



Neuromarketing Secrets

Tips & tricks backed by
Neuroscience

Common Visual Attention Biases



Motion Bias

Movement draws attention over elements that are stationary.



Facial Bias

Evolutionarily, we are drawn to look at and identify faces, or things that look like faces.



Co-Attention Bias

Humans tend to follow the gaze of other humans, even in static imagery.



Central Bias

We are biased to explore the center of an image or scene first, where our eye can take in the most information at once.





Contrast Bias

Attention is drawn by objects or elements that contrast with others – size, shape, color, position, etc.



“Reading” Bias

In Western cultures, people generally navigate images and scenes top-to-bottom, left-to-right.

We have a **winner**

Readability Bias

Text in a large font size will draw attention before text in smaller font sizes.

Common Text-Based Considerations

Small Text

Processing small text is more effortful, decreasing effectiveness and fluency.

High Contrast

Text that stands out from its background is easier to notice and read.

Avoid Multiple, or Uncommon, Fonts

Changes in font type, or use of heavily-stylized fonts can make it difficult for viewers to focus on messaging.

Capitalized/Cursive Text

Our default is to read information written in “lower case”. ALL CAPS can disrupt our natural reading flow.

Vertical vs. Horizontal Text

We naturally read left-to-right, and top-to-bottom. Vertical or off-horizontal orientation requires significantly more cognitive effort to read.

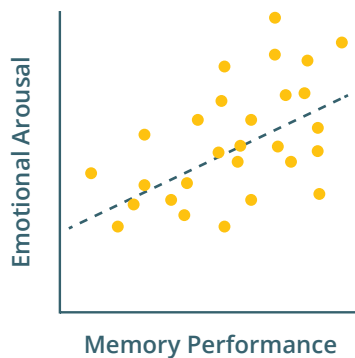


Use Emotional Cues to Facilitate Cognitive Processing

When we encounter even minor threats or rewards, we have an emotional response to them, and our brain “tags” those threats and rewards as being “relevant”. When information is flagged as relevant, it typically receives prioritized cognitive processing.

Memory formation is one of the prioritized processes: We are more likely to remember information which elicits an emotional response. This is an evolutionary process that supports learning and future behavior.

We naturally read left-to-right, and top-to-bottom. Vertical or off-horizontal orientation requires significantly more cognitive effort to read.



In general, the more something elicits an **emotional arousal response** from us, the more likely we are to remember that information later on.

1 Hamann, S. (2001). TRENDS in Cognitive Sciences.

2 Damasio, A. (1991). Somatic Markers and the Guidance of Behavior.

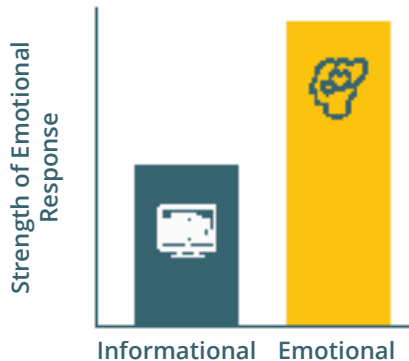
3 Kensinger, E.A. (2007). Current Directions in Psychological Science.

Information Processing Reduces Emotional Intensity

Public communications are often crafted either to provide consumers with details about a brand, product, or service, or to evoke an emotional response from individuals.

While the nature of the communication is driven by message goals, communication mix, and so on, **information-heavy creative is less likely to connect emotionally with individuals.**

Although informational creative can serve an important purpose, realize that its relative lack of emotional resonance can have downstream consequences for human behavior: **Emotional information is more likely to get noticed**, for example, and more likely to be prioritized for memory processing.



1 Hamann, S. (2001). TRENDS in Cognitive Sciences.

2 Cadet, F.T., Aaltonen, P.G. & Kavota, V. (2017). Marketing Management Journal.

3 Yoo, C. & MacInnis, D. (2005). Journal of Business Research.

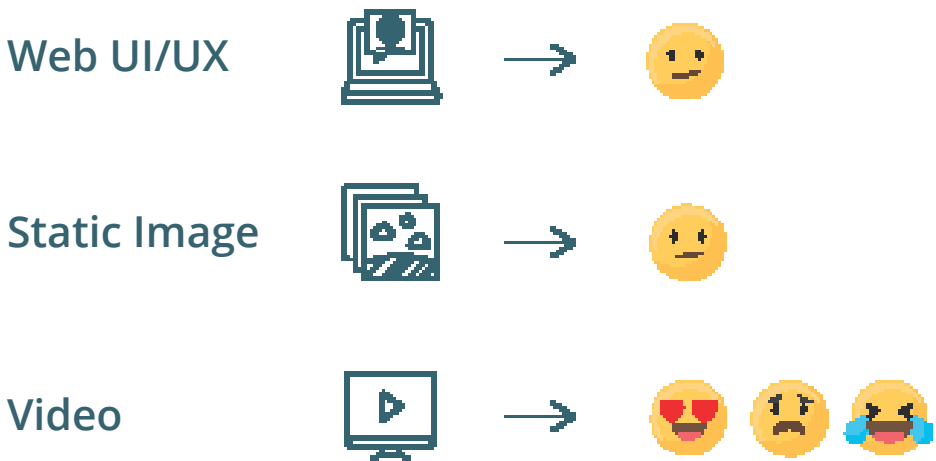
Facial Expressions Are Social Signals

Facial expressions evolved as **social signals**: Their primary purpose is to give, and receive, information to and from others.

Because of this informational purpose of facial expressions, they are not necessarily a reflection of a person's **internal thoughts or feelings**.

Many lab-based studies involve people in **non-social** situations (such as viewing content on a computer). Less-social and less-dynamic stimuli are **less likely to elicit meaningful facial expressions**.

Videos may elicit smiles and laughter, while static imagery and user interfaces are more likely to elicit neutral expressivity.



1 Crivelli, C. & Fridlund, A.J. (2018). TRENDS in Cognitive Sciences.

2 Krebs, J.R. & Dawkins, R. (1984). Behavioral Ecology: An Evolutionary Approach.

3 Fridlund, A.J. (1994). Human Facial Expression: An Evolutionary View.

“Vicarious” Rewards are Rewarding

It is well-known that the experience of **“reward” is a powerful driver of human behavior**. However, “vicarious” reward – that is, seeing someone else be rewarded – can elicit similar brain responses to the experience of reward itself.

Both personal and vicarious rewards can activate overlapping regions of the ventromedial prefrontal cortex, suggesting that vicarious reward (such as seeing someone else get a discount, win a prize, etc.) can be used effectively in domains like advertising and marketing communications to help drive brand and/or product affinity.

Personal Reward



Vicarious Reward



1 Morelli, S.A., Sacchet, M.D. & Zaki, J. (2015). Neuroimage.

2 Morelli, S.A., Knutson, B. & Zaki, J. (2018). Social Cognitive and Affective Neuroscience.

3 Bhanji, J.P. & Delgado, M.R. (2013). Wiley Interdisciplinary Reviews: Cognitive Science.

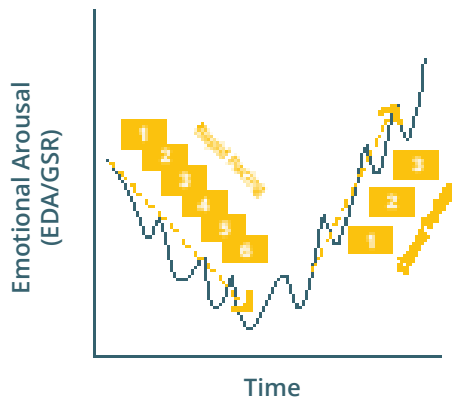


Rapid Video Cuts Are Cognitively Taxing

It is well-known in video editing that pacing – the amount of time between each scene, or even between each shot – is critical to how viewers experience the content.

Very rapid cuts – those which occur in under one second – can require viewers to deploy additional cognitive resources to visually and semantically process the video. This often reduces the degree of emotional response to the video.

Moreover, rapid cuts are frequently associated with increased central visual bias, with viewers defaulting to the center of the screen to capture as much “meaning” from the ambiguous visuals as possible. This may lead to important information getting missed.



- 1 Silvert, L., Naveteur, J., Honoré, J., Sequeira, H. & Boucart, M. (2004). Visual Cognition.
- 2 N'Diaye, K., Sander, D. & Vuilleumier, P. (2009). Emotion.
- 3 Hadjikhani, N., Hoge, R., Snyder, J. & de Gelder, B. (2008). Brain and Cognition.
- 4 Adams, R.B., et al. (2011). Social Cognitive and Affective Neuroscience.

Deeper levels of Human Behavior

with Biosensor Research

Conscious
behavior

Traditional Research Methods

Self-reporting, focus groups, etc.

Taking place
after exposure to
stimuli

Biosensor Research



Eye Tracking



Facial Expression
Analysis



EDA (GSR)



EEG



EMG



ECG

Nonconscious
behavior

Recording
during exposure
to stimuli

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EMG



Eye tracking



ECG



Facial Expression Analysis



EEG



EDA



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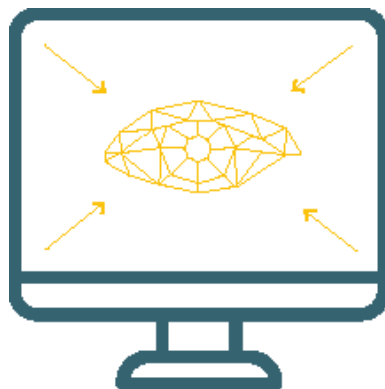
Attention is Biased Towards the Center of a Screen

When seeing images, videos, or other stimuli on a screen, **viewers tend to demonstrate a central bias**: Looking at the center of the screen disproportionately more than other areas.

This central bias may be driven, in part, by the visuomotor system, wherein **shorter eye movements are prioritized over larger movements**.

Additionally, features that are relevant for processing a stimulus are frequently centrally-located, leading to cognitive – as well as motor – biases.

Evolutionarily, a central bias allows individuals to take in as much information about a stimulus as quickly as possible.



1 Tatler, B.W. (2007). Journal of Vision.

2 Parkhurst, D., Law, K. & Niebur, E. (2002). Vision Research.

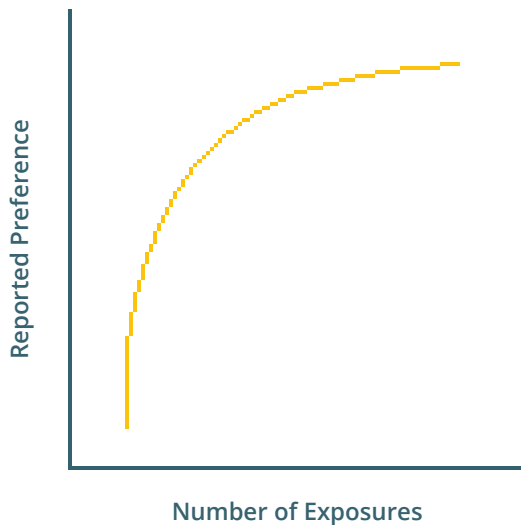
3 Parkhurst, D. & Niebur, E. (2003). Spatial Vision.



Familiarity Drives Preference

People form preferences – about people, products, experiences – with input from many different sources. One of those sources is familiarity: We are more likely to **have a positive affective response to something we have been exposed to before**, even if only briefly.

The Mere Exposure Effect is well-documented in behavioral psychology: Even a single, brief exposure to a stimulus is enough for individuals to form an affective preference relative to an unfamiliar stimulus.



1 Zajonc, R. (1968). Journal of Personality and Social Psychology.

2 Bornstein, R. (1989). Psychological Bulletin.

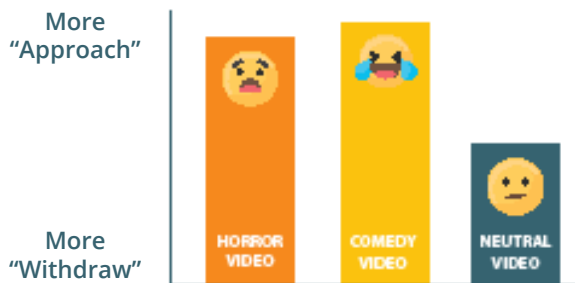
3 Tom, G., Nelson, C., Srzentic, T. & King, R. (2010). Journal of Psychology: Interdisciplinary & Applied.

“Motivation” Does Not Equate to “Good” or “Bad”

“**Frontal alpha asymmetry**” – the disparity in alpha-band power in the left and right hemispheres of the frontal lobe – is a commonly-used index of an **individual’s motivation to “approach” or “withdraw** from” a stimulus.

Although this is sometimes misinterpreted with emotional valence – for example, interpreting an “approach” motivation as positive – behavioral motivation is non-valenced.

We can be motivated to approach something negative (e.g., a child falling into a lake), or withdraw from something positive (e.g., a piece of cake while on a diet).



Consider an example where viewers are watching trailers for horror and comedy movies, along with neutral videos. Despite containing “aversive” material, horror movies can still elicit high behavioral “approach” motivation, especially from viewers who enjoy the horror genre. This makes logical sense: if horror movies were tagged to “withdraw”, those movies would never make it to the box office!

1 Davidson, R.J. (1984). Emotion, Cognitive, and Behavior.

2 Aarts, H., Custers, R. & Holland, R.W. (2007). Journal of Personality and Social Psychology.

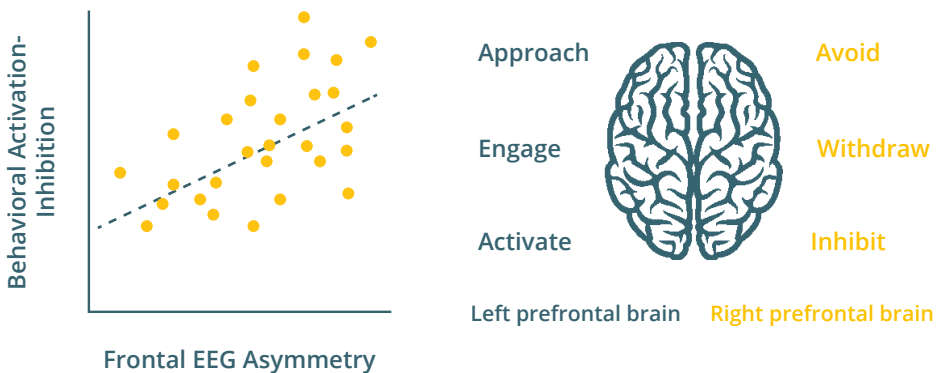
3 Veling, H., Holland, R.W. & Knippenberg, A. (2008). Journal of Experimental Social Psychology.



Frontal Asymmetry Measures Motivational Affect

Differential activation in the prefrontal brain indicates the presence of an approach or avoidance motivation. Approach motivation is considered to move a person toward a stimulus, while avoidance motivation is a withdrawal from a stimulus.

Behavioral motivation may indicate how a consumer may act in the future regarding a stimulus or product.



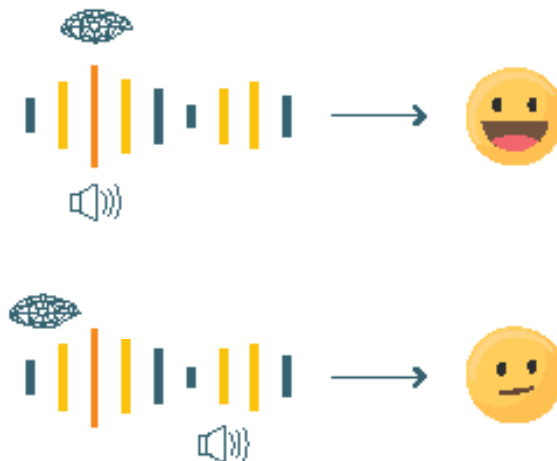
Asymmetrical activation in the left and right prefrontal lobes reflects in differential alpha waves in the EEG signal.

1 Sutton, S. K., & Davidson, R. J. (1997). Psychological Science.
 2 Carver, C.S. & Harmon-Jones, E. (2009). Psychological Bulletin.
 3 Spielberg, J. M. (2008) Social and Personality Psychology Compass.

Audio-Visual Synchrony Helps Message Processing

Synchronous information from visual and auditory modalities are integrated strongly. Human perception system detects synchronous audiovisual cues as emanating from the same source, prioritizing their sensory integration. **Researchers also find that stimuli are liked more when audiovisual synchrony is used.**

For instance, in a video ad, adjusting visuals (e.g. shapes, colors, objects) to change in synchrony with music (rhythm, tone, melody) can enhance the overall perceptual experience. In addition, sound cues can be used over a text message presentation on the points that are aimed to be emphasized.



1 Takehana, A., Uehara, T., & Sakaguchi, Y. (2019). PLoS ONE.

2 Lewis, R. & Noppeney, U. (2010). The Journal of Neuroscience.

3 Vatakis, A. & Spence, C. (2006) Brain Research.

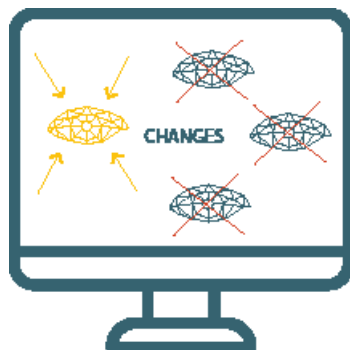


Changes in Our Visual Field May Go Missed Due to Cognitive Focus

People perceive a whole visual field, rather than focusing on parts and details. Thus, even big and obvious changes may go unnoticed. This tendency to overlook changes in visual stimuli is termed as **change blindness**.

One example of this phenomenon is the “Monkey Business Illusion,” in which participants are instructed to count the number of times players in white shirts pass a ball. After the task, participants are asked if they noticed other significant changes during the video. Because they are focused on the task at hand, most participants report completely missing the other changes in the video. Try it yourself!

Change blindness can be important when considering sequencing of visual information in media, or when attempting to present new and unobtrusive information (e.g., lower-third graphics).



1 Simons, D & Levin, D. (1997). TRENDS in Cognitive Sciences.

2 Whithenton, K. (2015). Nielsen Norman Group.

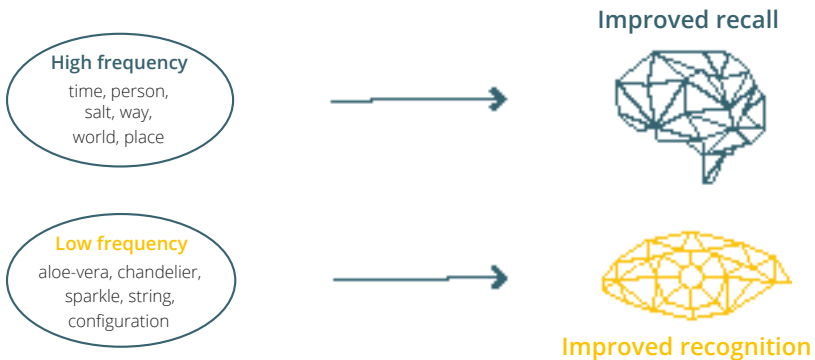
3 Simons, D. J., & Chabris, C. F. (1999). Perception. [Video](#)

Use Frequency of Words Determines Their Memorability

A high frequency word is one that is commonly used in daily life and a low frequency word is one that is rarely used. Word-frequency effects tell us that we store these words differently.

Extensive studies indicate that **high frequency words are much more likely to be freely recalled**, whereas **low-frequency words are much more likely to be recognized among irrelevant information**. Moreover, eye tracking studies show that people fixate much more on low frequency words compared to high frequency ones.

This principle may be employed when creating product designs or brand attributes. For example, unusual, low-frequency words may be used on a new product package to elicit higher visual attention and to increase its recognition on store shelves.



1 Segui, J., Mehler, J., Frauenfelder, U. H., & Morton, J. (1982). *Neuropsychologia*.

2 Van Kesteren, M. T., Ruiter, D. J., Fernández, G., & Henson, R. N. (2012). *TRENDS in Neurosciences*.

3 Takeuchi, T. et al. (2016). *Nature*.



Familiarity & Novelty Positively Influence Memorability

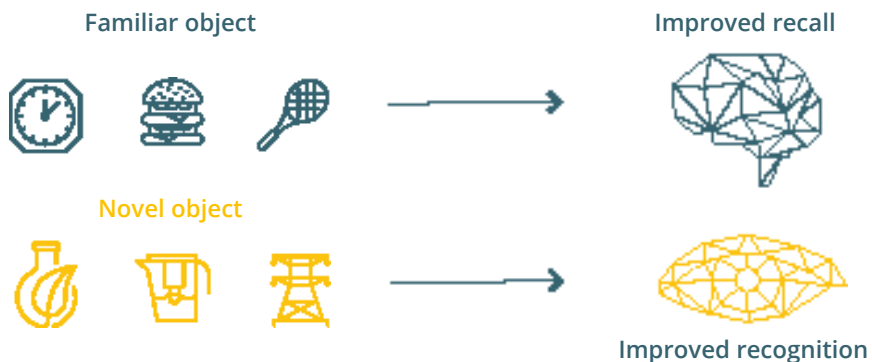
An individual's prior experience with memory items (words, objects, images, ideas...) strongly determines their memorability for future recall.

Familiarity

Memory items that are familiar to us, meaning that we have been previously exposed to them, are associated with improved recall. Familiarity improves memory especially for what is called "episodic memory", the type of memory for specific events and happenings.

Novelty

Memory items that are novel to us, meaning that we have not been previously exposed to them, are associated with improved recognition.



1 SPoppenk, J., Kohler, S., Moscovitch, M. (2010). Journal of Experimental Psychology: Learning, Memory, & Cognition.

2 Van Kesteren, M. T., Ruitter, D. J., Fernández, G., & Henson, R. N. (2012). Trends in Neurosciences.

3 Takeuchi, T. et al. (2016). Nature.



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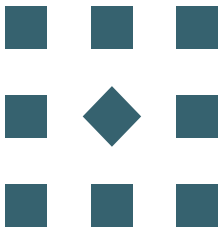
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Saliency Facilitates Memorability and Preferences

Saliency is the characteristics of a stimulus that make it stand out from other stimuli in a given context.

For instance, **bright and contrasting colors can make an object very salient to the eye.** For a baby seagull, its mother's red beak is the most salient object in its world. For a human baby, its mother's smile is highly salient. So, saliency is not just about color, but also about the relevance of an object to an organism.

Given its power in human perception, saliency highly facilitates the memorability of items. Numerous studies find that high saliency objects are more easily retrieved from memory.



Orientation of stimuli can be used to create saliency. For instance, the shape in the middle easily catches attention.



Memorability of a product can be increased by inducing salience on a store shelf with **contrasting colors.**



1 Fine, M. S., & Minnery, B. S. (2009). Journal of Neuroscience.

2 Pedale, T., & Santangelo, V. (2015). Frontiers in Human Neuroscience

3 Tinbergen, N. & Perdeck, A. C. (1951). Behavior



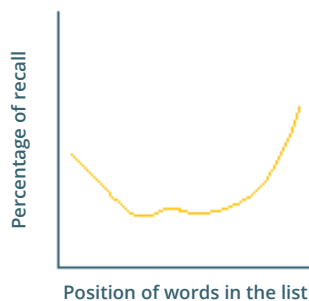
Beginning and End of Experiences Are Best Remembered

Research has shown that object recall is greatest for the first and last items in an experience, while the items in the middle are mostly forgotten.

Memory researcher Murdock gave participants a list of 10 to 40 words and later asked them to freely recall any of the words. The probability that a word was remembered depended on its position in the list.

Higher recall for the words in the beginning of the list is termed the **"primacy effect"**. Higher recall for the words at the end of the list is termed the **"recency effect"**.

In a commercial context, this effect may apply, for instance, when a consumer better remembers the items that were noticed the earliest and latest during a shopping experience.



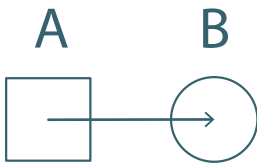
The graph above shows Murdock's findings. The curve clearly demonstrates the primacy and recency effects with the words positioned in the beginning and at the end of the list having significantly higher recall percentage.

- 1 Murdock, B. B. (1962). *Journal of Experimental Psychology*.
- 2 Atkinson, R. C., & Shiffrin, R. M. (1968). *The Psychology of Learning and Motivation*.
- 3 Howard & Kahana (1999). *Journal of Experimental Psychology: Learning, Memory, and*

Leverage Brain's Associative Properties to Learn New Info

Our brains are made up of “semantic networks”, whereby different pieces of related information are linked together. This structure helps us retrieve information from memory and allows us to learn new information.

Associations can be influenced by many factors, including the **emotional content** of one or more pieces of information, how close in **time** and/or **space** the pieces occurred, and how **similar or dissimilar** the information is to something we already know.



A and B co-occur with one another, and are therefore learned together.



When we learn something new, our brain tries to “latch” that information onto existing information we know. It's why we can learn new concepts relatively easily but learning someone's name is difficult: Names are relatively arbitrary, so it's hard for us to associate them with existing information.



Image is fully visible, with direct line-of-sight. A is negative and B is not; if A and B co-occur, they are learned together and B may take on some of the “negative” aspects of A.

1 Schacter, D. (2001). *The Seven Sins of Memory: How the Mind Forgets and Remembers*.

2 Murray, B. & Kensinger, E.A. (2012). *Memory & Cognition*.

3 Murray, B. & Kensinger, E.A. (2013). *Frontiers in Behavioral Neuroscience*.



Easy-to-Perceive Stimuli Promote Positive Affect

When displaying information in the form of text, images, or another form, avoid occlusion. When elements are hidden or difficult to see, cognitive load increases to fill in the blanks of missing information, which leaves fewer resources for cognitive processing or memory encoding.

This concept applies to obstructed images, such as faces, the back of a head, or a zoomed-in object. Similarly, text that is overlaid on an image directs attention to the image as the brain fills in the missing information from the occluded image. Stimuli that are more readily processed may promote positive affect more than occluded stimuli.



High Fluency

Image is fully visible, with direct line-of-sight for viewers



Low Fluency

Image is partially obscured, leaving viewers to “fill in the blanks”



Low Fluency

Image is off-angle and low-contrast, making it more difficult to perceive

1 Moore, C.M, Yantis, S., & Vaughan, B. (1998). Psychological Science.

2 Spelke, E. S. (1990). Cognitive Science.

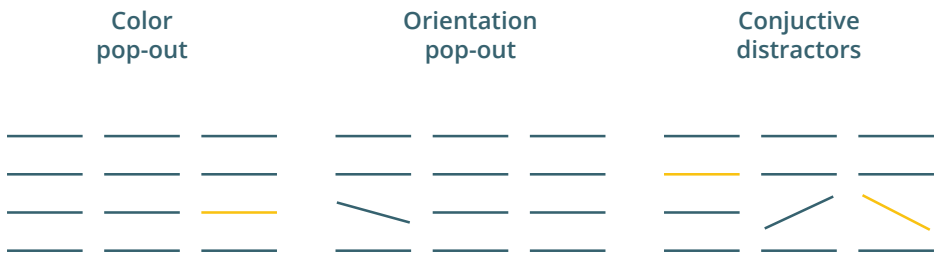
3 Campbell, K. S. (2013). Routledge.

Avoid “Attention Vampires”

Certain types of elements may distract or “steal” visual attention from key elements that help deliver on messaging. These elements are called “**attention vampires**”. Many of these are seen in the Common Visual Attention Biases.

The most significant features at the point fixation in the human vision are color sensitivity and acuity. The visual-cognitive system exploits this by actively controlling gaze, to direct fixation towards important and informative scene regions in real time.

To carry out a good commercial strategy, you should **avoid any type of distractor** that can capture the attention of users, diverting their interest from the important point of study.



Above depicts examples of detection of distractors based on colors and orientation.

1 Henderson, J.M. (2003). TRENDS in Cognitive Sciences.
2 Itti, L. (1999). Vision Research.
3 Treisman A.M. & Gelade G. (1980). Cognitive Psychology.

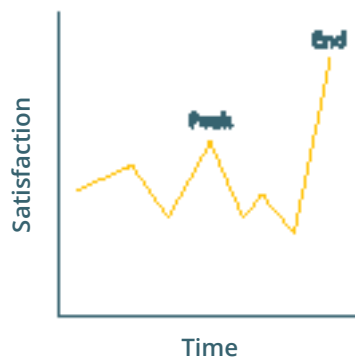


The Peak and End of an Experience Are Most Salient

When we remember the past, we re-construct events in memory. However, our memory is not a perfect record of the past – some details can become omitted, edited, or accentuated.

The **Peak-End Rule** is a cognitive bias that shows how people remember past events. It represents the intense positive or negative moments as “peaks” and the final moments of an experience as the “end”.

Generally when we remember an event, we show a bias towards remembering the peak emotional moment(s), as well as whatever happened near the end of the experience (see the Primacy and Recency effects).



Understanding the rules of thumb that our minds use when storing information allows us to design more memorable products and services.

- 1 Kane L. (2018). Nielsen Norman Group.
- 2 Bruun A. et al. (2016). Usability and User Burden.
- 3 Gutwin et al. (2016). Engaging Players in Games.

Novel Text Grabs Attention

Reading is often automatic, effortless and fast. Humans are constantly seeking information, leading to visual attention following text. Certain techniques can be utilized to **make text stand out** and increase visual draw to that information.

Some methods by which advertisers employ this principle include choosing **capturing headlines, formatted text, or exciting language**. Some examples include large fonts, bold or italicized styles, high color contrast, relatable phrasing such as “you” or “your,” and enticing language to develop a sense of urgency.

We need
YOU

1 Lemos J. (2010). Noldus Information Technology.

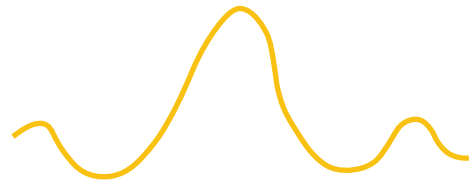
2 Nicola A. (2014). Iowa State University. Digital Repository.

3 Treisman A.M. & Gelade G. (1980). Cognitive Psychology.



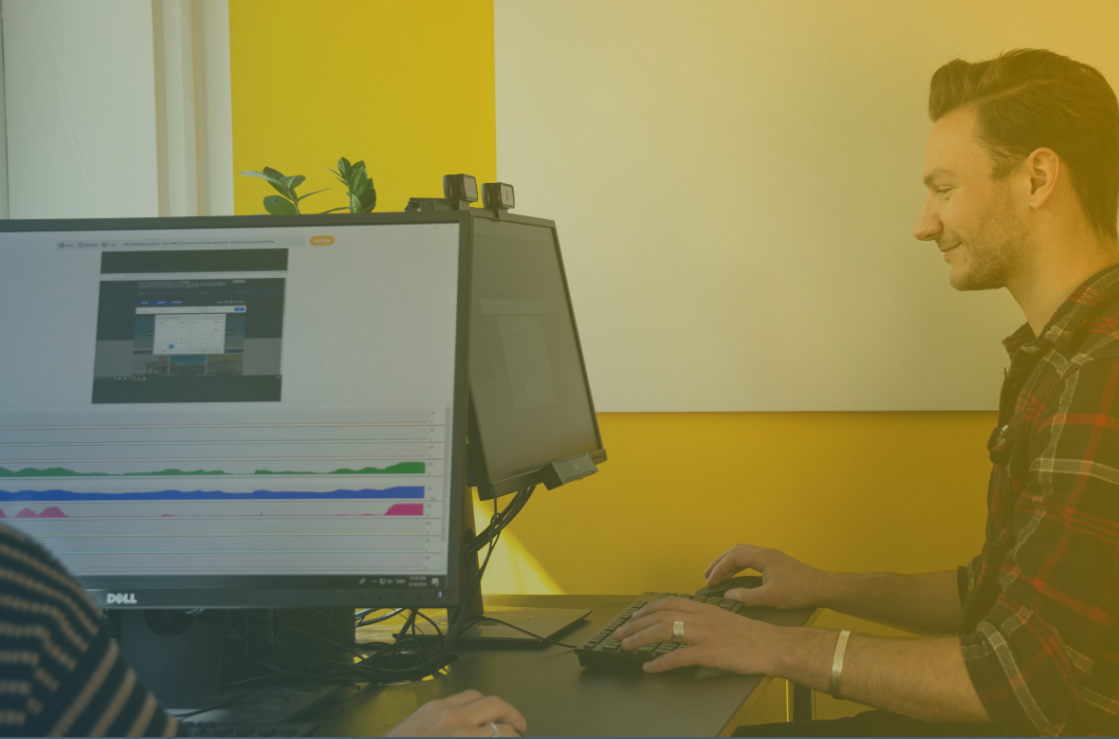
Anticipatory Response May Drive Differences in Behavior

Research has revealed that during the process of learning, individuals begin to become faster at reporting the next item in a sequence, developing a response that occurs prior to the evoking stimulus being presented. This phenomenon is called **anticipatory response**. Neurons begin to show asymmetric shifts in their activity and start firing earlier in anticipation of their preferred stimulus. Marketers and advertisers can leverage the emotional impact of eliciting an anticipatory response by **priming or cuing consumers** with things like music, imagery, etc.



Imagine the moments leading up to a jump scare in horror films. What imagery is shown, and what sounds are used? This is an example of filmmakers priming with imagery and sounds the audience may associate with fear.

- 1 Reddy, L. et al. (2015). Nature Communications.
- 2 Koch, (2007). Human Movement Science.
- 3 Critchley H.D., Mathias C.J. and Dolan R.J. (2001). Neuron.
- 4 Jensen et al. (2003). Neuron.



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