

How augmented reality affects the brain

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Key neurological insights from Mindshare UK's groundbreaking report, 'Layered'

Over the past few months, Neuro-Insight has been working in partnership with Mindshare UK and Zappar on 'Layered' - a first-of-its-kind study into the consumer, neurological and brand impact of augmented reality.

Until now, there has been little research carried out to understand the neurological effects of augmented reality (AR) and the ways in which the brain responds to various AR tasks and experiences. With 'Layered', we wanted to bridge this gap, unearthing AR's true value - not just as a marketing and communications channel, but also an everyday utility that has the potential to transform the world around us, making it more rich, meaningful and engaging.

In this post I wanted to build on Jeremy Pounder, Director, Mindshare Futures' blog discussing the future of AR and its implications for brands and share some of the key neurological insights from the UK's first ever neurological study into the effects of AR on the brain.

Using neuroscience to study the effects of AR on the brain

To fully understand the effects of AR on the brain we recruited 151 UK smartphone users aged between 18 and 65. We allocated them into two cells, each with around 75 respondents, closely matched by their demographic, attitudinal and behavioral characteristics.

We used Steady State Topography (SST) brain-imaging technology to measure how the brain responded to different types of stimulus. SST measures the electrical activity in the brain in order to report (second-by-second) on a number of cognitive functions, including attention, personal relevance, emotional response and memory encoding. We can't mind read (yet), but the technology can measure and quantify some very interesting things going on in your brain.

In order to capture these changes in brain response, we created six AR and non-AR tasks for the participants to complete with the aim of measuring how the brain reacts to augmented reality.

These six tasks were:

1. Google Translate: AR version vs. the online tool with text input
2. Product packaging: Zappar's AR-enabled product packaging vs. traditional non-AR pack
3. Stacks (the game): Playing the AR version vs. the standard version
4. Ikea AR app: Placing virtual furniture in a room vs. browsing the Ikea website
5. Specsavers app: AR app vs. normal browsing on the website
6. BBC Civilisations website: AR experience vs. standard web experience

Upon arrival, respondents were sorted into the two matched cells and briefed on each of the six tasks they would be carrying out during the study. Half the sample completed the six tasks in AR and the other half completed the non-AR version.

Participants were asked to carry out the tasks on an iPad as they would normally do at home, with the order of the tasks rotated. Respondents were individually filmed as they carried out the tasks, allowing us to match their second-by-second activities to their neuro data.

It was truly fascinating to see how the brain reacted to augmented reality for the very first time. Like with a lot of the studies we undertake here at Neuro-Insight we expect a degree of variance from one study condition to another, but with AR we saw an unprecedented level of difference between the two cells of respondents in the study.

Three ways augmented reality affects the brain

As I'll highlight below, augmented reality affects the brain in new and exciting ways. If you have the time, you should discover the full neurological findings in 'Layered'.

Here are just three ways augmented affects the brain:

1. AR drives high levels of visual attention in the brain (almost double that of non-AR tasks)
2. Right now, AR elicits a 'surprise' response in the brain
3. What is stored, or encoded into memory is 70% higher for AR experiences

Let's dive a bit deeper into these three core learnings to understand what's happening in the brain when we talk about attention, surprise and knowledge retention.

1. AR drives higher levels of visual attention in the brain

Attention is a necessary precursor to any sort of brain response to communication - if people don't register a brand message it can't possibly have any sort of lasting impact. So, whether it be online, TV, billboards, or in our case, augmented reality, capturing attention is something that successful brands or business spend a lot of time, money and resource getting right.

One of the incredible findings from 'Layered' was AR's ability to drive high levels of visual attention and engagement compared to non-AR tasks. In fact, upon completion of our research, we found that AR drove higher levels of attention than pretty much any other medium we have studied.

As you can see from the AR experience below, we see much higher levels of cognitive activity when the brain is exposed to the AR task compared to that of the non-AR task.

AR experience in 'Layered' showing how augmented reality affects the brain

This wasn't just a single experience either. Across the series of cognitive function measures carried out as part of the study, AR delivered almost double (1.9 times) the levels of visual attention compared to their non-AR equivalent.

This was particularly true of right brain visual attention, (attention to the overall feel or something rather than the detail). This is incredibly important when we talk about memory encoding, as there's a direct correlation between the emotional intensity of a stimulus and how it's encoded by the brain.

This finding, in particular, is crucial in showing AR's ability to generate a more powerful response than equivalent non-AR experiences.

Cognitive activity during tasks. Brain activity measured using SST headsets; unit of measurement is radians, which equates to strength of brain response.

If we break this down further we can see increased levels of emotional intensity and visual attention in the brain compared to both TV and online viewing. What's happening here is the brain is working much harder where we would expect it to. In particular, we saw incredibly strong levels of visual attention amongst younger smartphone users.

If we specifically look at levels of attention elicited by AR vs. TV, we see AR delivers a 45% higher level of attention. So, for media and brands competing to achieve cut-through, this is hugely significant in determining how to spread investment across channels.

So why are high levels of emotional intensity important? Simply put, emotional intensity is crucial when it comes to how we process experience because emotional intensity both drives and colors what the brain stores, or encodes, into long-term memory. This is highly significant for brands wanting to make a lasting impression on target audiences because memory encoding has a strong correlation with decision-making and purchase behavior.

These high levels of emotional intensity and attention were typified for us by the AR-enabled packaging concept W-in-a-Box created by Zappar for SIG. This was conclusive in demonstrating the ability of augmented packaging to increase levels of engagement, emotional intensity and attention.

Zappar's augmented reality packaging concept for SIG.

2. Right now, AR elicits a ‘surprise’ response in the brain

The second insight found in ‘Layered’ came out of AR’s ability to surprise the end user. In neurological terms, what we saw in the study were lower measures of ‘approach/withdrawal’ (which captures the extent to which the user wants to move towards or away from a stimulus) in participants when undertaking AR tasks.

Average levels of brain response during AR and non-AR tasks.

A withdrawal response can be indicative of a number of different emotional take-outs; in this context, having also asked people about their conscious responses to the tasks in the study, it’s apparent that the “step back” response was a strong indication of the sense of surprise that occurs in the brain when smartphone users start an AR experience. Essentially what we’re seeing here is something that people aren’t expecting, a bit like a jack in the box. Your first reaction is to step back until you understand what you’re seeing.

It’s interesting to note that amongst men there was a stronger approach response than amongst women suggesting that, in this case, they were faster to embrace and engage with the unfamiliar.

Zappar's AR-enabled gin bottle for Shazam and Bombay Sapphire

What does this mean for the future of AR? The capacity for AR to deliver surprising and emotionally powerful experiences is likely to endure for the foreseeable future as the software used to create AR experiences continually improves, enabling creatives to build more compelling and immersive AR experiences.

However, there's also a bigger opportunity for AR to grow into more of a wider utility as it permeates our everyday lives. The qualitative research carried out in 'Layered', alongside our neurological findings, points to the fact that smartphone users welcome the technology's ability to problem-solve different contexts and occasions of everyday life.

3. Memory encoding is 70% higher with AR

In neurological terms, if any type of branding or communication is to be effective, it needs to be encoded into long-term memory - otherwise, it will have little to no impact on any of our future actions.

Let's put this into perspective. How many ads do you remember seeing yesterday? Even though you probably saw hundreds of ads across mobile, online and out of home billboards, if you're like most people, you wouldn't be able to recall more than a couple. (I'm able to recall exactly zero ads from yesterday!).

Graph showing left and right brain memory response to AR and non-AR tasks.

What we found in 'Layered' was that memory encoding was 70% higher in the AR tasks compared to the non-AR tasks. What this means is that AR can be a particularly powerful way to deliver information that is subsequently retained. Despite seeing higher visual attention for younger people, and stronger approach for men, the memory encoding response was similarly high for all groups of respondents.

What does this mean for brands? Simply put, the future for AR is looking promising. If advertisers can achieve 70% higher levels of memory encoding, then AR becomes a very interesting medium to put marketing budget behind to secure wider, more engaged reach.

Pernod Ricard collaborated with Shazam, OLIVER and Zappar to create an augmented reality experience for the box for their limited edition The Glenlivet Code product.

Neuroscience and the future of AR

As with most new mediums, the novelty factor associated with AR is likely to diminish to some extent over time. I'm sure we all remember the excitement of getting a broadband (or dial-up) internet connection and the seemingly endless possibilities it brought.

With this in mind, the withdrawal effect (jack in a box) I mentioned earlier will more than likely decrease as we see AR segway into an everyday utility that, much like the internet, becomes an integral part of our everyday lives.

It will be at this point that novelty transcends into strategy, and narrative and content become a much more integral part of delivering the AR experiences of the future. The ability to tell compelling and engaging stories will become increasingly more important as people's brains come to expect everyday surfaces, products and packaging to be augmented.

Kate Spade utilise AR for the launch of their flagship store in Paris.

Conclusion

So what does all this mean for brands and how can they start leveraging AR as a more effective way of generating brand awareness in terms of attention, emotion and memory encoding?

These findings have huge implications on the way brands should be thinking about their long-term commercial strategies. As Neuro-Insight's research certainly suggests, AR experiences are considerably more engaging and memorable than non-AR experiences, which presents a huge opportunity for brands to lead the way in leveraging the technology.

The folks at Zappar have seen AR move into the mainstream over the last year with some of the titans of tech, (the Googles and Apples of the world) investing in augmented reality, and

now with 'Layered', we're seeing the science to validate this investment. These findings don't just stop at a brand level either. The implications are much more far reaching. For example, what will this mean for L&D professionals knowing that AR can drive greater levels of attention and engagement, but also enable staff to memorize more of their training? I know what I'd do.

Likewise, CPG brands can finally get 'stand-out' with their packaging on supermarket shelves whilst educating and entertaining their customers in the process. Now is the time to start thinking about your long-term AR strategy.

Don't forget, you can take a deeper look into the neuroscience research carried out by Neuro-Insight in Mindshare's 'Layered' report.

Project film for Mindshare's Layered report.

About the author

A graduate of Cambridge University, Heather has over 30 years' experience in the areas of marketing, market research and media strategy.

Prior to joining Neuro-Insight, Heather had roles as marketing director for part of Rowntree Macintosh (now Nestlé) and for a satellite television station. Moving into consultancy, she worked as a marketing and strategy consultant with PWC and Oxford Strategic Marketing where she specialized in media work, and in developing marketing and communication best practice for blue chip multinationals.

Heather has been working in neuro-marketing for over ten years and is one of the founders of Neuro-Insight's UK operation.