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A Cross-Cultural Study on the Effect of Decimal Separator on Price Perception

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1 Abstract

The impact of decimal separator use in prices has not received attention in previous research. The present study examines the effect of the two worldwide prevailing separators, comma and dot, on the price perception of Portuguese and US consumers via an anchoring and adjustment cognitive processing model. Both separator types were characterized in terms of their visual salience, either salient or non-salient, and contextual novelty, either familiar or novel. Price perception was measured in its negative role, as an outlay of economic resources. Applying a factorial design for multivariate testing of the hypothesized model which predicted lower price perception for salient and novel separators, the results indicated that the separators' choice has no effect on its own. In turn, an interaction among the separators' salience and novelty occurred mainly driven by two of the six presented products, possibly revealing limitations to the study. American consumers revealed generally higher levels of perceived prices than European. The study contributes by linking pricing and process numbering literature, providing several recommendations for studies to come.

1.1 Keywords

(1) Price Perception

(2) Decimal Separator

(3) Salience

(4) Novelty

2 Purpose

Few other determinants mold consumer behavior as much as the price itself. In fact, price is directly linked to perceptions as product quality (e.g. Rao & Monroe, 1989), the fairness of a deal (e.g. Bolton, Warlop & Alba, 2003), among many others. Frequently, prices influence consumers unconsciously: Ariely (2008) revealed that something simple as thinking about a specific number, either high or low, may influence consumers' willingness-to-pay.

In other words, prices and the way these are displayed and pointed mold consumer behavior. Firms adopt this knowledge to their advantage: For example, 99-ending prices have been showed to be used more frequently than integer prices (e.g. Stiving & Winer, 1997) as research has proposed a left-digit effect causing consumers to round down prices to their leftmost digits due to left-to-right processing (Thomas & Morwitz, 2005).

Despite vast pricing literature, one factor has not received any attention in research: The decimal separator. The separator is a symbol which separates the integer from the fractional part of numbers in a specific positional numeral system which are cultural constructs that express numbers under the consistent use of symbols and graphemes. Why should something apparently meaningless explain price perception?

First, as price is an *omnipresent element in all consumption situations* any information contained in it is an influential factor for consumer behavior (Lichtenstein et al. 1993), explaining the relevance of price formats. Worldwide, three decimal separator types are used, according to the underlying numeral system. Despite the existence of a distinct Arabic numeral system, the comma and dot as decimal separators are used by far more consumers. Although international effort has been realized by the International Standardization Organization (ISO) to uniform the usage of separators

towards the dot (Baum, 2006), its application remains a social consensus with historical roots (van der Waerden, 1985).

The use of decimal separators is geographically distinct: The comma is most widely used among continental Europe and South America, while most Anglophonic countries as the USA or UK as well as China and India use the dot (Figure 1 – Freedman, 2006).

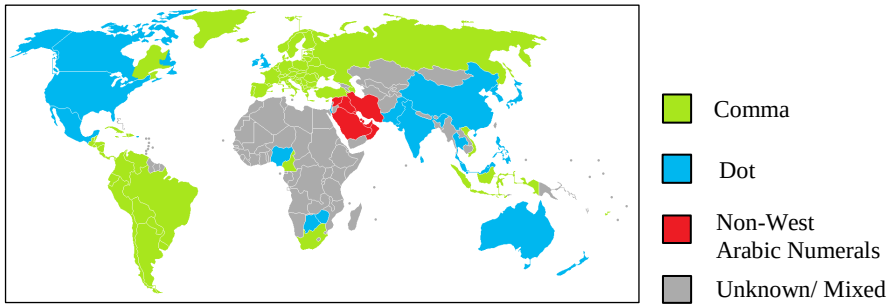

Figure 1: World according to Decimal Separator Usage

The second reason for considering the decimal separator as influential for price perception is *globalization*: Due to the widespread proliferation of the World Wide Web, financial transactions and travelling, consumers have increasingly been exposed to different price formats (concerning aspects as the size, outlay, shape and aspects as the separator) with changing separators, being noted by Freedman (2006) how "mixing these conventions holds potential to wreak havoc with international prices". These developments call for deeper investigation on how such an omnipresent symbol may influence decision making.

In this context, the cross-cultural nature of this question becomes pertinent. I postulate a theory on how numbers, or as here, prices, are encoded within an anchoring and adjustment model, conditioned by its decimal separators and present an experimental approach on how consumers with different cultural backgrounds may react distinctly to these stimuli. By that, the study intends to explore a new research field within the pricing literature focused on linking its content with that of the number processing literature.

3 Literature Review

The importance of decimal separators as determinants of price perception will be treated as part of the information encoding process of consumers which occurs during price visualization (Jacoby & Olson, 1974). An anchoring and adjustment model is used to hypothesize on the impact of salience and novelty of separators on price perception.

3.1 An Anchoring & Adjustment Model for Price Perception

Jacoby and Olson (1974) described price perception based on a stimulus-organism-response model in which price is referred to as the main cue which activates a perception process on the organism, i.e. the consumer. By acquiring, encoding and storing the consumer translates the information contained in the price into cognition, forming a price attitude. This attitude is then integrated by a behavioral response (e.g. purchasing or not). Thus, the encoding as an interpretative process of price information was found to be crucial in forming price perceptions (Berkowitz & Walton, 1980).

Lichtenstein et al. (1993) characterized price perception by seven constructs which either described price information in its negative role, i.e. uniquely as an economic cost, negatively affecting purchase probability, or in its positive role, as an indicator of higher purchase probability. In the negative role five constructs are described: Price consciousness, value consciousness, coupon proneness, sale proneness and price mavenism. In the positive role, two: Price-quality schema and prestige sensitivity. In this study, the price perception concept is going to be adapted within the boundaries of price consciousness, i.e. at which level a product price is perceived by the consumer, assuming that he is mainly concerned with paying low prices. In other words, price will be treated and measured mainly *in its negative role*.

Given the study's purpose to explore the separator's effect on price perception, the cognitions of number processing should have explanatory power. The anchoring and

adjustment heuristic states that individuals insufficiently adjust from a first approximation, the *anchor*, which is a reference point for following cognitive adjustments (Tversky, Kahneman, 1974). The model has been used in several other studies to describe how individuals make judgments, as, for example, how face value of foreign currencies influences purchase behavior (Raghubir & Srivastava, 2002; Wertenbroch, Soman & Chattopadhyay, 2007).

In this context, anchoring and adjustment has been used as an explanation for the cognitive processing of numbers. Dehaene et al. (1990) proposed a holistic model for two-digit numbers as, for example, 51 and 55, in which first the digital code of the number is "converted into an internal magnitude code on an analogical medium termed number line" (*anchor*), and in a second step, are compared per se in terms of their analogical distance on the number line, being afterwards discretely classified as either larger or smaller, the *adjustment*. However, the same study proposed a lexicographic model for the processing of more complex numbers consisting of more than two digits, stating that consumers extract (1) decade digits of two two-digit numbers to make a first approximation of the difference among both numbers and that, (2) a comparison of the unit digit is only done if both decades digits are equal.

As prices are almost always expressed in two components of digits, namely the leftmost (LMD's) and the rightmost digits (RMD's) (e.g. 19,50 in which LMD's are 19 and RMD's are 50), I postulate that the salience and novelty of the separator influences the encoding of relatively large numbers as prices because a straightforward encoding would be mentally more taxing than for one or two-digit numbers.

I propose a model in which (1) consumers encode first the LMD's of a price which form an anchor in the price perception, analogously to lexicographic encoding. The rationale for this processing is that prices have been showed to be processed from left-

to-right (Stiving & Winer, 1997) and that consumers dispose of limited memory that just store the most valuable information (Schindler & Wiman, 1989), here, LMD's. (2) The adjustment of the LMD's price perception according to the RMD's is influenced by the separator of choice as the (in-) adequate encoding of the latter ones (RMD's) is linked to the attention attributed to the separator. This notion is based on limited resource model of attention, in which an individual must divide its attention which amount depends on the consumers' level of arousal (Kahneman, 1973). A fixed pool of attention limits the capacity to correctly encode RMD's after setting LMD's as anchor because the processing activity has to be allocated to various price components.

3.2 Visual Salience of Decimal Separators

The salience of symbols (as the separator) has been described by four dimensions, namely: Semantic, numeric, worded and visual (Hyeong & Kachersky, 2006) from which the latter is one of the two factors in this study. The visual salience of an object depends on three factors which include (1) its size relative to the context it is inserted in, (2) the degree to which it stands out and (3) the strength of its physical limits (Hoffman, Singh, 1997 – Figure 2).

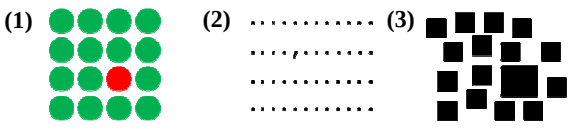

Figure 2: Examples of Visual Salience based on (1) Color (2) Shape and (3) Size

As such, I postulate that a comma is a more salient decimal separator than a dot in prices due to its larger size, its more prominent shape and thus calls for more attention.

While the information's degree of salience influences the ability to store it in memory and recall (Zukin, 1981; Tversky & Kahneman, 1974), when *attention* is affected by salience, Taylor and Thompson (1982) exemplified salience, or vividness, as

the state where an observer attributes relatively larger attention to one aspect over another. Other researchers define the concept broader and consider all stimuli as salient which catch the observer's attention (Pryor & Kriss, 1977). Also was it shown that visual salience positively influences price awareness by making unit prices on retail shelf labels visually salient. (Miyazaki, Sprott & Manning, 2000). Thus, I hypothesize:

Hypothesis 1: Main Effect of Visual Salience

A comma is more salient than a dot and thus will positively influence the attention attributed to the LMD's (*anchor*), consequently reducing the *adjustment* which should take place by the encoding of the RMD's, as numbers are processed from left-to-right and consumer dispose of a limited pool of attention. Ergo, a "comma-price" will be perceived as lower than the same price with a dot.

3.3 Novelty of the Decimal Separator

The degree to which a decimal separator is novel or not to its observer depends on the surrounding cultural and social context the observer is inserted in and is as such a contextual variable. Two forms of novelty are distinguished: *Uniqueness* and *familiarity*. Uniqueness refers to the level to which a stimulus is distinct from other (Guido, 2001). Familiarity expands this perspective, corresponding to an individual's level of formerly acquired experience with a stimulus (Baker et al. 1986). Thus, the frequency of exposure to a stimulus defines much of its perceived novelty. Consumers were shown to seek novelty in consumption choices (Hirschman, 1980), increasing the effort to interpret and encode these stimuli. Also does novel information contribute to more extensive cognitive processing and thus positively influence information recall (Lynch and Scrull, 1982) as well as the amount of attention attributed to a stimulus (Guido, 2001). Thus, for the separators' novelty on price perception I hypothesize:

Hypothesis 2: Main Effect for Novelty

A price separator not commonly used in a cultural community (*ergo* comma in US and dot in EU) is a novel stimulus to its consumers and thus will positively influence the attention attributed to LMD's (*anchor*), consequently reducing the adequacy of the *adjustment* occurring while consumers encode RMD's. Thus, a price including a novel decimal separator will be perceived as lower than the same price (converted into local currency) when using a decimal separator the observer is familiar with.

However, novelty is correlated with visual salience, as shown by Schindler et al. (1987) who showed that the likelihood of choice in a lottery game with payoffs determined by chance was greater for visually salient and thus contextual novel options. Lynch and Srulls (1982) concluded that *novelty* alone is enough to make a stimulus more salient, as novel stimuli call more attention. Consequently, a novel stimulus as an unfamiliar separator should also be perceived as more salient for price encoding, thus contributing to an even stronger effect on price perception by their interaction:

Hypothesis 3: Interaction between Salience and Novelty

When the decimal separator is salient (comma) and novel (*ergo* US consumer), the attention attached to the encoding of LMD's (*anchor*) will increase and consequently reduce the attention attributed to properly adjust the perception according to RMD's. That is, US consumer facing comma-prices will have the lowest price perception.

In graphical terms, the hypotheses can be summarized by the following figure 3:

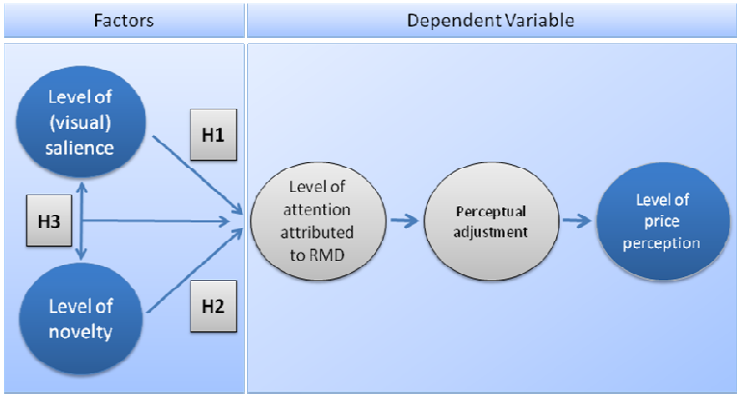

Figure 3: Hypothesized Model

4 Methodology

4.1 Model

A causal-comparative research factorial design was employed to the present study. The following table summarizes the study's operational design:

		Level of Novelty	
		Familiar	**Novel**
Level of salience	**Salient**	PT	US
	Non-salient	US	PT

Figure 4: Research Design Table

The degree of salience of decimal separators in prices is either *salient* when the comma is used, or *non-salient*, for dots. The separator's degree of novelty is either *familiar* when the consumer is used to it, or *novel*. That is, two factors are employed, each with two levels, designated as 2x2 between-subjects design.

4.2 Procedure and sample

The method of data collection was based on web-surveys. In total, four surveys, corresponding to each level of salience and novelty and geographic area (Table 2), were drafted. Only decimal separators and currency symbols were changed (either $ or €) while the prices were converted, holding everything else constant.

The two euro priced surveys were completed by 50 undergraduate students of a Portuguese business university (25 per group) while the US dollar priced surveys were completed by 50 undergraduate students of an Eastern US university (25 per group). In order to guarantee the study's validity, the respondents were not allowed to answer both surveys (comma or dot) designated to their group (PT or US), thus sending the surveys to their personal e-mail accounts to avoid this happening.

While choosing the sample, two factors were crucial. (1) *Convenience*, which refers to a sufficient number of students with personal e-mail accounts. (2) *Homogeneity of the*

student samples: By increasing the sample's consistency in terms of demographics and psychographics (e.g. lifestyle) the risk of extraneous variables (e.g. age) decreasing the validity of the study should be minimized (Hofstede & Bond, 1988). Previous cross-cultural studies have confirmed choosing students as sample (e.g. Moore et al. 2003).

While the Portuguese sample with a mean participant age of 19,4 years was slightly younger than the American with 20,6 years, the Portuguese sample was more balanced in terms of the participant's gender (appendix A). In general, homogeneity among both samples could be assured, with the sample size of 25 cases per cell being sufficient to guarantee model robustness and avoid a violation of multivariate normality.

4.3 Measurements

The surveys were developed on a renowned survey website. All were taken in English to avoid translation equivalence issues. English was assumed appropriate as US consumers' native language, as well as for the Portuguese sample as the instructions were simple to understand and followed a step-by-step approach (appendix B).

In order to measure the level of price perception, Thomas and Morwitz's (2005) five-point Likert scale was deemed appropriate as basis for the study because it measures price in its negative role as an outlay of economic resources, including a single statement for evaluation: "The product's price is high". While the statement was maintained, two more points were added to the scale in order to assure that differences among the various groups would be more easily distinguishable, ranging from "1 – very strongly disagree" to "7 – very strongly agree". The scale would be presented in horizontal format, without pre-selection to avoid a *status quo* bias.

Six products were chosen based on an adequate level of the sample's familiarity with the products (i.e. previous consumption experience), involvement and diversity to avoid

a bias in terms of consumption preference. This would facilitate price estimation and increase the response rate. All products included a short description, picture and price (appendices B&C). To avoid brand influencing price perception, all labels were visually eliminated. Also were products chosen for which brand can be assumed less relevant as these are relatively generic and thus considered quasi-commodities (e.g. pen drive). To further dilute the brand bias effect on responses the product descriptions included functional benefits to avoid a judgment based on brand associations deriving from emotionally charged descriptions (appendix C).

The prices were pointed to avoid price rounding bias (e.g. 99-ending prices), so that half of all products would end on 50 cents (e.g. 19,50). Three prices were European-based, i.e. the price was investigated on-line, adapted on a 50-ending basis and then converted to US dollars (e.g. 19,50€ → $26.27). The three remaining products had US-based prices (e.g. $3.50 → 2,59€), assuring calibration equivalence. To further guarantee equivalence across currencies, the respective Euro (€) and Dollar ($) symbols were positioned below the price and were relatively small (Figure 5).

Figure 5: Example of Product Picture with Dot-Price

4.4 Pre-tests

Pre-tests were necessary to ensure the 7-point scale's appropriateness for a specific price such that the evaluations would not fall consistently into the highest or lowest item of the scale ("extreme observations") what would decrease the probability of observing relevant differences among the groups. Despite not being possible to apply the central limit theorem (CLT: n<30), standard scores, which indicate how many standard deviations an observation lies below or above the mean, were computed to

identify outliers and the number of extreme observations measured (appendix D). Results indicated the need to adjust the product E's price slightly upwards as four observations of seventeen (23,5%) fell into the highest item and a single relatively high z-score was observed ($z \approx 2{,}21$). Product D (DVD movie) showed highest variance among all products ($\sigma \approx 1.954$), increasing the risk of extreme observations: Three observations fell into a scale end (appendix E). This possibly occurred because many respondents had overseen the information standing above the picture stating that the movie should be considered as any of personal interest (e.g. drama). To avoid this, the information was included into the description. No other adjustments were made.

5 Findings

5.1 Descriptive

Overall, the descriptive statistics for all four groups show marginally higher average price perception for the dot alternative (4,05 vs 3,935) but significantly higher for the US groups (Figure 6). Standard deviation revealed to be lower for the cases in which the decimal separator is a symbol consumers' are familiar with (appendix F).

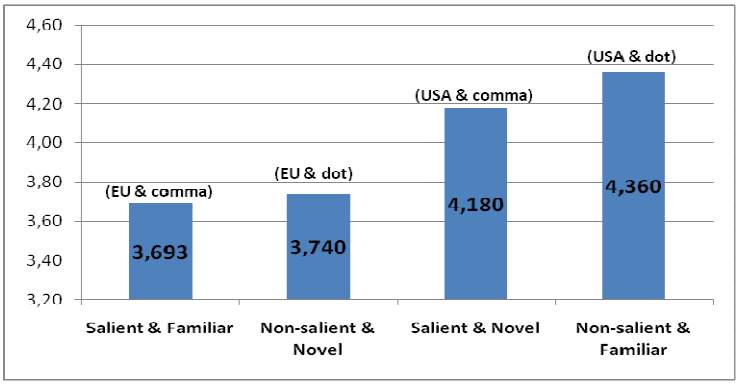

Figure 6: Mean of Perceived Prices per Sample Group

5.2 Multivariate Testing for Model

The 2x2 between-subjects model (two IV, one DV) was tested by inferential statistics (multivariate analysis of variance – MANOVA) with the Statistical Package for Social Sciences (SPSS). For all tests, the significance level was 5% (α=0,05).

The model validity was assessed by Wilk's lambda ($0 \leq \lambda \leq 1$) which is a measure of the proportion of variance of price perception which is unaccounted for by salience and novelty. The lower Wilk's λ is, the more the effect contributes to the model. Neither for salience (IV1), nor for novelty (IV2), λ reached a relevant significance level (0,561>0,05 for IV1 and 0,200>0,05 for IV2), thus neither contributing to explain the observed variance in perceived price. However, for the interaction of salience and novelty, statistical significance was obtained ($p<0,05$ or $F=4,211$ – appendix G).

When the perceived price of each product was *tested as dependent variable*, no significant difference in price perception means due to the separator's salience could be found, with the lowest p-value being 0,234 (F=1,435) for product A (appendix H). For the separator's novelty as factor no significant differences in means were discovered, either. However, here a marginally significant effect was found for product D ($p \approx 0,05$).

As indicated by overall testing, interaction was significant, driven by products D and E (appendix I), being confirmed by the corrected model (both $p<0,05$ or $F=7,192$ & 2,784 respectively) while the main effects were not significant. Adjusted R-squares, which indicate the proportion of variability in the data that is accounted for by the statistical model, revealed more explanatory power for product D than for E (0,158>0,051). (Complete test outputs on support document, pp. 11-14.)

5.3 Multivariate Testing with Constant Factor

As a significant interaction was obtained for the overall model, mainly based on strong interaction for product D and E, multivariate testing was applied to the perceived price of each product, holding one of the two factors constant, i.e. either the level of salience or novelty. As such, four multivariate analyses were conducted with one constant factor per test (Figure 7):

	Constant Factor			
	Salience	**Non-salience**	**Familiarity**	**Novelty**
Significance of Wilks' λ	0,058	0,023	0,006	0,219
Most significant products	B (p=0,034)	D (p=0,000)	D (p=0,002)	D (p=0,008)
	E (p=0,07)	E (p=0,056)		

Figure 7: Overview of Findings for Multivariate Testing with Constant Factor

Only for non-salience and familiarity as constant factors, checking for the impact of novelty and salience, respectively, Wilk's λ was significant and thus explained a relevant part of the observed variance. For constant salience, marginal significance was observed. Product D protruded being significant in explaining the differences in perceived price means in three of four multivariate procedures ($p<0,05$). Product E was marginally significant to explain differences in means for the impact of novelty when the degree of salience was held constant (comma or dot). B just appeared to be relevant for the case in which the comma was employed and tested between a US and EU group.

The tendencies in marginal perceived prices were relatively consistent, indicating for constant salience (comma), lower marginal price perception for the PT sample; for constant non-salience (dot), higher price perception for the US; for constant familiarity, lower price perception for the comma option and for constant novelty, the comma showed lower price perception. These tendencies were inverted by product F for constant salience, novelty and familiarity, by product A for constant novelty and by product B for constant non-salience. (Complete output on support document, pp. 15-38.)

5.4 Outliers

The data set was verified for outliers by computing standard scores, assuming a normal distribution (n=100, CLT). Therefore the population mean and standard deviation were calculated. No extreme outliers were detected ($z>3$), despite higher frequency of moderate outliers at the US groups (max. $z \approx 2,12$). However, moderate outliers may include valuable information and were therefore not cut off.

6 Discussion

According to the findings, no main effects for salience or novelty were identified and thus neither hypothesis one nor hypothesis two statistically confirmed. Still, if from a descriptive point-of-view the comma option revealed marginally lower price perceptions than the dot. Also must it be stated that the negative effect of comma use on price perception was approximately three times larger for the US sample than for the Portuguese (0,18 vs 0,046 – appendix J), though not statistically significant.

However, noteworthy was the interaction which occurred for the levels of salience and novelty of decimal separators, even if this finding is not consistent with hypothesis three which predicted the lowest price perception when a separator was defined as salient and novel (i.e. US consumers facing comma-prices). Instead, Portuguese consumers exposed to dot-prices (non-salient & novel) revealed the lowest relative price perception, with US consumers revealing, in general, higher perceived prices. As such, the anchoring and adjustment model's validity for price processing could not be confirmed based on the hypotheses. Several reasons may have contributed.

First, the effect of the separator's salience and novelty *may not have surpassed the necessary threshold* to provoke any effects for the first two hypotheses, probably because consumers did not attribute enough attention. Possibly this may have occurred because price encoding is an almost totally automatic cognitive task and, in general, the hypothesized attribution of attention may have inaccurately predicted the consumers' processing system. Increased cultural dilution as a consequence of globalization may also explain an increase of the threshold for the attribution of attention to the separator.

Second, the hypothesized model itself *may not properly explain number processing* for all sample groups. Consumers may have, independently from the separator, encoded the price in one step only, what would suggest holistic number processing. However, a

holistic encoding seems mentally taxing, as proposed by several price rounding studies (e.g. Thomas & Morwitz, 2005) and would also not explain the significant difference found for the interaction. Still, the marginally lower price perceptions found for the comma alternative, which was three times larger for the US sample, may indicate that US consumers, generally exposed to larger price constructs than Europeans (as the dollar is a fraction of the euro), encode prices more probably in a two-step process, so that the separator had more relevance for the adjustment according to the RMD's. This would explain why prices were perceived as higher within the boundaries of the model.

In terms of interaction, the pattern was the following: When a salient separator (comma) was employed, perceived prices increased if also novel relative to familiar; when non-salient (dot), perceived prices decreased if novel; when familiar, perceived prices increased if non-salient and when a novel separator was employed, perceived prices decreased if non-salient. These interactions were statistically significant (sig. Wilks $\lambda < 0,05$) for the cases in which non-salience and familiarity were hold constant, explaining why, in descriptive terms, perceived prices were highest for US consumers exposed to dot-prices and lowest for Portuguese consumers facing comma prices.

Taking a closer look at which products contributed to the interaction, product D was statistically significant while product F always contradicted (except for testing impact of novelty on dot) the tendencies found in marginal price perceptions, as multivariate testing with one constant factor per time revealed. Not surprisingly, this underlines the need to explore the impact of possible research limitations, because if the interaction would have been caused by the separator's choice, holding everything else constant, the interaction should have been observed systematically through all product categories. However, product D contributed more than all other products to the interaction found in the overall model. In addition, product F contradicted the general

findings (e.g. when the separator was familiar to the observer, the comma showed lower marginal price perceptions relative to the dot price for five of six products, except F). Briefly, the choice of product categories and related distinct price perceptions among both US and Portugal may have contributed to the interaction.

To explain within the hypothesized model why price perception was highest and lowest when consumers were familiar with the separator, it may be concluded that *familiarity had a positive effect on the adjustment of LMD's according to the RMD's*, even if having in attention that differences in perceived prices may derive mainly from the choice of product categories which may have distinct prices in the US and EU. The consumer's familiarity with the separator may have simply amplified this effect, as the participants may have unconsciously adapted a *posture of perceptual defense* excluding stimuli as the unfamiliar separator to protect *per se* against the possibility of misunderstanding the contained information (Schiffman & Kanuk, 1991). This would support the found interactions but not that price perception was marginally (and non-significantly) lower for the comma options.

The fact that American consumers generally perceived prices as higher than Portuguese suggests that a *cultural factor* may have played a role, besides the product choice and familiarity, as facilitating factor for perceptual adjustment. As the concept was measured in its negative role as price consciousness, i.e. in which consumers are considered to be solely worried about paying the lowest price, this may have ignored that different cultures have distinct perceptions of price, either in its negative or positive role. Despite finding evidence for relative equivalence of the various dimensions of price perception across cultures (Moore et al. 2003; Watchravesringkan, Yan & Yurchisin, 2008), mainly judging by Moore's (2003) study, US consumers revealed a more intense perception of price in comparison to his Polish sample, primarily in its

negative role and particularly in two dimensions: price mavenism ("the degree to which consumer tend to be a source of price information for other consumers to find products and places with the lowest prices, answering to other consumer's requests for marketplace price information") and sale proneness ("an increased propensity to respond to a purchase offer because the sale form in which the price is presented positively affects purchase evaluations", Lichtenstein et al, 1993). Possibly, this intense perception of US consumers of price in its negative role, which are more frequently exposed to intense sales promotions (Moore et al. 2003) than Europeans explains partially their higher price perception. This effect may have been augmented by the product choice in the present study, which are relatively low priced and for which resellers frequently adapt aggressive sales tactics to increase volume, emphasizing the perception of price as a negative market cue. I.e., if US consumers perceived the product prices mainly as outlays of economic resources, negatively affecting purchase probability, this would explain why their price perception was higher than for European.

6.1 Limitations

From a *resource-based point-of-view* the study was the limited by the difficult access to American undergraduate students. Eventually, one could have chosen more appropriate products categories if an American sample would have been available in the pre-test phase, as these could have revealed differences in price perception for some products. Although the research had statistical validity due to a sufficient large sample size, larger samples could have been valuable, as, at least in descriptive terms, the comma as a matter of fact showed generally lower perceived than the dot option.

Further, as the US surveys were sent by a local to a sample of his choice within the chosen university conditions, this possibly induced a selection bias. Farer, despite the

homogeneity of student samples across cultures, using price as a marketing fundamental among other consumer segments in Portugal would not be desirable without further analysis as different age segments may be characterized by an attribution of importance to dimensions of price perception others than price consciousness (Moore et al. 2003). Moreover, this also made it more difficult to predict and evaluate the answers' accuracy.

On the other hand, from a *content driven point-of-view*, the choice of product categories may have limited the study's results. Possibly, the local face value effect (e.g. Raghubir & Srivastava, 2002) played a role, as by simply converting prices from euros into dollars and vice-versa the distinct face value in each currency did not reflect the selected products' local pricing. Especially product D and E, which were the most significant in explaining the interaction, revealed much higher average price perceptions for the US group relative to the Portuguese (+1,46 and 1,04, respectively – appendix L).

Another effect which may have occurred is magnitude-related: Prices expressed in dollars are relatively larger than the same price in euro's, such that the RMD's in dollar prices were eventually more frequently ignored or, at least, LMD's insufficiently adjusted, due to their lower relative weight (analogous to face value effect). However, on contrary to the findings this should have revealed lower price perception for US consumers, possibly showing a higher effect of local face value than of price magnitude.

Although in absence of visual brands, some products may have been implicitly brand-related, limiting the comparative findings: For example, a sports drink may have a brand association with Gatorade, which may be much wider known in the US than a comparable brand in Europe. The different levels of brand equity in the US and EU may have influenced price perception.

7 Conclusion

In general it could not be shown that either the separators' visual salience or the novelty are drivers of price perception on their own. This may suggest that either the attention attributed to pricing separators did not exceed the necessary threshold because the encoding process is practically automatic despite the relatively high information load included in prices; Or the two-step encoding model does only apply to American consumers which are more commonly exposed to larger numbers than Portuguese, thus needing a less mentally taxing approach for number processing.

Yet, an interaction could be obtained which may be explained by the erroneous choice of products, which are possibly distinctly priced in the US and Portugal. Though this was a limitation to the study, the interaction could also be explained within the model's boundaries, as the consumers' familiarity with the separator was always underlying to the highest and lowest mean price perceptions: Familiarity may have worked as an amplifier for the interaction and facilitated the price encoding process.

Moreover, a cultural factor may have contributed to the interactions' strength, as US consumers created keener price perceptions in their negative role due to a more frequent exposure to aggressive sales tactics, insofar explaining why the price perception was highest for the US sample. However, this does not only reveal a limitation to the study, but should be understood as a motivation for further inquiry about the separators' influence on different price dimensions.

It must also be mentioned that the study was inherently risky due to its exploratory character and its intention to approach the number encoding and pricing literature by integrating a cognitive processing model. Therefore, the limitations and findings of the present study should be considered in the light of a study which is meant to be a door opener to further studies within the field.

8 Recommendations

8.1 For Business

For business, even if no straightforward recommendations can be drawn from the study's results, a conclusion important to the business world is that price formats are a field which in the future requires a higher degree of attention. The impact of distinct price formats, which can be found today in a variety of industries as, for example, the fast moving consumer goods' industry, with distinct shapes, sizes (both varying in the LMD and RMD's), colors and even touch (e.g. choice of material), should be studied in the light of purchase behavior and understood as a basis for new marketing tools. Especially for low margin business, volume is a key success factor and thus small changes in price perception are crucial. Further do such measures require low capital investments and are relatively fast to implement, so that they should be considered especially in times of economic crisis as the world is undergoing.

Firms should pay attention in adequately adjusting pricing policies, recognizing that it is not enough to convert prices from one currency to another. The face value effect of money reflects this problem, especially in businesses as tourism, where consumers tend to underspend when confronted with prices in currencies which are less valuable than their home currency, requiring from firms to proactively modify their marketing tactics.

Further, firms going into culturally distinct regions may attribute supplementary attention to which dimensions of price perception are relevant to local consumers, especially in markets where profound social, political or economic changes have take place in the recent past or still take place (e.g. China, where price is generally perceived in its negative role – Sternquist, Byun, Jin, 2004) and are thus in a phase of convergence with most Western countries where price is more frequently understood as a multi-dimensional construct with positive and negative associations (Moore et al. 2003).

8.2 For Future Research

Some of the number processing literature has been built on how fast consumers are able to compare numbers (Dehaene et al. 1990). This research design could also be interesting for future research on the separator's impact on number processing and, in last instance, on price perception, providing a more reliable model for future research.

Other price rounding related research has already revealed that consumers adjust prices insufficiently, for example, in the case of 99-ending prices, i.e. RMD's (e.g. Steven & Winer, 1997). By testing for differences in price perception and/or recall, given both separators used in this research, their role in encoding prices could be further clarified. It could also be useful to investigate the influence of either comma or dot in their role as thousand case separators (e.g. 10,000 vs 10.000).

The use of smaller, three-digit prices could be practical (e.g. 0,50€) because this would increase the relative importance of the RMD's in the price magnitude, even if this effect was lower than the face value effect (limitations). This would make it possible to study the separator's effect on perceptual adjustment with higher accuracy.

Taking into account the multi-dimensionality of price perception future research should examine whether the separator has a relevant effect on other dimensions, for example, in its positive role as an indicator of product quality. It may be possible that the separator is related to concepts of intrinsic values such as product quality via the country-of-origin effect, as the comma is despite all globalization, a European symbol.

Finally, the present study did reveal a lack of formal research on price formats or tags. Testing whether, for example, the size or shape of RMD's has an effect on price encoding would be valuable to confirm the relevance of the two factors employed be the present study in forming price perceptions. This could also include a longitudinal study comparing the effect of non-salient to salient price formats in terms of consumer recall.

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10 Appendices

Appendix A: Sample Information

Sample	n	Average age	Gender (M/F%)	Nationality
Comma & PT	25	19,24	32/68	Portuguese (100%)
Dot & PT	25	19,56	60/40	Portuguese (100%)
Comma & US	25	20,32	72/28	USA (100%)
Dot & US	25	20,88	64/36	USA (≈81%); Others* (≈19%)
TOTAL/ AVG.	**100**	**20,00**	**57/43**	*Ireland, India, Cape Verde, Canada (all permanent residents)

The total raw data can be found in the support document.

Appendix B: Survey Outline (in column form)

1. Purpose

Thank you very much for following the link.

This survey is part of a Master in Management thesis of the Faculdade de Economia da Universidade Nova de Lisboa (Portugal). For further information, consult http://www.fe.unl.pt/.
In total, you will be asked to rate the price of six products. To do your evaluation, please consider description and price as given and do not consult external sources (e.g. internet, friends).

All data is treated confidentially.

a. Please indicate your age.
b. Indicate your gender.
c. Indicate your nationality.
d. Indicate your country of residence.

(a)-d) were multiple choice questions)

2. Pen

3-in-1 twist design with black ink, stylus and pencil, solid brass cap and barrel.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:
"The product's price is high."

3. USB Pen

8GB USB pen, easy-to-handle.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:
"The product's price is high."

4. Wireless mouse

Wireless mouse, plug&play, highly precise, USB adapter included.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

5. DVD movie

Recently launched. Length: 120min. and extra scenes 45min. Subtitles. Dolby Surround, HD (For this evaluation, consider any movie which you are particular interested in).

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

6. Dictionary software

Instant access to 225000 definitions & 340000 synonyms and antonyms, 21 search options, audio pronunciations, partially downloadable to mobile devices.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

7. Sports Drink

Isotonic drink, free from additives. 500ml. Multiple flavors. (Price per bottle)

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

8. End

Thank you for taking the survey. [Done]

Screenshots from the survey website can be found in the support document.

Appendix C: Products, Designation, Category & Price

Product	Designation	Category	Price
3-in-1 pen	A	Office equipment	3,50€ = 4.71$*
Memory pen	B	Electronic apparels	16,50€ = 22.24$*
Wireless mouse	C	Electronic apparels	25.50$ = 18,90€*
DVD movie	D	Entertainment	19,50€ = 26.27$*
Dictionary software	E	Software	20.50$ = 15,19€*
Sports drink	F	Beverages	3.50$ = 2,59€*

*converted at exchange rates of 1€=1.34767US$ or 1US$=0,742024€ (05/04/2010 @ 12:30UTC)

Appendix D: Pre-Test Data

Sample	n	Mean age	Gender (M/F%)	Nationality
Comma & PT	17	22,765	47/53	Portuguese (88%) Other (12%)

The raw data from the pre-test can be found in the support document.

Appendix E: Descriptive Statistics from Pre-test

Products	A	B	C	D	E	F
Mean	3,706	4	4,294	4,235	2,706	4,176
Standard deviation	1,724	1,768	1,160	**1,953**	1,490	1,590
# of observations in item 1	2	2	0	1	**4**	1
# of observations in item 7	1	1	0	**3**	0	1
# of moderate outliers[1]	3	3	1	1	2	2
# of extreme outliers[2]	0	0	0	0	0	0

[1] z < -1,5 or z > 1,5 [2] z < -3 or z > 3. Outlier detection can be found in the support document.

Appendix F: Descriptive Statistics of Findings

	Salient (comma)				Non-salient (dot)			
	Familiar (EU)		Novel (US)		Familiar (US)		Novel (EU)	
Products	x[1]	s[2]	x	s	x	s	x	s
A	3,96	1,65	4,08	2,00	4,64	1,70	4,24	1,64
B	3,48	1,78	4,56	1,71	4,16	1,62	4,24	1,98
C	3,36	1,41	4,08	1,66	3,76	1,30	3,64	1,80
D	3,72	1,17	4,52	1,98	5,16	1,84	3,04	2,00
E	2,88	1,94	3,88	1,88	4,32	1,93	3,24	1,96
F	4,76	1,59	3,96	1,77	4,12	1,96	4,04	1,99
Average	**3,69**	**1,59**	**4,18**	**1,83**	**4,36**	**1,73**	**3,74**	**1,90**

Note: 1 = lowest price perception 7 = highest price perception

[1]Mean [2]Standard deviation

Appendix G: Multivariate Test [b] and Overall Model Validity

Effect	Value	F	Hypothesis df	Error df	Significance
Intercept	0,058	2,482E2	6,000	91,000	0,000
IV1 (Level of salience)	0,949	**,815**[a]	6,000	91,000	**0,561**
IV2 (Level of novelty)	2	**1,462**[a]	6,000	91,000	**0,200**
IV1 * IV2 (Interaction)	1	**4,211**[a]	6,000	91,000	**0,001**

a. Exact statistic b. Design: Intercept + IV1 + IV2 + IV1 * IV2

The complete test output from SPSS can be found in the support document.

Appendix H: Test of Between-Subject Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	6,590[1]	3	2,197	0,715	0,546
	DVB	15,470[2]	3	5,157	1,627	0,188
	DVC	6,670[3]	3	2,223	0,92	0,434
	DVD	64,190[4]	3	21,397	**7,192**	**0,000**
	DVE	31,080[5]	3	10,36	**2,784**	**0,045**
	DVF	10,040[6]	3	3,347	0,994	0,399
IV1[a]	DVA	4,41	1	4,41	**1,435**	**0,234**
	DVB	0,81	1	0,81	0,256	0,614
	DVC	0,01	1	0,01	0,004	0,949
	DVD	0,01	1	0,01	0,003	0,954
	DVE	4	1	4	1,075	0,302
	DVF	1,96	1	1,96	0,582	0,447

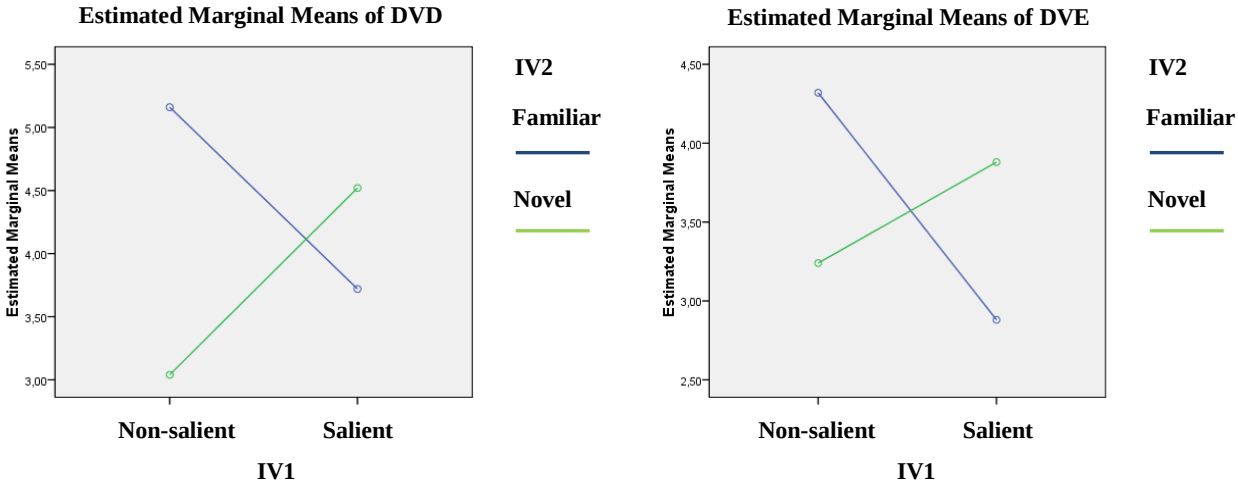
IV2[b]	DVA	0,49	1	0,49	0,159	0,691
	DVB	8,41	1	8,41	2,653	0,107
	DVC	2,25	1	2,25	0,931	0,337
	DVD	10,89	1	10,89	**3,661**	**0,059**
	DVE	0,04	1	0,04	0,011	0,918
	DVF	4,84	1	4,84	1,438	0,233
IV1 * IV2[c]	DVA	1,69	1	1,69	0,55	0,460
	DVB	6,25	1	6,25	1,972	0,164
	DVC	4,41	1	4,41	1,825	0,180
	DVD	53,29	1	53,29	**17,913**	**0,000**
	DVE	27,04	1	27,04	**7,266**	**0,008**
	DVF	3,24	1	3,24	0,963	0,329

[a] Level of salience [b] Level of novelty [c] Interaction of salience with novelty

1. R^2=,022 (Adjusted R^2= -,009); 2. R^2=,048 (Adj. R^2= ,019); 3. R^2=,028 (Adj. R^2= -,002); 4. R^2=,184 (Adj. R^2= ,158); 5. R^2=,080 (Adj. R^2= ,051); 6. R^2=,030 (Adj. R^2= ,000)

The dependent variables (DVA-F) are the perceived prices for each product per observation (n = 100). The sources Intercept, Error, Total and Corrected Total can be found in the support document.

Appendix I: Graphical Interaction for Products D & E



Appendix J: Differences in Mean Price Perception per Product and Cultural Community

Products	Mean Perceived Price in PT	Mean Perceived Price in US	Difference (US-PT)
A	4,1	4,36	0,26
B	3,86	4,36	0,5
C	3,5	3,92	0,42
D	3,38	4,84	**1,46**
E	3,06	4,1	**1,04**
F	4,4	4,04	-0,36

The above table confirms that product D and E are mainly responsible for driving the interaction.

FACULDADE DE ECONOMIA DA UNIVERSIDADE NOVA DE LISBOA

Support Document for Work Project

Part of the thesis: "A Cross-Cultural Study on the Effect of Decimal Separator on Price Perception"

Author
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#15000441

A PROJECT CARRIED OUT ON THE MASTER IN MANAGEMENT PROGRAM (MSC) WITH MAJOR IN MARKETING UNDER THE SUPERVISION OF:

ASSISTANT PROFESSOR OF MARKETING

ELS DE WILDE

June 2010

Table of Contents

1 Pre-Test Statistics: Outlier detection

Age	Gender	Nationality	Pen	z	USB Pen	z	Wirel. Mouse	z	DVD Movie	z	Dict. Software	z	Sports drink	z-scores
22	F	Portugal	1	**-1,570**	4	0,000	4	-0,254	2	-1,144	1	-1,145	7	**1,775**
23	M	Portugal	7	**1,911**	1	**-1,697**	3	-1,116	7	1,415	2	-0,474	6	1,147
21	M	Portugal	5	0,751	5	0,566	6	1,471	7	1,415	4	0,868	3	-0,740
22	M	Portugal	5	0,751	5	0,566	5	0,609	4	-0,120	4	0,868	3	-0,740
22	F	S.T.&P.	4	0,171	6	1,131	5	0,609	4	-0,120	1	-1,145	5	0,518
22	F	Portugal	6	1,331	4	0,000	6	1,471	7	1,415	5	**1,540**	5	0,518
24	M	Portugal	4	0,171	3	-0,566	4	-0,254	3	-0,632	3	0,197	4	-0,111
21	F	Portugal	2	-0,990	2	-1,131	6	1,471	3	-0,632	2	-0,474	2	-1,368
24	F	Portugal	4	0,171	4	0,000	3	-1,116	3	-0,632	1	-1,145	4	-0,111
25	M	Portugal	4	0,171	6	1,131	4	-0,254	2	-1,144	1	-1,145	6	1,147
23	F	Portugal	5	0,751	7	**1,697**	4	-0,254	2	-1,144	2	-0,474	4	-0,111
23	M	Portugal	1	**-1,570**	5	0,566	5	0,609	1	**-1,656**	3	0,197	1	**-1,997**
24	M	Portugal	3	-0,410	2	-1,131	3	-1,116	5	0,391	2	-0,474	6	1,147
22	F	Portugal	5	0,751	1	**-1,697**	2	**-1,978**	5	0,391	2	-0,474	4	-0,111
23	M	Portugal	2	-0,990	3	-0,566	4	-0,254	5	0,391	4	0,868	3	-0,740
21	F	Portugal	2	-0,990	5	0,566	4	-0,254	6	0,903	3	0,197	3	-0,740
25	F	Brazil	3	-0,410	5	0,566	5	0,609	6	0,903	6	**2,211**	5	0,518
		Average	**3,706**		**4,000**		**4,294**		**4,235**		**2,706**		**4,176**	
		St.dev.	**1,724**		**1,768**		**1,160**		**1,954**		**1,490**		**1,590**	

7 = Highest price perception | 1 = Lowest price perception

Moderate outliers: -1,5 > z and 1,5 > z
Extreme outliers: -3 > z and 3 > z

2 Number of Extreme Observations in Pre-Tests

Products	A	B	C	D	E	F
Item 1	2	2	0	1	**4**	1
Item 7	1	1	0	3	**0**	1

3 Raw Data from Surveys with Basic Descriptive Statistics

Age	Gender	SALIENT, FAMILIAR	A	B	C	D	E	F
19	M	Portugal	5	5	5	3	3	4
18	F	Portugal	4	6	4	3	4	5
19	F	Portugal	3	5	5	3	7	6
18	F	Portugal	2	2	1	5	1	6
18	M	Portugal	5	1	2	6	1	6
19	F	Portugal	2	4	3	4	2	7
18	F	Portugal	4	1	2	4	5	2
18	F	Portugal	7	1	4	5	1	5
18	F	Portugal	2	3	1	5	1	5
19	F	Portugal	6	3	4	6	6	2
18	M	Portugal	4	6	2	5	2	4
21	M	Portugal	5	4	3	2	3	4
27	M	Portugal	4	4	5	3	6	7
18	F	Portugal	3	3	2	3	3	3
19	F	Portugal	5	2	4	4	2	6
18	F	Portugal	5	2	4	3	6	3
18	M	Portugal	3	2	4	4	4	4
18	M	Portugal	4	7	3	5	1	7
18	F	Portugal	6	3	4	3	2	3
20	M	Portugal	6	3	2	2	1	4
19	F	Portugal	5	2	3	3	1	6
18	F	Portugal	2	6	6	3	1	7
18	F	Portugal	1	4	3	4	2	6
28	F	Portugal	5	6	6	2	2	4
19	F	Portugal	1	2	2	3	5	3
19,24	**32,00%**	**Average**	**3,96**	**3,48**	**3,36**	**3,72**	**2,88**	**4,76**
	68,00%							
Age	**Gender**	**NON-SALIENT, NOVEL**	**A**	**B**	**C**	**D**	**E**	**F**
19	F	Portugal	3	2	4	4	4	5
20	M	Portugal	3	6	3	1	1	6
19	F	Portugal	3	2	2	1	1	3
19	M	Portugal	5	3	6	6	4	6
20	F	Portugal	3	3	2	2	1	1
21	M	Portugal	4	6	6	5	7	5
20	F	Portugal	5	7	3	2	4	2
19	F	Portugal	5	5	6	6	7	3
20	F	Portugal	5	2	2	4	6	5
19	M	Portugal	7	7	7	2	3	7
19	F	Portugal	7	7	7	2	1	7
19	M	Portugal	4	6	4	5	2	5
20	M	Portugal	2	6	3	3	4	2
21	F	Portugal	7	3	4	3	2	1

19	M	Portugal	5	6	5	2	3	2
20	M	Portugal	3	7	3	2	1	7
20	M	Portugal	4	3	1	1	1	2
19	M	Portugal	4	6	3	6	6	5
19	M	Portugal	2	2	2	5	4	5
20	M	Portugal	5	3	3	5	3	5
20	M	Portugal	3	3	2	2	3	2
19	M	Portugal	4	2	3	4	3	2
19	F	Portugal	5	4	6	1	3	5
20	M	Portugal	1	1	1	1	1	2
19	F	Portugal	7	4	3	1	6	6
19,56	**60,00%**	**Average**	**4,24**	**4,24**	**3,64**	**3,04**	**3,24**	**4,04**
	40,00%							
Age	**Gender**	**SALIENT, NOVEL**	**A**	**B**	**C**	**D**	**E**	**F**
22	F	United States of America	2	3	3	2	3	3
20	M	United States of America	1	4	4	3	3	2
20	M	United States of America	4	2	3	1	2	4
18	M	United States of America	2	6	6	3	4	1
18	F	United States of America	1	6	7	5	4	5
22	F	United States of America	7	6	4	7	2	6
20	M	United States of America	4	5	4	6	7	6
20	M	United States of America	5	7	3	7	3	4
25	M	United States of America	4	6	6	7	7	2
20	F	United States of America	2	5	2	2	3	6
19	M	United States of America	5	5	5	4	5	4
20	M	United States of America	7	4	5	6	3	7
20	M	United States of America	5	3	4	5	3	3
19	F	United States of America	3	5	7	4	7	6
19	M	United States of America	7	5	2	4	1	1
19	M	United States of America	5	4	4	5	3	4
22	F	United States of America	3	4	4	3	2	4
22	M	United States of America	2	1	1	1	1	1
20	M	United States of America	5	5	4	3	4	3
19	F	United States of America	6	4	3	6	7	4
18	M	United States of America	3	7	6	7	5	3
19	M	United States of America	7	1	2	5	4	4
20	M	United States of America	6	7	6	7	3	5
20	M	United States of America	1	3	2	7	7	7
27	M	United States of America	5	6	5	3	4	4
20,32	**72,00%**	**Average**	**4,08**	**4,56**	**4,08**	**4,52**	**3,88**	**3,96**
	28,00%							
Age	**Gender**	**NON-SALIENT, FAMILIAR**	**A**	**B**	**C**	**D**	**E**	**F**
24	M	United States of America	5	6	5	7	5	5
22	M	United States of America	3	3	3	1	2	2

20	F	Ireland	6	5	4	4	3	5
19	F	United States of America	6	7	6	4	2	4
25	M	India	4	6	3	5	6	4
20	F	United States of America	5	4	4	7	7	1
21	M	United States of America	7	3	3	5	7	6
20	F	United States of America	7	6	6	6	7	5
22	M	United States of America	5	3	1	5	3	7
21	M	United States of America	5	6	3	6	2	7
20	F	Cape Verde	4	3	5	5	7	4
22	M	United States of America	6	2	3	7	4	4
19	M	United States of America	4	2	6	3	4	4
21	F	United States of America	5	3	3	6	4	7
21	M	United States of America	3	5	4	2	3	1
18	F	United States of America	5	3	4	7	4	2
24	M	United States of America	3	1	4	2	3	1
20	M	United States of America	1	3	3	3	1	1
20	F	United States of America	6	5	3	7	2	4
20	M	United States of America	2	4	2	6	7	7
19	F	Canada	2	3	4	6	7	5
20	M	United States of America	3	5	3	7	5	4
24	M	United States of America	5	4	3	4	5	4
20	M	United States of America	7	5	3	7	3	3
20	M	United States of America	7	7	6	7	5	6
20,88	**64,00%**	**Average**	**4,64**	**4,16**	**3,76**	**5,16**	**4,32**	**4,12**
	36,00%							

4 Outlier Detection for Raw Data: Standard z-scores

Obs.	SALIENT, FAMILIAR	A	B	C	D	E	F
1	Portugal	0,441076	0,4951938	0,830962	-0,5905231	-0,2928386	-0,1199261
2	Portugal	-0,13175	1,0515912	0,1868054	-0,5905231	0,2120555	0,4251927
3	Portugal	-0,704576	0,4951938	0,830962	-0,5905231	**1,726738**	0,9703115
4	Portugal	-1,277402	-1,1739987	**-1,74566**	0,4734825	-1,3026269	0,9703115
5	Portugal	0,441076	**-1,7304**	-1,1015078	1,0054853	-1,3026269	0,9703115
6	Portugal	-1,277402	-0,0612037	-0,4573512	-0,0585203	-0,7977328	**1,51543**
7	Portugal	-0,13175	**-1,7304**	-1,1015078	-0,0585203	0,7169497	-1,2101638
8	Portugal	**1,586728**	**-1,7304**	0,1868054	0,4734825	-1,3026269	0,4251927
9	Portugal	-1,277402	-0,6176012	**-1,74566**	0,4734825	-1,3026269	0,4251927
10	Portugal	1,0139021	-0,6176012	0,1868054	1,0054853	1,2218439	-1,2101638
11	Portugal	-0,13175	1,0515912	-1,1015078	0,4734825	-0,7977328	-0,1199261
12	Portugal	0,441076	-0,0612037	-0,4573512	-1,1225259	-0,2928386	-0,1199261
13	Portugal	-0,13175	-0,0612037	0,830962	-0,5905231	1,2218439	**1,51543**
14	Portugal	-0,704576	-0,6176012	-1,1015078	-0,5905231	-0,2928386	-0,665045
15	Portugal	0,441076	-1,1739987	0,1868054	-0,0585203	-0,7977328	0,9703115

16	Portugal	0,441076	-1,1739987	0,1868054	-0,5905231	1,2218439	-0,665045
17	Portugal	-0,704576	-1,1739987	0,1868054	-0,0585203	0,2120555	-0,1199261
18	Portugal	-0,13175	**1,607989**	-0,4573512	0,4734825	-1,3026269	**1,51543**
19	Portugal	1,0139021	-0,6176012	0,1868054	-0,5905231	-0,7977328	-0,665045
20	Portugal	1,0139021	-0,6176012	-1,1015078	-1,1225259	-1,3026269	-0,1199261
21	Portugal	0,441076	-1,1739987	-0,4573512	-0,5905231	-1,3026269	0,9703115
22	Portugal	-1,277402	1,0515912	1,4751187	-0,5905231	-1,3026269	**1,51543**
23	Portugal	**-1,85023**	-0,0612037	-0,4573512	-0,0585203	-0,7977328	0,9703115
24	Portugal	0,441076	1,0515912	1,4751187	-1,1225259	-0,7977328	-0,1199261
25	Portugal	**-1,85023**	-1,1739987	-1,1015078	-0,5905231	0,7169497	-0,665045
	NON-SALIENT, NOVEL	**A**	**B**	**C**	**D**	**E**	**F**
26	Portugal	-0,704576	-1,1739987	0,1868054	-0,0585203	0,2120555	0,4251927
27	Portugal	-0,704576	1,0515912	-0,4573512	**-1,65453**	-1,3026269	0,9703115
28	Portugal	-0,704576	-1,1739987	-1,1015078	**-1,65453**	-1,3026269	-0,665045
29	Portugal	0,441076	-0,6176012	1,4751187	1,0054853	0,2120555	0,9703115
30	Portugal	-0,704576	-0,6176012	-1,1015078	-1,1225259	-1,3026269	**-1,75528**
31	Portugal	-0,13175	1,0515912	1,4751187	0,4734825	**1,726738**	0,4251927
32	Portugal	0,441076	**1,607989**	-0,4573512	-1,1225259	0,2120555	-1,2101638
33	Portugal	0,441076	0,4951938	1,4751187	1,0054853	**1,726738**	-0,665045
34	Portugal	0,441076	-1,1739987	-1,1015078	-0,0585203	1,2218439	0,4251927
35	Portugal	**1,586728**	**1,607989**	**2,119275**	-1,1225259	-0,2928386	**1,51543**
36	Portugal	**1,586728**	**1,607989**	**2,119275**	-1,1225259	-1,3026269	**1,51543**
37	Portugal	-0,13175	1,0515912	0,1868054	0,4734825	-0,7977328	0,4251927
38	Portugal	-1,277402	1,0515912	-0,4573512	-0,5905231	0,2120555	-1,2101638
39	Portugal	**1,586728**	-0,6176012	0,1868054	-0,5905231	-0,7977328	**-1,75528**
40	Portugal	0,441076	1,0515912	0,830962	-1,1225259	-0,2928386	-1,2101638
41	Portugal	-0,704576	**1,607989**	-0,4573512	-1,1225259	-1,3026269	**1,51543**
42	Portugal	-0,13175	-0,6176012	**-1,74566**	**-1,65453**	-1,3026269	-1,2101638
43	Portugal	-0,13175	1,0515912	-0,4573512	1,0054853	1,2218439	0,4251927
44	Portugal	-1,277402	-1,1739987	-1,1015078	0,4734825	0,2120555	0,4251927
45	Portugal	0,441076	-0,6176012	-0,4573512	0,4734825	-0,2928386	0,4251927
46	Portugal	-0,704576	-0,6176012	-1,1015078	-1,1225259	-0,2928386	-1,2101638
47	Portugal	-0,13175	-1,1739987	-0,4573512	-0,0585203	-0,2928386	-1,2101638
48	Portugal	0,441076	-0,0612037	1,4751187	**-1,65453**	-0,2928386	0,4251927
49	Portugal	**-1,85023**	**-1,7304**	**-1,74566**	**-1,65453**	-1,3026269	-1,2101638
50	Portugal	**1,586728**	-0,0612037	-0,4573512	**-1,65453**	1,2218439	0,9703115
	SALIENT, NOVEL	**A**	**B**	**C**	**D**	**E**	**F**
51	United States of America	-1,277402	-0,6176012	-0,4573512	-1,1225259	-0,2928386	-0,665045
52	United States of America	**-1,85023**	-0,0612037	0,1868054	-0,5905231	-0,2928386	-1,2101638
53	United States of America	-0,13175	-1,1739987	-0,4573512	**-1,65453**	-0,7977328	-0,1199261
54	United States of America	-1,277402	1,0515912	1,4751187	-0,5905231	0,2120555	**-1,75528**
55	United States of America	**-1,85023**	1,0515912	**2,119275**	0,4734825	0,2120555	0,4251927
56	United States of America	**1,586728**	1,0515912	0,1868054	**1,537488**	-0,7977328	0,9703115
57	United States of America	-0,13175	0,4951938	0,1868054	1,0054853	**1,726738**	0,9703115
58	United States of America	0,441076	**1,607989**	-0,4573512	**1,537488**	-0,2928386	-0,1199261

59	United States of America	-0,13175	1,0515912	1,4751187	**1,537488**	**1,726738**	-1,2101638
60	United States of America	-1,277402	0,4951938	-1,1015078	-1,1225259	-0,2928386	0,9703115
61	United States of America	0,441076	0,4951938	0,830962	-0,0585203	0,7169497	-0,1199261
62	United States of America	**1,586728**	-0,0612037	0,830962	1,0054853	-0,2928386	**1,51543**
63	United States of America	0,441076	-0,6176012	0,1868054	0,4734825	-0,2928386	-0,665045
64	United States of America	-0,704576	0,4951938	**2,119275**	-0,0585203	**1,726738**	0,9703115
65	United States of America	**1,586728**	0,4951938	-1,1015078	-0,0585203	-1,3026269	**-1,75528**
66	United States of America	0,441076	-0,0612037	0,1868054	0,4734825	-0,2928386	-0,1199261
67	United States of America	-0,704576	-0,0612037	0,1868054	-0,5905231	-0,7977328	-0,1199261
68	United States of America	-1,277402	**-1,7304**	**-1,74566**	**-1,65453**	**-1,30263**	**-1,75528**
69	United States of America	0,441076	0,4951938	0,1868054	-0,5905231	0,2120555	-0,665045
70	United States of America	1,0139021	-0,0612037	-0,4573512	1,0054853	**1,726738**	-0,1199261
71	United States of America	-0,704576	**1,607989**	1,4751187	**1,537488**	0,7169497	-0,665045
72	United States of America	**1,586728**	**-1,7304**	-1,1015078	0,4734825	0,2120555	-0,1199261
73	United States of America	1,0139021	**1,607989**	1,4751187	**1,537488**	-0,2928386	0,4251927
74	United States of America	**-1,85023**	-0,6176012	-1,1015078	**1,537488**	**1,726738**	**1,51543**
75	United States of America	0,441076	1,0515912	0,830962	-0,5905231	0,2120555	-0,1199261
	NON-SALIENT, FAMILIAR	**A**	**B**	**C**	**D**	**E**	**F**
76	United States of America	0,441076	1,0515912	0,830962	**1,537488**	0,7169497	0,4251927
77	United States of America	-0,704576	-0,6176012	-0,4573512	**-1,65453**	-0,7977328	-1,2101638
78	Ireland	1,0139021	0,4951938	0,1868054	-0,0585203	-0,2928386	0,4251927
79	United States of America	1,0139021	**1,607989**	1,4751187	-0,0585203	-0,7977328	-0,1199261
80	India	-0,13175	1,0515912	-0,4573512	0,4734825	1,2218439	-0,1199261
81	United States of America	0,441076	-0,0612037	0,1868054	**1,537488**	**1,726738**	**-1,75528**
82	United States of America	**1,586728**	-0,6176012	-0,4573512	0,4734825	**1,726738**	0,9703115
83	United States of America	**1,586728**	1,0515912	1,4751187	1,0054853	**1,726738**	0,4251927
84	United States of America	0,441076	-0,6176012	**-1,74566**	0,4734825	-0,2928386	**1,51543**
85	United States of America	0,441076	1,0515912	-0,4573512	1,0054853	-0,7977328	**1,51543**
86	Cape Verde	-0,13175	-0,6176012	0,830962	0,4734825	**1,726738**	-0,1199261
87	United States of America	1,0139021	-1,1739987	-0,4573512	**1,537488**	0,2120555	-0,1199261
88	United States of America	-0,13175	-1,1739987	1,4751187	-0,5905231	0,2120555	-0,1199261
89	United States of America	0,441076	-0,6176012	-0,4573512	1,0054853	0,2120555	**1,51543**
90	United States of America	-0,704576	0,4951938	0,1868054	-1,1225259	-0,2928386	**-1,75528**
91	United States of America	0,441076	-0,6176012	0,1868054	**1,537488**	0,2120555	-1,2101638
92	United States of America	-0,704576	**-1,7304**	0,1868054	-1,1225259	-0,2928386	**-1,75528**
93	United States of America	**-1,85023**	-0,6176012	-0,4573512	-0,5905231	-1,3026269	**-1,75528**
94	United States of America	1,0139021	0,4951938	-0,4573512	**1,537488**	-0,7977328	-0,1199261
95	United States of America	-1,277402	-0,0612037	-1,1015078	1,0054853	**1,726738**	**1,51543**
96	Canada	-1,277402	-0,6176012	0,1868054	1,0054853	**1,726738**	0,4251927
97	United States of America	-0,704576	0,4951938	-0,4573512	**1,537488**	0,7169497	-0,1199261
98	United States of America	0,441076	-0,0612037	-0,4573512	-0,0585203	0,7169497	-0,1199261
99	United States of America	**1,586728**	0,4951938	-0,4573512	**1,537488**	-0,2928386	-0,665045
100	United States of America	**1,586728**	**1,607989**	1,4751187	**1,537488**	0,7169497	0,9703115

7 = Highest price perception | 1 = Lowest price perception

Moderate outliers: -1,5 > z and 1,5 > z
Extreme outliers: -3 > z and 3 > z

Population means and standard deviations were computed from the above raw data in order to compute the respective z-scores. The formula used to compute the z-score comes below.

	Pop. Mean	Pop. St. Dev.
A	**4,23**	**1,745731**
B	**4,11**	**1,797276**
C	**3,71**	**1,552417**
D	**4,11**	**1,879689**
E	**3,58**	**1,980613**
F	**4,22**	**1,834462**

$$z = \frac{X - \mu}{\sigma}$$

5 Multivariate Test [b] and Overall Model Validity

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	**Pillai's Trace**	,942	2,482E2	6,000	91,000	,000
	Wilks' Lambda	,058	2,482E2	6,000	91,000	,000
	Hotelling's Trace	16,362	2,482E2	6,000	91,000	,000
	Roy's Largest Root	16,362	2,482E2	6,000	91,000	,000
IV1 (Level Of Salience)	**Pillai's Trace**	,051	,815[a]	6,000	91,000	,561
	Wilks' Lambda	,949	**,815[a]**	6,000	91,000	**,561**
	Hotelling's Trace	,054	,815[a]	6,000	91,000	,561
	Roy's Largest Root	,054	,815[a]	6,000	91,000	,561
IV2 (Level Of Novelty)	**Pillai's Trace**	,088	1,462[a]	6,000	91,000	,200
	Wilks' Lambda	,912	**1,462[a]**	6,000	91,000	**,200**
	Hotelling's Trace	,096	1,462[a]	6,000	91,000	,200
	Roy's Largest Root	,096	1,462[a]	6,000	91,000	,200
IV1 * IV2 (Salience * Novelty)	**Pillai's Trace**	,217	4,211[a]	6,000	91,000	,001
	Wilks' Lambda	,783	**4,211[a]**	6,000	91,000	**,001**
	Hotelling's Trace	,278	4,211[a]	6,000	91,000	,001
	Roy's Largest Root	,278	4,211[a]	6,000	91,000	,001

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	**Pillai's Trace**	,942	2,482E2	6,000	91,000	,000
	Wilks' Lambda	,058	2,482E2	6,000	91,000	,000
	Hotelling's Trace	16,362	2,482E2	6,000	91,000	,000
	Roy's Largest Root	16,362	2,482E2	6,000	91,000	,000
IV1 (Level Of Salience)	**Pillai's Trace**	,051	,815[a]	6,000	91,000	,561
	Wilks' Lambda	,949	**,815[a]**	6,000	91,000	**,561**
	Hotelling's Trace	,054	,815[a]	6,000	91,000	,561
	Roy's Largest Root	,054	,815[a]	6,000	91,000	,561
IV2 (Level Of Novelty)	**Pillai's Trace**	,088	1,462[a]	6,000	91,000	,200
	Wilks' Lambda	,912	**1,462[a]**	6,000	91,000	**,200**
	Hotelling's Trace	,096	1,462[a]	6,000	91,000	,200
	Roy's Largest Root	,096	1,462[a]	6,000	91,000	,200
IV1 * IV2 (Salience * Novelty)	**Pillai's Trace**	,217	4,211[a]	6,000	91,000	,001
	Wilks' Lambda	,783	**4,211[a]**	6,000	91,000	**,001**
	Hotelling's Trace	,278	4,211[a]	6,000	91,000	,001
	Roy's Largest Root	,278	4,211[a]	6,000	91,000	,001

a. Exact statistic

b. Design: Intercept + IV1 + IV2 + IV1 * IV2

6 Test of Between-Subject Effects

Source	Dep. Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	6,590[a]	3	2,197	,715	,546
	DVB	15,470[b]	3	5,157	1,627	,188
	DVC	6,670[c]	3	2,223	,920	,434
	DVD	64,190[d]	3	21,397	**7,192**	**,000**
	DVE	31,080[e]	3	10,360	**2,784**	**,045**
	DVF	10,040[f]	3	3,347	,994	,399
Intercept	DVA	1789,290	1	1789,290	582,041	,000
	DVB	1689,210	1	1689,210	532,874	,000
	DVC	1376,410	1	1376,410	569,745	,000
	DVD	1689,210	1	1689,210	567,802	,000
	DVE	1281,640	1	1281,640	344,373	,000
	DVF	1780,840	1	1780,840	529,093	,000
IV1 (Level of salience)	DVA	4,410	1	4,410	1,435	,234
	DVB	,810	1	,810	,256	,614
	DVC	,010	1	,010	,004	,949
	DVD	,010	1	,010	,003	,954
	DVE	4,000	1	4,000	1,075	,302
	DVF	1,960	1	1,960	,582	,447
IV2 (Level of novelty)	DVA	,490	1	,490	,159	,691
	DVB	8,410	1	8,410	2,653	,107
	DVC	2,250	1	2,250	,931	,337
	DVD	10,890	1	10,890	**3,661**	**,059**
	DVE	,040	1	,040	,011	,918
	DVF	4,840	1	4,840	1,438	,233
IV1 * IV2	DVA	1,690	1	1,690	,550	,460
	DVB	6,250	1	6,250	1,972	,164
	DVC	4,410	1	4,410	1,825	,180
	DVD	53,290	1	53,290	**17,913**	**,000**
	DVE	27,040	1	27,040	**7,266**	**,008**
	DVF	3,240	1	3,240	,963	,329

Error	**DVA**	295,120	96	3,074		
	DVB	304,320	96	3,170		
	DVC	231,920	96	2,416		
	DVD	285,600	96	2,975		
	DVE	357,280	96	3,722		
	DVF	323,120	96	3,366		
Total	**DVA**	2091,000	100			
	DVB	2009,000	100			
	DVC	1615,000	100			
	DVD	2039,000	100			
	DVE	1670,000	100			
	DVF	2114,000	100			
Corrected Total	**DVA**	301,710	99			
	DVB	319,790	99			
	DVC	238,590	99			
	DVD	349,790	99			
	DVE	388,360	99			
	DVF	333,160	99			

a. R Squared = ,022 (Adjusted R Squared = -,009)

b. R Squared = ,048 (Adjusted R Squared = ,019)

c. R Squared = ,028 (Adjusted R Squared = -,002)

d. R Squared = ,184 (Adjusted R Squared = ,158)

e. R Squared = ,080 (Adjusted R Squared = ,051)

f. R Squared = ,030 (Adjusted R Squared = ,000)

7 Multivariate Testing with Constant Factors

7.1 Multivariate Testing with Familiarity as Constant Factor

General Linear Model

Notes

Output Created		26-Abr-2010 15:59:39
Comments		
Input	Active Dataset	DataSet0
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	50
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM DVA DVB DVC DVD DVE DVF BY IV1 /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PLOT=PROFILE(IV1) /CRITERIA=ALPHA(.05) /DESIGN= IV1.
Resources	Processor Time	00:00:02,468
	Elapsed Time	00:00:02,672

Between-Subjects Factors

		N
IV1	non-sal	25
	salient	25

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,960	1,703E2	6,000	43,000	,000
	Wilks' Lambda	,040	1,703E2	6,000	43,000	,000
	Hotelling's Trace	23,758	1,703E2	6,000	43,000	,000
	Roy's Largest Root	23,758	1,703E2	6,000	43,000	,000
IV1	Pillai's Trace	,335	3,604[a]	6,000	43,000	,006
	Wilks' Lambda	,665	3,604[a]	6,000	**43,000**	**,006**
	Hotelling's Trace	,503	3,604[a]	6,000	43,000	,006
	Roy's Largest Root	,503	3,604[a]	6,000	43,000	,006

a. Exact statistic

b. Design: Intercept + IV1

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	5,780[a]	1	5,780	2,059	,158

	DVB	5,780[b]	1	5,780	1,987	,165
	DVC	2,000[c]	1	2,000	1,087	,302
	DVD	25,920[d]	1	25,920	10,876	,002
	DVE	25,920[e]	1	25,920	6,909	,011
	DVF	5,120[f]	1	5,120	1,604	,211
Intercept	DVA	924,500	1	924,500	329,394	,000
	DVB	729,620	1	729,620	250,872	,000
	DVC	633,680	1	633,680	344,391	,000
	DVD	985,680	1	985,680	413,572	,000
	DVE	648,000	1	648,000	172,723	,000
	DVF	985,680	1	985,680	308,829	,000
IV1	DVA	5,780	1	5,780	2,059	,158
	DVB	5,780	1	5,780	1,987	,165
	DVC	2,000	1	2,000	1,087	,302
	DVD	25,920	1	25,920	**10,876**	**,002**
	DVE	25,920	1	25,920	**6,909**	**,011**
	DVF	5,120	1	5,120	1,604	,211
Error	DVA	134,720	48	2,807		
	DVB	139,600	48	2,908		
	DVC	88,320	48	1,840		
	DVD	114,400	48	2,383		
	DVE	180,080	48	3,752		
	DVF	153,200	48	3,192		

Total	DVA	1065,000	50			
	DVB	875,000	50			
	DVC	724,000	50			
	DVD	1126,000	50			
	DVE	854,000	50			
	DVF	1144,000	50			
Corrected Total	DVA	140,500	49			
	DVB	145,380	49			
	DVC	90,320	49			
	DVD	140,320	49			
	DVE	206,000	49			
	DVF	158,320	49			

a. R Squared = ,041 (Adjusted R Squared = ,021)

b. R Squared = ,040 (Adjusted R Squared = ,020)

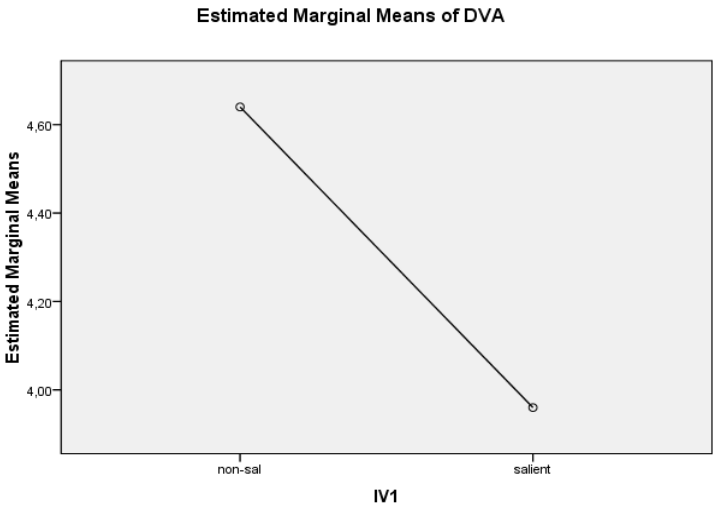
c. R Squared = ,022 (Adjusted R Squared = ,002)

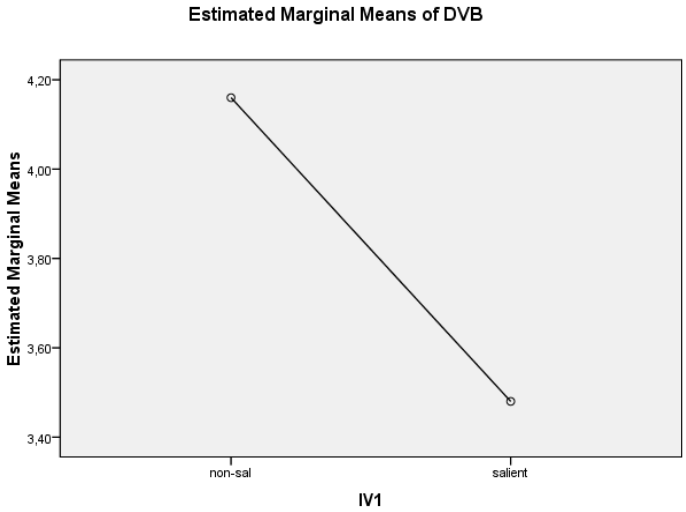
d. R Squared = ,185 (Adjusted R Squared = ,168)

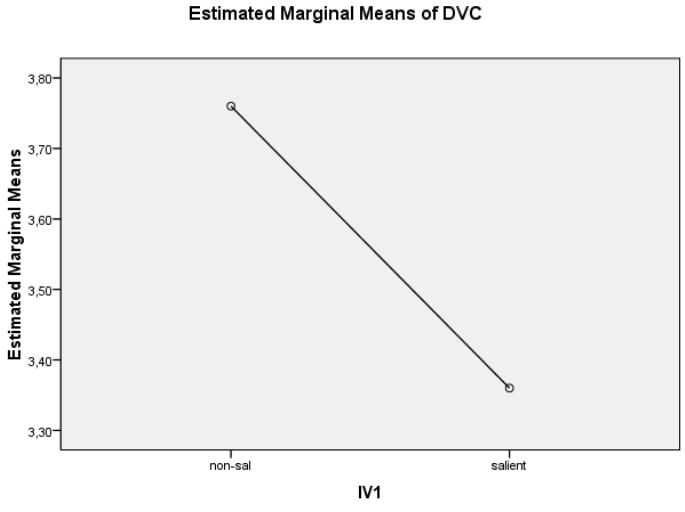
e. R Squared = ,126 (Adjusted R Squared = ,108)

f. R Squared = ,032 (Adjusted R Squared = ,012)

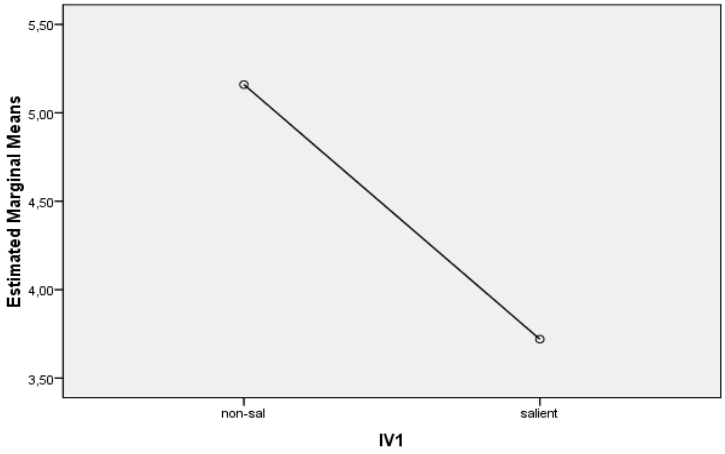
Profile Plots



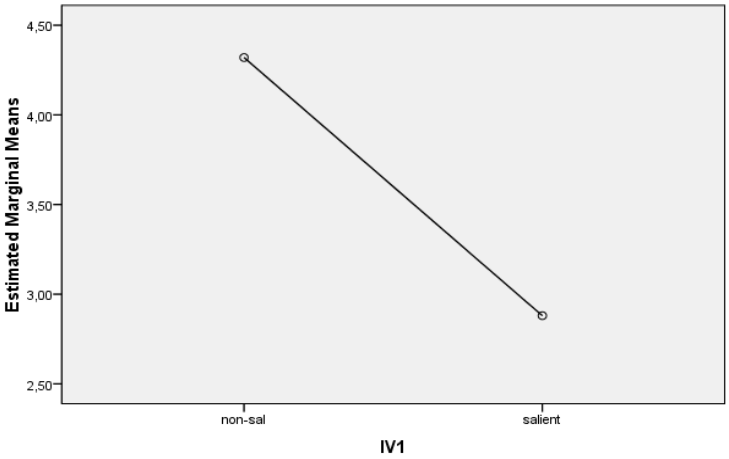




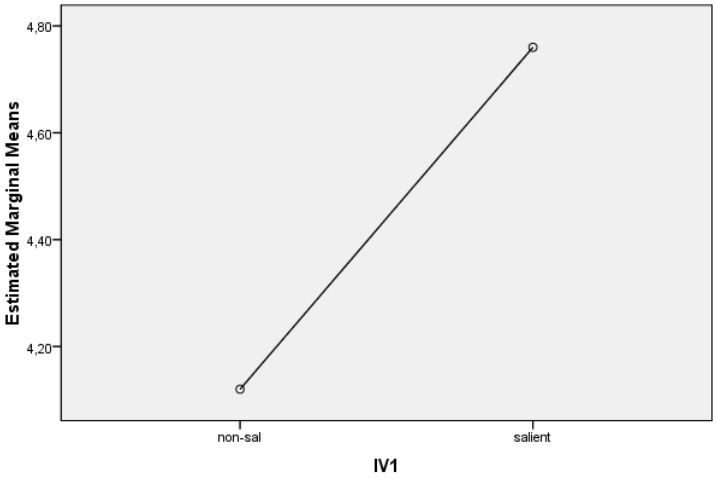
Estimated Marginal Means of DVD



Estimated Marginal Means of DVE



Estimated Marginal Means of DVF



7.2 Multivariate Testing with Novelty as Constant Factor

General Linear Model

Notes

Output Created		26-Abr-2010 11:58:31
Comments		
Input	Active Dataset	DataSet0
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	50
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM DVA DVB DVC DVD DVE DVF BY IV1 /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PLOT=PROFILE(IV1) /CRITERIA=ALPHA(.05) /DESIGN= IV1.
Resources	Processor Time	00:00:02,593
	Elapsed Time	00:00:02,516

Between-Subjects Factors

		N
IV1	non-s	25
	salie	25

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,930	94,792[a]	6,000	43,000	,000
	Wilks' Lambda	,070	94,792[a]	6,000	43,000	,000
	Hotelling's Trace	13,227	94,792[a]	6,000	43,000	,000
	Roy's Largest Root	13,227	94,792[a]	6,000	43,000	,000
IV1	Pillai's Trace	,168	1,447[a]	6,000	43,000	,219
	Wilks' Lambda	,832	1,447[a]	6,000	43,000	,219
	Hotelling's Trace	,202	1,447[a]	6,000	43,000	,219
	Roy's Largest Root	,202	1,447[a]	6,000	43,000	,219

a. Exact statistic

b. Design: Intercept + IV1

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.

Corrected Model	DVA	,320[a]	1	,320	,096	,758
	DVB	1,280[b]	1	1,280	,373	,544
	DVC	2,420[c]	1	2,420	,809	,373
	DVD	27,380[d]	1	27,380	7,677	,008
	DVE	5,120[e]	1	5,120	1,387	,245
	DVF	,080[f]	1	,080	,023	,881
Intercept	DVA	865,280	1	865,280	258,937	,000
	DVB	968,000	1	968,000	282,079	,000
	DVC	744,980	1	744,980	249,018	,000
	DVD	714,420	1	714,420	200,305	,000
	DVE	633,680	1	633,680	171,651	,000
	DVF	800,000	1	800,000	225,989	,000
IV1	DVA	,320	1	,320	,096	,758
	DVB	1,280	1	1,280	,373	,544
	DVC	2,420	1	2,420	,809	,373
	DVD	27,380	1	27,380	**7,677**	**,008**
	DVE	5,120	1	5,120	1,387	,245
	DVF	,080	1	,080	,023	,881
Error	DVA	160,400	48	3,342		
	DVB	164,720	48	3,432		
	DVC	143,600	48	2,992		
	DVD	171,200	48	3,567		
	DVE	177,200	48	3,692		

	DVF	169,920	48	3,540		
Total	DVA	1026,000	50			
	DVB	1134,000	50			
	DVC	891,000	50			
	DVD	913,000	50			
	DVE	816,000	50			
	DVF	970,000	50			
Corrected Total	DVA	160,720	49			
	DVB	166,000	49			
	DVC	146,020	49			
	DVD	198,580	49			
	DVE	182,320	49			
	DVF	170,000	49			

a. R Squared = ,002 (Adjusted R Squared = -,019)

b. R Squared = ,008 (Adjusted R Squared = -,013)

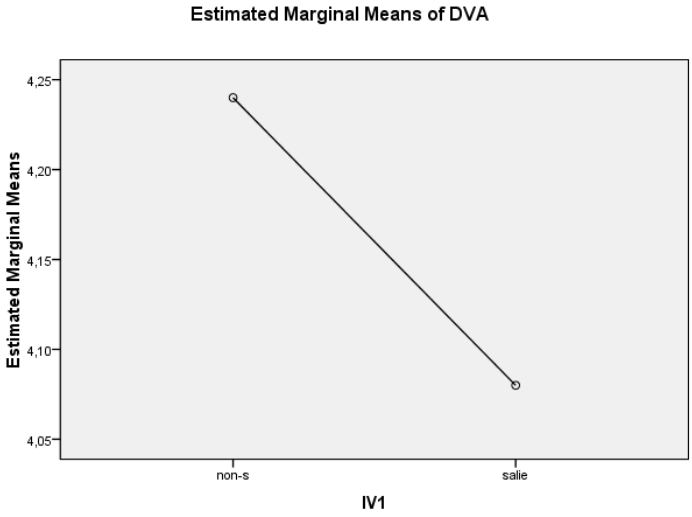
c. R Squared = ,017 (Adjusted R Squared = -,004)

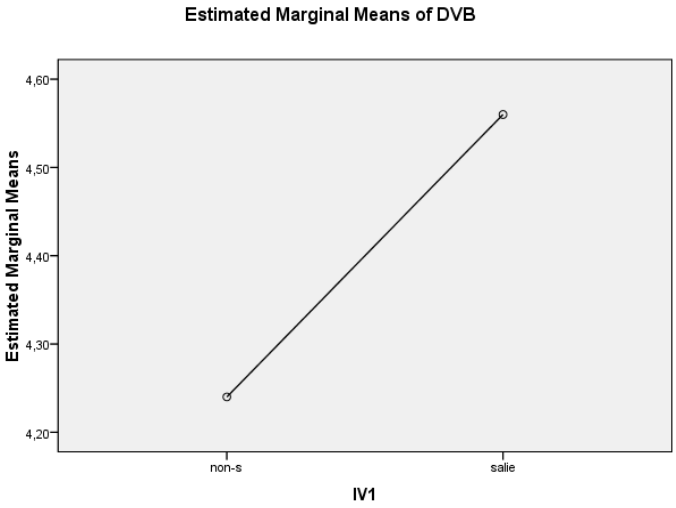
d. R Squared = ,138 (Adjusted R Squared = ,120)

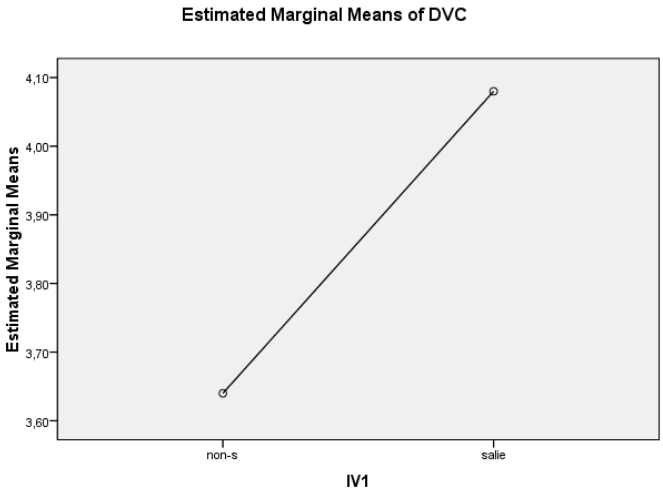
e. R Squared = ,028 (Adjusted R Squared = ,008)

f. R Squared = ,000 (Adjusted R Squared = -,020)

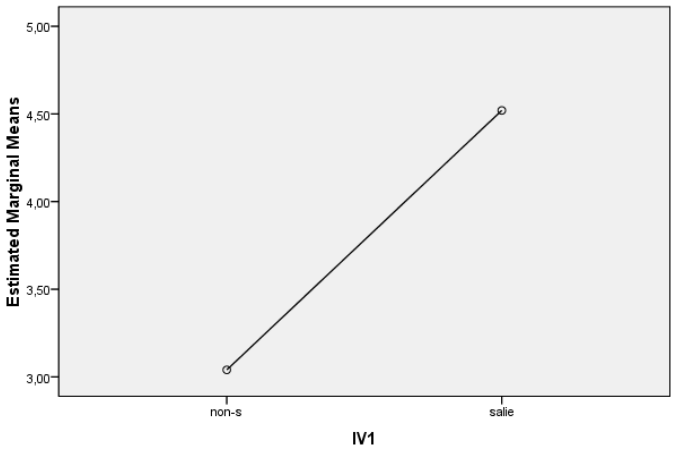
Profile Plots



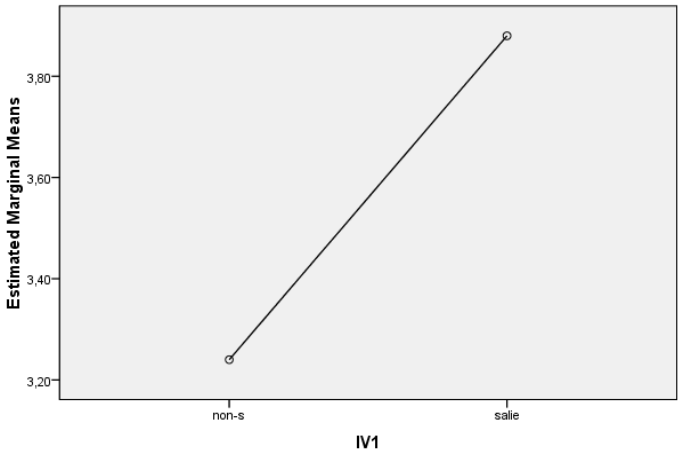




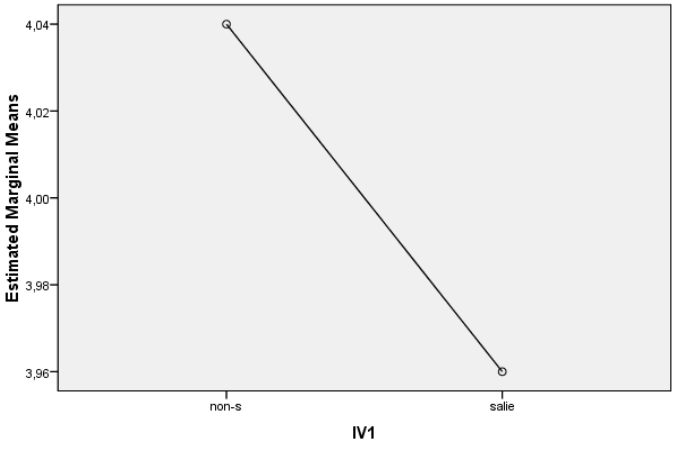
Estimated Marginal Means of DVD



Estimated Marginal Means of DVE



Estimated Marginal Means of DVF



7.3 Multivariate Testing for Constant Salience (comma)

General Linear Model

Notes

Output Created		26-Abr-2010 12:02:12
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	50
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM DVA DVB DVC DVD DVE DVF BY IV1 /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PLOT=PROFILE(IV1) /CRITERIA=ALPHA(.05) /DESIGN= IV1.
Resources	Processor Time	00:00:02,469
	Elapsed Time	00:00:02,375

Between-Subjects Factors

		N
IV1	Famil	25
	Novel	25

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,955	1,512E2	6,000	43,000	,000
	Wilks' Lambda	,045	1,512E2	6,000	43,000	,000
	Hotelling's Trace	21,101	1,512E2	6,000	43,000	,000
	Roy's Largest Root	21,101	1,512E2	6,000	43,000	,000
IV1	Pillai's Trace	,238	2,232[a]	6,000	**43,000**	**,058**
	Wilks' Lambda	,762	2,232[a]	6,000	**43,000**	**,058**
	Hotelling's Trace	,312	2,232[a]	6,000	**43,000**	**,058**
	Roy's Largest Root	,312	2,232[a]	6,000	**43,000**	**,058**

a. Exact statistic

b. Design: Intercept + IV1

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	,180[a]	1	,180	,054	,818
	DVB	14,580[b]	1	14,580	4,780	,034

	DVC	6,480[c]	1	6,480	2,738	,105
	DVD	8,000[d]	1	8,000	3,017	,089
	DVE	12,500[e]	1	12,500	3,423	,070
	DVF	8,000[f]	1	8,000	2,834	,099
Intercept	DVA	808,020	1	808,020	241,200	,000
	DVB	808,020	1	808,020	264,925	,000
	DVC	691,920	1	691,920	292,361	,000
	DVD	848,720	1	848,720	320,070	,000
	DVE	571,220	1	571,220	156,427	,000
	DVF	950,480	1	950,480	336,652	,000
IV1	DVA	,180	1	,180	,054	,818
	DVB	14,580	1	14,580	4,780	**,034**
	DVC	6,480	1	6,480	2,738	,105
	DVD	8,000	1	8,000	3,017	,089
	DVE	12,500	1	12,500	3,423	**,070**
	DVF	8,000	1	8,000	2,834	,099
Error	DVA	160,800	48	3,350		
	DVB	146,400	48	3,050		
	DVC	113,600	48	2,367		
	DVD	127,280	48	2,652		
	DVE	175,280	48	3,652		
	DVF	135,520	48	2,823		
Total	DVA	969,000	50			

	DVB	969,000	50			
	DVC	812,000	50			
	DVD	984,000	50			
	DVE	759,000	50			
	DVF	1094,000	50			
Corrected Total	DVA	160,980	49			
	DVB	160,980	49			
	DVC	120,080	49			
	DVD	135,280	49			
	DVE	187,780	49			
	DVF	143,520	49			

a. R Squared = ,001 (Adjusted R Squared = -,020)

b. R Squared = ,091 (Adjusted R Squared = ,072)

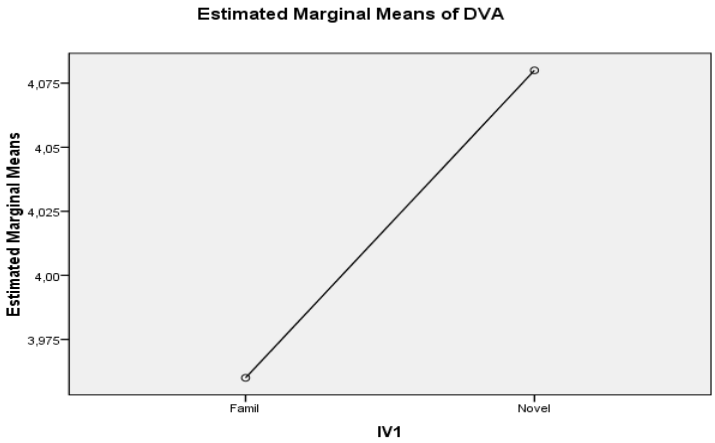
c. R Squared = ,054 (Adjusted R Squared = ,034)

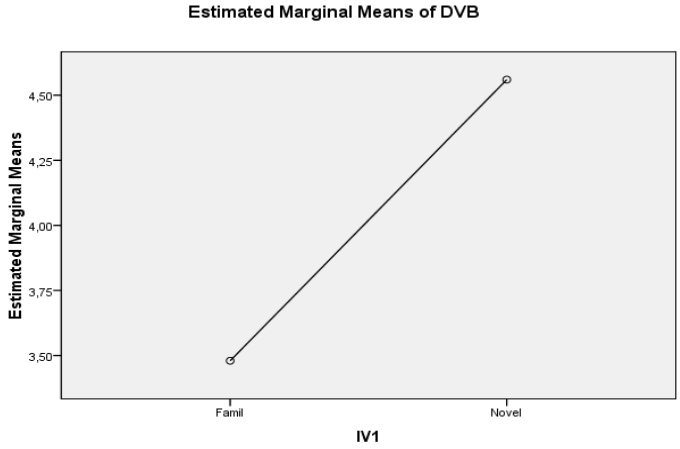
d. R Squared = ,059 (Adjusted R Squared = ,040)

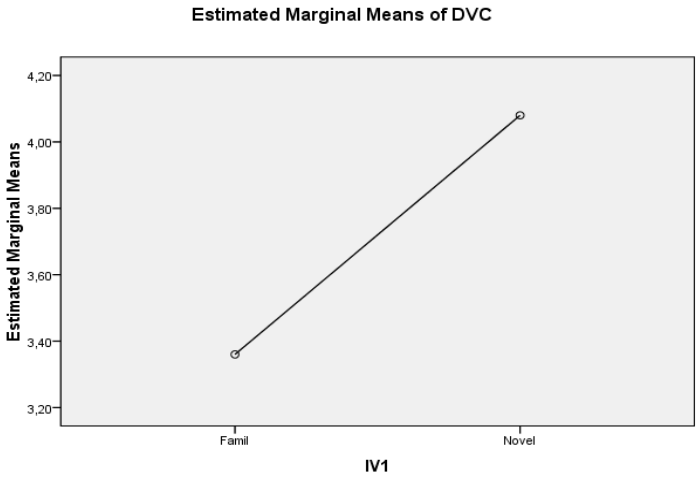
e. R Squared = ,067 (Adjusted R Squared = ,047)

f. R Squared = ,056 (Adjusted R Squared = ,036)

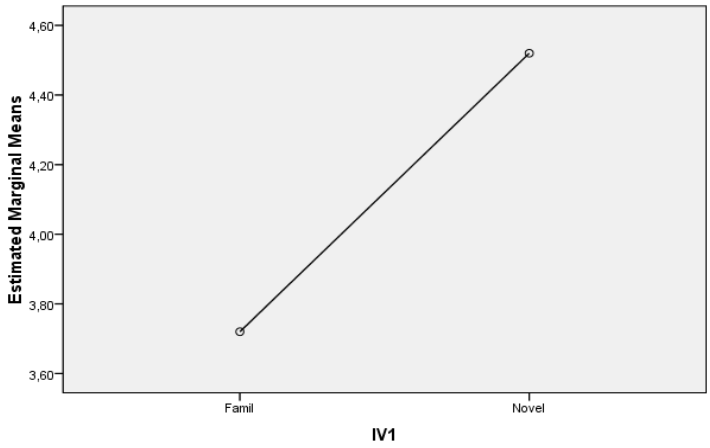
Profile Plots



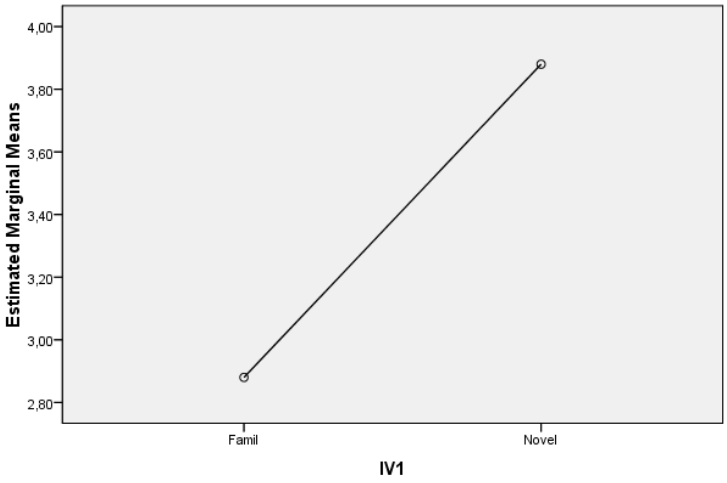




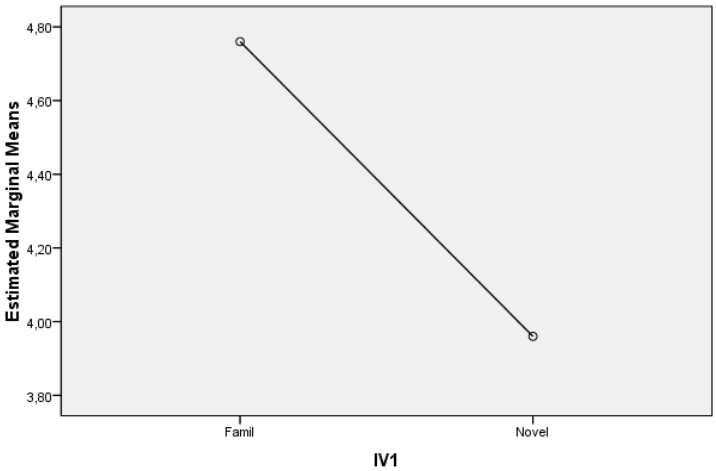
Estimated Marginal Means of DVD



Estimated Marginal Means of DVE



Estimated Marginal Means of DVF



7.4 Multivariate Testing for Constant Non-Salience (dot)

General Linear Model

Notes

Output Created		26-Abr-2010 11:56:43
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	50
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		GLM DVA DVB DVC DVD DVE DVF BY IV1 /METHOD=SSTYPE(3) /INTERCEPT=INCLUDE /PLOT=PROFILE(IV1) /CRITERIA=ALPHA(.05) /DESIGN= IV1.
Resources	Processor Time	00:00:02,985
	Elapsed Time	00:00:02,531

Between-Subjects Factors

		N
IV1	Famil	25
	Novel	25

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,933	1,002E2	6,000	43,000	,000
	Wilks' Lambda	,067	1,002E2	6,000	43,000	,000
	Hotelling's Trace	13,987	1,002E2	6,000	43,000	,000
	Roy's Largest Root	13,987	1,002E2	6,000	43,000	,000
IV1	Pillai's Trace	,278	2,758[a]	6,000	43,000	,023
	Wilks' Lambda	,722	2,758[a]	6,000	43,000	,023
	Hotelling's Trace	,385	2,758[a]	6,000	43,000	,023
	Roy's Largest Root	,385	2,758[a]	6,000	43,000	,023

a. Exact statistic

b. Design: Intercept + IV1

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	2,000[a]	1	2,000	,715	,402

	DVB	,080[b]	1	,080	,024		,877
	DVC	,180[c]	1	,180	,073		,788
	DVD	56,180[d]	1	56,180	17,033		,000
	DVE	14,580[e]	1	14,580	3,845		,056
	DVF	,080[f]	1	,080	,020		,887
Intercept	DVA	985,680	1	985,680	352,238		,000
	DVB	882,000	1	882,000	268,085		,000
	DVC	684,500	1	684,500	277,688		,000
	DVD	840,500	1	840,500	254,826		,000
	DVE	714,420	1	714,420	188,418		,000
	DVF	832,320	1	832,320	212,960		,000
IV1	DVA	2,000	1	2,000	,715		,402
	DVB	,080	1	,080	,024		,877
	DVC	,180	1	,180	,073		,788
	DVD	56,180	1	56,180	17,033		,000
	DVE	14,580	1	14,580	3,845		,056
	DVF	,080	1	,080	,020		,887
Error	DVA	134,320	48	2,798			
	DVB	157,920	48	3,290			
	DVC	118,320	48	2,465			
	DVD	158,320	48	3,298			
	DVE	182,000	48	3,792			
	DVF	187,600	48	3,908			

Total	DVA	1122,000	50			
	DVB	1040,000	50			
	DVC	803,000	50			
	DVD	1055,000	50			
	DVE	911,000	50			
	DVF	1020,000	50			
Corrected Total	DVA	136,320	49			
	DVB	158,000	49			
	DVC	118,500	49			
	DVD	214,500	49			
	DVE	196,580	49			
	DVF	187,680	49			

a. R Squared = ,015 (Adjusted R Squared = -,006)

b. R Squared = ,001 (Adjusted R Squared = -,020)

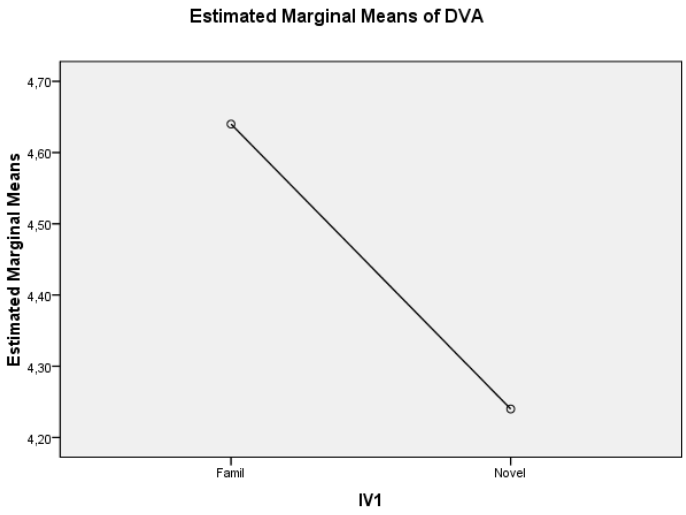
c. R Squared = ,002 (Adjusted R Squared = -,019)

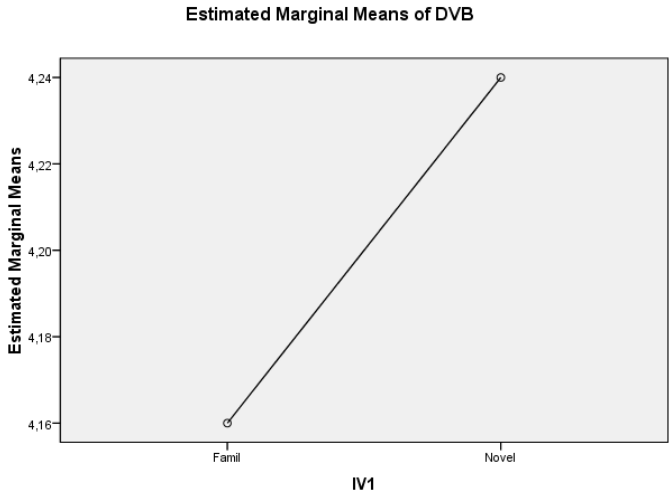
d. R Squared = ,262 (Adjusted R Squared = ,247)

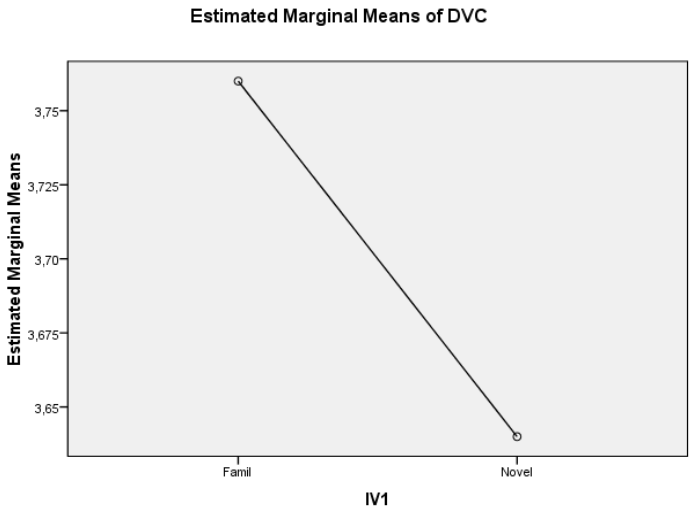
e. R Squared = ,074 (Adjusted R Squared = ,055)

f. R Squared = ,000 (Adjusted R Squared = -,020)

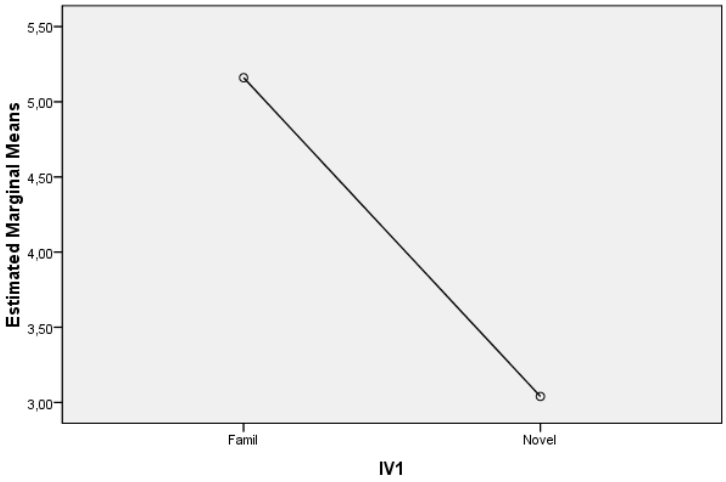
Profile Plots



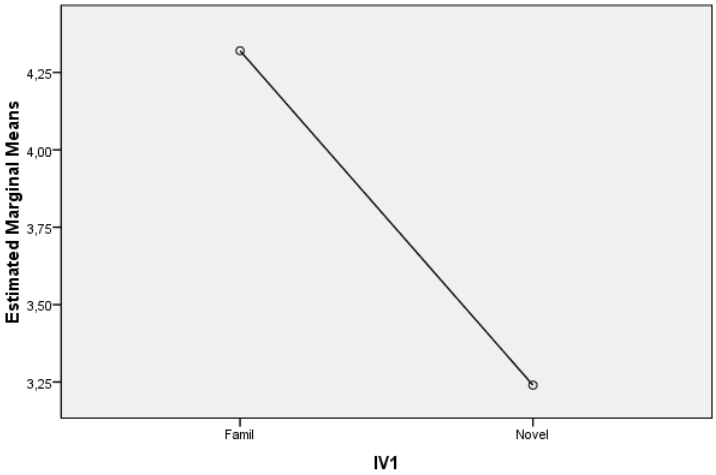




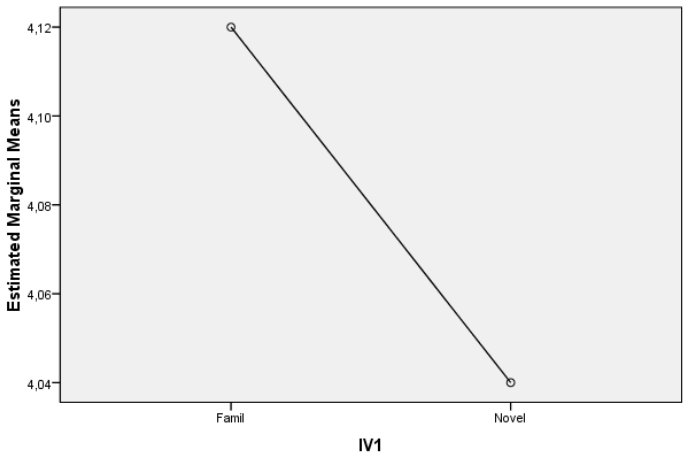
Estimated Marginal Means of DVD



Estimated Marginal Means of DVE



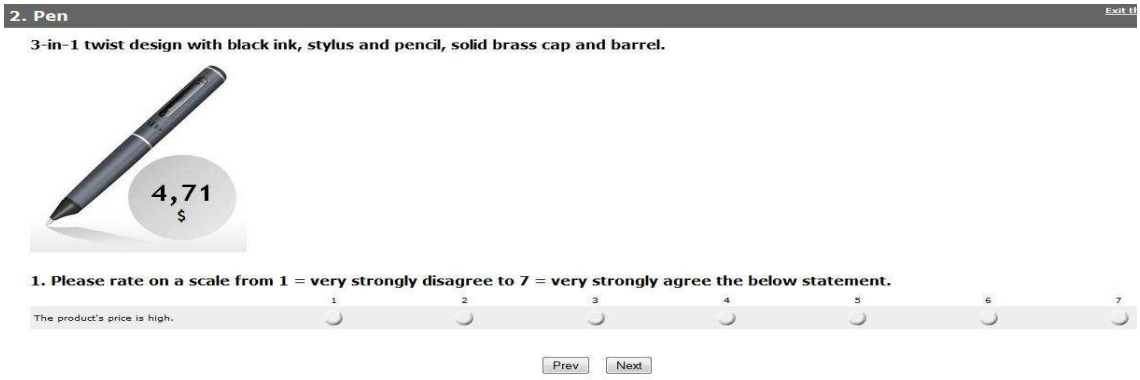
Estimated Marginal Means of DVF



8 Screenshots from Surveys for each Product

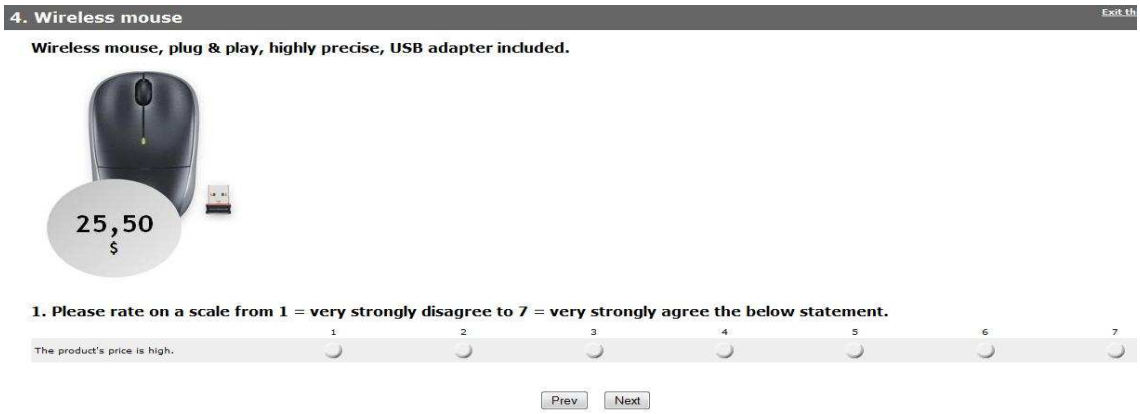
8.1 Purpose

8.2 Product A: Pen

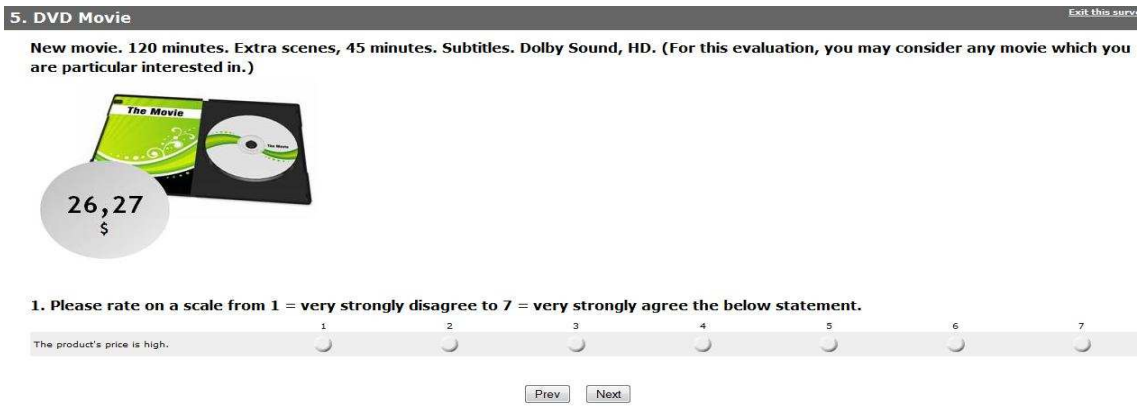


8.3 Product B: Memory pen

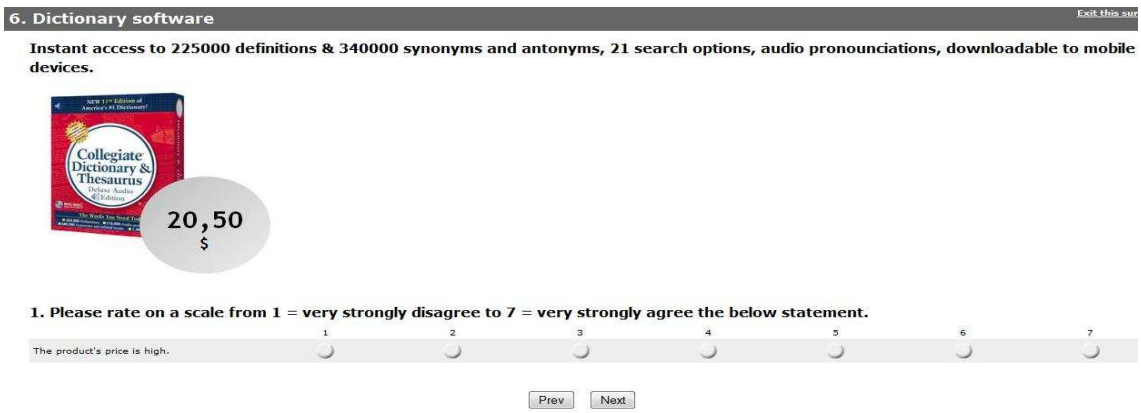
8.4 Product C: Wireless mouse



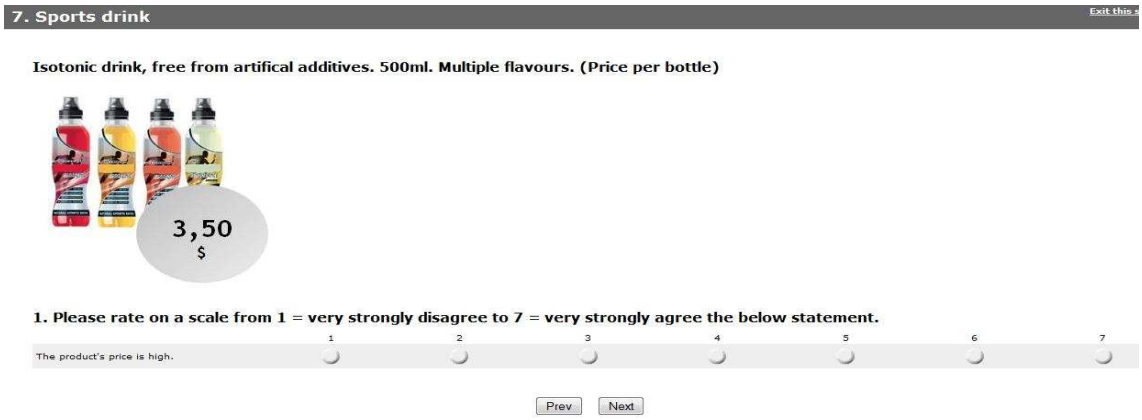
8.5 Product D: DVD movie



8.6 Product E: Dictionary software



8.7 Product F: Sports drink



9 Included Appendices from Work Project

9.1 Appendix A: Sample Information

Sample	n	Average age	Gender (M/F%)	Nationality
Comma & PT	25	19,24	32/68	Portuguese (100%)
Dot & PT	25	19,56	60/40	Portuguese (100%)
Comma & US	25	20,32	72/28	USA (100%)
Dot & US	25	20,88	64/36	USA (≈81%); Others* (≈19%)
TOTAL/ AVG.	**100**	**20,00**	**57/43**	*Ireland, India, Cape Verde, Canada (all permanent residents)

9.2 Appendix B: Survey Outline (in column form)

1. Purpose

Thank you very much for following the link.

This survey is part of a Master in Management thesis of the Faculdade de Economia da Universidade Nova de Lisboa (Portugal). For further information, consult http://www.fe.unl.pt/.
In total, you will be asked to rate the price of six products. To do your evaluation, please consider description and price as given and do not consult external sources (e.g. internet, friends).

All data is treated confidentially.

a. Please indicate your age.
b. Indicate your gender.
c. Indicate your nationality.
d. Indicate your country of residence.

(a)-d) were multiple choice questions)

2. Pen

3-in-1 twist design with black ink, stylus and pencil, solid brass cap and barrel.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:
"The product's price is high."

3. USB Pen

8GB USB pen, easy-to-handle.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:
"The product's price is high."

4. Wireless mouse

Wireless mouse, plug&play, highly precise, USB adapter included.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

5. DVD movie

Recently launched. Length: 120min. and extra scenes 45min. Subtitles. Dolby Surround, HD (For this evaluation, consider any movie which you are particular interested in).

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

1 2 3 4 5 6 7

6. Dictionary software

Instant access to 225000 definitions & 340000 synonyms and antonyms, 21 search options, audio pronunciations, partially downloadable to mobile devices.

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

1 2 3 4 5 6 7

7. Sports Drink

Isotonic drink, free from additives. 500ml. Multiple flavors. (Price per bottle)

Please rate on a scale from 1 = very strongly agree to 8 = very strongly disagree the below statement:

"The product's price is high."

1 2 3 4 5 6 7

8. End

Thank you for taking the survey. [Done]

9.3 Appendix C: Products, Designation, Category & Price

Product	Designation	Category	Price
3-in-1 pen	A	Office equipment	3,50€ = 4.71$*
Memory pen	B	Electronic apparels	16,50€ = 22.24$*
Wireless mouse	C	Electronic apparels	25.50$ = 18,90€*
DVD movie	D	Entertainment	19,50€ = 26.27$*
Dictionary software	E	Software	20.50$ = 15,19€*
Sports drink	F	Beverages	3.50$ = 2,59€*

*converted at exchange rates of 1€=1.34767US$ or 1US$=0,742024€ (05/04/2010 @ 12:30UTC)

9.4 Appendix D: Pre-test Data

Sample	n	Mean age	Gender (M/F%)	Nationality
Comma & PT	17	22,765	47/53	Portuguese (88%) Other (12%)

9.5 Appendix E: Descriptive Statistics of Pre-test

Products	A	B	C	D	E	F
Mean	3,706	4	4,294	4,235	2,706	4,176
Standard deviation	1,724	1,768	1,160	**1,953**	1,490	1,590
# of observations in item 1	2	2	0	1	**4**	1
# of observations in item 7	1	1	0	**3**	0	1
# of moderate outliers[1]	3	3	1	1	2	2
# of extreme outliers[2]	0	0	0	0	0	0

[1] z < -1,5 or z > 1,5 [2] z < -3 or z > 3. Outlier detection can be found in the support document.

9.6 Appendix F: Descriptive Statistics from Findings

	Salient (comma)				Non-salient (dot)			
	Familiar (EU)		Novel (US)		Familiar (US)		Novel (EU)	
Products	x[1]	s[2]	x	s	x	s	x	s
A	3,96	1,65	4,08	2,00	4,64	1,70	4,24	1,64
B	3,48	1,78	4,56	1,71	4,16	1,62	4,24	1,98
C	3,36	1,41	4,08	1,66	3,76	1,30	3,64	1,80
D	3,72	1,17	4,52	1,98	5,16	1,84	3,04	2,00
E	2,88	1,94	3,88	1,88	4,32	1,93	3,24	1,96
F	4,76	1,59	3,96	1,77	4,12	1,96	4,04	1,99
Average	**3,69**	**1,59**	**4,18**	**1,83**	**4,36**	**1,73**	**3,74**	**1,90**

Note: 1 = lowest price perception 7 = highest price perception

[1]Mean [2]Standard deviation

9.7 Appendix G: Multivariate Test [b] and Overall Model Validity

Effect	Value	F	Hypothesis df	Error df	Significance
Intercept	0,058	2,482E2	6,000	91,000	0,000
IV1 (Level of salience)	0,949	**,815[a]**	6,000	91,000	**0,561**
IV2 (Level of novelty)	2	**1,462[a]**	6,000	91,000	**0,200**
IV1 * IV2 (Interaction)	1	**4,211[a]**	6,000	91,000	**0,001**

a. Exact statistic b. Design: Intercept + IV1 + IV2 + IV1 * IV2

The complete test output from SPSS can be found in the support document.

9.8 Appendix H: Test of Between-Subject Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	DVA	6,590[1]	3	2,197	0,715	0,546
	DVB	15,470[2]	3	5,157	1,627	0,188
	DVC	6,670[3]	3	2,223	0,92	0,434
	DVD	64,190[4]	3	21,397	**7,192**	**0,000**
	DVE	31,080[5]	3	10,36	**2,784**	**0,045**
	DVF	10,040[6]	3	3,347	0,994	0,399
IV1[a]	DVA	4,41	1	4,41	**1,435**	**0,234**
	DVB	0,81	1	0,81	0,256	0,614
	DVC	0,01	1	0,01	0,004	0,949
	DVD	0,01	1	0,01	0,003	0,954
	DVE	4	1	4	1,075	0,302
	DVF	1,96	1	1,96	0,582	0,447

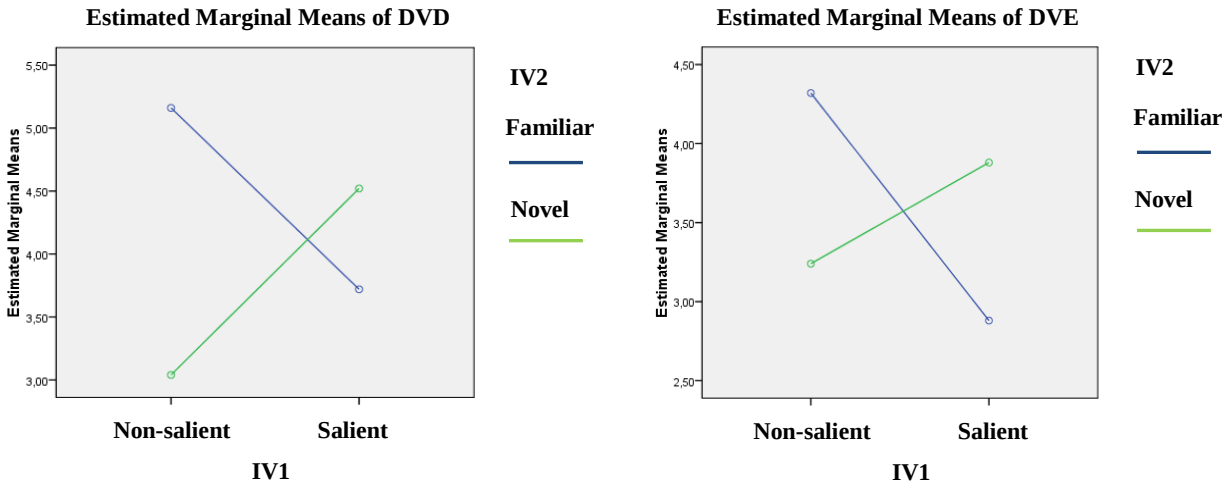
IV2[b]	**DVA**	0,49	1	0,49	0,159	0,691
	DVB	8,41	1	8,41	2,653	0,107
	DVC	2,25	1	2,25	0,931	0,337
	DVD	10,89	1	10,89	**3,661**	**0,059**
	DVE	0,04	1	0,04	0,011	0,918
	DVF	4,84	1	4,84	1,438	0,233
IV1 * IV2[c]	**DVA**	1,69	1	1,69	0,55	0,460
	DVB	6,25	1	6,25	1,972	0,164
	DVC	4,41	1	4,41	1,825	0,180
	DVD	53,29	1	53,29	**17,913**	**0,000**
	DVE	27,04	1	27,04	**7,266**	**0,008**
	DVF	3,24	1	3,24	0,963	0,329

[a] Level of salience [b] Level of novelty [c] Interaction of salience with novelty

1. R^2=,022 (Adjusted R^2= -,009); 2. R^2=,048 (Adj. R^2= ,019); 3. R^2=,028 (Adj. R^2= -,002); 4. R^2=,184 (Adj. R^2= ,158); 5. R^2=,080 (Adj. R^2= ,051); 6. R^2=,030 (Adj. R^2= ,000)

The dependent variables (DVA-F) are the perceived prices for each product per observation (n = 100). The sources Intercept, Error, Total and Corrected Total can be found in the support document.

9.9 Appendix I: Graphical Interaction for Product D and E



9.10 Appendix J: Differences in Mean Price Perception per Product and Cultural Community

Products	Mean Perceived Price in PT	Mean Perceived Price in US	Difference (US-PT)
A	4,1	4,36	0,26
B	3,86	4,36	0,5
C	3,5	3,92	0,42
D	3,38	4,84	**1,46**
E	3,06	4,1	**1,04**
F	4,4	4,04	-0,36

The above table confirms that product D and E are mainly responsible for driving the interaction.