Shelfgram | hotspex™

The complete guide to AI heatmaps

How to win shopper attention with predictive eye tracking

Executive summary

1-3 seconds. That's about all the time you get to win a shopper's attention or risk getting lost in the shuffle. These critical few seconds when shoppers encounter products at the shelf is known as the “first moment of truth”, a concept introduced by Procter & Gamble. It's the moment where all of a brand's efforts in product development, pricing, promotion, and distribution culminate to influence a purchasing decision.

The human brain can process visual content in as little as 13 milliseconds, highlighting the quick and automatic nature of visual perception[1]. While the mantra of "don't judge a book by its cover" reminds us not to make snap judgments, the opposite holds true in the world of consumer goods and retail. Ultimately, shoppers vote with their wallets and in the ongoing battle for market share, it’s clear that consumers are heavily influenced by in-store merchandising.

Marketers have traditionally regarded share-of-shelf as the primary indicator of brand performance. It’s easy to measure and the rationale behind it is straightforward: more shelf space signifies greater visibility, which should lead to increased sales.

However, there's a growing recognition across the industry that share-of-attention might hold even greater significance than

1. https://news.mit.edu/2014/in-the-blink-of-an-eye-0116

the amount of occupied linear feet. Each time we enter a store, we're bombarded with an overwhelming amount of dense visual information while making a series of rapid decisions. Naturally, our brains use a variety of heuristics to decide what to focus on and what to tune out. Brands that understand and cater to these mental shortcuts can capture more shopper engagement and conversion.

In this whitepaper, we'll present a deep-dive exploration into the integral role shopper attention plays at retail, with a specific focus on packaged goods and planogram design. By synthesizing advanced AI techniques, shopper marketing strategies, and a wealth of empirical data from multiple scientific studies, we will provide a detailed and multidimensional understanding of how this kind of attention can be captured, influenced, and retained.

We'll explore the top 10 factors that influence visual saliency such as the universal attraction of faces, the power of color contrast, the subtle nuances of texture breaks, and the impact of brand blocking. Additionally, we'll shed light on seemingly counterintuitive factors, including the 'camouflage effect' of small packaging and the immediate implications of out-of-stock scenarios.

Further, we'll interpret the predictive capabilities of modern AI models in decoding shopper behavior and forecasting shopper attention, laying the groundwork for a future where predictive AI heatmapping informs and transforms retail strategies.

With this comprehensive overview, we'll offer brands and retailers a potent toolbox to successfully navigate a highly competitive retail landscape, foster superior shopper engagement, and ultimately, boost sales performance to find new growth.

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Decoding shopper behavior with eye tracking

The science of shopper behavior

To understand the importance of eye tracking in shopper design, we need to first explore the intricacies of shopping behavior itself. Shopping is a complex behavior influenced by a range of variables from personal tastes to product placement and is a multisensory experience. Of course, the most used human sense while shopping is sight. Our eyes, often unbeknownst to us, are drawn to what intrigues or attracts us, acting as a bridge between our subconscious impulses and conscious choices. Let's break this down:

Deliberate Shopping

When shoppers make intentional, well-informed choices about their purchases, they demonstrate deliberate shopping. This often happens when buying unfamiliar or high-value items. For example, when buying a new laptop, a shopper is likely to research different models, compare prices, and think carefully about what they need. They are fully aware of what they're doing and why they're doing it, and they lean on previous knowledge and experiences to make an informed decision. This is also known as System 2 thinking, based on Daniel Kahneman's model of decision-making, which is slower, deliberate, and logical.

Habitual Shopping

A significant portion of regular shopping behavior is instinctive and automatic, akin to how one might drive a car along a familiar route. You might suddenly realize that you've covered a considerable distance without consciously thinking about every turn or stop. It's as though you've been on autopilot, with your subconscious mind handling the task based on ingrained habits from experience.

The same principle applies to shopping. We're a lot more on autopilot than we might like to admit. Often, people pick-up their regular brand of toothpaste or milk from the supermarket shelf without much deliberation. This habitual shopping is typically seen with frequently purchased, low-value items, where convenience and familiarity play a huge role. This behavior is linked to 'System 1' thinking, characterized by fast, instinctive decisions rooted in established patterns.

When you're disrupted while driving, say by a sudden event like a pedestrian stepping onto the road, your brain can rapidly switch from System 1 to System 2. You immediately go from driving on autopilot to actively assessing the situation and making quick, conscious decisions, like braking or swerving safely. This switch can happen in fractions of a second. That's why sales and discounts, eye-catching packaging, and prominent product placement can all be so effective - they catch our attention and can disrupt our autopilot behavior, influencing us to make different purchasing decisions.

The best retail strategies take into account both of these behaviors. For instance, retailers might use clear, informative wayfinding signage and helpful staff to support deliberate shopping. At the same time, they might arrange their stores in a way that facilitates habitual shopping, with frequently bought items placed consistently in easily accessible locations.

What is eye tracking?

Category managers often have strong intuitions about product placement but without supporting data, it's hard to turn these into recommendations. By validating these hunches, planogram designers can make smarter decisions that refine the overall retail experience.

Eye tracking technology provides marketers with a rich source of objective data by measuring subconscious human reactions and conscious gaze. The technology works by recording the direction and duration of a person's eye movement patterns and gaze (pauses), pinpointing what they are looking at and for how long. This goes beyond what consumers say they notice and reveals implicit preferences and biases that influence shopping behavior[2].

The output of these research reports is usually represented as a heatmap where the most intense colors reflect the points of maximal interest. These rich insights describing visual saliency (how the human eye responds to visual stimuli) help inform strategic design and positioning of products in-store.

There are a number of ways to conduct an eye tracking study, ranging from using specialized headgear with cameras and sensors, to webcams and even point and click devices (mouse, trackpad, touch screen).

2. Wedel, M., & Pieters, R. (2008). A review of eye tracking research in marketing. Review of Marketing Research

Video Based

Video-based eye tracking systems use a camera (or multiple cameras) to capture images of the eye. These systems typically use infrared light to create reflections on the cornea (the clear front surface of the eye) and track the movement of these reflections. Some video-based systems also track the center of the pupil or the outline of the iris, as these parts of the eye provide additional information about eye position and gaze direction.

Virtual Reality

This is a newer method that leverages the immersive capabilities of virtual reality technology. VR headsets equipped with eye tracking technology are used to monitor gaze within a simulated 3D environment. In addition to offering the same benefits as traditional eye tracking, VR eye tracking can simulate various realistic scenarios without the need for a physical setup. This also allows for better control of the environment and the variables that could influence gaze behavior.

Infrared Oculography

Infrared Oculography uses the difference in reflective properties between the sclera (the white part of the eye) and the iris (the colored part of the eye) to track eye movements. These systems shine infrared light into the eye, and a sensor measures the reflected light. As the eye moves, the balance of light and dark in the sensor's field of view changes, allowing the system to track the direction and amplitude of eye movements.

Point and Click

This is a more scalable approach, which collects attention patterns based on consumers using mouse / trackpad / touchscreen to indicate what they notice. Although considered a more intentional (thereby more explicit) method, this has been proven to be a reliable way of measuring attention at shelf.

Traditional eye tracking limitations

The precision of an eye tracking study involves balancing many factors including the eye tracking system used, the design of the experiment, the data analysis process, and the representativeness of the sample population. Ongoing technological advancements continue to enhance the quality, affordability, and user-friendliness of eye tracking systems. Nevertheless, the limitations of cost, time, and a small sample can lead to insufficient data or unrepresentative findings that hinder the generalizability of the study's results.

Cost

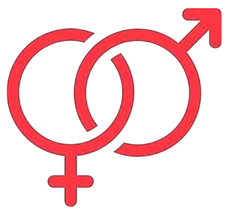
The overall cost of a market research study comes from the accumulation of several expenses. This includes the specialized skills of the professionals involved, the time and labor across all research stages, the use of specialized devices, and of course, participant recruitment costs. Quality control measures, comprehensive reporting, and overhead costs also add to the expense. All these factors, though individually necessary for high-quality results, collectively contribute to making market research a substantial investment. Broadly speaking, for a comprehensive eye tracking study, professional firms might charge anywhere from $10,000 to $60,000 or even more.

Time

Eye tracking studies can be time-consuming to set-up and conduct. Participants must be individually calibrated with the system to ensure accurate results. The process of analyzing eye tracking data can also be intensive, requiring specialized knowledge and skills to interpret heat maps, scan paths, and gaze plots. In terms of the validity of the insights gained from eye tracking studies, it largely depends on the design and execution of the study. The larger the sample size, the more reliable the results. A study with just a few participants might not be representative of your broader audience. More participants mean more cost and also more time spent on recruiting, data collection, and analysis.

Noise in the data

Physical retail is a space with tens of thousands of products, retail media and other visual complexity. Measuring eye tracking movements using biometric techniques such as laser eye tracking and headsets are measuring pure eyeball movements. You don’t actually notice everything that enters your peripheral vision. Therefore, this data requires a lot of filtering to measure focal vision in order to correlate with sales.

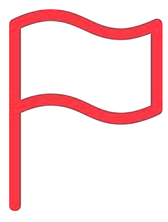


Gender

Research shows that men and women can have different shopping habits and preferences. In some categories, women might be more detail-oriented and spend more time on individual products, while men might scan more quickly and the inverse might be true in other categories. They also shop different parts of the store and may enter and exit the aisle from different directions based on these preferences.

Age

Age can significantly influence consumer behavior. Younger audiences tend to have a bias towards bold, innovative designs, while older audiences often prefer more traditional and familiar layouts. Age-related vision changes can also impact what people can easily see or read from different distances.



Culture

Cultural differences can heavily influence what people notice and value. Some cultures are more drawn to specific colors or to certain symbols or imagery. Eye tracking studies conducted across different cultures can help understand these differences and tailor marketing accordingly.

Socioeconomic status

Affordability and perceived value can heavily influence the buying decision, which can be reflected in eye tracking data. Those from higher socioeconomic statuses might gravitate towards premium, high-cost items, while those from lower statuses might have a bias to focus more on value-sized products or sale tags.

Education level

This can affect the complexity and amount of information a person can process at a glance. Higher educated individuals might linger on products with detailed information, while others may be overwhelmed and prefer simpler messaging. Different levels of literacy in the native language can also affect whether people gaze more at copy or imagery.

Lifestyle preferences

Each individual has unique preferences and lifestyles that guide their attention. For example, a health-conscious person will likely spend more time examining nutritional facts.

Small Sample Size

When conducting eye tracking studies, it's important to remember that even the most segmented target market isn't a homogenous group. Scaling up your sample size is the best way to eliminate the outliers caused by inherent differences between humans. Unfortunately, traditional eye tracking often involves lab-based setups that can only accommodate a limited number of participants at a time.

Consequently, results might not be representative of a larger audience. This limitation is particularly significant when studying diverse consumer bases or trying to understand broader shopper behavior. These are some of the major factors that lead to variances in eye tracking data, especially when you’re working with a small sample size.

The rise of predictive AI heatmapping

The advent of predictive visual saliency heatmapping can actually be traced back to the dawn of the digital revolution and the emergence of web analytics. A new generation of businesses were embracing eCommerce and wanted to know when and where their users were clicking. They were interested in the specific sections of a webpage that users were observing, how far they were scrolling, and how they were interacting with all the elements on their website. The goal was to optimize clickthrough rates along the path to purchase because it had a direct, immediate, and measurable impact on sales.

This journey of iterative A/B testing and discovery marked a significant milestone in web usability when an early eye tracking study by the Nielsen Norman Group discovered that users generally scan a webpage in an 'F' pattern. It led to a design principle that arranged vital elements strategically along a top navigation bar with the most important content left-centered and “above the fold.”

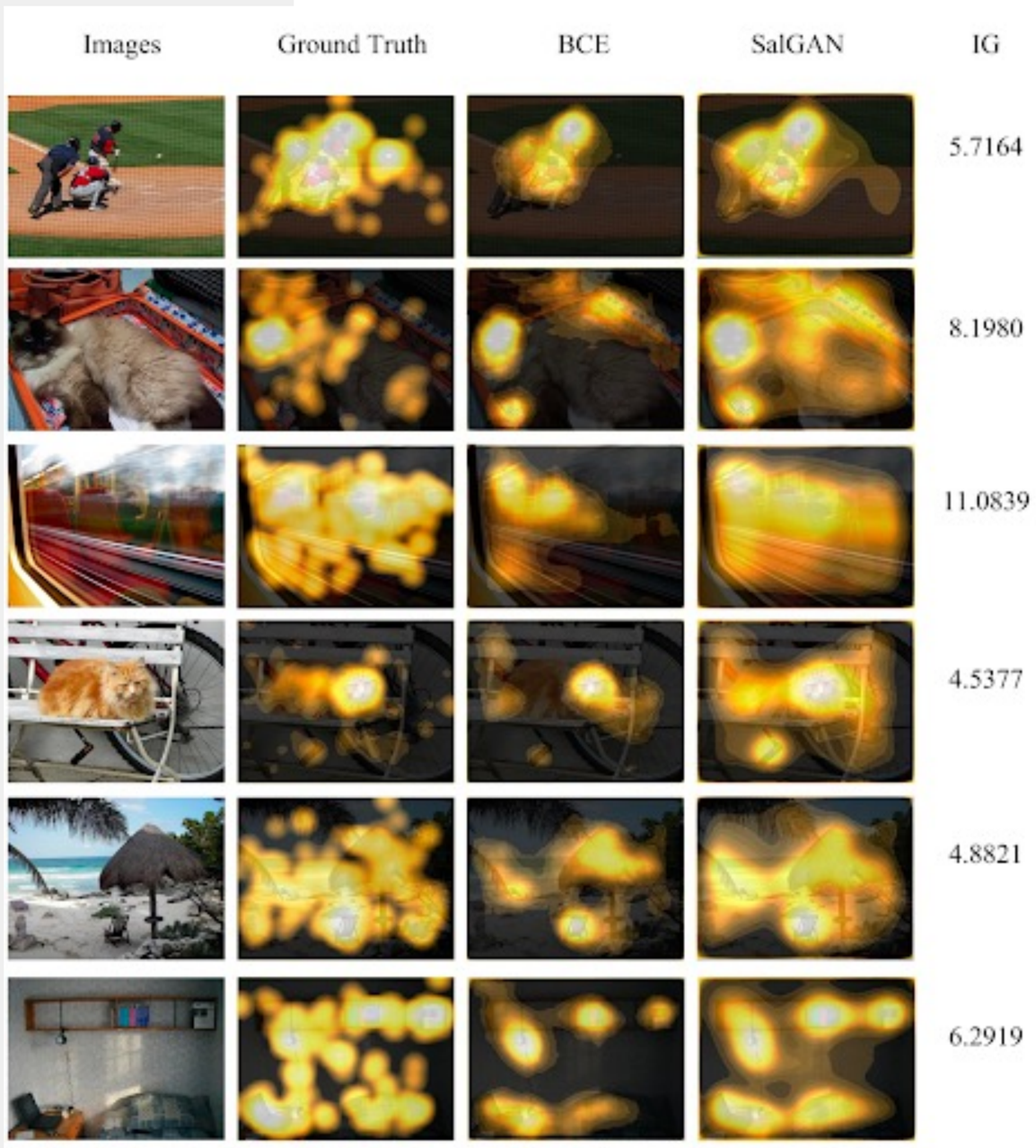
As marketers analyzed summary reports of clicks - represented as heatmaps - and deployed website updates, they noticed conversion rates increase with each iteration. This profound discovery sparked a renewed interest in extending this methodology beyond the screen, and bringing heatmapping to life on the physical retail shelf.

However, given the cost and time limitations of traditional eye tracking studies, there's been a lot of work done across the industry to introduce systems that can predict visual saliency without needing to conduct a full study. While this is an active area of research in the fields of neuroscience and computer vision, each generation of AI models is delivering more accurate, cost-effective, and comprehensive insights.

Key examples of these technologies include Bayesian Correlation Explanation (BCE), SalGan, and DeepGaze. BCE uses AI to provide a more rigorous statistical foundation for interpreting eye tracking data. SalGAN and DeepGaze are models in the field of computer vision, particularly focusing on saliency prediction – estimating which parts of an image will draw the most attention. SalGAN uses a technique called Generative Adversarial Networks (GANs) to create and refine its predictions while DeepGaze uses deep learning, specifically convolutional neural networks, to learn from large sets of images and make its predictions.

These novel technologies can crunch through vast amounts of data to analyze complex patterns and provide nuanced insights into viewer behavior. Not only can they identify elements like color and texture, but they can also detect subtler components like emotional context and cultural symbolism. Some commercialized products that leverage these and similar technologies include 3M™ Visual Attention Software (VAS), Dragonfly AI, and EyeQuant.

Predictive heatmapping effectively addresses the small sample size problem often encountered in traditional eye tracking studies by leveraging the scale and diversity of its training data. This allows for the creation of robust models that accurately predict eye movements and attention patterns across a broad spectrum of consumer behavior. As these technologies advance, they are redefining consumer engagement and ushering in a new era of shopper experience optimization.



This chart presents a collection of images alongside visual overlays that capture where viewers are most likely to direct their attention. It contrasts the actual focus points of viewers, known as the 'ground truth,' with focal areas predicted by two models: BCE and SalGAN. The numbers on the right indicate the effectiveness of the models, with lower scores suggesting a closer match to the ground truth.

Current limitations of AI models

Before jumping all-in on predictive heatmapping, it’s important to understand some of the current limitations. While machine learning models can identify patterns and trends in huge datasets that would be impossible for humans to analyze manually, they might overlook nuanced, contextual, or subjective factors that a more bespoke study could capture. Predictive heatmapping is a great way to produce generalized insights but here are some are important limitations and caveats:

- Well-known brands often capture more attention because they're already stored in the consumer's memory. This 'pop-out' effect means that familiar brands can draw attention away from lesser-known brands, even if the latter occupy more shelf space.[3] Some visual elements evoke personal emotions like nostalgia that can captivate a specific segment of shoppers.[4]

- In some categories, consumers enter with expectations that introduce visual biases. For example, shoppers looking for ketchup might be more prone to notice a wall of deep red products whereas shoppers looking for olive oil would be drawn-in by tall reflective greenish-gold glass bottles.

- Consumer behavior can be influenced by seasonal changes, holidays, and cultural events. Even the time of day or week might affect shopping behavior. Customers might be in a rush during certain hours, thereby limiting their attention. These temporal factors impact shopping patterns in different ways but are unlikely to manifest in a generalized model.

In the future, the most effective approach will likely involve leveraging AI for its scalability, speed, and predictive powers, while also conducting custom studies to explore specific questions. The ability to ground the AI's quantitative findings with rich qualitative human context from a custom market research project may likely yield the most validated insights.

3. Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2007). Measuring the Value of Point-of-Purchase Marketing with Commercial Eye Tracking Data. INSEAD and Wharton

4. Liao, L., Corsi, A. M., Lockshin, L., & Chrysochou, P. (2015). Emotional Responses towards Food Packaging: A Joint Application of Self-report and Physiological Measures of Emotion. Food Quality and Preference.

Top 10 heatmapping findings

Faces attract a lot of attention

Human brains are wired to look at faces. It’s a phenomenon known as the "face advantage”. This observation refers to our ability to recognize, remember, and process faces more quickly and efficiently than any other complex visual stimuli. In fact, studies show that faces are even better than voices for storing memories and retrieving semantic information (e.g., a person's occupation) as well as for the recall of episodic information (e.g., specific memories associated with a person).[5]

Evidence of the face advantage is found in the existence of a specific brain region, the fusiform face area (FFA), which becomes particularly active when viewing faces, suggesting that our brains have specific mechanisms dedicated to facial recognition.

Paul Ekman, a pioneer in the study of emotions and their relation to facial expressions, has identified thousands of emotions that can be expressed through numerous subtle movements of the 43 different facial muscles. Our complex muscular facial structure is more developed and intricate than most other animals and is also disproportionate compared to the rest of the body, where larger muscles are designed for movement and strength rather than intricate expression. The high concentration of facial muscles allows for strong non-verbal communication and contributes to the complex social bonding, cooperation, and group living, which have all been important for our survival and success as a species throughout evolution.

The power of faces in capturing attention even extends beyond humans to include animal faces, cartoon characters, and just about any other recognizable facial-like structure. In fact, this predisposition is so strong that we often see faces where there are none - in clouds, rocks, in the front of cars, and countless other places. The tendency to see faces in inanimate objects and abstract patterns is a well-known phenomenon known as "pareidolia".[6]

Marketers and designers can leverage this bias to attract more attention to their products. For instance, a study examining the effectiveness of brand mascots (i.e., Tony the Tiger, the Jolly Green Giant) found that these characters significantly increased attention and recall.[7] Similarly, brands like Pedigree and Iams often use images of dogs on their packaging, understanding that pet owners will be drawn to these familiar and endearing faces.

5. https://www.jstor.org/stable/44318613

6. Liu, J., Li, J., Feng, L., Li, L., Tian, J., & Lee, K. (2014). Seeing Jesus in toast: Neural and behavioral correlates of face pareidolia.

7. Nelson, C. A. (2001). The development and neural bases of face recognition. Infant and Child Development: An International Journal of Research and Practice.

Another interesting factor is the emotional response that certain faces can evoke. For example, cartoon characters are often designed with exaggerated, highly expressive faces that can evoke specific emotions in viewers, making them more engaging and memorable.[8] Some more famous examples include the Energizer Bunny, Toucan Sam, the Pillsbury Doughboy, the Kool-Aid Man, and Mr. Peanut. So while our attention is indeed attracted to faces, the underlying mechanism is more about the familiarity and emotional connection that the face - be it human, animal, or cartoon - can evoke in us.

Moreover, humans are naturally drawn to familiar faces. That's why celebrities with high public visibility are instantly recognizable. When shoppers see a celebrity's face on a product or in an advertisement, it immediately catches their attention amidst a sea of unfamiliar images, brands, or even other faces. Using Shelfgram's massive repository of retail execution images, we've noticed that almost everywhere we encounter faces, the AI focuses the attention heatmap in that area.

While faces are powerful attention grabbers, they actually pose a unique challenge to shopper marketers because they hog attention. As a viewer's focus gets drawn-in and locked onto a face, particularly the eyes, this often detracts from other key elements in a display or advertisement like the product itself, the promotional copy, or the call-to-action (CTA).

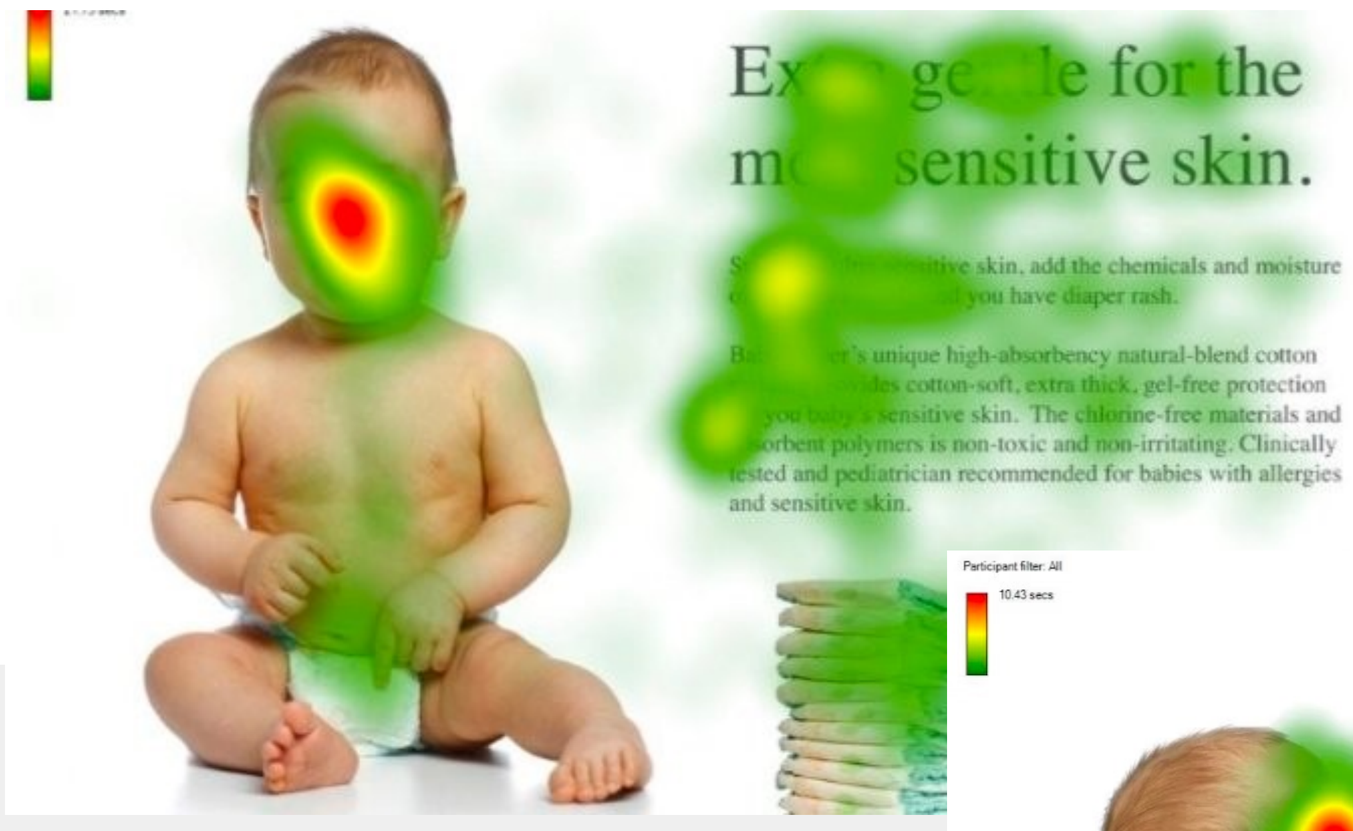
8. Riecken, G., & Hensel, K. (2012). The use of spokes-characters in print advertising: An updated content analysis comparing the period 1994–2003 to the years 1969–1970. Journal of Current Issues & Research in Advertising.

The concept of 'gaze cueing' presents a strategic solution to this challenge. By directing the gaze of the face in the marketing material towards the product or CTA, marketers can leverage our natural tendency to first look at the eyes and then follow that gaze. The face still attracts initial attention due to our inherent strong face bias, but the gaze cueing effectively 'halos' that attention onto the targeted elements like a brand logo.

In this M&M's display, attention is initially drawn towards the expressive face but is then "gaze cued" upwards by the angle and position of the pupils within the eyes.

Gaze cueing can help balance the strong attention-grabbing power of faces with the need to highlight products or sales offers. It's a nuanced two-step approach that requires careful design and planning but when done correctly, can significantly enhance the impact of shopper marketing efforts.

In this M&M's display, attention is initially drawn towards the expressive face but is then "gaze cued" upwards by the angle and position of the pupils within the eyes.



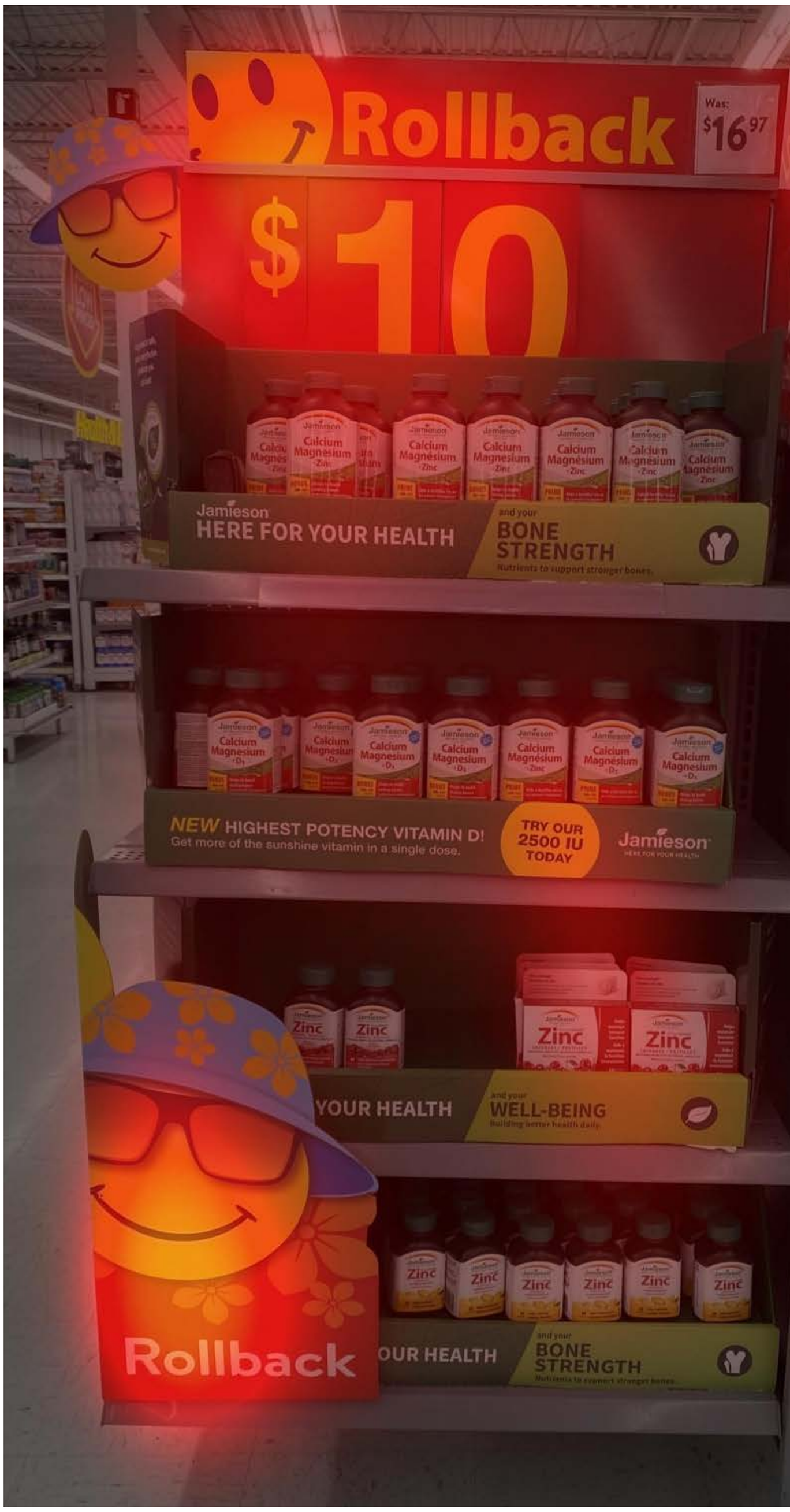
Increased attention is found distributed across the text in the version of the image that features the baby's gaze directed towards it.

Contrast and lighting play an important role

The use of colors, lighting, and signage in retail environments is well studied and supported by various academic findings. These are all aspects of “retail atmospherics”, a term coined by marketing professor Philip Kotler, which refers to the conscious designing of space to create certain effects in buyers.

Regarding color, research has shown that it can have a significant influence on consumers' moods and attitudes. In a study published in the Journal of Business Research, it was found that color affects consumers' emotions, which in turn impacts their purchase intentions. For instance, brighter colors, such as red, can create feelings of excitement and can be used to attract attention to particular products. This is why most sales tags and retailer promotional material will use red, orange, yellow, or another vibrant color. Walmart famously uses red and yellow together in rollback features to create a strong visual cue.

A good example of using color contrast to drive attention was the original canary yellow 'Post-it' Notes. It helped the product stand out against the sea of white pages, black notebooks, grey files, and beige folders that make up the office supplies category.



[Yellow Tail] wine stood out against a backdrop of red and white wine bottles, which often feature more conservative and traditional labeling. The brand's use of bright labeling and a memorable kangaroo contrasted sharply with the category's earthy tones, drawing attention and appealing to consumers seeking a more approachable and less intimidating wine experience.

Another example is Burt's Bees, which uses a distinctive color palette of yellow and brown on its packaging. This makes it immediately recognizable and differentiated from other skincare and personal care products, which often use softer or more minimalist color schemes.

More recently, brands like RxBar and LaCroix make use of vibrant and varied colors with bold fonts in utilitarian categories often dominated by subdued colors to improve shopper recognition.

Bright, contrasting colors certainly draw attention. But before a brand decides to embrace neon packaging, it's crucial to consider a few things. The chosen colors should not only catch the eye, but also reflect what the brand and its products stand for. Take an organic food company, for example, that might choose more muted, earthy colors. These tones probably won't stand out the most on the shelves, but they do give a clear message of naturalness, which is key to the brand's image. Similarly, luxury brands often use shades of gray to communicate a sense of elegance and sophistication fitting for high-end products. And one more thing to remember: while bright colors are great for attracting attention, they can make it harder to read the packaging if not used properly. So it's less about striking packaging and more about striking the right balance.

Brands like Cole Haan, Dyson, and Nespresso have all used vibrant colors to juxtapose their products in categories characterized by browns and greys.

Casino games use bright and bold colors to grab players' attention, create an energetic atmosphere, and evoke feelings of excitement and optimism. Additionally, these colors help establish visual clarity, reinforce branding, and leverage positive associations with luck and luxury within the gambling culture.

Lighting also has a notable effect. A study published in the Journal of Marketing Management found that lighting influences customers' perceptions of a store and can affect their behavior, where brighter lighting creates a more positive perception and leads to longer shopping durations.

Thoughtfully positioned and modulated lighting can also serve as a silent guide, subtly directing shoppers towards specific products or areas within a store.[9]

Apple stores are renowned for their minimalist design and strategic use of lighting. Upon entering an Apple store, the overall lighting is uniform, bright, and welcoming. This makes the store feel spacious, comfortable, and inviting. The tables displaying products like iPhones, iPads, and MacBooks have a bright, focused light source directly above them, subtly guiding customers towards these stations. The brighter, well-lit product tables stand out against the slightly less bright walkways, guiding customers to interact with the products.

9. Areni, C. S., & Kim, D. (1994). The Influence of In-Store Lighting on Consumers' Examination of Merchandise in a Wine Store. International Journal of Research in Marketing.

Out-of-stocks are major detractors

Out-of-stock situations indeed tend to be major detractors of shopper attention, and there are several reasons for this that we should explore. The big one is that the primary reason shoppers visit stores is to find products they need. Simply put - there’s nothing particularly interesting about an empty shelf.[10]

When a product goes out of stock, that empty space essentially becomes a dead zone, devoid of the key element that attracts shoppers attention: the product. Without a product to catch the eye, shoppers naturally overlook this space, focusing their attention instead on the adjacent areas where products are available.[11]

One theory to help explain this phenomenon is that out-of-stock scenarios lead to frustration and disappointment, particularly if the product missing is one that the shopper had intended to purchase. This negative emotional response might cause shoppers to subconsciously avoid similar experiences in the future, leading them to pay even less attention to areas where products are not visibly available.[12]

Sometimes, analyzing one sense through the lens of another can provide useful insights for how we interact with the environment we’re in. In the case of vision, let's consider an analogy with hearing.

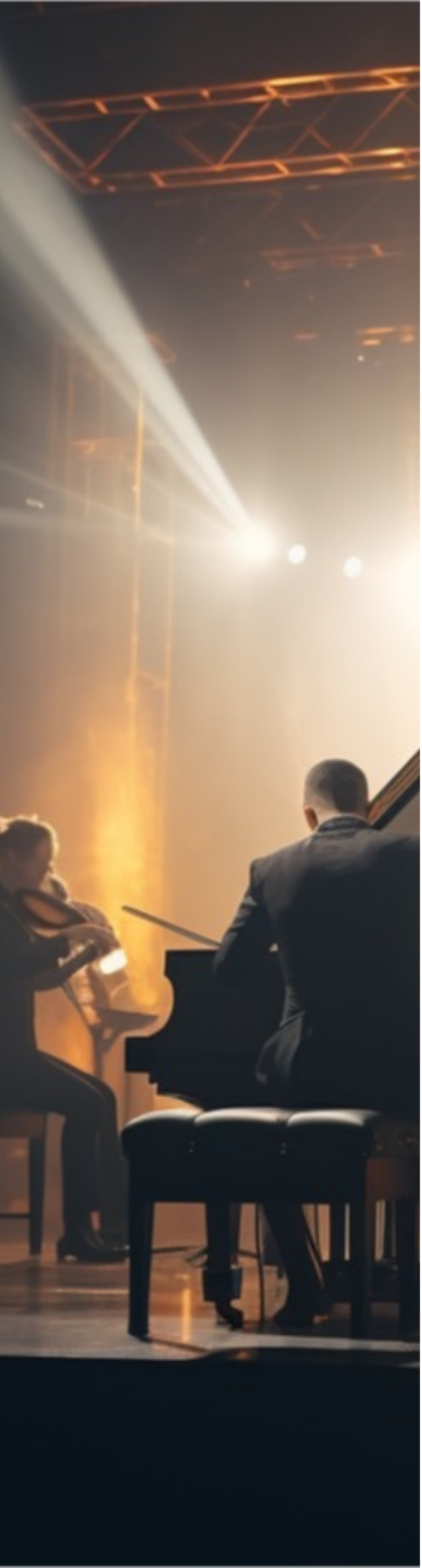
Imagine you're attending an orchestra performance where each instrument contributes to the overall symphony. Now let’s suppose you attend this performance once a week and become well versed in the different melodies. If one of the instruments suddenly stopped playing, creating a moment of unexpected silence, it would be noticeable but in a negative way.

You're there for the full symphony, and the absence of a part leaves you feeling that something is missing. Similarly, when a shopper encounters empty shelf space, it does not attract their attention beneficially; instead, it's a void that detracts from the overall shopping experience.

10. Pieters, R., & Wedel, M. (2004). Attention Capture and Transfer in Advertising: Brand, Pictorial, and Text-Size Effects. Journal of Marketing.

11. Campo, K., & Gijsbrechts, E. (2011). Three Decades of Research on Retail Shelf Space: Issues, Methodologies, Results, and Future Directions. Journal of Retailing and Consumer Services.

12. Gruen, T. W., Corsten, D., & Bharadwaj, S. (2002). Retail Out-of-Stocks: A Worldwide Examination of Extent, Causes and Consumer Responses. Grocery Manufacturers of America.



It’s important to consider the concept of Scarcity Bias within this context. The theory suggests that people place a higher value on items that are scarce, and a lower value on those that are in abundance. It’s a well known phenomenon amongst marketers which is why you’ll see "limited time offers", promotions that end with “while supplies last”, and discount events like Black Friday and Cyber Monday.

This psychological principle may also explain why stockouts lead to strong visual saliency to nearby facings. Perhaps when a product is missing, the revealed empty space signals scarcity, making the surrounding products more desirable. The consequential suggestion of a product shortage or high consumer demand can heighten the perceived value of any adjacent products. This prospect of an item being the "next to sell out" can magnetize attention, compelling shoppers to consider products they might have otherwise overlooked.

It turns out that in categories where shelf availability is a persistent challenge, the best strategy for capturing shopper attention is simply to be in stock.

Eye-level counts

Humans are predisposed to pay more attention to the center of their visual field, with less attention to the periphery. That's why the phrase "eye level is buy level" rings true in merchandising. Statistically, placement is crucial to product visibility with studies indicating that eye-level placement performs on average 45% better in terms of sales compared with lower or higher shelves.[13]

The phenomenon of attention defaulting to eye-level, often termed the "Bull's-Eye Zone" in retail, is driven by the natural alignment of human vision and ergonomics. When we walk, our eyes tend to focus on what's directly ahead of us at eye-level, simply because it's the most comfortable and requires the least effort. This instinctive behavior translates directly into walkable shopping environments and this is well supported by neuroscientific research.[14]

Eye-level shelf space is also the optimal height for customers to reach out and interact with the products, which further increases engagement.[15]

This has also been observed as "center bias", the tendency of people to focus their attention on the center of a scene when they first view it, before exploring other parts. This bias has been found in various contexts, including viewing artwork, photographs, and even some website interfaces.

Human height is a trait influenced by numerous factors such as age, geography, gender, genetics, nutrition, and health. In general, height increases from birth to adolescence and then declines gradually with men typically taller than women. Consequently, for the majority, eye-level shelving, which falls between 4 and 5 feet off the ground, aligns with the average adult's line of sight, making it prime real estate for product placement to maximize visibility and reach.

13. Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2007). Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase. Journal of Marketing.

14. Valenzuela, A., & Raghubir, P. (2009). Position-based beliefs: The center-stage effect. Journal of Consumer Psychology..

15. Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2009). Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase. Journal of Marketing

These findings are especially relevant in some categories like health and wellness products, where marketers are looking to win shoppers that may experience challenges with mobility, vision, or dexterity. For example, consumers shopping in the eye drops category are often experiencing visual discomfort. Perhaps their eyes are itchy, red, or dry and their vision may even be blurry, making the task of locating and selecting the right product stressful. The small packaging of eye drops and the wide assortment of different products in the category, although necessary for portability and efficacy respectively, compounds this difficulty. These considerations underscore the importance of empathy within category management and shopper marketing. Retailers that create an inclusive environment encourage more customers to return.

Wayfinding, the practice of using environmental information to navigate, is an essential part of accommodating the various needs of diverse shoppers. Beyond the basics of marking aisles, wayfinding is about creating an intuitive path to guide customers to their desired products efficiently. For instance, in a pet food section, clear signage indicating 'dog food' or 'cat food' along with further subdivisions like 'puppy', 'adult', 'senior', or ‘wet’ vs. ‘dry’ can simplify the shopping experience.

Not all shelves bring the heat

The design and aesthetics of in-store displays, shelf layouts, and point-of-purchase (POP) signage play an integral role in capturing shopper attention and engagement. These 'scenes' in a retail environment, if designed well, can incite curiosity and evoke emotions, making them more effective in attracting the shoppers' attention.

However, not all shelves 'bring the heat'. A display with low aesthetic value, such as one that's overly simplistic, lacks variation, or misses a clear focal point, might struggle to generate shopper interest. For instance, if a shelf layout or display is monotonous, with minimal variation in color, texture, or form, it could be perceived as unexciting. Similarly, poorly designed or cluttered POP signage can make it hard for shoppers to quickly understand the intended message or offer. With predictive AI heatmapping, this is reflected in the output as low color intensity.

The potential of transforming these lackluster retail 'scenes' into more engaging, aesthetically appealing experiences represents a significant opportunity for brands.

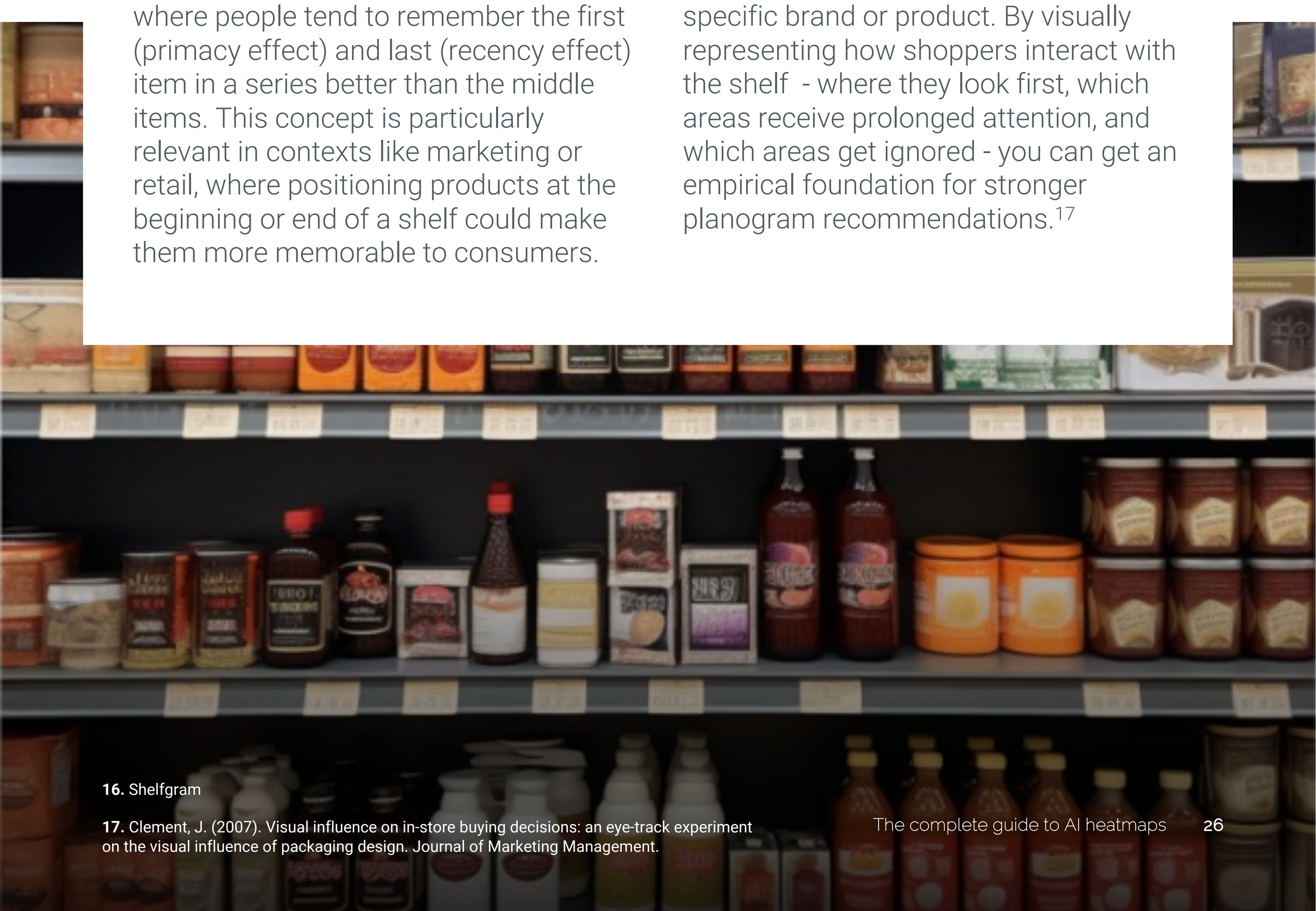
Adjacencies matter

Placing complementary products next to each other is a common retail strategy to boost sales. For example, when potato chips are next to dips and spreads, it encourages shoppers to buy both categories to support a usage occasion like hosting a dinner party or watching a sporting event. Placing fabric softeners adjacent to laundry detergents is another common example. Retailers often co-promote two categories on a single display to appeal to these usage occasions. In an analysis of twenty thousand photos of coffee displays in Canada between 2022 and 2024, we found that the most adjacent category was cereal (32%) because retailers are catering to the breakfast shopper.[16]

Another common reason why adjacencies matter is the serial position effect. It's a psychological phenomenon where people tend to remember the first (primacy effect) and last (recency effect) item in a series better than the middle items. This concept is particularly relevant in contexts like marketing or retail, where positioning products at the beginning or end of a shelf could make them more memorable to consumers.

Tide provides a prime example of this effective retail strategy. Their distinct orange and blue packaging makes it instantly recognizable on the laundry detergent aisle and by positioning their products near the entry of each aisle, customers tend to notice them more. This smart combination of branding and placement is amplified by the brand's strong equity because consumers can easily find a trusted and familiar brand, streamlining their purchase decisions.

By leveraging heatmaps to analyze shopper attention, category managers can make more informed decisions about product adjacencies, which can help improve the shopping experience, enhance category performance, and ultimately drive sales growth. This is especially true when it comes to finding the most favorable adjacencies for a specific brand or product. By visually representing how shoppers interact with the shelf - where they look first, which areas receive prolonged attention, and which areas get ignored - you can get an empirical foundation for stronger planogram recommendations.[17]



16. Shelfgram

17. Clement, J. (2007). Visual influence on in-store buying decisions: an eye-track experiment on the visual influence of packaging design. Journal of Marketing Management.

Identifying high-attention areas

Heatmaps can indicate "hot spots" – areas on the planogram that naturally draw more attention. These might be at eye level, near well-recognized brands, or adjacent to high-contrast or unique packaging. Once these areas are identified, category managers can strategically place products to capitalize on this attention.[18]

Discovering complementary products

Heatmaps can also show which products shoppers tend to view sequentially or concurrently. For instance, if shoppers often shift their gaze between two product types, it might suggest that these products are used together or considered as alternatives. Placing these products adjacent to each other can make the shopping process more convenient, potentially driving up sales of both products.[19]

Uncovering underutilized spaces

Conversely, heatmaps can highlight "cold spots" – areas that shoppers often overlook. Understanding why these areas aren't attracting attention can spur changes in product placement, signage, or even lighting to improve visibility and draw attention.

Validating assumptions

Category managers often make educated guesses about product placement based on sales data, market research, and consumer insights. Heatmaps can provide qualitative context to this quantitative data, validating these assumptions or challenging them with shopper behavior insights.[20]

18. Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2009). Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase. Journal of Marketing.

19. Hui, S. K., Huang, Y., Suher, J., & Inman, J. J. (2013). Deconstructing the "First Moment of Truth": Understanding Unplanned Consideration and Purchase Conversion Using In-Store Video Tracking. Journal of Marketing Research.

20. Reimann, M., Zaichkowsky, J., Neuhaus, C., Bender, T., & Weber, B. (2010). Aesthetic package design: A behavioral, neural, and psychological investigation. Journal of Consumer Psychology.

Blocking works

Blocking in retail refers to the strategic arrangement of products on shelves in neat, organized blocks, making it easier for customers to view and find items, thus enhancing the overall shopping experience. Blocking is usually designed to align with the customer purchase decision tree.

This is a step-by-step process that shoppers go through when making a purchase and it varies across different product categories. Broadly, the decision tree starts with recognizing a need, followed by information gathering, evaluating alternatives and making a decision.

When buying body wash products for example, shoppers might first make a decision by format and contemplate bar soap vs. liquid soap. After that, sequential decisions are made along a decision tree by brand, scent, price, ingredients, and more. That's why products sometimes appear on the shelf next to one another horizontally, vertically, or checkerboarded. The goal of blocking is to aid shoppers along that decision tree.

Creating a 'block' of the same brand's products is known to enhance brand visibility and make it easier for customers to find their preferred product. Brand blocks also convey a sense of brand authority and expertise. When customers see a dedicated space filled with a brand's products, it creates an impression of a comprehensive product offering and market dominance. This perception of authority, leadership, and trust can influence customer purchasing decisions and instill confidence in the brand's quality and reliability.

But not all categories are blocked by brand. For example, produce is often arranged by color to be visually appealing, where vibrant red tomatoes may sit next to bright yellow bell peppers. The spices and herbs section is often arranged alphabetically to make it easier to locate specific items on a shopping list - especially given the small packaging. Dried pasta, on the other hand, is generally grouped by type so that you'll find all the spaghetti together, separate from other pasta shapes like penne, fusilli, or macaroni. Sometimes, it’s a mix of these like the canned soup aisle where items are usually grouped by type (canned, boxed, instant), and then further sorted by flavor and brand.

While it might seem like offering more options on the shelf is always better, research suggests that this isn't always the case. Too many choices can lead to decision paralysis, and the customer might end up buying anything or spending less than they would had they been presented with fewer options. For example, customers often develop loyalty to a particular skincare brand due to its specific formulation or perceived effectiveness. Brand blocking makes it easier for these customers to find their preferred brand and discover other products within the same brand line to add to their basket.

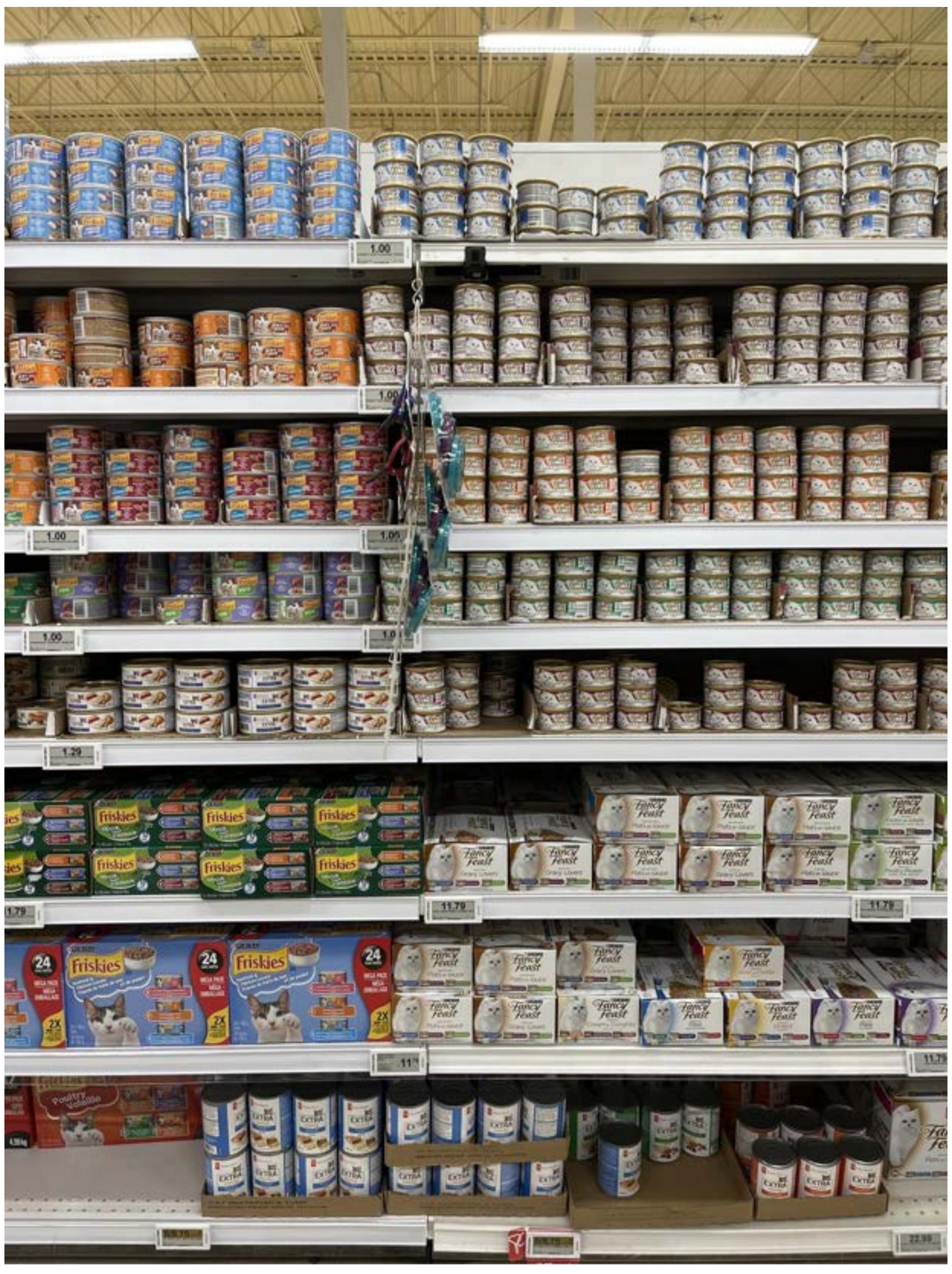
Avoid the camouflage effect

The goal of each product on the shelf is to grab shopper attention so as to encourage foveal vision. That’s the type of human vision where visual acuity is highest. It occurs when light enters the eye and strikes a tiny pit in the retina called the fovea. It has a high density of cones which allows for the highest resolution, sharpness, and color perception of visual perception.

We instinctively direct the fovea towards objects that we want to see in detail, like this text that you’re reading right now. This likely evolved to allow us to focus on detailed tasks like tool use and precision hunting.

Camouflage, in a broad context, is a strategy that involves blending into the surrounding environment, which makes something difficult to see and focus on. It's often achieved by mimicking the surrounding colors, patterns, or shapes. While the term is widely used in biology, it's also applicable to other fields like military tactics, design, and of course shopper marketing.

In a retail environment, products are often placed next to each other on shelves in large quantities - especially when it comes to brand blocking. This can potentially cause individual packages to blend into each other, making it harder for shoppers to differentiate between individual products. This effect is further amplified if the brand uses similar colors and design elements across different products in their range. This setup can inadvertently create a type of camouflage through the repeating patterns of packaging, particularly if the products are all from the same brand and feature similar designs.



From an evolutionary perspective, our ability to recognize patterns was critical for survival. Early humans needed to identify edible plants, avoid predators, and navigate complex environments with seasonal changes. This skill extends to our modern world where it aids us in swiftly recognizing familiar signs, faces, or brands amidst a sea of dynamic visual information.

In the context of shopper marketing, it’s critical to test whether the uniformity and consistency of logos, colors, and design creates a recognizable pattern that provides an immediate sense of familiarity which draws attention or creates a camouflage effect which inhibits attention.

Take the cat food category, for example. Within this category, a product's visibility can be significantly boosted by brand blocking. However, the category has small and large size packaging and when smaller, individual cans or pouches of cat food from the same brand are situated next to larger pack offerings, the camouflage effect takes over. The repeating pattern of small products makes it difficult to focus on and attention halos onto the adjacent larger packaging. This can be counteracted through distinctive design elements, strategic placement, or the use of shelf organizers.

The camouflage effect can counteract other visual saliency drivers. A good example of this is the hair coloring category. When placed individually or among unrelated products, these products are often highly salient. The model’s face which appears prominently on the front of the packaging is a powerful attention grabber. Coupled with bright colors and reflective packaging designs, these products catch shopper eyes quite easily.

The continuity of a repeating pattern like a zebra's stripes helps conceal an individual by blending into a larger group. At retail, the same effect can be observed where small individual products are less noticeable when they're in a large brand block.

However, when grouped together in large numbers, they lose their individual distinctiveness. The result is akin to a kind of visual "white noise." This can lead to the counterintuitive effect of making the entire shelf of hair coloring products less noticeable, rather than more.

The frozen pizza category presents a similar scenario. If the pizza boxes are stacked flat, the frequent repeating patterns of similar box tops can blur together. On the other hand, if some of these boxes are placed upright, it presents the full front of the packaging to the consumer, allowing the different designs, brand logos, and pizza images to be easily seen. The upright positioning interrupts the repetitive stack pattern, making these boxes extra distinct, and hence, more likely to attract shopper attention.

A related reason why we see this effect is the "Size Bias": a well-documented factor in visual attention studies.[21] Our eyes are naturally drawn to larger objects due to their dominance in our visual field. Spotting a large fruit tree or a large predator from a distance conferred enormous survival value to early humans. Even though most modern humans no longer need to worry about these things, the bias still affects our perception in a variety of contexts including retail shopping. For this reason, larger products or packaging adjacent to smaller ones tend to be more interesting to us and end up capturing more attention.[22]

21. Poole, A., & Ball, L. J. (2005). Eye tracking in human-computer interaction and usability research: Current status and future prospects. In C. Ghaoui (Ed.), Encyclopedia of human-computer interaction (pp. 211–219). Pennsylvania: Idea Group.

22. Pieters, R., & Wedel, M. (2004). Attention capture and transfer in advertising: Brand, pictorial, and text-size effects. Journal of Marketing, 68(2), 36-50

Texture breaks steal attention

Varying the texture of packaging or shelf materials can create a visual break, capturing shopper attention. In the same way that a loud noise in a quiet room immediately captures our attention, visually salient elements in a scene command our focus due to their distinctiveness.

Research has shown that the human visual system actually possesses specialized neurons that respond specifically to subtle changes in texture boundaries.[23] This is believed to be an evolutionary adaptation that helps us quickly detect potential threats or opportunities in our environment. By adapting to focus on unique or irregular shapes around us, our ancestors could quickly detect hidden predators or potential new resources.

By strategically incorporating texture breaks, such as contrasting shapes or colors, into product displays, packaging, and signage, category managers and planogram designers can attract attention, guide shopper focus, and create visually appealing retail experiences.

A good example of texture breaks are shelf danglers and clip strips often seen hanging in the aisle of retail stores. They stand out from the typical flat, stacked arrangement of products on the shelves. This disruption to the expected visual field catches shopper attention because it contrasts with the expected shelf pattern.

23. Malik, J., & Perona, P. (1990). Preattentive texture discrimination with early vision mechanisms. Journal of the Optical Society of America A, 7(5), 923-932.

No Name is a Canadian line of generic brand grocery and household products, owned by Loblaw Companies Limited. The brand is known for its distinctive yellow and black minimalistic packaging, with simple plain font descriptors of the product inside.

Moreover, the human brain is wired to recognize and remember novel or unfamiliar stimuli.[24] When we encounter something unique or irregular, it activates our curiosity and triggers memory processes. This enhanced processing and encoding of novel stimuli make them more likely to be remembered and stand out in our memory, leading to increased visual salience and attention in future encounters. Research suggests that stimuli that are encoded as salient or important are more likely to capture attention in the future.[25] This can be seen as an adaptive response, enhancing our ability to detect and respond to significant stimuli in our environment.

Brands can create texture breaks by introducing whitespace on product packaging and displays. The concept of whitespace, or 'negative space', has its roots in graphic design, where it's used to give structure to a composition, highlight important elements, and improve readability. But it’s not merely 'empty space' - in the retail environment, minimalism and whitespace can speak volumes. Studies have shown that the use of whitespace can increase comprehension by almost 20%. In a retail setting, this means that customers can better understand what's on offer and make more informed decisions.[26]

The utilization of whitespace to help products stand out is also true for premium brands.[27] Aesop, an Australian luxury skin care brand, embraces this concept in both their product design and their retail spaces. As you enter an Aesop boutique, you notice the use of whitespace in the form of open, uncluttered space, giving the interior a minimalist and tranquil feel.

The shelves are not overstuffed with products. Instead, each bottle of facial cream, cleansers, and lotions is neatly arranged and has a clear texture break with enough room to stand on its own. This strategic use of physical space sends a signal to customers that the products are high quality because each item is unique and worth your time and consideration. It’s similar to a piece of art displayed in a modern gallery. This is the magic of whitespace.

The packaging of Aesop products follows the same philosophy. Their skincare, hair care, and body care products come in minimalist amber bottles, echoing the aesthetics of old apothecaries. The labels on these bottles are simple, usually white or cream, with black, classic typefaces that clearly state the product's name and main ingredients.

24. Itti, L., & Koch, C. (2001). Computational modelling of visual attention. Nature Reviews Neuroscience.

25. Jan Theeuwes (2010). Top-down and bottom-up control of visual selection.

26. Chaparro, B. S., Shaikh, A. D., & Baker, J. R. (2004). Reading Online Text: A Comparison of Four White Space Layouts. Usability News.

27. Pocheptsova, A., Labroo, A. A., & Dhar, R. (2010). Making Products Feel Special: When Metacognitive Difficulty Enhances Evaluation. Journal of Marketing Research.

Shape variation works by breaking patterns

A related concept to texture breaks is shape variation. Consumers are drawn to scenes or products with unique or irregular shapes and they're more likely to remember them too.[28] This is known as the von Restorff effect, named after German psychiatrist and pediatrician, who first identified it in the 1930s. If most products in a category are packaged in boxes, the von Rostorff effect teaches us that introducing a product packaged in a tube or a tin could make it stand out and be more easily remembered by shoppers. The classic example is Coca-Cola's iconic contour bottle, originally conceived to be distinctive and recognizable, even when broken or touched in the dark.

Due to the efficacy of the von Restorff effect, this strategy can now be observed in plenty of other categories.

The von Restorff effect is also why in-store displays are so effective. Our brains are hardwired to recognize and follow patterns. It's a cognitive shortcut that helps us process the massive amount of information we encounter daily without becoming overwhelmed. Now, imagine you're walking through a store where every aisle looks pretty much the same. Your brain switches to autopilot, scanning the environment but not really engaging with it. This is where in-store displays come in. By breaking the monotonous pattern with a distinct, attention-grabbing display, they jolt the brain out of its routine, capturing your attention and making you more likely to consider the displayed product.

So, it's not just about making products visible, but also about presenting them in a way that stands out from the norm. This disruption of our expectations compels us to pay attention, leading to a higher probability of product engagement and potential purchase.

28. Veryzer, R. W., Jr. (1993). Aesthetic Response and the Influence of Design Principles on Product Preferences. Advances in Consumer Research.

Examples of shape variation in product packaging

Nespresso's colorful, sleek coffee capsules stand out against the typical ground coffee or coffee beans packaging.

The tall, slim boxes of Pocky sticks contrast with other snack items that often come in wider packages or bags.

The Eos lip balm stands out with its unique spherical shape and bright colors, while most other lip balms are packaged in cylindrical tubes.

Altoids come in a small, distinctive tin box, contrasting with other mints packaged in plastic containers or wrappers.

Red Bull's slim, silver cans are instantly recognizable and distinct from other energy drinks that often come in larger, more robust cans.

Quaker Oats' cylindrical container is recognizable in an aisle of boxed cereals.

Crystal Head Vodka, for instance, is known for its irregularly-shaped skull-shaped bottle.

Terry's Chocolate Orange is sold in a round box mimicking the shape of an orange, quite different from typical rectangular or square chocolate boxes.

Method's cleaning product line uses unusually shaped bottles and bright colors to stand out on the shelf.

Shelfgram

shelfgram.com

Shelfgram is a retail insights platform that supercharges the store check. We offer a suite of AI-powered tools that empower businesses to understand a more holistic picture of their retail execution.

hotspex™

hotspex.com

Hotspex enables brand builders from the Top 50 CPG multinationals with always-on platforms and human expertise to design and optimize superior packaging and retail executions. From our on-demand services that take the friction out of the research process to our multi-layered AI stack that seamlessly merges insights from multiple data sets, we are revolutionizing the way analytics and insights enable decision-making and design thinking.