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The Effect of Discount Option Quantity on Consumer Purchase Decisions

Group 2

Pilot Study Findings

CONTENTS

MOTIVATION

- **Choice overload**: too many options can depress purchase likelihood (Iyengar & Lepper 2000).

- **Discount framing**: identical monetary values drive different choices depending on "% off", "$ off", etc. Wording and format can influence consumer behavior (Gendall et al., 2006)

- Online retailers often show several discounts at once – yet little is known about the joint effect of quantity × frame.

RESEARCH QUESTION & HYPOTHESES

- **RQ**: How does the number of discount options presented simultaneously influence which specific discount framing format consumers select, and does this create systematic patterns in position-based choices?

- **H1**: More options → earlier / central choices dominate.
- **H2**: More options → higher cognitive-load (↑ mouse travel, ↑ RT).
- **H3**: For high-priced goods, $-off frames outperform %-off.

CHOICE OVERLOAD IN CONSUMER ENVIRONMENTS

- Consumers face an overwhelming array of choices spanning product assortments, brands, features, and promotional offers (Broniarczyk & Griffin, 2014; Kahn et al., 2014).

- **Paradox of Choice**: excessive options can diminish consumer satisfaction and purchase likelihood (Schwartz, 2004; Scheibehenne et al., 2010

  - Iyengar and Lepper's (2000) field experiment: Shoppers encountered either 6 or 24 varieties of jam at a grocery sampling display. While the extensive assortment initially attracted more visitors, the limited assortment generated substantially higher purchase rates (30% vs. 3%).

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MECHANISM OF CHOICE OVERLOAD

Several cognitive processes appear to contribute to this phenomenon:

1. Larger choice sets demand greater cognitive resources to evaluate options, contributing to decision complexity and mental fatigue (Chernev et al., 2015).

2. Expanded choice sets often heighten decision difficulty by increasing the number of attribute trade-offs consumers must navigate (Dhar & Nowlis, 1999; Tversky & Shafir, 1992).

3. Extensive choice sets may elevate anticipated regret by increasing consumers' concerns about overlooking superior alternatives (Carmon et al., 2003; Sagi & Friedland, 2007)

4. Larger assortments frequently amplify choice deferral, as consumers postpone decisions when confronted with choice complexity (Dhar, 1997; Jessup et al., 2009).

DISCOUNT FRAMING

- Discount framing is how price reductions are presented to consumers, as is a particularly important dimension of promotional presentation (DelVecchio et al., 2007; Krishna et al., 2002).

- Economically equivalent discounts can evoke different consumer responses depending on their presentation format (Gendall et al., 2006; Chen et al., 1998; Hardesty & Bearden, 2003)

- Several common discount framing approaches dominate retail environments:
  1. Percentage discounts (e.g., "20% off")
  2. Absolute or dollar-off discounts (e.g., "$20 off")
  3. Direct price comparisons (e.g., "Was $100, now $80")
  4. Quantity-based promotions such as "buy one get one"

EFFECT OF DISCOUNT FRAMING

The relative effectiveness of these framing approaches varies with contextual factors.

- Low-priced products: percentage discounts often appear more attractive than absolute discounts of equivalent value, as they create an impression of greater savings relative to the base price (Chen et al., 1998; DelVecchio et al., 2007).

- High-priced products, absolute discounts frequently outperform percentage discounts, as consumers focus on the absolute magnitude of savings rather than the proportion (Chen & Rao, 2007; González et al., 2016).

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Cognitive processing depth also moderates framing effects.

- Under high cognitive load or time pressure, consumers often rely more heavily on heuristic processing, rendering them more susceptible to certain framing approaches (Chaiken, 1980; Lee & Chen, 2011).

- When cognitive resources are constrained, simplicity of calculation and immediate accessibility may determine which discount frame appears most attractive (Coulter & Coulter, 2007; Thomas & Morwitz, 2009).

THE INTERSECTION OF CHOICE QUANTITY AND DISCOUNT FRAMING

- Existing gap: Despite parallel advances in understanding choice overload and discount framing, little research has systematically investigated their interaction.

- Importance of studying the intersection:
  1. **Cognitive load theory**: Decision complexity ↑⇒ Consumers rely more heavily on simplistic processing strategies (Payne et al., 1992; Bettman et al., 1998)
  2. Limited attention resources may lead consumers to focus on certain framing characteristics (Kahneman, 1973; Milosavljevic et al., 2012)
  3. **Choice architecture research** : option arrangement significantly influences preference construction, particularly under conditions of decision complexity (Johnson et al., 2012; Dinner et al., 2011).

CONTRIBUTIONS

The present research aims to address this theoretical gap by
systematically manipulating both the number of discount options
presented to consumers and the framing approaches employed across
these options. By examining which discount frames consumers select

when faced with varying choice set sizes, we contribute to a more
integrative understanding of how choice architecture and promotional
framing jointly shape consumer decision-making in digital commerce
environments.

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EXPERIMENT PROCEDURE

This study will be conducted on the Gorilla online experiment platform. The experimental procedure follows this sequence:

1. Consent and demographic survey

2. Initial Block (9 trials):
   - 2-4 discount options with varying base prices
   - Randomized trial order and discount positions
   - No follow-up questions

3. Main Block (6 trials):
   - 2 trials for each condition (2-4 discount options)
   - Identical base prices and final prices within each trial
   - Follow-up questions
   - 2 Attention checks with explicit instructions and memory-based attention checks

4. Debriefing and Completion

STIMULI

For all stages of the experiment, participants will be presented with between 2 and 4 discounted products in each trial. All options include

- A photo of the product
- Base price
- One of four discount framings:
    ❶ Now–price,
    ❷ $-off,
    ❸ %-off,
    ❹ Buy-one-get-one.

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Initial Block

You need to buy 2 of the same product. Which of the following products do you prefer to buy?

$200 (Deal: 15% off)

$350 (Deal: buy 1 get 1 free)

$200 (Deal: $30 off)

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MAIN BLOCKS

Which of the following products do you prefer to buy?

$20 (Deal: 10% off)

$20 (Deal: $2 off)

$20 (Deal: now $18)

REVISIONS

You need to buy 2 of the same product.
Which deal would you select?

Original: $120
Deal: buy 1
get 1 50% off

Original: $120
Deal: $15 off

Original: $120
Deal: now $98

Original: $120
Deal: 10% off

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FOLLOW-UP QUESTIONS

Please answer the following questions about the task you just completed.

How many discount options did you see on the previous screen?

[   ]

How likely would you be to buy the product you chose?

Unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Likely

How confident are you in the choice you made?

Not Confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Confident

If given more time to consider the options, how likely are you to make the same choice?

Unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Likely

Why did you make this decision? Please answer in at least 10 words.

[   ]

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REVISIONS

Please answer the following questions about the task you just completed.

How many options did you see on the previous screen?

How likely would you be to buy the product shown?   Unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Likely

How confident are you in option you chose?   Not Confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Confident

Please select 7 for this response.   Not Confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Confident

If given more time to consider the options, how likely are you to make the same choice?   Unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Likely

Why did you make this decision? Please try to answer in at least 5 words.

Next

KEY MEASURES

- **Primary:** chosen frame, screen position.

- **Process:** reaction time (RT), total mouse path (px).

- **Post-choice:** buy likelihood, confidence, choice stability (7-pt scales).

- Demographics for context (age, gender, income, shopping frequency).

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PILOT SAMPLE (N = 20)

- U.S. convenience sample.
- Age: $M = 28.6$ (SD = 6.4); 60 % female.
- Ethnicity: 75 % Asian; Education: 75 % Bachelor's+.
- Goal = protocol debugging and effect-size estimation.

As expected, the sample skewed toward young adults, highly educated individuals, majority Asian racial identity, lower income brackets (likely students). While this limits generalizability, it served

the pilot's purpose of identifying technical and procedural issues prior to scaling the study to a more diverse population.

DESCRIPTIVE STATISTICS OVERVIEW

Age
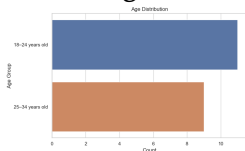
Gender
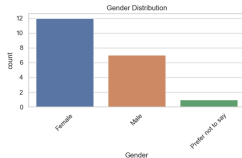
Race
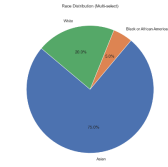
Education
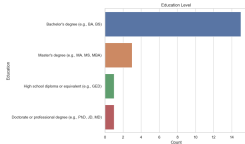
Income
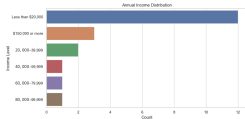
Shopping Frequency

## INDIVIDUAL ACCURACY PERFORMANCE

Distribution of individual correct rates during fatigue trials:
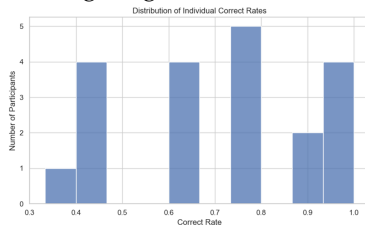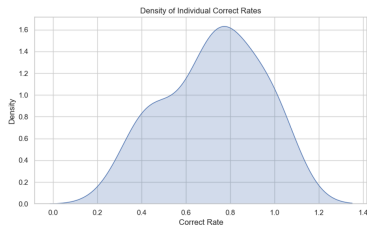
Most participants had correct rates between 0.6 and 0.9, with fewer falling below 0.5.
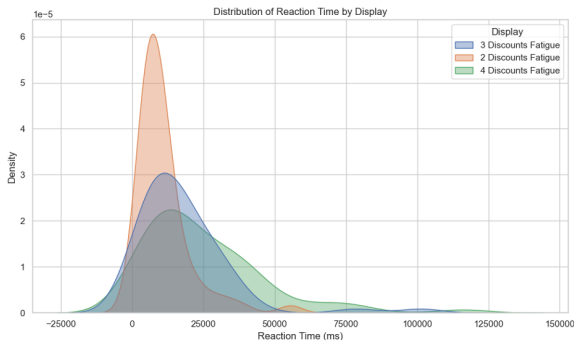
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REACTION TIME DISTRIBUTIONS

Reaction times displayed a strong right-skew, as shown in the overall histogram:

Distribution of Reaction Times
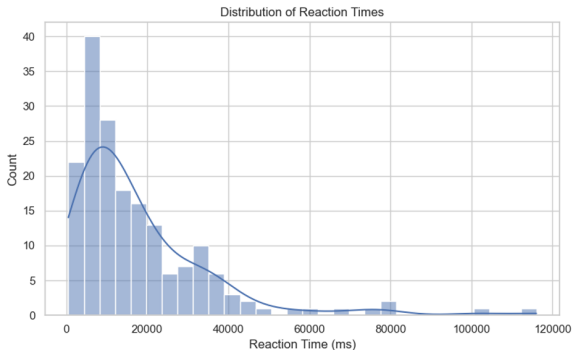
- Most reactions were under 30,000 ms, with a sharp drop after 10,000 ms.
- A small number of very long responses (outliers above 80,000 ms) pulled the average up.
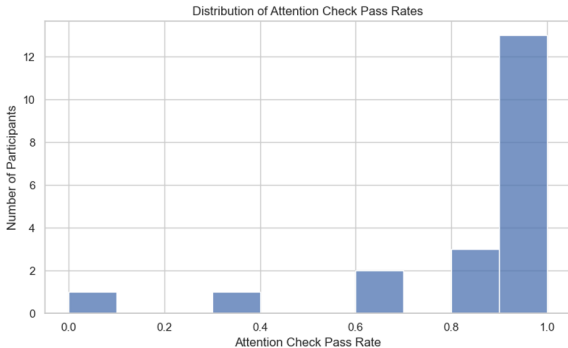
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REACTION TIME BY DISPLAY CONDITION

Distribution of Reaction Time by Display

- 2 Discount Fatigue trials: tightest and fastest response times, with most under 15,000 ms
- 3 Discount Fatigue trials: slightly more spread and a modest increase in slower reactions.
- 4 Discount Fatigue trials: much wider range and higher reaction times, with some peaking well beyond 50,000 ms

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ATTENTION CHECK PASS RATES

Distribution of Attention Check Pass Rates

- Most participants performed very well. The majority achieving rates above 80%.
- Only a few participants failed more than one attention check.
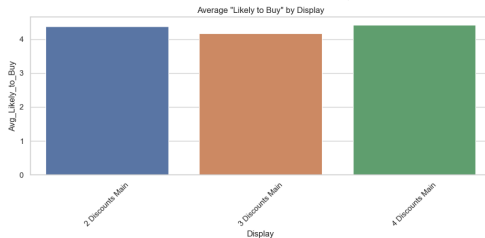
REACTION TIME

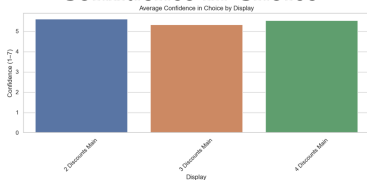Reaction times increased with the number of discounts
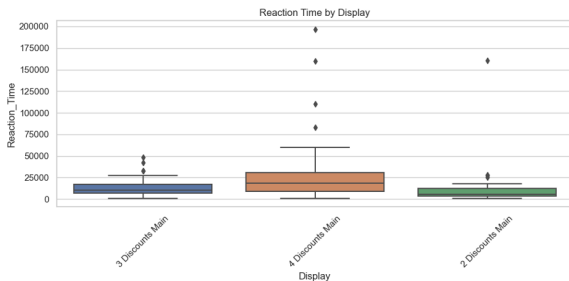
- 2 Discount Fatigue trials: lowest median reaction time and the least variability
- 3 Discount Fatigue trials: slightly higher and more variable response times.
- 4 Discount Fatigue trials: highest median and largest variance, with some extreme outliers reaching over 150,000 ms.

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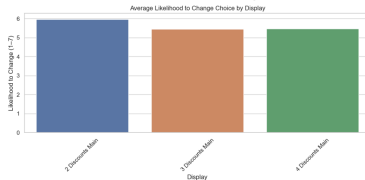Literature Review
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DECISION-RELATED MEASURES

Likelihood to Buy

Confidence in Choice

Likelihood to Change Choice

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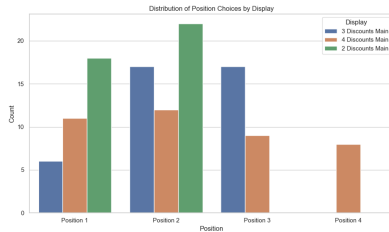
DESCRIPTIVE FREQUENCY TABLE OF CHOSEN POSITION
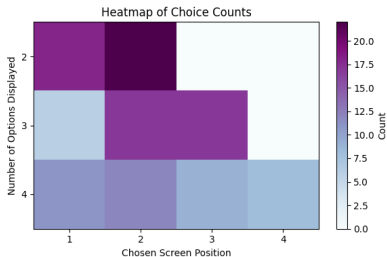
(a) heatmap

(b) histogram

χ^2 TEST: IS THE OVERALL DISTRIBUTION ACROSS POSITIONS UNIFORM?

- 2 options $\rightarrow \chi^2(1) = 0.40$, p = 0.527
- 3 options $\rightarrow \chi^2(2) = 6.05$, p = 0.049
- 4 options $\rightarrow \chi^2(3) = 1.00$, p = 0.801
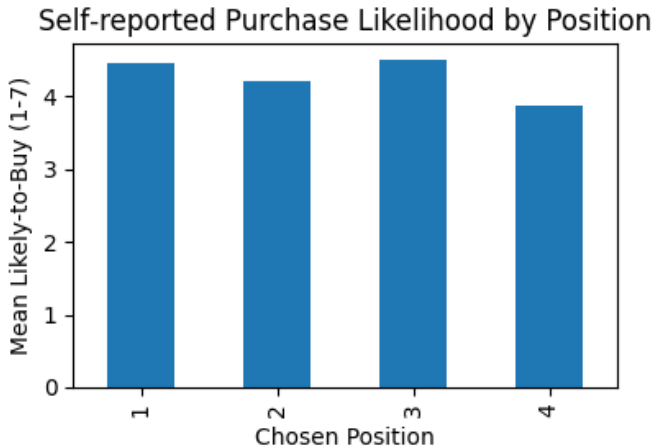
DIRECT TEST OF "EARLIER / CENTRAL" BIAS

One-sided z-tests vs. chance for bias positions:

- 2 options $\rightarrow$ 18/40 bias choices ($\hat{p}$= 0.45, $p_0 = 0.50$) z = -0.64, p = 0.737
- 3 options $\rightarrow$ 23/40 bias choices ($\hat{p}$ = 0.57, $p_0 = 0.67$) z = -1.17, p = 0.880
- 4 options $\rightarrow$ 23/40 bias choices ($\hat{p}$ = 0.57, $p_0 = 0.50$) z = 0.96, p = 0.169

- The χ^2 test shows a significant departure from uniformity only when three options are on screen ($p \sim 0.049$).
- However, the skew is not in the predicted direction: Position 1 is under-selected relative to the two central spots.
- The direct "bias-position" test finds no condition where Position 1 or centre is chosen more often than chance (all one-sided p > 0.16).
- Taken together, the pilot data do not support Hypothesis 1. If anything, users gravitated toward the two middle positions when three options were available, but the classic "first-option" primacy effect is absent.

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ANOVA TEST

- Reaction Time $\sim$ Position ANOVA F = 2.49 p = 0.0638
- Likely to buy $\sim$ Position ANOVA F = 0.45 p = 0.7159

Self-reported Purchase Likelihood by Position

Figure: Likelihood-by-position

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MOUSE MOVEMENT

Mouse movement increased with discount number, but efficiency and
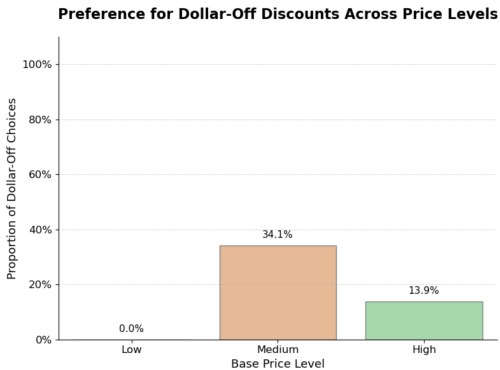speed were not statistically different
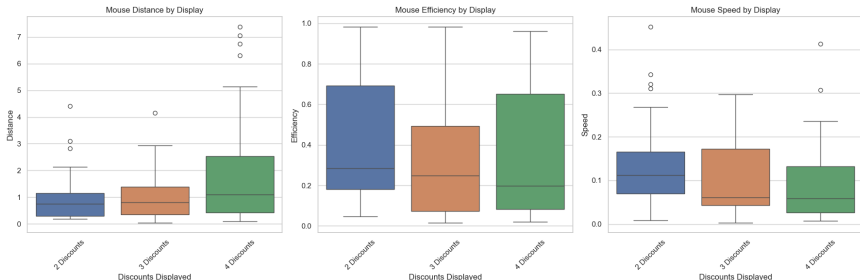
One-way ANOVA:

- Distance: $F(2, 117) = 6.07$, $p = .003$
- Efficiency: $F(2, 117) = 0.34$, $p = .71$
- Speed: $F(2, 117) = 1.97$, $p = .14$

DEAL TYPE DISTRIBUTION

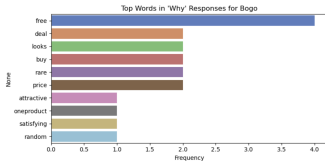- The most frequently chosen deal type was Percentage off (nearly 60 occurrences), followed by Now price, Dollar off, and BOGO.
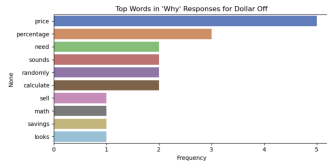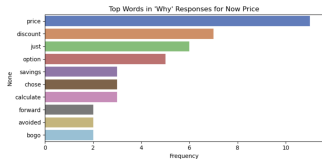
DEAL TYPE

Preference for Dollar-Off Discounts Across Price Levels

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DEAL TYPE

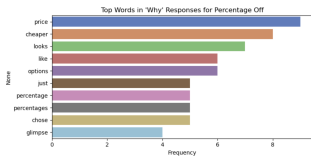
(a) Top Words of Bogo

(b) Top Words of $ of

(c) Top Words of Now Price

(d) Top Words of Percentage off

Figure: Top Words in "Why" Responses by Deal Type

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DESCRIPTIVE STATISTICS BY OPTION COUNT

	2 opts	**3 opts**	**4 opts**
Mean RT (s)	1.82	2.35	2.94
SD RT	0.61	0.77	0.93
Mean mouse distance (px)	540	710	865
SD distance	154	201	242
Valid trials (%)	100	97	95

RT trimmed at ± 2.5 SD; two timeout trials (8 s cap) removed.

MANIPULATION CHECK

- One-way ANOVA on RTs: $F(2, 117) = 5.52$, $p = .005.\%$
- Median RT rises steadily from $2 \to 3 \to 4$ options.
- Confirms choice-quantity successfully induces cognitive load.

HEADLINE PILOT FINDINGS

- % off frames chosen most (~ 60 selections) $\rightarrow$ contrary to H3.
- **Position 2** (central) dominates across all conditions $\rightarrow$ layout salience matters.
- RT and variance grow with option count, supporting H2.
- Attention-check pass rate high ($> 80\%$) $\rightarrow$ data usable.

IMPLICATIONS

- Need larger, representative sample to test *framing × price* interactions.
- Counter-balance numeric magnitude of discounts more tightly.
- Redesign UI to separate ordinal order from centrality.

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FEEDBACK ACKNOWLEDGMENTS

- Henry: Clear labeling of pages, Clarify wording of instructions, and added more explicit attention check
- Yunfei: Clarify that you always make one selection
- Vera: Refer to choices as simply "options"
- Andy, Zhoujun, John: Many expressed frustration about the repetitiveness or confusion about the equal prices, which were all confirmations of our design

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THANK YOU

Q&A