Effects of Legibility of Text in Product Descriptions on Price Perceptions.

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Marketing often needs to engage consumers and hold their attention. However typefaces used to present product information may differentially affect attention to different text elements. In two studies we find that participants committed fewer errors recognizing product attributes when they were presented in the harder to read typeface but also showed a distortion in price recall. This initial evidence supports research that has shown a superior effect of harder-to-read typeface on consumers' recognition of product attributes, but raises a question whether this readeability may lead to weaker recall of accompanying price information.

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Marketing often needs to engage consumers and hold their attention in likable ways. It is not surprising then that retailers like Trader Joe's use creative point-of-sale materials with fancy calligraphy, a merchandising technique that not only provides product details but also capture consumers' attention by its uniqueness. Pieters and Wedel (2004) showed that advertisers aiming to maximize attention to their communications should consider devoting more space to its text, but also asserted that the extent to which such effects were caused by text layout (e.g., font type) was not well understood. The focus of the present study is whether typeface used to present product information affects attention to different text elements (price and product attributes).

Several recent studies provide evidence confirming that words are identified during reading by discriminating the underlying structure of their component letters. In particular, Sanocki (1987) showed that the visual cues readers use to derive the underlying structure of letters, and the rules they implement to achieve this, are adjusted according to the typeface in which text appears. Based on this research and evidence that individuals have limited visual attention (Wolfe, Cave and Franzel 1989), we predict that when typeface consumes greater cognitive resources, it results in increased attention to product details using that text at the expense of price information. Integrating this underlying process and the concept of working memory capacity (Hambrick and Engle 2002) and left-digit effect in number processing (Thomas and Morwitz 2005), we predict that consumers when processing product information presented in a harder to read typeface will pay greater attention to product attributes than if they were presented information in a relatively easy to read typeface. Because consumers' attentional resources are limited, increasing attention to an element in a communication maybe at the expense of other elements. Consequently recall of price information in more difficult to read typeface will be distorted and consumers will truncate numbers in a price (say $29.58) and recall a lower price (e.g., $20.08) than when price was presented in an easier to read typeface.

Pretests led to the selection of two typefaces that were either easy (Helvetica) or hard (Bradley) to read. Two studies then collected initial evidence for whether legibility of such typeface affected processing of attribute information and a distortion of price recall. In study 1, materials were presented on computer stations in a behavioral laboratory and participants (55 undergraduate students) were included in a lottery to stimulate their engagement with the task. The study was conducted as part of a larger study and the software randomly presented product information for two products using these two typefaces. At the conclusion of the study, participants completed a working memory task adapted from Hambrick and Engle (2002). Results revealed that participants committed fewer errors recognizing attributes when product descriptions were presented in the harder to read typeface. Furthermore, such a pattern of errors was explained by participants' working memory capacity; those with lower working memory capacity showed greater errors.

Though study 1 showed differences in the scrutiny of product attributes described in the two typefaces, the effects of this closer examination of attributes on recall of price information was not measured. Study 2 assessed both processing of product attributes, as well as price recall for the target product. Using the same typefaces as in study 1, four versions of the target description were created. These versions differed in whether product descriptions accompanied price in the same or a contrasting typeface. Similar to study 1, working memory capacity of participants (111 undergraduate students) was also measured. The results were interesting and revealed that the harder to read typeface resulted in a greater distortion of price recall, supporting not only a parallel visual search by consumers (Wolfe, Cave and Franzel 1989), but also left digit-effects on price recall. Furthermore, these main effects were qualified by a significant interaction effect of typeface and working memory capacity, with differences between the typefaces on price recall becoming non-significant for those with high working memory capacity. Consistent with study1, the harder to read typeface also increased accuracy of processing product attributes.

Though Nelson (1985) endorsed a complexity in advertising as it "slows down the reader making things more difficult to take in" (p. 115), others suggest that complexity hurts advertising because it makes people pay less attention to the brand (Pieters Wedel and Batra 2010). The initial evidence from this research shares kinship with the latter research and shows a superior effect of harder-to-read typeface on consumers' recognition of product attributes, but a weaker recall of the accompanying price. These results add not only to our understanding of how consumers conduct visual search, but also how consumers' attention to product descriptions compromises their attention to price.

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The Neural Correlates of Buying: Implications for Marketing

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The emerging field of neuromarketing attempts to apply "neuroscientific methods to analyze and understand human behaviour in relation to markets and marketing exchanges"(Lee, Broderick, & Chamberlain, 2007). This field has touched on the brain systems associated with the processing of advertisements, as well as those associated with the predictability of choice, pleasure, and reward in the context of buying/shopping (Lee et al., 2007). The current research expands on this through preliminary exploration of brain systems that may be associated with impulse buying, compulsive buying, and shopping ruminations. We hypothesized that the prefrontal cortex (PFC) and temporal (TL)/parietal lobes (PL) (with projections from reward processing circuitry) would be differentially implicated in impulse buying, compulsive buying, and shopping ruminations. The medial prefrontal cortex has been previously implicated in collecting behaviors (Anderson, Damasio, & Damasio, 2005) and hence we hypothesized that compulsive buying behavior and excessive shopping ruminations may be associated with the PFC. Sections of the TL and PL have been associated with impulse control/temporal discounting since they receive projections from the subcortical reward processing circuitry, and we hypothesized that they would be associated with impulse buying (Raab, Elger, Neuner, & Weber, 2010; Richards, Zhang, Mitchell, & de Wit, 1999).

Utilizing the neuroscientific research approach of the lesion method, we recruited 36 participants (from the University of Iowa, Lesion Patient Registry) with single, stable, well-characterized brain lesions to the PFC *(N=10),* TL *(N=10),* PL *(N=4)* as target groups as well as the occipital lobe (OL) *(N=12),* as a brain damaged comparison group. These participants and their collaterals (a close relative), were administered a Shopping Behavior Questionnaire, which we created, based on other well validated questionnaires (Ridgway, Kukar-Kinney & Monroe, 2008) in order to assess the dimensions of impulse buying, compulsive buying, shopping ruminations and their life consequences. Each statement in the questionnaire was rated on two scales. The first scale was a Likert scale from 1 (strongly disagree) to 7 (strongly agree). The second scale was used to ascertain whether there was change in shopping behavior after the participant's brain lesion, ranging from a large decrease to large increase with an option of no change. Following these statements, a second section of the questionnaire assessed family history of compulsive/impulsive buying. In addition, usage, overall time, and access to the Internet and television were assessed. Transportation access and means (for shopping), as well as various financial questions (to ascertain income and financial control) were also asked. Only collaterals were asked if they had taken any steps or measures to curb the participant's spending. Twenty-three participants (63%) identified a collateral. Three participants were unable to respond via phone and data was solely collected from their collaterals. The research study was executed as phone based interviews, lasting approximately 15 minutes per participant/collateral.

Based on data drawn from participant self-ratings on the questionnaire, our preliminary analyses (ANOVA) have indicated that the PFC and the TL/PL are differentially implicated in buying behaviors. Not only the PFC (as we had hypothesized), but the TL and PL as well were associated with compulsive shopping behaviors, as the self-ratings ($p= 0.0256$) and change scores (after brain lesion) ($p=0.1179$) were significantly higher than the OL comparison group. In the case of impulse buying, however, only the TL and PL (as hypothesized) were implicated and the self-rating ($p=0.0232$) and change scores ($p= 0.0048$) were significantly higher than the OL and PFC groups. In the case of excessive shopping ruminations, the TL and PL groups were significantly higher in self-ratings ($p=0.0107$) and change scores ($p=0.1647$) than the PFC and OL groups. This is interesting since one would assume that the PFC, with its prior association with collecting behavior and compulsive shopping behavior (from our dataset), would also be associated with excessive shopping ruminations, but this was not the case in our dataset. This indicates that compulsive buying need not always be preceded or accompanied by perseverative cognitions or thoughts about shopping. Strong correlations existed between the PL/TL groups' excessive shopping ruminations and (a) lying about the time or money spent shopping to friends or family (.77), (b) having difficulty controlling the amount of time spent thinking about shopping (.72), and (c) having to obtain new lines of credit to increase or maintain shopping habits (.72).

Additionally, we also note that although a few individual participants did report decreases in buying behavior or ruminations after the onset of brain damage, no brain lesion group demonstrated a pattern of such decrease. While our target groups spent significantly less time on the Internet than the OL comparison group, t-tests revealed that there were no significant differences between our target and comparison groups in financial resources, financial control, or transportation access.

The brain lesions of a subset of these participants have been mapped. Thus, the next step in data analysis would be to map the region of maximum overlay within each target group to identify those regions within the PFC, TL and PL (for example, medial PFC, hippocampus, insula) that may shed more light on specific regions and how their explicit functions contribute to these buying behaviors.

Thus our data indicate that compulsive buying may be associated with both prefrontal and temporal and parietal lobes, while shopping ruminations and impulse buying are unique to only temporal and parietal lobes. These preliminary findings may have implications for the field of marketing in further delineating the neural substrates underlying buying behavior. Thus, consumers that impulsively shop need not