Tracking Consumer Attention At The Point-Of-Sale

New approach and case study

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INTRODUCTION

Each new product introduction is accompanied with uncertainty regarding the most appropriate parameters for its design and display, and the optimal amount of shelf space to allocate. An improper location or an under-allocation of space might make a product fail before it achieves full sales potential. For the retailer, optimizing shelf space is also of utmost importance: allocating too many facings is a waste, while allocating too few will result in lost sales due to unmet demand.

One key driver of success at the point-of-sale is consumer attention. The following characteristics of consumer behavior suggest that in-store consumer attention is both malleable and an important determinant of purchase behavior.

1. A significant portion of purchase decisions are still being made at the point-of-sale (Inman and Winer, 1999). This suggests that consumer information processing is strongly influenced by stimulation at the point-of-sale ('bottom-up processing').
2. Consumers show a low level of involvement with most of these in-store decisions, making choices very quickly after minimal search and price comparisons. One key factor in designing efficient shelf layouts is time. Consumers don't have much time, and they scan shelf layouts and product displays quickly. If they cannot find what they are looking for in a few seconds, they will either turn away, or move attention to a different category.
3. What is not seen cannot be purchased. This also holds for image-oriented design and layouts if the information displayed is not noticed or not understood by consumers, there will be no effect. Attention is a strong filter, and it must be mapped under low-involvement situations in order to fully understand and better influence consumer behavior at the point-of-sale. One problem in measuring consumer attention has been the complexity involved in tracking eye movements. Traditional eye tracking is a time- and cost-intensive way to measure attention. The use of surveys (e.g., recall) bypasses this cost, but creates a different problem: recall data are unreliable measures of attention. We do notice much more than we consciously remember, and this has a significant influence on our behavior at the point-of-sale (e.g., Chandon, Hutchinson and Young, 2001).

The basic idea underlying AttentionTracking is to tap into consumer attention by exploiting the fact that attention coordinates all visual-motor behaviors, not just eye movements. Our contribution is a test design in which a pointing device (e.g. the index finger or the mouse pointer) is used to measure consumer attention, together with sophisticated analysis tools and benchmarks to measure, analyse and optimise the effectiveness of:

- Entry points the hotspots of a shelf;
- Product placement in the shelf;
- Area covered in the shelf (number of products, pack size, pack shape);
- Color combination, combination of pack size and shape;
- Promotions;
- Price displays, other promotions.

AttentionTracking focuses on capturing the image encoding process in low involvement contexts where consumers scan a shelf quickly. Results include entry points, the percentage of attention for product categories, product packages, and the scanning path of consumers across the shelf.

AttentionTracking is a software-based solution to measure attention in realtime and in implicit testing conditions. The use of a simple pointing device to measure consumer attention makes it possible to test large number of consumers in little time.

The case study presented here maps the attention of 400 consumers, but there is no upper limit in the number of consumers that can be tested. This makes it possible to differentiate scanning paths for particular target groups, build benchmarks, and test package designs early in the design process. Tests can be run on virtual shelf displays, such as the ones used in this study, as well as photographs of real shelf layouts displayed on computer screens or projected in real size using beamers. The advantage of using virtual displays and photographs is that tests can be run online, in addition to the traditional lab setting. This online approach is particularly powerful when pre-testing different layouts of a shelf or package design, as large numbers of consumers can be tested in short periods of time, making it possible to continuously feed results from market research back into the category management process.

The images in Figure 1 show entry points of 400 subjects for three different shelf layouts. In 'Heatmaps', the darker the red, the more attention ('heat') was on that area of the shelf. In 'Coldmaps', all elements that have been overlooked or poorly attended to are blacked.
The AttentionTracking method is based on scientific findings that human visual attention governs not only eye movements, but it also controls pointing movements with the index finger (e.g., Deubel et al, 1998; Neggers, 2000), and head movements (e.g., Gilchrist et al, 1998). A recent study has shown that there is a large overlap in the neural structure underlying attentional, eye and pointing movements, suggesting 'an attentional role that generalizes across response effectors' (Astavief et al, 2003, p. 468-9). Our contribution has been to show that participants can be trained to have the mouse cursor act as a pointing device for visuo-spatial attention (e.g. Egner et al, 2000).

The conclusion is that consumer attention can be measured by tracking eye position, but can also be measured by tracking pointing and head movements.

In our patent-pending implementation the procedure is as follows. First, participants are trained for two to three minutes to use the mouse, or their index finger, to rapidly point out salient spots on images presented for short periods of time (typically five to ten seconds). When the test is run online, the training procedure consists of a game-like instructional movie where participants learn how to click appropriately. There are five levels that need to be passed. In order to pass, participants have to click at least once a second to follow the speed with which attention moves. More than 90% of participants in online tests are able to pass this training phase, i.e. to learn how to correlate looking and clicking. Even five-year olds are able to do this correctly.

After training, the test consists in having participants click on a series of images, e.g., showing shelf displays from different distances and viewing angles. In a laboratory setting, the participants are shown how to click, or how to use their index finger, in a standard procedure very similar to the one just described for online tests. When using the index finger as the pointing 'device', a touch screen system is used. A software system runs in the background to collect and store all the pointing and/or clicking data. All visualizations and analyses are based on these raw data. Notice that each data point corresponds to a fixation in traditional eye tracking. Unlike eye tracking, fixations are not calculated with arbitrary thresholds (e.g., Salvucci and Goldberg, 2000), but fixations are rather measured directly. Each click corresponds to a fixation of the eye. Due to the large sample sizes available, data plausibility checks can be run easily.

This article shows that attention data like these cannot only be used to track consumer attention at the point of sale, but that they also have a strong correlation with branding and purchase intention measures gathered by Ipsos Germany GmbH using a multimedia survey system with which AttentionTracking was integrated. In this case study, participants were instructed to use their index finger to do the AttentionTracking, since the multimedia system is based on touch screen interfaces. The case study will now be summarized.

**CASE STUDY**

**Goal**

A snack manufacturer would like to introduce a new design and package shape for its nut range. In this study, two new designs (hereafter referred to as 'Design1' and 'Design2') will be evaluated as well as two new package shapes ('Shape1' and 'Shape2'). The goal is to improve shelf impact, visibility and notice of the nut range.

**Sample**

The target group consisted of buyers of pre-packed nuts and nut products Lorenz Snack World (Bahlsen), Felix, Kunz, Pittjes or ltje in the last three months, with 50% women and 50% men, aged 30-60 years (about one-third each in the three segments 30-40 years, 41-50 years, and 51-60 years). Respondents were screened on the street and invited to take part in the self-completion interview. The sample size was 500, of which 400 participated in AttentionTracking.

The field period was December 2002. The new designs in combination with the package shapes were tested monadically against the current design and package which acted as a benchmark.

**Interview**

The interview concerning shelf impact consisted of three steps:

1. AttentionTracking of the shelf displays ('attention');
2. Recognition of unbranded packs ('recognition');
3. Assumed branding of the packs ('branding').

In addition, purchase intent was measured by asking for the relevant set of purchase and the first choice of purchase.

**Scanning Paths**

Scanning paths for current pack design (left, N=100) and new pack design (right, N=100). The numbers show when the products are noticed (up to the fourth step), and the arrows denote the direction of the scanning path. Scanning path analysis shows that with the current pack design, the packages are noticed quite late in the scanning process. The new pack design improves this by drawing consumer attention earlier. This significantly improves branding, recognition, and purchase considerations. (See Figure 2)

**Comparison of Pack Designs**

This analysis focuses on pack design. The current design was benchmarked against two new designs. Table 1 summarizes results for one of the new designs. This new design, which essentially involves better placement of brand information (e.g. logo) and claim, works better along all relevant dimensions: it is seen by more consumers, catches attention better over time, holds attention longer and is a stronger eye-catcher.
Analysis of Pack Shape

Shelf space is expensive. The test design presented here makes it possible to establish, for each pack design, which combination of pack sizes and shapes in the shelf is optimal in terms of reaching consumers in a low-involvement context.

Three pack shapes with different sizes were analyzed:

1. Small:
   - one pack of current shape,
   - two packs of Shape 1 (medium size),
   - one pack of Shape 2 (large).

2. Medium:
   - three packs of Shape 1,
   - one pack of Shape 2.

3. Large:
   - one pack of Shape 1,
   - three packs of Shape 2.

Results show that only the last condition ('large') with three large packs results in a significant increase of consumer attention. (See Figure 3)

In general, the approach presented here can establish whether or not a combination of pack shape and size will have a significant effect on consumer attention.

ATTENTION RESULTS IN BRANDING

This section shows that consumer attention has strong impact on branding. High levels of attention on the brand (the logo in this case) result in strong branding.

Figure 4 shows overall attention on the three main brands analysed. Itje gets most attention, while Pittjes gets the least amount of attention. Next, branding was measured by showing participants unbranded pack designs from all three brands. Their task was to indicate which pack belongs to which brand. They could select between the three brands Pittjes, Lorenz, Itje, all shown during the test, and five other brands producing nut products. Figure 5 shows these branding results.

BRANDING RESULTS

The pattern is almost identical to the one shown for brand attention: the more attention on a brand, the better the branding. However, this finding may be biased by a priori brand knowledge. In a next analysis step, attention and branding for the three pack designs were compared. Two of these three designs have not been used in the real market, and therefore are unknown to the participants of the test. Any branding effects must therefore result from information processing during the test. Figure 6 shows the distribution of attention (% attention) for the three pack designs.

The current design draws the least attention, the new design 'Design 2' draws most attention. From this pattern we predict that branding should be best for 'Design 2' and worst for the current pack design. Figure 7 shows the branding results for the three pack designs.

The results show that, indeed, the pack that draws the most attention also results in the highest branding scores. All three packs are produced by the same brand and contain the same product. Pack size is also identical across the three designs. The only difference between them concern placement and combination of text and colors.

Attention analysis clearly predicts that the new design 'Design 2' works best, and should be preferred over the original pack design. Branding can be achieved by drawing consumer attention at the point-of-sale. In a competitive market situation, attention can help to communicate the brand at the point-of-sale, and thereby increase customer loyalty and sales.

Additional analyses show that in addition to branding, consumer attention also increases purchase intent, in particular first choice of purchase. (See Figure 8)

For this to work, pack design has to communicate brand, product and price information efficiently. Using attention analyses we show why the new design 'Design 2' results in much higher purchase intentions than both the original and the new design 'Design 1'.

The key drivers of the optimal pack design were:

- Impact of the brand (logo), and visibility of the claim. Branding is important, the logo must be noticed early.
- Effective scanning of the key visuals. Optimal impact is achieved when consumer attention can scan the key information within one second. The human eye re-fixates roughly three times per second. The optimal pack guides consumer attention to the product shot (eye-catcher), then the brand followed by the claim. This pattern of attention results in strong impact and visibility on the shelf, as well as branding and purchase intent.
The relative impact of brand, pack shot and claim. The optimal results were obtained with a pack design that resulted in the following distribution of attention: brand 15% (original pack: 8%), product shot 65% (original pack: 82%), claim 12% (original pack: 5%).

- Package size and shelf area covered three (and more) large packs placed along the horizontal axes achieved optimal results.
- Attention was drawn significantly less when smaller packages were tested, or when large packages were placed along the vertical axes. Shelf displays are akin to be grouped horizontally by visual perception.

The consumer appears to use a global-to-local (‘zooming’) strategy and saliency-driven search mechanisms to scan a shelf. A visual scan of a shelf involves:

- Bias to start a few degrees below eye-level.
- Quick scan of the entire visible segment during the first second. In this phase, product categories are grouped strongly based on visual processing. The visual brain extracts a saliency map where the most conspicuous areas are marked the eye then moves to the strongest peak on this map.
- The shelf is then scanned in the neighborhood of the entry point. In low involvement situations, or when there is time pressure or strong distractors, attention is again heavily based on visual processing.
- Packages are often grouped together this grouping is especially strong along the horizontal axis. Since size is found to be an important factor in attracting consumer attention, grouping can lead to strong impact in the shelf.
- Individual packages are inspected for periods of about one second, or three fixations of the eye. The product shot acts as the entry point, and ideally guides attention to the brand.

DISCUSSION

We have introduced a new approach to measuring, analysing and optimizing consumer attention at the point-of-sale. Data from a case study with 400 participants are used to illustrate the concept.

The results of this case study illustrate that consumer attention at the point-of-sale:

- can be mapped across large samples of consumers, yielding data for optimising shelf space and pack design;
- increases branding participants better recognized those product packages which they attended most strongly during the AttentionTracking-Test;
- increases the likelihood to enter the relevant set of purchase;
- increases purchase intent if the package design is optimal.

We also show that the preferred viewing angle and entry point is below the horizontal, but there are strong differences across shelf layouts. Some layouts manage to focus consumer attention on single product facings, in others consumer attention is more blurred and there are several entry points. (See Figure 9)

VIRTUAL SHOP SIMULATION

Shelf space and positioning of products has a strong influence on consumer attention. As expected, the more space a category covers, the higher the consumer attention on that area. However, there is an optimum amount of shelf space beyond which is wasted money. Horizontal placements of products have a much stronger impact than vertical placements. Shelf layouts prime consumer perception to group objects along the horizontal axis. How can this approach be integrated into the category management process? Since data collection and analysis are very efficient, actionable results even for larger numbers of designs and placements can be obtained within two weeks. This makes it possible to have package designs tested early in the design process. AttentionTracking is based on screenshots, and can therefore be used to test design variations long before they go into production. A screen design is enough to test both the package design as well as its impact on the shelf. The entire process results in a benchmarking system where previous analyses have established best-practice examples, both in terms of consumer attention as well as in terms of generating sales. This benchmark is then used to evaluate new layouts quickly and objectively, thereby significantly reducing the time to establish a new package design, and at the same time ensuring that the design works well with the target group.

REFERENCES


NOTES & EXHIBITS

Christian Scheier
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FIGURE 1: HEATMAPS AND COLDMAP
FIGURE 2: CURRENT AND NEW PACK DESIGN
Scanning paths for current pack design (left, N=100) and new pack design (right, N=100). The numbers show when the products are noticed (up to the fourth step), and the arrows denote the direction of the scanning path.

**TABLE 1: IMPACT OF PACK DESIGN**

<table>
<thead>
<tr>
<th>Impact of Pack Design</th>
<th>Current</th>
<th>New</th>
<th>Difference</th>
<th>The new design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noticed at least once (Share-of-attention)</td>
<td>44%</td>
<td>66%</td>
<td>+50%</td>
<td>Is being noticed by more consumers</td>
</tr>
<tr>
<td>Looked at pack first</td>
<td>22%</td>
<td>34%</td>
<td>+55%</td>
<td>Is the stronger eye catcher</td>
</tr>
<tr>
<td>Impact over time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Second</td>
<td>44%</td>
<td></td>
<td>+10%</td>
<td></td>
</tr>
<tr>
<td>2. Second</td>
<td>35%</td>
<td></td>
<td>+13%</td>
<td>Activates and catches attention better</td>
</tr>
<tr>
<td>3. Second</td>
<td>34%</td>
<td></td>
<td>+55%</td>
<td></td>
</tr>
<tr>
<td>4. Second</td>
<td>31%</td>
<td></td>
<td>+48%</td>
<td></td>
</tr>
<tr>
<td>Returning on product pack</td>
<td>25%</td>
<td>36%</td>
<td>+44%</td>
<td>Holds more attention</td>
</tr>
<tr>
<td>Viewing time</td>
<td>11%</td>
<td>19%</td>
<td>+73%</td>
<td></td>
</tr>
</tbody>
</table>

Scanning paths for current pack design (left, N=100) and new pack design (right, N=100). The numbers show when the products are noticed (up to the fourth step), and the arrows denote the direction of the scanning path.
Attention is only significantly increased when large packs are used.
Source: MediaAnalyzer Software & Research GmbH
The attention index is calculated by normalizing percent attention on the brand with the area covered in the shelf by that brand. In this way, impact on consumer attention can be shown independent of the shelf area covered.

Source: MediaAnalyzer Software & Research GmbH

FIGURE 5: BRANDING RESULTS

Branding was measured by prompting the packages unbranded.
Branding: correct branding / wrong branding.
1 = correct branding equals wrong branding.
Source: Ipsos Deutschland GmbH
FIGURE 6: DISTRIBUTION OF ATTENTION (% ATTENTION) FOR THREE PACK SIZES

Index is calculated by normalizing percent attention on the design with the area covered in the shelf by that design. In this way, impact on consumer attention can be shown independent of the shelf area covered. MediaAnalyzer Software & Research GmbH

FIGURE 7: BRANDING RESULTS FOR THREE PACK DESIGN

Branding was measured by prompting the packages unbranded. Branding: correct branding / wrong branding. 1 = correct branding equals wrong branding.
Source: Ipsos Germany GmbH
FIGURE 8: PURCHASE INTENT FOR THE THREE DESIGNS TESTED

Purchase intent for the three package designs tested, for buyers of the nut brand, and for the total sample. Data show percent of first choice of purchase.
Source: Ipsos Germany GmbH

FIGURE 9: VIRTUAL SHOP SIMULATION

Three-dimensional shop display. This virtual shop simulation is running online. Consumer behavior is measured by capturing position and orientation. This simulation is being developed in cooperation with the University of Hamburg.