# Attribute Evaluability and the Range Effect

CATHERINE W. M. YEUNG
DILIP SOMAN*

We examine situations in which (*a*) consumers choose between options that vary on two attributes that are different in their evaluability and (*b*) the ranges for both attributes change simultaneously. As the ranges widen, the range effect makes perceptual differences on both attributes look smaller. However, our framework suggests that the attributes' evaluability influences the strength of the range effect and that perceptual judgments of the two attributes are affected to different degrees. This changes the relative preference between the options. We found that when the range is wide, preference shifts toward the option having a greater amount of the high evaluability attribute.

Choices between products are often made in the context of a set of available options. Consider a television buyer who has narrowed her choice to two options—a Zenith TV for $189 and a Symphonic TV for $239. Figures 1 and 2 show these products, among others, from two editions of a catalog. In catalog 1 (fig. 1), the two TVs are embedded in a choice set of four TVs, ranging in price (and also in quality) from $169 to $299. In catalog 2 (fig. 2), there are again four TVs, but the prices now range from $139 to $349. The question of interest for this research is, would the relative preference between the Zenith and Symphonic TVs be different across the two catalogs?

Prior research shows that the relative preference between two options in a two-attribute setting is driven by the trade-offs between the two attributes (Simonson and Tversky 1992). In particular, our TV buyer can gain higher quality only by sacrificing cheapness. In determining her preference, she needs to identify the price difference and quality difference between the Zenith and Symphonic TVs and then make a trade-off between these two values. Researchers have long known that judgments of a given difference may be influenced by the width of the range of attribute values in the context (the range theory; Parducci 1965; also see Beattie and Baron 1991). Range refers to the difference in attribute value between the two extreme options. In figures 1 and 2, for example, the range of price is wider in catalog 2 than in catalog 1. If the TVs differed only on price (but not quality), the range theory predicts that the buyer would perceive a smaller difference in price between the Zenith and Symphonic TVs in catalog 2 than in catalog 1 (see Janiszewski and Lichtenstein 1999 for a demonstration). Prior demonstrations of the range effect have considered only one attribute in isolation. In this research, we examine the more realistic situation in which options vary on more than one dimension simultaneously. We consider attribute pairs that are ecologically correlated, such that increasing the range of one also increases the range of the other attribute. In figures 1 and 2, for example, the TV sets vary both on cheapness as well as on quality, with catalog 2 having a wider range of both dollar values and quality than catalog 1.

We next develop the notion of attribute evaluability and build a theoretical framework of range effects in a two-attribute setting. We then present an experiment that tests the framework and conclude by discussing the contributions and extensions of our research.

## THE RANGE EFFECT AND ATTRIBUTE EVALUABILITY

Range theory posits that when people evaluate a stimulus, they identify what they believe to be the most and least extreme values and thus determine a range that serves as a context for evaluating the stimulus. The particular range used might be drawn from past experience or from the range of stimuli in the current choice context. Judgment of any stimuli along this range is a function of their relative location within the range (Ostrom and Upshaw 1968; Parducci 1965, 1968). Therefore, the perceived difference between two stimulus values is smaller when they are evaluated in the

*Catherine W. M. Yeung is assistant professor of marketing, National University of Singapore, NUS Business School, Singapore 117592 (cyeung@nus.edu.sg). Dilip Soman is the Corus Professor of Communication Strategy and professor of marketing, Rotman School of Management, University of Toronto, 105 St. George Street, Toronto, Canada M5S 3E6 (Dilip.Soman@rotman.utoronto.ca). A portion of the research reported in this article was conducted when both authors were at the Hong Kong University of Science and Technology, and the support of that university is gratefully acknowledged. A portion of this research was supported by grant R-316-000-052-112 from the National University of Singapore, Republic of Singapore. The authors thank Meichi Chan, Amar Cheema, Amanda Snow Conant, Johnny Kuo, Vivian Lam, and Xiuping Li for their excellent research assistance. The authors also thank Mengze Shi, Bob Wyer, Rongrong Zhou, and the *JCR* editor, associate editor, and reviewers for their constructive comments and suggestions.

**FIGURE 1**

CATALOG PAGES FOR TELEVISION SETS—CATALOG 1 (NARROW CHOICE SET)


context of a wide than a narrow range. By changing the perceived difference on one attribute only, range can also influence the trade-off between two attributes (Mellers and Cooke 1994). Note, however, that past research manipulated the range of stimulus values on only one attribute at a time. In reality, consumers usually experience range effects on multiple attributes simultaneously. We conducted a series of simple analyses of product quality ratings and price information for several product categories from *Consumer Reports* and found that a correlation between price and quality was the rule rather than the exception. Thus, the variation of the range on only one dimension in the past research restricts its applicability on real-life situations.

Why do we observe range effects? We propose that range effects are detected when individuals need to use contextual information to add meaning to, and to interpret, the value of a stimulus. Consider a consumer choosing between two sound systems, one with a total harmonic distortion (THD) of .013% and costing $700 and the other with a THD of .019% and costing $500. In making this trade-off, she may know what the extra $200 means to her but is less sure about THD. During a visit to a store, she sees that the THD of other available systems ranges from .002% to .032%; therefore, she can now better interpret the .006% difference in THDs between the two systems. Based on the past findings on the range effects, one can expect to record a range effect on judgments of THD by changing the options displayed in the store. In contrast, although it is certainly possible to detect a range effect for price, it appears less likely. Why? We propose that the two attributes differ in terms of their evaluability.

The concept of attribute evaluability was first proposed by Hsee (1996, 2000). We define evaluability of an attribute as the degree of difficulty associated with the evaluation of a product based solely on the level of the attribute alone, independent of any contextual information. In general, an attribute is low in evaluability when consumers do not know about its distributional characteristics or when it is new to the marketplace (Hsee 2000). In contrast, an attribute is high in evaluability when it has well-defined distributional characteristics and when consumers have developed their own standard in judging the attribute (Hsee 2000) such that there is little to learn from the context. We therefore expect that range effects should be more pronounced for attributes that are low in evaluability relative to attributes that are high in evaluability.

In the case of a two-attribute choice in which the range is made wide on both attributes simultaneously, what effect might differences in evaluability have on relative preference between two options? Consider two options, $x$ and $y$ (see

**FIGURE 2**

CATALOG PAGES FOR TELEVISION SETS—CATALOG 2 (WIDE CHOICE SET)


fig. 3*a*) that differ along two attributes, a high evaluability attribute ($A_{HE}$) and a low evaluability attribute ($A_{LE}$; the subscripts stand for high and low evaluability, respectively). The differences between the two options on the two attributes are denoted by $\Delta A_{HE}$ and $\Delta A_{LE}$, respectively. The angle $\theta$ represents the unit gain in $A_{LE}$ that buyers of $x$ will get for every unit sacrifice in $A_{HE}$ they make and hence represents the relative trade-off, or relative preference, for $x$ instead of $y$ (cf. Simonson and Tversky 1992). The relative preference for option $x$ will be greater if $\theta$ is larger.

Suppose a consumer makes the $x$ versus $y$ trade-off in the context of either a narrow set (fig. 3*b*) or a wide set (fig. 3*c*). She will now trade off the differences as she perceives them; that is, she will trade off $p\Delta A_{HE}$ with $p\Delta A_{LE}$, where the prefix $p$ stands for "perceived." For the sake of exposition, we assume that the attribute $A_{HE}$ is evaluable in the extreme. As such, the range of the background set has no effect on the perception of difference along this attribute. Hence, $p\Delta A_{HE}$ does not differ across the narrow range context (fig. 3*b*) and the wide range context (fig. 3*c*). However, changing the width of the background set will result in a range effect on the low evaluability attribute ($A_{LE}$). Hence, a given difference on this attribute will be perceived as bigger under the narrow range context relative to the wide range context. As a result, the relative trade-off, as reflected by the size of angle $\theta$, is more favorable when the background set is narrow than when it is wide ($\theta_1 > \theta_2$). In other words, as the range of the background set extends from narrow to wide, consumers' relative preferences will shift away from $x$ and toward $y$. Specifically, we hypothesize that

**H1:** When two attributes have different levels of evaluability, extending the range of the background set would shift preferences toward the option that has a greater quantity of the high evaluability attribute. When the two attributes have the same levels of evaluability, however, the range effect would not influence preferences systematically.

We next report an experiment designed to test this hypothesis.

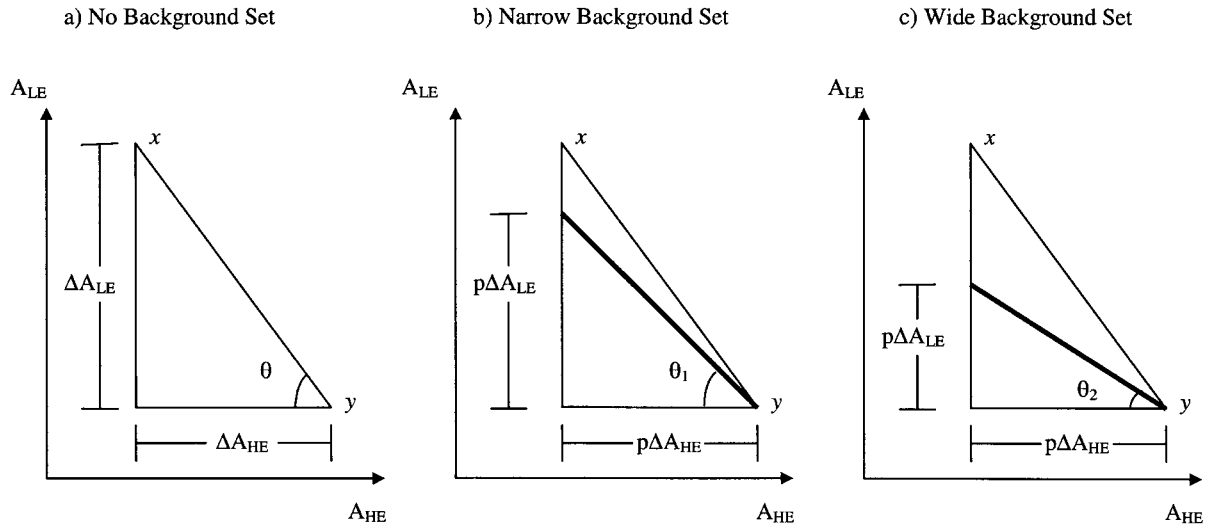
## EXPERIMENT

### Method

*Design and Participants.* This study employed a 2 (quality evaluability: high vs. low) × 2 (price evaluability: high vs. low) × 2 (range of background set: wide vs. narrow) factorial design. Participants were 120 undergraduates in a U.S. university, who were paid for participating in a

**FIGURE 3**

ATTRIBUTE EVALUABILITY AND THE RANGE EFFECT




NOTE.—$A_{LE}$ = low evaluability attribute (e.g., quality); $A_{HE}$ = high evaluability attribute (e.g., cheapness).

series of unrelated experiments and were randomly assigned to one of the eight conditions.

*Manipulations and Stimulus.* Participants in the experiment evaluated six options of PDAs (personal digital assistants)—two target options and the other four completing the choice set. Prior research suggests that consumers are unsure about how to integrate across multiple attributes and come up with an overall evaluation of quality (e.g., Ha and Hoch 1989). Therefore, we manipulated quality evaluability by varying the dimensionality of the quality attribute. In the low quality evaluability conditions, participants saw quality information on two separate dimensions, which were screen size and memory (RAM), respectively. However, participants in the high quality evaluability conditions got an additional piece of information for each option—an overall quality rating—ostensibly provided by a consumer reports magazine. Each rating was computed as the average of screen size (in $cm^2$) and RAM (in Mb). Therefore, these participants had quality information encapsulated in one number and also knew the distributional characteristics of these ratings. Details of the product information are shown in table 1.

Similarly, we manipulated price evaluability by varying the dimensionality of the price attribute. The price of each option was a function of multiple components, which were (*a*) the amount of monthly payment, (*b*) the duration of payment, (*c*) a monthly surcharge, and (*d*) the value of complimentary accessories (see table 1). In the low price evaluability conditions, participants received information on all four components. In the high price evaluability conditions, they were also provided an "effective price," which was the net present value of the payment stream.

We manipulated the range of the background set by changing the ranges of price and quality of the PDAs concurrently. Each component of price and quality spread along a wider range of values in the wide range conditions than in the narrow range conditions. We kept the features of the two target options constant across the two range conditions.

*Dependent Measures.* Participants were asked to indicate their preferences between the two target options (options *C* and *D*; see table 1) on a nine-point scale (1 = definitely [the cheaper option]; 9 = definitely [the more expensive option]). Afterward, they reported their perceptions of price difference between the two options by indicating "the extent to which [the more expensive option] is more expensive than [the cheaper option]" on a nine-point scale (1 = only a little bit; 9 = much more). They also reported their perceptions of quality difference between the two options in a similar way. To mask the purpose of the experiment, we also asked them to judge other pairs of PDAs after they have finished judging the target pair.

## Manipulation Checks

All participants were asked how easy it was to evaluate the price and the quality of the PDAs on a nine-point scale (1 = easy; 9 = difficult). The ease of evaluating quality was influenced only by the manipulation of quality evaluability but not by the other experimental factors ($M_{HE}$ = 4.02, $M_{LE}$ = 6.12, $p < .01$; for all other experimental factors, $p > .10$). Similarly, the ease of evaluating price was

**TABLE 1**

STIMULUS AND ANALYSIS PLAN EMPLOYED IN EXPERIMENT 1

| | Narrow range set | | Wide range set | |
|---|---|---|---|---|
| | Screen size (mm × mm) and memory (RAM in Mb) | Installment scheme | Screen size (mm × mm) and memory (RAM in Mb) | Installment scheme |
| A. | Screen size: 77 × 85<br>RAM: 16<br>**Overall rating: 41**[a] | $85 × 9 mo.<br>$9 monthly surcharge<br>Gift: one dictionary software (original price: $40)<br>**Effective price: $795**[b] | Screen Size: 60 × 160<br>RAM: 32<br>**Overall rating: 64** | $109 × 9 mo.<br>$10 monthly surcharge<br>No gift<br>**Effective price: $1,058** |
| B. | Screen size: 75 × 81<br>RAM: 16<br>**Overall rating: 38** | $71 × 9 mo.<br>$8 monthly surcharge<br>Gift: one dictionary software (original price: $40) and one extra battery (original price: $20)<br>**Effective price: $642** | Screen size: 55 × 160<br>RAM: 16<br>**Overall rating: 52** | $81 × 9 mo.<br>$9 monthly surcharge<br>Gift: one dictionary software (original price: $20)<br>**Effective price: $760** |
| C. | Screen size: 61 × 81<br>RAM: 8<br>**Overall rating: 29** | $86 × 6 mo.<br>$7 monthly surcharge<br>Gift: 1 extra battery (original price $10)<br>**Effective price: $543** | Screen size: 61 × 81<br>RAM: 8<br>**Overall rating: 29** | $86 × 6 mo.<br>$7 monthly surcharge<br>Gift: one extra battery (original price $10)<br>**Effective price: $543** |
| D. | Screen size: 59 × 76<br>RAM: 5<br>**Overall rating: 25** | $69 × 6 mo.<br>$6.5 monthly surcharge<br>Gift: one extra battery (original price $8)<br>**Effective price: $441** | Screen size: 59 × 76<br>RAM: 5<br>**Overall rating: 25** | $69 × 6 mo.<br>$6.5 monthly surcharge<br>Gift: one extra battery (original price $8)<br>**Effective price: $441** |
| E. | Screen size: 55 × 74<br>RAM: 3<br>**Overall rating: 22** | $59 × 5 mo.<br>$5 monthly surcharge<br>Gift: one leather case (original price: $5)<br>**Effective price: $313** | Screen size: 50 × 80<br>RAM: 1<br>**Overall rating: 21** | $37 × 4 mo.; $3 monthly surcharge<br>Gift: one leather case (original price: $5)<br>**Effective price: $154** |
| F. | Screen size: 50 × 67<br>RAM: 1.2<br>**Overall rating: 17** | $58 × 4 mo.<br>$3 monthly surcharge<br>No gift<br>**Effective price: $242** | Screen size: 40 × 60<br>RAM: .3<br>**Overall rating: 12** | $20 × 3 mo.<br>$2 monthly surcharge<br>No gift<br>**Effective price: $66** |
| | High quality evaluability | | Low quality evaluability | |
| **Analysis plan:** | | | | |
| High price evaluability | Case 1 | | Case 3 | |
| Low price evaluability | Case 4 | | Case 2 | |

[a]Overall ratings (effective prices) were given only for participants in the "high quality (price) evaluability" conditions.
[b]Effective prices were given only for participants in the "high price evaluability" condition.

influenced only by the manipulation of price evaluability ($M_{HE} = 3.18$, $M_{LE} = 5.78$, $p < .01$; for all other experimental factors, $p > .10$). Thus, our manipulations of price and quality evaluability were successful.

In order to check our manipulation of range, we asked a separate group of 22 participants to review the stimulus choice sets. After answering a few unrelated questions, the original questionnaire was taken away, and they were asked to recall the highest and lowest value of each attribute that they had seen information on (i.e., effective price, monthly payment, surcharge, RAM, overall quality rating, etc.). For each attribute, we calculated the difference between the highest and lowest values (referred to as recalled range) and compared these across the narrow and wide range conditions. For most attributes, the recalled range in the wide range condition was significantly greater than that in the narrow range condition ($p < .05$ in all cases). In one case, screen size, we recorded the two dimensions separately and did not find significant differences. An examination of the data suggests that some respondents had interchanged the two dimensions, resulting in noisy data. Overall, the test suggested that our manipulation of range was successful.

## Results

*Influence of Range on Relative Preference.* In order to test for range effects, we compare the relative preference between the two target options for narrow versus wide range condition in each of four cases (see the analysis plan shown at the bottom of table 1). The analyses were conducted through planned contrasts using the overall error terms. In case 1, when both price and quality were high in evaluability, the relative preference for the more expensive option did not change as a function of the range of the background set ($M_{narrow} = 6.00$; $M_{wide} = 6.13$; $F(1, 112) < 1$, $p > .50$). Similarly, there was no effect of range in case 2, when both price and quality were low in evaluability ($M_{narrow} = 6.20$; $M_{wide} = 6.13$; $F(1, 112) < 1$, $p > .50$).

However, the range of the background set had an effect on preferences when price and quality had different levels of evaluability. In case 3, when price was more evaluable than quality, moving from narrow to wide range shifted participants' relative preferences toward the cheaper option ($M_{narrow} = 6.27$ vs. $M_{wide} = 4.53$; $F(1, 122) = 6.57$, $p < .05$). In contrast, in case 4, when price was less evaluable than quality, range extension increased participants' relative preferences toward the more expensive option ($M_{narrow} = 4.73$ vs. $M_{wide} = 6.27$; $F(1, 122) = 5.14$, $p < .05$). In general, preferences shift toward the option that has a greater quantity of the high evaluability attribute as the range of the background set became wider. We therefore found support for hypothesis 1.

*Influence of Range on Perceived Price Difference and Perceived Quality Difference.* In case 1, when both price and quality were high in evaluability, range extension changed neither perceived price difference ($M_{narrow} = 4.40$, $M_{wide} = 4.47$) nor perceived quality difference ($M_{narrow} = 4.60$, $M_{wide} = 4.73$) between the two target options. Surprisingly, when both price and quality were low in evaluability (case 2), range extension also did not induce any significant changes in perceived price difference ($M_{narrow} = 3.20$, $M_{wide} = 2.87$) and perceived quality difference ($M_{narrow} = 5.00$, $M_{wide} = 4.60$; $F(1, 112) < 1$) in both cases.

In case 3, when price had higher evaluability than quality, however, perceived quality difference changed as a function of range ($M_{narrow} = 4.33$ vs. $M_{wide} = 3.40$; $F(1, 112) = 2.70$, $p < .05$, directional), while perceived price difference did not change much ($M_{narrow} = 4.33$, $M_{wide} = 4.40$; $F(1, 112) < 1$). In case 4, when quality was more evaluable than price, we found the opposite pattern of results. Perceived quality difference did not change as a function of range ($M_{narrow} = 5.07$, $M_{wide} = 4.93$; $F(1, 112) < 1$), whereas perceived price difference decreased from 4.20 to 2.87 when the range of the background set increased from narrow to wide ($F(1, 112) = 7.84$, $p < .05$).

## Discussion

This experiment showed that when price was more evaluable than quality, preferences shifted toward the lower quality (and cheaper) option when the range of the background set extended from narrow to wide. This effect reversed when price became less evaluable than quality. Moreover, the effects of range on relative preferences attenuated when price and quality were comparable in terms of their evaluability (i.e., when both are easy or when both are hard to evaluate). The changing direction and attenuation of preference shift as a result of changes in the relative evaluability of price and quality implies that relative evaluability mediates the influence of the range of background set on preference shifts.

The data on perceptual judgments of differences (i.e., perceived price difference and perceived quality difference) are consistent with the data on relative preference. However, it is unclear why there was no effect on the perceptual judgments when both price and quality were low on evaluability (i.e., case 2). We expected both the perceived price difference and perceived quality difference to be smaller under the wide than the narrow range condition. While the means are in the expected direction (for perceived price difference, $M_{wide} = 2.87$ vs. $M_{narrow} = 3.20$; for perceived quality difference, $M_{wide} = 4.60$ vs. $M_{narrow} = 5.00$), the differences were not significant.

Two additional issues are worth discussing. First, to ensure that the effects we found were not simply due to changes in the participants' anchoring of the rating scales (Lynch, Chakravarti, and Mitra 1991), we conducted an additional experiment and successfully replicated these results using binary choice as the dependent variable. Second, in this experiment, we made price and quality hard to evaluate by manipulating the quantity of information the participants received. However, evaluability may also be influenced in other ways. In another follow-up study, we asked participants to evaluate different hotel rooms. They were given information on price alone. As such, they had to infer quality from room rate and hence presumably found quality to be difficult to evaluate. Across narrow and wide range conditions, participants' perceived price difference between a more expensive room and a cheaper room did not differ ($M_{narrow} = 4.53$; $M_{wide} = 4.76$; $F(1, 32) < 1$), but the corresponding perceived quality difference was bigger under the narrow range condition ($M = 5.06$) than under the wide range condition ($M = 3.94$; $F(1, 32) = 3.04$, $p < .05$, directional). As predicted, participants had a stronger preference for the more expensive room under the narrow range conditions ($M = 4.76$) than under the wide range condition ($M = 3.06$; $F(1, 32) = 7.20$, $p < 0.01$). This finding suggests that evaluability of an attribute is not driven solely by the amount of information being considered but also by the characteristics of the attribute.

# GENERAL DISCUSSION AND CONCLUSIONS

Research presented in this article demonstrates that the relative preference between two options shifts as a function of the width of the background set. In particular, the strength

of the range effect is greater for attributes that are low in evaluability, and hence the range of the background set might influence the trade-offs that consumers make in determining preference.

Past research had failed to demonstrate that the range effect might be one cause of the decoy effect (Huber, Payne, and Puto 1982; Huber and Puto 1983). We believe that the range effect did not play a role in this stream of research, as their participants received product information that was engineered to highlight objective information, and hence was impoverished. In contrast, ours was an information-rich environment, and our participants would find it hard to form judgments without interpreting the information subjectively. In other words, our participants should have formed perceptual judgments of the stimulus values, and, therefore, the range effect had an impact on these judgments and the preferences they reported subsequently. The current research, therefore, contributes to the literature by reexamining the range account of context effect and provides insight into the question that remained unanswered in Huber et al.'s research.

The present experiment also opens up avenues for future research. In this research, we suggest that extending the range of a background set should yield a stronger impact on perceptual judgments along the lower evaluability attribute than on those along the higher evaluability attribute. This argument is based on the assumption that the extensions of the two attribute ranges are comparable to each other in terms of magnitude. It is possible, however, that the ranges of the two attributes might be extended differentially. In this case, the direction of preference reversal should depend not only on the attributes' relative evaluability but also on the relative extent of contextual variations along the two attribute dimensions. For example, suppose an extension of a background set's range is accompanied by an extensive extension of its price range but only a minimal extension of its quality range. In this case, the range effects may have a more significant impact on perceptions of price difference than on perceptions of quality difference, despite price being more evaluable than quality. Consequently, consumers may switch their preferences to the more expensive (and higher quality) option. This prediction is different from the effect we observed and is worth testing in future research.

In our experiments, we directly manipulated the range of the choice set and asked participants to choose between two options. However, a consumer could also use recently encountered stimulus as the context (e.g., shopping in one store right after another store) or bring to mind a context set from memory, such as a memory-based consideration set (Nedungadi 1990), or some combination of these. The manner of generating a context set might have implications for the characteristics of the set (e.g., number of alternatives, accuracy of product information) and hence on the strength of the range effect. The manner in which the range is evoked and any subsequent effects could be an interesting avenue for future research to pursue.

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