This paper is a best practice evaluation of communications in the context of long-term affective memory impact which inherently operates at subconscious level. This challenges traditional communications measurement systems, which rely mostly on measures that are focused on the short-term executional success of the ad itself and built on conscious recall of the sales message. Our paper argues for a broader diagnosis of advertising success (using new survey questions), with both long-term and short-term effects being taken into account, and that neuroscience principles should guide our understanding of long term memory effects.
1. **Introduction**

Much has been written about how to measure communications effectiveness in the last decade. Reading through the literature, it becomes clear that the way in which the industry has defined ‘communications effectiveness’ has remained relatively stable over time, with ‘success’ being underpinned by an underlying requirement of conscious recall and rational liking of the ad (Heath & Feldwick, 2008).

Meanwhile, neuroscientists have – for a long time – applied themselves to questions around how the brain works, how messages get assimilated and what the role of subconscious exposure is. In fact, Herbert E. Krugman (1971) started looking at eye movements and brainwave measurements to understand levels of involvement and ad effects back in the 1970s. The implications of these early neuroscience explorations did not, however, fundamentally alter the way in which the industry defined or measured communications success (Heath et al, 2008).

The last five to ten years has seen the advent of active neuroscience explorations by marketers into understanding why people do what they do. Interest in applying neuroscience techniques to marketing questions, and specifically communications effectiveness, has grown markedly. But despite its growing popularity, neuroscience techniques tend to be used merely to augment traditional models. It has not yet prompted a more fundamental rethink into how we define and measure the success of communications. This means there has been an overall failure to incorporate an understanding of how people make decisions into our communications research measures. As such, quantitative measurement techniques based on rational opinion still prevail.

Our paper aims to look at communications measurement afresh, putting the knowledge derived from neuroscience at the very centre of our entire measurement system. We redefine success based on the latest neuroscience learnings (taking into account both short-term and long-term goals of the ad), we propose three new measures based on neuroscience principles to add further depth of understanding, and we test our new measures against Electroencephalography (EEG) results to assess the linkage between these quantitative measures and real neurological processes.

But before we outline our view on what this neurologically sound theory looks like, let us step back in history to understand where we are today.
2. **A history of sales-focused premises**

Good advertising has always been closely linked to the art of communication. Before the days of print media, this art was practised by salesmen themselves. The advent of print media made it possible to spread the message more widely – and the very beginnings of advertising were therefore thought of as ‘salesmanship in print’ (Heath et al, 2008). Advertising was merely the printed version of the sales message.

The importance of the message content in communicating the unique selling point was further underpinned by E. St. Elmo Lewis in the late nineteenth century (Heath et al, 2008). Lewis, who was a salesman himself, invented the attention, interest, desire, action (AIDA) framework for communication evaluation (Barry & Howard, 1990). This framework has dominated every marketing textbook ever since, even though it was thought out by Lewis without any scientific base or rigour. In fact, it was established long before marketing was recognised as a social science and taught as a subject at universities (Heath et al, 2008).

There have been many variations of the AIDA model since its inception, with formulaic, sequential steps in engagement (awareness to interest and ultimately purchase) being common denominators, as well as the need for communicating a clear, unique selling point. The AIDA model is therefore very much founded on a principle that ads are there to serve short-term sales goals.

Today, most claim to have moved away from a pure AIDA approach. But still, advertising is measured primarily on whether a message is ‘memorable’ enough to be brought to mind consciously, and therefore the short-term sales goals prevail in our measurement systems. Reactions to the ad are assessed based on self-reported interest, liking and behavioural intent. This leaves the creative and affective power of an ad (and its impact on long-term brand memories) under-represented.

Heath et al (2008) highlights the industry’s blind acceptance of these short-term, sales-focused models. What is missing though is a call for the industry to embrace a balanced view on ad success, with a holistic short-term (sales) and long-term (brand building) goals taken into account. In contemporary society, people are inundated with messages: roughly 11 million bits of information per second, whilst only 50 bits of information are processed at any given time, the vast majority of it on a subconscious level (Plassmann, Ramsøy & Milosavljevic, 2012). A more holistic, neurologically sound approach is essential to represent the subconscious message take-up that can affect the brand over the long term.
3. **Untapped truths of the neuroscience world**

Plassman, Ramsøy and Milosavljevic (2012) offer the following definition of neuroscience: ‘the study of the nervous system that seeks to understand the biological basis of behaviour.’ And they see the purpose of consumer neuroscience as: ‘to adapt methods and theories from neuroscience – combined with behavioural theories, models and tested experimental designs from consumer psychology and related disciplines, such as behavioural decision sciences – to develop a neuropsychologically-sound theory to understand consumer behaviour.’ This is the inspiration for our paper: to build sound neuroscience principles into our quantitative measurement systems in order to build subconscious, long-term brand effects into our understanding of communication success.

Neuroscience has long investigated ideas that could help to mature and develop marketers’ understanding of advertising success, not least by allowing subconscious effects and emotions to play a more pronounced role.

The primacy of emotions and feelings in driving decisions has been debated among neuroscientists for over thirty years. In his paper, R.B. Zajonc (1980) calls for science to embrace the truth that poets take for granted: that feelings are primal, that they are present before rational thinking takes place, and that they play a crucial role in driving behaviour (Zajonc, 1980).

Zajonc argues that this primacy of affect has fallen by the wayside in our quest to understand human behaviour, despite the psychologist W. Wundt making well-founded claims about the role of emotions back in 1907. He calls on cognitive and social psychologists to give affective phenomena the attention that they deserve by taking Wundt seriously when he argues that ‘the clear apperception of ideas in acts of cognition and recognition is always preceded by feelings’ [Wundt (1907), as quoted from (Zajonc, 1980)].

The fact that every social interaction is dominated by affect is also evident in the science of non-verbal communication (for example body language and tone of voice), which is of course subconscious and governed by feelings. In the 1970s, the psychologists Argyle, Salter, Nicholson, Williams and Burgess found that a person’s tone of voice accounts for 22 percent more variance than the content of what they are saying [(Argyle et al., as quoted from (Zajonc, 1980)].

The well-known Portuguese-American neuroscientist/neurobiologist, Antonio Damasio, echoes this view that emotion underpins – and in fact is necessary for – decision making (Damasio, 1996). And to add momentum to this view, the likes of Ratnayake, Broderick and Mitchell argued accordingly in their 2010 paper ‘A neurocognitive approach to brand memory’. The lack of a scaled diffusion of
learnings from neuroscience into marketing sciences is surprising given these clear directive findings.

In scientific fields, convention often stands in the way of new ideas – historical examples of outdated concepts that remain in circulation well after they have been disproven are plentiful. For example, it took centuries for the concept of spontaneous generation (life arising from inanimate objects) to be dispelled, despite early evidence in favour of biogenesis (life arising from life). So too with quantum mechanics – its replacement of Newtonian ideas took many years. In modern time, the idea that a particular bacterium caused stomach ulcers and not physiological problems was met with resistance for many years (Wolinsky, 2008). In his article, Wolinsky summarises this historical problem in scientific fields as such: ‘It is not only the reluctance of established research fields and communities that slow down the uptake of revolutionary hypotheses, but also general reluctance to explore new ideas and support those who do so.’

German physicist Max Planck (1858–1947) once observed, ‘a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.’ [(Planck, as quoted from (Wolinsky, 2008)).]

The question that we need to ask ourselves is, given how much we know now, just how much longer will the market research industry endure this short-term, sales-focused approach that does not build neuroscience truths about long-term brand building into measurement systems?

Part of the allure of the so-called ‘information processing model’ or perspective is its simplicity and its focus on short-term sales goals (for example recall, liking, intent). These measures all have solid normative databases associated with them, which flow from the historical depths of this approach. Such measures – backed up by norms – translate naturally into a corporate environment where quick, rational decisions about ‘go / no go’ for ads are made (Heath et al, 2008). When faced with the unknown wilderness of neuroscience methods and new metrics with limited normative backing, it is often easier to continue along a traditional path than to embrace the change.

Recently, popular neuroscience techniques like implicit testing, eye tracking or EEG measurements have started to become more widely used in communications research. But these techniques are still used as supplements to already-existing traditional methods, which focus on short-term, rational effects whilst under-representing subconscious, emotive brand effects.

The market industry must guard against a false sense of security about embracing neuroscience for all it has to offer if the root of our approach has not evolved markedly from short-term, sales-focused models of yesteryear. More can be done, over-and-above supplementing these existing
approaches with neuroscience research pieces. We need to take hold of a new, redefined framework of communications effectiveness, which up-weights the role that emotion, long-term brand building and subconscious processes play in communications success.

4. **Our point of view on advertising success**

In our paper, we propose that in-market communications effectiveness results from certain ‘messages’ gaining behavioural power. This happens when explicit and/or implicit aspects of communication insinuate themselves into consumers’ nervous systems and become anchored to the brand in some ways that later influence choice and commandeer behaviour, generating increased sales and profit for the brand being advertised (both in the long and short-term).

Short-term objectives are generally volume-based and favour a direct approach in which immediate behavioural triggers such as discount pricing (an offer or incentive), new product features or some other promotional event, should be central.

At the same time, it has been proven that communications that are focused on long-term brand building and strengthening of the brand provide better sustained commercial success for the business compared to communications that are focused on short-term activation only. Supporting evidence for this comes from a seminal paper that the IPA has written outlining the effectiveness of long-term and short-term advertising (Binet & Field, 2013).

Our point of view is that the most successful brands are able to command attention repeatedly, in different contexts and at different levels, all the while keeping a sense of ‘fresh consistency’ that enables them to build long-term brand memories over time, with supporting short-term sales goals as required.

This implies a move away from purely short-term focused ad metrics, to a more balanced view, incorporating the impact on short-term activation and memory effects, which lead to long-term brand building. The current industry norm is to measure the success of the ad itself based on views that require conscious recall (and liking) of the message on the respondent’s behalf. These traditional approaches are informative in telling us to what extent the ad is liked and what the key memorable elements of the ad were. These are important elements as they help us understand the short-term impact of the ad, but they fall short of telling us what the long-term effect of the communications is on the brand.

In their IPA paper, Binet and Field (2013) demonstrated that advertising with short-term goals (‘call to action’) has significant impact on sales, but the effects are not necessarily enduring or sustainable. Advertising focused on brand building does not necessarily have as great an impact in
the short term, but over time steadily improves the strength of the brand and produces strong business results. Figure 1 shows a comparison of the sales uplift experienced over time from rational messaging versus emotional priming (for long-term success).

We posit that it is important for advertising campaigns to have a balance in both short-term goals and long-term goals (with the balance being determined by the overall campaign objective). The nature of business requires that there is an immediate impact on sales, thus we cannot downplay the importance of advertising that activates immediate sales. However, it needs to be balanced with long-term brand building goals to ensure continued growth and a sustained brand presence in the market.

Figure 1: How effects from multiple exposures build (Binet et al, 2013)

So it is important that we have an understanding on how to build long-term brand effects. Central to this is the role of memory. In the next section, we outline the major learnings and developments in the areas of attention and memory, which impact the way we define success.
5. **Brands in the brain: the art of landing in the long-term memory**

In the last decade, much has been learned about how brands and decision making function in the brain. In particular, we have learnt a lot about the role, and dynamic nature, of memories.

Memory is often mistakenly thought of as a means simply to store information from the past. But it has a far more important role – memory is used to help us make decisions. The memories that we record are the things that experience teaches us will help make better predictions and choices. The way that we store and retrieve brand memories in our minds affects subsequent decision making behaviour [(Plassmann, Ambler, Braeutigam & Kenning, 2007, as quoted from (Ratnayake et al, 2010)].

Critically, from a communications point of view, it has been shown that memory is malleable and that advertising can alter the memory of consumers’ past product experience. Over time, this post-experience advertising information can become incorporated into the brand schema and influence future product decisions (Braun, 1999).

Ratnayake et al (2010) asserts that when brand information is retrieved from memory, two discrete physiological systems are activated with different functions. Autobiographical memory (AM) indicates brand information associated with self-relevant, personal lifetime experiences. In contrast, brand knowledge about features and attributes is stored in the semantic memory (SM) system with little connection to self-identity systems.

In the context of AM, information is stored in affect-laden episodes connecting to specific situations, which may result in *hedonic* brand choices over rational evaluations. On the other hand, SM involves abstract information about the brand that leads to *rational* choices.

As outlined in section 3, it is apparent that our research industry is heavily reliant on assessing communications based on SM systems (an assessment of the brand/ad itself). However, Ratnayake et al points to the importance of both the AM and SM systems in decision making.

The key learning from our improved understanding of how the brain and memories work is that communications are most effective when they create affective memories that embed the brand into contexts that are meaningful and relevant to individuals, hence embedding the brand into the AM system.

So in measuring communications effectiveness, we should not *only* focus on the execution of the ad, but also the deeper question around whether and how the ad filters through the AM, and if it has the potential to update, build or support the overall brand narrative. For the message to land in the memory, it needs to catch the person’s attention first and foremost.
Findlay (2011) provides an extensive overview on how attention functions – it can be divided into two types of processes. Bottom-up processing implies that our attention is guided by cues in the environment without much conscious thought on the observer’s behalf. This means that it is not a goal-specific process. In contrast, top-down processing is goal-directed where attention is given to items that match our current goal. This has implications for advertising. Unless the advertising already coincides with someone’s top-down goals, the advertising will have to be noticed under bottom-up processing (via subconscious scanning of the environment). Within the first 2.5s of exposure, the brain creates a saliency map of the aspects within the visual field that require further processing – whatever seems most important will be attended to further (Plassmann et al, 2012). In the absence of a particular goal to direct our top-down attention, any stimuli that are particularly novel or surprising will take priority in directing our bottom-up attention.

Novelty therefore plays a significant role in how we process information, particularly because the brain has limited attentive resources and needs a mechanism to filter out messages and stimuli that are not important to recognise. Novelty – defined as the difference between expectations and reality – signals that there is something worth learning or paying attention to. In essence, novelty is the end result of predictions that fail.

Recent research has revealed that humans have a built-in novelty detector in the hippocampus region of our brain. For example, Lisman & Grace (2005) have demonstrated a physiological ‘filtering’ process in which new information is stored into long-term memory. This filtering process works through the ‘novelty detector’ of the hippocampus region, which they call the Hippocampal-VTA loop.

First, incoming information is compared with what is in the memory to come up with predictions of what is happening next. Then, the prediction is compared with reality, resulting in a tagging in terms of novelty (or, ‘non-expected’) – this is the first filter. Of course, one should note that not all novel or surprising events may be of sufficient importance to enter memory. Indeed, there is so much novelty in the environment that it could easily overwhelm the brain’s capacity. Hence there is a further regulation in which the novelty tagging engages the VTA region to test the information on two further filters: the affective value of the information and the evaluation of motivation (relevance to current goals).

Assessing the novel information on the affective value is needed, as not all new things are important to invest in updating our memories: it is only those that we care about (and relate to strong affective memories already established in our brain).
Creating and reinforcing affective memories does not guarantee behavioural outcomes; the circumstances of the present have a powerful role to play in influencing how the memory will be perceived and acted upon. Relevance is the third filter implemented to measure whether or not a stimulus is behaviourally relevant and motivates someone to action (behavioural intent).

It would only be in the case where these successive filters – novelty, affective impact and relevance – are cleared that dopamine would be properly released. Dopamine is a neurotransmitter chemical that has been shown to be a contributory factor in affecting long-term potentiation, a form of synaptic plasticity thought to encode long-term memory. So in trickling through all these filters, information about the brand stands a good chance of updating longer-term brand memories and becoming part and parcel of beliefs held about the brand, ultimately enabling the purchase decision.

So to summarise, our brain’s initial reaction to an event, and the extent to which the information it contains is attended to and stored in memory, is affected by its lack of expectedness, its emotional meaning and its resonance with respects of goals.

6. **Implications in research**

This understanding of brands in the brain gives us clear direction in terms of how to update our quantitative market research approach in assessing communications effectiveness. We have established that we ought no longer to focus only on short-term executional effects of the ad – we must also concern ourselves with the potential of ad messages to land up in the long-term memory to update or strengthen brand memories.

So what is required in order to measure these effects? We know that much of our decision making is the result of a complex web of past experiences and memories, which are malleable to the outside environment. Therefore, we cannot simply ask people to tell us the degree of influence of the ad on their purchase decisions.

Ultimately, we want to measure the long-term memory impact of the execution – whether the ad is able to update or build the brand narrative in the brain. But quantitative surveys are by definition system 2 devices that elicit rational responses\(^1\), so we cannot collect the *implicit* impact of advertisements entrenching the brand in the long-term memory of people. Instead, we need to utilise questions that tap into an ‘edge of consciousness’ heuristic and give us a sense of system 1 processing potential.

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\(^1\) System 1 thinking is fast, instinctive and emotional, whereas system 2 thought processes are rational and logic-based. (Kahneman, 2013)
The three-filter process described in the previous section provides a useful guide in terms of which constructs to measure in order to tap into long-term memory effects. A measurement system built upon these neuroscience learnings will assess if the ad was novel enough to pass through the initial subconscious environmental scan to catch the attention, affective in a way that connects deeply to the recipient on an emotive level, and relevant to their current goals in order to create a focus on the message itself.

The ideal is of course not to conduct communications evaluations on quantitative measurements only. A quantitative survey will always render a more rational response to questioning than implicit or projective techniques, and certainly the ideal would be to collect passive, physiological data through fMRI testing, EEG testing or more simply through EyeTracking. However, these techniques are not always practical in terms of scalability – and many client organisations are not yet ready for a fully-fledged neuro-based approach that is independent of quantitative surveys. A bridge between the old and the new is required: a holistic, updated quantitative measurement system for which norms can be built, and that is scalable within client organisations. This will then lead more naturally into in-depth neurological investigations for a more detailed, second-by-second view of the ad.

The first step in this process is to acknowledge the limitations of our current approaches. As an industry we have been too focused on short-term activation measures only, and we now need to build in long-term brand effects, based on neurological findings about the brain – such as learnings about memory filters by Lisman & Grace (2005).

For the purposes of this paper, we have defined three questions to cover the three memory filters. We will refer to the combination of these three questions as “Affective Memory Potential” (AMP). The phrasing of these questions may not yet be optimised, but after much deliberation we feel they are a solid foundation from which to work:

1. **Novelty:** ‘To what extent, if at all, did this ad convey something better than you expected?’ Novelty can, of course, be negative OR positive. We phrased this question positively, in order to capture the ad’s potential to update brand memories in a positive direction.

2. **Affective impact:** ‘How vividly, if at all, does the ad you’ve just seen remind you about things you personally care about?’ The personal affective connection necessary for a message to filter through to the long-term memory is implicit in this question.

3. **Relevance:** ‘When you think about which mobile network is best for you, to what extent, if at all, did this ad contain something that is relevant to you?’ The relevance to personal goals, which activates further attention, is captured in this question.
We used a 7-point Likert scale on each question, where seven was ‘strongly agree’ and 1 was ‘strongly disagree’.

In addition to considering each individual measure on its own, we considered the combination of the three memory filter questions sequentially, to reflect the filtering process described by Lisman & Grace (2005), to capture how new information filters through into the long-term memory. Therefore, we interpreted the percentage of people who gave a Top 2 Box score across all three questions as the overall long-term memory potential of the ad.

Although our data collection method might still be somewhat rational by being asked in a quantitative survey, it would at least attempt to reveal the underlying potential of adverts to influence the long-term memory of people.

7. Our research propositions

These learnings about attention and memory have led us to the following propositions around how communications testing should be implemented:

Proposition 1

Despite using somewhat rational system 2 responses typical of quantitative surveys, communications questions built around neurological memory filters (novelty, affective impact and relevance) are able to reflect unconscious effects of the ad and tap into its long-term brand building potential.

Proposition 2

In addition to asking respondents traditional questions about their immediate response to the ad itself, richer information about the ad will be derived if respondents are questioned on the dimensions that affect long-term brand building potential (novelty, affective impact, and relevance).
8. Research methodology

We chose three recently-aired television advertisements by mobile telecommunications providers (Vodacom, MTN and Cell C: refer to Appendix A for stills of the advertisements) and tested them using a two-phased process. Firstly, we used an EEG pilot and compared results against our neuro-centred survey measures (asked of the 20 neuro-participants). The aim here was to see if the new measures reflected the way in which the messages are received, neurologically speaking (Proposition 1).

The aim of the second phase was to compare the depth of response of traditional measures to the new ones (Proposition 2). Here we asked both the traditional survey measures and the neuro-centred survey measures of a bigger sample to compare the quantitative results.

Our sample for our neuroscience phase comprised black females only in order to eliminate any demographic biases towards the ads. It follows that our analysis of quantitative data focused on this same demographic group, in order to be comparable.

8.1. EEG methodology

In order to test Proposition 1, we partnered with HeadSpace Neuromarketing\(^2\), a company that specialises in the field of neuromarketing and has particular expertise in utilising (EEG) to understand people’s reaction to advertising better.

EEG is a well-validated medical imaging technique that reads scalp electrical activity generated by brain structures. When brain cells (neurons) are activated, local current flows are produced. EEG measures mostly the currents that flow during synaptic excitations of the dendrites of many pyramidal neurons in the cerebral cortex (Teplan, 2002).

EEG allows us to measure the physiological responses to adverts during the actual exposure, rather than relying on direct questions after exposure. This means we can get to a measured response to an ad, which more closely reflects how people engage with adverts in the real world (people do not typically stop and think about an ad after they are exposed to it, yet we artificially induce this atypical assessment in surveys).

Through EEG, HeadSpace Neuromarketing has the ability to measure the sub-conscious processing of adverts. In this particular study, the neurometric dimensions of emotion, novelty, thoughtfulness,

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\(^2\) This paper deals with the marketing implications of EEG measurement of the three chosen ads. Detailed measurement and methods behind the EEG experiment can be obtained from HeadSpace Neuromarketing.

\(^3\) The authors would like to thank HeadSpace Neuromarketing for their valuable contribution in terms of providing the EEG results and analysis thereof. Overall conclusions and findings based on these results were conducted by Alida Jansen and Lorcan McHarry.
engagement and arousal were measured. We wanted to test our constructs of novelty, affective impact and relevance against these neurometrics as a representation of the ‘truth’ of message effects.

The neurometric measures can be understood as follows:

1. **Emotion** can be thought of as emotion-laden attention, measuring withdrawal (negative) or approach (positive) motivation. Successful ads effectively employ the optimal levels of approach and withdrawal affect at various moments in the execution.

2. **Novelty** is a response that might cause a person to stop and look at the ad. In order to capture attention, an ad should ideally have novelty in the first few seconds, but should not be novel throughout, as this may cause confusion or make the ad challenging to process. A high overall ‘novelty’ score is therefore not in itself an indicator of a successful execution.

3. **Thoughtfulness** is a response that indicates the brain is moving out of a relaxed mode into a more deliberative mode. Again, an ad with a high overall thoughtfulness score may be cognitively too demanding, and therefore not necessarily ideal.

4. **Engagement** indicates the level of focus achieved – for example if one were to focus on one particular person’s verbal speech in amongst a crowd.

5. **Arousal** is the strength of emotion and leads to a nervous system response. ‘Emotion’ can therefore be thought of not only as ‘positive’ or ‘negative’ in valence, but the strength of the emotion will determine the level of nervous system response.

Twenty black female participants were recruited for the study, and informed consent was obtained from each participant for the EEG measurement. HeadSpace Neuromarketing’s standard testing protocol was used. The 20 respondents gathered at a central venue where they were exposed to the three chosen mobile network adverts as well as three additional decoy ads, whilst being measured through EEG.

Topographical maps were computed using spectral power (energy) estimates within specific bands. In the instances where one wanted to compare viewing activity to baseline conditions, the baseline values were subtracted from the measurement during viewing conditions.

After the baseline conditions were established, participants were shown a segment of white-noise (TV static) with a cross centred in the middle of the screen. This was followed by the advertisements. The same advertisements were viewed within three blocks preceded by the TV static condition. The order of the ads was randomised in each block to control for sequential viewing effects. After viewing the advertisements, participants completed an on-line survey.
containing the three memory diagnostic questions aimed at measuring long-term memory potential (novelty, affective impact, relevance).

8.2. Quantitative survey

The quantitative survey was designed to test Proposition 2 and used a separate sample. We interviewed 129 black female respondents on an online panel in South Africa. Of these, 57 were asked a traditional set of questions about the ad (liking and persuasion), whilst 72 were asked the new question sequence of novelty, affective impact and relevance. We compared the two sets of questions to ascertain the depth of insight from both, and to identify how these questions can complement each other. We focused on black females in order for this sample to be demographically matched with neuroscience participants.

Our sample qualified if they deemed themselves to be regular television watchers. This ensured everybody had a fair chance of having been exposed to the ads in question.

The Communications Measurement section started off with a question about awareness of mobile network television ads, before being exposed to the three chosen ads, one after the other. Our sample was then split into two cells: one cell answered traditional questions about the ad, whilst another cell answered our neuroscience-based memory filter questions.

**Traditional cell** diagnostic questions were:

<table>
<thead>
<tr>
<th>Liking</th>
<th>Brand linkage</th>
<th>Believability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling</td>
<td>Interest</td>
<td></td>
</tr>
<tr>
<td>Tell me everything about ad (open-ended)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Memory cell** diagnostic questions were:

<table>
<thead>
<tr>
<th>Novelty</th>
<th>Affective impact</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>What things that you care about does the ad bring about? (open-ended)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We asked open-ended questions of both cells. For the memory cell, our open-ended question was more focused on the memories that the ad evoked, rather than the specific particulars of the message that the respondent liked or remembered. All too often, open-ended questions result in a play-back of the ad’s storyline, rather than deeper impressions of the ad itself. For a more detailed outline of the survey structure, please refer to Appendix B.
9. **Research findings**

Below we outline our research findings in four sections – first we look at the EEG results in isolation, after which we outline conclusions based on the quantitative Affective Memory Potential questions.

In the third section, we test Proposition 1 to see if there is any evidence of a statistical relationship between the new quantitative measures and EEG results.

Our fourth section deals with Proposition 2, looking at traditional results and new memory questions. We ask whether the new measures based on memory filters and long-term memory potential render any deeper insights than more traditional, short-term focused communications measures.

**9.1. EEG results**

The findings from the EEG measurements revealed how the three adverts all produced different reactions from participants (Table 1). It should be noted that a television commercial is a dynamic stimulus, ideally measured through a scene-by-scene analysis. A full analysis of the EEG readings for each commercial will therefore need to examine the interplay of the various levels of each metric throughout the commercial. For this exercise, however, a mean score for each metric was provided in order to provide an abridged view of each commercial with which to compare the two methodologies.

The neurometrics indicate that overall, the Vodacom execution was the most arousing and engaging of the three advertisements. It elicited approach-related tendencies amongst participants. The Cell C advertisement had high Novel and Thoughtful scores, whereas MTN scored highest on Emotion.
The ad for Cell C appears to be the least effective of the group. It outperformed the other two ads on the Novel and Thoughtful metrics which is indicative of a cognitively demanding ad to which the audience applied a higher level of mental resource. The ad created a high level of directed attention and cognitive thought and respondents had to decode the message and storyline of the ad actively. This demand on cognitive resources affected the ability of the ad to drive emotion and engagement with the execution.

Both the MTN and Vodacom ads performed relatively well in creating a positive response from participants (across all measures). However, each ad worked differently in achieving this. The MTN ad prompted the strongest emotional response, outperforming the other two ads on the Emotion metric. This indicates a positive approach response and drew people in. The emotive loading on the ad could be attributed to the storyline, which featured a father singing a lullaby to his daughter over the telephone.
In contrast, the Vodacom ad did not create as strong an emotional response, but was a consistent performer on the other measures, creating the highest levels of arousal and engagement. This indicates that it generated a physiological response from people, which suggests that it is most likely to generate a meaningful emotive response, coupled with call-to-action response at the cognitive level. In contrast the MTN ad was very emotive, but less likely to elicit an immediate response.

The Vodacom ad had a strong, internationally popular sound-track, strong colours and a distinct up beat celebratory feel, whilst also communicating a very clear call-to-action at the end. This ad therefore spoke to both long-term (emotive) and short-term (call to action) success factors.

**9.2. Quantitative survey results**

Proposition 1 is about testing whether the new memory filter questions mirror these all-round positive results on the neurometrics, to ascertain the long-term memory potential of the ad.

Figure 2 and 3 summarises the results from the quantitative survey where 72 respondents were exposed to the three adverts and answered the three questions on long-term memory potential.

We can look at the scores in two ways. Firstly, (as in Figure 2) we can look at the performance of the adverts within each of the three dimensions of novelty, affective impact and relevance. Here we have taken the top two box score as a measure of success (that is, all ratings of 6 or 7 from the 7-point Likert scale). Importantly however, the key outcome for an ad is to score well on all three dimensions of novelty, affective impact and relevance. Given this, we define the requirement for a successful ad as one that scores a rating of 6 or 7 across all three questions. We label this the Affective Memory Potential (AMP) and this is what is displayed, as a step-wise sequence, in Figure 3. A global R&D pilot study was conducted, which provides normative information for comparative purposes.

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4 Run independently from this paper
Figure 2: Emotive cut through (black females, n=72)

Figure 3: Affective Memory Potential (black females, n=72)
What we can surmise from these results are the following:

- In terms of overall performance (which we define by combining all three questions), the Vodacom ad is determined to be the most likely to have the strongest long-term impact for the brand. In contrast, Cell C is the weakest ad. In the total sample, Vodacom has an Affective Memory Potential (AMP) score of 44%, well ahead of MTN with 31% and Cell C with 6%. This reflects the finding of the EEG tests which indicated that the Vodacom ad was the strongest performing ad in terms of “engaging impact”.

- When looking at the specific aspects of the AMP, MTN stands out as the ad that has the most affective (emotive) impact with three fifths of the sample saying the ad reminded them about things that they cared about. However, its relatively weaker performance in terms of novelty and relevance means that the potential impact of the ad has been diluted. This tallies with the findings from the EEG measurements which suggested that the MTN ad had a strong emotive impact, but was lacking in terms of spurring people to react.

- Although the Vodacom ad was slightly weaker in terms of affective impact, it scored consistently well across all three measures. This suggests that it has all the ingredients of novelty, affective impact and relevance to bring the brand into the long term memory of people.

We have shown that, when run independently, the EEG measurements and the quantitative questions can produce similar conclusions. But Proposition 1 requires us to take it one step further to understand the nature of the relationship from a statistical point of view.

9.3. EEG versus Survey

To test Proposition 1, we asked EEG participants the quantitative Affective Memory Potential questions after they had participated in the EEG pilot. Having the two sets of results for the same individuals allowed us to make a direct comparison between participants’ neuroactivity and the responses they gave to the survey questions.

Investigating the relationship between survey questions and neurometrics consisted of a two-phased process:

Firstly, in order to assess whether the three individual survey questions were associated with the neurometrics, a subset selection was performed with survey results as the response variable, and the neurometrics as the predictors. Each survey construct was assessed in isolation through this process, but no stable predictive models were found at this level of analysis.

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5 A forward step-wise selection algorithm was used.
In the second phase, the same process of subset selection was used on a set of Principle Components\textsuperscript{6}, to see if a stable model existed. A stable model was indeed found when looking at the Vodacom ad, which produced the strongest response in both the EEG measurements and the survey measures.

This significant association emerged when looking at Vodacom’s first Principle Component (PC1), which explains approximately 68% of the variance in participants’ survey responses. High ratings were associated with changes in frontal alpha power (energy). Alpha power over the frontal region of the scalp is a sensitive biomarker for the allocation of attentional resources (decreases in alpha power are associated with increased allocation of attention). Approximately 40% of the variability observed within the principal component accounted for by the variance in alpha power (energy) over the frontal regions ($\beta = -0.04$, $p < 0.01$). See Figure 4 for an illustration of this relationship.

Of course, the interpretation of the magnitude of $R^2$ is field-specific. It should be noted that 40% variability explained is a fair amount in the context of a physiological response. With many different factors able to drive a physiological process, this outcome is a very encouraging result indeed. Neuroscience researchers normally consider 10-15% as noteworthy in this context.

\textsuperscript{6}Principal component analysis (PCA) was performed on the survey data from each of the three advertisements to assess the underlying sources of variability within the participants’ response data. The percentage variance explained by each Principle Component, for each ad, as well as the PCA loadings, can be found in Appendix C.
Figure 4: A significant association between survey responses (PC1 for Vodacom) and Alpha Energy — a decrease in alpha frontal energy indicates an increase in attentional resources.

Figures 5 and 6 illustrate that the more highly the participants rate the advertisement, the greater the degree of frontal alpha de-synchronisation. The decrease in frontal alpha energy is often observed in neurophysiological, as well as neuromarketing studies, and has been linked to allocation of attention resources. In the context of the model, those participants who rated the advertisement more highly allocated more attentional resources to the stimulus. This then points to the fact that emergence in audio-visual information streams is important in terms of the impact that it will have on a participants rating of the ad.
Figure 5: Neuroactivity amongst respondents who gave a high survey response (Vodacom ad)

Energy in the Alpha band decreases over the anterior regions.

High Rating – Baseline

High Rating – Vodacom viewer

Figure 5: Survey questions vs. relative Alpha power over the frontal region. The associated scalp maps comparing baseline and viewing conditions, baseline activity is set to zero. Unit of measurement is log power.
Figure 6: The higher participants rate the advertisement, the greater the degree of frontal alpha desynchronisation (Vodacom ad)

Figure 6: The associated spectra for each condition overlaid on top of each other. The alpha band is indicated by two vertical lines extending from the x-axis.

So in the context of Proposition 1, this demonstrates that there is a significant relationship between the combination of the survey metrics (high ratings across all three questions, possibly due to a heuristic when answering the questions) and the actual physiological response to the information received by a person.

9.4. Traditional and Affective Memory Potential questions

Our second proposition is that the three quantitative Affective Memory Potential questions can render rich additional information about the adverts’ potential to influence long-term memories, over and above traditional short-term focused questions.

Figure 7 summarises a host of standard measures used to assess the three mobile network provider advertisements. MTN has a better-liked ad, but for all other questions, Vodacom rates higher. So in a sense, apart from the likeability question, the standard measures pick out the Vodacom ad as the strongest in terms of short-term effects.
These traditional measures are outcome-focused, summarising the overall outcome of people’s reaction to the ad without diagnosing in particular the mechanics behind why people respond positively (or negatively). These show that the Vodacom ad is a particularly strong ad in regards to short-term activation potential. But adding the layer of long-term memory filter questions, we see the Vodacom ad’s true potential beyond its sales potential – it has the power to influence brand measures over the long-term by the fact that it engages the brain’s attentional resources to impact the brand narrative over time.

Looking at the MTN ad, the measure that it scores particularly well on is the question focused solely on the ad (‘how much do you like the ad?’). The MTN data shows that the ad is more liked than the Vodacom execution. Based on this, it would be tempting to come to the conclusion that it is a more effective commercial. Here the weakness of traditional measures to diagnose the full effect over the longer-term becomes evident: we know the ad is well-liked, but we are unable to diagnose the source of it as being a strong emotive component, or the weakness that lies therein (a lack of relevance to bring about behavioural intent). Other traditional measures also do not point at the overarching heuristic that could bring about long-term updates to the brand narrative.

Adding the Affective Memory Potential questions allows us to diagnose that the high liking stems from strong personal memories. So, in line with (Binet et al, 2013) – and supporting Proposition 2 – a combination of short-term and long-term ‘memory’ measures could help diagnose communications effects more holistically.
Open-ended questions add a crucial dimension to understanding message assimilation, but oftentimes they result in a factual playback of the storyline or tagline. We proposed that framing these questions around memories (rather than messages) should elicit a richer understanding of the ad’s connection with respondents on an affective level. In our research, we posed a traditional open-ended question, as well as one which was framed around memories. We contrast the two here, in order to understand whether the latter gives richer results.

Figure 8 summarises the results from a standard open-ended question about the message that respondents took from the MTN ad (“What were the main things that the advertiser was trying to tell you in this ad?”) whilst Figure 9 summarises the results from an open-ended question phrased around affective memories created by the advertisement (“You said that the ad reminded you quite vividly about things that you really care about: what does it bring to mind as you watch it?”). We chose to compare the results from the MTN ad specifically, as this was the most emotive of the three ads, giving both open-ended questions the chance to render emotive responses.

There is a marked contrast in the responses from the two open-ended questions. The traditional question was dominated by more factual information (free, talk, airtime, cheaper) with MTN being the obvious subject.

When we direct the respondents to focus on memories that the ad reminded them of, a much stronger emotive response is elicited (Figure 9). ‘Family’ and ‘children’ dominate the response with a lot of warm words being used (love, loved, touch, people). There is little factual playback of what the ad was trying to communicate.
Assessing Proposition 2, we have already shown that a combination of short- and long-term memory measures can render a deeper, more holistic sense of advertising success, as it opens up conversations about the long-term success of the ad.

In addition, by acknowledging the importance of memories in driving decisions, and building this into our open-ended survey questions, we can gain a richer understanding of why an ad like MTN’s is well-liked. Traditional results indicate a very high liking score for the MTN ad, but not a very strong brand impact.

Combining this with our memory-based questions, we can learn that the MTN ad has an affective impact on people (it is very emotive) and that this affect is connected to people’s love for their family and children. Furthermore, we can learn that it does not deliver new information that is unexpected (or existing information delivered in an unexpected way), and is not immediately relevant to their needs. The Vodacom ad is a consistent performer across all three memory filter measures and shows more potential than the MTN ad to influence long-term memories for the brand.
10. Discussion and Conclusions

Our research attempts to usher in a new era of communications effectiveness measurement by putting neuroscience learnings at the centre of a measurement system, to build a balanced view of short- and long-term advertising effectiveness. This has some important implications for the marketing insights industry.

Firstly, as an industry, we must be brave enough to accept the limitations of current approaches in fully diagnosing advertising success, as current models still have their roots in sales models of yesteryear. In addition, we must embrace new measures that spring from a greater understanding of how messages are assimilated in the brain’s long-term memory. Such measures, founded in neuroscience principles, could add a valuable understanding of communication success, and improve the depth of understanding we provide our clients.

Traditional models have long standing, rich databases on which to benchmark results, but a brave venture into new uncharted territory is necessary in order to embrace new measures which are rooted in neuroscience. Our research has shown that such new measures are valid, easy to interpret and directive in their findings around the memory potential of an ad.

It goes without saying that new communications measures need to be based on sound neurological findings about how the brain works. The measures used in our research are based on the science of attention and memory filters. However, there may be other areas or interpretations of neuroscience that may result in equally useful survey measures.

Using neuro-inspired measures within a quantitative survey to assess communications effectiveness has a side benefit of building a more natural bridge between pure traditional measures and new neuroscience measures which are able to diagnose advertising strength on a second-by-second basis. With quantitative measures solidly grounded in the basic principles of attention and memory formation, neuroscience methods can be more easily incorporated.

Implicit in all of this is the need to become more balanced in defining communications success, taking into account long-term brand building and short-term sales goals into account. Thus far, communications effectiveness measures have been focused on rational recall and liking of the ad, and whether the ad motivates towards (short-term) action. However, this does not tell us about the success of the ad in building the long-term brand narrative over time. The conversation about long-term versus short-term goals of advertising should move out of the boardrooms in marketing departments, and into our communications measurement systems.
A renovated, fit-for-the-future way of measuring communications effectiveness should give due consideration to rational as well as emotive layers in the message, rely on both short-term call-to-action measures and long-term brand building measures.

11. Acknowledgements

We are indebted to the contribution of Jan Hofmeyr and Franck Sarrazit of TNS in the development around the role of long-term memory in decision-making and its application in communication measurement.
Bibliography


Appendix A – Advertising stills and links

a. The Vodacom Give a Happy ad

https://www.youtube.com/watch?v=2PlYeZC6Mow

b. The MTN Lullaby ad

https://www.youtube.com/watch?v=Hzuk6W5ULZ0

c. The CellC Data ad

https://www.youtube.com/watch?v=IX6aGvPTZ8I
Appendix B – Quantitative survey flow

Our survey structure is outlined below. We split the sample into two groups – those who answered the traditional communications questions, and those who answered the new memory-based communications measurement questions.

1. All respondents
   1.1. Screener
   1.2. Awareness and usage of mobile network providers
   1.3. Awareness of mobile network provider adverts

2. Traditional communications measurement (half of the sample)
   2.1. Liking
   2.2. Brand linkage
   2.3. Believability
   2.4. Feeling
   2.5. Interest
   2.6. Traditional open-ended question

3. New communications measurement (half of the sample)
   3.1. Novelty
   3.2. Affective Impact
   3.3. Relevance
   3.4. Memory-based open-ended question

4. All respondents
   4.1. Demographics
Appendix C – PCA analysis

PCA was computed using standardised variables (0 mean, 1 standard deviation) and the singular value decomposition algorithm. The derived principal components for each ad were then used as response variables to perform subset selection. The PCA loadings and percentage variance explained (PVE) by each component are presented in Table 2 and Table 3. The bi-plots for the PCA for each of the advertisement are presented in Figure 10.

Table 2. Percentage variance explained

<table>
<thead>
<tr>
<th>Ad</th>
<th>PC1</th>
<th>PC2</th>
<th>PC3</th>
</tr>
</thead>
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<tr>
<td>MTN</td>
<td>51.83</td>
<td>31.27</td>
<td>16.91</td>
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<tr>
<td>CellC</td>
<td>80.35</td>
<td>10.61</td>
<td>9.03</td>
</tr>
<tr>
<td>Vodacom</td>
<td>67.90</td>
<td>18.58</td>
<td>13.53</td>
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Table 3. Principal component loadings

<table>
<thead>
<tr>
<th>Ad</th>
<th>Metric</th>
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<th>PC2</th>
<th>PC3</th>
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</thead>
<tbody>
<tr>
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<td>-0.2168</td>
<td>0.7081</td>
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<td></td>
<td>Affect</td>
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<td></td>
<td>Affect</td>
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<tr>
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</tbody>
</table>
Figure 10: Biplots for each of PCAs: (top-left) MTN, (top-right) CellC, and (bottom) Vodacom.