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## **Attentional Contrast During Sequential Judgments: a Source of the Number-Of-Levels Effect**

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As the number of intervening attribute levels increases, the derived importance weight of an attribute increases. In three studies, we show that attentional processes contribute to this number-of-levels effect. When there is inequality in the number of attribute levels across attributes, any given profile will include levels of one attribute that are relatively more novel than levels of the accompanying attributes. A process of attentional contrast directs attention toward the relatively novel attribute levels within each profile. Increased attention to the relatively novel attribute levels results in a larger derived importance weight for the attributes defined on those levels.

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# Attentional Contrast During Sequential Judgments: A Source of the Number-of-Levels Effect

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## EXTENDED ABSTRACT

Normatively, people should be sensitive to changes in the range of attribute levels, but not to changes in the number of attribute levels within a specific range. Yet, several studies from the conjoint literature show that derived importance weights increase with increases in the number of attribute levels, range held constant (e.g., Currim, Weinberg, and Wittink 1981).

In searching for methods to control for the number-of-levels effect, several accounts of the effect have been offered. First, it has been proposed that the number-of-levels effect is related to the data collection method, the measurement scale for the dependent variable, and the parameter estimation procedure. Although tests of these methodological accounts have allowed researchers to reduce the size of the number-of-levels effect, no methodological adjustment has completely eliminated the bias. Second, researchers have acknowledged that the effect could be a consequence of attentional processes. More specifically, it has been proposed that respondents may assign more weight to attributes with more levels because novel attribute levels draw attention or because more attribute levels results in a level changing more frequently across profiles. These accounts rely on non-relational directed attention because the number-of-levels effect for one attribute is predicted to be independent of the number of levels of the other attributes (e.g., moving from a 2x2 design to a 4x4 design will increase the absolute importance of both attributes). Several studies have included one or more tests of non-relational directed attention, but have failed to find support for the hypothesis.

Since methodological factors and psychological accounts based on non-relational directed attention cannot fully account for the number-of-levels effect, there may be other sources of the number-of-levels effect. We propose that one such source is attentional contrast—attention directed towards relatively more novel attribute levels in sequential judgments, reflected in attribute importance. The attentional contrast account predicts that people direct attention away from attribute levels they have seen more often and towards attribute levels they have seen less often. For example, in a 4x2 design, the first attribute has four levels and each of these levels will be experienced twice in a full-factorial design. The second attribute has two levels and each of these levels will be experienced four times in a full-factorial design. Thus, within a profile, the levels of the first attribute will be *relatively* more novel than the levels of the second attribute. Attention will contrast away from the more common levels of attribute two and toward the less common levels of attribute one. This relational directed attention explanation differs from non-relational directed attention explanations in that the novelty of an attribute level depends on the number of levels of the other attributes in the design.

The proposed attentional contrast explanation is consistent with two observations from the number-of-levels effect literature. First, the number-of-levels effect is more likely to be obtained using a decompositional method than a compositional method. A decompositional method asks respondents to provide multiattribute judgments for the full-profile descriptions of alternatives. In a decompositional method, attribute levels are repeated across profiles but the repetition may not be uniform. The differential repetition of the levels of the attributes allows attentional contrast to operate within a profile. Compositional methods ask respondents to

assign values to each level of an attribute. The values are combined to construct an overall evaluation of an alternative. In a compositional method, each level of an attribute is repeated only once and it is repeated out of context, so attentional contrast cannot operate. Our second observation is that the designs used in studies of the number-of-levels effect invariably compare conditions in which the number of levels of more than one attribute is varied concurrently (i.e., varying the number of levels of attribute 1 is confounded with varying the number of levels of attribute 2). For example, consider an experiment in which participants respond to a 2x4 design (i.e., attribute 1 has two levels and attribute 2 has four levels) or a 4x2 design. If one finds that the derived importance weight on attribute 1 is larger in the 4x2 condition than in the 2x4 condition, then the weight difference may be due to the increased number of levels of attribute 1 (i.e., absolute novelty of the levels of attribute 1) or to the accompanying decrease in the number of levels of attribute 2 (i.e., relative novelty of the levels of attribute 1). In other words, the number-of-levels effect may not be caused (solely) by the increased number of levels of an attribute. It may also be caused by the reduced number of levels of other attributes in the experimental design. It is important to note that all published demonstrations of the number-of-levels effect concurrently vary the levels of two or more attributes.

Three experiments, each using three designs, examined whether attentional contrast contributes to the number-of-levels effect. These designs were investigated using a full profile task with reservation price estimates as the dependent variable and an ANOVA analysis technique. In experiment 1, we show that the number-of-levels effect occurs only when one attribute has more levels than a second attribute (i.e., a relative novelty effect). In experiment 2, we manipulate the relative novelty of one attribute's levels and produce a "number-of-levels effect" when both attributes have the same (absolute) number of levels. In experiment 3, we use a design in which the levels associated with an attribute having fewer levels are made relatively more novel than levels associated with an attribute having more levels and obtain the "number-of-levels effect" on the attribute having fewer (absolute) levels. The results of the three studies show that the relative novelty of attribute levels contributes to the number-of-levels effect.

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