




A Conceptual replication of the differential price framing effect in the field

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Accepted: 3 July 2023 / Published online: 12 July 2023
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Abstract

Across a series of 10 laboratory and online studies, Allard, Hardisty, and Griffin (2019) demonstrated an increased preference for premium, higher-priced products over standard products when consumers were presented with the additional cost of the higher-priced option (i.e., differential price framing; e.g., “for \$20 more”) rather than with its total price (i.e., inclusive price framing; e.g., “for \$60 total”); a phenomenon referred to as the differential price framing effect. In this paper, we conceptually replicate this effect in a field experiment that focuses on the application of a differential price framing strategy to a specific product format; namely, multipacks of identical products. Consistent with the differential price framing effect, the present study shows—based on 45,626 add-to-cart events and 30,426 completed product purchases on an online retailer’s website—that the choice shares of higher-priced options increase when a differential price framing strategy is used. However, compared to non-consequential add-to-cart activities, this bias is considerably less pronounced in actual purchase patterns.

Keywords Differential Price Framing · Conceptual Replication · Partitioned Pricing · Consumer Choice · Field Experiment

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1 Introduction

It is well-established that consumers' choice between standard and higher-priced premium product versions is highly susceptible to the way in which the available options are presented. For example, preferences can be shifted toward premium options when product attributes are described using an expanded scale (e.g., the number of available new movies in a movie-rental plan per year) rather than a contracted scale (e.g., the number of new movies per week; Burson et al., 2009), when information about the common attributes of the options is omitted (vs. presented; Evangelidis & Van Osselaer, 2018) from product descriptions, and when round prices (e.g., \$30.00 and \$40.00) rather than just-below prices (e.g., \$29.99 and \$39.99) are assigned to the available product versions (Manning & Sprott, 2009; see also Kim et al., 2022, for a similar effect).

In a similar vein, investigating a specific form of partitioned pricing (e.g., Abraham & Hamilton, 2018; Morwitz et al., 1998), Allard et al., (2019) reported an increased preference for premium over standard products when the additional cost of the higher-priced option is made explicit using differential price framing (e.g., \$199.99 for the standard option and \$60 more for the premium option) rather than standard inclusive price framing (e.g., \$199.99 for the standard option and \$259.99 for the premium option), although both pricing formats result in equivalent payments which they refer to as the differential price framing effect. The authors argue that, relative to inclusive price framing, differential price framing directs consumers' attention to the price difference between the available options rather than to the total prices. As this price difference is always lower than the total price of the premium option, focusing on the price information as presented (i.e., the price difference) reduces the perceived cost of the superior alternative. Consistent with this price focalism account, the authors found that the differential price framing effect is mediated by the perceived expensiveness of the premium option.

In a series of 10 experiments (four reported in the article and six more in a web appendix), Allard et al., (2019) provided convergent empirical evidence of the differential price framing effect in different study contexts (e.g., computer monitors, newspaper subscriptions, and bikes), demonstrated its robustness to a variety of conditions (e.g., when displaying the total cost of a purchase, bad deals, and easy-to-compute price differences), and showed that the effect vanishes when consumers adopt a slow and systematic decision process. However, despite the substantial empirical evidence of the differential price framing effect provided by Allard et al., (2019), it remains unclear whether the effect demonstrated in a set of laboratory and online studies involving hypothetical and incentive-compatible choices translates to actual purchase behavior in the field. Against this background, the purpose of this research is to test the generalizability and robustness of the differential price framing effect through a field experiment that focuses on the application of a differential price framing strategy to a specific product format; namely, multipacks of identical products (see Allard et al., 2019, Study

4 for a similar setting).¹ The design of our study differs from the experiments reported in Allard et al., (2019) in several relevant aspects. For example, we used different operationalizations of the dependent variable; instead of stated preferences (e.g., “Please select the monitor you would normally choose”) we used two behavioral indicators of customers’ preference—namely, add-to-cart activities and completed product purchases on an online retailer’s website. Moreover, while the constructed choice sets in Allard et al.’s (2019) studies consisted of only two options, we examine the effect of differential price framing in choices among three alternatives: small, medium, and large sets of identical products. Furthermore, our study tests the robustness of the differential price framing effect in a setting where additional price information was provided besides the cost of each option—namely, average unit price and percentage savings when buying larger product sets; information that is often presented in the context of multipacks. Table 1 contains a detailed comparison of the design of the studies reported in Allard et al., (2019) with current research.

In the next section, we describe the methodology of our field experiment and present the results of our study. We then discuss the contributions of our work and conclude with an outline of worthwhile opportunities for future research.

2 Empirical study

2.1 Study design and procedure

For this field experiment, we collaborated with a large German basic clothing retailer and conducted the study on their website. At the time of data collection, the retailer’s assortment included 43 different products (e.g., t-shirts, business socks, and boxer shorts) across six categories (e.g., shirts and tops, socks, and underwear) that were offered in multipacks of three different sizes (e.g., 3 vs. 6 vs. 9 t-shirts; 4 vs. 8 vs. 12 pairs of business socks; 6 vs. 12 vs. 18 boxer shorts; see Fig. 1 for a complete overview of all products and categories that were included in the study). The sizes of the sets are designed such that the medium sets contain twice as many identical products as the small sets and the large sets contain three times as many. As is common with many shopping websites, a typical purchase process on the retailer’s website can be roughly divided into three stages: (1) selecting a product and set size, (2) adding the selected product set to the shopping cart, and (3) completing the purchase (confirming the product selection, providing the shipping address, and making the payment).

The experiment involved a single-factor between-subjects design with two conditions (inclusive price framing vs. differential price framing). In the inclusive price framing condition, the price differences between the small, medium, and large sets

¹ Because the investigated multipacks include multiple *identical products* that are sold at a quantity discount, they are conceptually different from product bundles which typically consist of two or more *different products* (e.g., Janiszewski & Cunha, 2004).

Table 1 Comparison of the original studies and the current research

Allard et al. (2019)		Current Research
Experiment character	Laboratory (Studies 1–3, C) and online (Studies 4, A, B, D–F) experiments	Field experiment
Study contexts	Computer monitors (Study 1, Study B), newspaper subscriptions (Study 2), bicycles (Study 3), wine glass sets (Study 4), train routes (Study A and E), hard drives (Study C), and flights (Study D and F)	Basic clothing (e.g., socks, underwear, t-shirts)
Dependent variable(s)	Preferences between a standard and a premium product ¹ in hypothetical (Studies 1, 3, 4, A–F) and incentive-compatible (Study 2) choices	Preferences between three set sizes of identical products in non-consequential add-to-cart events and consequential completed product purchases
Mediator	Perceived expensiveness	–
Moderators	Transaction role (buyer vs. seller; Study 3), speed of processing (slow vs. fast vs. control; Study 4), and time framing (inclusive vs. differential)	–
Robustness checks	Robust to displaying the total price (Study 1), bad deals (Studies A and B), cost of upgrade larger than base price (Study E), and effortless price difference computations (Study F)	Robust to displaying the total price, provision of additional price information (i.e., average unit price and percentage savings when buying larger options), and in a multi-choice (three options; rather than two) context
Subjects	$N=4,379$ undergraduate students (Studies 1–3, C), Prolific academic users (Studies 4, A, D–F), and Amazon Mechanical Turk workers (Study B)	$N=138,026$ customers of an online fashion retailer, 45,626 add-to-cart events, and 30,426 completed product purchases

¹Applying a broader understanding of the terms standard and premium product, respectively, the dependent variable in Study 4 involved the choice between a small and a large set of identical wine glasses

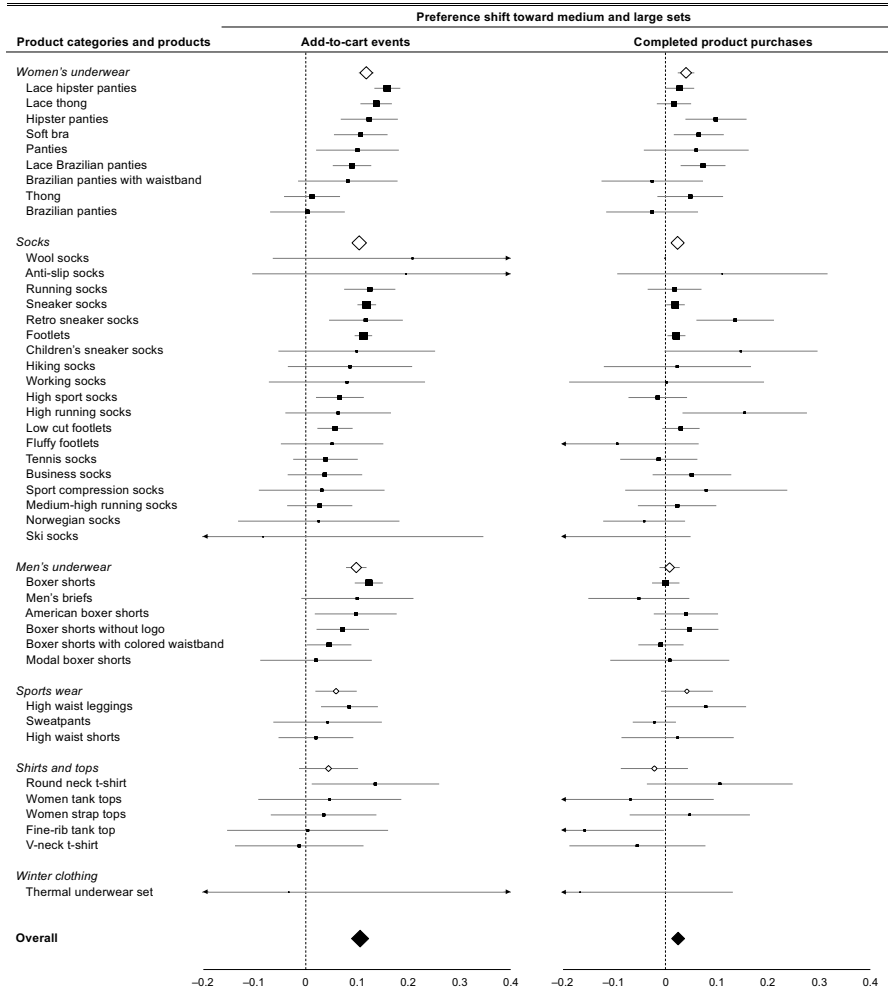


Fig. 1 The effect of differential price framing on set size preferences across all product categories and products. Notes: The positions of the squares on the x-axis represent the shift in customers' (combined) preferences toward larger (i.e., medium and large) product sets, as indicated by the difference in the choices shares of medium and large sets between the inclusive price framing condition and the differential price framing condition. The bars indicate the 95% confidence intervals of the differences in these proportions. The sizes of the squares are proportional to the square root of the number of add-to-cart events and completed product purchases, respectively, for each product or product category. Product categories and products within their category are sorted in descending order of the size of the differential price framing effect in add-to-cart activities

of each product were left implicit by only quoting the total price of each option (e.g., €24.99 for the small set, €43.99 for the medium set, and €61.99 for the large set). In contrast, in the differential price framing condition, the price differences between the different sets were made explicit by displaying the additional costs of the medium set (e.g., +€19.00) and the large set (e.g., +37.00 €) relative to the standard option

(e.g., the small set for €24.99). After selecting one of the three set options of a product, the total price of the chosen set was also displayed (an example of the presentation of price information in the inclusive and differential price framing conditions is shown in the [Appendix](#)). Apart from the described price information, the average price per unit was also indicated. Additionally, information about the percentage savings of the unit price when buying larger sets was provided. This additional information was kept constant across the experimental conditions.

We ran the experiment from May 27 to June 10, 2022. During the two-week period, 138,026 website visitors were randomly assigned to one of the two experimental conditions; 68,694 customers were exposed to the inclusive price framing and 69,332 customers to the differential price framing condition. To examine how consumers' preferences for different set sizes are affected by the different price framing conditions, we recorded all add-to-cart events and completed product purchases during the data collection period. In accordance with the concept of field experimentation in the strictest sense, subjects were not aware of the fact that they were taking part in a research study and that an experimental manipulation had occurred; and they engaged in real shopping behavior that was recorded unnoticed (e.g., Gneezy, 2017; Morales et al., 2017).

2.2 Results

2.2.1 Add-to-cart events

Overall, during the two weeks of the experiment execution, website visitors added 45,626 product sets to their shopping carts (21,459 in the inclusive price framing and 24,167 in the differential price framing condition). An overall χ^2 -test revealed that the proportion of small, medium, and large product sets that had been added to the shopping carts was dependent on the price framing condition ($\chi^2(2)=702.85$, $p<0.001$). Consistent with the differential price framing effect, the proportion of the small product sets that had been selected was significantly smaller in the differential price framing condition ($P_{\text{DPF}}=71.1\%$) than in the inclusive price framing condition ($P_{\text{IPF}}=81.7\%$; $\Delta P_{\text{small}}=-10.6\%$, $\chi^2(1)=702.01$, $p<0.001$), while both the medium ($P_{\text{IPF}}=14.7\%$ vs. $P_{\text{DPF}}=23.4\%$; $\Delta P_{\text{medium}}=8.7\%$, $\chi^2(1)=555.67$, $p<0.001$) and the large ($P_{\text{IPF}}=3.6\%$ vs. $P_{\text{DPF}}=5.5\%$; $\Delta P_{\text{large}}=1.9\%$, $\chi^2(1)=90.90$, $p<0.001$) product sets became more popular. See [Table 2](#) for a comparison of the results of the studies reported in Allard et al., (2019) and the current research.

We then conducted a logistic regression with customers' (combined) preference for larger (i.e., medium and large) sets as dependent variable (set selection: small=0, medium and large=1) and price framing condition (inclusive price framing=0, differential price framing=1) as independent variable, and we included product price (i.e., price of the small set) and set size configuration (i.e., number of products in the small set; information about the set prices and set size configurations of all the products is provided in the [Web Appendix](#)) as covariates. This analysis revealed that controlling for the effects of product price ($\beta=0.005$, Wald $\chi^2(1)=4.46$, $p=0.035$) and of set size configuration ($\beta=-0.039$, Wald

Table 2 Comparison of the original studies' findings and the current research

	Preference measurement	Choice shares of higher-priced options		Percentage differences ^a
		Inclusive price framing	Differential price framing	
<i>Allard et al. (2019)</i>				
Study 1	Hypothetical choice	42%	58% (53% when total costs were included)	38% (26%)
Study 2	Incentive-compatible choice	23%	47%	104%
Study 3	Hypothetical choice	50%	70%	40%
Study 4	Hypothetical choice	52%	68%	31%
<i>Current study</i>				
	Add-to-cart activities	18.3%	28.9%	58%
	Completed product purchases	14.5%	16.9%	17%

Conditions wherein additional factors apart from price framing were manipulated (differential quality framing in Study 2, seller conditions in Study 3, processing speed in Study 4) were excluded from this presentation. ^aThe reported percentage differences reflect the increase in choice shares of higher-priced options in the differential price framing condition relative to the inclusive price framing condition

$\chi^2(1)=25.62, p<0.001$) did not affect the direction or significance of the effect of the price framing manipulation ($\beta=0.596$, Wald $\chi^2(1)=690.11, p<0.001$). Figure 1 illustrates the combined increase in consumers' preferences for the medium and large sets ($\Delta P_{\text{medium}} + \Delta P_{\text{large}}$) in the differential price framing condition relative to the inclusive price framing condition across all product categories and products reflected in add-to-cart events (and in completed product purchases).

2.2.2 Completed product purchases

In the next step, we investigated whether the differential price framing effect was also reflected in actual purchase patterns by examining the distribution of small, medium, and large product sets in completed product purchases across the two experimental conditions. In total, 30,426 product sets were purchased during the data collection period (15,174 in the inclusive price framing and 15,252 in the differential price framing condition). Again, an overall χ^2 -test revealed that the proportion of small, medium, and large product sets that had been purchased was dependent on the price framing condition ($\chi^2(2)=40.40, p<0.001$). Consistent with our analysis of add-to-cart events, the proportion of the small product sets that had been purchased was significantly smaller in the differential price framing condition ($P_{\text{DPF}}=83.1\%$) than in the inclusive price framing condition ($P_{\text{IPF}}=85.5\%$; $\Delta P_{\text{small}}=-2.4\%$, $\chi^2(1)=35.06, p<0.001$), while purchases of both the medium ($P_{\text{IPF}}=12.0\%$ vs. $P_{\text{DPF}}=13.6\%$; $\Delta P_{\text{medium}}=1.6\%$, $\chi^2(1)=17.44, p<0.001$) and the large ($P_{\text{IPF}}=2.5\%$ vs. $P_{\text{DPF}}=3.4\%$; $\Delta P_{\text{large}}=0.9\%$, $\chi^2(1)=20.27, p<0.001$) product sets increased. Again, controlling for the effects of product price ($\beta=-0.005$, Wald $\chi^2(1)=2.355, p=0.125$) and of set size configuration ($\beta=-0.043$, Wald $\chi^2(1)=15.62, p<0.001$)

did not affect the direction and significance of consumers' preference for larger (i.e., medium and large; $\beta=0.188$, Wald $\chi^2(1)=35.46$, $p<0.001$) sets.

2.2.3 Further analyses

Furthermore, we also explored potential differences in (1) the proportion of customers placing an order, (2) the amount of money spent per order, and (3) the amount spent per customer between the two price framing conditions. First, 8,134 out of the 68,694 customers (11.8%) in the inclusive price framing and 8,133 out of the 69,332 customers (11.7%) in the differential price framing condition placed at least one order during the experiment; the differences in the proportions were not statistically significant ($\chi^2(1)=0.41$, $p=0.525$). Second, we examined the values of the 8,384 and 8,427 orders that were placed in the inclusive and the differential price framing conditions, respectively. As the amount of money spent per order was right-skewed (skewness=2.51, SE=0.019), we used a Poisson regression model to analyze the effect of price framing on order values. This analysis revealed that the average order value in the differential price framing condition ($M=€52.50$) was significantly higher than in the inclusive price framing condition ($M=€50.98$; $\beta=0.029$, $\chi^2(1)=167.69$, $p<0.001$). Third, as a consequence of this increase in order values, another Poisson regression model with the amount spent per customer (skewness=5.01, SE=0.007)—including those who did not place an order—as dependent variable found that customers who were exposed to the differential price framing condition spent more ($M=€6.38$) than those who were exposed to the inclusive price framing condition ($M=€6.22$; $\beta=0.025$, $\chi^2(1)=138.57$, $p<0.001$).²

2.3 Discussion

In sum, the findings of this field experiment show that the differential price framing effect introduced by Allard et al., (2019) in a set of laboratory and online experiments involving hypothetical and incentive-compatible choices also manifests in facets of consumers' shopping behavior in the field—namely in add-to-cart activities and actual purchases and, by extension, in order values as well as in the amount of money spent per customer. However, when comparing the results of add-to-cart events and completed product purchases, the impression is that the differential price framing effect is considerably weaker in actual purchase patterns. Specifically, while the choice share of medium and large product sets in add-to-cart activities increased from 18.3% in the inclusive price framing condition to 28.9% in the differential price framing condition—a percentage increase of 57.9%—the proportion of medium and large multipacks in completed purchases increased by only 16.6%—from 14.5% in the inclusive price framing condition to 16.9% in the differential price framing

² Despite their statistical significance, the differences in the amount of money spent per order and the amount spent per customer between the two price framing conditions seem relatively small. However, according to the cooperating retailer, shifting purchases to larger product sets entails additional benefits including higher margins as well as reduced logistics costs.

condition. To assess the relative strength of the differential price framing effect in completed product purchases compared to add-to-cart events, we conducted a logistic regression with price framing condition (inclusive price framing = -1, differential price framing = 1) and type of preference measure (add-to-cart events = -1, completed product purchases = 1) as well as their interaction as predictors of customers' set size preferences (small = 0, medium and large = 1). This analysis revealed significant main effects of price framing condition ($\beta = 0.205$, Wald $\chi^2(1) = 442.32$, $p < 0.001$) and type of preference measure ($\beta = -0.240$, Wald $\chi^2(1) = 606.33$, $p < 0.001$) qualified by a significant price framing \times preference measure interaction ($\beta = -0.111$, Wald $\chi^2(1) = 130.59$, $p < 0.001$). This indicates that, indeed, the differential price framing effect was significantly less pronounced in actual purchase patterns when compared to non-consequential add-to-cart events.

3 General discussion

Consistent with Allard et al.'s (2019) initial work on the differential price framing effect, the current research examining real shopping behavior on an online retailer's website demonstrates that consumers' preferences can be shifted toward higher-priced alternatives when the additional cost of higher-priced options is made explicit through differential price framing rather than left implicit by displaying (only) the total prices of the available alternatives. This conceptual replication contributes to a better understanding of the differential price framing effect in several important ways: First and foremost, by showing that this effect is not only reflected in hypothetical and incentive-compatible choices in laboratory and online experiments but also manifests in real shopping behavior in the field, we provide support for the external validity of the differential price framing effect. Second, by examining customers' preference between three different options (i.e., small, medium, and large product sets), we show that the differential price framing effect also extends to the context of a multi-option choice—a critical shortcoming identified in the original study (Allard et al., 2019). Precisely, we found that—similar to the choice between two options considered in the original work—customers' preferences for a standard (i.e., small) option decreased through differential price framing, while higher-priced (i.e., medium and large) options became more popular. Third, our study demonstrates the robustness of the differential price framing effect to conditions wherein additional price information (i.e., average price per unit and percentage savings per unit when buying larger product sets) is provided apart from the cost of different product versions. In this context, Allard et al., (2019) speculated that the differential price framing effect could be weakened when consumers focus on other price information such as the cost of the marginal unit such that the benefits of using differential price framing are questionable. In a similar vein, extant research on consumers' response to price presentation formats (e.g., Biswas et al., 2013) suggests that the presentation of percentage savings may reduce the strength of the differential price framing effect as well. Our findings, however, demonstrate that differential price framing occurs despite the availability of additional price information. Finally, by examining add-to-cart activities and completed product purchases, our

study considered two behavioral indicators of customers' preferences that differ in their degree of consequentialness. Consistent with prior research on the discrepancy between purchase intentions and actual purchase behavior (see e.g., Morwitz & Munz, 2021 for an overview), our analysis of these preference measures revealed that, compared to non-consequential add-to-cart activities, the differential price framing effect is considerably less pronounced in actual purchase patterns. Thereby, we add to prior research investigating the robustness of heuristics and biases across different types of choice framing (e.g., Cunha & Shulman, 2011; Kim, 2017; Suk et al., 2012).

Regarding the limitations of our work, it should be noted that our study focuses on the use of a differential price framing strategy in the context of a particular product format (i.e., multipacks of identical products; see Allard et al., 2019, Study 4), and the additional price information presented in our study (i.e., average price per unit and percentage savings per unit when buying larger product sets) is highly specific for this setting. Thus, future research should examine the effectiveness of differential price framing in the context of other product formats (e.g., product versions that differ in terms of quality rather than quantity). In addition, in particular when considering completed product purchases, the increase in consumers' preference for premium (i.e., larger) product sets caused by a differential price framing strategy was relatively small compared to the effects reported in Allard et al., (2019; see Table 2). Thus, future research could explore the extent to which the differences in study designs between our study and the experiments documented in the original work (see Table 1) are responsible for these different effect sizes.

Appendix: Example of the presentation of price information in the inclusive and differential price framing conditions

A) Inclusive price framing condition

Boxershorts aus Bio-Baumwolle
die eine Passform wie eine zweite Haut haben

nur 6,67€/ Stück

€39,99 inkl. MwSt.

inkl. KOSTENLOSER Versand & Retouren

Menge		
Bestelle einen Mengenpack und spare bis zu 16%		
	du sparst 9%	du sparst 16%
6 Stück €39,99	12 Stück €72,99	18 Stück €100,99

B) Differential price framing condition

Boxershorts aus Bio-Baumwolle
die eine Passform wie eine zweite Haut haben

nur 6,67€/ Stück

€39,99 inkl. MwSt.

inkl. KOSTENLOSER Versand & Retouren

Menge		
Bestelle einen Mengenpack und spare bis zu 16%		
	du sparst 9%	du sparst 16%
6 Stück €39,99	12 Stück + €33,00	18 Stück + €61,00

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11002-023-09690-7>.

Funding Open Access funding enabled and organized by Projekt DEAL.

Declarations

Ethical approval All procedures followed the ethical standards of the corresponding author's institution. (The authors' institutions do not require a formal ethics approval.)

Conflict of interest The authors declare no competing interests.

Informed consent Not applicable

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