THE "ALPHA" AND THE "NUMERIC" IN ALPHANUMERIC BRAND NAMES

Selcan Kara*

Doctoral Candidate
University of Connecticut
2100 Hillside Rd. Unit 1041
Storrs, CT 06269-1041
Phone: (860) 486-1102
Fax: (860) 486-5246
Email: skara@business.uconn.edu

Kunter Gunasti

William T. Ross, Jr.

* Please address all correspondence to Selcan Kara.

Selcan Kara (e-mail: skara@business.uconn.edu) is a doctoral candidate in Marketing Department at the University of Connecticut. Selcan Kara's research broadly explores consumer behavior towards branding in two aspects, cognitive and relational; specifically, focuses on number processing, cross-linguistic variations in number processing, brand and interpersonal relationships, and self-concept related brand consumption. Because some part of her dissertation focuses on the effect of language on consumers' number cognition that influences alphanumeric brand evaluations, Selcan received the CIBER International Business Dissertation Scholarship in 2015.

Kunter Gunasti (e-mail: gunasti@uconn.edu) (PhD Pennsylvania State University) is an Assistant Professor of Marketing at the University of Connecticut. Professor Gunasti's research focuses on consumer behavior issues with strategic marketing implications such as branding, numerical processing, consumption experiences, gift giving, inference making, and country of origin effects. His work has been published/forthcoming in *Journal of Consumer Research, Journal of Marketing Research, Marketing Letters, Journal of Business Research,* and *Journal of Public Policy & Marketing* for which he received the Thomas Kinnear Award.

William T. Ross, Jr. (e-mail: bill.ross@business.uconn.edu) (PhD Duke University) is the Voya Financial Chair and professor of Marketing at the University of Connecticut. He has previously served on the faculty at Wharton, Temple, and Penn State. His research specializes in channel and brand management, ethical decision-making, and buyer decision-making. His publications have appeared in, among others, *Journal of Consumer Research, Journal of Marketing, Journal of Marketing Research*. Over his career, he has taught courses at the undergraduate, MBA, EMBA, and doctoral levels.

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Abstract

This paper, in five experiments, delineates the effects of alpha and numeric components of alphanumeric brand names (ANBs), by demonstrating the effects of disparities in processing between letter and number sequences on consumers' brand evaluations. Findings show (i) ascending letters in ANBs (from D10 to E10) lead to more favorable evaluations of line extensions than descending letters in ANBs (from D10 to C10), (ii) line extensions are evaluated more favorably when a line extension ANB is formed with a change in number (from A70 to A80) (vs. a change in letter) (from A70 to B70) for an existing ANB, (iii) consumers' tendency to align brand numbers with product advancements mediates the relative effects of numbers vs. letters in brand names and (iv) the observed effects are robust to differences in stimuli and context.

Keywords: Alphanumeric brand names, number cognition, letter cognition, alignability, Selective Accessibility Model, anchoring

INTRODUCTION

The choice of what brand name to use is important to both firms and consumers, because brand names build and enhance brand equity (Keller, 1993), and affect consumers' evaluations of quality and other product attributes (Maheswaran *et al* 1992). Alphanumeric brand names (ANBs) consist of combinations of letters and numbers (Pavia and Costa, 1993), such as Audi A4. Letters and numbers in brand names convey various meanings both separately and together, evoking cues concerning overall product or specific attributes (Auh and Shih, 2009; Gunasti and Ross, 2010; Yan and Duclos, 2013). Consumers often base product evaluations on brand names alone, a phenomenon called the brand-name heuristic (Maheswaran *et al* 1992), and ANBs lead to strong consumer reactions such as a preference for higher numbers (Gunasti and Ross, 2010) and brand-name likeability (King and Janiszewski, 2011). Practitioners use ANBs in different ways, and change the letter or number components of existing ANBs to label product line extensions. Table 1 shows examples of how practitioners use different ANB strategies to denote attribute and product enhancements.

"Insert Table 1 about here"

For example, Mercedes increases the order of letters in its ANBs to denote improvement in the overall quality of its cars (C class cars are superior to B class cars; and B class cars are superior to A class cars) (A and B class cars are merchandised in Europe market). On the other hand, BMW, another major player in the automobile market, increases the numbers in its ANBs to designate the superiority of its classes (4 series cars are superior to 3 series cars; and 3 series cars are superior to 2 series cars). Hence, the purpose of the research herein is to explore which strategy is more effective in terms of creating favorable consumer evaluations for line extensions. Extant ANB literature suggests both number and letter effects. For example, consumers may match letters to product types (the letter A is associated with food, such as A1

steak sauce; the letter X is associated with technical products, such as BMW X5 SUVs) (Pavia and Costa, 1993; Peterson and Ross, 1972). Research also documents that consumers align their preferences for attributes and product models to larger numbers in ANBs due to the-higher-the-better heuristic (BMW 3 35 has better attributes than BMW 3 20; the Audi A8 is superior to the Audi A6) (Gunasti and Ross, 2010).

Although extant research offers insights concerning perceptions of ANBs, disparities in consumers' processing of numbers vs. letters in ANBs (e.g., ordinal and cardinal meanings associated with serial order processing)—and resulting effects on brand evaluations—remain uninvestigated. The purpose of this study is to examine the effects of alpha and numeric components of ANBs on consumer evaluations of product-line extensions. We explore disparities in consumer evaluations of letter and/or number variations in ANBs to uncover (i) how consumers react to letter changing strategies (ascending vs. descending letters in ANBs), (ii) which brand-name strategies are more effective (letter change vs. number change), and (iii) why consumers favor one strategy over the other. For example, given the existing product Panasonic C80, is it more beneficial for Panasonic to name an extension C90 or D80?, and how do these brand-name strategies influence consumer evaluations of a new product?

In five experiments, we demonstrate first that ascending, compared to descending letters, in ANBs are better at evoking more favorable consumer evaluations for line extensions. We then show, however, that increasing numbers, compared to ascending letters, have a stronger effect on favorability of line extension evaluations. Replications show that the effect holds for different letter-number pairs, numbers with more or less number of digits, letter-number pairs in reversed order, and with unknown brands. To explain these differences between letter and number sequences, we show that consumers have a tendency to align increases in the numbers in ANBs

with increases in numeric attribute values, and that this tendency to align drives the positive effect of number change over letter change on consumers' line extension evaluations, a finding which is consistent with the Selective Accessibility Model of Numerical Anchoring.

This research has important theoretical and managerial contributions. First, unlike extant research (Pavia and Costa, 1993), we conceptualize the evaluative properties of letters as members of serial orders, over and above their categorization utility, such as the letter "A" being associated with foods. Second, we delineate the effects of alpha and numeric components of ANBs by demonstrating the effect of differences in processing between letter and number sequences on consumers' brand evaluations. Finally, from a managerial perspective, we suggest ways in which practitioners can enhance effectiveness of ANBs in line extensions.

CONCEPTUAL BACKGROUND

Alpha Component of ANBs: Letters in Line Extensions

Alphabets, which are letters in a defined serial order, lack a rule-governing structure and are abstract (i.e., one needs to memorize the entire alphabet), implicit (i.e., the primary purpose of the alphabet is not generating order, but producing words), and closed-ended (i.e., although the number of letters in an alphabet varies across languages, all alphabets have a set number of letters) (Jou, 2003). Therefore, serial order memory processes are memorization-based for letters. Moreover, letters possess only ordinal representation (Jacob and Nieder, 2008), which refers to the position of an object in a serial order, such as whether the letter X comes before Y (Fitousi, 2010). Hence, letters in a serial order display a strong forward direction bias in that ordinal representation. However, subsequent letters do not always connote superiority. Specifically, the superiority of letters actually may decrease in ascending alphabetical order for some uses of letters (A is superior to B in grades and credit ratings) (Jou, 2003). So ordinal superiority

suggests that B is greater than A, but ascending letter superiority suggests that B is inferior to A. In the ANB context, the forward-direction bias suggests that B10 is preferred to A10, whereas descending superiority in an alphabetical order suggests the opposite. We propose that, in the context of line extensions, because the name indicates a product or extension that comes after an original, the forward-direction bias will dominate, such that B10 will be evaluated more favorably than A10. We hypothesize that consumers evaluate line extensions with increasing (vs. decreasing) order of the ANB's alpha components as superior. Therefore:

H1: Ascending letters in the ANBs of line extensions compared to the original ANB (from B to C) lead consumers to evaluate the line extension more favorably (e.g., as a better product) than descending letters compared to the original ANB (from B to A).

The Alpha and the Numeric Effects in ANB Line Extensions

Literature suggests a dissociation between letter/word and digit/number recognition from both behavioral (Hamilton *et al* 2006) and neuropsychological perspectives (Park *et al* 2011). Specifically, serial-order processing is different for numbers and letters (Jou, 2003). Unlike letter sequences, number series are rule-governed (i.e., once the order of numbers between 1 and 9 is learned, one can generate and form the entire series), explicit (i.e., the purpose of the number system is to code an order or denote a magnitude), and open-ended (i.e., number series go to infinity) (Jou, 2003). Because number sequences are rule-governed, serial-order processing is less memorization-based for numbers than for letters (Jou, 2003). Additionally, unlike letters, numbers possess both ordinal and cardinal meanings. Cardinality refers to the magnitude or value of an object, such as whether 40 is greater than 30 (Fitousi, 2010). Because numbers possess both cardinal and ordinal meaning, comparison of numbers, which have automatic access to their sematic meanings–the magnitude (Dehaene and Akhavein, 1995), is more

straightforward than comparison of letters. Moreover, cardinality of numbers eliminates any ordinal meaning related ambiguities, such as the forward direction bias and descending superiority in letter series. As previously discussed, in a line extension ANB context, on one hand, B10 may be evaluated to be superior to A10, because B comes after A. Anyhow, B10 may be evaluated to be inferior to A10, because B, compared to A, does not necessarily connote a superior meaning (grades). However, in number series, both serial-order (ordinal) and semantic meanings (cardinal) of the numbers connote corresponding superiorities in a line extension context. Specifically, in a line extension ANB context, A20 is evaluated to be superior to A10, because 20 comes after 10 (ordinal meaning), and 20 is superior to 10 (cardinal meaning) (20 is greater than 10 in terms of the magnitude). Consequently, we suggest that disparities resulting from a number, compared to a letter change in ANBs lead to an advantage in consumers' evaluation of the "change", because numbers are better than letters in terms of inducing the notion of "increase" to consumers.

H2: Consumers evaluate line extensions more favorably (e.g., as a better product) when the extension ANB is formed with increasing numbers rather than ascending letters.

Mediating Role of Consumers' Tendency to Align

In a recent taxonomy of ANBs, Gunasti and Ross (2010) examine how consumers make interpretations about the brands based on ANBs. The authors report that consumers often base their interpretations of ANBs on "how the increase or decrease in the numeric portions of brand names aligns with some product aspect" (p. 1178) and that consumers tend to perceive ANBs with higher numerical portions as corresponding to better products. This consumer tendency to align "increases" in brand name numbers with "increases" in product enhancements influences their evaluations of ANBs especially when practitioners employ brand-attribute pairs (X10 with

10 MP) whose correlations are obvious and easily detectable by decision makers (Gunasti and Ross, 2010). The authors further observed that consumers' tendency to align their preferences with numbers in ANBs is prevalent even when there are no brand-attribute correlations or such information is not easily detectable. Therefore, the notion of an "increase" in an ANB leads to an advantage for numbers over letters to induce more favorable brand evaluations.

Accordingly, consumers' tendency to align brand numbers, and products should help them detect increases in numerical components of ANBs more readily than alpha components. Knowing that brand name information is diagnostic in terms of signaling overall product quality, and influencing consumers' inferences for attribute values (Auh and Shih, 2009; Mazursky and Jacoby, 1985), especially in comparative evaluations of line-extension products, consumers should perceive increasing brand numbers as denoting more advanced products compared to ascending brand letters. Given that anchoring also influences consumer behaviors (Biswas and Burton, 1993), this conceptualization is also consistent with the Selective Accessibility Model (SAM) (Strack and Mussweiler, 1997). Specifically, recent literature on numeric anchoring rests on the theory that "'selective accessibility' or 'activation' of anchor-consistent knowledge leads to the anchoring effect" (Wegener *et al* 2010, p. 6). Oppenheimer *et al* (2008) demonstrate that anchors bias judgments when they prime general notions of largeness or smallness by activating a general sense of magnitude instead of a numeric value. Similarly, a notion of an increase in ANBs can also act as an anchor by activating the general sense of increase in consumers' brand evaluations. Based on the tendency to align and the selective accessibility of "increase" in ANBs, we expect increases in numeric components of ANBs to lead consumers to interpret the line extension to possess increased numeric attribute values compared to the existing brand. And, this

tendency to align an increase in ANBs with the increase in numeric attribute values should lead to a more positive effect of number, compared to letter, change in ANBs. Consequently:

H3: Consumers' more favorable brand evaluations for increasing numbers in ANBs, compared to ascending letters in ANBs, is mediated by their tendency to align increases in ANBs with increases in product enhancements.

We test the aforementioned hypotheses in five experiments (Figure 1). In Study 1, we test H1, which suggests that ascending letters in ANBs results in more favorable evaluations of line extensions than descending letters. In study 2, we test H2; we address comparisons of alpha vs. numeric components by examining whether changing the number parts of ANBs results in greater perceptions of improvement and more positive evaluations of line extensions in comparison to an existing product than changing the letter parts of ANBs (H2). Given that some firms employ a different ANB strategy, such as positioning the number before the letter (iPhone 5S), Study 3 increases the robustness and generalizability of our findings by demonstrating that the order of the ANB components (letter first – A70 vs. number first – 70A) does not influence the more positive effect of the number change compared to the letter change on consumers' ANB evaluations. Study 4 replicates the results of study 2, and tests H3, which posits mediation by tendency to align an "increase" in ANBs with increases in attribute values and overall product advancement. Study 5 rules out two alternative explanations (i) number processing fluency of numeric attribute values and numbers in ANBs driving the results, and (ii) consumer brand knowledge confounding the results. Specifically, in Study 5, we test H2 with unknown brands that have non-numeric attribute values in a non-extension context.

"Insert Figure 1 about here"

In all the studies, letter change is expected to result in favorable consumer evaluations for the line extension compared to the existing brand. However, number change is expected to result in more favorable consumer evaluations than letter change for the line extension compared to the existing brand. Accordingly, we examine the difference in consumers' comparative evaluations of line extensions and existing brands between the number change and the letter change conditions. Because disparities between two numbers can range from minimal to infinity—in opposition to disparities between letters—we are forced to limit the scope of the numbers we use for the ANB's for this study. To have a standard and fair comparison of number vs. letter changes, we limit comparisons to numbers with the same number of digits, changing only left digits (A70 vs. A80), and refrain from well-known effects (A7 vs. A70, A90 vs. A100, etc.) that boost numeric disparity perceptions. As shown in Table 1, changing the left digit in numbers of ANBs is representative of the ANB extensions in the market. To be consistent with the calibration in number vs. letter changes, similarly, we increase the order of the letter by one step (A70 vs. B70, M70 vs. N70, etc.). Regarding H2, we compare the effects of increasing the left digit in the numeric component of ANBs by one unit (A70 to A80, A7 to A8, etc.), to a similar increase of the order of the alpha component in ANBs by one step (A70 to B70, A7 to B7, etc.).

METHODOLOGY

Study 1: Alpha Effects – Ascending Versus Descending Order of Letters

The purpose of study 1 was to test H1 by examining how changing letters in ANBs influences consumers' evaluations of line extensions. We tested whether using ascending letters (from D to E), compared to descending letters (from D to C) leads consumers to evaluate line extensions more favorably. Letter pairs might be sufficiently physically similar that they might bias our tests of differences between letters versus numbers. To avoid this, we conducted a

pretest to select letter pairs that would not be physically similar. A total of 109 respondents evaluated how different successive letter pairs were. The overall difference levels differed significantly across pairs, and we selected letter pairs that were statistically significantly different from each other. Eighty-nine undergraduate students at a northeastern university participated in a between-subjects experiment for course credit. All respondents were initially exposed to specifications of a Dell D10 laptop (the existing brand), and were then exposed to a line extension either for a Dell C10 (descending letter) or Dell E10 (ascending letter), depending on the condition to which they were assigned randomly. The brand Dell was selected for widespread use of numbers in its models. Stimuli consisted of a picture of the laptop and a table of specifications (Appendix A). The extension was identical in both conditions, except for the brand name. Participants reviewed the specifications of the Dell D10, and then the line extension on three dimensions: processor speed, RAM, and storage capacity. The line extension outperformed the existing brand on one dimension, storage capacity, but was equal on the others. Next, participants provided their expectations for relative price of the line extension in comparison to the Dell D10 on a bipolar scale, with end points 1 (Price of the line extension is much cheaper than Dell D10) and 10 (Price of the line extension is much more expensive than Dell D10).

Results and Discussion

Supporting H1, participants expected the line extension to have a higher price for the E10 ($M = 6.38$) than for the C10 ($M = 5.7$, $t(87) = 2.73$, $p < .01$). Results suggest that when they evaluate line extension ANBs, consumers favor ascending over descending alpha, despite the decreasing superiority of letters in ascending alphabetical order (C is perceived superior to D) (Jou, 2003). However, C10 comes before D10, whereas, consistent with the line extension context denoting a product "coming after" a new one, E10 comes after D10. Therefore,

participants expected the line extension to have a higher relative price than D10 when the line extension was named E10 vs. C10.

Study 2: Alpha versus Numeric Change Effect

Study 2 tested H2 by examining how the introduction of changes using letter or number parts to existing ANBs (A70 vs. A80, A70 vs. B70, etc.) influences evaluations of line extensions relative to current offerings. Eighty-nine new undergraduate students at a northeastern university participated in a between-subjects experiment for course credit. The product was a digital camera, and Canon was used as an existing brand because of its prominence in the product category and widespread use of numbers in its model numbers. The existing brand was the Canon A70. Participants were assigned randomly to one of the two conditions: Canon A80 (ANB number-change) or Canon B70 (ANB letter-change). All participants were initially provided with attribute information for the Canon A70, and subsequently reviewed the identical information concerning the line extension except for the names, A80, B70. The line extension slightly outperformed the Canon A70 on one dimension, digital zoom. However, the Canon A70 was superior to the line extension on two other attributes, resolution and optical zoom. We designed the line extension not to be superior to the existing offering, A70, to focus on the effect of the names on brand evaluations. Thus, the existing brand was superior in terms of quantifiable attributes, but its brand name implied inferiority in comparison to the new brand (Appendix A).

Participants indicated their preferences between existing and line extension options on a bipolar scale, with end points 1 (I think the existing product A70 is definitely better) and 9 (I think the new product A80 (or B70) is definitely better). To understand expectations of attribute improvement as they relate to numerically calibrated attributes, respondents were told that existing product A70 had a screen size of 2.1 inches, and were asked to infer the screen size of

the extension, A80/B70, using a range of 1.5 to 2.7 inches. Participants were asked to infer the line extension's screen size by choosing from a 7-point scale ranging incrementally from 1.5 to 2.7 inches (The midpoint = 2.1'', the screen size of the A70).

Results

Despite marginal superiority of the A70 to the line extensions in both conditions, the letter vs number change created a difference in consumer evaluations of line extensions. Preference for the A80 (M = 4.02) over the A70 was higher than for the B70 (M = 3.05, $t(80.32^{1}) = 2.04$, $p < .05$), supporting H2. Respondents also inferred a larger screen size for the new camera when the brand name was A80 (M = 2.13) (number change condition) vs. B70 (M = 1.99) (letter change condition) ($t(87) = 2.23$, $p < .05$). Only 24.4% of participants inferred a larger screen size for the B70; whereas this ratio nearly doubled for the A80, so that 45.8% of participants inferred a larger screen size for the A80 ($\chi^2 = 4.42$, $p < .05$).

Discussion

The results of study 2 suggest a difference in evaluations of a line extension in comparison to an existing product, depending on whether the number or the letter changes in the ANB. Participants evaluated the same line extension differently solely because the ANB changed from A70 (existing product) to A80 (line extension, number-change) vs. B70 (line extension, letter-change). Although the line extension was superior to A70 in neither of the conditions, the preference for the line extension was higher in the number-change condition than in the letter-change condition. Thus, participants evaluated the line extension in the number-change condition more favorably than in the letter-change condition, though the product was inferior in comparison to A70. We interpret this difference in favorability as the result of the change in the numeric component of the ANB. Similar results were observed for inferences. Participants

inferred screen size of the line extension to be larger when the brand name was A80 (number-change) than when the brand name was B70 (letter-change). Hence, numbers are better at inducing higher favorability and choice shares than letters. We ran two additional studies to replicate study 2. The first was identical to study 2 except that we used single digit numbers in the brand names and involved 197 mTurk participants after dropping 7 who responded unconscientiously (Downs *et al* 2010). The second was identical to study 2 except that we replaced the letters A and B in the brand names with the letters D and E and involved 407 mTurk participants after dropping 9 who responded unconscientiously. Results in both studies replicated those of study 2, strongly supporting the generalizability of the results of study 2.

Study 3: Does The Order of ANB Components Matter?

To strengthen our proposition of evaluative differences between letter and number pairs, and to rule out the possibility that the results can be attributed to attention or perception related ideas, such as the greater noticeability of change in number vs. letter components, we conducted Study 3. Additionally, practitioners can also use ANBs with components in reversed order, such as positioning numbers before letters (iPhone 5S). To increase the generalizability of our conceptualization in terms of managerial implications, we tested whether the order of ANB components (letter first – A70 vs. number first – 70A) will influence the positive effect of number change over letter change. Based on our theorization of processing differences in numbers vs. letters, our anticipation was that the order of ANB components will not affect our findings regarding number vs. letter changes in ANBs. Another purpose was to examine how number vs. letter changes in ANBs influence price expectations.

A total of 468 mTurk workers participated in a 2 (change: number vs letter) x 2 (order: letter first vs. number first) between-subjects, online experiment. The brand names used in Study

3 were identical to those in Study 2. In a minor departure from previous studies, participants were not instructed that there was an original brand and an extension. Instead, participants were instructed that Canon, a well-known electronics brand, has two brands that they need to evaluate based on brand names. This minor departure from previous studies enabled us to demonstrate that the findings supporting H2 are not specific to a line extension context. Participants were randomly assigned to one of the four conditions: Canon A70 and Canon A80 (number change – letter first condition), Canon A70 and Canon B70 (letter change – letter first condition), Canon 70A and Canon 80A (number change – number first condition), or Canon 70A and Canon 70B (letter change – number first condition). Next, participants were asked to indicate their preferences between the two brands on a 6-point bipolar scale, with end-points 1 (Canon A70 is more favorable) and 6 (Canon A80 is more favorable) for the letter first – number change condition. Finally, participants were told that the price of A70 (letter first conditions) was $109, and were asked to what they thought the price of the A80 (the number change condition) is.

Results

One participant who did not pass the attention check was excluded. Supporting our theorization of differences in evaluations, the type of change in the ANB had a highly significant effect on relative preference for the two brands ($F(1, 463) = 85.36$, $p < .01$), whereas the order of the ANB components was not statistically significant ($F(1, 463) = 2.82$, $p > .09$). The interaction of Order and Change was non-significant ($F(1, 463) = 1.5$, $p = .22$) Specifically, preferences for A80 ($M = 5.52$) in comparison to A70 were higher than preferences for B70 ($M = 3.39$) in comparison to A70 ($F(1, 463) = 54.42$, $p < .01$). Similarly, preferences for 80A ($M = 5.61$) in comparison to 70A were also higher than preferences for 70B ($M = 3.98$) ($F(1, 463) = 32.3$, $p < .01$). Hence, independent of the order of ANB components, the number change ($M = 5.57$)

resulted in higher comparative evaluations than the letter change did (M = 3.69, F(1, 463) = 85.36, $p < .01$). Similarly, for the price expectation, the effect of the type of change in the ANB was significant (F(1, 463) = 41.47, $p < .01$); whereas the effect of order of ANB components was non-significant (F(1, 463) = .474, $p > .05$). The interaction of Order and Change was also non-significant (F(1, 463) = .1, $p > .05$). Particularly, participants inferred higher prices for A80 (M = 151.76) in comparison to A70 than for B70 (M = 129.52) in comparison to A70 (F(1, 463) = 18.65; $p < .01$). A similar pattern was also observed, when the order of ANB components was reversed. Participants inferred higher prices for the 80A (M = 150.4), in comparison to the 70A than for the 70B (M = 125.88) (F(1, 463) = 22.97, $p < .01$). Overall, the number change (M = 151.08) led to higher comparative price expectations than the letter change (M = 127.7, F(1, 463) = 41.49, $p < .01$) in ANBs, independent of the order of ANB components.

Discussion

Results of Study 3 revealed that changing the order of the components (alpha and numeric) in ANBs does not reduce the stronger effect of number change compared to letter change on consumers' brand evaluations. This finding also supports our theorization based on different evaluative properties of number vs. letter series, by ruling out attention related alternative explanations, such as position of numbers in ANBs (always after letters) enhancing the noticeability of disparities between numbers compared to those between letters.

Study 4: Tendency to Align Numeric Increase in ANBs with Numeric Attributes

The purpose of study 4 was to test H3 by examining whether a) increasing numbers in ANBs lead consumers to evaluate a line extension as having increased numeric attributes (tendency to align), and b) this tendency to align mediates more positive effect of increased numeric, compared to alpha components on consumers' favorable evaluations of ANBs

Stimuli

The product category and letter-number combinations were identical to those of Study 2a. The brand name was changed to the Sony CyberShot, another major player in the market, to replicate results using a different brand. The existing brand was Sony CyberShot A70. The line extension was Sony CyberShot either A80 (number change condition) or B70 (letter change condition). First, to measure participants' tendency to align, we created four product specifications from which participants chose the one that best characterized the line extension. As shown in Appendix B (for the letter change condition), the four options were created by adding attributes to and/or improving attributes of the A70. We increased the numeric values of attributes and added attributes to calibrate the numeric attribute advancements. The first option was identical to the A70 on all but one attribute, which was superior in terms of one increased numeric attribute. The second option had identical specifications to A70, but it also had one additional feature. The third option was superior to the A70 on all dimensions. The fourth option had all of its attributes improved and an additional feature added in comparison to the A70.

Because the purpose was to test whether increasing the number in the ANB (from A70 to A80), in comparison to increasing the order of the letter in the ANB (from A70 to B70) leads participants to perceive the line extension as having increased numeric attributes in comparison to an existing product (A70), we created two sets of options. The first two options had one numeric attribute change in comparison to A70, and the second two had multiple numeric attribute changes in comparison to A70. The first two product alternatives that had one improved attribute or one extra specification added with respect to A70 were classified as *one numeric attribute change* options, and the two alternatives, with all superior attributes or all features improved plus an extra specification, were classified as *multiple numeric attribute change*

options. The same set of options was provided to participants for the number-change condition. The only difference was the line extension brand name, A80. Second, to test consumers' assessments of line extension quality, we created a measure of picture quality. As shown in Appendix B, for the letter-change condition, 4 photographs with varying levels of quality were used to test evaluations of extension quality. The photographs were created by altering the pixels, and ordered in quality levels of better, equal, worse, and much worse in comparison to the quality of the photograph supposedly taken with the A70.

Procedure

A total of 178 undergraduate students at a northeastern university participated in the study for course credit. Participants were assigned randomly to one of two conditions, letter change (B70) vs. number change (A80). Initially, participants were instructed that Sony, a popular digital and electronics brand, had two digital camera products that were the Sony CyberShot A70 and Sony CyberShot A80 (number-change condition) or Sony CyberShot B70 (letter-change condition). Before provided with product information, participants identified which brand was for the newer product, A70 or A80 in the number-change condition, and A70 or B70 in the letter-change condition based solely on ANBs. This helped us understand evaluations of improvement regarding which product was newer based on the brand names.

Participants were then shown specifications (numeric attributes) of the A70 and specifications for four additional product options, with comparable feature sets to A70 (see Appendix B for the letter-change condition). Described previously, these options were created to examine the effect of letter vs. number change on participants' anticipations of numeric attribute improvements. The same set of options was provided to participants in the letter-change condition. The only difference in the number-change condition was the line extension brand

name being A80. Participants chose the option they perceived was A80 (for the number-change condition) or B70 (for the letter-change condition). Participants were then shown a photograph supposedly taken with the A70, and shown a set of 4 photographs with varying levels of quality (Appendix B). They identified the one they believed was taken by the line extension, A80 or B70. The photographs were ordered by quality, but no labels indicated the quality of the photographs. Finally, participants were told that the price of A70 was $199, and were asked to write what they thought the price of the A80 or the B70 (depending on the condition) is.

Results

Two participants whose attention or involvement was low were excluded. We ran a logistic regression with the two conditions (number and letter change) as the independent variable and perceptions of product newness (A70 vs. A80 or B70) as the dependent variable. The regression coefficient was significant (b = -1.75, Wald $\chi^2 = 13.06$, $p < .01$). 70.5% of participants in the letter-change condition identified B70 as the new product, whereas 93.2% in the number-change condition recognized A80 ($\chi^2 = 15.28$, $p < .01$), showing that more participants associated the change in numeric (vs. alpha) component with the introduction of a new product. To evaluate participants' quality expectations for A80 and B70, the photographs were coded in ascending order of quality from 1 to 4, where higher values corresponded to higher perceived image quality. Participants expected a higher image quality in the number change condition (A80) (M = 3.82) compared to the letter-change condition (B70) (M = 3.67, t(166.19) = -2.08, $p < .05$). 69.3% of participants rated the quality of the photograph produced by B70 as better than that produced by A70, whereas the percentage increased to 83% for A80 ($\chi^2 = 4.5$, $p < .05$). Participants also expected the A80 to have a higher price (M = 256.6), compared to A70, than the B70 (M = 243.55, t(174) = -2.1, $p < .05$).

Mediation of Product Quality Judgments by Attribute Improvements (Tendency to Align) As described earlier, participants were shown two sets of two options to identify as A80 or B70 given the characteristics of A70. Mediation analysis, with 5000 bootstrapped samples, was run on M-Plus because, we had a dichotomous independent variable (letter vs. number change) and a dichotomous mediator (attribute improvements as *multiple* vs. *single*). Mediation analysis revealed indirect-only mediation (Zhao et al 2010); controlling for letter/number change, the differential effect of attribute improvement (*single* = 0; *multiple* = 1) was positive on product quality judgments ($\beta = .19$; $t(174) = 4.35$, $p < .01$). Controlling for attribute improvement, the direct effect of letter/number change (letter = 0; number = 1) on product quality judgments was not significant ($\beta = .05$, $t(174) = .69$, $p = .49$). The indirect path ($\beta = .1$) had a 95% confidence interval that did not include zero (.03, .19).

Mediation of Price Expectation by Attribute Improvements (Tendency to Align) Mediation analysis with 5000 bootstrapped samples revealed indirect-only mediation (Zhao et al. 2010) on M-Plus; controlling for letter/number change, the effect of attribute improvement (*single* = 0; *multiple* = 1) was positive on price expectation ($\beta = 14.06$, $t(174) = 3.41$, $p < .01$). Controlling for attribute improvement, the direct effect of letter/number change (letter = 0; number = 1) on price expectation was not significant ($\beta = 5.65$, $t(174) = .88$, $p = .38$). The indirect path ($\beta = 7.34$) had a 95% confidence interval that did not include zero (2.5, 15.13).

Discussion

Participants' product assessments were measured with different dependent variables: perceptions of newness of the line extension, expectations of quality, and price expectation for the line extension. Results suggest increases in brand evaluations between extensions when the numeric component of the ANB increased vs. when the order of the letter component of the

ANB increased. Study 4 provides details regarding perceptions of improvement for the new product solely based on letter or number changes. Thus, the results also suggest participants evaluated a number change in the ANB as an indication of a higher quality line extension with improved specifications in comparison to a letter change in the brand name. The most noteworthy result of study 4 was the mediating role of tendency to align increases in numeric components with evaluations of numeric attributes. Increasing the numeric component in the existing ANB to form the line extension ANB led consumers to perceive increases in numeric attribute values of the line extension in comparison to the current product. This tendency to align mediated the differential effect of alpha vs. numeric changes in ANBs on brand evaluations (H3).

Study 5: Tendency to Align or Fluency?

The basic premise of the hypothesized effects lies in the proposition that numbers are better at inducing a notion of increase than letters, because they have cardinal meaning (magnitude). However, one can argue that the results of Study 4 could have been driven by the fluency of number processing. Particularly, increasing numbers in ANBs and numeric attribute values may lead to a fluency in number processing, and this fluency might be driving the more positive effect of the number change over the letter change in ANBs on consumers' ANB evaluations. Hence, the question of whether number, compared to letter change, results in more favorable ANB evaluations in existence of non-numeric attribute values arises. Thus, the purpose of Study 5 was to test H2, which posits that consumers evaluate line extensions more favorably when the extension ANB is formed with increasing numbers rather than ascending letters, with non-numeric attribute values that should favor letter change over number change based on a fluency argument. However, because we suggest that number change is better than letter change in terms of inducing the notion of increase, we continued to expect observe more favorable

consumer reactions to the number change in ANBs than the letter change in ANBs. Hence, we aimed to increase the robustness of our findings by ruling out the fluency argument. Another purpose of Study 5 was to replicate the results in a non-extension context, in which participants do not anchor on one of the brands as a new version of the other. As in Study 3, this context enables us to increase the generalizability of the findings, by demonstrating that the more favorable effect of number change over letter change in ANBs is not specific to the line extension context. The final purpose of Study 5 was to replicate our results with unknown brands so that we could rule out another possible alternative explanation, that the more positive effect of number, over letter change in ANBs is affected by consumers' knowledge about the brand.

A total of 181 undergraduate students at a Northeastern university participated in a 2 (change: number vs. letter) condition between-subjects experiment in exchange of course credit. The product category was again a digital camera. However, diverging from previous studies the cameras were non branded ANBs, such as A70 and A80 or B70. As in Study 3, participants were not instructed that there was an original brand and an extension. Instead, participants were provided with a table that displays non-numeric consumer ratings on three dimensions, image quality, ease of use and LCD panel quality, for the two camera brands, A70-A80 (number change) or A70-B70 (letter change). The reviews ranged from "fair" to "excellent" for each of the cameras; and were designed to be balanced so that neither of the camera brands was superior to the other. Next, participants were asked to indicate their preferences between the two brands on a 6-point bipolar scale, with end-points 1 (A70 is more favorable) and 6 (A80 or B70 is more favorable). Finally, participants chose which product they would like to purchase using a bipolar scale, with end points of 1 (Definitely A70) and 6 (Definitely A80 or B70).

Results and Discussion

As with previous studies, the results of study 5 support H2. Preferences for the A80 (number change) over the A70 (M = 4.76) were greater than preferences for the B70 (letter change) over the A70 (M = 4.23, t(175.82) = -2.21, $p < .05$). Similarly, participants were more willing to purchase the A80 (number change) (M = 4.63) in comparison to the A70 than the B70 (letter change) (M = 4.15) in comparison to the A70 (t(175.14) = -2.13, $p < .05$). Results of Study 5 revealed that the more positive effect of increasing numbers over ascending letters in ANBs on consumers' ANB evaluations is robust with non-numeric attribute values. Specifically, as previously discussed, in line with processing fluency, an alternative explanation for this effect could be the consistency between numbers in ANBs and numeric attribute values of the product, which could drive more positive effect of the number change, over the letter change in ANBs on consumers' brand evaluations. According to the consistency argument, ascending letters, compared to increasing numbers in ANBs should have led to more favorable ANB evaluations. However, we showed that increasing numbers, compared to ascending letters, still lead to more favorable consumer evaluations for ANBs even when attribute values are non-numeric. Thus, in support of our tendency to align theorization, increasing numeric, compared to alpha in ANBs induce expectation of an improved new product to consumers. Another contribution of Study 5 was showing that this effect is robust with unknown brands and in a non-extension context.

GENERAL DISCUSSION

As extant literature indicates often, brand name, as an extrinsic product attribute, is highly influential on consumer evaluations of products, including quality judgments and attribute assessments (Mazursky and Jacoby, 1985). ANBs lead consumers to associate letter and/or number parts of a brand name and product features, series, or new product lines (Auh and Shih, 2009; Gunasti and Ross, 2010; King and Janiszewski, 2011; Pavia and Costa, 1993). This study

contributes to extant literature by delineating alpha and numeric components of ANBs and examining the effect of each component on consumers' ANB evaluations. We address the alpha component of ANBs, and despite the descending superiority in the ordinality of the alphabet (Jou, 2003), we demonstrate that consumers evaluate a line extension formed with an ascending order of the letter in ANBs in comparison to a descending order more favorably because of strong forward-direction bias in the alphabet (Jou, 2003), resulting in strong associations of the latter letter (B compared to A) with introduction of line extensions.

We illustrate the effect of disparities between number and letter cognition in assessments of line extensions introduced by changing the letter or number components of existing ANBs. Due to differences in serial order processing between numbers and letters (Damian, 2004; Jou, 2003), consumers perceive line extensions as a larger improvement of an existing product when the number component of an ANB increases than when the order of the letter component of the ANB increases. This effect was observed with various dependent variables such as overall favorability, quality judgment, price expectation, and novelty of the product. We report variations in how consumers evaluate attribute improvements and dimensions of improvement resulting from the effect of tendency to align numeric components with numeric attribute values on subsequent judgments. We find that consumers are influenced by increases in numeric components of ANBs and align this notion of increase with increases in numeric attribute values. The tendency to align mediates the differential effect of alpha vs. numeric changes in ANBs on consumer evaluations of line extensions. Finally we increase the robustness and generalizability of our findings by replicating the effect with different stimuli, such as different number-letter pairs, numbers with more or less number of digits, and letter-number pairs in reversed order, and in various contexts, such as non-extension contexts, unknown brands, and with non-numeric

attribute values. From a theoretical perspective, by showing that the more positive effect of the number change, over the letter change, is also observed with a non-numeric attribute set, which should have favored ascending letters in ANBs according a fluency (consistency) argument, we ruled out the effect of fluency (consistency) as an alternative conceptualization. And, we provided further support for our conceptualization involving tendency to align as a mediator, which suggests that increasing numbers, compared to ascending letters in ANBs, induces notion of an improved new product to consumers, as the mechanism that drives the more positive effect of increasing numbers, over descending letters in ANBs on consumers' ANB evaluations.

Our perspective indicates that the serial order processing of numeric vs. alpha changes in ANBs leads to a variation in perceived differences between line extensions and existing products. From a managerial viewpoint, our findings provide insights into a common practice by practitioners. As previously discussed, firms change the letter or number components of existing ANBs to label line extensions. This research suggests that practitioners' current naming strategies may not be optimal. Specifically, Panasonic changes letters to imply attribute advancement (the Panasonic HDC-HS80 and the HDC-TM80, refer to the same product with different data-storage attributes), whereas Mercedes changes letters to differentiate product lines (Mercedes A, B, C E, and S define improved classes of cars). However, consumers might not perceive common use of letter-changing strategies to reflect new product lines and number-changing strategies to indicate attribute improvements as effective. This research suggests that it might be better for practitioners to use number-changing strategies to denote improved line extensions than to use letter-changing strategies. Another managerial implication is that our findings are robust when alphanumeric components occur in reversed order, such as Apple iPhone 4, 4S, 5, and 5S. Increasing numbers, over ascending letters, still result in more favorable

line extension evaluations, when the order of ANB components is reversed (e.g., iPhone 4S vs. iPhone 5S). Furthermore, as previously discussed, our findings are also robust when ANBs are unknown brands in a non-extension context. Thus, the more positive effect of increasing numbers, over ascending letters in ANBs, is not specific to line extension contexts, and can be equally important for less known or completely unknown new brands. These finding increase the generalizability of our conceptualization in terms of managerial implications.

Limitations and Future Research

This study offers new insights into ANBs, and opportunities for future research. We focus on two electronics product categories, cameras and laptops, two categories in which ANBs are predominant and successful. Extant literature suggests that widespread use of ANBs is especially prevalent in technical product categories (Auh and Shih 2009; Gunasti and Ross, 2010; Pavia and Costa, 1993). Use of cameras as stimuli serves as a baseline to understanding strong consumer reactions toward number and letter changes in ANBs. Replication with various product categories represents a research opportunity, and changing the product category might alter how consumers evaluate letter and the number changes. Another future research opportunity lies in testing the aforementioned hypotheses with varying number and/or letter combinations. This research is limited to increasing the left digit of numbers in ANBs by one unit, and increasing the order of letters by one step. One or more numeric effects such as the distance effect, defined as "the closer the perceived distance between the two analog magnitudes, the greater the difficulty in discriminating them on this scale" (Thomas and Morwitz, 2005, p. 55), might influence results. Such number-related effects might represent boundary conditions for the more positive effect of numeric changes in ANBs in comparison to alpha changes we find.

[1] Levene's test for equality of variances was significant ($F = 17.52$, $p < .01$); and the assumption of equal variances was rejected. Therefore, we report statistics for preferences using adapted degrees of freedom. This difference occurred in subsequent studies, which is why we have df values in decimals for some statistics.

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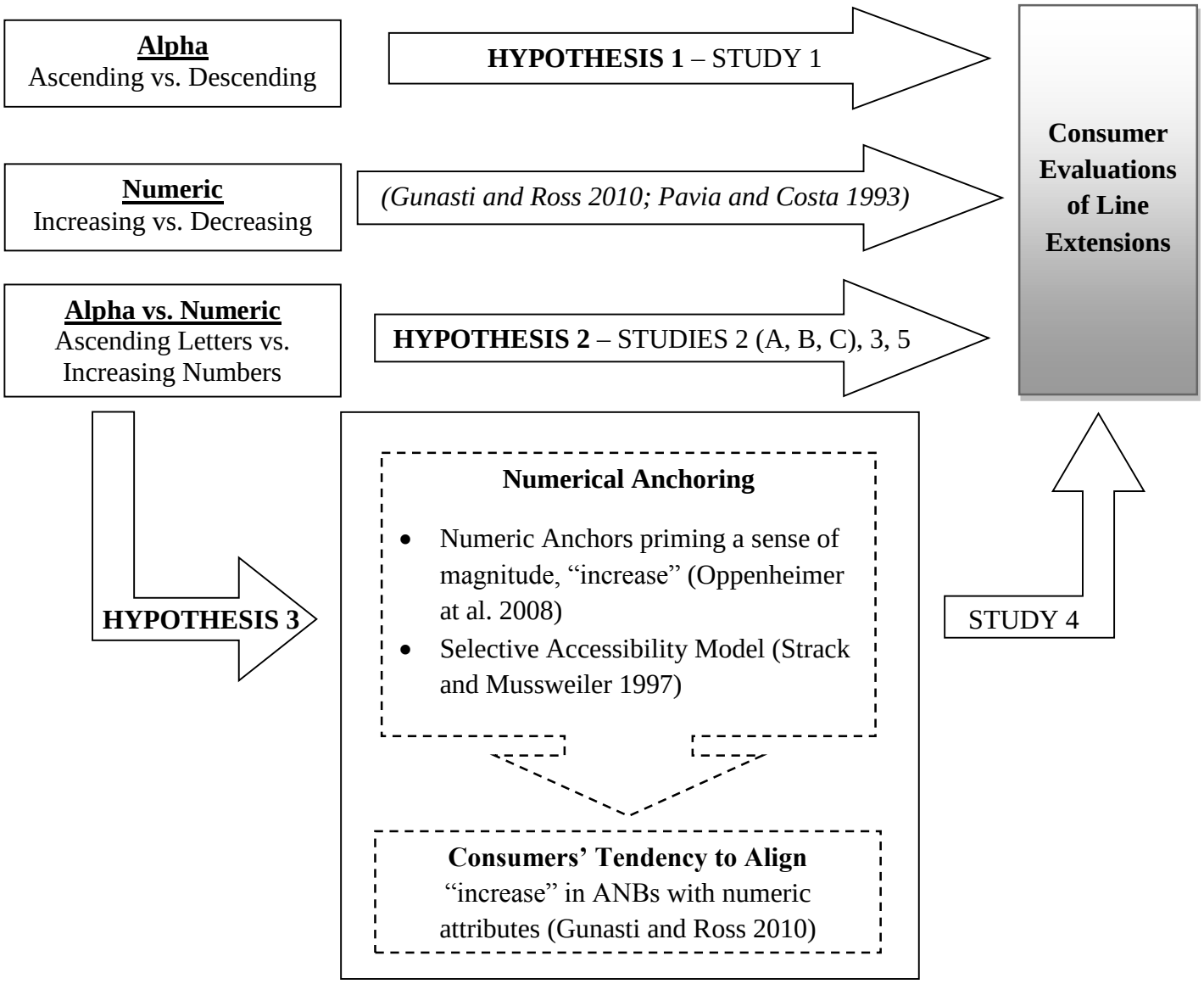
TABLE 1

SUMMARY OF ANB STRATEGIES IN LINE EXTENSIONS

Brand	**Line extensions**			
	Use of numbers	**Dimension of improvement**	**Use of letters**	**Dimension of improvement**
Audi	A**4** vs. A**6**	Engine size	**A**4 vs. **S**4	Engine type
BMW	3 **20** vs. 3 **50** **2** vs. **3** vs. **4** series	Engine size Improved classes of cars	M5 **x**Drive vs. M5 **i**Drive	Drive terrain
Mercedes	E**3**50 vs. E**5**50	Engine size	**A** vs**. B** vs**. C**	Improved classes of cars
Panasonic Camera	V**5**50 vs. V**2**50	Image Stabilizer	**TM**90 vs. **SD**90	Memory capacity
Nikon Camera	J**3** vs**.** J**4**	Pixels, size, and ISO sensitivity	**J**3 vs. **V**3	Improved classes of cameras
Lenovo Tablet	A**8** vs. A**10**	Battery and hard drive Screen size	**A**8 vs. **S**8	RAM, screen resolution, and processor
Apple	iPhone **3** vs. **4** vs. **5**	Extension	iPhone 4 vs. 4**S** iPhone 5 vs. 5**S**	Extension

FIGURE 1

CONCEPTUAL MODEL OF RESEARCH ON DELINEATING ALPHA AND NUMERIC IN ANBS



APPENDIX A

STIMULUS FOR STUDIES 1 AND 2A

Stimulus for Study 1 – Ascending Letters Condition

Dell, an electronics brand has the Dell D10 laptop model with the following key features

Existing Dell Product Specs	*Brand:* ***Dell D10***
Processor Speed (GHz)	1.8
RAM (GB)	4
Storage Capacity (GB)	320

Dell is planning to introduce a new laptop, Dell E10, in the market with the following specifications

Existing Dell Product Specs	*Brand:* ***Dell E10***
Processor Speed (GHz)	1.8
RAM (GB)	4
Storage Capacity (GB)	500

Stimulus for Study 2A

		Number Change	**Letter Change**
Canon	**Canon A70**	**Canon A80**	**Canon B70**
Digital Zoom	5x	6x	6x
Resolution (Mega Pixels)	4.0 MP	3.2 MP	3.2 MP
Optical Zoom	3.6x	3x	3x
Dependent Variables	**Mean Values**		
Relative Preference	N/A	4.02	3.05
Inference Making	N/A	2.13	1.99

APPENDIX B

STIMULUS FOR STUDY 4

Letter Change Condition – Attribute Improvement

Sony has ***Sony CyberShot A70*** digital camera product with following features:

Sony CyberShot A70	
Resolution	8.2 MP
Optical Zoom	3.6x
Digital Zoom	11x

Which of the following offerings do you think stand for ***Sony CyberShot B70***?

Single Numeric Attribute Change

Sony CyberShot B70	
Resolution	8.2 MP
Optical Zoom	5.6x
Digital Zoom	11x

Sony CyberShot B70	
Resolution	8.2 MP
Optical Zoom	3.6x
Digital Zoom	11x
Extra Memory Card	4 GB

Multiple Numeric Attribute Change

Sony CyberShot B70	
Resolution	12.2 MP
Optical Zoom	5.6x
Digital Zoom	13x

Sony CyberShot B70	
Resolution	12.2 MP
Optical Zoom	5.6x
Digital Zoom	13x
Extra Memory Card	4 GB

Letter Change Condition – Perceived Output Quality

This photograph depicts the 30x zoom version of the original image below that was taken with ***Sony CyberShot A70***. Accordingly, which one of the following do you expect to be the 30x zoom of the photo that was taken with ***Sony CyberShot B70***?