scientific revenue

pricing without compromise

# What Makes a Price a "Good Price"

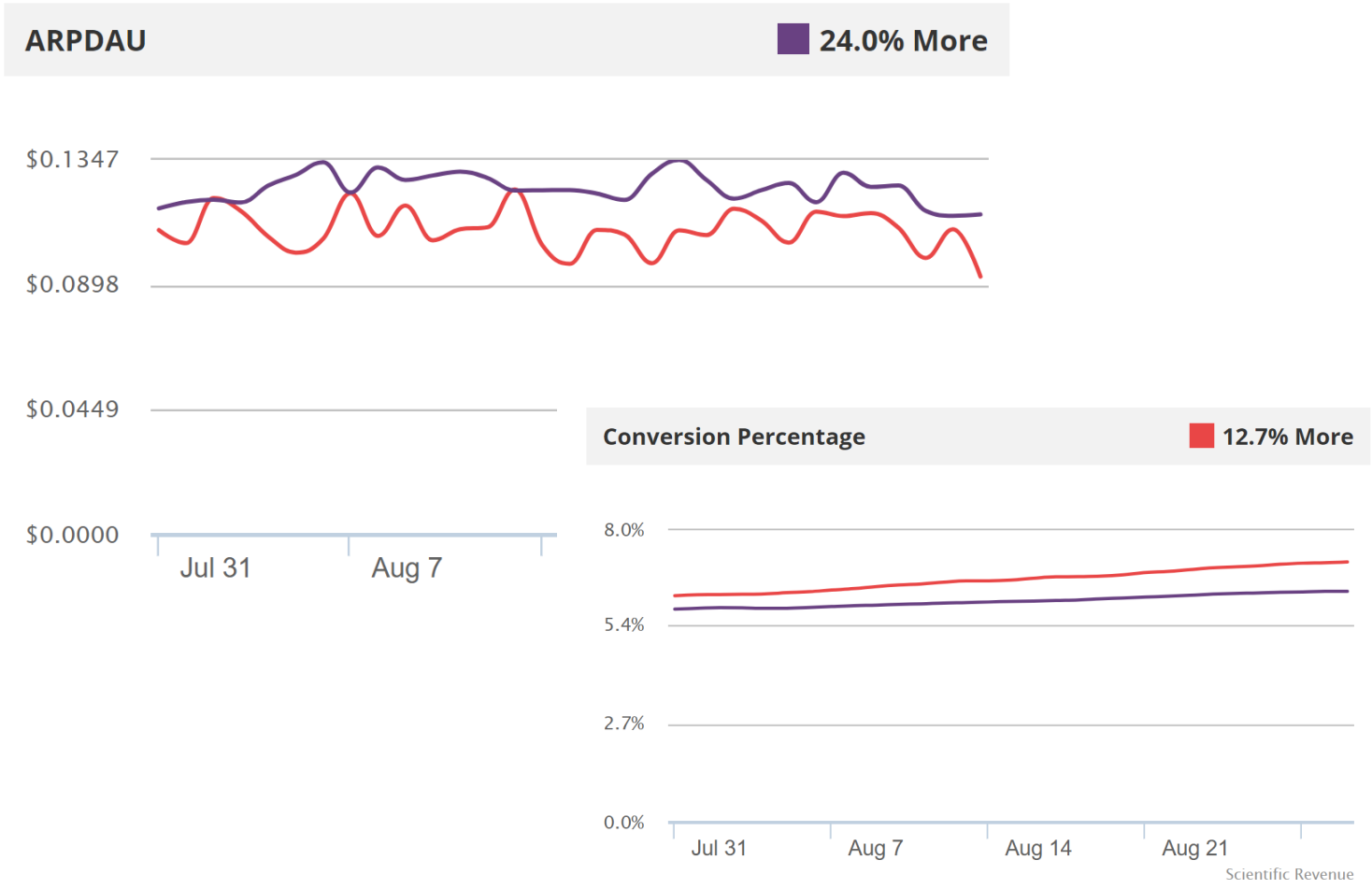
Pocket Gamer Connects, Helsinki, 2017

William Grosso, CEO Scientific Revenue
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# <<TL;DR>>


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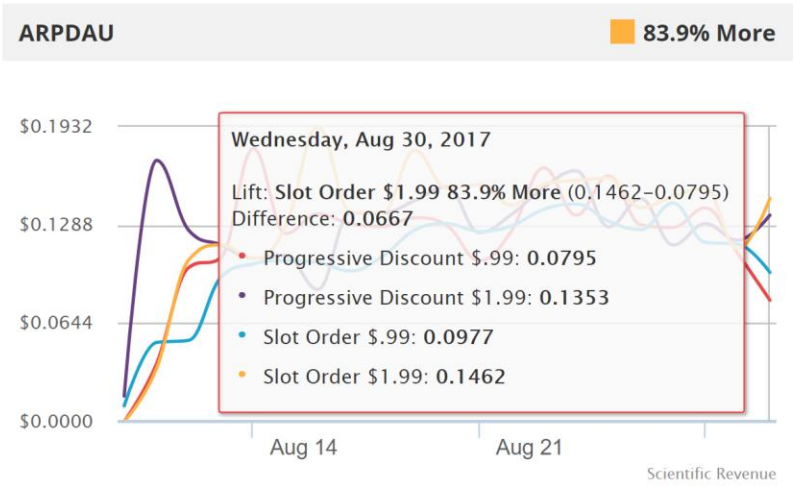
# Basic Payment Wall Design FTW

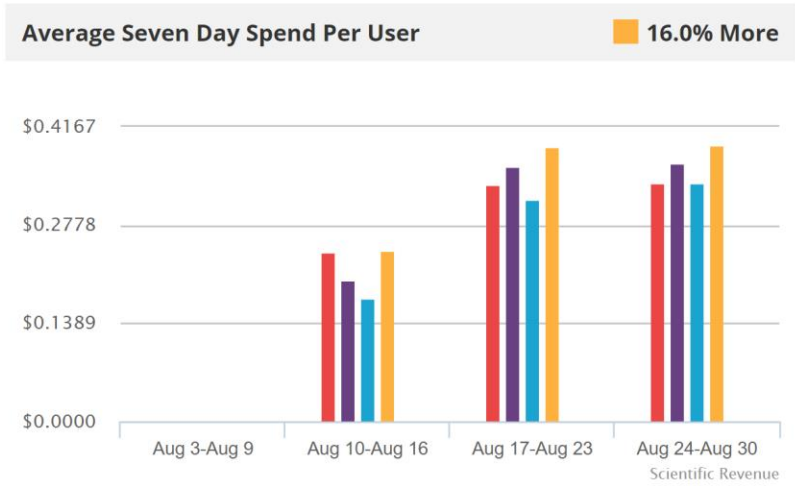




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# Measure Everything





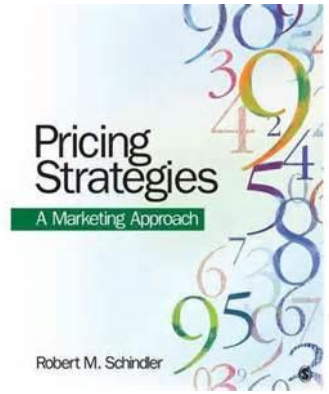
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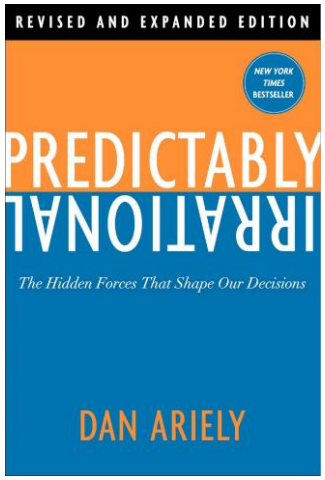
# Read the (Academic) Papers

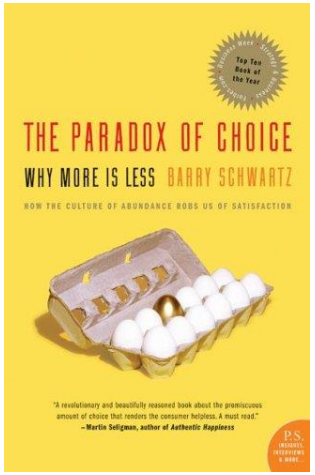
- **Penny wise and pound foolish the left-digit effect in price cognition--** http://forum.johnson.cornell.edu/faculty/mthomas/LeftDigitEffect.pdf
- **Psychological aspects of price an empirical test of order and range effects --** http://marketing-bulletin.massey.ac.nz/V14/MB_V14_N1_Bennett.pdf
- **Widespread use of odd pricing in retail sector**-- https://marketing-bulletin.massey.ac.nz/V8/MB_V8_N1_Holdershaw.pdf
  - The 99 Price Ending As a Signal of a Low-Price Appeal -- http://www.acrwebsite.org/volumes/8788/volumes/v30/NA-30
  - Patterns of Rightmost Digits Used in Advertised Prices: Implications for Nine-Ending Effects -- https://academic.oup.com/jcr/article-abstract/24/2/192/1794913/Patterns-of-Rightmost-Digits-Used-in-Advertised?redirectedFrom=fulltext
  - Increased consumer sales response though use of 99-ending prices-- http://www.sciencedirect.com/science/article/pii/S0022435996900135
- **Regular prices and sales--** http://onlinelibrary.wiley.com/doi/10.3982/TE1274/pdf
- **Psychological Thresholds, Demand, and Price Rigidity** -- http://users.uoa.gr/~sdrakop/manch92.pdf

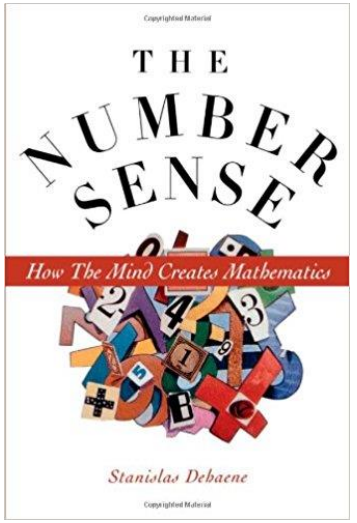

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# Read the Popularizations Too





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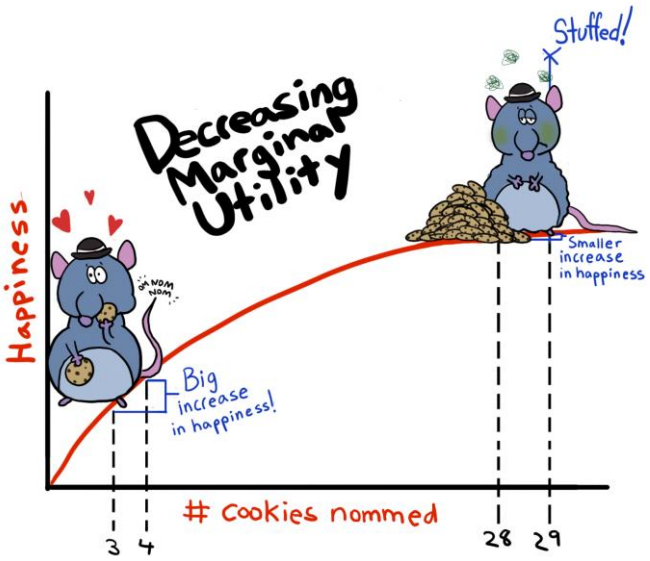
# Outline

- **Classical Economics**
- Gaming Literature is Often Wrong
- Academic Pricing Literature
- An Example of Behavioral Finance in Action
- What Really Happens


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# Utility Functions

- People have a function, called a utility function
  - F: {G} -> $\mathbb{R}$
  - Bigger number == more utility == preferred thing
  - Decreasing marginal utility




*The utility of 10 cookies is not 10 times the utility of a single cookie*


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# Volume Discounts

- Volume discounts are necessary to combat decreasing marginal utility
  - Users value the 10’th cookie less, so if you’re selling bundles you need to charge less for the 10’th cookie.
- Benefits of volume discounts:
  - If user is hit by a garbage truck, you still have the money
  - User more likely to come back (commitment effect)
- Problems:
  - Easy to accidentally “give away the game”
  - Not a lot of literature on how to do volume discounts effectively


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# Beware: Cannibalization

- The marginal utility of your 10'th cookie is not the same as the utility of the cookie 5 days from now

$$\sum_{cookiesatonce} utility(cookies) < \sum_{cookiesovertime} utility(cookies)$$

- This is why we pay attention to wallet velocity and training effects
  - Is there a training effect?
  - If you have more cookies, do you eat them faster?


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# Good Folklore

**KONGREGATE**

## Buy Screen







- Bonuses % or/and items provide incentives for buying larger hard currency packages
- Clearly call out bonuses of larger packages!
- Make all packages visible in one page
- Hide $100+ packages until after first purchase


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# Less Good Folklore

## The no-brainer first dollar: Free-to-play Design Rule 8

*By Nicholas Lovell on September 26, 2012*

Print PDF




After you have designed your game to make it possible for people to play the game for free, for ever, you need to start thinking about how to monetise them.

For a player, the decision to spend for the first time is a momentous one. The game they are playing will move from being a free game to being a paid-for game. You need to think hard about what will motivate a player to spend that all important first dollar.

(Note, it doesn't have to be a dollar. The first purchase should be so obviously good value that someone who was enjoying your game would be crazy not to buy it. I like to price it at the lowest amount the Appstore will accept – i.e. $0.99 – but a $1.99 version might work. Outside the Appstore, in, say, Facebook or the wider web, you might try a different price point. But don't be greedy and do keep the price low. The objective of this no-brainer first dollar is to get the player to spend for the first time, not to maximise revenue. If you are using the GAMESbrief free-to-play spreadsheet, then you would consider that this technique is targeting conversion rate, not ARPPU.


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# Penny Wise and Pound Foolish

- Separate out the price value from the perceived magnitude
- "Analog model of numerical cognition"
  - Brains don't store digits separately – convert numerical symbols to "analog magnitude"
  - Magnitude encoding starts while we're still reading the number (brain doesn't wait)


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# Psychological Aspects of Price

- "This study tested the effects of price order, price range, and number of price points on the average price respondents are willing to pay."

The B coefficients in Table 3 indicate that:

- A descending price presentation produced a 4.1% increase in the mean price differential over a random presentation. Although the ascending presentation resulted in a 1.8% lower mean price differential than a random order presentation, this effect was not statistically significant
- The use of either 3 or 5 price points had a negative effect on the price differential. These produced mean prices that were, respectively, 3.7% and 4.3% lower than those produced using 4 price points.
- Using a wide price spread resulted in a 6.4% higher mean price differential than using a narrow price spread
- The Beta coefficients indicate that the greatest effect on price selection was not the three elements under consideration (Order, Choice or Range), but age of respondent.


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# Widespread Use of Odd Prices

An odd price was defined as a price which fell just below and within:

- 5 cents of the nearest whole dollar (e.g., 95, 96, 97, 98, 99).
- 1 cent of the nearest 10 cents (e.g., 19, 29, 39 ...).
- $5 of the nearest $100 or $1000 amount.
- $1 of the nearest round dollar amount (e.g., 19, 29, 39 ...).

There is now some evidence to support the firm belief which exists amongst retailers that greater than expected demand occurs at odd price points. However, the reason for this effect is not known. The illusion of odd prices being much cheaper than even prices is certainly promoted in retail advertising by displaying a much smaller type size for cents digits than for dollar digits, thereby emphasising the dollar amount of the price. This factor may contribute to the illusion that odd prices are much cheaper than they actually are.


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# Patterns of Rightmost Digits

- Round numbers, and numbers ending in 5, are more “cognitively accessible” (“available”)
  - Subconscious relies on “available” numbers
  - People remember “available” numbers better
- Perceived gain effect (Prospect theory):
  - “$4.99” == “$5 + a bonus”
  - “$5.01” == “$5 + a loss”
  - Weak evidence
- Underestimation effect:
  - Analog number model essentially implies truncation
  - Strong evidence


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# Effects of Pricing and Promotion on Consumer Perceptions

- "Consumers often consider the discounted price, rather than the initial price claim, to be the 'true' price of the item"
- "Our findings suggest marketers should consider offering free gifts instead of discounts"


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# Customer Walls

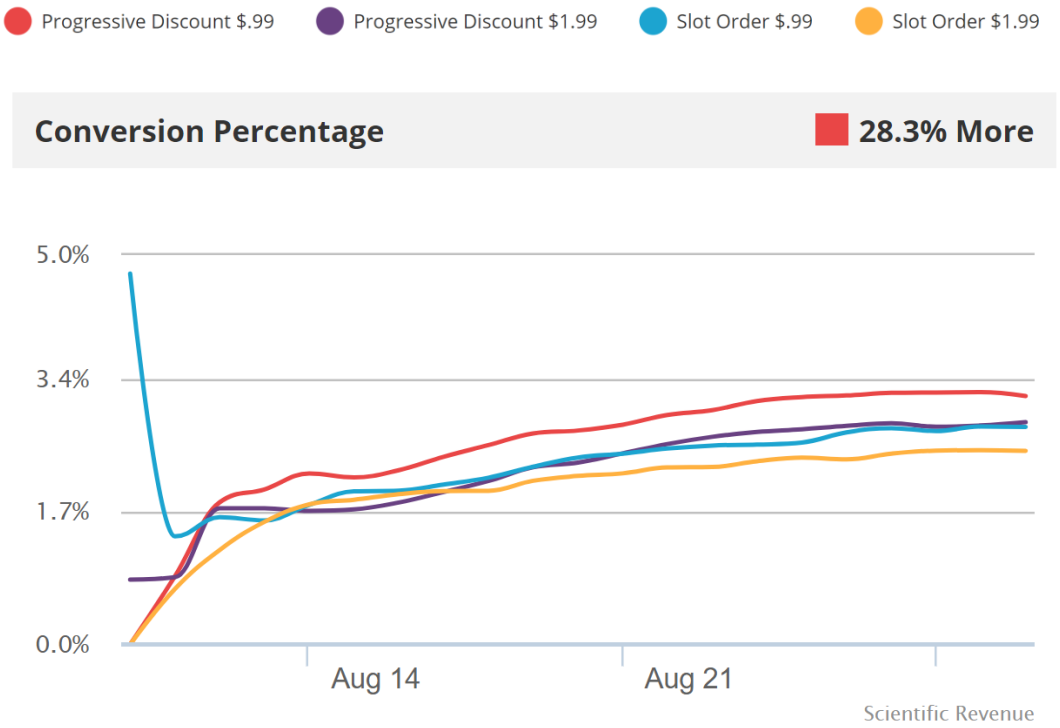
- 4 Payment Walls
  - $.99 and $1.99 and then with slot orders changed ($9.99 moved to first position)

| Position | Currency Amount | Currency Name | Price Tier (USD) | Product ID | Title (en-US) |
|---|---|---|---|---|---|
| 1 (default) | 5 | | 1 ($0.99) | | |
| 2 | 20 | | 3 ($2.99) | | |
| 3 | 100 | | 10 ($9.99) | | |
| 4 | 300 | | 25 ($24.99) | | |
| 5 | 700 | | 50 ($49.99) | | |

| Position | Currency Amount | Price Tier (USD) |
|---|---|---|
| 1 (default) | 10 | 2 ($1.99) |
| 2 | 30 | 5 ($4.99) |
| 3 | 100 | 10 ($9.99) |
| 4 | 300 | 25 ($24.99) |
| 5 | 700 | 50 ($49.99) |


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# Customer Conversion and Models




- Leading with $.99 increases conversion
- Leading with $9.99 increases overall monetization
- Machine learning sends 65% of people to walls  leading with $9.99


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# Primary Explanation: Loss Aversion

In economics and decision theory, **loss aversion** refers to people's tendency to prefer avoiding losses to acquiring equivalent gains: it's better to not lose $5 than to find $5. Some studies have suggested that losses are twice as powerful, psychologically, as gains.[1] Loss aversion was first demonstrated by Amos Tversky and Daniel Kahneman.[2]

| Position | Currency Amount | Currency Name | Price Tier (USD) | Product ID | Title (en-US) |
|---|---|---|---|---|---|
| 1 (default) | 5 | | 1 ($0.99) | | |
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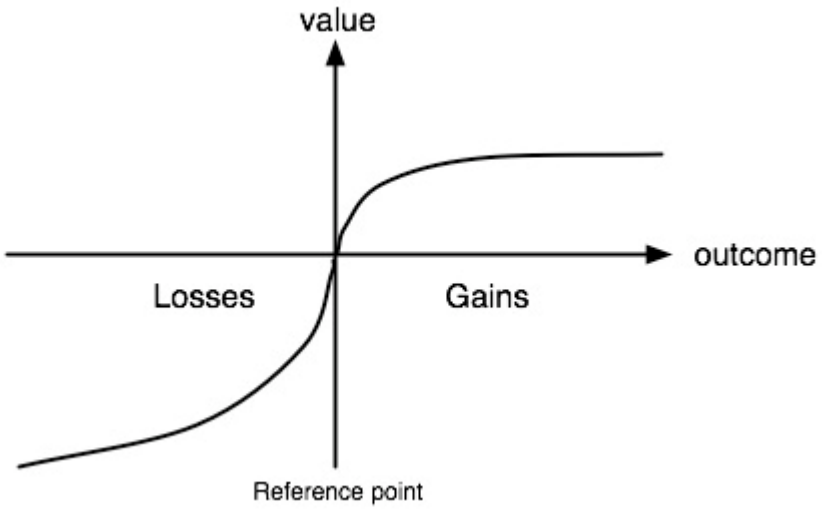
| Position | Currency Amount | Price Tier (USD) |
|---|---|---|
| 1 (default) | 100 | 10 ($9.99) |
| 2 | 10 | 2 ($1.99) |
| 3 | 30 | 5 ($4.99) |
| 4 | 300 | 25 ($24.99) |
| 5 | 700 | 50 ($49.99) |

Moving off the first position gives me free hints!

Moving off the first position costs me free hints!!!


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# More Generally, Prospect Theory




Prospect theory leads to:

- Offer a discount; don't charge a premium (phrasing)
- Small price changes capture most of the behavioral change (when messaged appropriately)
- Losses impact more than gains


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# People Look at Prices

- They look at the actual amount they will be spending (and the prices that are available)
  - They look at the overall package they will be getting
  - And they say “hmmm… good deal” (or not)
- They are aware of unit-prices at a subliminal level
  - And at an approximate level
  - But not at an exact level (.0027 dollars per coin)


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# The Lowest Immediately Perceived Price has "Gatekeeper" Role

- It's a gatekeeper on first purchases
  - If the cheapest price is $49.99, it doesn't matter what you're selling
  - If the cheapest price is $.99, people will look more
- This is why games have adopted "windowing"
  - Once the player has spent, they don't need permission to spend
- Similarly, a prominent "expensive" price has an gatekeeper effect on first purchases


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# People Upsell Themselves by Pairwise Comparison

- They look at the thing that draws their eye
  - Could be first, could be highlighted, could be ….
- It has gatekeeper effect
  - It is the default purchase
- They then look to nearby things
  - If the nearby things are obviously better deals, they might upsell themselves (they might not; depends on their utility function)
  - If they can't figure out whether the neighboring thing is a better deal without thinking, they won't upsell themselves


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# Pairwise Comparison Must be Automatic

- Subconscious
  - Introducing friction forces conscious thinking
- Bad things
  - “Weird” prices
  - Fractions
  - “Close” comparisons
  - Layouts that don’t facilitate pairwise comparison


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# Pairwise Comparison Has to be Automatic

| Position | Currency Amount | Currency Name | Price Tier (USD) | Product ID | Title (en-US) |
|---|---|---|---|---|---|
| 1 (default) | 10 | | 1 ($0.99) | | |
| 2 | 45 | | 4 ($3.99) | | |
| 3 | 125 | | 10 ($9.99) | | |
| 4 | 200 | | 15 ($14.99) | | |
| 5 | 550 | | 40 ($39.99) | | |

Is going from (3) to (4) a good idea? Kind of

- Price goes up by 1.5
- 1.5 * 125 = 187.5 so … the unit price went down!
- **Make it 250!**


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