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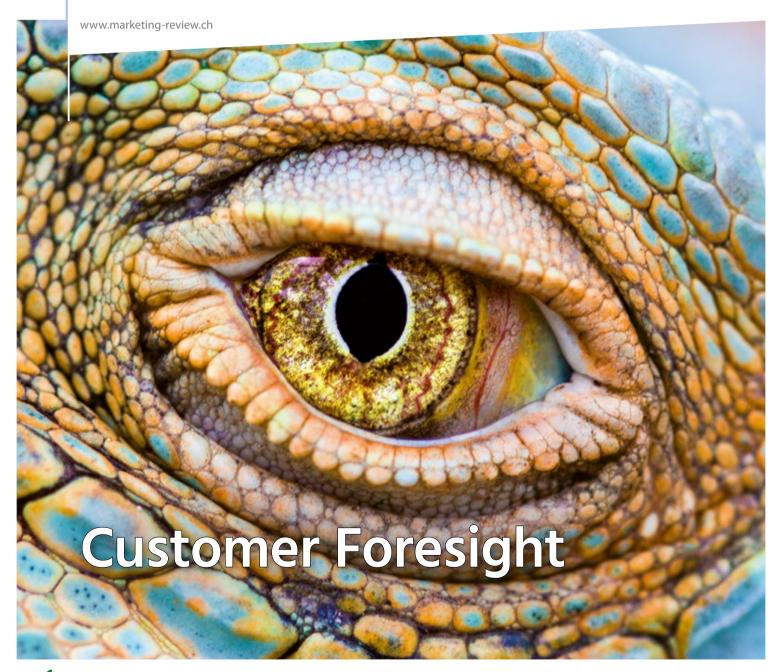
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Product Category Priming – A Case Study on Chocolate

Any supermarket visit involves a series of consecutive product choices. These various product categories can prime memory associations. This paper studies how exposure to higher (pralines) vs. lower quality (chocolate bars) product categories drives interest and demand for a target chocolate product (duplo, Giotto).

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ue to the decreasing impact of traditional advertising media, consumer-packaged goods firms have shifted resources from advertising to shopper marketing and the presence at the point of sale (Gilbride, Inman, & Stilley, 2015). For example, Procter and Gamble optimizes the "First Moment of Truth", i.e., the first three to seven seconds when consumers encounter a product in the store (Hui et al., 2013). At the same time, the growing amount of brands and individual product innovations make shelf positioning an increasingly contested issue between manufacturers and retailers (Valenzuela, Raghubir, & Mitakakis, 2013). Most prominently, central shelf positions are considered particularly advantageous because they attract attention (Atalay, Bodur, & Rasolofoarsison, 2012) but also suggest a high level of product popularity to consumers (Valenzuela & Raghubir, 2009). Other exposed locations such as end-cap displays or special island placements are desirable for similar reasons (e.g., Larson, Bradlow, & Fader, 2005; Garrido-Morgado & Gonzalez-Benito, 2015).

These considerations center around demand for products in such advantageous positions. While these products may be considered first, research on consumer decision making suggests each product consideration can also influence subsequent decisions on products in close proximity (e.g., Dhar, Huber, & Khan, 2007; Vohs & Faber, 2007; Gilbride, Inman, & Stilley, 2015). This happens because each purchase decision results in memory activations, i.e., attitudes and emotional consumption experiences (Weber & Johnson, 2006). In consecutive product choices, the memory activations caused by each product encounter make related information more salient in the consumer's mind. This is important because heterogeneous consumption experiences are often difficult to evaluate ex ante, making assessments prone to arbitrary influences (Ariely & Carmon, 2003).

In an online experiment, Mandel and Johnson (2002) observed that the landing pages of online shopping sites activate memory associations that affect subsequent choices. Initial landing pages with coins primed thriftrelated thoughts. Clouds were associated with softness and comfort. This mattered for subsequent choices of couches. Individuals exposed to coins chose cheaper and less comfortable sofas while the opposite pattern (more comfortable, more expensive sofas) emerged for individuals who saw clouds. While the actual product selection screen did not include any background image, differences in the initially viewed landing page had a profound impact on subsequent demand. This so-called feature priming has been widely observed and replicated in field settings.

Category priming is similar to feature priming. Specifically, whenever the classification of target objects is ambiguous, classifications and consequential responses are influenced by previous category encounters. Higgins, Rholes, and Jones (1977) confronted subjects with words describing either positive or negative traits. In an ostensibly unrelated experiment, subjects were more likely to classify a target person as more positive and formed more positive opinions when primed by positive trait adjectives. Implicit (subconscious and automatic) memory processes are believed to be the basis for these effects (Arkes, 2001). According to Herr (1989), these effects only emerge when category priming is unobtrusive, i.e., non-obvious

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to individuals and characterized by automatic processing as opposed to conscious reflection. Primes that are consciously perceived as a persuasion tactic can produce reverse priming (Laran, Dalton, & Andrade, 2011) and contrast effects (Herr, Sherman, & Fazio, 1983; Martin, 1986), i.e., evaluations opposite to the prime (Mandel & Johnson, 2002).

Similar effects of category priming are likely to play a role when consumers sequentially evaluate products. This is relevant to marketers interested in optimizing the retail presence of their products. For example, consider a car buyer who is confronted with expensive car models and subsequently evaluates a target car. Primes of expensive cars are likely to shift inferences about value upward while less expensive car primes will shift inferences in the opposite direction (Herr, 1989). In a supermarket context, product category priming depends on which products are in close proximity. For example, placing

Management Summary

Surrounding product categories matter when choosing retail positions. These have strong impact on sales, product value attributed by consumers (price expectations) and expected consumption pleasure. Taking product context into account can improve sales performance.

Crémant in the vicinity of regular sparkling wine is likely to result in lower quality inferences than the same Crémant located near champagne. Thus, pricing and positioning products at the point of sale requires careful consideration of the types of product category priming caused by the context of surrounding products. This makes it important for marketers

to understand the impact of category priming in more detail.

This paper illustrates how product category priming can be implemented in a supermarket context for an exemplary chocolate product. To investigate the effect of category priming, we ran a field experiment, a more controlled online survey experiment and a functional magnetic resonance imaging (fMRI) experiment using visual cues.

Anecdotal Evidence on Chocolate Demand

Many consumer goods manufacturers struggle with optimizing their retail presence. Ferrero, for example, faces the decision of where to position special chocolate product displays within supermarkets. Obviously, seeking an exposed position is desirable. It is less clear which context of surrounding product categories is most desirable. Similar to sparkling wines, confectionary items have different levels of value and, accordingly different expecta-

tions of consumption experience. While pralines are higher-priced, presumably more sophisticated and higher-quality products, regular chocolate bars represent the other end of the spectrum in terms of both price and anticipated consumption pleasure. Consequently, these product category primes will result in very different memory activations.

Ferrero considered capitalizing on product category priming by positioning its duplo chocolate bar in a dedicated in-store display next to either other chocolate bars or pralines. To find the best strategy, Ferrero conducted an A/B test for both locations using special end cap displays located at the end of different shelfs. Four weeks were selected that were not influenced by festive periods, holiday seasons or special promotions of the target product. Across the four weeks, duplo was presented either in the proximity of chocolate bars or near pralines every alternate week. Ferrero counted each customer purchasing at least one confectionary item in the proximity of the duplo display as a potential duplo customer. This resulted in 3,190 potential customers with duplo next to chocolate bars, and 3,352 with duplo next to pralines. When duplo was located next to chocolate, .88% of these customers purchased at least one pack of duplo. When the display was relocated to the pralines category, sales increased to 1.07%. While this difference is not statistically significant at conventional alpha levels due to the low levels of purchase incidence, it is in the expected direction of product category priming. If conducted nationwide, a 21.5% increase in sales has important implications for Ferrero, in particular when considering that the costs for the alternative display locations are about equal.

Impact of Product Category Priming in a Controlled Online Experiment

Field experiments provide important indications on actual effect sizes but come with several limitations. Specifically, the field settings in the above experiment prohibited full control over potential confounding factors. For example, the different locations in store may have differed in other factors (e.g., different walking paths). It is also not clear whether both pairs of weeks were fully comparable and whether individuals who bought or did not buy in the chocolate position weeks might have modified their behavior in the praline weeks. In addition, the chocolate position is closer to the traditional shelf space of duplo, while the praline position is more unusual and may thus have attracted additional buyers. Prior research has demonstrated that price comparisons are critically impacted by different aspects of shelf layout (e.g., Choi & Coulter, 2012). Since pricing of duplo is closer to regular chocolate than pralines, the relatively low price of duplo compared to pralines may also have attracted additional customers. Finally, Ferrero chose duplo for the A/B test because advertising had positioned duplo as a chocolate bar akin to pralines. It was therefore not clear whether it would be possible to replicate the effect in a more controlled setting for other products with different advertising.

Experimental Design

Since the necessary levels of control are challenging if not impossible to implement in the field, a more controlled online experiment is an efficient way to gain more insights. Data on a sample of 261 participants representative of the German population were the basis for this. Respondents were randomly assigned to a presentation of either a plain chocolate bar (127 participants) or a single praline (134 participants) image without any price information, each displayed for 10 seconds. Subsequent to these image displays, participants indicated their willingness to pay (WTP) for two target products: Giotto (another non-chocolate bar confectionary item of Ferrero, which comes in a bundle of 4 packages, each containing 9 Giotto balls) and a bundle of 10 bars of duplo. WTP measurement for Giotto always preceded

Main Propositions

- **1.** Many marketers face the challenge of finding optimal retail positions for their products.
- **2.** Products in close proximity activate consumer memory associations and drive product perceptions and price potential (category priming).
- **3.** Special placements among high-value product categories can improve value perceptions and demand.
- **4.** Product category priming effects are stronger when primes are unobtrusive and products are perceptually similar.

duplo on a separate page, so the potential recall of the duplo advertising could not drive results for Giotto. WTP for both products was measured on 11-point scales ranging from 0.00 € to 2.00 € (in steps of 20 cents). To investigate whether WTP would translate into sales when consumers can make choices within and across product categories, the survey also asked participants to distribute 100 points between four products to indicate their purchase likelihood. The four products consisted of the two Ferrero products (Giotto and duplo) and two products from other categories (blueberry jam, mate flavored ice tea). Measurement and analysis of WTP and purchase likelihood was carried out with the quantilope agile insights software.

Results

Results were consistent with the field evidence for both Giotto and duplo in terms of WTP. Average WTP for duplo was the equivalent of € .87 (5.27 on the 11-point scale) in the chocolate prime condition and € 1.00 (6.04 on the scale) after the praline prime. This represents an increase of 15% in price potential due to the praline vs. the chocolate product category prime (p < .01). The effect for duplo is similar in relative terms with a WTP of € .47 (3.33 on the scale) vs. € .53 (3.74 on the scale) as a function of the chocolate vs. praline prime, i.e., a 13% increase in price potential (p < .05).

In terms of purchase likelihood, demand for Giotto increased from 23.87% for the chocolate category prime to 28.33% for the praline category prime (p<.10). However, demand for duplo decreased by a similar amount (42.25% vs. 35.56%, p < .10). Note that Giotto is sold in balls, i.e., the product form resembles pralines more closely,

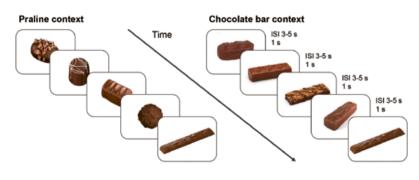
while the product form of duplo is more akin to chocolate bars. Presumably, within-category demand was shifted towards the product perceptually closer to the prime. This suggests that product category primes can drive product value perceptions but the actual impact depends on the visual similarity between the primed category and the promoted product.

Impact of Product Category Priming on Expected Reward and Pleasure

The concept of product category priming rests on the assumption of predicted consumption reward. What goes on in consumers' minds is difficult to assess in field and survey settings. However, two brain regions have been established as relating to reward and pleasure: the nucleus accumbens (NAcc) and the medial orbitofrontal cortex (mOFC) / ventromedial prefrontal cortex (vmPFC) (see Liu et al., 2011; Kühn & Gallinat, 2012; Brown et al., 2011). Related brain activation has been demonstrated to correlate with actual market demand (Kühn, Strelow, & Gallinat, 2016). These activations can be triggered by simple brand cues. For example, Mc-Clure et al. (2004) demonstrated that identical coke mixtures resulted in different brain activations in the vmPFC depending on whether or not the brand Coca Cola was displayed. Later replications with similar setups found direct evidence also for NAcc activation due to branding (Kühn & Gallinat, 2013). Similarly, fair trade labelling impacted activity in the NAcc and willingness to pay as correlated with the mOFC (Enax et al., 2015). Product category priming goes beyond these effects by linking the encounter with a related product category with activations of expected reward and pleasure.

To investigate the impact of product category priming on reward processing, eighteen healthy subjects with a mean age of 40.4 years (SD = 9.9, range: 29–58 years) participated in an fMRI experiment on the basis of informed consent. All subjects had normal or corrected-to-normal vision and normal hearing. No subject had a history of neurological, major medical, or psychiatric disorders. During the fMRI experiment, participants were presented with pictures of chocolate bars and pralines. Each trial started with a fixation

Fig. 1: Design of the fMRI Experiment



Source: Strelow, Heitmann, & Kühn, 2020.

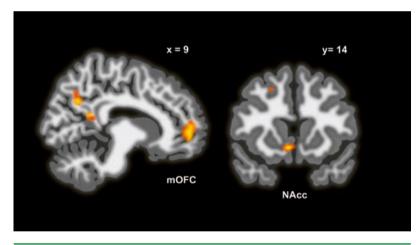


cross presented for a jittered duration of 3–5 s; then, depending on the withinsubject manipulation, a picture of a chocolate bar or a praline was shown for 1 s. This fixation and picture presentation were repeated four times with different pictures from the same category (chocolate bar or praline). The fifth picture shown was the chocolate bar duplo. In all, each trial had an average length of 25 s. The paradigm consisted of 20 trials (see figure 1). From the participant point of view, the entire paradigm consisted of a continuous stream of pictures depicting sweets. The participants were instructed to view all picture presentations passively. To compare this manipulation with an explicit persuasion attempt, another set of trials was performed with the same subjects. This trial had the same setup except that an instruction screen was presented for 2 s with the German word for chocolate bar (Schokoriegel) or praline (Praline) before the duplo chocolate bar was shown. Participants were instructed to consider duplo as belonging to the chocolate or praline category displayed on screen. Each trial had an average length of 15 s. The paradigm consisted of 32 trials. The sequence of

Brain images were collected on a 1.5 T Avanto MRI scanner system (Sie-

stimuli was randomized.

Fig. 2: Differences in the Reward- and Pleasure-related Brain Regions mOFC and NAcc as a Function of Product Category Priming



Source: Strelow, Heitmann, & Kühn, 2020.

mens 156 Medical Systems, Erlangen, Germany) using a 20-channel head coil. Data was analyzed using SPM8 software (Wellcome Department of Cognitive Neurology, London, UK). We extracted percent signal change values in anatomically pre-defined regions of interest, namely in the bilateral nucleus accumbens (NAcc) (Harvard-Oxford subcortical atlas) and the bilateral medial orbitofrontal cortex (mOFC) (AAL atlas: frontal middle

orbital and gyrus rectus), for which we had a-priori hypotheses. To analyze the resulting data, we extracted blood-exogen-level dependent (BOLD) signals from the bilateral NAcc and mOFC. We determined BOLD signals during "duplo" presentations where participants were instructed to view the product as a praline as compared with a chocolate bar and found no significant differences, neither in the NAcc $(t(17) = 0.503, \, p = 0.622)$, nor in the

mOFC (t(17) = 0.627, p = 0.539). However, in the image product category prime condition it made a significant difference whether the product was presented in the context of pralines or other chocolate bars. In the NAcc and mOFC the signal was significantly higher in the praline context (NAcc: t(17) = 2.719, p < .05; mOFC: t(17) = 2.216, p < .05). To test whether the image display interacted with the written text instruction, we computed interaction effects in a repeated-measures ANOVA and found a significant interaction for the NAcc (F(1,17) = 5.531, p < .05). At the same time, we observed a main effect of context with the praline eliciting higher BOLD responses (F(1,17) = 6.762,p = 0.019). In the mOFC, this interaction effect was not significant (F(1,17) = 2.048, p = 0.171) but exhibited a similar pattern. Figure 2 displays the clusters of differential activation for the two regions mOFC and left NAcc.

Discussion

The case of chocolate products illustrates that product category priming is a potentially important topic to consider in shopper marketing. Shelf placement is not only about exposed positions (e.g., eye-level shelf positions, dedica-



ted displays) but also about the context of surrounding products. Every product encounter activates product category associations of consumers and impacts subsequent buying behavior. We observed that high value categories can prime value expectations that transfer to a target product. This resulted in increased sales in the field, increased WTP and purchase likelihood in a controlled online experiment, and increased reward-related brain activation. The effects we observed were large (13-15% increase in WTP, 21.5% increase in demand) and highly persistent across products and types of research.

These findings have implications for all small to large companies interested in optimal product display at the point of sale. We investigated purely hedonic chocolate products, since hedonic elements play an important role across the FMCG industry (Gilbride, Inman, & Stilley, 2015). We therefore expect similar effects for many other supermarket items with hedonic or taste-based value propositions. In addition, many durables (e.g., home entertainment, furniture), services (e.g., hotels, recreational activities) or media products (e.g., music, movies) are characterized by hedonic elements. In online shopping, products can also be featured in close proximity to other related high- or low-value products. For example, the same flatscreen TV promoted in the context of low-quality stereo equipment is likely to be perceived very differently from a promotion in the context of high-end audio devices. Since memory contains both emotional experiences and cognitive deliberations, there is no theoretical reason why the effects we observed would not translate to less hedonic and more utilitarian items (e.g., cleaning products, home appliances).

Marketers interested in leveraging product category priming must keep in mind that the effects are nuanced. For example, the results of the online experiment suggest visual similarity amplifies the effect of category priming.

Lessons Learned

- **1.** The optimal retail location depends on the surrounding product category context.
- **2.** Among other things, value perceptions of the surrounding products are transferred when consumers evaluate products sequentially. This results in strong and systematic effects on demand.
- **3.** Optimal retail requires thorough empirical assessments. Costefficient means include simulated choices in online surveys. Field experiments and functional magnetic resonance imaging (fMRI) provide additional insights.

Also, priming must not appear as a persuasion attempt. Thus, the effects vanished when we used explicit words. In practical applications, simply hanging a sign "pralines" over a duplo placement is less promising than positioning duplo next to praline assortments. Since many other factors may play a role, we recommend empirical investigations. Valid inferences can be drawn even without the costly in-store

field experiments or fMRI studies we conducted. When resources are scarce, simple experimentation in online surveys has proven an effective means to better understand category priming for the product of interest. For products sold online, A/B tests in online shopping environments are readily available. Insights from survey research will provide valuable guidance for constructing promising tests. For products

such as chocolate where traditional retail channels play an important role, simulated online decisions as we have employed provide both efficient and effective means for a thorough understanding of category priming. Considering the size of the effects and the efficient means of research available, there are few reasons not to investigate the topic more closely when choosing retail placements.

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