The impacts of assortment size and assortment type on perceived assortment variety: purely vs. mixed alignability

Richard Huaman-Ramirez
EM Strasbourg Business School
Victor Mejia
University Institute of Technology GRM (EA 4711), Côte d'Azur University

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Abstract

This study investigates the link between assortment type (i.e. alignability) and assortment size (i.e. number of products) on assortment perceived variety. Two experiments demonstrate that (1) when assortment are differentiated along a single attribute (either alignable or nonalignable), only assortment type influences perceived variety while assortment size does not, (2), when assortments are differentiated along two attributes (both alignable and nonalignable), both assortment type and assortment size separately and jointly influence perceived variety.

Keywords

Assortment type, assortment size, perceived variety, alignability, nonalignability

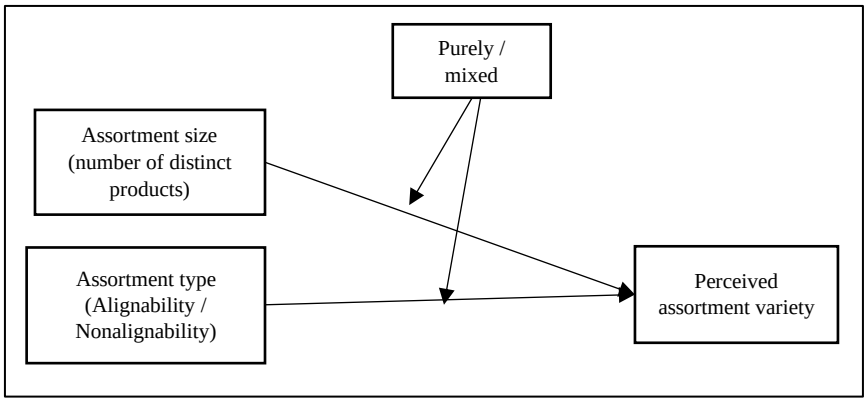
Track: Retailing & Omni-Channel Management

1. Introduction. Empirical studies on assortment type have shown a negative interaction of it with assortment size, such when size increases, nonalignable assortments influence negatively consumers' choice or satisfaction (Gourville and Soman, 2005; Herrmann et al., 2009). For instance, the share of choice of a nonalignable assortment decreases from 53% to 40%, when its size increases from 1 to 5 products (Gourville and Soman, 2005). On the other hand, nonalignable attributes better highlight differences between products (Nam et al., 2012) and provide more information to consumers (Griffin and Broniarczyk, 2010), compared to alignable attributes. Consequently, nonalignability can also increase perceptions of variety of a given assortment and the direct effect of assortment type on perceived assortment variety remains largely unknown. Moreover, past studies focus on assortments differentiated along a single attribute (e.g. flavor *or* format), forgetting more realistic situations where assortments are differentiated on both alignable and nonalignable attributes (e.g. flavor *and* format).

This paper presents two studies which show that when an assortment is differentiated by a single attribute, only assortment type but not assortment size influences perceived variety (Study 1). When an assortment is differentiated by two attributes (one alignable, one nonalignable), assortment type and assortment size both influence separately and jointly perceived assortment variety (Study 2). This papers complements research on perceived variety (Deng et al., 2016; Prediger et al., 2019; Townsend and Kahn, 2014; Wen and Lurie, 2019) by showing how assortment size, on the one hand, and assortment type, on the other hand, can influence perceived variety. Contrary to the main view on assortment type which considers nonalignability to be negative for consumers (Gourville and Soman, 2005; Herrmann et al., 2009; Markman and Loewenstein, 2010), we demonstrate that nonalignability increases the perceived variety of an assortment.

2. Conceptual background. Assortment type is generally considered as binary, with assortments being either purely alignable or purely nonalignable (Gourville and Soman, 2005; Som and Lee, 2012). But in any category, products possess few distinct attributes, some of them being alignable (e.g. format, sugar content) and some others being nonalignable (e.g. flavor, shape) (e.g. Fasolo et al. (2009)). Thus, depending on the number of levels for each alignable and nonalignable attribute, an assortment should be better classified along a continuum, from purely nonalignable to purely alignable (Griffin and Broniarczyk, 2010). Figure 1 describes the conceptual model.

Figure 1. Conceptual model



2.1. Assortment type, mixed alignability and its effects on perceived variety. To clarify the concept of "mixed" alignability, Table 1 displays four assortments differentiated by two attributes: flavor (a nonalignable attribute) and format (an alignable attribute). The main attribute, with more levels, is presented in the top row, while the "secondary" attribute, with fewer variations, is presented in the bottom row. Assortment A and B represent "purely" alignable and "purely" nonalignable assortment, where only the main attribute varies. This corresponds to the main view for assortment type (Gourville and Soman, 2005; Som and Lee, 2012). Assortments C and D represent assortments where both attributes vary. Assortment C is denoted "mixed alignable" because it has more variations on the alignable attribute than on the nonalignable attribute and conversely, assortment D is denoted "mixed nonalignable".

Table 1. Assortments with varying degrees of alignability

		#P1	**#P2**	**#P3**	**#P4**	**#P5**	**#P6**
Assort. A	Purely alignable	100 ml	200 ml	300 ml	400 ml	500 ml	600 ml
		Vanilla	Vanilla	Vanilla	Vanilla	Vanilla	Vanilla
Assort. B	Purely	Vanilla	Chocolate	Strawberry	Orange	Raspberry	Lemon
	nonalignable	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml
Assort. C	Mixed alignable	100 ml	200 ml	300 ml	400 ml	500 ml	600 ml
		Vanilla	Vanilla	Vanilla	Chocolate	Chocolate	Chocolate
Assort. D	Mixed	Vanilla	Chocolate	Strawberry	Orange	Raspberry	Lemon
	nonalignable	100 ml	100 ml	100 ml	200 ml	200 ml	200 ml

While alignable attributes (e.g. format) are easier to process and more frequently used in the comparison process (Markman and Loewenstein, 2010), nonalignable attributes (e.g. flavor) are more diagnostic to understand differences between products (Nam et al., 2012) and convey more information to consumers (Griffin and Broniarczyk, 2010). Assortments comprising dissimilar products are perceived as more varied (Oppewal and Koelemeijer, 2005; van Herpen and Pieters, 2002). Nonalignable assortment, with only noncomparable attribute levels (e.g. Vanilla, Chocolate…) should be perceived as more varied

than comparable alignable assortments. Thus, independent of assortment size, we expect a positive main effect of nonalignability on perceived variety.

H1: Compared to alignable assortments, nonalignable assortments are perceived as more varied for purely nonalignable assortments (H1a) and for mixed nonalignable assortments (H1b).

2.2. The interaction between assortment size and alignability on perceived variety. In a purely nonalignable assortment, each product has a specific attribute level that cannot be compared. Nonalignability increases the difficulty of processing the whole assortment and this difficulty increases with assortment size (Gourville and Soman, 2005; Griffin and Broniarczyk, 2010). Since the cognitive capacity of individuals is limited (Lurie, 2004), consumers will not be able to assess the actual variety of a purely nonalignable assortment when its size increases (Kahn and Wansink, 2004). On the contrary, alignability eases assortment perception, because all the products can be compared directly on the alignable attribute (e.g. 100 ml vs. 200 ml) (Herrmann et al., 2009; Som and Lee, 2012). Moreover, each new product can be easily compared to the current assortment (Zhang and Markman, 1998). Consequently, purely alignable assortments should be insensitive to assortment size changes. To summarize, the only expected difference between purely nonalignable and purely alignable assortments is the initial advantage of nonalignability on perceived variety (i.e., H1a), but the magnitude of the differences between alignable and nonalignable assortments will not increase with assortment size.

For mixed alignable/nonalignable assortments (e.g. assortments C and D), we expect a positive effect of assortment size, only for nonalignable assortments, following a categorization effect (Chang, 2011; Mogilner et al., 2008). Research on categorization shows that grouping products within one assortment into distinct categories increases perceived variety (Mogilner et al., 2008), because consumers use the presence of categories as a signal of variety. In the case of a mixed nonalignable (alignable) assortment, the secondary attribute could act as a signal that the assortment offers distinct categories (e.g., various flavors in 100 ml and various flavors in 200 ml in assortment D), with a positive effect on perceived variety. This reasoning is similar to assortment "blocking" (e.g., classifying products by colors), which helps consumers better assess assortment variety when assortments are large (Deng et al., 2016; Kahn and Wansink, 2004; Pizzi and Scarpi, 2016). On one hand, nonalignable attributes are hypothesized to be the main drivers of perceived variety, and on the other, alignable attributes may not be affected by variations in size. Accordingly, we expect that increases in assortment size will have a positive effect on perceived variety for mixed nonalignable assortments (e.g. Assortment D), but not for mixed alignable assortment (e.g., Assortment C):

H2: Compared to smaller assortments, larger assortments are perceived to be more varied when the assortment is mixed nonalignable (H2b), but this effect is neither replicated for mixed alignable (H2c), purely alignable nor for purely nonalignable assortments (H2a).

3. Experiments. Two experiments were conducted. The first investigates the effects of assortment size and type for purely alignable and purely nonalignable assortments and thus tests H1a and H2a. The second experiment considers mixed situations and tests H1b and H2b and H2c.

3.1. Study 1. Perceived variety for purely alignable and purely nonalignable assortments.

3.1.1. Experiment design. Study 1 was a 2 (size: small: 4 products vs. large: 12 products) *x* 2 (assortment type: purely alignable vs purely nonalignable) full-factorial, between-subject design. The stimulus was a coffee-pod assortment. A pretest (N = 31 students)[1] was run to assess attribute importance (7-point scale, totally unimportant – totally important) among 4 coffee-pod ordinary attributes (alignable: coffee intensity and coffee type -100 % Arabica, 100 % Robusta…; nonalignable: flavor and country of origin). Coffee intensity and flavor were the most important attributes ($M_{intensity}$ = 4.81 vs. $M_{composition}$ = 3.74; p = 0.00; M_{flavor} = 4.29 vs. M_{origin} = 3.23; p = 0.00), with no differences between them ($p > 0.05$). For the large alignable assortment, levels vary from intensity 1 to 12. For the large nonalignable assortment, flavor levels were: light, delicate, soft, fruity, subtle, creamy, sophisticated, balanced, rich, full-bodied, strong and intense. We maintained a correspondence between intensity and flavor: intensity 1 corresponds to light, intensity 2 to delicate, and so on. In the small assortment situation, values covering the entire range of attributes were selected, while avoiding extreme values (Herrmann et al., 2009). For the small alignable assortment, intensities 2, 5, 7, 11 and the corresponding flavors for the small nonalignable assortment were used (delicate, subtle, sophisticated, strong).

83 students participated in our study (female = 59%). Respondents were told that a brand (real but not available in the country) had an assortment of 4 products (12 products), differentiated by their intensity (alignable condition) or flavor (nonalignable condition). Participants were first asked about their coffee drinking habits (drinking frequency, types of coffee drunk, subjective knowledge about coffee on a 5-point scale, and coffee machine ownership). Then, they were shown the assortment, with products presented in rows of 4 (Appendix A). On the next page, they were asked about perceived assortment size (on a 7-point semantic scale: small – large) and perceived variety (not varied –varied).

3.1.2. Results and discussion. A two-way ANOVA, taking perceived assortment variety as a dependent variable, with coffee drinking habits and gender as control variables, showed that only assortment type has a significant main effect on perceived variety. Indeed, a nonalignable (nali) assortment is perceived

[1] All sample sizes are indicated after exclusion of non-consumers.

as more varied than an alignable one (ali) (M_{nali} = 4.42; M_{ali} = 3.57; F (1, 80) = 4.78; p = 0.03). In contrast, assortment size does not impact perceived variety (M_{small} = 3.98; M_{large} = 4.05; F (1, 80) = 0.08; p = 0.78). In addition, the interaction effect of assortment size and assortment type on perceived variety is not significant, along with the control variables ($p > 0.05$). Regarding the manipulation check, the large assortment was perceived larger than the small assortment (M_{small} = 3.29; M_{large} = 5.31; F (1, 80) = 46.94; $p < 0.00$). A nonalignable assortment is perceived as more varied than an alignable one in a context of differentiation by a single attribute, thus confirming H1a. Nonalignable assortments comprise products which cannot be compared directly. Such assortments are perceived as more varied, compared to alignable ones, but in the same time, they are more difficult to process (Gourville and Soman, 2005; Griffin and Broniarczyk, 2010). Conversely, purely alignable assortments are easy to process, whatever their size (Markman and Loewenstein, 2010; Som and Lee, 2012). In summary, when an assortment is differentiated by a single attribute, perceived variety is primarily driven by assortment type, and not by assortment size.

3.2. Study 2. Perceived variety for mixed alignable and nonalignable assortments.

3.2.1. Experiment design. In Study 2, mixed alignable assortments and mixed nonalignable assortments were presented to respondents. The aim of this study was to measure the effects of changes in assortment size when assortment type was kept constant. Experiment design was a 3 (assortment size: small: 3 products, medium: 6 products or large: 9 products) *x* 2 (presentation type: mixed alignable or mixed nonalignable) full-factorial, between-subject experiment, resulting in 6 experimental conditions. 161 undergraduate students participated in this experiment (females = 64%). The experiment procedure was identical to Studies 1 and 2, with another assortment (dark chocolate). From the pretest (N = 41) among four ordinary attributes (alignable: format and cocoa percentage; nonalignable: flavor and country of origin), cocoa percentage and flavor ranked as most important, (M_{cocoa} = 4.76 vs. M_{format} = 3.61; p = 0.00; M_{flavor} = 4.90 vs. M_{origin} = 3.05; p = 0.00) and both were of similar importance (p = 0.73).

Each assortment was differentiated along both cocoa percentage (54%, 56 %, 59%, 72%, 75%, 78%, 81%, 83%, 85%) and flavor (raspberry, orange, mango, almonds, pistachio, walnut, caramel, coffee, mint). The mixed alignable (nonalignable) assortment displays three levels for the alignable (nonalignable) attribute for one level for the nonalignable (alignable) one. Thus, assortment type is kept constant whatever is assortment size (i.e. a ratio of three levels for one level). Packaging was identical across conditions, except for presentation order. For the mixed alignable condition, the first attribute displayed was cocoa percentage and the second was flavor, and conversely for the mixed nonalignable condition. A third attribute was also displayed (country of origin, Peru) (Appendix B). Products were presented in rows of 3. Perceived variety was measured on a 9-point Likert scales (α = 0.82).

3.2.2. Results and discussion. We conducted a two-way ANOVA taking perceived variety as the dependent variable with chocolate eating habits and gender as control variables. Main effects of both assortment size and assortment type were significant as well as their interaction. A larger assortment increased perceived variety (M_{small}= 3.15, M_{medium}= 4.09, M_{large}= 5.06; F (2, 153) = 23.10; p = 0.00) and mixed nonalignable assortments were perceived as more varied than mixed alignable assortments (M_{ali} = 3.15; M_{nali} = 4.95; F (1, 154) = 70.11; p = 0.00). In addition, there was a significant interaction (F (2, 153) = 11.78; p = 0.00), such as when assortments were mixed nonalignable, perceived variety was higher for a larger assortment (Figure 2). A detailed analysis showed that there were no differences between the small conditions for mixed alignable and nonalignable assortments (p = 0.23), but differences were significant for medium and large conditions (p = 0.00). Moreover, the differences in perceived variety between nonalignable and alignable conditions increased with size: 0.42 for the small assortment, 2.14 for the medium assortment, and 3.13 for large assortment.

The effect of assortment type on perceived variety (Study 1) holds also when assortments are differentiated along two attributes (mixed alignability), thus confirming H1b. If we observed a direct positive effect of assortment size on perceived variety, in line with past studies (Broniarczyk et al., 1998; Oppewal and Koelemeijer, 2005; van Herpen and Pieters, 2002), this effect is mainly due the positive effect of size for mixed nonalignable assortments. Indeed, comparing perceived variety for mixed nonalignable and mixed alignable assortments showed that there is a strong increase for the former ($M_{small\text{-}nali}$ = 3.34; $M_{medium\text{-}nali}$ = 5.10; $M_{large\text{-}nali}$ = 6.69; F (2, 79) = 39.04; p = 0.00), while there are no differences for the latter ($M_{small\text{-}ali}$ = 2.92; $M_{medium\text{-}ali}$ = 2.96; $M_{large\text{-}ali}$ = 3.56; F (1, 72) = 1.46; p = 0.24). Thus we confirmed H2b and H2c.

For mixed nonalignable assortments, the presence of a simpler alignable attribute (e.g., cocoa content) potentially helps to categorize the main nonalignable attribute (e.g. flavor) in subgroups, thus reducing the difficulty of processing the assortment (Chang, 2011; Mogilner et al., 2008) and creating some sort of assortment "blocking" (Deng et al., 2016; Pizzi and Scarpi, 2016), with a positive effect on perceived variety. For mixed alignable assortments, as the main alignable attribute (e.g. cocoa percentage) is not affected by changes in assortment size (Study 1), the secondary nonalignable attribute (e.g., flavor) does not increase variety perception when assortment size changes.

4. Conclusion. Assortment "variety" is a major topic in marketing because of its effects on consumer choice, preference and satisfaction and its implications for brand management (Bauer et al., 2012; Mantrala et al., 2009). Research has shown that alongside assortment size, various factors can influence perceived assortment variety (e.g., organization, entropy, blocking…) (Deng et al., 2016; Kahn and Wansink, 2004; Prediger et al., 2019; Townsend and Kahn, 2014; Wen and Lurie, 2019). This research

focus on another factor, namely assortment type, and its interaction with assortment size, on perceived assortment variety.

4.1. Theoretical contributions. Our results can be summarized as follows. When assortments are differentiated along a single attribute (purely alignable or purely nonalignable, Study 1), only assortment type influences perceived assortment variety. Nonalignable assortments are indeed perceived as more varied than similar alignable assortments, whatever their sizes (small or large). Larger assortments are perceived as more varied than smaller ones, irrespective of assortment type (purely alignable or purely nonalignable). When assortments are differentiated along both alignable and nonalignable attributes (mixed alignable and mixed nonalignable, Study 2), assortment type and assortment size influence together perceived variety. Study 2 replicates, for mixed assortments, the positive effect of nonalignability on perceived variety observed in Study 1. Moreover, when assortment type is kept constant (i.e. keeping the same alignability(nonalignability) whatever the assortment size), larger assortments are perceived as more varied than smaller assortments. Finally, type and size interact, such that for mixed nonalignable assortments, increases in size improve variety perception, but not for mixed alignable assortments. The presence of a secondary alignable attribute contributes to categorizing the main nonalignable attribute into subgroups thereby increasing variety perception without increasing assortment complexity (Chang, 2011; Mogilner et al., 2008). As alignable attributes do not influence perceived variety, this categorization effect does not occur for mixed alignable assortments.

Our results add new nuances to the role of assortment type on consumer perception and choice (Gourville and Soman, 2005; Griffin and Broniarczyk, 2010; Markman and Loewenstein, 2010). Indeed, instead of being simply binary (alignable/nonalignable), assortment type can be a mixed situation which varies from purely alignable to purely nonalignable, with distinct effects on consumer assortment perception. Moreover, contrary to the majority of studies which view nonalignability as negative for consumers (Markman and Loewenstein, 2010), we found that nonalignable assortments increase variety perceptions, in line with the positive effect of nonalignability on satisfaction observed by Griffin & Broniarczyk (2010).

4.2. Managerial Implications. From the managerial viewpoint, our study contributes a better understanding of how to manage assortment variety. Assortment size and assortment type act separately and jointly on perceived variety; this implies that both need managing when building assortments. For example, according our results, a large assortment of 24 jam flavors (a nonalignable attribute) with some variations of an alignable attribute (for example, fruit content or sugar content) might be perceived as more varied than the same assortment of 24 jams with only flavor differences. Moreover, as

nonalignable attributes drive more variety perception than alignable attributes, a recommendation could be to highlight one attribute or another based on the desired effects on perceived variety. For the jam example, presenting the assortment using a "fruitiness" content, or a "sweet-sour" scale may reduce perceived variety.

5. Limitations and future research. We did not investigate the assortment type effects when size is held constant and assortment type varies. By holding size constant, assortments can be made more alignable or more nonalignable based on the number of levels for each alignable and nonalignable attribute. Secondly, we only investigated assortment perception, and not choice, preference or satisfaction. Indeed, it is possible that despite a lower level of perceived variety, consumers would still prefer alignable assortments, because when it is a matter of choice, nonalignable assortments may be perceived as too complex to choose from (Gourville and Soman, 2005; Som and Lee, 2012). It is possible that the increased perceived variety of large nonalignable assortments backfires, if, for example, perceived variety is linked with higher expectations of product or brand quality (Berger et al., 2007).

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Figure 1. Perceived variety function of assortment size and assortment type for purely alignable/nonalignable assortments

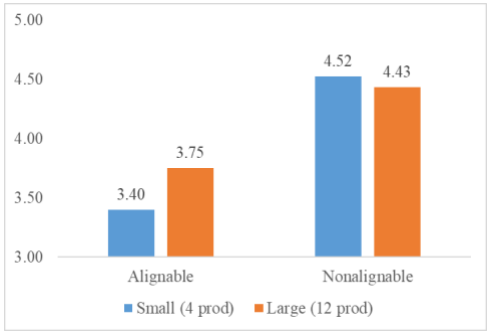
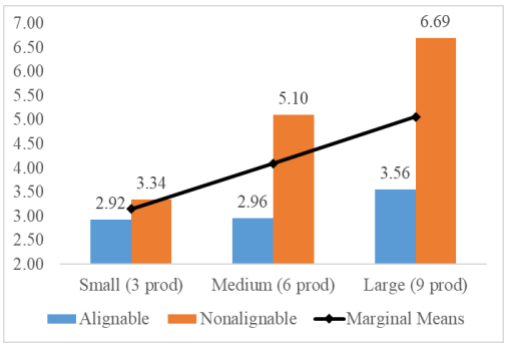


Figure 2. Perceived assortment variety function of assortment size and type for mixed assortments



Appendix A. Examples of stimuli used in Study 1

4 alignable products assortment.

4 nonalignable products assortment

Appendix B. Examples of stimuli used in Study 2

3 alignable products assortment.

3 nonalignable products assortment