Average Value Affects Consumer Budgets

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ABSTRACT

Consumers frequently use budgets to manage their spending. Money in budgets is treated as though it is not fungible, so budget allocations matter. What determines budget allocations? The authors propose budgeters are sensitive to the *average value* of the set of products constituting a budget category. This represents a departure from normative budget setting, which is based solely on products' *marginal value*. Results indicate budget allocations are indeed sensitive to the average value of products within a budget category, beyond what can be explained by standard economic theory. This finding is unique to budgeting, such that budgeters are more sensitive to average value than are non-budgeters. Consequently, the mere act of budgeting affects the composition of purchases, even when spending levels and preferences remain unchanged.

Keywords: budgeting; resource allocation; evaluation mode

Budgeting can be a powerful tool for consumers to manage their personal finances. The act of budgeting involves allocating resources across categories and then making spending decisions within those categories. As a result of this two-stage process, budget allocations are consequential: They affect both what consumers buy and how much they spend. This central role of budget allocations in consumer spending calls attention to a key question: What determines budget allocations? The present research seeks to further our understanding of how consumers' perceptions of value (average value versus marginal value) guide these budget allocations.

We propose consumers will be sensitive to a category's average value when setting budgets. As a result, they will allocate more funds to the categories they perceive as more valuable, on average. This contrasts with the standard economic model, which contends marginal value is the basis for normative approaches to budgeting and consumption. Marginal value is the incremental value of the next-best, most-valuable available option. The principle of marginal analysis guides normative theories of budgeting and purchasing. The simple rule to maximize value is to select the options providing the greatest marginal value. Despite this straightforward approach prescribed by normative theories, we argue that consumers (and the budgets they set) will be sensitive to the average value of budget categories.

Why might budgets deviate from the value-maximizing principle presumed to guide both budget setting and ordinary purchase behavior? We propose that the process of setting a budget encourages category-level evaluations, in which consumers extract and make decisions based on summary information (i.e., average values). This differs from marginal analysis, which involves evaluating the value of individual items. As a result, we expect budget allocations to reflect the average value of budget categories, whereas purchase decisions should reflect the marginal values of individual items. The implication is that the mere act of budgeting (versus purchasing) alters how consumers assess value. And because budget allocations are sticky, consumers with identical preferences and identical levels of spending may systematically consume different bundles, depending on whether they budget.

We begin by defining budgeting and discussing prior research on consumer budgeting and budget allocation. We then introduce and distinguish two different measures of value: average and marginal. This is followed by two studies designed to assess budgeters' consideration of average value in addition to marginal value when allocating budgets. Study 1 surveys consumers about their actual budgeting behavior. Respondents described their own discretionary budgets and indicated the extent to which those budgets reflected both average value and marginal value. Study 2 measures participants' preferences and valuations of various activities and examines how average and marginal value relate to hypothetical budget allocations. Next, we characterize why these findings are unique to budgeting, as opposed to general consumer decision making. Specifically, the task of budget allocation engages relatively more category-level evaluation, compared to ordinary purchase decisions. We present evidence for this shift in evaluation mode through a supplemental experiment involving stimuli from Amazon.com. We then present Study 3, which uses a tightly controlled experimental game to manipulate average category values while holding marginal value constant. The set of results suggests that allocation is uniquely sensitive to a category's average value, above and beyond marginal value. This has implications for consumers' use of budgets to manage their finances, because allocating a budget may shift consumption in previously unforeseen ways.

THEORETICAL DEVELOPMENT

Budgeting as a Two-Stage Process

The word "budget" is commonly used in everyday language to refer to myriad forms of planning, behavior, and constraint for both individuals and organizations. We adopt the definition of budgeting as a two-stage process involving: (1) the allocation of funds (planning how to spend), and (2) the subsequent spending of those funds (Heath and Soll 1996; Lukas and Howard 2023; Thaler 1985; Zhang and Sussman 2018). In the first stage, allocation represents the division of funds between distinct accounts. Allocation makes money non-fungible, as specific funds become linked to specific usages. In the second stage, previously allocated funds are used in a manner consistent with the account's rules. This form of budgeting resembles how many consumers divide and spend their discretionary funds, whereby they first decide how much to allocate and later decide exactly what to buy. The current research focuses on this form of budgeting. Note that two-stage budgeting is distinct from automatic bill payments, which are more accurately described as automated transactions.

Budgets can be used to manage both the total level of spending as well as the composition of spending across budget categories. Whereas other consumer research considers how the act of budgeting affects the *level of spending* (Larson and Hamilton 2012; Lukas and Howard 2023; Thaler 1985, 1999; Thaler and Shefrin 1981; Wertenbroch 1998), we consider how the act of budgeting affects the *composition of spending*. In particular, for a given level of total consumption, we focus on how funds are allocated and used across different budget categories. A representative survey conducted by Zhang et al. (2022) finds that consumers use categories to organize their budgets. In our own replication and extension of the Zhang et al. (2022) budgeting survey, we find the majority (58%) of budgeters claim one of the main reasons for budgeting is to manage spending across such categories (web appendix A). These findings underscore the importance of understanding how consumers allocate their budgets across specific categories, separate from their overall level of constraint.

The effect of budgeting on consumption. Budgeting matters because consumers prefer to spend within their budget allocations. Once allocated, money in budgets is treated as though it is no longer fungible: Money budgeted for one purpose is less likely to be used for a different purpose (Hastings and Shapiro 2013, 2018; Heath and Soll 1996; Soman and Cheema 2011; Sussman and O'Brien 2016; Thaler 1985; Zelizer 1997). As a result, budgeting affects consumption in multiple ways. Having pre-established budgets affects how consumers respond to price and income shocks (Du and Kamakura 2008; Hastings and Shapiro 2013, 2018), and consumers can use budgets strategically to reduce consumption of goods they seek to limit due to self-control considerations (Krishnamurthy and Prokopec 2010). Ironically, under certain circumstances, using budgets can lead to unintentional increases in spending. For example, the use of budgets might reduce the focus on minimizing costs, conditional on remaining under budget (Larson and Hamilton 2012), and consumers who set budgets too early might habituate to a higher level of consumption and find it harder to regulate the spending of previously allocated funds (Choe and Kan 2021). Depending on whether a limited budget (e.g., a weekly happy hour budget) or expansive budget (e.g., a monthly food budget) is more accessible can impact the perceived costliness of different expenditures, thereby affecting consumption (Morewedge, Holtzman and Epley 2007).

As these examples demonstrate, allocation has direct consequences for within-category spending. But what affects allocation? Prior research highlights several key inputs into the budget allocation decision.

Predicted spending. One key input is predicted spending: When people believe they will spend more, they tend to allocate more money to that budget (Howard et al. 2022; Lukas and Howard 2023; Peetz and Buehler 2009; Stilley, Inman and Wakefield 2010a; Stilley, Inman and Wakefield 2010b; Sussman and Alter 2012; Ülkümen, Thomas and Morwitz 2008). People are not always well-calibrated: Their predictions are often underestimates of true spending for a variety of reasons. But in categories in which consumers expect to spend more, they tend to set larger budgets (Howard et al. 2022; Lukas and Howard 2023).

Self-control. Budget allocations are also often intertwined with self-control considerations. Budgets enhance self-control (and reduce consumption) when avoidance aspects of the consumption experience are highly salient and consumption monitoring is feasible (Krishnamurthy and Prokopec 2010). As a result, consumers may strategically set budgets lower than predicted spending in such contexts (Thaler 1985, 1999; Thaler and Shefrin 1981; Wertenbroch 1998). Budgets can also help constrained consumers navigate trade-offs they might otherwise avoid, thereby reducing dysfunctional behavior (Fernbach, Kan and Lynch 2015).

Incidental factors. Beyond predicted spending and self-control considerations, a number of incidental factors affect budget allocations. These are factors which ought to be irrelevant by most accepted normative standards but nevertheless shape the allocations that consumers make.

Budget allocations depend on arbitrary groupings of budget categories, consistent with the broader literature on partition dependence (Bardolet, Fox and Lovallo 2011; Jia, Li and Krishna 2020; West et al. 2022). For example, consumers may allocate more money to entertainment if they have two budgets devoted to entertainment and food (where food encompasses both groceries and dining out), than if they have three budgets devoted to entertainment, groceries, and dining out. In addition, consistent with a broader literature indicating that attention affects choice, exogenous factors that call greater attention to a budget category lead to greater prioritization of that budget category (Mrkva and Van Boven 2017).

In each of these cases of predicted spending, self-control, and incidental factors, a key underlying assumption is that consumers allocate based on where they perceive the greatest value. That is, each of these literatures implicitly or explicitly acknowledge that consumers allocate more to budget categories that are perceived as more valuable. But how do consumers assess the value of budget categories? This is the question we seek to answer.

Assessing the Value of Budget Categories

Consider the task of setting a budget for discretionary entertainment expenses. Given some set of considered options (e.g., bowling, going to the movies, mini golf, attending a concert, and taking a pottery class), how valuable is this budget category? One approach to answering this question is to consider the value offered by each individual prospect. For a consumer who highly values bowling and mini golf but does not value the other activities enough to purchase them, the value of the budget category should reflect anticipated consumption of bowling and mini golf. This approach is consistent with valuing a budget categories in terms of *marginal value*.

An alternative approach is to zoom out and consider the average value of the set of entertainment options. That same consumer might perceive this set to have a medium value on average (high-value items like bowling and mini golf balanced against low-value items like movies, concerts, and pottery classes). This describes how consumers might think about budget categories in terms of *average value*.

Normative models of decision making suggest consumers think in terms of marginal value, which is the incremental value of an additional unit of consumption. In the preceding example, this entails iteratively asking "how much value would I get out of my favorite available entertainment option from the set I have not yet decided to purchase?" If a consumer does indeed consider value in this way, then the "marginal principle" from economics prescribes making consumption decisions according to these marginal values (Samuelson and Nordhaus 2009; Colander 2019). Strict adherence to this principle ensures consumers will get the "best bang for the buck" by only making purchases that confer the best possible value, relative to the alternatives. The consumer who derives value from paying to go bowling and mini golfing but does not derive value from going to a concert will consume the former activities but not the latter. The marginal principle is a powerful model of decision making that implicitly guides the standard assumption that consumption follows preferences.

Yet, we suggest budgeters in particular might not think and act in terms of marginal value alone, but rather average value as well. Drawing upon prior work in ensemble perception and the evaluation of sets, we expect consumers to value budget categories based on the *average value* of their options. Furthermore, we expect budgeters to allocate in accordance with this value.

The key insight driving these predictions is that budgeting is distinct from ordinary purchasing because it encourages the organization of individual purchases (e.g., bowling, going to the movies, mini golf, attending a concert, and taking a pottery class) into a set of purchases (e.g., entertainment options). This subtle yet meaningful shift in how options are represented (as a budget category, rather than individual items) should encourage consumers to focus on the average value of the category rather than the marginal values of the items.

Extracting averages. People automatically extract average (mean)[1] representations from sets, categories, and groups of people with little to no effort (Ariely 2001; Haberman and Whitney 2009; Whitney and Yamanashi Leib 2018; Yamanashi Leib et al. 2020). This has been demonstrated in relatively simple contexts (e.g., basic visual perception involving size, color, and motion paths; Ariely 2001; Chong and Treisman 2003; Watamaniuk and Duchon 1992) and with complex assortments (Whitney and Yamanashi Leib 2018; Woiczyk and Le Mens 2021). For example, people quickly and automatically extract average features and expressions from group of faces (Haberman and Whitney 2007, 2009), and consumers extract the average value from assortments of products (Yamanashi Leib et al. 2020).

Decisions based on averages. The literature reviewed above indicates people quickly assess and encode the average representation of a set, including its average value. We expect budgeters will similarly assess the average value of a budget category. Though extracting an

[1] Ensemble perception generally discusses "average" as the mean representation of a set. While it is beyond the scope of the current research to consider other measures of central tendency (e.g., median and mode), we discuss some of the implications of sensitivity to different distributional features in the general discussion.

average representation does not guarantee it will serve as the basis for downstream decisions, there is ample evidence across related disciplines that averages indeed inform decision making. In studies of distributed choice (i.e., consumption over time), people tend to choose in proportion to the average long-run benefits they receive from those choices (Davison and McCarthy 1988; Herrnstein and Prelec 1991; Herrnstein et al. 1993; McDowell 2013; Rachlin and Laibson 1997). Facing nonlinear cost structures, people often make economic decisions based on average costs (Liebman and Zeckhauser 2004). This tactic is observed for judgments and decisions in the face of tax schedules (de Bartolome 1995; Rees-Jones and Taubinsky 2020), price schedules (Gottfries and Hylton 1987; Ito 2014; Shin 1985) and credit card repayments (Gathergood et al. 2019). For example, energy consumption is sensitive to changes in average price when marginal price is held constant (Ito 2014; Shin 1985), and tax expectations reflect average rather than marginal tax rates (Rees-Jones and Taubinsky 2020).

Consumers may also occasionally base decisions on extracted averages. For example, when reporting their willingness to pay for a choice set, adding a less-attractive alternative decreases willingness to pay (Le Lec and Tarroux 2020). Consumers are less willing to pay for a medium of exchange which does versus does not have additional less-attractive uses associated with it (Spiller and Ariely 2020). Even when considering relatively simple gambles, adding a dominated option decreases the proportion of occasions on which consumers choose that choice set (Smith and Spiller 2024).

Average value diverges from marginal value. Evidence from across disciplines suggests there are occasions on which people make decisions based on averages rather than marginal analysis. This raises the possibility that budgeting may also be sensitive to average values, thus deviating from purely marginal thinking and decision making. We suggest it is, because budgets are themselves sets of options, organized within a categorical structure. Such cognitive representation aligns with ensemble perception, which favors representing category values by their mean. It is important to understand how consumers perceive value when making allocation decisions because budgets based on average value versus marginal value can diverge in important ways. This can be the case even for consumers with identical preferences, facing identical option sets, and spending equivalent amounts of money. Consider that average value reflects the evaluation of the entire category, which might be pulled up by high-valued options or dragged down by low-valued options. When considering average value—as we propose budgeters do—composition of the full set matters. This is not the case for marginal value, which does not depend on the entirety of the set, but rather on the most-valued items. Because average value and marginal value differ, if budgeters rely on average value, their allocations will systematically deviate from allocations based on marginal value. And because budgeting is a two-stage process in which allocations guide downstream consumption, any sensitivity to average value while setting a budget will have a downstream effect on spending from a budget.

H1: Budget allocations are sensitive to a category's average value, above and beyond the category's marginal value.

H2: Because budget allocations are sticky, spending from allocated funds will be sensitive to a category's average value, above and beyond marginal value.

We first provide evidence for H1, our central hypothesis, in two studies. Study 1 surveys consumers about their own budgeting behavior. Consistent with H1, consumers report high levels of attention to average category value in describing how they originally set their budgets. Study 2 provides a more nuanced test of H1 by asking study participants to make allocation decisions based on their own preferences for hypothetical vacation activities. After providing evidence that budgeting is sensitive to average value (H1), we next explain why the observed pattern of results should be unique to budgeting—in contrast to purchasing in the absence of budgeting. This argument considers how budgeting and purchasing engage distinct modes of evaluation. A supplementary experiment using stimuli from Amazon.com suggests budgeters evaluate categories relatively more, whereas purchasers evaluate items relatively more. We return to H2—alongside H3 and H4, introduced later—in Study 3, which presents an incentivized consumption game. Key results are summarized in table 1, and all preregistrations, materials, data, and code are available at https://researchbox.org/353&PEER_REVIEW_passcode=MIJYNO.

TABLE 1
SUMMARY OF STUDY METHODS AND KEY FINDINGS

Study	**Method**	***N***	**Key Findings**
1	Descriptive survey of actual budgeting behavior	100 (100)	(1) Average value is important in setting budgets (H1) (2) Average value is no less important than marginal value (3) The majority of participants rate average value to be at least as important as marginal value
2	Study of real preferences over vacation activities	501 (451)	(1) Average value relates to budget allocations, above and beyond marginal value (H1)
3	Incentive-compatible consumption game	970 (821)	(1) Higher average value draws larger allocations, holding marginal value constant (H1) (2) Higher average value leads to more spending, holding marginal value constant (H2) (3) Budget allocation by budgeters is more sensitive to average value than is spending by purchasers (H3) (4) Spending by budgeters is more sensitive to average value than is spending by purchasers (H4)

Note—Summary of key findings. In column labelled *N*, top number indicates recruited sample size and bottom number, in parentheses, indicates final sample size.

STUDY 1: SURVEY OF BUDGETING BEHAVIOR

Do budgets reflect the value of downstream consumption? If so, is value captured by the category average or value at the margin? To begin to address these questions in a naturalistic fashion, we asked consumers to report and comment on how they set their actual budgets.

Method

We recruited 100 participants from Amazon Mechanical Turk (AMT) to take part in a survey about their own budgeting behaviors (M_{age} = 39; 41% female).[2] In an effort to capture an accurate description of actual behavior, we asked participants to consider their real financial situation when responding to all questions. We then provided participants with a series of questions to elicit their actual budgets, as well as their rationale for their budget structure.

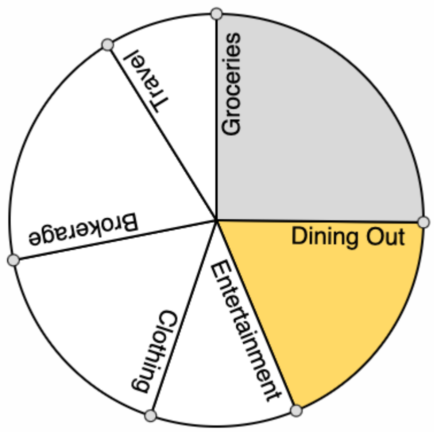
First, participants indicated their total amount of monthly take-home pay (after taxes and deductions). Next, they indicated how much of the take-home pay went towards recurring, essential expenses. The difference of these two amounts reflects monthly discretionary funds, which was displayed to participants.[3] Subsequently, participants were asked to indicate their monthly budgets for discretionary funds across different categories of expenditures. For all participants, these categories included groceries, dining-out, entertainment, and clothing, which are categories used by a majority of budgeters (Zhang et al., 2022). Participants also had the option to create up to three additional categories.

[2] There were originally 101 responses, though two responses were linked to the same identifier. Therefore, we removed the second, duplicate observation (i.e., the response that started after the prior one was completed).
[3] For the 18% (18/100) with less than or equal to $100 of monthly discretionary income, we asked them to imagine having $100 for the remainder of the survey. Excluding these participants does not meaningfully affect our findings.

FIGURE 1

EXAMPLE OF BUDGETING PIE CHART USED IN STUDY 1

Please indicate the approximate share of your discretionary budget that you allocate to costs associated with: **Dining Out**



Drag the dots to adjust your budget.

Budget	Amount
Groceries	$455
Dining Out	$335

Note—This image depicts a participant indicating the size of their Dining Out budget, after previously setting the size of their budget for Groceries, but not yet setting the size of any other budgets. In addition to the area of each slice of the pie chart, participants also saw the dollar amount (rounded to the nearest $5) of each allocation. Groceries, Dining Out, Entertainment, and Clothing were presented to all participants. Brokerage and Travel are depicted here as two custom categories created by this participant.

Next, participants indicated the total dollars of discretionary money allocated to each budget category using a budgeting pie chart. Respondents worked one category at a time, setting their budget by adjusting the area of the pie slice (figure 1). Participants always encountered the four default categories (groceries, dining-out, entertainment, clothing) prior to any custom categories. For each of these default categories, we also asked participants on the same page to "briefly describe how you originally settled upon that amount for your budget." Responses were collected in an open-text form, which required at least 25 characters to proceed. The purpose of this exercise was to encourage reflection upon how funds were originally allocated (beyond merely recalling the allocations). After the four default categories, participants continued to set the budget sizes for any ad-hoc categories, though we did not collect open-ended protocols during this portion of the exercise.

After completing the budgeting pie chart, we showed budgeters their prior written responses and asked them to recall the extent to which they focused on average value and marginal value when originally setting their budgets (order counterbalanced). To reduce the likelihood of drawing conclusions based on specific ways of describing abstract concepts such as average value and marginal value, we sampled from a set of four question variants for each construct. All questions were measured on a 1-7 scale, anchored on 1 = "Not at all" to 7 = "Very much." The full set of question variant wordings is provided in table 2. (We additionally asked participants to self-report their focus on items and categories. We report those measures in web appendix table B.1.)

TABLE 2

VARIANT WORDINGS USED IN STUDY 1

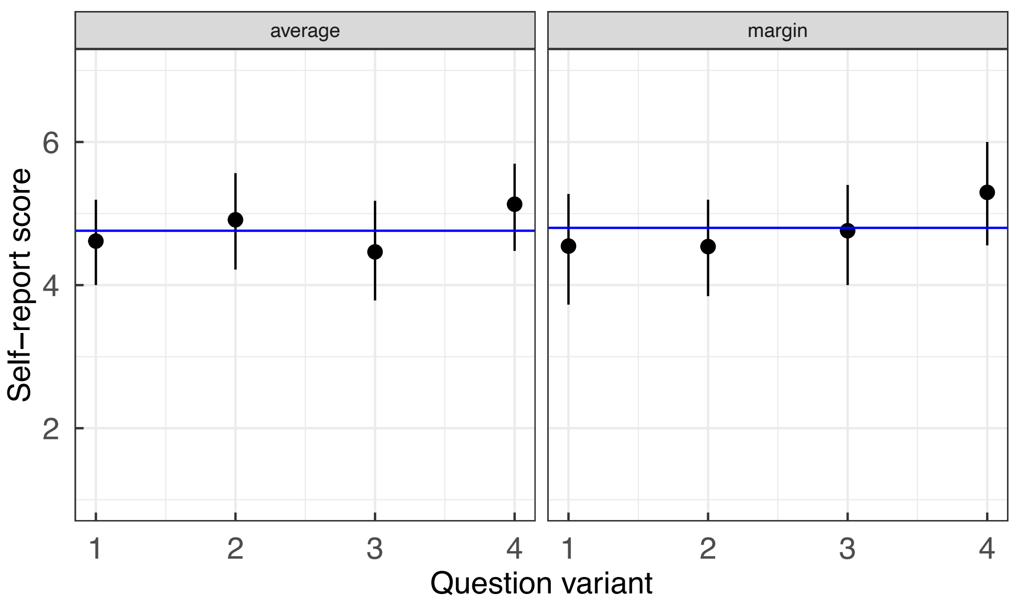
When thinking about setting your budget, to what extent did you find yourself…

Measure	Variant wording	Variant id
Average	…thinking about your overall impression of how much you like each category?	1
	…remembering your general liking of each category?	2
	…comparing your overall enthusiasm for each category?	3
	…relying on your general evaluation of each category?	4
Margin	…thinking about what you could buy with just a little more money (or conversely, what you would lose if you spent a little less)?	1
	…imagining how a small adjustment to one of your budgets could change what you buy?	2
	…weighing the trade-offs between having enough money to buy one thing or the other, but not both?	3
	…considering how giving up one thing might allow you to buy something else?	4

Results

Budgeters reported considering both average value and marginal value when making allocation decisions. As depicted in figure 2, both means ($M_{average}$ = 4.76, $SD_{average}$ = 1.70; M_{margin} = 4.80, SD_{margin} = 1.90) were significantly above the midpoint of 4 on a 1-7 scale (both ts > 4.21; both ps < .001). Though normative principles suggest consumers should consider only value at the margin (Samuelson and Nordhaus 2009; Colander 2019), average value is not considered less than marginal value (p = .88). Furthermore, the majority of respondents (61/100) reported considering average value at least as much as marginal value.[4]

FIGURE 2
SELF-REPORTED FOCUS ON AVERAGE AND MARGINAL VALUE



Note—Self-reported focus on the dimensions of average value and marginal value across question variants. Higher scores indicate an increased focus on the specific dimension of value. Error bars are 95% confidence intervals. The solid blue lines independently depict the mean of average value and marginal value. The question variant refers to the "variant id" in table 2.

[4] 36/100 reported considering average value more than marginal value, 25/100 reported considering the two value metrics equally, and 39/100 reported considering average value less than marginal value.

Discussion

In study 1, participants described their budgets and reflected upon how they originally allocated their funds. Across a variety of question wordings, we find consistent evidence that budgeters considered both average value and marginal value when originally setting their budgets. Specifically, we identify three pieces of evidence for the important role of averages: (1) participants considered average value at levels above the scale midpoint; (2) average value is not significantly less considered than marginal value; and (3) the majority of respondents indicated they considered average at least as much as margin. This finding is an important departure from what would be expected if budgets strictly follow the marginal principle. Instead, it appears that budgeters draw upon multiple dimensions of value, including the average value of a budget category (H1).

STUDY 2: SETTING VACATION BUDGETS

Are budgeters sensitive to the average value of consumption options, above and beyond their sensitivity to marginal value? Whereas study 1 presented evidence that budgeters report sensitivity to average value (as well as marginal value), study 2 more strictly tests whether budgets are sensitive to average value, even after accounting for value at the margin. In other words: Study 2 provides a stronger test of sensitivity to average value, above and beyond what can be explained by marginal value (H1). We test this using a paradigm carefully designed to leverage participants' own preferences for a variety of vacation activities.

Method

Participants. 501 participants from AMT completed this study (M_{age} = 43; 37% female).

Design and stimuli. Participants planned activities for a 3-day vacation for which flights, ground transportation, and an all-inclusive hotel reservation were already booked. They were instructed to budget for additional experiences during the trip and saw a travel brochure of 15 activities popular among tourists. The activities were presented in a random order, and each option cost $30. See figure 3. Participants set their budget using a slider snapped to $30 increments, ranging from $0 to $450.

FIGURE 3
TRAVEL BROCHURE OF ACTIVITIES IN STUDY 2

Activities ($30 each)
Running a half marathon
Dancing at a nightclub
Taking a yoga class
Riding the country's fastest roller coaster
Attending a science lecture at the nearby university
Bungee jumping
Visiting the museum of local history
Playing 9 holes of golf
Relaxing in local hot springs
Snorkeling in the reef
Unwinding at late-night whiskey bar
Hiking up a scenic trail
Attending a fancy afternoon tea
Renting a car to sightsee
Playing games in an arcade

After setting their budget, participants sequentially rated the value of each of the 15 activities on a 1-10 scale anchored on 1 = "Very little value" to 10 = "A lot of value."

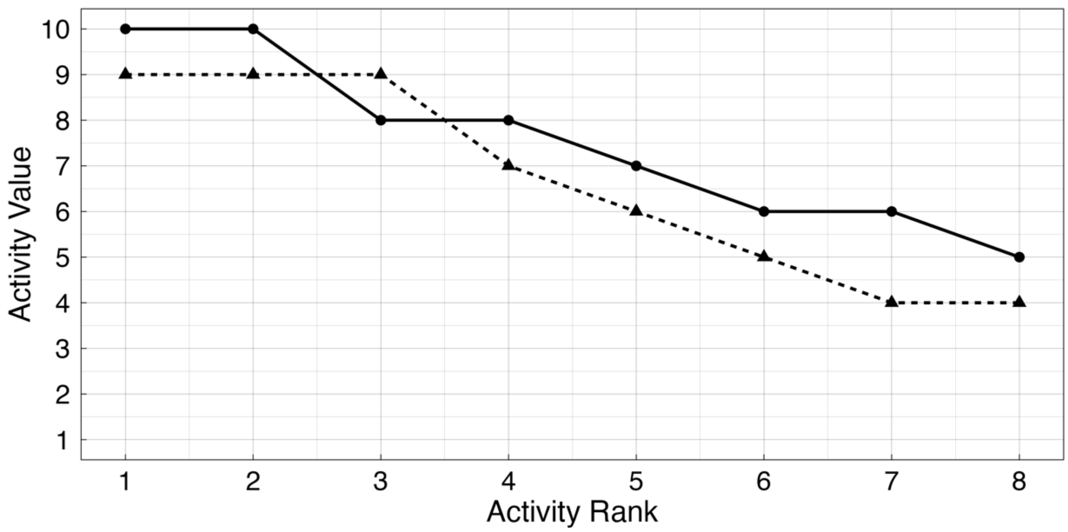
Participants were instructed “if you would never even consider paying for an activity, then click the following button,” which was labelled “No Value – Would Not Even Consider.” This feature is useful for identifying the considered set of activities—as opposed to the entire set. After *rating* the value of all 15 activities, participants then *ranked* only the considered items by sequentially identifying the best activity until no considered activities remained. Therefore, our key measures are: (1) the budget allocation; (2) the value ratings of each activity; and (3) the rankings of each considered activity, from best to worst. We can use these measures to assess how budget allocation (as the dependent measure) relates to the average of the value ratings, controlling for marginal value (H1). In addition to these key variables, we also observed which activities participants purchased, given their budget allocation. This measure is useful to confirm whether participants’ preferences are consistent for both allocation and purchase decisions (they are).

Analysis plan. Our primary interest is in whether average value guides budget allocation decisions, above and beyond value at the margin. Therefore, we analyze whether allocations are related to the average rated value of activities after controlling for marginal value. We limit our analysis to the values of considered activities (i.e., the rated values of all activities except those participants said they would not consider). Our main analysis considers whether a participant allocates enough money for a particular activity based on its rank, k. For example, we can observe whether a participant budgets for their $k = 4^{\text{th}}$ ranked activity by noting whether the budget is at least \$120 (because activities cost \$30 each). For each participant, for each rank, we consider whether they budgeted enough to purchase that activity. As predictors, we consider marginal value (the rated value of the k^{th} activity) as well as the average value of all other considered options. For additional precision, we distinguish between the average value of all considered options ranked better than the k^{th} activity and the average value of all considered options ranked worse than the k^{th} activity.

As an example, consider the two sets of hypothetical activity ranks and values depicted in figure 4. Imagine we are interested in whether a participant budgets enough for the $k = 3^{rd}$ ranked activity (at least $90) as a function of (i) the *marginal* value of the 3rd ranked activity and (ii) the *average* value of all other considered activities. At the margin, the value of the $k = 3^{rd}$ ranked activity is 9 (triangles) or 8 (circles). Normative theories of decision making suggest consumers will be sensitive *only* to this value when deciding whether to budget for the 3rd ranked good. In our example, the prediction based on the marginal principle is that the hypothetical consumer depicted by triangles is more likely to budget for the 3rd ranked activity than the consumer depicted by circles. This is because the incremental benefit of budgeting for 3 activities—compared to 2—only depends on how much additional value is offered by the 3rd ranked option. Any value conferred by the better-ranked options is not relevant in the decision to budget for an additional activity, as these values are already guaranteed with a budget for 2 activities. Similarly, the values of worse-ranked activities (e.g., ranked 4th and worse) do not affect the additional value offered by the 3rd ranked option, as these values will not be realized if the budget does not accommodate the 3rd ranked good.

Departing from this normative prediction, we suggest consumers might also be sensitive to the average value of the other considered items (H1). Following the previously described approach, we calculate the average value for activities ranked better than 3 ([9+9]/2 = 9 for triangles; [10+10]/2 = 10 for circles), and the average value for activities ranked worse than 3 ([7+6+5+4+4]/5 = 5.2 for triangles; [8+7+6+6+5]/5 = 6.4 for circles). In this example, marginal value (triangles > circles) and average value (triangles < circles) diverge. We predict participants will be sensitive to average value (H1).

FIGURE 4
ILLUSTRATION OF HYPOTHETICAL VALUE-RANK RELATIONSHIPS



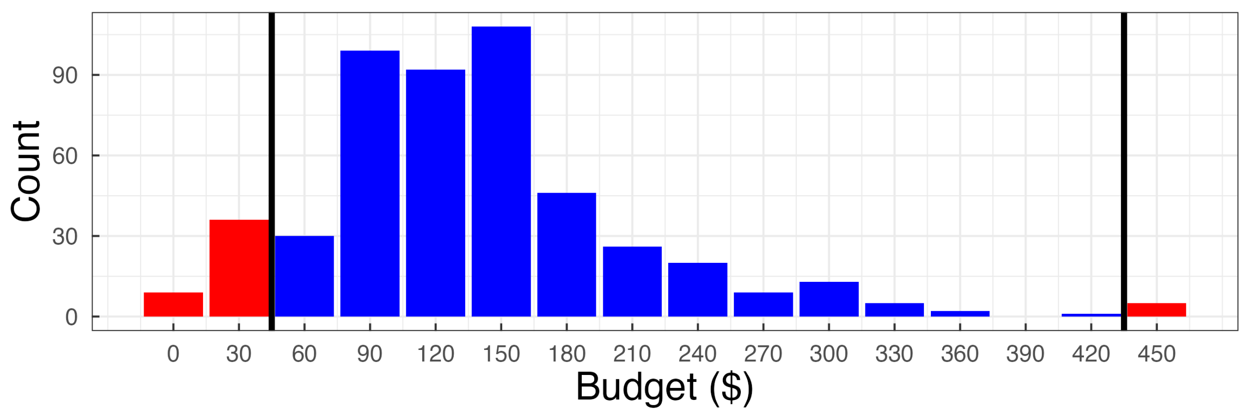
Note—Rank-value pairings for two hypothetical respondents (circles and triangles). Both consider 8 items (thus indicating 7 other items would not be considered). When predicting whether each respondent allocates enough for 3 activities, our model considers each participant's value of the 3rd ranked activity (the marginal value) and the average value of activities ranked above the margin (ranks 1, 2) and below the margin (ranks 4-8).

We implement this analysis by constructing a dataset where each observation corresponds to one considered item by one participant. We regress whether a participant has allocated for the k^{th} ranked activity (1 = yes, 0 = no) on the marginal value (the rated value of the k^{th} activity), the average value for activities ranked above k (more preferred), and the average value for activities ranked below k (less preferred). We include rank-level fixed effects (to account for differences in values across activity ranks) with cluster-robust standard errors (to account for non-independence).[5]

Results

Following our preregistered plan, we excluded 50 respondents who set extreme activity budgets of \$0, \$30, or \$450, as depicted in figure 5. Following this exclusion results in a remaining sample of 451 participants.

FIGURE 5
DOLLARS ALLOCATED TO ACTIVITY BUDGET



Note—Histogram of budget allocations (in dollars) for vacation activities in study 2. Participants who set extremely small budget (\$0, \$30) or large budgets (\$450) were excluded, following our preregistration. Excluded participants are depicted in red and fall beyond the preregistered cutoffs (vertical lines).

We then used a linear regression (with cluster-robust standard errors) to estimate how marginal value, average value of the above-margin options, and average value of the below-

[5] This represents a deviation from our preregistered analysis. Our preregistered analysis effectively separates this single model into a set of independent regression equations, one for each rank. We present the previously discussed model for ease of explication, while noting the results align closely with those of the preregistered analysis plan and support identical substantive conclusions (see web appendix C.1).

margin options relate to the decision to budget for the k^{th} ranked activity. Consistent with the marginal principle, the value of the marginal good (the value of the k^{th} good) was positively associated with the choice to budget for the k^{th} activity while controlling for rank and average value ($b_{margin} = 0.020$, $se = 0.003$, $t(280) = 5.93$, $p < .001$).[6] Consistent with H1, average value was also positively associated with the choice to budget for the k^{th} activity (after controlling for marginal value). Specifically, the average value below the marginal k^{th} ranked activity drove this effect ($b_{\text{below}} = 0.035$ $se = 0.006$, $t(202) = 5.56$, $p < .001$). There was no relationship between budget and the average value above the marginal k^{th} ranked activity ($b_{\text{above}} = 0.001$, $se = 0.009$, $t(148) = 0.09$, $p = .92$). [7] Though the action appears to be driven by sensitivity to average value below the margin, participants are sensitive to the overall average value of all considered activities, after controlling for the value of the marginal k^{th} activity ($b = 0.03$, $se = 0.008$, $t(236) = 3.91$, $p < .001$; web appendix C.4).

Robustness. One concern involves our interpretation of the coefficient "below" (the average value of activities ranked worse than the marginal activity). We claimed that normatively, the decision of whether to allocate for k activities should not be influenced by the average value below the marginal activity, conditional on the marginal value. This claim holds if the relationship between activity ranks and values is at least weakly monotonically decreasing for all options ranked worse than the marginal option. This is because if any options ranked worse than the k^{th} option had a higher value, then participants should be considering that lower-ranked-but-higher-valued option when decided how to set their budget. In other words, if rated

[6] Given cluster-robust standard errors, all degrees of freedom are estimated.

[7] We preregistered a particular interest in the coefficient on the "above" variable. Unexpectedly, the action was in the coefficient on the "below" variable. We further discuss how average value is perceived across the distribution of values (relative to average value) in study 3 and in the general discussion.

values are not at least weakly monotonically decreasing over activity rankings, then we will misidentify the value of the marginal good. Furthermore, the true marginal value would be inadvertently captured by the average value below the margin.

To address this potential concern, we reconsider our analysis after removing instances of nonmonotonicity. Specifically, we remove any case in which the k^{th} activity (the activity we identify as the marginal good) is rated as less valuable than any worse-ranked option. This ensures we do not consider cases in which the value at the margin is clearly misestimated (and incorporated into the average value of options below the margin). Reconsidering our analysis on this constrained subset of the data (1993/3864 observations) again finds a significant relationship with value at the margin ($b_{margin} = 0.031$, $se = 0.006$, $t(177) = 5.13$, $p < .001$) and average value below the margin ($b_{below} = 0.024$, $se = 0.008$, $t(193) = 2.89$, $p = .004$), but not average value above the margin ($p = .20$; web appendix C.2).

As additional robustness checks, we consider various alternative model specifications. We include non-considered options in the construction of averages (web appendix C.3); we consider the overall average of all non-margin considered items (web appendix C.4); and we consider alternative constructions of average value for better- and worse-ranked items (web appendix C.5). Results from these additional models do not substantively or statistically change the interpretation of the primary results. Furthermore, we confirm both value and rank are strong predictors of hypothetical purchase decisions, suggesting participant preferences and decisions within the paradigm are internally consistent (web appendix C.6).

Discussion

In study 2, we consider how budget allocation decisions relate to both marginal value and average value. This design explores these relationships using only participants' stated preferences and valuations alongside a budget allocation decision. While the decision was hypothetical, the activities were intended to be familiar to participants; and the scenario was intended to resemble the types of contexts budgeters frequently encounter when making allocation decisions in their real lives. Beyond the naturalistic appeal, the design allows us to specifically focus on the values of options within the considered set (i.e., activities that are sufficiently valuable to be considered).

We find evidence that allocations are guided by average value in addition to marginal value (H1). Specifically, participants were more likely to set a budget to accommodate a given activity (of rank *k*) when they perceived greater average value among the considered options, after controlling for marginal value. This sensitivity to average value was driven by the average value among the set of considered items ranked below the marginal purchase. These values—which drive allocation decisions—also matter for spending. We observed a high degree of internal consistency among participants who consistently indicated they would purchase the most-valued and best-ranked activities, given their budgets.

One set of concerns around study 2 is the potential for measurement error. While our design benefits from participants' ability to express their preferences for the various vacation activities, there may be deviations between rated values, ranks, and true underlying preferences. Though our set of robustness checks lends confidence that our interpretation of the results is not driven by specific analysis decisions (web appendix C), we acknowledge the potential role of measurement error underlying the valuations used across our analyses. This concern is addressed in study 3, where we use imputed values (rather than elicited values) to test the relationship between category average value and budget allocation.

BUDGETING VERSUS PURCHASING

Studies 1 and 2 provide initial evidence for budgeters' sensitivity to a category's average value—above and beyond marginal value—when making allocation decisions (H1). The implication is that allocations (and downstream consumption) will be sensitive to conditions that affect how a category's value is perceived *on average*. Does this sensitivity to average reflect a unique aspect of budgeting, or is it common to all purchase decisions?

Evaluation mode. To better understand what makes budgeting unique, consider how allocation differs from purchasing. The task of budget setting is necessarily a decision involving one or more *categories*. Budgeting reorganizes individual purchase opportunities into sets that we call an "entertainment budget," a "vacation budget," or a "discretionary spending budget." Attention to categories naturally facilitates the extraction of averages (Ariely 2001; Haberman and Whitney 2009; Whitney and Yamanashi Leib 2018; Yamanashi Leib et al. 2020), so we expect budgeters will evaluate a category's average value. In contrast, purchasing requires evaluating individual options, which is better-suited to marginal analysis. In the case of purchasing, the consumer need only identify the most valuable option(s), given their constraints. Therefore, budget allocation and purchasing should differ in the mode of evaluation precisely because they are different tasks. The act of budgeting encourages *category-level evaluations*, whereas the act of purchasing encourages *item-level evaluations*. This distinction between category-level and item-level evaluation modes relates to the distinction between direct and derived evaluations (Sood, Rottenstreich and Brenner 2004).

To test whether budgeting and purchasing differ in evaluation mode, we conducted a supplementary experiment using stimuli from Amazon.com (see Appendix). Participants (N = 200) identified an Amazon department they were likely to shop from and subsequently saw a matrix of the 30 best-selling items as though they were on Amazon's "Best Sellers" page. We randomly assigned participants to either indicate how much they would budget for these types of products or click on the types of products they would purchase. After engaging in the exercise to either budget or purchase, participants self-reported the extent to which they focused more on category-level or item-level evaluations during the task. Consistent with our theorizing, budgeters reported a relatively stronger focus on category-level evaluations than did purchases ($t(198) = 3.21$, $p = .002$; Appendix).

The supplementary experiment provides evidence that allocating and purchasing engage distinct modes of evaluation. This is perhaps unsurprising, given allocating and purchasing are very different tasks. Yet, the very goal of setting a budget is to ultimately guide purchasing. If allocating and purchasing involve different modes of evaluations—as we suggest—then consumers with the same end goal (i.e., making the best purchases) may nevertheless form discrepant evaluations. It is precisely because of the unique evaluations associated with budgeting versus spending that we expect budgets to be sensitive to category average values, more so than purchases. Whereas the nature of budgeting draws attention to categories (therefore encouraging the use of average value), the nature of purchasing does not. This is why the assumption that decision makers rely on marginal value may be poorly suited for budgeting, compared to purchasing. Instead, because budgeters are more likely to engage in category-level evaluation than purchasers, we expect budget-setting to be more sensitive to category averages than purchasing.

H3: Budget allocation decisions are more sensitive to a category's average value than are purchase decisions (in the absence of a budget).

An implication of H3 is that allocations and purchases will differ, even among consumers with identical preferences and financial constraints. This is important, because if prior allocations guide subsequent spending (Heath and Soll 1996; Lukas and Howard 2023; Thaler 1985; Zhang et al. 2022), consumers who budget should ultimately spend differently than those who do not. This is not because they are spending different amounts in total. Rather, budgeters first allocate more to categories with higher average value and later adhere to those allocations when spending, making their eventual spending also sensitive to average values. Thus, although H3 implies a comparison of seemingly non-alignable tasks (budget allocations and purchase decisions), it has important downstream consequences. The prediction is that two otherwise identical consumers with the same level of spending will differ in the composition of spending if one allocates prior to purchasing and the other does not.

H4: Because budget allocations are sticky, the effect of a category's average value on spending will be greater for those who budget than for those who do not budget.

In summary, we propose the sensitivity to average value (above and beyond marginal value) documented in studies 1 and 2 reflects a unique aspect of budgeting. Compared to purchasing, budgeting encourages greater category-level evaluations (supplementary study; Appendix). This difference in evaluation mode explains why allocation decisions are especially sensitive to the average value of budget categories. And because budgets are sticky, budgeters consume relatively more from high-value categories compared to purchasers, even at equivalent levels of overall spending. We test these accounts using an incentive-compatible experimental design in which we exogenously manipulate the average value of different budget categories, holding marginal value constant, and observe both budgeting and spending decisions.

STUDY 3: INCENTIVIZED CONSUMPTION GAME

Study 3 has three main goals. First, we test the complete set of hypotheses within a single experimental paradigm: Are budget allocations sensitive to average value (H1)? Is the downstream spending of budgeters sensitive to average value (H2)? Are budget allocations more sensitive to average value than non-budgeted purchase decisions (H3)? Is spending more sensitive to average value when consumers previously set budgets (H4)? Second, we use a highly controlled and incentive-compatible game design that allows us to (i) precisely induce and manipulate average values; (ii) hold marginal value constant by design; (iii) incentivize value-maximization; (iv) observe both allocation and spending decisions; and (v) collect data in an environment with ample opportunity for learning. Third, we consider a different context of budgeting: Dividing funds between distinct budget categories. Whereas the prior studies involved setting a single budget relative to the outside option, participants in the current study explicitly divide spending between two different accounts.

Method

Participants. 970 participants recruited from AMT completed this study (M_{age} = 41; 52% female).[8]

Design overview. We developed an incentivized, multi-period consumption game in which participants spent money on items that varied in value. All items had the same cost but differed in the points (value) they awarded. Half of the items belonged to the dining category and half belonged to the entertainment category. The goal of the game was to accumulate as many points as possible, which was directly incentivized with a modest additional payout. Therefore, all participants were aligned in their goal to maximize value by purchasing the items with the highest point values, regardless of whether those items belonged to the dining or entertainment category. As our key manipulation of average value, we randomized whether the dining or entertainment category had a higher average value. Additionally, we randomly assigned participants to either play as budgeters (who allocated and then made purchases) or non-budgeters (who never allocated funds).

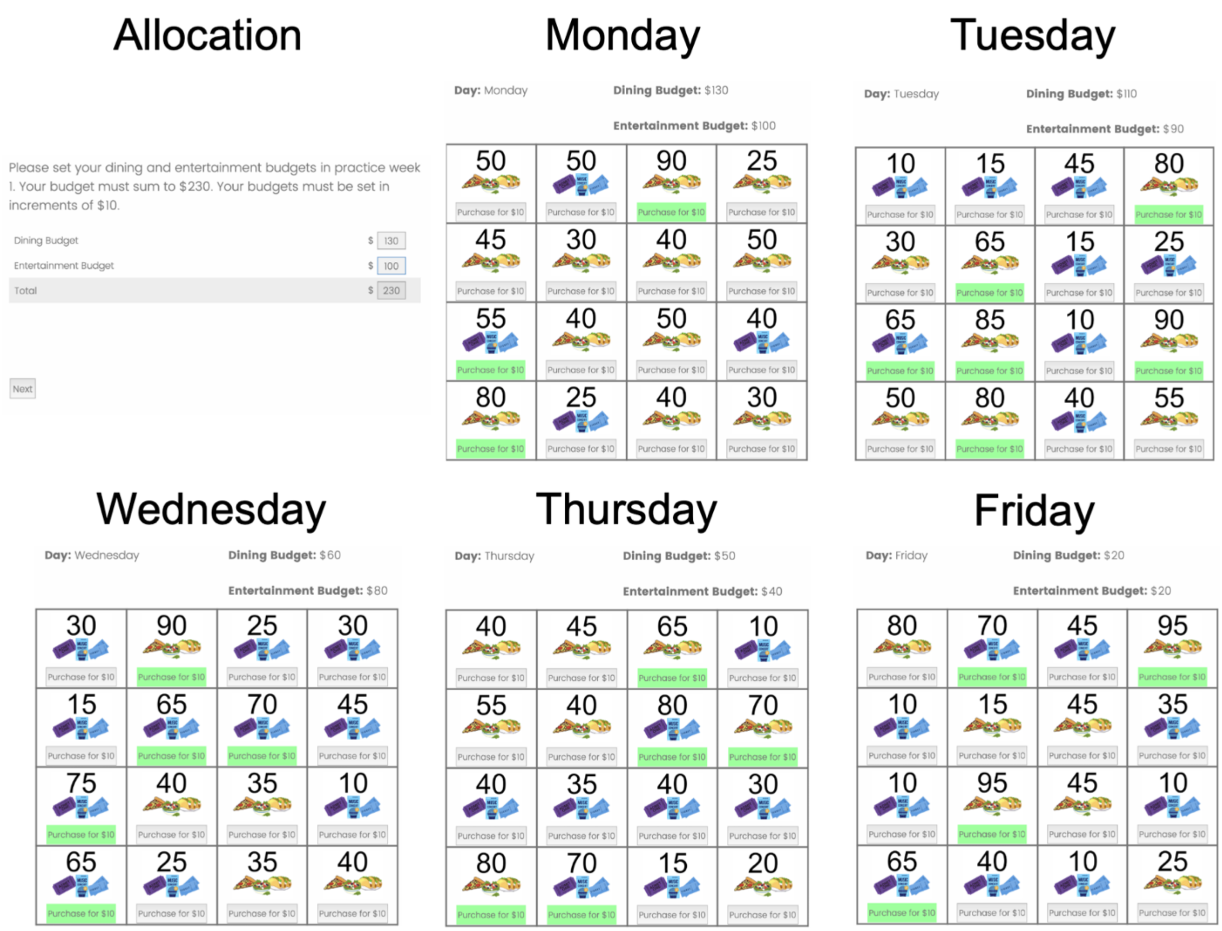
The game was structured as occurring over a sequence of simulated weeks, though the entire game took place in a single experimental session lasting approximately 25 minutes. Participants played five practice weeks (which we do not analyze) and then five incentivized weeks (which we do). Each week, participants had $230 to spend on items costing $10 each. A

[8] There were originally 1007 complete observations. In two cases, a single participant identifier had two complete observations; we kept the first response from each such pair for analysis. We excluded 35 observations for having a previous or concurrent incomplete response from the same participant identifier in the dataset, meaning the completed observation may not have been naïve. This resulted in the final sample of 970 naïve participants. All of our focal results (i.e., those involving the high vs. low dining average distribution) replicate if we include all 1005 or 1007 observations instead.

set of 16 items was displayed each day (Monday through Friday), such that an entire week was comprised of 80 total options (16 per day for 5 days). Of the 80 total options, 40 were dining (indicated by an image of food) and 40 were entertainment (indicated by an image of event tickets). Every participant received a single draw of 80 options, and the order of these options was re-randomized every week (including the practice weeks). Using the same draw of 80 items made learning the game and the point value distributions more tractable. The basic structure of a game week is depicted in figure 6.

FIGURE 6

OVERVIEW OF THE CONSUMPTION GAME STAGES



Note—A depiction of a simulated week in the consumption game. Each of five practice weeks and five game weeks followed these steps. First, participants in the budgeting condition (as depicted) allocated $230 across a dining budget and an entertainment budget. Next, all participants made purchase decisions on each of five days. Items were randomized across days, and participants faced each day's screen in sequence. On some days, participants may have needed to scroll to the right to see all budget information. For presentation purposes, this information has been condensed into this image.

Participants used their weekly money to buy dining and entertainment items. Each item cost $10 and was worth the number of points indicated on the item, ranging from 10 to 95. Each simulated day (Monday through Friday) participants encountered a 4 x 4 grid of 16 items, as depicted in figure 6. Participants could purchase as many items as they had money available; they could not exceed $230 in weekly spending. After making decisions for one day, participants were shown their purchased items and then continued to the next day's selection. Participants were not permitted to revise previous decisions. Unused money carried over from day to day within each week but did not carry over from one week to the next. After five practice weeks there were five incentivized weeks with total incentives averaging approximately 20% of overall compensation. Realized bonuses among non-excluded participants ranged from $0 to $1.25, with a median of $0.80. Bonuses were paid in addition to a fixed $3.25 participation payment.

Budget manipulation. Participants were randomly assigned to either the budgeting or non-budgeting condition. Budgeters started each week by allocating their $230 between a dining and entertainment budget (in $10 increments). They then encountered five sequential days, during which they could spend up to $230. Expenses were automatically tracked to the appropriate budget and participants could see the remaining balance in each budget (see figure 6); however, allocations were non-binding. Participants knew they were allowed to disregard their allocations, so long as their spending did not exceed the weekly constraint of $230. Non-budgeters did not allocate weekly funds prior to encountering the five days in which they could spend. Just as it was for budgeters, the only spending constraint was that non-budgeters could not exceed $230 of weekly spending. Therefore, participants in both conditions faced an identical spending task (spending up to $230 each week) and differed only in that budgeters previously allocated their $230 between the dining and entertainment account, while non-budgeters did not.

Category average value manipulation. All items ranged in value from 10 to 95 points in 5-point intervals. We manipulated the distributions of points within the dining and entertainment categories, such that either dining or entertainment had a higher average value. Rather than manipulating the entire range of the distribution (e.g., from 10 to 95), we instead divided this range into the high-point items (those worth 60 or more points) and the low-point items (those worth less than 60 points). The threshold of 60 points was deliberate, as this was precisely the value of the marginal purchase for both categories, as detailed below.

Separately manipulating the average value in the high-point region and the low-point region allows us to better analyze where average value plays a role. Recall that we expect consumers to extract average values from the assortment of goods they consider (meaning unconsidered goods should not play a role). In study 2, the design asked participants to identify which vacation activities were considered and which were not. In the present design, we cannot precisely identify the set of considered items from the 80 different options that are presented each week. But prior research suggests high-value options are more likely to be considered and evaluated (Bear et al. 2020; Bettman and Park 1980; Payne 1976). Therefore, by independently manipulating average value among the high-value items and the low-value items, we can assess whether average value plays a role among the set of items most likely to be considered (point values ≥ 60) and the set of items least likely to be considered (point values < 60).

The high-point distributions were manipulated to be either higher for dining (realized dining vs. entertainment means across participants: 81 vs. 70) or lower for dining (74 vs. 82). Similarly, the low-point distributions were manipulated to be either higher for dining (38 vs. 26), or lower for dining (25 vs. 37). Given the expectation that participants would be most likely to consider high-point items (possibly paying little attention to low-point items), we preregistered a clear interest in the effect of the high-point distribution condition. For ease of explication, we focus on reporting and interpreting the results of manipulating average values in this high-point region, which we will refer to as the “dining average” manipulation. Complete analyses and additional discussion of the low-point distribution are included in web appendix D.

Disentangling average and marginal values. We designed the distributions with one additional key feature in mind. Specifically, we aimed to hold the marginal value constant across the two categories in both conditions, such that participants could do no better by consuming an additional item in either category. We achieved this by ensuring there were always exactly 23 items worth 60 points or more, consisting of exactly 14 dining and 9 entertainment items. Therefore, given the $230 of weekly funds, an omniscient player would always allocate for and/or purchase the 23 items with point-values of 60 or higher, corresponding to 14 dining and 9 entertainment items. This optimal split is unaffected by whether dining is manipulated to have a higher average value (relatively more items with point values of 80, 85, 90, or 95) or a lower average value (relatively more items with point values of 60, 65, 70, or 75). Our design also ensures minor deviations from the optimal split (e.g., 16 dining and 7 entertainment; or 12 dining and 11 entertainment) lead to symmetrically-lower payoffs, reducing any incentive to hedge in favor of the category with a higher average value. (The details regarding how we ensure symmetric implications, even as participants slightly deviate from the 14/9 split, are outlined in web appendix D).

Holding the marginal value constant by design allows us to isolate the effect of manipulating a category's average value to be high or low. This experimental approach provides a high degree of control, enabling us to cleanly test all hypotheses in an engaging and incentive-compatible paradigm. Specifically, we can ask whether budgeters are sensitive to average value in their allocation decisions (H1) and whether this sensitivity carries through to their subsequent spending (H2). By comparing budgeters' allocations to non-budgeters' spending, we can compare whether allocations are more sensitive to average value than are purchases (H3). And by comparing budgeters' final spending after setting their allocations to non-budgeters' spending, we can observe whether consumers who engage in two-step budgeting are more sensitive to average value than consumers who merely make purchases (H4).

Summary. To recap, participants in the budgeting condition repeatedly allocated funds between two budgets, and all participants purchased items to earn points. The distributions of items were structured such that the dining category had either a higher or lower average value, but the marginal value was equated across dining and entertainment. Participants were well-informed (five comprehension questions, reported in web appendix D) and well-trained in the paradigm (five practice weeks). Participants knowingly faced the same weekly distribution of items for the entire session of practice and incentivized weeks to facilitate learning. Within this incentivized game, we examine whether budgeters versus purchasers respond differently to category average values when marginal values are held constant.

Results

Because of the potential for noise and extreme responses, we preregistered to exclude participants who failed to buy at least 50% of the most-valuable options. Of 970 participants, 149 purchased fewer than 50% of these items across the 5 game weeks, likely indicating inattentiveness or misunderstanding, and were thus excluded, leaving a final sample of 821. The interpretation of the preregistered analyses does not meaningfully change if noise participants are included (see web appendix D).

Dining share measure. The fact that study 3 includes two budget categories allows us to consider outcomes in terms of preference for dining or entertainment. For ease of reporting, we discuss our outcomes (e.g., allocation, spending) in terms of the "dining share." Specifically, we construct two different measures of the dining share: one for allocations and one for spending. In both cases, the dependent variable is calculated as [dollars of dining / (dollars of dining + dollars of entertainment)] x 100%.[9] For example, $150 to dining and $80 to entertainment equates to a dining share of 65%. For those in the budgeting condition, we can examine the dining share of allocation and the dining share of spending. For those in the non-budgeting condition, we only consider the dining share of spending (because these participants never set budget allocations).

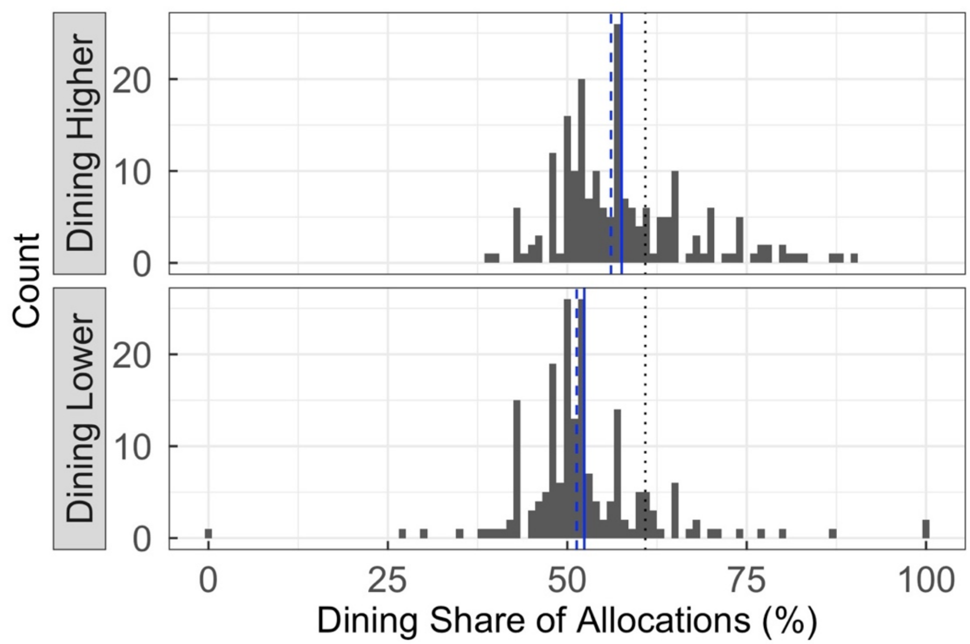
[9] Our preregistration specified (Dining – Entertainment) rather than (Dining / (Dining + Entertainment) x 100%). Because some participants did not exhaust their budget, these two measures are not perfectly deterministic transformations of one another. They are, however, extremely highly correlated (r = .994), neither is clearly dictated as a preferred measure, and none of our key results hinge on which metric we use. We use dining share for ease of interpretation. Complete preregistered results using the difference measure are presented in web appendix D.

Analysis plan. We preregistered two levels of analysis. First, we consider only participants in the budgeting condition and regress their dining share of allocation on dining average condition (+1 = dining high, -1 = dining low), the low-point dining average condition (+1 = dining high, -1 = dining low), and their interaction. We are interested in whether category average value (specifically among the high-point items, as captured by the dining average condition variable) affects the dining share of allocation in an environment in which marginal value is held constant across categories (H1). Extending this model to the dining share of spending provides a test for H2. Second, we consider all participants and examine the dining share of spending. Here, we are specifically interested in whether budgeters and purchasers differ in their sensitivity to the dining average condition (H3). We regress the dining share of spending on dining average, the low-point dining average, budget versus purchase (+1 = budget, -1 = purchase), and all two- and three-way interactions (H4).

Budget allocations are sensitive to average value (H1). The first analysis considers only participants in the budgeting condition. As previously noted, we are interested in the effect of the dining average condition (reflecting the average value among the high-point items that are more frequently purchased). Participants allocated a greater dining share when dining was manipulated to have a higher average (M = 57.58, SD = 9.47), compared to a lower average (M = 52.37, SD = 9.90; b = 2.61, se = 0.49, $t(390)$ = 5.35, p < .001, Cohen's d = 0.54; figure 7). This indicates allocations are sensitive to the average value of budget categories, even when the marginal value of each category is held constant (H1).

Though not our focus, we also consider the effect of manipulating average value in the low-point region of the distribution (options with less than 60 points, which were less likely to be purchased). Participants assigned to see higher dining averages in this region allocated marginally more funds to dining than entertainment (*M* = 55.88, *SD* = 10.33) than those assigned to see lower average values in this region (*M* = 54.21, *SD* = 9.66; *b* = 0.83, *se* = 0.49, *t*(390) = 1.71, *p* = .089, Cohen's *d* = 0.17). This effect was significantly smaller than the focal effect of the dining average condition in the high-point region (*t*(390) = 2.57, *p* = .010). Similar to the robustness check in study 2, we construct an overall measure of average value from condition assignment in both the high- and low-point regions[10] and observe that being assigned to a higher overall average value increases budget allocations (*t*(392) = 4.96, *p* < .001; web appendix D).

FIGURE 7
BUDGETS BY DINING AVERAGE CONDITION



NOTE—The dependent measure, the dining share of allocations, by dining average distribution. Solid blue lines represent condition means. Dashed blue lines represent condition medians. Dotted black lines represent the value-maximizing allocation ($140 to dining and $90 to entertainment; a 61% dining share).

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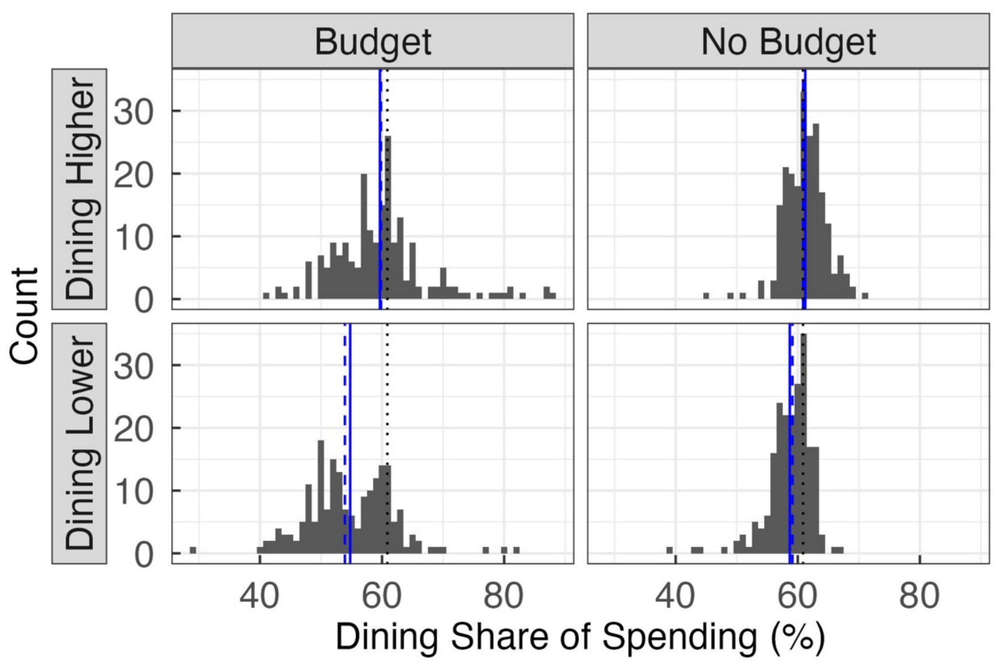
[10] We can approximate an overall average by collapsing the 2 (dining average: high, low) x 2 (low-point dining average: high, low) conditions into 3 conditions: both high (coded as +1), mixed (coded as 0), and both low (coded as -1).

Budgeters spend more in categories with a higher average value (H2). We can test whether budgeters spend more in high-average categories by regressing the dining share of spending on the dining average (as well as the low-point region dining average, and their interaction). Even though participants could deviate from their allocations (so long as they adhered to the total constraint of $230 each week), we observe budgets are sticky (see supporting analyses in web appendix D). As a result, budgeters in the higher dining average condition spent more on dining (M = 59.65, SD = 7.87) than those in the lower dining average condition (M = 54.78, SD = 7.13; $t(390) = 6.49$, $p < .001$, Cohen's d = 0.65).

Budget allocations are more sensitive to average than are purchases by non-budgeters (H3). This study permits a non-preregistered test of H3. Specifically, we can compare the dining share of allocation for budgeters with the dining share of spending for non-budgeters. There is a main effect of dining average ($t(813) = 8.04$, $p < .001$) and a main effect of budgeting ($t(813) = -10.11$, $p < .001$). These are qualified by the expected interaction, such that the effect of dining average is greater for budgeters' allocations ($M_{\text{higher}} = 57.78$, $SD_{\text{higher}} = 9.47$ vs. $M_{\text{lower}} = 52.37$, $SD_{\text{higher}} = 9.90$) than non-budgeters' spending ($M_{\text{higher}} = 61.23$, $SD_{\text{higher}} = 3.40$ vs. $M_{\text{lower}} = 58.70$, $SD_{\text{higher}} = 3.61$; $t(813) = 2.56$, $p = .011$, Cohen's f = 0.09). The main effect of budgeting may represent naïve diversification for budgeting (Benartzi and Thaler 2001; Bardolet, Fox, and Lovallo 2011), pushing allocations toward an even split.

Budgeters' spending is more sensitive to average value than purchasers' spending (H4). Recall, our preregistered plan was to regress dining spending on the dining average condition, the low-point dining average condition, budget condition, and all two- and three-way interactions. The goal of this analysis was to test whether the effect of dining average had a different effect on spending for budgeters versus non-budgeters. As expected, the effect of dining average varied depending on the presence of budgets (b = 0.54, se = 0.20, $t(813)$ = 2.78, p = .006, Cohen's f = 0.10). This provides direct support for H4, which predicts spending will be more sensitive to average value for budgeters than non-budgeters. Specifically, spending was more sensitive to the dining average among participants who previously set budgets (M_{higher} = 59.65, SD_{higher} = 7.87 vs. M_{lower} = 54.78, SD_{lower} = 7.13) compared to those who never set budgets (M_{higher} = 61.23, SD_{higher} = 3.40 vs. M_{lower} = 58.70, SD_{lower} = 3.61). Given differences in variance across conditions, we repeated this analysis with robust standard errors. No substantive nor statistical conclusions changed. See figure 8. Full results are reported in web appendix table D.4.

FIGURE 8
CONDITIONAL SPENDING DISTRIBUTIONS



Note—Dining share of spending by dining average distribution. Solid blue lines represent condition means. Dashed blue lines represent condition medians. Dotted black lines represent value-maximizing spending ($140 to dining and $90 to entertainment; a 61% dining share).

Discussion

Study 3 permits tests of all four hypotheses within a controlled and incentivized experimental paradigm, in which the marginal value, given value-maximizing decisions, is held constant by design. Consistent with H1, we find budgeters allocate more funds to categories with higher average values. Consistent with H2, budgeters spend more on categories with higher average values (because prior budget allocations guide subsequent spending, even though these allocations are non-binding). As predicted by H3, the allocations of budgeters are more sensitive to average value than the spending of non-budgeters. As a result, and consistent with H4, budgeters' spending is more sensitive to average value than non-budgeters'. Taken together, this experiment suggests consumers with identical preferences are differentially sensitive to category average values depending on whether or not they budget, thus leading to differences in spending.

Beyond the ability to test all four hypotheses within a single setting, we extend our prior findings to a budgeting context in which consumers allocate funds between multiple distinct accounts. Whereas prior studies examined allocation into a single budget category (relative to an outside option), the present study extends our findings to additional budgeting contexts. As a concluding note, the game design is quite distinct from the scenarios of other studies (including the supplementary study). This experiment provided an engaging and incentivized repeated decision task in which there was ample opportunity to learn with well-defined item values. Consistent findings across such varied designs lends support to the generalizability of the findings across contexts.

GENERAL DISCUSSION

Consumers' budget allocations matter because they affect spending. The current research explores how consumers set budgets and identifies average value as an important driver of budget allocations. Uncovering the role of average value in budget allocations introduces a number of possibilities that would not occur if budgeters followed normative allocation principles (i.e., setting budgets based on equating value at the margin). For example, we suggest allocations will be sensitive to factors that change the perception of average value, even when marginal value is unaffected (e.g., distributions that pull the average up or down, as in study 3). Consumers generally adhere to the budgets they set, so the sensitivity to average value at the time of allocation affects downstream spending. Therefore, an important contribution of this work is that budgeting (versus purchasing without prior allocation) changes the composition of spending, even when it does not change the amount of spending.

Future Directions

Measuring central tendency. In study 1, consumers reported their own assessment of average value; in study 2, we analyzed the mean of rated values; in study 3, we manipulated a distribution of values. Across these studies, the underlying construct of "average" does not distinguish among multiple forms of central tendency (e.g., mean, median, mode). Though ensemble perception has traditionally focused on the arithmetic mean of groups and sets (Ariely 2001; Haberman and Whitney 2009; Whitney and Yamanashi Leib 2018; Woiczyk and Le Mens 2021), we acknowledge there are multiple possible measures of average.

Recent work suggests there may be meaningful distinctions between such metrics in certain contexts (Howard et al. 2022). We suspect such distinctions are unlikely to qualitatively impact our findings. First, our core interest is not in distinguishing between related measures of central tendency (Howard and Shiri 2022), but rather in examining sensitivity to a category's summary representation. Furthermore, category value represented by the mean, median, and mode are all distinct from marginal value, which we hold constant in study 3. Across studies, we demonstrate the robustness of average value (as a proxy for central tendency) by measuring it in different ways. The same key pattern of results exists across these approaches. In other consumer contexts, there may be situations in which it is more useful to distinguish between measures such as mean, median, and mode. For example, a consumer who splurges on a rare, extravagant vacation might become more likely to perceive differences between the mean and median value of their entertainment purchases. This provides a potential area for future research.

What gets considered when evaluating budget categories. A second area for future research is the extent to which various purchases are or are not evaluated within a distribution of values (regardless of how central tendency is assessed). In both studies 2 and 3, participants are sensitive to the overall average value, though we separately consider average values in more localized regions (e.g., above or below the margin). Yet, in study 3, we find participants are more sensitive to average value for high-point items than low-point items, whereas in study 2 we found greater sensitivity to the average value of low-value considered items. This raises the possibility that consumers put differential weight on values across the distribution depending on context (Bear et al. 2020) or edit out non-considered options from consideration (Kahneman and Tversky 1979). This latter explanation may provide a way to reconcile the study 2 and study 3 results, as study 3 participants with ample learning opportunity may have grown accustomed to disregarding the low-value, infrequently purchased items. In study 2, on the contrary, even the low-value items were still identified by participants as part of the consideration set. This potential role for editing or differential attention may be especially important when consumers have budget categories spanning a wide array of possible values (as in study 3). Valuable alternatives which are highly accessible may encourage consumers to allocate more money to a budget, even if the value of that alternative is unlikely to meaningfully affect the value of consumption offered by a budget category.

Constraining consumption. Self-control considerations are key motivating reasons for budgeting (Krishnamurthy and Prokopec 2010; Thaler 1980, 1999; Wertenbroch 1998). If consumers are concerned that their short-run selves will selfishly overconsume at the expense of their long-run selves, they may seek to constrain short-run spending opportunities by setting strict budgets. This characterization emphasizes a potential factor missing from our current analysis: There can be multiple dimensions of value which can be realized over different time horizons, and these are sometimes in conflict with one another (e.g., short-run value, like taste, versus long-run value, like health). Our inquiry has collapsed value into a single dimension, and thus does not speak to such self-control issues. Future research could address this by considering domains with different short-run and long-run benefits and orthogonally manipulate the average value of each.

Additional predictors of evaluation mode. In the supplementary experiment detailed in the Appendix, we find allocating (versus purchasing) induces greater relative focus on category-level evaluations than on item-level evaluations. However, there are likely additional predictors of evaluation mode. Among allocators, the nature and the complexity of a task may further reinforce a given evaluation mode. We suspect complexity (e.g., the accessibility of possible purchases, the number of possible purchases, the number of budgets, the duration of budgeting periods, etc.) will encourage category-level thinking as a simplification strategy.

Heterogeneity in sensitivity to averages. In addition to the important inter-group differences, we also observe considerable intra-group differences in budget allocation, suggesting the presence of meaningful heterogeneity in allocation decisions (see figure 7). What drives this heterogeneity? Prior examinations of cost-benefit reasoning have examined education and training in economics (e.g., Larrick, Nisbett and Morgan 1993), suggesting they may be plausible contributors to thinking on the margin. We conjecture that forward-thinking consumers (e.g., those who plan ahead or consider potential outcomes; Lynch et al. 2010; Nenkov, Inman and Hulland 2008) may be less likely to be sensitive to the average when budgeting, as planners are more likely to consider their opportunity costs (Bartels and Urminsky 2015; Fernbach et al. 2015; Spiller 2011).

Implications

Budgeting patterns. A subtle implication of the current findings is that consumers may allocate too much (from a value-maximization perspective) to categories from which they perceive the greatest average value, all else equal. Consider study 3, in which we held constant the set of items that would earn the most points and the largest real bonus payment. Allocating (and downstream spending) in line with a category's average value dragged some participants away from this value-maximizing bundle. If consumers place some weight on the average rather than the best and most desirable purchases, categories with a few stand-out favorites are likely to draw an outsized wallet share. Deliberate attempts to prioritize and attend to budgets could even exacerbate this effect, as focusing on what they value may lead consumers to give greater weight to typical or salient category exemplars rather than the marginal purchases.

Budgeting tools. The current work suggests a potential dimension for budgeting tools to focus on: recouping value at the margin. As budgeting encourages category-level evaluations, this has potential benefits and costs. As a benefit, it enables consumers to see the whole picture. But as a cost, they may rely on a holistic value and miss out on value at the margin, as in study 3. As budgeting tools in the fintech space like EveryDollar, YNAB (You Need A Budget), Rocket Money, and Simplifi continue to grow in popularity, they have the potential to shape the kinds of financial decisions consumers make. Such budgeting tools provide ample feedback about spending performance, relative to allocated levels (e.g., being under or over budget). However, the usefulness of this performance feedback is necessarily conditioned upon the quality of budget allocations. The current findings suggest that consumers will make budget allocations in accordance with the perceived average value of their budget categories. This may come at the expense of higher-value expenditures. Therefore, information architects who are interested in shifting consumption back towards the highest-valued marginal expenditure might offer feedback about allocation performance or allocation strategies and encourage consideration of specific expenses. For example, rather than encouraging allocating to categories that are best-liked or most-important, one might want to encourage allocating to categories to ensure not missing out on the best-liked or most-important purchases. Additionally, the strategic organization of budget categories could be used to attract or discourage allocations to a given category.

Cascading implications. Finally, these findings with respect to budget allocations are likely to have additional downstream impacts, because these are not outcomes that disappear in equilibrium. Neither prior work in ensemble perception (Whitney and Yamanashi Leib 2018) nor our current work on budget allocation finds that these patterns are attenuated with experience; instead, they can be reinforced or exacerbated, as consumers drift further towards allocations that equate average values.

Consumers use budgets to guide and manage their spending. While budgets may help consumers to stay on track in terms of their *level* of spending, budgets may also change the *composition* of spending. As budget setting favors categories with higher average values, budgeting changes how people evaluate options, how they spend, where they spend, and ultimately, what they consume.

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APPENDIX: AMAZON STUDY

Do allocation decisions engage a different mode of evaluation than purchase decisions?

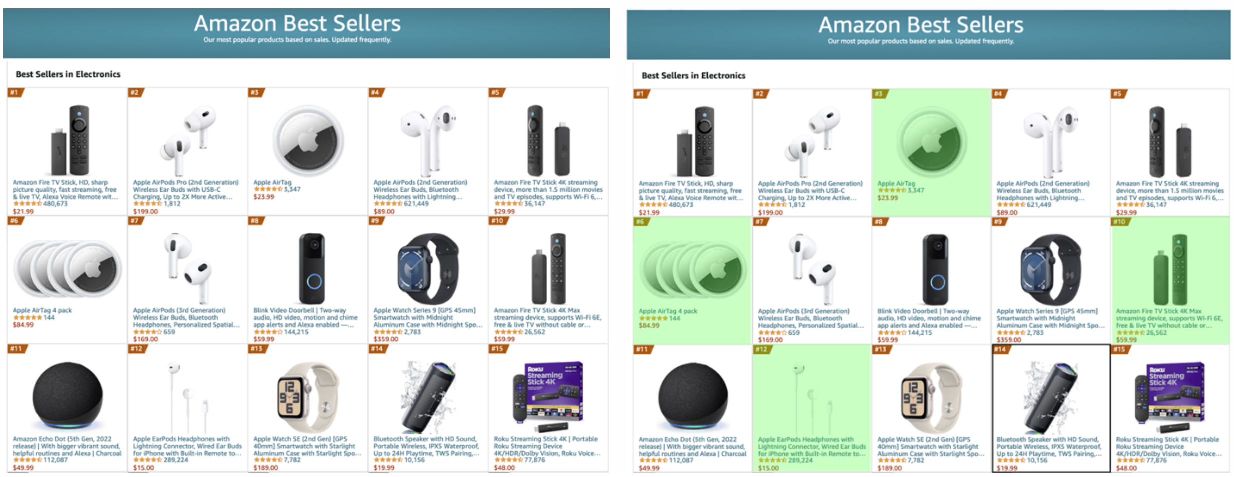
Method

We recruited 200 participants from AMT in the last week of July (2024) to take part in a brief experiment (M_{age} = 43; 41% female). All participants were asked to select the Amazon.com department they were most likely to shop from the list including: “Grocery & Gourmet Food,” “Tools & Home Improvement,” “Electronics,” “Beauty & Personal Care,” and “Kitchen & Dining.” Subsequently, participants viewed an image of the “Amazon Best Sellers” for their selected department. These images were captured directly from Amazon.com and presented the top 30 best-selling items in late July 2024 (figure A1).

Participants were randomly assigned to either a budget or purchase condition. In the budget condition, participants were asked to indicate “what budget/s would you set for these types of products in the near future?” and responded using an open-ended text box. In the purchase condition, participants were instructed to “think about the kinds of products you would purchase in this department if you had a $50 Amazon gift card.” We asked participants to “click on the types of products you would buy” and reinforced “you do not need to use the entire gift card; and you can also spend additional money by going into your own pocket.” In the purchase condition, each item from the Amazon Best Seller list was clickable using the Qualtrics heat map feature (figure A1).

After the task of thinking through budget allocation or purchase decisions, participants provided a self-report measure of their evaluation mode. Specifically, respondents indicated whether they had been focusing more on individual items or more on the collection of items as a whole. This was measured on a 1-7 scale anchored on 1 = “Entirely focused on individual items” and 7 = “Entirely focused on the collection as a whole.”

FIGURE A1
EXAMPLE STIMULI

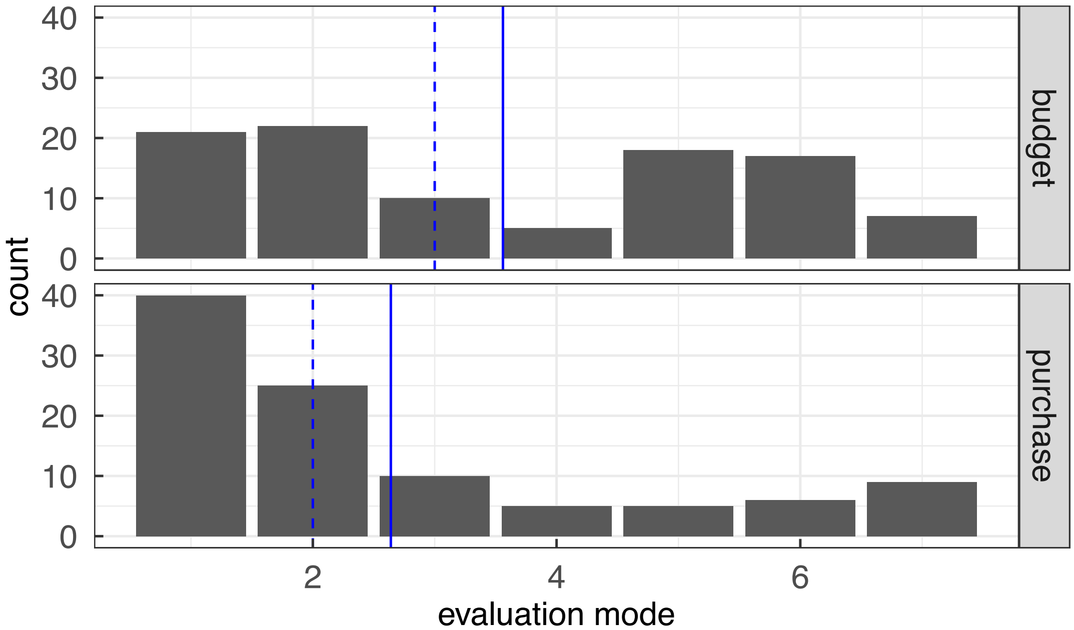


Note—(*Left*) Example of Amazon Best Sellers in the electronics department. Truncated screenshot shows 15/30 products presented to participants. (*Right*) In the purchase condition, participants clicked on the types of products they would buy within the Amazon department they previously selected.

Results

All participants were included for analysis. The preregistered t-test indicates budgeters’ self-reported evaluation mode was more consistent with category focus (M = 3.56, SD = 2.05) than purchasers’ was (M = 2.64, SD = 2.00; t(198) = 3.21, p = .002, Cohen’s d = 0.45; figure A2). 42% of budgeters—but only 20% of purchasers—indicated a greater relative focus on categories than items (5, 6, or 7).

FIGURE A2
SELF-REPORTED EVALUATION MODE DISTRIBUTIONS



Note—Distributions of self-reported evaluation mode. Lower scores indicate greater relative focus on items, and higher scores indicate greater relative focus on categories. Solid lines are marginal means, and dashed lines are marginal medians.