What Did That $2.5 Million Ad Buy Us?
Cognitive Science Goes to the Super Bowl

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Abstract

Advertisers spend a lot of money each year producing commercials. Yet they have done little to incorporate sound cognitive science into ensuring that their advertisements are effective, particularly in terms of memory for the desired brand. This research develops a metric, CogScore, that attempts to predict the memorability of the brand from any given ad. We show that our metric significantly predicts the memory for brand, much more so than a traditional metric on which advertisers currently rely.

Keywords: information processing; memory; advertising effectiveness; gender differences; Super Bowl

Introduction

Advertisers spend billions of dollars every year in an attempt to persuade the public to consume countless products (Raine, 2005). Despite this demonstrated belief in the power of advertising, the corporate world is frustrated by a general inability to determine the return on that investment (Neff, 2006). An oft-quoted remark attributed to John Wanamaker, a 19th-century businessman and a founding father of modern advertising, is still relevant today: "Half the money I spend on advertising is wasted; the trouble is I don't know which half."

In fact, while today's online and direct marketing methods (e.g., direct mail, infomercials) lend themselves to measurements of effectiveness and therefore to testing and analysis of effective and ineffective features, the vast majority of advertising can be assessed only at a very broad level or with intrinsically unreliable consumer self-reports. Broad-level measures include the noisy economic data of actual sales and ad-industry "tracking studies" that purport to measure "brand awareness" (which correlates nicely with "ad spend," thereby encouraging further advertising investment), while consumer self-reports of "liking" and "purchase intent" are found via focus groups or online surveys.

None of these measures can reveal the actual economic impact of a particular ad. Nor have these measures been shown to accurately predict how effective an ad will be before it is put into market and has already cost the company an enormous amount of money, both in development costs and in "media spend." Indeed, these measures cannot even take the first step of determining whether an ad can induce recall of the brand featured *in* the ad. Even the most revered creative minds in the industry cannot identify a concrete "magic formula" for ad memorability. (Horovitz, 2006). The industry is therefore spending billions of dollars on a trial-and-error approach that does not offer a precise measurement of its return on investment.

We propose the following argument. The purpose of advertisements is to sell products. Ads are therefore designed to at least raise awareness of a brand's existence, and at best to be persuasive and even likable. However, awareness, persuasion, and likability will have no effect if the brand being advertised is not remembered as belonging to that ad. Indeed, any skillful persuasiveness could be inadvertently attributed to a competing brand. This would not have an advantageous impact on sales. Therefore, the effectiveness of any ad should be correlated with its brand memorability. Indeed, brand memorability should be a predictive factor of the economic success of any given ad.

In this study, we endeavor to assess the brand memorability for specific ads and to thereby take the evaluation of television advertising into the realm of information processing. We employ a simple model of cognition and apply it to the most sensational event of the advertising year: the Super Bowl. In testing our model, we examine memory for ads a year after the game aired. To our knowledge, no empirical study of ad recall or recognition after such a long interval has ever been attempted. However, memory of the brand associated with "that funny ad" a year later should not, perhaps, be too much to ask for $2.5 million.

Our CogScore model is being developed in a modern advertising agency by the first author. By way of giving context to the development of this model, some personal observations are of interest. First, people often assume that ad agencies have psychologists on staff. While this may have been true historically, it is not generally the case today. Advertisers certainly have expertise in influencing people, but they do so without scientific expertise on human behavior. Indeed, the industry appears to pay very little attention to the academic journals that are devoted to the scientific examination of their field.

This is not due to a lack of interest in the topics, as practitioners regularly pose questions to which these researchers have answers. Yet the products of the *Journal of Advertising* and the *Journal of Consumer Research* are poorly applied, if at all. The successful endeavors of advertisers are still based on a combination of trial-and-error feedback and creative instincts. Their instincts are good, but science can certainly improve their success rate.

The SuperBowl. SuperBowl ads as a set have several advantages for study. To handpick any other set of ads for study would require extensive knowledge of their initial air date, demographic target, popularity of shows sponsored, number of weeks aired, and size of TV market. This information is well guarded by advertisers and would require a monumental (and likely ineffective) effort to amass. Thus, the fact that these SuperBowl ads all ran for the first time on the same day, all had an audience of almost 91 million viewers (which covers show popularity and TV market), and a fairly well-defined demographic is incredibly fortuitous (Atkinson, 2006). In addition to this wealth of advantages, USA Today publishes an annual ranking of AdMeter scores for the Super Bowl ads, based on consumer self-reports of "liking" (USA Today, 2006), to which the advertising world pays a great deal of attention (Klaasen, 2006). This will provide an excellent comparison for the effectiveness of our model. Thus, while there will be plenty of noise in any data for memory of in-market ads, there is some margin of consistency for this particular set of ads. It is unfortunate that we have no way of measuring participant exposure to each ad during the Super Bowl, or whether and how often participants were exposed to each ad after the game. We can only hope that our model will account for enough variance to overcome this considerable noise.

The CogScore Model

Standard television ads are 30 seconds long and may include music, voice over, written language (copy), spoken language, sound effects, a story line, a punch line, and even a "call-to-action". Ads constitute multimedia. As such, Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2001) provided some useful guidance in distilling cognitive science into a practical set of principles for application to this domain. However, Mayer's theory is designed to inform effective instruction, presumably of a time period exceeding 30 seconds. A cognitive framework for evaluating the effectiveness of individual ads requires a more intense focus on immediate information processing and virtually incidental learning. To simplify the application of cognitive science to such complex real-world stimuli, we settled on six "cognitive principles" to evaluate the effectiveness of an ad as it relates to information processing. They are *implicit affect*, *sensory processing*, *working memory*, *knowledge representation*, *elaboration*, and *cognitive engagement*.

As ads are assigned scores for each principle, we call the model CogScore.

Implicit affect (IA). This first principle is one that advertisers regularly attempt to measure. Berridge and Winkielman (2003) proposed this concept of an "unconscious emotion," a gut reaction to a stimulus that can be positive or negative, and that can affect both later consumption behavior with respect to the stimulus and the quality of information processing for the stimulus (Ashby, Isen, & Turken, 1999). As affect is heavily subject to individual differences, assigning a score on this principle generally requires some independent insight into the tastes of the target consumer – something that advertisers are constantly struggling to grasp. There has been recent investigation of the use of fMRI as a way to infer consumers' subconscious reactions to advertising stimuli (McClure, et. al., 2004; Mucha, 2005). Though costly, cumbersome, and currently inexact, these endeavors show promise of more accurate findings on subconscious emotions than the standard approach of asking the viewer.

Sensory processing (SP). Although the scientific community knows a great deal about how visual and auditory information is processed, the advertising world is uninformed about these findings. Spots are full of stimuli coming through multiple sensory channels and in multiple formats per channel. In the auditory realm advertisers use music, voiceovers, dialogue, and sound effects; visually, they use copy, pictures, charts, and moving scenes. Unfortunately, advertisers do not employ guidelines as to *when* to use what modalities. Scoring of the SP principle is intended to capture two somewhat competing aspects: 1) avoiding sensory overload in conveying the desired information, and 2) maximizing sensory availability to convey the desired information (Mousavi, Low, & Sweller, 1995).

This principle is also one that can yield different scores for male vs. female consumers. There is evidence to suggest gender differences in sensory processing as well as differences in the processing of ads in particular (Darley & Smith, 1995; Meyers-Levy & Maheswaran, 1991).

Working memory (WM). As with SP, much of what we know about this important principle of cognitive science is absent from the design of ads. The basic concepts of limited working memory capacity (Baddeley & Hitch, 1974; Sweller, 1988) are violated on a regular basis in ads for insurance, financial services, electronics, medicine, and beyond. Advertisers cram a lot of information into 30 seconds, and although this practice may be somewhat intentional in limited cases, their lack of awareness of this principle hurts their cause more than it helps. In this model we apply higher scores to ads that contain fewer chunks of "take-home" information.

Knowledge representation (KR). Different people know different things, and this difference in knowledge affects how they acquire and think about new information (Chase & Simon, 1973). This principle takes into account the target audience for the ad and evaluates the information the ad presents given the presumed knowledge of the audience. We apply lower scores to spots that fall into the expert blind spot trap (Nathan & Koedinger, 2000), and higher scores to spots that respect the content knowledge of the target consumer.

This principle is another for which males and females may receive different scores, not due to any difference in processing, but rather because in certain product categories males are more frequent consumers than are females, and vice versa. They will therefore have different content knowledge in such categories. This is of course true for any well-defined subset of consumers.

Elaboration (EL). Elaboration refers to how well connected items are in memory; the more connections to an item exist, the easier it will be to recall (Anderson, 1976). EL is separated here from KR because it measures the structure and design of knowledge more than knowledge content. The goal of a spot, then, is to not only place itself within the viewer's current KR, but to also provide connections to existing memory structures and between the memory structures created by the ad itself. Elaboration is extremely useful in advertising. A joke is a great elaboration, and in a world of trial-and-error, jokes have been established as a good formula for making people remember an ad. As is often the case, however, the underlying principle for that success is poorly understood. We have all seen and remembered ads for which we cannot remember the brand. Unless the brand itself is elaborated, it will not be successfully integrated into the memory. Scores on this principle attempt to capture how effectively the brand is incorporated into general memory for the ad.

Cognitive engagement (CE). Cognitive engagement (Mayer, 2001) is included here as a proxy for active processing, which has been shown to improve learning and memory (Chi, et al., 1994) and to result in increased learner enjoyment. Indeed, there is evidence to suggest that insufficiently active processing, or "mental underload" can lead to a drastic decrease in performance and learning (Parasuraman & Riley, 1997). This principle also provides another interesting point for gender differentiation, as men and women demonstrate different implicit strategies for processing ad information (e.g., skimming vs. comprehensive processing; Meyers-Levy & Maheswaran, 1991; Putrevu, 2004). For CE we assign higher scores when the spot facilitates active processing of the brand name.

A CogScore Example. The following example demonstrates how CogScore is applied to individual TV spots. In *turbulence*, a woman sitting on a plane tries to exit her row to use the restroom but falls face down on a sleeping man when turbulence hits. Just then, the lights come on and the other passengers gaze in horror at her position. The ensuing voiceover says: "Don't judge too quickly. We won't." The Ameriquest insurance brand then appears on screen with further voiceover.

To create a CogScore for *turbulence*, each cognitive principle is assigned a rating from 1 to 4 (1 = poor, 2 = neutral, 3 = good, 4 = very good). The average across principles is then derived for the CogScore. Table 1 lists the CogScore ratings for *turbulence*.

Table 1: CogScore example coding for *turbulence*.

Score	IA	SP	WM	KR	EL	CE	Ave.
Brand	4	1	1	1	1	1	1.5

For IA, we used the best approximation available to us: the AdMeter scores. A rating of 4 on this principle is a direct adaptation of the AdMeter scores into a 4-point scale (*turbulence* made the AdMeter Top 10). Apparently people enjoyed this spot. However, the remaining scores are not so good. The brand is not mentioned until after the interesting story has ended, and its connection to that story is quite tenuous: "Don't judge too quickly. We won't." Unfortunately, that tag line could lead to many different categories of products and services. This ad completely disregards the capacity of working memory and the serial aspects of sensory processing: all of the pertinent brand information is put into the last five seconds of the spot. Thus, the spot gets 1's for SP and WM. This spot also gets a "1" for KR, for four reasons: 1) consumers are unfamiliar with this particular product category, 2) the product category is not highly anticipated in the Super Bowl environment, 3) the brand itself is not generally salient (does not have intrinsically high brand awareness), and 4) the category has nothing to do with a plane. As for EL, the brand name is not elaborated at all: it is simply appended to the end of the story. These types of "piggyback" ads are everywhere: a 25-second ad followed by a 5-second sales pitch that is entirely divorced from the story and that would require 5 seconds of super-human information processing to acquire the information. Similarly, while CE might be great for the first 25 seconds, consumers are likley to mentally check out for the last 5 relatively boring and overloaded seconds. EL and CE both get scores of 1. The *turbulence* spot gets a Brand CogScore of 1.5 (the average of the six principle ratings).

Advertising professionals will assert that this type of ad will actually do well, because after many exposures to this spot and its "sister" spots from the same campaign, consumers will come to recognize the boilerplate format of "Don't judge too quickly" as belonging to the Ameriquest brand. What these professionals fail to realize is that if the brand name and that particular boilerplate are never associated with one another in any of those

instances, then they will not enjoy elaborate connections to one another in consumers' content knowledge, and repeated exposures will do little to ameliorate the problem.

It should be noted that it is not always the case that SP and WM get similar ratings, or that EL and CE get similar ratings. It is possible to present a large amount of information to working memory without violating the limits of sensory processing. It is also possible to elicit cognitive engagement with a spot while failing to provide it with the necessary elaboration to make it more memorable.

There is one crucial aspect missing from the CogScore model: getting a consumer's attention. However, this aspect is one for which advertising practitioners have arguably more expertise than can be significantly improved upon by the application of cognitive science.

Thus, on the premise that memory for a spot is necessary for it to have a discernible effect on purchase behavior, we devised the CogScore model to provide a more accurate prediction of brand memory (and, presumably, purchase behavior) than measures of liking. In this study, we seek to first establish that the CogScore model can accurately predict memory for a brand, as demonstrated by accounting for a significant portion of the variance in recall of Super Bowl ad brand names, even a year after that event. We further predict that self-reports of "liking," as embodied in the USA Today AdMeter, will not predict memory for brand as accurately as CogScore.

Method

Participants

Eighty-four undergraduate students at the University of Tampa participated. Data collection occurred the week of January 22, 2007, 51 weeks after the Super Bowl aired.

Materials

Each participant filled out a paper-and-pencil form that contained four sections. The first section asked if the participant had watched the 2006 Super Bowl, and, if so, which teams played, and who won. The second section asked them to recall and describe any spots they remembered from that Super Bowl and to identify the brand if possible. The third and fourth sections provided a prompt for each of 25 spots, textually for the third section, and with a single screenshot of the spot for the fourth section. Participants indicated their general level of recognition for the spot (Did you see the ad?: yes, no, maybe), and reported the associated brand name along with a Likert scale of their confidence in their brand answer (1 = "It's a total guess" to 5 = "I'm positive"). To control for the order of the stimuli and for textual vs. visual stimuli, we used four counterbalanced forms.

Each spot was assigned a CogScore as described previously. All spots are listed in detail in Table 2 of the Results section and can be viewed, as of February 1,

2007, at www.commercialsihate.com. We used 21 ads for which USA Today published AdMeter scores. An additional 4 ads did not have published AdMeter scores for some reason, and will therefore not be included in subsequent comparison analyses.

Results and Discussion

Fifty-four of 84 participants (64%) reported having watched Super Bowl XL. However, only 18 of those 54 (33%) correctly recalled the two teams who played in the game (Pittsburgh Steelers and Seattle Seahawks) and that the Steelers won the game. By contrast, 25 out of the 54 participants (46%) recognized the "magic fridge" ad as a Budweiser commercial.

There were no differences in recall or recognition based on the ordering of the experimental stimuli, although we did observe a slight but non-significant lift in performance for the textual descriptions over the screen shots. The number of participants who reported pure recall of spots and their correct brand name is small (25% of participants, with 18 spots total). In contrast, a substantial number of participants reported recognition memory of spots and were able to correctly recall the associated brand. Our analyses will therefore focus on the percentage of participants who correctly identified the brand associated with a prompted spot (the Likert scale provided no additional reliable information). Table 2 lists all AdMeter scores, Brand CogScores, and percent Brand Correct (percent of participants that correctly identified the brand associated with the spot).

CogScore vs. AdMeter

Our first step is to test the adequacy of "liking" as a meaningful measure of advertising success. The correlation between the 21 AdMeter scores and Brand Correct is significant ($r = +.55$, $p < .02$, two-tails), indicating that the likability of an ad does indeed influence the probability that its brand will be remembered.

The CogScore model improves on this measure considerably: Brand CogScore is a better predictor of how memorable an ad is, accounting for 19% more of the variance ($r = +.70$, $p < .01$). This is a substantial improvement in understanding the true effectiveness of an ad, and the analysis, although it requires a relatively rare type of expertise, is far less costly and time-consuming than that of collecting the opinions of a representative sample and providing incentives for those opinions. (The correlation between CogScore and Brand Correct is similarly significant when the four spots without AdMeter scores are included in the analysis: $r = +.65$, $p < .01$).

There is another story in this data, however. As can be seen in Table 2, this analysis includes 5 spots just for Budweiser. Because Bud is the major sponsor of the Super Bowl and has such enormous presence throughout the broadcast, the noise around the recall for any Bud spot will be far greater than that for other brands. Merely

Table 2. Ads and scores used in experiment.

Brand CogScore	% Brand Correct	AdMeter score	Spot	Brand	USA Today Spot Description
1.58	1.85%	5.95	spock	Aleve	Leonard Nimoy's hand pain gets in way of an appearance.
1.50	0.00%	7.80	crash paddles	Ameriquest	Patient's family walks in on medical misunderstanding.
1.50	0.00%	7.67	turbulence	Ameriquest	Plane turbulence creates awkward situation.
2.50	46.30%	8.39	magic fridge	Bud Light	A secret fridge stocks Bud Light.
2.50	31.48%	7.82	roof	Bud Light	Men pretend to work on rooftops, but relax instead.
2.25	24.07%	7.69	office	Bud Light	Office manager motivates employees with hidden bottles.
2.33	22.22%	7.64	grizzly	Bud Light	Man saves himself from scary bear.
1.92	20.37%	7.81	streaker	Budweiser	Sheep streaks at big game.
2.83	24.07%	6.24	whopperettes	Burger King	Whopperettes sing and dance.
1.50	0.00%	4.96	catwalk	Cadillac	New Escalade truck poses on the catwalk as fashion model.
1.92	0.00%	6.28	stuntmen	Degree for Men	People living on the edge in Stunt City.
2.33	14.81%	6.96	freckles	Dove	Dove promotes self-esteem fund for young girls.
2.42	22.22%	7.95	caveman	FedEx	Cave man uses prehistoric overnight delivery.
1.83	1.85%	6.40	kermit	Ford Motor	Kermit says green is good when he sees Escape hybrid.
1.67	3.70%	6.53	mudflap	Honda	Ad for Ridgeline pickup brings trucking icons to life.
2.50	7.41%	6.37	hummer	Hummer	Monsters marry and have a Hummer baby.
1.58	7.41%	6.59	macgyver	MasterCard	MacGyver buys lifesaving gadgets with MasterCard.
1.67	0.00%	7.03	touch football	Michelob	Touch football gets ugly.
1.17	5.56%	n/a	swing	Nationwide	Man pushes little son on swing, and son returns as big teen.
1.33	3.70%	6.73	fabio	Nationwide	Life moves fast for romance novel cover star Fabio.
2.17	0.00%	6.82	pirate	Sharpie	Pirate mascot uses retractable Sharpie to sign autographs.
1.33	12.96%	n/a	locker room	Sprint	Man in locker room demonstrates "crime deterrent" phone.
1.75	22.22%	6.16	ocean	Toyota	Tacoma pickup rides out the incoming tide.
1.50	9.26%	n/a	backyard	Vault	Man turns his backyard into football for son.
1.50	7.41%	n/a	scarecrow	Vault	Man builds uber-scarecrow that wreaks havoc.

recognizing the category of a Bud spot (i.e., "beer") should lead to a very high probability of identifying the correct brand, if only via educated guess. For these Brand Correct, while the CogScore model accounts for 41% of the Brand Correct variance (CogScore: $r = +.64$, $p < .01$; AdMeter: $r = +.08$, $n.s.$). The Super Bowl saliency for Bud can explain the Bud-specific predictive success of AdMeter, but the utter lack of predictability for non-Bud spots begs the question of whether likability can truly predict brand memorability at all. This same test lends strong support to the CogScore model, which retains substantial predictive value.

Brand Fuzziness

When a participant attempted to name a brand but got it wrong, they would often name a competing product, at least getting the category correct. We call the difference between brand corrects and category corrects "Brand Fuzziness." For example, *caveman* (done by FedEx) was sometimes confused with UPS (a competing package delivery service). Of the full set of 25 ads, there were six for which the Brand Fuzziness was over .50 (that is, over 50% of the time the viewer thought the ad was for a

reasons, we examined the data without the 5 Bud ads. When the primary Super Bowl sponsor is removed from the analyses, the AdMeter scores have no correlation to competing product): *locker room*, *swing*, *touch football*, *mudflap*, *crash paddles*, and *catwalk* (listed in increasing order of Brand Fuzziness). Brand Fuzziness should provide a valid test for the CogScore model, as CogScores should serve as an indicator of how well a brand is connected to its spot, and therefore have an inverse relationship to Brand Fuzziness. In fact, Brand CogScore is a significant inverse predictor of Brand Fuzziness ($r = -.679$, $p < .01$, two-tails).

Gender

We separately coded male and female CogScores due to the potential processing and content knowledge differences described previously. The resulting analysis further demonstrates the predictive power of the CogScore model, which correlates significantly with gender-specific Brand Correct ($p < .01$), and provides a slightly better fit for males ($r = +.74$; $r = +.59$). While we do not know the demographics of the AdMeter sample, it is possible that it was skewed to men and that our

AdMeter-derived IA scores are partly responsible for CogScore's lower predictability for women.

For a closer look at the ads recalled by men vs. women, we examined only the nine spots for which at least 10% of the sample got the brand correct, to avoid coincidental results. Though only marginally significant, (t(48) = 1.66, p < .1), males correctly identified more brands (M = 3.96, SD = 4.22) on average than females (M = 2.28, SD = 2.79). While men did appear to be paying more attention to the game - they were more likely to remember the teams involved (48% v. 31%) and the winner of the game (64% v. 38%) – the explanation for their greater recall of the spots is more likely due to a deliberate attempt on the part of the advertisers to target men. Indeed, the one spot out of these 9 that was better recalled by women was for Dove (female CogScore: 3.00, male CogScore: 1.83) and was presumably designed to target the female audience rather than the male.

Conclusions

Memory of an ad, and of its brand in particular, should be a criterion for assessing ad effectiveness, as it should presumably be related to the economic success of an ad. The CogScore model provides a strong measure of future memorability for an ad's brand, and performs significantly better than a measure of "liking". We do not claim that "liking" is an unimportant factor, nor do we claim that "liking" can be approximated via a cognitive model. Certainly a consumer must like a product in order to want to buy it. Rather, we claim that "liking" is not sufficient. The CogScore model, in fact, provides a far more descriptive and predictive assessment of ad memorability, and provides a more detailed explanation for why or why not an ad may be working. Indeed, a follow-up examination of the power of each of the six cognitive principles should help to further develop the value of the model. In addition, future research to examine the link between brand memorability and inclusion in purchase "consideration sets" would test whether CogScore is predictive of an ad's ultimate economic effectiveness. In the meantime, these results suggest that the ad industry would do well to pay heed to the lessons of cognitive science.

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