Motivating Behavioral Change: Lessons from Behavioral Finance

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Revolutionizing Global Leadership
Common Pool Problem?
Money on the Table

U.S. MID-RANGE ABATEMENT CURVE – 2030

Source: McKinsey analysis
Discounting

\[ PV = \frac{C_n}{(1+r)^n} \]
Hyperbolic Discounting

Would you like to have
A) $10 now
   or
B) $11 in an hour

Would you like to have
C) $10 in a week
   or
D) $11 in a week and an hour
Exponential Discounting

$11

$10

PV

time
Choosing fruit vs. chocolate
Read and van Leeuwen (1998)

Choosing Today

Eating Next Week

If you were deciding today, would you choose fruit or chocolate for next week?
Patient choices for the future:

Choosing Today  

Today, subjects typically choose fruit for next week.

Eating Next Week  

74% choose fruit
Impatient choices for today:

Choosing and Eating

Simultaneously

If you were deciding today, would you choose fruit or chocolate for today?
Time Inconsistent Preferences:

Choosing and Eating Simultaneously

70% choose chocolate
The desire for instant gratification
Read, Loewenstein & Kalyanaraman

Choose among 24 movie videos

- Some are “low brow”:
- Some are “high brow”:

- Picking for tonight: 66% of subjects choose low brow.
- Picking for next Thursday: 37% choose low brow.
- Picking for second Thursday: 29% choose low brow.
Discount Rate

Apparent utility as time progresses

A = smaller reward (blue)
B = larger reward (red)

Discounting zone: Apparent utility of A seems larger here

Larger reward, obtained later

Smaller reward, obtained sooner

Time when A is obtained
Time when B is obtained

Apparent Utility

Time
Preference reversal and delayed reinforcement

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and

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Harvard University, Cambridge, Massachusetts 02138
Hyperbolic Discounting

Figure 2
Non-Exponential Discounting.

Source: Ainslie (1975).
Behavioral Model

- Quasi-hyperbolic discounting (Laibson, 1997)
- Discounted utility function
  \[ U_t = u_t + \frac{1}{2} [u_{t+1} + u_{t+2} + u_{t+3} + ...] \]

- Discounted utility from the perspective of time \( t+1 \).
  \[ U_{t+1} = u_{t+1} + \frac{1}{2} [u_{t+2} + u_{t+3} + ...] \]

- Discount function reflects dynamic inconsistency: preferences held at date \( t \) do not agree with preferences held at date \( t+1 \).
Suppose you can exercise (effort cost 6) to gain delayed benefits (health value 8).

When will you exercise?

- Exercise Today: \(-6 + \frac{1}{2} [8] = -2\)
- Exercise Tomorrow: \(0 + \frac{1}{2} [-6 + 8] = 1\)

Happy to make plans today to exercise tomorrow.
But likely to fail to follow through.
How can declining discounting be explained?

- Standard theory assumes a constant discount factor $\delta$.

- Hyperbolic discounting (Laibson 1997 and others): the higher impatience of people in the present can be modeled with an additional discount factor $\beta$ that applies to all time points in the future (Beta-Delta-Model).
  
  $U = u_t + \beta \delta u_{t+1} + \beta \delta^2 u_{t+2} + \beta \delta^3 u_{t+3} + \ldots$

- Dual-self models (Fudenberg/Levine 2006)
Standard vs. $\beta\delta$-Model

Standard model: exponential discounting

Quasi-hyperbolic discounting ($\beta\delta$-Model)
Limbic system vs. Fronto-Parietal System

- Frontal cortex
- Parietal cortex
- Caudate nucleus and putamen (striatum)
- Nucleus accumbens (ventral striatum)
- Ventral tegmental area
- Substantia nigra

Limbic system
Brain Activity in the Frontal System and Limbic System Predict Behavior
(Data for choices with an immediate option.)
Conclusions of fMRI study

• Time discounting results from the combined influence of two neural systems:
  • Limbic structures are impatient (accounts for $\beta$)
  • Fronto-parietal systems are patient. (accounts for $\delta$)
• These two systems are separately implicated in ‘emotional (affective)’ and ‘analytic (cognitive)’ brain processes.
• The limbic (emotional) brain, does not value delayed rewards
• The limbic brain creates a drive for instant gratification
• Results have now been replicated with juice rewards
Dual Brain Model

- Again offer subjects a choice between chocolate cake and fruit salad
- While they are presented with this choice, give some of them a distraction tasks.
- Distraction task can be easy: remember three digits
- Or hard, remember 9 digits
Dual Brain Model
Shiv and Fedorikhin (1999)

- Those faced with harder task, chose chocolate cake more often

<table>
<thead>
<tr>
<th>Processing burden</th>
<th>% choosing cake</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low</strong> (remember only 2 digits)</td>
<td>37%</td>
</tr>
<tr>
<td><strong>High</strong> (remember 7 digits)</td>
<td>59%</td>
</tr>
</tbody>
</table>
Cash or Credit
Always Leave Home Without It: A Further Investigation of the Credit-Card Effect on Willingness to Pay

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Table 1. Study 1: Mean values for Celtics tickets, Red Sox tickets, and Banners, by payment method

<table>
<thead>
<tr>
<th>Payment Method</th>
<th>Celtics</th>
<th>Red Sox</th>
<th>Banners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash mean (N = 31)</td>
<td>$28.51</td>
<td>$9.02</td>
<td>$3.32</td>
</tr>
<tr>
<td>(std err)</td>
<td>(3.25)</td>
<td>(1.10)</td>
<td>(1.61)</td>
</tr>
<tr>
<td>Credit card mean (N = 33)</td>
<td>$60.64</td>
<td>$15.92</td>
<td>$5.29</td>
</tr>
<tr>
<td>(std err)</td>
<td>(11.09)</td>
<td>(2.66)</td>
<td>(1.66)</td>
</tr>
<tr>
<td>Credit card premium</td>
<td>+113%</td>
<td>+76%</td>
<td>+59%</td>
</tr>
<tr>
<td>t-test</td>
<td>t = 2.71, p &lt; .01</td>
<td>t = 2.35, p &lt; .05</td>
<td>t = .85, ns</td>
</tr>
<tr>
<td>Cash median</td>
<td>$25.00</td>
<td>$8.00</td>
<td>$1.00</td>
</tr>
<tr>
<td>Credit card median</td>
<td>$41.00</td>
<td>$12.00</td>
<td>$2.00</td>
</tr>
<tr>
<td>Wilcoxon rank-sum test</td>
<td>z = 2.64, p &lt; .01</td>
<td>z = 1.42, ns</td>
<td>z = 1.98, p &lt; .05</td>
</tr>
</tbody>
</table>
Do Payment Mechanisms Change the Way Consumers Perceive Products?

PROMOTHESH CHATTERJEE
RANDALL L. ROSE

Study 1: Differential Errors due to Payment Primes

![Bar chart showing differential errors for credit card and cash payments, with bars indicating benefits and costs.](chart.png)
Do Payment Mechanisms Change the Way Consumers Perceive Products?

PROMOTHESH CHATTERJEE
RANDALL L. ROSE

Study 2: Differential Focus due to Payment Primes

![Bar chart showing the comparison between benefits and costs associated with credit card and cash payments.](chart.png)
Defined Contribution Plans

- Shift from DB to DC
- Usually requires action by employee
- Employees often defer action
- Even when they want to participate
- Even when employees match!
Procrastination in retirement savings
Choi, Laibson, Madrian, Metrick (2002)

● Survey
  ▪ Mailed to 590 employees (random sample)
  ▪ 195 usable responses
  ▪ Matched to administrative data on actual savings behavior

● Consider a population of 100 employees
  ▪ 68 report saving too little
  ▪ 24 of 68 plan to raise 401(k) contribution in next 2 months
  ▪ Only 3 of 24 actually do so in the next 4 months
$100 bills on the sidewalk

- Sample companies provide a 50% or greater employer match. (13 companies)
- Sample restricted to active employees with tenure $\geq 1$ and $20000 \leq \text{salary} \leq 160000$. Eligible population includes 166099 employees. Active population includes 152340 employees.
- Control variables were age, tenure, and company fixed effect dummies.

Source: Choi, Laibson, Madrian, Metrick.
Effort
Effort
Effort
The office candy dish: proximity’s influence on estimated and actual consumption

B Wansink¹, JE Painter² and Y-K Lee³

![Bar chart showing the impact of proximity on actual and estimated candy consumption.](chart.png)

**Figure 1** The impact of proximity on actual and estimated candy consumption.
Joining a Gym
Della Vigna and Malmendier (2004)

- Average cost of gym membership: $75 per month
- Average number of visits: 4
- Average cost per visit: $19
- Cost of “pay per visit”: $10
Life Cycle Pricing

0% Intro APR on Purchases and Balance Transfers.*

START  
APR  
ENDS

DEFAULT APR
At any point your APR can change to the Default APR, if you miss payments and/or go overlimit.

You close your account
Life Cycle Pricing

Figure 4.7  Subprime Mortgage Delinquency Rate

Source: Amherst Securities, LoanPerformance.
Life Cycle Pricing

Get Comcast High-Speed Internet

$19.99 per month for the first 6 months
Includes PowerBoost™

Plus Free Modem™ and $125 Cash Back

Save even more with Comcast Triple Play

Bundle all three Comcast services for $33/ month each for 12 months. Order now and earn additional cash (after rebate).
1,500 Page Black Toner Cartridge for Dell 1230c Color Laser Printer

Cartridge delivers excellent print quality, sharp images and text – up to a 1,500 pages yield.

Dell Price: $63.99

Customer Recommendations

Customers who viewed this product also viewed these

Dell 1,000 Page Yellow Toner Cartridge for Dell 1230c Color Laser Printer
Dell Price: $56.99

Dell 1,000 Page Magenta Toner Cartridge for Dell 1230c Color Laser Printer
Dell Price: $56.99
Life Cycle Pricing
Thought Experiment

Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen, Bailenson, 2011
Inertia

Effective consent rates, by country. Explicit consent (opt-in, gold) and presumed consent (opt-out, blue).
Nudge
Nudge

D'oh, the donuts are wayy over there. Think I'll have fruit.

My cunning choice architecture will soon have Homer eating healthy.
Automatic Enrollment

Source: Choi, Laibson, Madrian, Metrick (2002)
Madrian and Shea (2001)

401(k) participation by tenure at firm

Fraction of employees ever participated

Tenure at company (months)

- Hired before automatic enrollment
- Hired during automatic enrollment
- Hired after automatic enrollment ended
Employees enrolled under automatic enrollment cluster at the default contribution rate.

- **Hired before automatic enrollment**
- **Hired during automatic enrollment (2% default)**
- **Hired after automatic enrollment ended**

The default contribution rate under automatic enrollment is indicated by the cluster at the 2% mark.
Default contribution Rate

Source: Choi, Laibson, Madrian, Metrick (2002)
Participants stay at the automatic enrollment defaults for a long time.

Fraction of participants hired during automatic enrollment at both default contribution rate and asset allocation.

![Graph showing the fraction of participants hired over tenure at company for different companies.](image)
Infrequent Reallocation

Figure 2
Choices of Equities by New Plan Participants

Panel A: The Equity Allocation of New versus All Plan Participants
Automatic enrollment: Conclusions

- Automatic enrollment dramatically increases 401(k) participation
- Participants hired under automatic enrollment tend to stay at the automatic enrollment defaults
- Similar default effects are observed for
  - cash distributions at termination
  - company stock asset allocations
  - saving rates at match thresholds
Takeaways

- Even if a choice is beneficial to an economic actor, he or she may not take it.
- People are subject to:
  - Hyperbolic discounting
  - Inertia
  - Procrastination
  - Failure to engage in lifecycle pricing
  - Inability to commit
- Behavioral Change is more likely when these obstacles can be overcome.
Commitment Strategies
Other Interesting Lessons from 401K plans

- Inattention Blindness
- Choice Paralysis
- Naïve Diversification
- Home Bias
Fund Investors Pay Attention to Load Fees

But Ignore Operating Expenses
Choice Paralysis
Paradox of Choice

![Graph showing limited and extensive choice conditions. The limited choice condition has a bar reaching approximately 40%, while the extensive choice condition has a bar reaching close to 100%.]
Figure 2. The Relation between Participation and Number of Funds Offered
Naïve Diversification
Naïve Diversification

- Investors tend to follow the 1/N rule
- If offered one equity and one debt fund, they will invest 50-50
- If offered three equity funds and one debt fund, they will allocate 75% to equity and 35% to debt.
Home Bias

- Investors allocate a disproportionate amount of their investment funds to company stock.
- Investors allocate a disproportionate amount of their investment funds to local and domestic stocks.