www.acrwebsite.org/volumes/1009781/volumes/v39/NA-39

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Spending Hurts? Examining the Antecedents and Consequences of the Pain of Paying

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Paper #1: Is Paying Painful?: Neuropsychological Underpinnings of Abstract and Somatosensory Costs During Consumer Decision Making
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Paper #2: The Origin of the Pain of Paying
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SESSION OVERVIEW
Recent research in behavioral economics has illustrated the critical role hedonics plays in an individual’s consumption decisions. For example, Prelec and Loewenstein (1998) suggested that when making purchase decisions, people experience competition between the anticipated pleasure derived from acquiring and consuming the product and the anticipated losses incurred not only from the money given up in the transaction (product price) and the hassle of executing the payment (transaction cost) but also from the pain of paying, the disutility derived from parting with money. It is the outcome of this hedonic competition that results in a consumer’s decision of whether or not to purchase. Interestingly, however, our understanding of the pain of paying concept is still rather vague.

The objective of the current session is to provide further evidence for the existence of pain of paying and to examine both its antecedents and consequences. With three paper presentations followed by a comprehensive discussion we seek to help foster a better understanding of the pain of paying, including what it is, how it is experienced, what is driving it, and how it influences consumers' decisions.

In the first paper, Plassmann, Mazar and Rangel used neuroimaging to examine how the human brain processes different types of costs during purchase decisions. Building upon previous research, Plassmann et al. investigated whether the neural representation of costs differ between abstract costs (e.g. paying money) and somatosensory costs (e.g. tolerating electric shocks). Although they found that purchase decisions involving money and shocks were similar on a behavioral level, they found significant differences at a neural level. More specifically, the authors found that making decisions involving somatosensory costs recruited brain areas involved in pain processing, while making decisions involving monetary prices did not. Simply put, the pain of paying (i.e. paying with money) is not experienced the same as the paying with physical pain.

In the second paper in this session, Mazar and colleagues examined with behavioral experiments whether the pain of paying is experienced as a physical pain, psychological pain, or whether it is not experienced as a pain at all. In two studies, they found that making psychological pain more salient decreased consumers’ willingness to pay for hedonic as well as utilitarian products, and these differences were not driven by individual’s liking of the products, their mood, or their arousal levels. Making physical pain more salient did not differ from the control group. The authors are currently running a third study, which will be completed by the time of the ACR conference. This new study, which more directly manipulates participants’ experience of pain of paying while purchasing (through placebo pills), examines whether making people more/less sensitive to their pain decreases/increases their willingness-to-pay.

The first two papers complement each other and together show that the pain of paying is more closely related to psychological pain than physical pain. The third paper in this session extends this work and examines the impact that individual differences in pain of paying have on consumers’ financial decisions. In their paper, Thomas and Park demonstrated that people who experience greater pain of paying are more predisposed to prepay their loans. In addition, they demonstrated the domain specificity of pain of paying, showing that these prepayment preferences only occur when the decisions are framed in terms of monetary gains; when gains are framed as non-monetary, pain of paying no longer has an effect on individuals preference to prepay. Together the studies in this paper suggest that financial decisions are influenced by the interaction of individuals’ innate sensitivity to pain of paying and the framing of decisions.

As our purchase decisions involve a hedonic trade-off between gains and losses, a clear fundamental understanding of pain of paying and its effects is important. In keeping with the conference theme “Building Connections,” the three papers in this session significantly contribute to this understanding by taking a number of different methods (e.g., neuroscience methods, behavioral experiments) and approaches (e.g., priming, decision framing) to help define what the pain of paying is, its underlying processes, and how individual differences in pain of paying influence decisions. This session focuses on a very current topic as the pain of paying plays a crucial role in individuals’ overspending and undersaving. As such, we believe this session will appeal to a wide audience at ACR. We also have a discussant, Scott Rick, with great experience and knowledge in the domain of pain of paying; he has published fMRI research looking at the neural predictors of purchases (Knutson et al., 2007) and has developed a scale to measure individual differences in pain of paying (Rick et al., 2008). His comments are sure to add further insight to the presented findings and initiate a thought-provoking and constructive debate with the audience of this session. Note: The findings of all three papers have been written up, i.e. in manuscripts that are either prepared or under review.

Is Paying Painful? Neuropsychological Underpinnings of Abstract and Somatosensory Costs During Consumer Decision Making

EXTENDED ABSTRACT
A seminal account proposed for the hedonics underlying consumption decisions distinguishes between two opposing factors: rewarding factors like the pleasure derived from consumption and aversive factors like the costs of the consumption often referred to as “pain of paying” (Prelec and Loewenstein, 1998). Previous research in neuroeconomics has investigated how decision utility computations are represented in the brain (Plassmann et al., 2007) and whether these representations differ for different modalities such as primary or secondary rewards (Chib et al., 2009). However, despite its importance for consumer decision-making, little is known about how the human brain computes aversive factors during purchasing,
namely the costs associated with the item for purchase. This is the central question of this paper. In particular, we investigated whether the representation of costs in the brain differ between abstract costs (e.g., paying money) or somatosensory costs (e.g., tolerating electric shocks) that are matched in economic value.

Consumer behavior theories have suggested that consumers consider abstract monetary prices as a potential loss that triggers a negative affective response that resembles the emotional or psychological components of pain processing (so-called “pain of paying”, see (Prelec and Loewenstein, 1998, Rick et al., 2008). A recent neuroimaging study found that when subjects decide to buy, areas of the brain that are known to represent the sensation of physical (but not psychological) pain - the Insula – are less activated as compared to when subjects decide not to buy (Knutson et al., 2007). These results suggested that the act of paying does physically “hurt” when prices are perceived as too high, i.e. it triggers a physical pain sensation. However, these results were based on inverse inferences about the Insula as their study did not allow for comparing the act of paying with the experience of physical pain. Given that the Insula is a highly interconnected brain area that has also been found to be involved in various other mental processes important for consumer decision-making, the current findings are inconclusive. Our paper addresses these shortcomings and provides a direct test of the physical pain of paying hypothesis.

We investigated the neural basis of cost computations by screening hungry subjects’ brains (N=21, aged 18-35, mean 23.65 years) while making 280 purchasing decisions for liked food items. Subjects could either pay in monetary units ($0-$1.50) or in subjectively equivalent physical pain units (electric shocks). Several days before the fMRI experiment, we performed a calibration of each individual’s subjective pain tolerance levels in which we matched their pain tolerance to monetary values using a BDM auction mechanism (Becker, DeGroot, and Marschak, 1964). Because of the characteristics of this auction, we can assume that in that pre-screening study individuals bid their ‘true’ utility for the right to avoid receiving an electric shock of different intensities (Wertenbroch and Skiera, 2002). During a second pre-scanning task, subjects underwent another BDM task, this time to sample subjects’ willingness-to-pay (WTP) for the 40 different food items. The fMRI task consisted of two different, within-subject trial types: Trials in which subjects could decide to buy 40 food items at four different monetary prices ($0, $0.50, $1.00, $1.50) (= 160 ‘$ trials’) and trials in which they could decide to buy the same 40 food items for tolerating pain (electric shock) at three different pain intensities (=120 ‘V trials’) that were matched with the three different non-zero monetary prices.

For the behavioral data analysis of the main study, we created dummy variables for WTP and purchasing prices in money and physical pain trials and entered them into a mixed effects logistic regression analysis. The model was significant (Wald $\chi^2(2)=1222.23$, DF=22, p<.000) and had significant regression coefficients for each predictor ($\beta_{\text{money}}=3.31$, p<.000; $\beta_{\text{shock}}=3.68$, p<.000; $\beta_{\text{price}}=-2.69$, p<.000; $\beta_{\text{price}}=-2.52$, p<.000). We tested differences in the regression coefficients between WTP and price predictors in each trial (money or shock) type and found significant differences for WTP and price in both, money and voltage trials (both p<.000). We also tested differences in the regression coefficients between money and voltage trials for WTP and price predictors and found no significant differences between trial type (price vs. price; p<.026; WTP vs. WTP; p<.09). For the fMRI data analysis we estimated a hierarchical mixed effect GLM to investigate differences and overlaps for brain areas that correlated with the size of monetary and physical pain costs. We found that the Insula, a region involved in physical pain processing, correlated positively with the size of physical pain prices, but not with the size of monetary prices (p<.005, uncorr.). A conjunction analysis revealed that no overlapping areas can be found (p<.005, uncorr.).

Taken together, these results show that while people’s brains react differently to “monetary” and “physical pain” their behavior does not. Our fMRI results suggest that paying with money might trigger very different processes than those involved with more “physical” forms of costs. We suggest that the act of paying recruits systems involved in psychological rather than physical pain processing. These results call into question the current findings in the neuroscientific literature: That is, our findings call into question that for everyday consumption decisions paying triggers a similar sensation as suffering physical pain. Our results have important implications for disadvantageous decision-making such as overspending and transformative consumer research.

The Origin of the Pain of Paying

EXTENDED ABSTRACT

In our daily lives we are continuously faced with the decision of whether or not to buy different goods and services. As research from behavioral economics suggests, when purchasing a product, people experience hedonic competition between the anticipated pleasure derived from acquiring and consuming the product and the anticipated losses incurred not only from the money given up in the transaction (product price) and the hassle of executing the payment (transaction cost) but also from pain of paying, the disutility derived parting with money (Prelec & Loewenstein, 1998). It is the trade-off between these anticipated gains and losses that determines the decision of whether or not to purchase. Interestingly, however, our understanding of the pain of paying construct is still inconclusive.

Early findings from judgment and decision making, in support of the pain of paying, demonstrated that people like to prepay for purchases and decouple spending from consumption (Prelec & Loewenstein, 1998). Recent findings from neuroeconomics (Knutson et al., 2007) went further and showed that a decision to purchase activated not only brain areas involved in reward processing (Nucleus Accumbens) but also deactivated brain areas (in particular the anterior Insula) that have been linked not only to physical pain but also to arousal (i.e. disgust and anxiety). The current research extends these previous findings and seeks to provide a better understanding of what the pain of paying is: how is it experienced and what is driving it.

One of the biggest unknowns that the current paper is focusing on is whether the pain of paying is in fact experienced as a physical pain, psychological pain, or whether it is not experienced as a pain at all. To address this question, as a first step we examined whether making pain more salient would influence consumer’s willingness-to-pay for products, and if so, which types of pain would have an influence. In Study 1 participants were primed, using a scrambled sentence task, with either psychological pain related words (e.g., sorrow, grief, heartbreak), physical pain related words (e.g., aching, sore, cramps), or neutral words (e.g., pen, ball, carpet). Participants were then given the opportunity to purchase a box of Godiva chocolates for real with their own money. They provided their willingness-to-pay (WTP) using a choice-based Becker-DeGroot-Marschak (BDM) auction (Becker, DeGroot & Marschak, 1964); a pre-test confirmed that only participants that understood the BDM auction-procedure proceeded to this task. Finally, participants completed liking, mood, and arousal measures. Our findings indicate that participants primed with psychological pain-related words were willing to