

# Science, advertising's most powerful advantage

## The Neuro Impact Factor



## INTRODUCTION

This morning in houses across the country, something miraculous and wonderful happened to us. As we awoke, and opened our eyes, we received the gift of consciousness. Nothing mystical, just our conscious experience of seeing - the bedroom ceiling, walls, our loved one, the world around us. This ordinariness, which is instantaneous and effortless, is extraordinary because the act of being conscious and seeing, hides the immense complexities, calculations and mega-data that our brains are processing. With 85 billion neurons and trillions of connections between those neurons, our brains are the most complex objects we know of in the universe. They run continuously, even when we are sleeping, dreaming or savouring that oh-so-tasty morning coffee.

These neurons and the trillions of connections that are made between them, create the experience of who we are, our memories, emotions, loves and hates, the very feeling of what it is like to be us. In a very real sense, **we are our brains.**

Understanding how our brains work, is not only crucial for understanding who we are, why we do the things we do, and how we combat disease, it also allows us to unlock the truth about how and why some advertising and marketing works and some does not.

The power of our brains is incalculable, we can contemplate the most profound ideas while still taking in everything that is happening around us. We know from science that this happens through the agile interplay of neural activity in all directions and the interaction of conscious and unconscious information.

The use of neuroscience in understanding the impact of advertising has only just begun. And this is the basis for the Outdoor Media Association's study (OMA) into the impact of Outdoor ads on the subconscious brain.

With the help of technology, we can now measure the brain's subconscious response, what it sees and how that drives future behaviour. We can study the role memory plays and map out psychological models that explain the journey from seeing an advertisement to its translation into purchasing.

While we all believe that we experience the world like a movie and in chronological order, this is not what our brain is recording. Because our brains are predictive and constructive, our brain is literally building the experience in front of us by combining material it has in storage while using the real-time information coming in from our eyes. Our brains are creating an experience akin to a continuous hallucination of its best guess of the world around us. This can be easily demonstrated with several visual illusions that show up when the brain's predictions fall short and go 'wrong'.

Look at the two images on the following page, first the surfaces on the left, the grey on top of the dice looks much darker than the grey below it. However, as you can see by the inset circle of grey, they are the same. Here your brain is predicting that the greys are different based on its years of experience that light almost always comes from above, like the sun or the light in your room. Likewise, do the strawberries on the right look red? They are not, there is no red in this picture, the strawberries are all different shades of grey. Again, your brain is predicting that you are going to experience the strawberries as red, because you have seen thousands and thousands of examples of red strawberries in your lifetime. These are only two of the many types of visual illusions from which you can notice that your brain is predicting and constructing your conscious experience from historical information and data it has collected over a lifetime.

Continued next page >

While illusions like this are simple and obvious, illusions extend beyond the optical to illusions and biases for memory and emotion. For example, if I ask you to try and remember a list of numbers, you will likely remember the numbers at the beginning and the end of the list, but most probably forget some in the middle of the list. This is because our memory is biased to remember things at the beginning and the end of events or lists, and hence often the things in the middle get forgotten.

Years ago, as part of my honeymoon, we went on an Alaskan cruise that departed from Vancouver. It was an amazing trip, seeing whales, glaciers, hiking with bears and white water rafting down icy cold rivers. But here is the thing, getting on and off the cruise boat was slow, stressful, hot and confusing. What's more, there were also issues after the cruise flying out of Vancouver. Now when I think back on the holiday it is very hard not to let those issues at the start and end, bias my whole memory of the trip. This is the same classic memory bias at work. What we remember and what happened are not always the same thing!

It is easy to establish that human memory is flawed and biased when playing back experiences. Science is the best way we know of, and have ever known of, to get to the truth.

If our memories of important events in our lives can be questioned, then what is our experience of the flotsam and jetson of our lives, the things we see in passing? Can a glance at a billboard really matter?

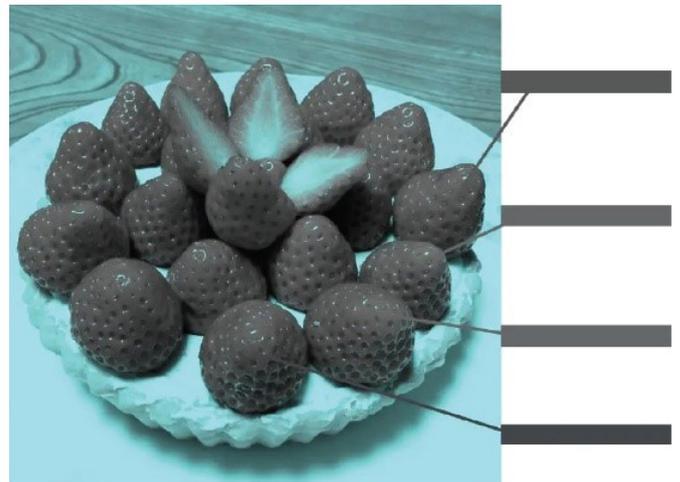
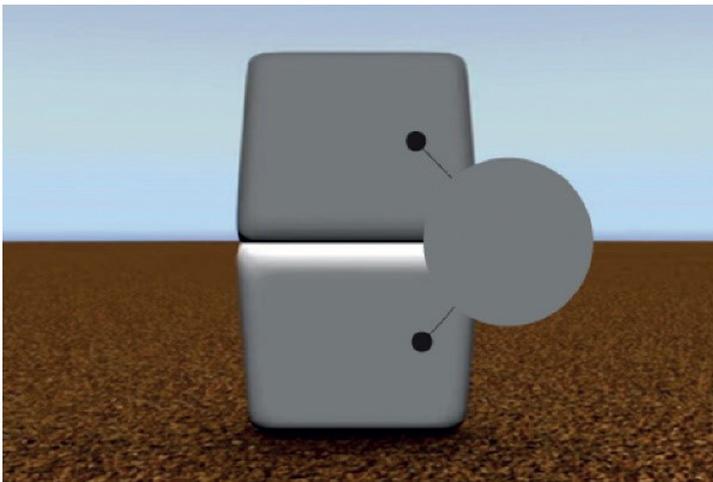
To find this out the Outdoor Media Association (OMA) ran a series of practical science experiments to discover how the brain encodes the small things we see each day.

**When it comes to business and advertising, science is more powerful than finance.** Running the numbers is easy, understanding why something happens or doesn't happen, or why people don't like something or love it, is infinitely harder because it is a mystery. The OMA Neuro-Impact study used science to solve this mystery by measuring the brain's reaction to the world it saw. Way more powerful than solving the numbers equation.

The study outlined here is the future of advertising. In the coming years we will see agencies and clients do research like this. Indeed, it will go beyond advertising, as businesses understand that undeniable insights about how people react to their products, services and practices can be uncovered by studying the human brain. Science is the most powerful strategic advantage any company can have. Running agile and accurate scientific studies is the best investment any company can make.

**Prof. Joel Pearson PhD**

*Director, Future Minds Lab & Prof. in the School of Psychology  
The University of New South Wales, Sydney, Australia*



The top and bottom greys on the dice are both the same despite the surface on top looking darker. Do these strawberries look red? They are not! They are all grey pixels, as shown on the right. Your brain is predicting that they should be red, because you have seen red strawberries thousands of times.

## ABOUT THE OUTDOOR MEDIA ASSOCIATION

The OMA is the peak industry body for Out of Home advertisers in Australia. Representing nearly 100 percent of the Out of Home industry advertising revenue from media display companies, and companies across the supply chain and asset owners (landlords).

The OMA delivers services to its members under four core areas:

- 1 Audience measurement: maintaining and upgrading MOVE, the industry's audience measurement tool.
- 2 Government relations: lobbying and advocacy to improve the regulatory framework for Out of Home across all tiers of government.
- 3 Marketing: channel marketing to media agencies, advertisers, government and the community.
- 4 Member services: covering a variety of financial, training and networking services provided to members.

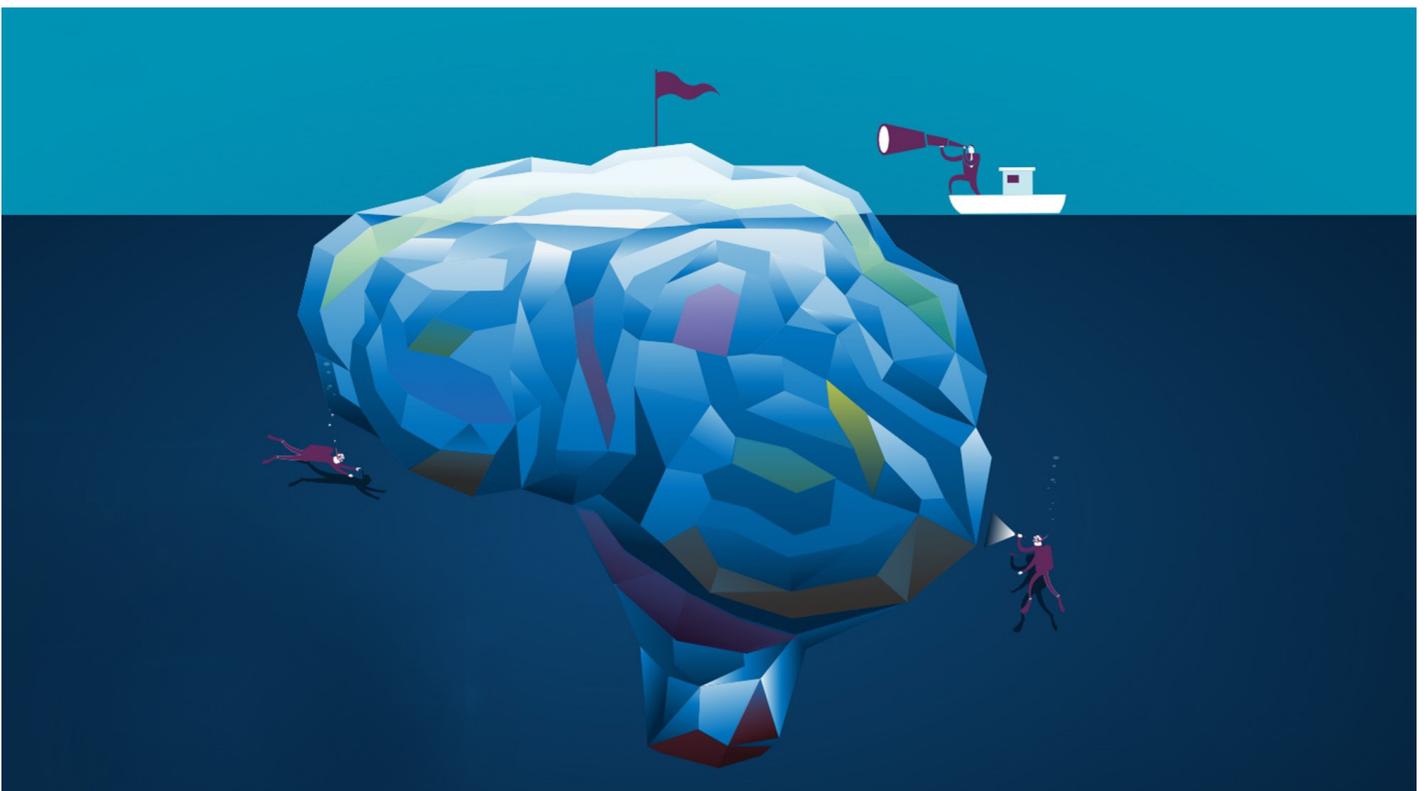
This paper is the presentation of the OMA's neuroscience study in partnership with Neuro-Insight, measuring the impact on the audience when they are viewing different Out of Home formats and the application of results as a media measurement metric.

## ABOUT NEURO-INSIGHT

Neuro-Insight is a market research agency that specialises in the measurement of subconscious responses, not only to advertising, but to the various media environments in which the advertising is situated. Using market validated Steady State Topography brain imaging technology, Neuro-Insight can uniquely capture responses second by second, in real time to quantify the impact of the first exposure. Given this experience is subconscious, Neuro-Insight have developed a methodology that is able to capture the pure, unbiased impact of both the advertisement and media environment.

## ABOUT THE NEURO IMPACT FACTOR

The Neuro Impact Factor (NIF) is a specialised approach that quantifies the subconscious impact of a media environment as individuals naturally experience it. The NIF is based on Neuro-Insight's scientifically and market validated metrics; long term memory encoding and emotional intensity with the specific behaviour of each metric also incorporated into the formula. Both measures are key subconscious drivers in how memory is processed and subsequently stored. The NIF is also backed by the Neuro-Insight global database, spanning 15 years and over 10,000 observations of brain responses to advertising and media environments. Using this data, Neuro-Insight has been able to establish the importance of 'peaks' which play an important role in memory creation and have been shown to predict future behaviour.



# TABLE OF CONTENTS

**M**  
**A**

THE STUDY		
01	Summary	2
02	Introduction	2
03	Method	3
3.1	Defining impact	3
3.2	The Neuro Impact Factor	4
3.3	Field work design	5
3.4	Negating the effect of advertising	7
04	Results	8
05	Conclusion and implementation within MOVE	9
06	End notes and further information	9

## 01 SUMMARY

A study into the impact of different Out of Home formats using neuroscience shows on average a 63 percent variation between a digital sign and a similar classic sign.

The study was conducted using neuroscience to measure the impact based on long term memory encoding and emotional intensity the audience recorded when viewing a sign. Memory encoding and emotion are measures that are traditionally used to understand the impact of campaigns. These results pertaining to memory and emotion, were combined using the Neuro Impact Formula developed by Neuro-Insight, a formula which has been validated to correlate using data from successful campaigns.

The resulting Neuro Impact Formula scores are reported alongside reach and frequency within Australia's Out of Home audience measurement tool to assist sellers and buyers to optimise the Out of Home campaign to meet the desired campaign objectives.

## 02 INTRODUCTION

The audience measurement of Out of Home in Australia is delivered by MOVE (Measurement of Outdoor Visibility and Exposure).

MOVE measures audience volumes, reach and frequency account for the viewing of a sign based on the Likelihood to See (LTS). When determining audience results the LTS includes characteristics of the sign (ie. size, location, angle of viewing, illumination, type, ad play length and share of time for digital), the environment (roadside, station, shopping centre, airport and public transport vehicles) and audience mode (drivers, passengers and pedestrians, including audience dwell for digital).

Like many countries MOVE utilises the results of eye tracking studies to measure differences in these characteristics. MOVE's eye tracking data defines that viewing has occurred based on a single glance of 200 milliseconds in length. With all environments and all audience modes (eg. Drivers, passengers, pedestrians etc.) following the same 200 millisecond rule.

The OMA members wanted to better understand what happens when viewing occurs. The study undertaken looked to deliver on three main areas:

- 1 The impact of classic and digital formats on the audience.
- 2 The impact of classic compared to digital, the prevailing thought being that digital has an 'X-factor'.
- 3 Building the results from the research into MOVE as an additional qualitative tool.

The OMA and MOVE turned to neuroscience and commissioned Neuro-Insight to measure the audience's subconscious reaction when viewing Out of Home signs.



## 03 METHOD

Neuroscience was chosen to understand the impact of Out of Home, given its abilities to measure both the subconscious responses while providing a media channel agnostic approach.

Neuroscience taps into the brain as information is processed measuring both conscious and subconscious responses, providing scientific proof as to what is occurring, even when respondents aren't consciously aware themselves.

- Neuro-insight estimate that 95 per cent of decision making and the brain's response to advertising is subconscious.

### 3.1 Defining Impact

The first step in the study is to define what we mean by impact. For this study we have defined impact as being a combination of long-term memory encoding and emotional intensity the respondents have when viewing Out of Home signs.

- Long-term memory encoding and emotional responses are commonly identified by authors of numerous studies (Mark Ritson, Ehrenberg Bass Institute and Binet & Field ) as being fundamentals to effective advertising.

#### 3.1.1 Long-term memory encoding

Long-term memory encoding is the process of laying down and committing new information into the brain. This is very different to recall, which is commonly measured using surveys. Recall is the process of retrieving previously stored knowledge, but it's only a fraction of what really gets in. Long-term memory encoding is the storage of experiences as they occur, in the moment (in that all important glance).

A key reason it is important is that the brain only stores information and experiences it deems to be of future importance. Everything our brain stores potentially drives our future behaviour.

Another way to illustrate the value of long-term memory in a consumer context is to consider it as mental availability . The implication being for a brand to come to mind when making a purchase, it must find its way into long-term memory first.

The concept of mental availability was coined by Professor Byron Sharp and Dr Jenni Romaniuk at the Ehrenberg Bass Institute, who defined it as the probability that a buyer will recognise and/or think of a brand in buying situations.

#### 3.1.2 Emotion

Emotion is another important piece in understanding the impact of advertising. The encoding of emotionally rousing moments is strongly associated with greater long-term memory (emotional campaigns typically outperform rational in effectiveness awards).

Another way to explain this is to say that emotional responses to experiences often attain a high status in memory.

As Alison Tilling, Chief Strategy Officer at VMLY&R AU-NZ said about emotion:

“We talk a lot about ‘emotional’ advertising, but that doesn’t mean reflecting emotions back to people. It means being vivid, visceral, conjuring feelings not just displaying or montaging them.

This kind of vivid can build mental availability for a brand by making memories and associations easier to access.”

A study by Ebiquity and Neuro-Insight for ThinkTV in the UK supports the importance of both memory and emotion, with image 1 illustrating memory and emotion as major differences between the best and worst performing campaigns.

This is why emotion, along with memory, are integral parts of the Neuro Impact Factor formula developed by Neuro-Insight.

Continued next page >

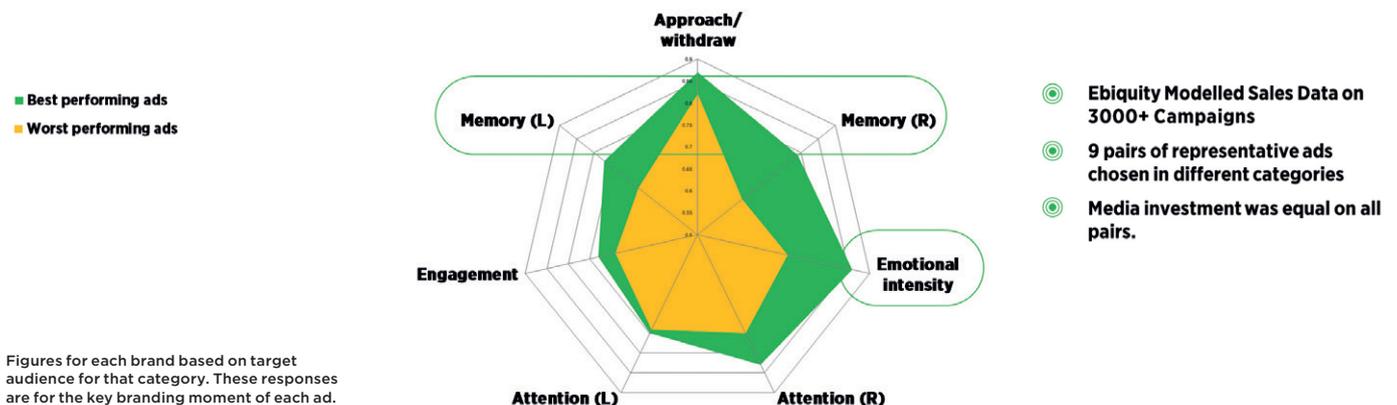


Image 1: Difference in memory and emotion in the best performing and worst performing ad in the ThinkTV study by Ebiquity and Neuro-Insight.

### 3.2 Neuro Impact Factor

The Neuro Impact Factor (NIF) is a formula developed by Neuro-Insight that accounts for both the strength and frequency of peaks in brain activity linked to emotional intensity and long-term memory encoding.

The formula is straightforward:

- 1 Take the peaks in long-term memory encoding
- 2 Add them to the peaks in emotional intensity
- 3 And then multiply that by the number of peaks

The result is a calculated score of the impact of an advertisement on the viewer.

An important component of this formula is that only the peaks above 0.7 are included (on a scale of 0 to 1). This threshold of 0.7 is crucial in pinpointing what is effective, and to explain the differences in impact between formats.

- The 0.7 value was established by Neuro-Insight through academic research and has been validated through its work with a range of clients.
- Brand messages that elicit a brain response at or above 0.7 are strongly encoded into long-term memory.

High levels of long-term memory encoding during peak branding moments have been scientifically proven to correlate with an increase in sales. It only takes one or two seconds for one of these peaks to be encoded into long-term memory, evidence that a glance medium like Out of Home has the potential to be effective.

- There is a strong correlation between the NIF score and sales as image 2 illustrates:
  - Each of the dots represents one campaign, a separate advertising creative execution.
  - These are plotted on the horizontal axis based on econometric modelling of the sales effectiveness score of the campaign.
  - The NIF score of the advertising creative execution is used the plot the campaign against the vertical axis.
  - The relationship between NIF score and sales' effects is measured by the line of best fit, which is the blue curve between all of dots.
  - Statistically measured there is an 86 per cent correlation with the advertisers' sales data and the Neuro Impact Factor.

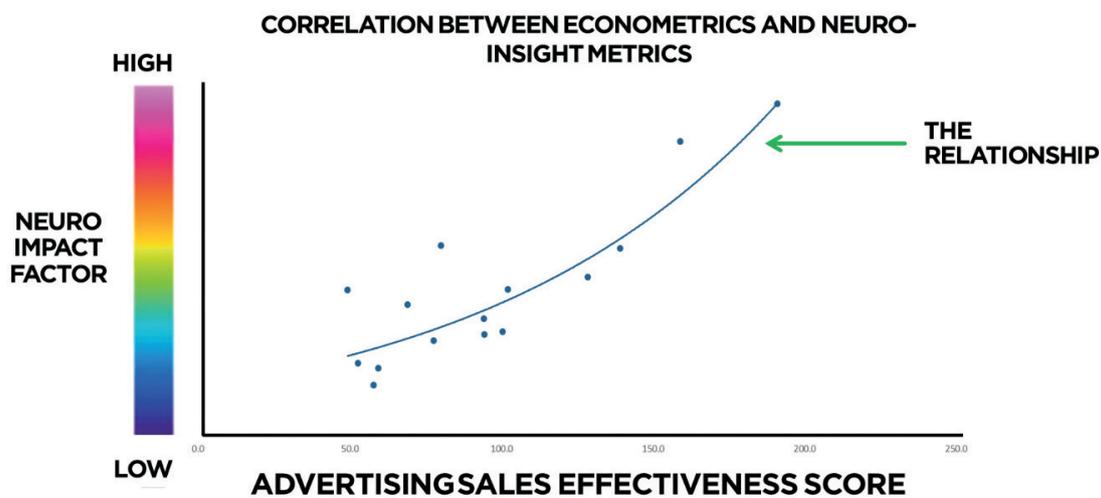


Image 2: Correlation between a clients advertising sales effectiveness (based on econometric modelling of 16 different campaigns) and the NIF score for the advertising used.

Continued next page >

### 3.3 Field Work Design

The initial stage was to identify a matrix of final measurements required, covering all formats including the different movement types available (ie. static, full motion video and partial animation) and the audience modes that can view the formats.

- All formats of Out of Home regardless of whether they were currently measured by MOVE or not were included, to ensure data was available for non-measured formats in the future as the need arose.

ENVIRONMENT	FORMAT	MOVEMENT TYPE				MODE		
		Static classic	Static digital	Full Motion digital	Partial Animation	Car Driver	Car Passenger	Pedestrian
Roadside	Large billboards >25sqm:	Yes	Yes	Yes (select locations)	Yes (select locations)	Yes	Yes	Yes
	Small billboards <25sqm	Yes	Yes	No	No	Yes	Yes	Yes
	External panels on buses/trams	Yes	No	No	No	Yes	Yes	Yes
	Street furniture - bus or tram shelter/free standing unit/kiosk	Yes	Yes	No	No	Yes	Yes	Yes

Image 3: The Roadside matrix example with formats, movement types and modes.

The second stage was to construct and film routes of everyday journeys to encompass the cells identified in the format matrix.

- These routes were designed by MOVE (with the assistance of OMA members) to cover a variety of formats and multiple signs of each format during the one journey. The same types of routes (eg. a visit to the shopping centre) were created across the major markets measured by MOVE of Adelaide, Brisbane, Melbourne, Perth and Sydney, and a regional town (in Townsville).

- Neuro-Insight filmed each route from the viewing perspectives of each audience mode required for the route. In some instances where different types of digital formats were required (eg. static, full motion video and partial animation) the same route was filmed multiple times with OMA members changing the type of advertising creative being displayed on the signs between filming.



Image 4: A film still from a Sydney route from a passenger perspective.

Continued next page >

A total of 42 routes covering more than 800 sign locations have been included in the results.

The third stage involved collection of neuroscience results from respondents as they viewed a filmed route. Neuro-Insight recruited at least 40 respondents for each route to meet the following criteria:

- 1 Respondents recruited should be familiar with the market, environments and route they were presented with.
- 2 To ensure the results were representative of the Australian population, wherever possible the

respondent group would be representative of the Australian population aged 18+ and not skew significantly to any gender, age or life stage (ie. education level, employment type or household type), except when an environment itself would have a skew (ie. signs in university locations).

In total more than 2,000 respondents were recruited.

Neuro-Insight identified when the respondents were looking at the sign using eye tracking glasses and then recorded the long-term memory encoding and emotional intensity during these windows of viewing using neuroscience.



Image 5: Example of combined eye tracking results of respondents to a sign.

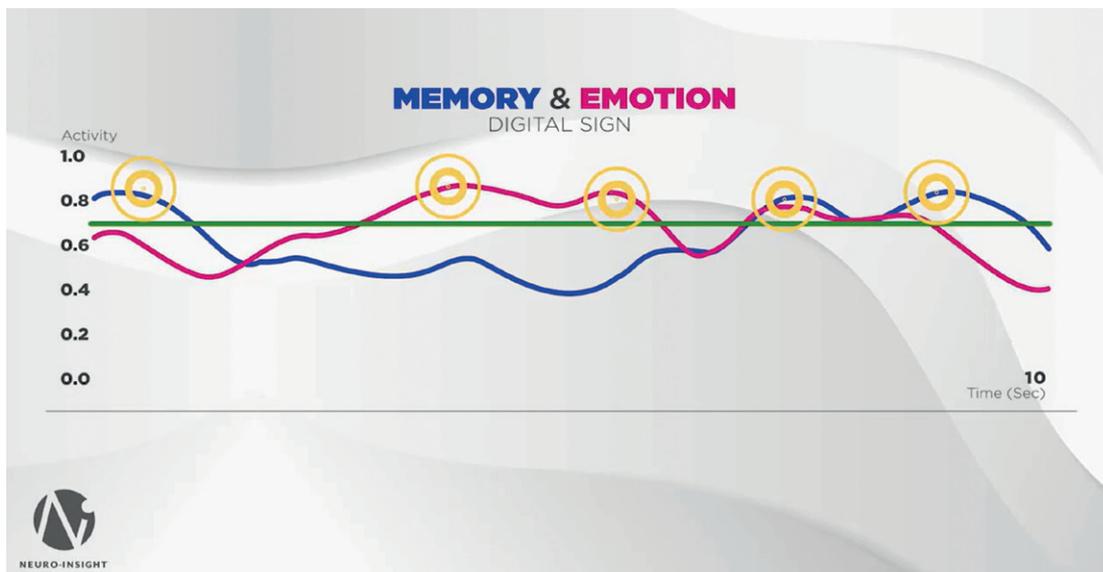


Image 6: Example of a respondent's memory and emotion peaks above 0.7 to a digital format in the study.

Continued next page >

### 3.4 Negating the effect of advertising creative

As advertising creative would play a significant part in long-term memory encoding and emotional intensity, it needed to be negated as much as possible given that the study was undertaken to understand the results produced by the formats of the signs.

Negating the effect of the advertising creative was done through the scale of the study. To achieve this study set out to measure the medium in a comprehensive way by looking at more than 800 Out of Home signs with all different types of advertising creative.

- For many of the digital locations this meant two or more advertising creative's on display during the journey.

With over 2,000 respondents, more than 800 sign locations and thousands of advertising creative executions, in total there are more than a million data points included in the results. The volume of signs of all sizes and formats that were factored into the study meant that, where possible, the advertising creative was normalised, thus isolating the NIF score to the impact of the sign's format.



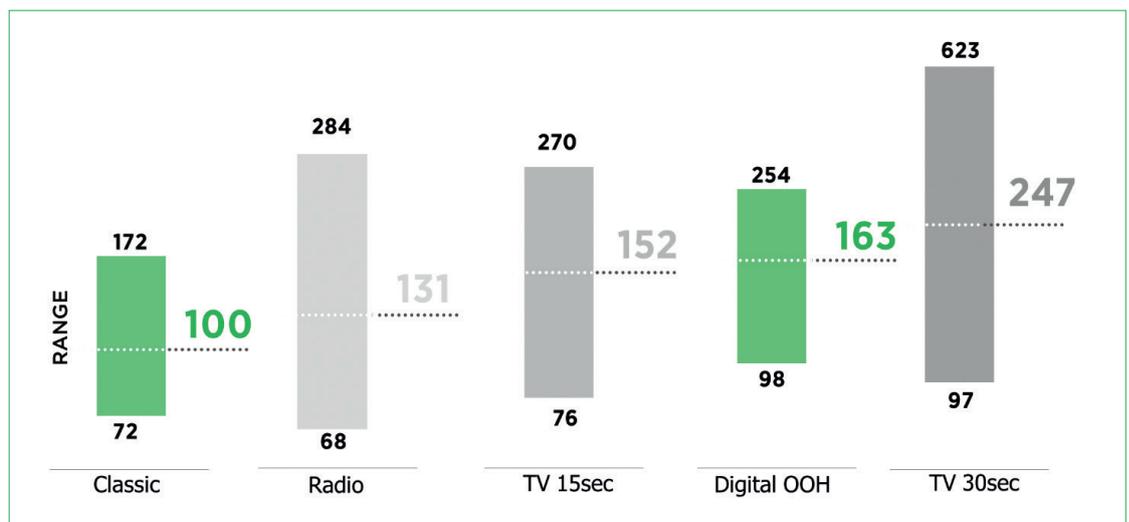
Continued next page >

## 04 RESULTS

The following results are based on comparison of the Neuro Impact Factor (NIF) scores achieved by each format.

- Overall, digital delivered an average of 63 percent higher NIF score than classic signs. Demonstrating that it does have an 'X' factor. This was due to digital signs delivering both stronger and more frequent peaks above the 0.7 threshold.
- Both classic and digital Out of Home formats deliver similar NIF results to what advertising creative on other broadcast media channels can achieve, especially digital (refer image 7 for details, which compares format results to the bank of advertising creative results).
- Size was a key driver with larger sizes within every environment achieving higher NIF scores in that environment to smaller signs.
- Environment also played a key role with the same size signs achieving different results in different environments. One of the most significant differences was in internal station locations versus airport or shopping centres. Neuro-Insight hypothesised that the high NIF score result in stations was due to it being more 'sterile' an environment than the others and therefore the signs stood out.
- Movement was shown to increase NIF scores in several ways:
  - Movement of the sign ie. public transport vehicles were higher versus other roadside of similar size
  - Movement within the sign ie. transition between advertisements on digital and scrolling signs regularly retriggered peaks in brain responses
  - Full motion video movement in digital advertising creative performed higher than static or partial animation. Partial animation achieved similar results to static digital, which Neuro-Insight's hypothesis is in part due to the subtlety of partial animation often used.
- Sound played a part in the results, with the highest NIF score being for 6x3 metre full motion video screens with sound on train station platforms.
- Mode differences for roadside were evident when comparing in vehicle audience versus pedestrians, with the latter being higher. Inside the vehicle the differences between driver and passenger were negligible. Which could be in part due to how the videos filmed of journey's were constructed ie. where the only difference was camera position to the left (passenger) or right (driver) of the windscreen.
- The illumination of roadside at night delivered significantly higher results with digital signs increasing NIF scores on average by 50 percent and classic by 98 percent on the same locations compared to daytime.

**Image 7:** The range of NIF format scores across classic and digital OOH formats, as well as Radio and TV advertising. All results are indexed to the average of classic (at 100). Note: the bars are not scale ie. 30 second TVC peaks at 623.



## 05 CONCLUSION AND IMPLEMENTATION WITHIN MOVE

The results of the study show that there are measurable differences in the NIF scores between Out of Home formats and within formats based on their size, audience mode, environment and more.

As part of MOVE 1.5 (released January 2022) the NIF scores for a campaign are reported based initially by the different environments, format within that environment (classic or digital), the size (big or small) and mode (for roadside) against the weekly audience.

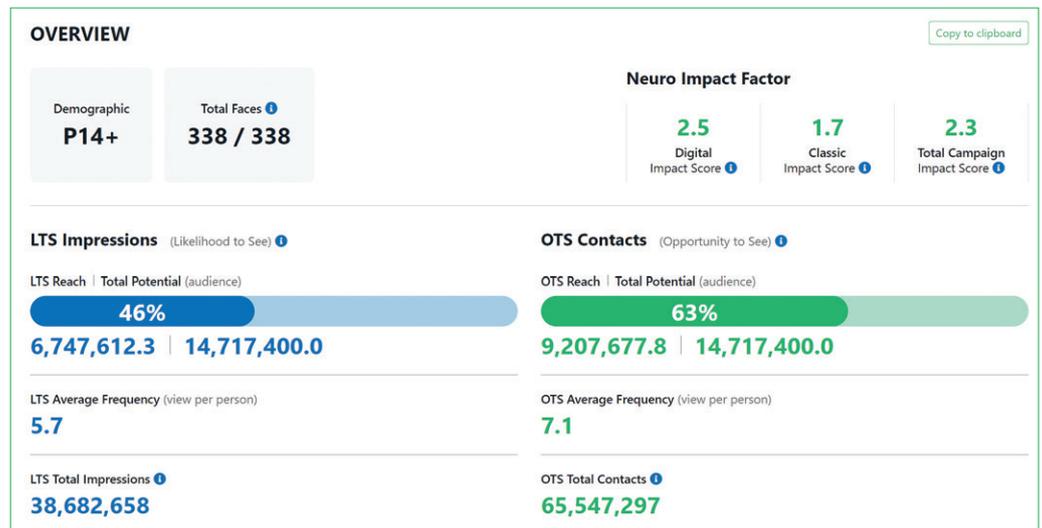
- For MOVE 2.0 (due for completion in 2024) this may be extended to include other significant differences eg. day versus night. MOVE 2.0 will calculate audience results at a more granular level than total weekly audience currently available in MOVE making this type of reporting possible.

The NIF scores reported are calculated based on each format's actual NIF score (as calculated by Neuro-Insight) weighted by the relevant audience impressions.

- For example, if a roadside format has a NIF score of 2 for in vehicle audience and 3 for pedestrians, and the signs bought achieve 200,000 in vehicle audience impressions and 100,000 pedestrian audience impressions then the resulting NIF score is 2.33 (being the sum of  $2 \times 200,000 + 3 \times 100,000$  divided by 300,000 total impressions).

We expect sellers and buyers will use the NIF scores alongside reach and frequency to help optimise the formats used to effectively meet the campaign objectives. While a high NIF score may be desirable to maximise impact it will likely be trade off with reach and/or frequency (eg. a higher impact score achieved by the digital signs compared with greater presence in market due to all day each exposure on the classic sign). There will of course be variations to this depending on audience dwell and share of time on digital screens being bought.

**Image 8:** Example of a current MOVE audience summary report for a campaign showing, separate NIF scores for the digital and classic portions of the campaign, and the total campaign NIF result, alongside the total LTS impressions (visibility adjusted impressions) and OTS contacts (total people with the opportunity to view, no visibility applied) for the campaign.



## 06 END NOTES AND FURTHER INFORMATION

<sup>i</sup> IPA: The long and the short of it, Les Binet and Peter Field

<sup>ii</sup> Mental availability

OMA Neuro Impact Factor study launch video and website

Outdoor Media Association,  
Suite 504, 80 William Street, East Sydney, NSW 2011  
[www.oma.org.au](http://www.oma.org.au)  
[info@oma.org.au](mailto:info@oma.org.au)