Office of Inspector General | United States Postal Service

RARC Report

Using Mail to Build Brands

Report Number RARC-WP-18-013 | September 5, 2018

Table of Contents

Executive Summary

Think of brands that define our understanding of the product. Brands like Kleenex, Post-It, and Popsicle are so embedded in our culture that they have entered our lexicon and become synonymous with a product category. But how did they get there? Companies devote a significant portion of their annual marketing budgets to get and keep their product at the front of your mind.

The rise of digital advertising is disrupting the traditional brand marketing paradigm, and branding is now, more than ever, an omnichannel endeavor. While mail has historically been overlooked for brand building, two previous studies by the U.S. Postal Service Office of Inspector General (OIG) pointed to its potential effectiveness, particularly because of its lasting impression and ability to make an emotional connection with consumers. To further this research, the OIG partnered with the Center for Neural Decision Making at Temple University's Fox School of Business to conduct a neuromarketing research study that:

1. Assessed the relative effectiveness of digital and physical formats for brand advertising, referred to as "ad format," and
2. Assessed the relative effectiveness of different brand advertising strategies — functional, emotional, or metaphorical — referred to as "ad category."

We found that physical ads outperformed digital ads in several brand marketing measures, such as brand name recall and brand association. Digital ads, on the other hand, were processed faster than physical ads — an advantage with limited audience attention. We also found that ads designed to elicit an emotional response or that used metaphorical symbols of the brand's value were generally a more effective branding tool than ads that described a product's function. Taken together, these findings demonstrate the power of physical ads for many brand advertising objectives. Now the challenge for the Postal Service and the mailing industry will be to communicate these findings into a compelling story that drives advertisers to consider mail as a resource for branding.

Highlights

- Physical ads outperformed digital ads in brand marketing measures such as brand recall and brand association.
- Digital ads were processed faster than physical ads.
- Regardless of format, participants remembered ads that elicited an emotional response or used metaphors to compare the product to a symbol of the brand's value better than ads that illustrated a product's function.

*References to specific brands or companies in this white paper do not constitute or imply an endorsement by the U.S. Postal Service Office of Inspector General or the United States government.

OIG Synopsis

Introduction

Are you willing to stand in line for a $4.00 cup of gourmet coffee rather than grabbing the quick $1.00 cup from a convenience store? Sure, it might taste a smidgeon better, but the gourmet roaster's branding may also influence your decision making. A strong corporate identity attracts and retains customers, and a positive brand perception translates into big bucks. Customer loyalty to a brand can lead to repeat purchases, inspire word-of-mouth advertising, and foster resilience in an era where social media allows news — particularly bad news — to travel quickly.

A brand stands for the entirety of the company's attributes, and companies devote enormous amounts of money and attention to crafting a distinctive corporate personality in the minds of consumers. Brand advertising shows consumers an idealized lifestyle, location, or emotion that companies hope you will associate with their name or product. Successful branding evokes positive thoughts and feelings when a consumer sees the company's name or logo.

Advertisers and agencies conduct brand marketing in a variety of media. Television commercials, billboards, glossy ads in magazines, and, recently, digital channels all trumpet brands, trying to raise consumer awareness and interest in a particular product or company. Marketing Mail, on the other hand, is often considered only for direct response, a type of advertising that asks the consumer to take an action, like apply for a credit card. But could mail be just as effective as other branding media?

To investigate if physical media, such as mail, is different from digital media when it comes to branding efficacy, the U.S. Postal Service Office of Inspector General (OIG) partnered with the Center for Neural Decision Making (CNDM) at Temple University's Fox School of Business to conduct a neuromarketing research study. The research builds on previous findings from our two prior neuromarketing studies.

Building on Prior Research

The OIG's first neuromarketing study, *Enhancing the Value of Mail: The Human Response*, found that physical ads were more quickly and confidently remembered. Brain scans revealed heightened neural activity when evaluating products and services featured in physical ads relative to digital ads, demonstrating stronger subjective value and desirability. At the same time, participants processed digital ads faster, meaning that the content of a digital ad was understood more quickly.

The second study, *Tuned In: The Brain's Response to Ad Sequencing* again found that physical ads were particularly effective for eliciting memories of ads. The study tested sequences of ads, finding that physical ads, shown twice in a sequence, led to better memory and higher subjective value than any other tested sequence. In particular, the results also hinted that physical advertising was effective for creating strong memories of the brand associated with an ad.

These studies, along with similar studies conducted by Canada Post, Royal Mail, and others, have helped advertisers understand the value of mail.[1] But given the upfront investment for print ads, Marketing Mail is often considered only as a direct response tool because of its proven ability to drive an action or purchase. This study was designed to test mail's influence on brand advertising objectives and understand its effectiveness in a role beyond coupons and sales flyers. Can mail also support a company's brand strategy? Specifically, do consumers react differently to branding material if viewed in physical versus digital format? And does the ad category type make a difference for branding objectives? The OIG's new study sheds light on these questions.

1 Royal Mail commissioned two studies examining how participants processed physical media relative to digital counterparts. The second demonstrated the power of mail as an advertising medium compared to email and television, in terms of engagement, emotional intensity, and memory. See Millward Brown, *Using Neuroscience to Understand the Role of Direct Mail*, 2009, http://www.millwardbrown.com/docs/default-source/insight-documents/case-studies/MillwardBrown_ CaseStudy_Neuroscience.pdf and Royal Mail, *The Private Life of Mail*, February 2015, http://www.mailmen.co.uk/campaigns/the-private-life-of-mail. In 2015 and 2016, Canada Post also examined the effectiveness of mail on a neurological level. The 2016 paper examined the sequence effects of mail with various digital media. See Canada Post, *A Bias for Action*, July 31, 2015, https://www.canadapost.ca/assets/pdf/blogs/CPC_Neuroscience_EN_150717.pdf and Canada Post, *Connecting for Action*, September 2016, https://www.canadapost.ca/web/en/pages/dm/whitepaper.page?ecid=murl|pdn|lb|31.

Research Objectives

This study had two primary research objectives:

1. Assess the relative effectiveness of digital and physical formats for brand advertising, referred to as "ad format," and
2. Assess the relative effectiveness of different brand advertising strategies — functional, emotional, or metaphorical — referred to as "ad category."

The research team found that physical ads outperformed digital ads in several brand marketing measures, such as brand name recall and brand association. Digital ads, on the other hand, were processed faster than physical ads — an advantage given limited audience attention spans. We also found that ads designed to elicit an emotional response or that used metaphorical symbols of the brand's value to the customer were more effective in some brand marketing measures than ads that merely described the functions of a product. Taken together, these findings give the Postal Service scientific evidence of the power of physical ads and insights on how to design the most effective campaign for brand advertising objectives. The challenge will be for the Postal Service to translate these findings into a compelling story to help companies and advertising agencies to consider mail as a resource for branding.

Methodology

This study was conducted in Spring 2018 and included 30 participants with a mean age of 27 years old.[2] Researchers recruited Millennial and younger Gen X participants because of their adoption and comfort with digital media. Similar to previous OIG neuromarketing studies, the study used self-reported measures, behavioral responses, and functional Magnetic Resonance Imaging (fMRI) technology. The fMRI analysis allowed the researchers to measure brain activity while participants viewed and answered questions regarding advertising stimuli. This technique indicated the extent to which advertising stimuli were effective on a subconscious level. [3] The self-reported measures and behavioral tests were conducted to reinforce findings from the fMRI, and provide additional insight into the effectiveness of digital versus physical advertising.[4]

To focus the study on brand advertising, the researchers selected 60 ads designed to promote the awareness and heighten desirability of a product or brand. The ads were further classified into one of three distinct design categories, with 20 ads assigned to each category: functional, emotional, and metaphorical. A pretest confirmed that each ad fit within its appropriately assigned category. See Table 1 for a description of these categories.

Table 1: Ad Categories

Category	Example
Functional ads often feature an image of the product and provide information about its benefits.	
Emotional ads promote the brand and product by specifically and intensely appealing to consumers' emotions.	
Metaphorical ads compare the product to something unrelated but symbolic of the brand's value to the customer.	

Note: Example ads are for Propel water, created by Fathom Communications (functional); Pedigree PetFoods, created by BBDO Chile (emotional); and Cruise Ship Centers in Canada, created by Grey Toronto (metaphorical).

Source: OIG analysis.

2 The typical sample size for an fMRI study of this type is between 25 and 30 people. With each participant viewing up to 60 ads, there are sufficient observations to make statistically significant conclusions.

3 Researchers use non-invasive fMRI to track changes in blood oxygen during cognitive tests. This shows local brain activity that can serve as an indirect measure of memory. For a more thorough discussion of the use of fMRI in the OIG's prior neuromarketing experiments, see: U.S. Postal Service Office of Inspector General, *Enhancing the Value of Mail: The Human Response*, Report No. RARC-WP-15-012, June 5, 2015, https://www.uspsoig.gov/sites/default/files/document-library-files/2015/rarc-wp-15-012.pdf, p. 17.

4 See Session 1 Measures and Tasks in the CNDM report for a description of the self-reported measures and behavioral tests.

A Two-Phased Experiment

The study was structured in two phases, which were conducted approximately one week apart.

Phase 1: Initial Exposure

Study participants viewed 60 ads split into two sets: 30 physical ads and 30 digital ads. Researchers evenly counterbalanced the ads and sequence among participants so that each ad was equally tested in both formats, with half of the participants viewing the physical ads first and half viewing them last. The physical ads were printed on high-quality, large postcards and the digital ads were viewed on a Microsoft Surface tablet.[5]

After reviewing a full set of ads, researchers asked participants to: remember which brands they had seen (brand recall); match a slogan to a brand (brand association); and indicate whether certain images were from ads they had just seen versus competitors' ads (brand discrimination). The time participants spent viewing each ad was measured with special eyewear.[6] Participants completed a survey about their opinion toward the brands (brand attitude) and ranked brands on a scale of liking and disliking (brand affinity). Table 2 describes Phase 1 tasks and what they measured.

Table 2: Phase 1 Tasks

Measurement	Task Description
Brand Recall	Participants listed all the brands that they could remember from the sets they had just viewed. This test was performed once after the set of physical ads and once after the set of digital ads (or vice versa, depending on the sequence).
Brand Message Association	For each format, participants were shown six messages or slogans from the ads they had viewed and were asked to name the brand associated with each message.
Brand Discrimination	For 10 different ads (five from print and five from digital), participants viewed logos, messages, and visual snippets. Foils were included (snippets from competitors' ads), and participants had to identify as quickly as possible whether the stimulus image was a match for the brand or not.
Brand Affinity	Participants positioned 12 brands (six from print and six from digital) along a scale of how much they like or dislike the brand.
Brand Attitude	For the 26 brands not used in previous tasks, participants answered questions on general attitude, such as confidence in the brand, willingness to pay more for a brand, and likelihood to recommend to friend.

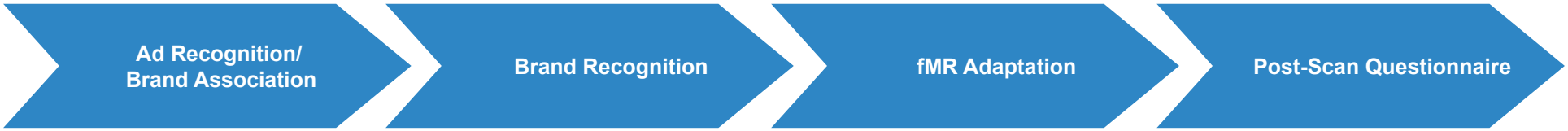
Source: OIG analysis.

5 See CNDM Appendix B.
6 See Methods section of CNDM report for a description of the use of glasses to record ad exposure duration.

Phase 2: Lab Testing

In Phase 2, researchers asked participants to recall ads they had seen the previous week. They used fMRI to measure brain activations while participants performed the tasks to reveal differences at the subconscious, neurological level. Participants were also tested on ad recollections outside of the fMRI. Table 3 summarizes the Phase 2 tasks and what they measured.[7]

Table 3: Phase 2 Tasks



Measurement	Task Description
Ad Recognition/Brand Association	Participants indicated whether selected snippets were from ads viewed in Phase 1. If participants correctly answered yes, they were asked if they had seen the ad in physical or digital format and what brand was associated with the ad.
Brand Recognition	Participants viewed brand names and were asked to remember as many details about the ad as possible in five seconds. Then, participants rated the vividness of their recollection.
fMR Adaptation	Participants were given a product category (e.g., headphone) and then were shown a brand name from that category (e.g., Bose). Participants indicated if they had seen an ad for that brand in Phase 1. In control trials, participants were shown unrelated product categories and brand names. Researchers measured brain activity to see the strength of subconscious brand associations.
Post-Scan Questionnaire	A post-scan questionnaire further tested brands recalled in the Brand Recognition task. Participants agreed or disagreed with seven statements about design elements of the recalled ad, such as content and color.

Source: OIG analysis.

Format Findings: Physical vs. Digital

The physical format outperformed digital in many brand marketing measures, although in others there was no significant difference between the two formats. The findings largely corroborate and expand upon the findings from the OIG's first two studies. This research indicates that physical media, including mail, may offer unique value for branding objectives relative to digital media.

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On the following page, Table 4 highlights significant differences in format. These include:

7 For a more detailed discussion of the measures used in Phase 2 see Session 2 Tasks and Measures in the CNDM report. See fMR Adaptation Task for an explanation of this study's fMR adaptation analysis. This study's techniques were derived from the methodology described in Kalanit Grill-Spector and Rafael Malach, "fMR-adaptation: A Tool for Studying the Functional Properties of Human Cortical Neurons," *Acta Psychologica*, May 2001, pp. 293-321.

- **Participants recognized a greater proportion of ads and brands from the physical format than the digital format.** Soon after initial exposure to the ads in Phase 1, participants were better able to recall more brands from physical ads than digital ads. During Phase 2, participants recognized a greater proportion of snippets and accurately identified a greater proportion of brand names from physical ads than from digital ads. These results indicate print is powerful for remembering both ads and brands associated with the ads.
- **Brand associations were stronger in the physical format.** The fMRI scans measured higher activation in the hippocampal regions of the brain when participants viewed snippets of the ads from the physical format, providing a neurological indicator of better memory retrieval.[8] In addition, the fMRI scans revealed greater activation in the frontal and insular regions for physical ads, which could indicate better retrieval of contextual information related to the ad snippets, such as the brand names, the products featured in the ad, or other ad messages. Importantly, the fMR adaptation test indicated a stronger association between the brand and the product category for physical ads compared to digital ads.[9]
- **Digital ads were processed more quickly.** During Phase 1, participants voluntarily spent more time reviewing physical ads than digital ads, consistent with observations from the OIG's first neuromarketing study. Interestingly, when controlling for the difference in the amount of time participants spent viewing physical versus digital ads in Phase 1, results were mixed on whether exposure time influenced other measures. Faster processing of digital ads was not associated with any disadvantages. Thus, with limited time and consumer attention, companies may be able to communicate a message more quickly with digital ads. On the other hand, exposure time was a significant predictor of snippet recognition accuracy and a consumer's ability to associate a message with a brand. This means that when a consumer voluntarily spends more time with physical ads — for example, when perusing a high-end mailed ad for a cruise line — it pays off in later memory measures.
- **Several tasks indicated no significant difference between formats.** This was particularly true in Phase 1, when results were statistically similar for brand measures like association, discrimination, and affinity.

Table 4: Summary of Significant Differences in Format from Phases 1 and 2

Measurement	Format	
	Physical	Digital
Brand Recall Proportion of brands correctly recalled.	✓	
Ad Recognition (Behavioral) Proportion of ad snippets accurately recognized.	✓	
Ad Recognition (fMRI) Activation in the frontal, insular, and hippocampal regions.	✓	
Brand Association (Behavioral) Proportion of brand names accurately associated with ads.	✓	
Brand Association (fMR adaptation) Activation in parietal cortex, prefrontal cortex, and anterior cingulate cortex when retrieving information about the brand when viewing a product category during fMR adaptation task.	✓	
Brand Recognition – Format Context Proportion of ads identified in the correct format from Phase 1.	✓	
Ad Exposure Duration* Time spent viewing ad.	✓ (More)	✓ (Less)

Note: There were no significant differences for several measures. For tests conducted immediately after exposure during Phase 1, there were no significant differences in terms of message association, brand discrimination, brand affinity, or brand attitude. During Phase 2, there were no significant differences in terms of brand vividness and the post-scan questionnaire identification of ad details.

In Phase 2, the proportion of brand names accurately associated with ads was marginally significant.

*Participants spent more time reviewing printed ads than digital ads. However, results were mixed on whether increased exposure time influenced other measures. Exposure time was a significant predictor of snippet recognition accuracy and a consumer's ability to associate a message with a brand, yet there were no disadvantages to faster processing of digital ads, so the shortened exposure could be advantageous when attention spans are limited.

Source: OIG analysis.

8 Several studies have associated the hippocampus with memory formation and retrieval.
9 For a more detailed discussion of the fMRI results, see fMRI Results of Ad Recognition in the CNDM report.

Category Findings: Functional, Emotional, and Metaphorical

We found the ad category — whether it is functional, emotional, or metaphorical — also matters for branding. These categories are important for advertisers' campaign strategies, and the Postal Service can use insights into their effectiveness to communicate how a mailpiece's design influences branding. In many measures, the metaphorical and emotional ads performed better than the functional ads, regardless of the ad format.[10] Key findings regarding the ad categories are:

Ad category findings can help the Postal Service communicate to advertisers the most effective brand strategy for mail campaigns.

- **Participants recognized more ads and brand names from emotional and metaphorical ads than from functional ads.** After initial exposure in Phase 1, participants recalled emotional and metaphorical ads better than functional ads and could more accurately discriminate between new metaphorical and emotional ads versus ones previously seen. Likewise, during Phase 2, participants remembered more snippets from the metaphorical and emotional ads, and they more accurately associated the brand names with those ads compared with functional ads.
- **Participants better recognized specific details about the functional and metaphorical ads.** In the Phase 2, post-scan questionnaire, participants remembered more specific details about functional and metaphorical ads than emotional ads. This distinction may relate to the different objectives of functional, emotional, and metaphorical advertising. Because emotional appeals attempt to raise consumers' involvement with the ad without requiring significant cognitive effort, it is not surprising that snippets and brand names were remembered while specific details were not. On the other hand, functional ads focus consumer attention on specific attributes and features of the brand and product, which could explain why participants remembered details from these ads.
- **Metaphorical ads performed well across all measures of brand recall and identification of details.** It is noteworthy that metaphorical ads elicited a lasting memory of ad snippets, brand names, and specific attributes of the ad designs. The fMRI scans also revealed greater activity for metaphorical ads in the frontal and insular regions during the ad recognition test, indicating stronger memory associations on a neurological level. The CNDM researchers speculate that metaphorical ads force consumers to process information more deeply, which may increase the ads' effectiveness across measures of ad and brand recall.

Ad category findings can help advertisers identify what types of ads will be more effective in accomplishing their campaign goals. The results indicate that, overall, emotional and metaphorical ads could be the most effective for creating a lasting brand impression during an ad campaign.

Areas for Future Research

Building upon its body of research, the OIG is conducting a follow-up effort to explore how age affects consumers' perception of advertising media. Many companies assume that digital natives are best reached in digital form, but what does the data say? Using techniques similar to this study, we will measure whether different generations respond similarly to physical versus digital ads. The Postal Service and the mailing community could use these insights to help advertisers cater their media mix to distinct age segments.

10 Ad category findings are valid for both physical and digital ads. Researchers performed interaction tests to separate the effects of category from format, but they did not uncover any differences in category findings between physical and digital formats.

In addition to this ongoing effort, other opportunities to investigate the value of mail and optimize mailpiece effectiveness include:

- **Field research on how consumers use media at home.** Our body of work shows strong evidence that physical media is particularly powerful at creating a lasting impression, while digital media is processed more quickly. However, the work has been mostly limited to the lab setting. Future research could analyze real-world ad campaigns that use physical and digital media, to examine the importance of context for consumer engagement. For instance, ethnographic research could investigate how much time consumers typically spend with different types of digital and physical media, and how differences in exposure time influence ad effectiveness.
- **Intra-format differences.** Future research could test differences in the effectiveness of different types of print (e.g., flyers, catalogs, magazines, etc.) and digital (e.g., email, mobile, display, etc.) advertising media.
- **Case studies to explore context and campaign objective effectiveness.** Researchers could investigate the relative effectiveness of digital and physical media in different marketing contexts. For instance, does one format outperform the other for marketing campaigns across industries, for different types of products, and for different target customers?
- **The importance of other design elements.** To build upon this project's investigation of ad categories, research could investigate how elements like color, size, and personalization and the effect of touch interact with ad category and format.
- **Meeting the wants and needs of brand marketers.** In-depth interviews and focus groups with marketing decision makers could help the Postal Service communicate the value of mail with brand advertisers and advertising agencies. By communicating key insights through the lens of marketers' needs and wants, the Postal Service can help promote more effective, relevant Marketing Mail.

Conclusion

This study builds on the OIG's body of work and explores how physical and digital ads perform when it comes to brand marketing. We found that physical media are more powerful for eliciting lasting recall of brand names and creating subconscious associations between product categories and specific brands. This means that physical media, including mail, may offer unique value for branding objectives. Notably, however, the study found that digital media is processed more quickly, which could be crucial depending on budgetary considerations and the expected attention of the target customer. Return on investment will drive whether digital, physical, or a combination of media makes the most sense for marketers. For example, branded mailpieces might make sense for high-engagement, high-dollar items — such as automobiles, jewelry, or travel packages — but digital branding strategies might be more effective for brands with lower-engagement, less-expensive products.

The study also sheds light on the importance of ad category — functional, emotional, and metaphorical — for both physical and digital ads. Emotional and metaphorical outperformed functional designs in many measures crucial to brand marketers, including brand recall and brand discrimination. Metaphorical ads, in particular, fostered lasting memories of both brands and details of ad designs. These ad category findings are relevant for brand marketers' strategic objectives and can help the Postal Service guide advertisers in creating effective mailpiece designs for their specific objective.

Taken together, this research explores how media format and ad category are important for branding effectiveness. Ultimately, the right format and design for an ad depends on individual campaign factors, such as the ad's objective, the product category, and where the audience is in the customer journey. Still, the Postal Service could consider taking an active role and work with advertisers and agencies to promote mail's benefits in terms of branding. There would surely be hurdles to overcome, including countering preconceived notions that mail is outdated or only useful for direct response messaging. Nevertheless, this body of research indicates that mail could be effective as a branding tool in an omnichannel world.

CNDM Report

RELATIVE EFFECTIVENESS OF PHYSICAL VERSUS DIGITAL ADVERTISING ON BRAND MARKETING

Marketers are continuously seeking ways to enhance the value of their brands using different types of marketing communications and advertisements. In two earlier studies — "Enhancing the Value of Mail: The Human Response" and "Understanding How to Optimize a Mixed-Media Campaign" — we demonstrated how the use of neurophysiological tools offer insights beyond traditional behavioral and self-reported measures to better understand the value and uniqueness of physical and digital mail. In this study, we build on these findings further by exploring the relative effectiveness of physical and digital communications in brand advertising and brand marketing. Specifically, we seek to elucidate the role of physical (print) and digital (electronic) formats on key measures of brand marketing, namely brand recognition, brand recall, and brand attitudes using a multi-methodological approach (self report, behavioral, and neuroscience). Self-reported measures include ad liking, ad relevance, brand familiarity, purchase intention, and brand attitudes (attitudinal equity, attitudinal loyalty, brand awareness, brand favorability, brand trust, and brand loyalty). Behavioral responses include the performance measures from different tasks associated with brand marketing (brand discrimination, brand recall, and message association). Finally, we capture implicit and explicit memory responses in the brain a week after exposure, using functional Magnetic Resonance Imaging (fMRI). In sum, using a multi-methodological framework, we seek to prescribe how marketers and advertisers should effectively use physical and digital communications in their advertising campaigns to enhance brand effectiveness.

Besides understanding the effectiveness of different formats (physical and digital) in brand marketing, the second goal of this study is to explore how advertising categories (functional, emotional, and metaphorical) affect brand marketing and the other focal measures of advertising effectiveness. Functional and emotional advertisements are commonly used in practice, though there has been an increase in the use of rhetorical and metaphorical ads recently. In this study, we seek to examine the relative effectiveness of these different types of ads. A functional advertisement focuses on the

main product or service, highlights some of its key features, emphasizes its superiority, and typically has a picture of the product or service. In general, functional ads focus on registering the attributes and features in consumers' mind. On the other hand, an emotional ad seeks to appeal to consumers' emotions without necessarily highlighting the actual product or service. Therefore, emotional ads are better suited at raising consumers' involvement with the ad without requiring substantial cognitive processing as functional ads typically do[1]. However, emotions are normally transient and context-dependent, and they are not expected to last long[2,3]. Therefore, we hypothesize consumers will probably not remember the details of emotional ads they have seen, or even the brand name, after a long delay. In contrast, metaphorical advertisements invite a comparison between two objects by suggesting that one object is similar to another, although they come from different domains. To "resolve" an advertising metaphor, consumers must draw inferences and find the similarities between the two scenarios. Therefore, consumers will intrinsically have a higher motivation to process the information in metaphorical ads, and thus spend more time thinking about the ads[4]. Accordingly, we expect consumers to have better brand memory and attitude for metaphorical ads compared to functional and emotional ads.

In our earlier work, neurophysiological measures showed that digital media was associated with higher cognitive attention to the advertised stimuli, while physical media was associated with better memory and recall, higher emotional response, and higher desirability and purchase intentions for the focal advertised product[5]. We also found that when participants were exposed to ads in the same medium (unimodal) twice, they were more likely to remember the snippets[6] from the original

1 Matthes, J., Wonneberger, A., & Schmuck, D. (2014). Consumers' green involvement and the persuasive effects of emotional versus functional ads. Journal of Business Research, 67(9), 1885-1893.

2 Andrade, E. B., & Ariely, D. (2009). The enduring impact of transient emotions on decision making. Organizational Behavior and Human Decision Processes, 109(1), 1-8.

3 Isen, A. M., Clark, M., & Schwartz, M. F. (1976). Duration of the effect of good mood on helping: "Footprints on the sands of time." Journal of personality and social psychology, 34(3), 385.

4 Karmarkar, U. R., & Tormala, Z. L. (2009). Believe me, I have no idea what I'm talking about: The effects of source certainty on consumer involvement and persuasion. Journal of Consumer Research, 36(6), 1033-1049.

5 U.S. Postal Service Office of Inspector General, *Enhancing the Value of Mail: The Human Response*, Report No. RARC-WP-15-012, June 5, 2015, https://www.uspsoig.gov/sites/default/files/document-library-files/2015/rarc-wp-15-012.pdf.

6 A snippet refers to an extract from an advertisement, like a face or a text or a scene.

advertisement better, an effect that was mostly driven by the physical sequence[7]. Based on these findings, we have a solid understanding of the role of advertising format (physical versus digital) on recognition, thus giving us an initial starting point for capturing effects related to brand recognition and brand awareness. Extending these two studies, in the current study, we evaluate the complementarity of these two formats on brand effectiveness across different ad categories (functional, emotional, and metaphorical), given the advantage of digital media in drawing consumer attention to brands and the benefits of physical media in soliciting higher memory recall and creating strong emotional responses to the focal brand. Specifically, we use a combination of behavioral and neurophysiological methods to understand how representation of brands can be influenced and modulated by marketing communications in different formats. We also seek to further elucidate the mechanisms underlying potential differences in brand recognition and attitudes across different ad categories (functional, emotional, and metaphorical).

METHODS

A total of 30 participants participated in this study[8]. All participants were screened to make sure they were eligible for an fMRI scan, such as having no piercings or medical implants. They also completed a questionnaire to measure their attitudes towards advertisement in general, as well as their relative preference for physical versus digital communications.

7 U.S. Postal Service Office of Inspector General, *Tuned In: The Brain's Response to Ad Sequencing*, Report No. RARC-WP-17-004, February 13, 2017, https://www.uspsoig.gov/sites/default/files/document-library-files/2017/RARC-WP-17-004.pdf.

8 Our participants included 16 females and 14 males. The study group included 25 Millennials between ages 18 and 31 and five Gen X between ages 37 and 47. Their mean age was 27 years.

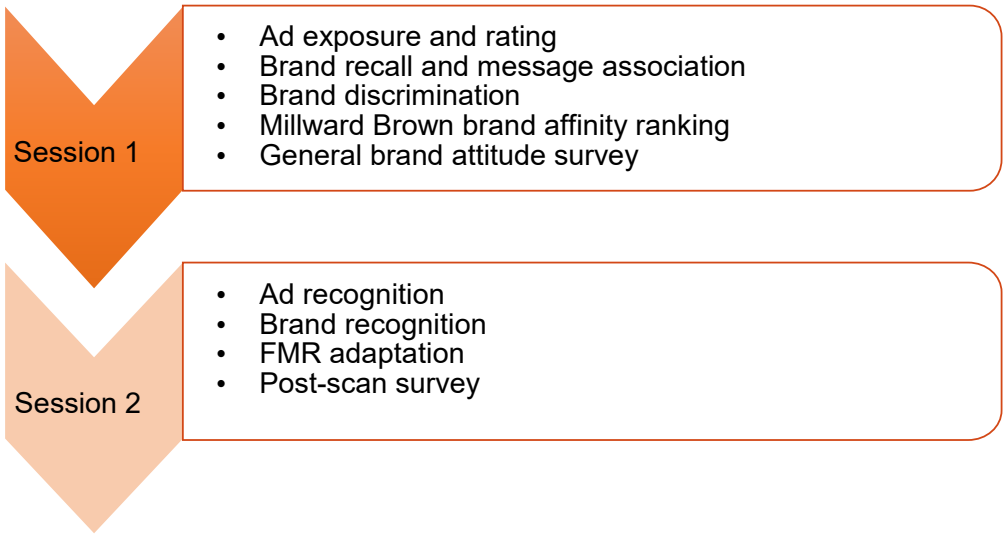


Figure 1: Protocol Summary

Participants came to the lab for Session 1 one week after screening. In this session, participants viewed 60 advertisements in two different formats (30 physical and 30 digital ads). The ads were selected equally from the three different categories (functional, emotional, and metaphorical). A total of 98 advertisements across the different categories were pretested using an independent sample of 119 participants in Amazon Mechanical Turk, and the final set of 60 advertisements were chosen based on the findings from the pretest (details about the pre-test are summarized in Appendix A). Each participant was randomly assigned to one of two groups: physical-first or digital-first. The ads were split into two sets (Set A and Set B) of 30 ads at the beginning of the session. Each ad was available in either physical or digital format. Physical ads were printed on oversized post cards, similar to previous OIG-Temple University studies. Digital ads were presented on a Microsoft Surface tablet. Appendix B shows examples of physical and digital ads. For the physical-first group, participants saw a set of 30 physical ads first, followed by a second set of 30 digital ads. The digital-first group saw digital ads first, followed by physical ads. Within each group, half the participants saw Set A in digital and Set B in physical and vice versa. The order of appearance of the ads was counter-balanced across participants. We also recorded the exposure using a camera mounted on glasses that

each participant was asked to wear during the experiment. These videos were then used to calculate the exposure duration for each of the physical ads in the study. Exposure times for digital ads were estimated automatically using the time markers in the tablet. After exposure to the ads, participants also completed a series of tasks as detailed in Figure 1. Session 1 lasted between 90 to 120 minutes. All participants returned approximately a week later for Session 2, where they were administered a surprise memory test for the contents of the ads, while being scanned using fMRI, in addition to other brand memory tasks. They also completed a self-reported survey after the fMRI scanning. Session 2 lasted approximately 75 minutes.

Session 1 Measures and Tasks

Ad Exposure and Rating Task

During exposure to the ads in Session 1, participants were instructed to review all ads in detail, and were informed that they may be asked questions about each of the ads subsequently. They first viewed each ad one by one in each block (physical or digital). After viewing each ad, they were specifically asked to rate the degree to which they agreed with the following statements on a 1 to 7 scale:

(1) I like this ad.

(2) This ad is relevant to me.

(3) I am familiar with the brand featured in the ad.

(4) I am likely to purchase the product/service in the ad.

For physical ads, participants wrote their responses on a physical booklet provided to them. For digital ads, they answered the questions on the same tablet screen on which the digital ads were presented to them.

Brand Recall and Message Association Tasks

At the end of each block, they had a short break (approximately 1 minute). Participants then performed a simple brand recall task for the ads featured in the preceding block. We obtained this

measure separately for each block to make sure there was no bias in the brand recall for the more recent format. They were asked to recall as many brands as possible for the ads they had just seen. For the digital-first condition, they typed the brands on the tablet using an extendable keyboard. For the physical-first condition, they continued to write the answers on the physical booklet. The names of the brands were coded for accuracy by two independent coders. Any disagreements between the coders were resolved through mutual discussions at the end of the study.

Participants also completed a brand message association task adapted from a measure used by Nielsen[9], where participants were shown a series of ad messages and were asked to name the brand associated with the ad message. Figure 2 provides an example of an emotional advertisement used in the study. In this example, participants were shown the message from the ad (e.g., "Never Compromise") and asked to name the brand associated with that message. The correct response was "Scott Kay". Participants completed a series of six message associations (two from each category) within each block.

After completing both blocks and answering the brand recall and message association questions, participants took a 5-minute break before completing brand discrimination and brand preference ranking tasks.

Brand Discrimination Task

In the brand discrimination task, we selected a total of 10 random brands (five from the physical ads and five from the digital ads) and presented them in a randomized manner. For each brand name, participants were presented with six different images: three selected from the target brand and three from a competitor. See Appendix C for an example. The images spanned the logo, a snippet from the ad itself, a message from the ad, or another salient aspect of the ad. Participants indicated whether the stimulus image was a match for the brand or not as quickly as possible. We measured both the accuracy (whether they matched the image correctly) and speed of response.

9 Nielsen, *Beyond Clicks and Impressions: Examining the Relationship Between Online Advertising and Brand Building*, 2011.

Figure 2. Example of an Emotional Ad

Millward Brown Brand Affinity Ranking Task

This task was adapted from a survey metric for brand affinity developed by Millward Brown[10]. A total of 12 brands were used in this task, and these brands were different from those used in message association and brand discrimination tasks above and included six physical ads and six from digital ads, equally selected from each of the ad categories. The brands were matched for product type (food and beverages of various kinds). The brand names appeared at the top of the screen, and participants were asked to position them along a scale based on how they liked that brand. They could place multiple brands on the same scale point, if desired. Figure 3 below provides an illustration of the task.

General Brand Attitude Survey

Finally, participants were administered a general brand attitude survey. This survey covered the remaining 26 brands not used in previous tasks. It measured: attitudinal equity, attitudinal loyalty, brand awareness, brand favorability, brand trust, and brand loyalty, for the remaining brands. See Appendix D for survey questions.

10 Alagon, J., & Samuel, J. *The Meaningfully Different Framework – a breakthrough in holistic brand equity measurement,* Millward Brown.

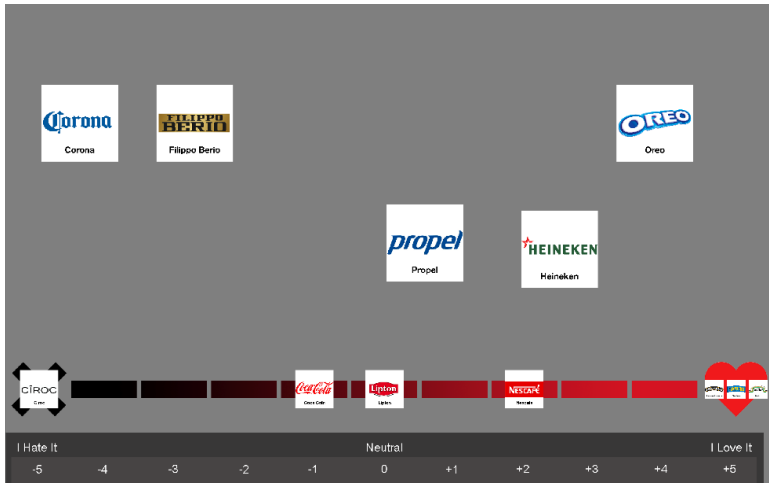


Figure 3: Illustration of the Millward Brown Brand Affinity Ranking Task

Session 2 Tasks and Measures

Session 2 took place six to eight days later at Temple University's Brain Imaging and Research Center, where a Siemens 3 Tesla magnet is hosted. When lying in the scanner, participants completed an ad recognition task, a brand recognition task, and a fMR adaptation task that measures implicit memory associations in the brain. They also completed a post-scan survey outside of the scanner.

Ad Recognition Task

In the ad recognition task, snippets of 36 target (18 digital and 18 physical) ads and 18 foils (ads previously not shown) were presented to participants (Figure 4 below). After viewing the snippet for 3 seconds, participants had to indicate, on a 1-4 scale, how confident they were that the snippet shown was part of an ad to which they had been exposed at Session 1. If they answered yes, then they were asked to recollect the format in which they were exposed to that ad in Phase 1 (physical or digital), and how confident they were in their answer. They were also asked to retrieve and choose the correct brand name featured in the corresponding ad from a list of three possible brand names. Only the first two letters of the brand name (word stem) were shown (e.g., Scott Kay was shown as SC).

Participants were also provided with a "DK" option (Don't know). The use of only word stems was done to prevent recognition of other brands in the study that were used in subsequent tasks. This also reduces potential bias for the subsequent fMR adaptation task, which used some of the same brands. The rationale behind this approach is that if participants were able to recognize the brand from the snippet, they should have no problem with the word stems. If not, they would not be able to identify the brand. However, if they falsely rated an old snippet as new, they simply proceeded to the next snippet. They had up to 3 seconds to answer the first two questions and up to 5 seconds to answer the brand name question.

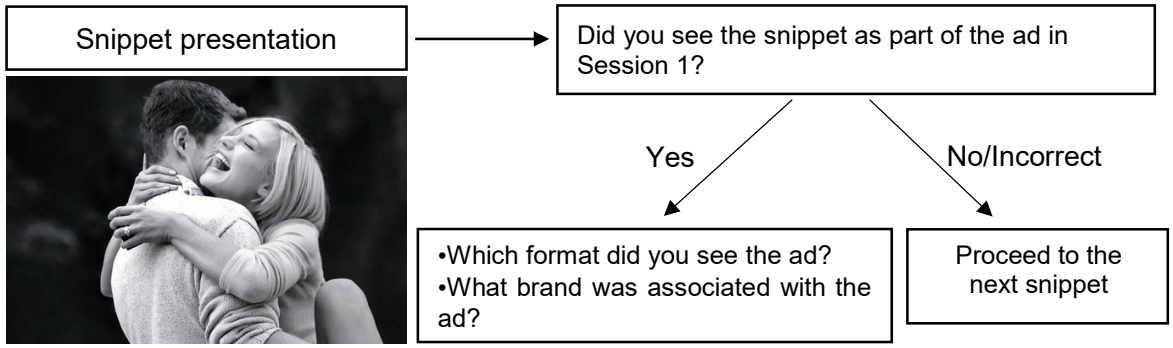


Figure 4: Example of Brand Recognition Task Flow

Brand Recognition Task

Subsequently, participants completed a brand recognition task, where they were shown the name of the 24 remaining brands that were not used in the ad recognition task, in a randomized order, and were asked to remember as many details about the ad as possible in five seconds. At the start of each trial, a brand name was displayed for 1 second. This was followed by a blank rectangle on the screen for 5 seconds, during which time participants were instructed to imagine as many details as possible about the ad that was featured for that brand in Session 1. At the end of the 5-second intervals, they were also asked to rate the vividness of their memory of the ads on a 1 to 4 scale:

(1) Do not remember seeing an ad for this brand at all;

(2) Remember seeing an ad, but remember very few details;

(3) Remember most details about the ad; or

(4) Remember all details about the ad.

Vividness was also verified by a post-scan survey.

FMR Adaptation Task

This method is a variant of an analysis technique used in fMRI analysis[11] to elucidate implicit brand awareness and brand association. It is based on the premise that when two identical or similar stimuli are presented in close proximity to each other, the second stimulus often elicits a smaller brain response than the first. Therefore, when a pair of stimuli is presented, the response to the second stimulus in the pair is smaller when it is similar to the first stimulus in the pair versus when it is dissimilar. We use a variant of this method to study the strength of brand associations. In each trial, participants were shown the name of a category of products (e.g., soap). If participants had seen an ad for a brand in that category in Phase 1, they should automatically make the association between the category and the brand name (e.g., Dove), and thus retrieve details about the brand. Therefore, when the brand name was subsequently shown, activation level should be reduced based on the strength of the initial association. We used 24 brand names from the original task, and these names overlapped with the brands used in the ad recognition task. The two tasks were separated by the brand recognition task involving different brands.

In each trial, a pair of words was shown. First, participants were presented a category name for 1 second. Following a 1 second inter-stimulus interval, they were then shown the name of a brand for 1 second and asked to remember whether they had seen an ad for that brand in Session 1. They had 3 seconds to indicate a Yes/No response, followed by an inter-trial interval of 4-6 seconds before the start of the next trial. We used three types of pairs for this task:

11 Grill-Spector, K., & Malach, R. (2001). fMR-adaptation: a tool for studying the functional properties of human cortical neurons. *Acta psychologica*, *107*(1-3), 293-321.

1. Target pairs. The brand was correctly associated with the category (e.g., Soap – Dove).

2. Control pairs. The brand was featured in Phase 1, but did not match the category (e.g., Chips – Dove). In the control trials, participants retrieved a different brand (e.g., Pringles) based on the category and hence they had to suppress this automatic retrieval and process the new brand name (e.g., Dove). Therefore, the brain response to the second stimulus (e.g., Dove) was expected to be much stronger, compared to the corresponding response in the target trials. Therefore, the difference in brain activation between the control and target trials was used as an index of the strength of brand associations and brand awareness.

3. Foils. We also used a third pair of trials (foils), where the category was paired with a novel brand that the participants were not exposed to in Phase 1 (e.g., Soap – Irish Spring). These trials were included to prevent participants from responding "Yes" to all brand names, and the foils are not discussed further in the analysis.

Post-Scan Survey

Finally, after completing the scanning session, participants answered a post-scan survey for the 24 brands featured in the brand recognition task. Participants were asked to rate how much they agree or disagree with each of seven statements for the 24 brands on a scale of 1 to 7. Four of the statements were correct and three were incorrect. An example of the post-scan survey for one brand is shown in Appendix E. The statements were designed to examine if participants remembered the details of the ads they had seen in Session 1, spanning the content, color, and location of items in the ads. A net memory score was calculated for each ad by averaging the data across the seven questions for that ad. Numbers were reverse scored if the statement was incorrect before averaging.

RESULTS

Pre-Attitude Measures

We asked participants a series of questions to measure their general attitudes towards physical and digital communications and advertisements in general. Participants generally (70 percent) did not have negative attitudes toward advertisements. The majority of the participants (67 percent) preferred receiving general communications by email. Moreover, 81 percent of the participants prefer taking notes on paper, and 78 percent prefer physical books over e-books.

We next sought to investigate the effect of format (physical or digital) and ad categories (functional, emotional, and metaphorical) on each of the measures obtained in Session 1 and Session 2. For all results presented below, we conducted a 2 (format) x 3 (category) repeated-measures analysis of variance (ANOVA) for each of the dependent measures, unless specified otherwise. Follow-up t-tests were used to determine the direction of effects and interactions from the ANOVA.

Session 1 Results

Ad Exposure and Ratings

We did not find any differences across formats for the ratings during exposure (Table 1). However, there was a significant main effect of ad format on exposure duration[12] ($F(1,26) = 16.550$, $p < .001$). Specifically, participants processed physical ads significantly longer than digital ads. The effect of ad category was not significant ($F(2,52) = 1.714$, $p = .190$). However, a post-hoc comparison revealed that subjects processed functional ads for a longer time than metaphorical ads ($p = 0.076$). The interaction between format and ad category was not significant ($F(2,52) = 1.014$, $p=.370$), as also illustrated in Figure 5. In subsequent analyses, we explore whether increased processing times for physical ads had a significant effect on memory performance in Session 2, or whether digital ads benefit from shorter and reduced exposure times with no effect on memory performance.

12 We excluded data from 3 participants from this analysis due to technical problems with video recording that prevented us from estimating exposure times for physical ads.

Table 1. Results Summary of Ad Exposure and Ratings

	Media		Statistics	
	Physical	Digital	*t(29)*	*p-val*
Exposure Time	17.84 (10.14)	11.55 (7.09)	4.068	<0.001
Ad Liking	4.58 (0.63)	4.70 (0.88)	–1.40	0.173
Ad Relevancy	4.27 (0.73)	4.16 (0.72)	1.14	0.262
Familiarity	5.42 (0.67)	5.58 (0.56)	–1.66	0.107
Purchase Intention	3.90 (0.70)	3.79 (0.78)	1.43	0.162

Note: Numbers in parentheses are standard deviations.

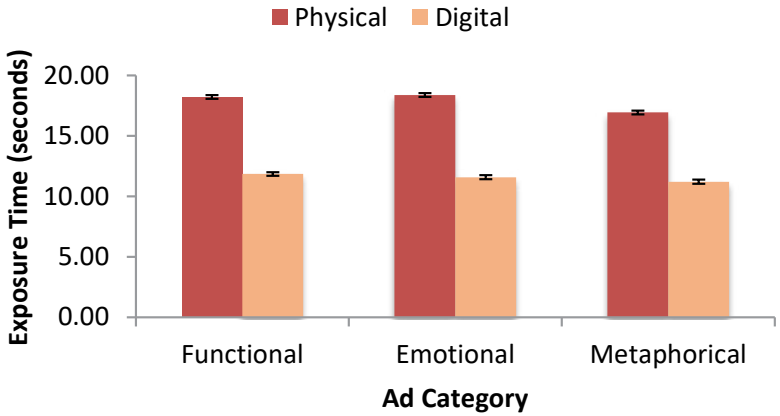


Figure 5. The Interaction of Format and Ad Category on Exposure Time

Brand Recall

We counted the proportion of brands recalled correctly for each of the different categories in each format (Figure 6, Table 2). We found a significant main effect of ad format ($F(1,29) = 4.649$, $p = .040$). Specifically, physical ads had better brand recall compared to digital ads. Moreover, the main effect of ad category was significant[13] ($F(2,46) = 19.034$, $p < .001$). Functional ads performed poorly compared to the other two ad categories (emotional and metaphorical). Finally, the interaction between ad format and ad category was marginally significant ($F(2,58) = 2.336$, $p=.106$). Specifically,

13 Greenhouse-Geisser sphericity correction was used here and in all the following analyses, which affects the degrees of freedom.

the difference between formats was the lowest for functional ads, whereas physical ads exhibited significantly higher brand recall than digital ads for both the emotional and metaphorical ads.

Table 2. Summary of Results for Brand Recall, Messsage Association, Brand Discrimination and Brand Attractive Rating

	Media		Statistics	
	Physical	Digital	*t(29)*	*p-val*
Brands Recalled (Proportion)	0.48 (0.19)	0.43 (0.16)	2.14	0.040
Message Association Accuracy	0.59 (0.05)	0.55 (0.04)	0.96	0.348
Brand Discrimination Accuracy	0.83 (0.12)	0.80 (0.12)	1.18	0.246
Brand Discrimination Reaction Time	2.00 (0.70)	2.01 (0.65)	-0.08	0.935
Brand Affinity Ranking	0.71 (1.17)	0.94 (1.29)	-1.02	0.319

Note: Numbers in parentheses are standard deviations.

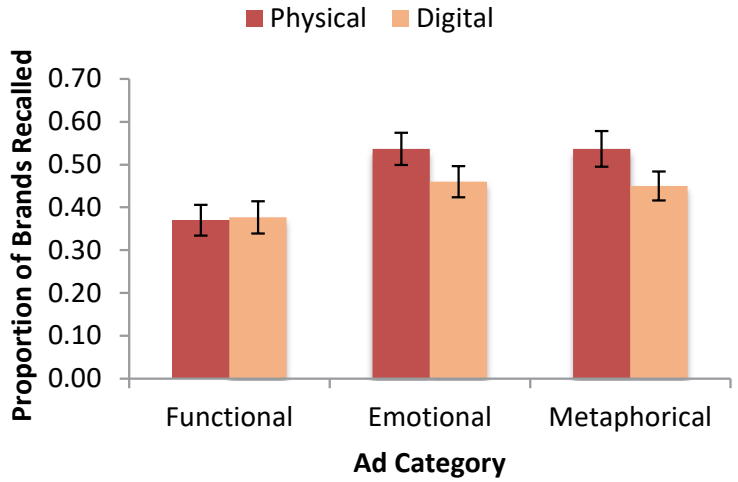


Figure 6. The Interaction of Format and Ad Category on Brand Recall

Message Association

Similar to brand recall, we estimated the number of messages that participants recognized correctly by associating them with the corresponding brands in each category (Table 2). The main effect of ad format was not significant ($F(1,29) = 0.912$, $p = .348$). The main effect of ad category was also not

significant F(2,44) = 0.536, p = .539). Finally, the interaction between ad format and ad category was also not significant (F(2,58) = 0.686, p=.508).

Brand Discrimination

Accuracy: For each brand, we estimated a brand discrimination accuracy based on how many of the six stimuli were correctly classified as old or new (Table 2). The effect of format on this brand discrimination accuracy was not significant (F(1,29) = 1.401, p = .246). However, the main effect of ad category was significant (F(2,58) = 4.868, p = .011). The discrimination accuracy was lower for functional ads, compared to emotional and metaphorical ads. There was no signifcant interaction effect between ad format and ad category (F(2,58) = 1.18, p= .314).

Reaction Time: For each brand, we estimated the mean reaction time as the time it look participants to classify the six stimuli as old or new (Table 2, Figure 7). The smaller the reaction time, the stronger the association between the images and the brand. In terms of reaction time for brand discrimination, there was no significant effect of format (F(1,29) = 0.007, p = .935). However, the main effect of ad category was significant (F(1,33) = 8.969, p = .004). Specifically, significantly longer time was needed to discriminate functional ads, as compared to emotional and metaphorical ads. The interaction effect between format and ad category was not significant (F(1,58) = .231, p = .728).

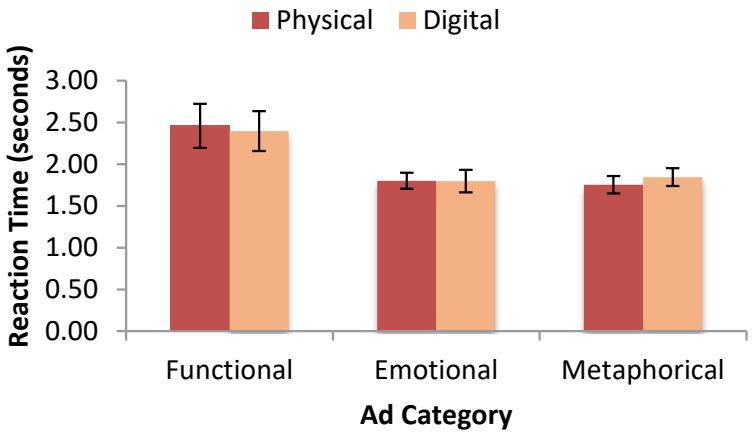


Figure 7. The Interaction of Format and Ad Category on Reaction Time

Millward Brown Brand Affinity Ranking

We obtained a brand affinity ranking for each brand based on the position it was placed in the scale (ratings varied from -5 to +5, with positive values indicating a more liked brand). We then tested if this aggregate brand attractiveness score varied as a function of format and category of the ad for that brand (Figure 8). The main effect of format was not significant ($F(1,29) = 1.026$, $p = .319$). However, the main effect of ad category was significant ($F(2,48) = 15.736$, $p < .001$). Specifically, metaphorical ads had higher ratings than functional and emotional ads. Finally, the interaction effect between ad format and ad category was not significant ($F(2,58) = 0.618$, $p=.543$).

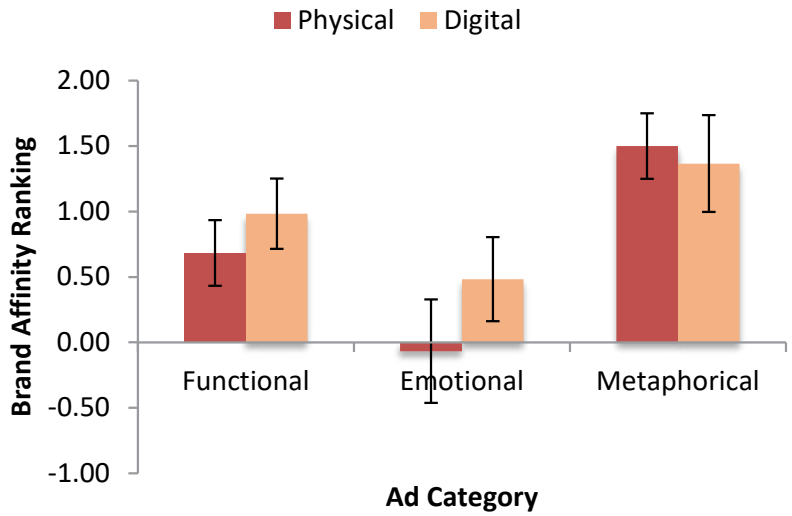


Figure 8. The Interaction of Format and Ad Category on Brand Affinity Ranking

Table 3. Results Summary of Brand Attitudes

	Media		Statistics	
	Physical	Digital	*t(29)*	*p-val*
Attitudinal Equity	3.83 (0.91)	3.90 (0.91)	-0.79	0.436
Attitudinal Loyalty	3.07 (1.12)	3.11 (1.10)	-0.57	0.570
Brand Awareness	4.28 (0.61)	4.35 (0.79)	-0.58	0.568
Brand Favorability	4.72 (0.63)	4.74 (0.82)	-0.21	0.832
Brand Trust	4.34 (0.91)	4.40 (0.90)	-0.63	0.532
Brand Loyalty	3.31 (0.73)	3.37 (0.63)	-1.05	0.303

Note: Numbers in parentheses are standard deviations.

Brand Attitudes

The means from the brand attitude measures for each of the constructs across formats are summarized in Table 3. We did not find any significant effects of ad format or ad category for any of these measures. These findings may suggests that brand attitudes are unlikely to change because of a single exposure, unlike measures associated with specific tasks and memory.

Session 2 Results

The results from the ad recognition, brand recognition and post-scan survey are also summarized in Table 4.

Table 4. Results Summary of Snippet Recognition, Brand Name Recognition, Format Recall and Post-scan Memory

	Media		Statistics	
	Physical	Digital	*t(29)*	*p-val*
Ad Recognition: Snippet Accuracy	0.73 (0.16)	0.61 (0.13)	4.25	<.001
Ad Recognition: Context Accuracy	0.42 (0.13)	0.28 (0.16)	4.10	<.001
Ad Recognition: Brand Name Accuracy	0.42 (0.19)	0.37 (0.16)	1.76	0.088
Brand Recognition	2.35 (0.54)	2.33 (0.43)	0.29	0.766
Post-scan Memory	4.37 (0.41)	4.26 (0.38)	1.60	0.119

Note: Numbers in parentheses are standard deviations.

Ad Recognition: Snippet Accuracy

We first estimated the accuracy of participants' recognition responses to the various snippets and classified them according to the corresponding ad category and ad format (based on whether they were exposed to the corresponding ads in physical or digital format in Session 1). There was a significant main effect of format ($F(1,29) = 18.281$, $p < .001$). Specifically, physical ads performed better than digital ads in terms of snippet recognition accuracy. Moreover, the main effect of ad category was also significant ($F(2,58) = 11.221$, $p < .001$). Functional ads had lower snippet recognition accuracy compared to emotional and metaphorical ads. The interaction effect between ad format and ad category was not significant ($F(2,58) = 0.160$, $p = .853$), which is illustrated in Figure 9.

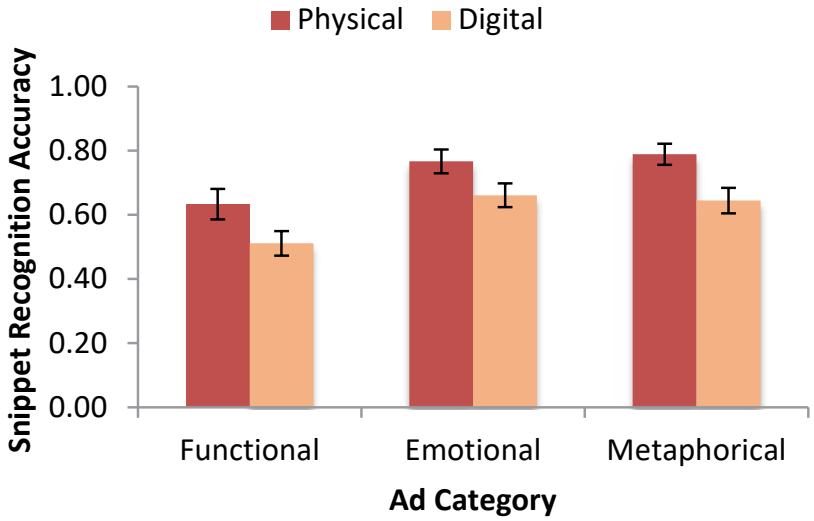


Figure 9. The Interaction of Format and Ad Category on Snippet Accuracy

Ad Recognition: Context Accuracy

We then estimated whether participants correctly identified the format (physical or digital) in which the snippets were presented to them in Session 1 (Figure 10). Note that if participants did not correctly recognize the snippets, then they would automatically be marked inaccurate for the brand name and format accuracy analyses (however, see below for additional conditional analyses using multi-level regressions). The main effect of ad format on context recognition was statistically significant ($F(1,29) = 16.843$, $p < 0.001$). Participants recognized the exposure format for physical ads better than digital ads. We also observed a significant main effect of ad category ($F(2,58) = 9.690$, $p < .001$). Functional ads had lower format recognition accuracy compared to both emotional and metaphorical ads. Finally, the interaction effect was not significant ($F(2,58) = 1.100$, $p = .340$).

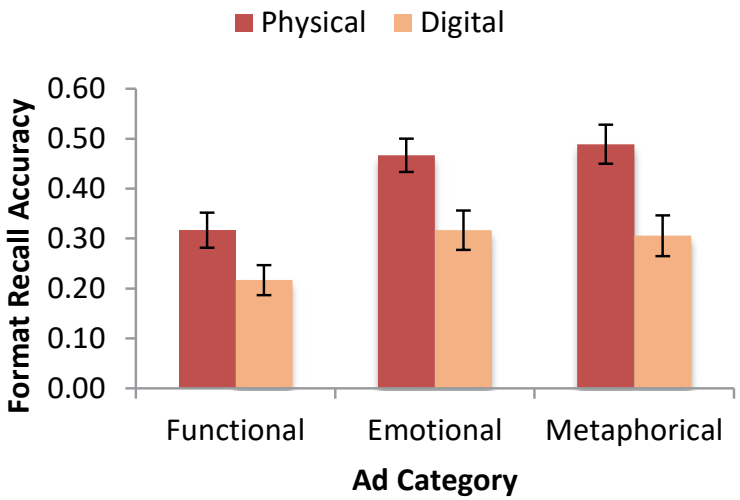


Figure 10. The Interaction of Format and Ad Category on Context Recognition

Ad Recognition: Brand Name Accuracy

We then estimated whether participants correctly identified the brand names associated with the snippets (Figure 11). We observed a marginally significant main effect of ad format ($F(1,29) = 3.159$, $p = .088$) in terms of brand name recognition accuracy. Specifically, participants recognized the brand name for physical ads better than digital ads. The main effect of category was also significant ($F(2,58) = 4.370$, $p = .017$). Functional ads had lower brand name recognition accuracy, compared to emotional and metaphorical ads. Finally, the interaction effect between ad format and ad category is not significant ($F(2,58) = 0.388$, $p=.680$).

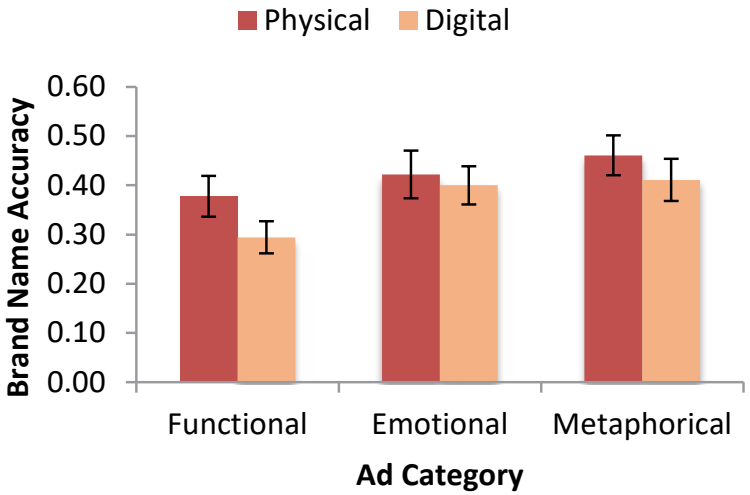


Figure 11. Interaction of Format and Ad Category on Brand Name Accuracy

Brand Recognition: Vividness

All participants also completed an ad recognition run, where they were asked to imagine as many details as possible about the ad that was featured for a given brand. We then asked participants to self-report their vividness for their memory recall on a scale of 1 to 4. We found that the main effect of format on these vividness ratings was not significant ($F(1,29) = 0.090$, $p = .766$). However, the main effect of ad category was significant ($F(2,58) = 3.721$, $p = .030$). Specifically, metaphorical and emotional ads had higher vividness ratings than functional ads. Finally, the interaction effect between ad format and ad category was not significant ($F(2,44) = 0.562$, $p=.530$), as illustrated in Figure 12.

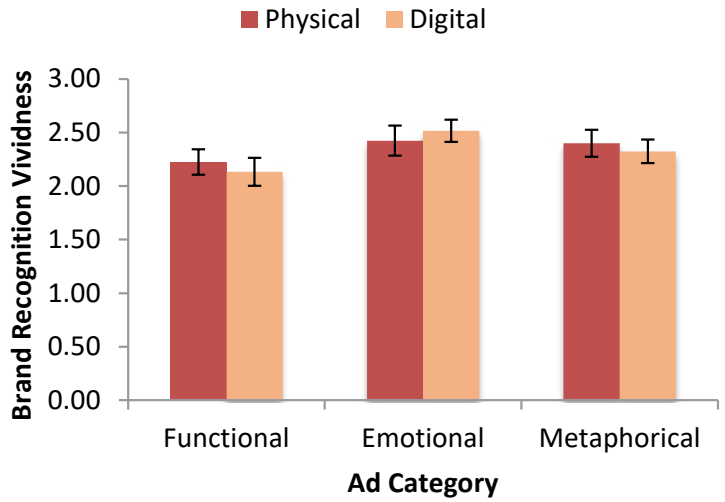


Figure 12. Interaction of Format and Ad Category on Brand Recognition Vividness

Post-scan Memory For Ad Details

Finally, participants were also presented with a series of statements that measured the depth of knowledge and memory for the various ads presented in Session 1. Based on their responses, we calculated a post-scan memory score for the details of the ad (Figure 13). The effect of ad format on this memory score was not significant ($F(1,29) = 2.587$, $p = .119$). However, the main effect of ad category was significant ($F(2,58) = 5.012$, $p = .010$). Emotional ads exhibited lower recall of their details relative to functional and metaphorical ads. The interaction effect between ad format and ad category was not significant ($F(2,58) = 0.839$, $p = .437$).

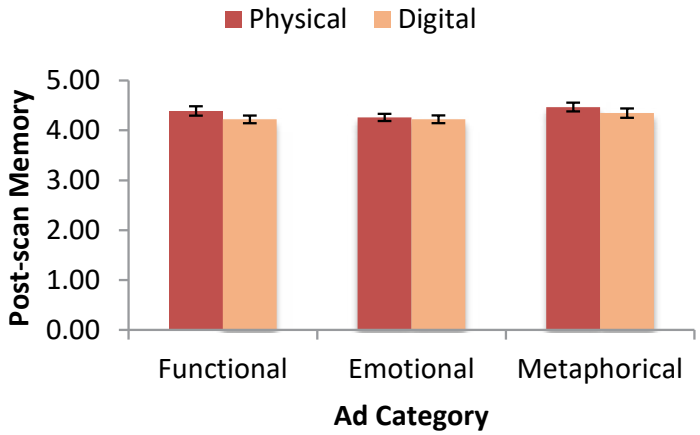


Figure 13. Interaction of Format and Ad Category on Post-scan Memory

Integrating Session 1 and Session 2 Measures

In Session 1, we found that physical ads were processed significantly longer than digital ads. We seek to understand whether the improved recognition accuracy for physical ads could be explained by increased processing times for physical ads during Phase 1. We also seek to understand whether prior familiarity with the brand had an effect on memory performance.

To test these effects, we ran a series of mixed-effects linear (glmer, binomial family) regression models using the statistical package R, where the variables were nested first by ad and then by participant. Since the primary objective of our study was to identify the effects of format (physical and digital),

we restricted these regressions to identifying the effect of format, collapsing ads across all the three categories. Consistent with the findings using ANOVA reported above, across all ad categories used in the study, we found a significant effect of format on snippet recognition accuracy ($b = 0.853$, $se = 0.17$, $p<0.001$) and context recognition ($b = 0.589$, $se = 0.14$, $p<0.001$), but not on brand name recognition based on the word stems ($b = 0.142$, $se = 0.14$, $p = 0.324$).

We next ran separate regressions, restricting the context and brand name data to only trials where participants correctly recognized the snippets. We found a significant effect of format (print versus digital) on context recognition ($b = 0.379$, $se = 0.15$, $p<0.05$), but not on brand name recognition ($b = -0.244$, $se = 0.17$, $p = 0.14$). In fact, as indicated by the negative regression coefficient, digital ads were associated with slightly higher brand name accuracy. We next sought to understand whether these differences were explained by differences in exposure time across the two formats (Session 1). We found that exposure time was a significant predictor of snippet recognition accuracy ($b = 0.048$, $se = 0.01$, $p<0.001$) and brand name association ($b = 0.02$, $se = 0.008$, $p<0.001$), but not context recognition accuracy ($b = 0.005$, $se = 0.006$, $p=0.431$). Critically, the effect of format was still significant for both snippet recognition ($b = 0.56$, $se = 0.18$, $p<0.001$) and context recognition ($b = 0.34$, $se = 0.16$, $p<0.05$), even when accounting for differences in exposure time with physical ads leading to better memory than digital ads.

The effect of format on brand name association was also significant ($b = -0.37$, $se = 0.17$, $p<0.05$), albeit in the opposite direction when accounting for differences in exposure time, with digital ads being associated with better brand name recognition accuracy than physical ads. Upon further investigation, we also found a significant exposure time by format interaction ($b = 0.04$, $se = 0.02$, $p<0.05$), such that exposure time was a stronger predictor of accuracy for physical ads, but not for digital ads.

Finally, we examined if the differences between the effect of exposure time on physical and digital recognition accuracy could be explained by brand familiarity. Therefore, we ran two separate regressions to capture the joint effect of brand familiarity and exposure time on brand name recognition accuracy for physical and digital ads, respectively. For physical ads, we found that exposure time ($b = 0.03$, $p<0.001$) and brand familiarity ($b= 0.132$, $p<0.05$) were significant predictors of brand name recognition accuracy. However, for digital ads, only brand familiarity ($b = 0.283$, $p < 0.001$) predicted

brand name accuracy. These findings suggest that memory for digital ads was predicted by familiarity with the brands prior to exposure, and not the duration for which ads were processed during the study. In other words, faster processing of digital ads was not associated with any disadvantages. On the other hand, increased exposure time significantly predicted memory associations for physical ads.

FMRI Results of Ad Recognition

For the ad recognition task, participants were first presented with a snippet and asked to recollect whether they remember seeing that snippet as part of an ad in Session 1. We focused on the brain activations when participants were processing these snippets and trying to retrieve associations between the snippet and the context, as well as brand. We found significantly greater activation in the frontal, insular, and hippocampal regions when participants were viewing snippets from physical ads compared to digital ads, as shown in Figure 14a. Physical ads were also associated with greater hippocampal activation (Figure 14b), suggesting increased strength of memory retrieval for snippets from physical ads. The increased frontal (Figure 14c) and insular region could represent the strength of memory associations about the context and brand names that are being triggered when participants are viewing the snippets. We contend that these associations are stronger for physical than digital ads, which leads to better memory performance for context and brand recognition for physical ads. Similarly, we found that the strength of memory associations was greater for metaphorical ads than functional ads as indexed by increased activity in the hippocampus (Figure 14b) and middle frontal gyrus (Figure 14c). In both regions, activity for emotional ads was greater than functional ads, but lower than metaphorical ads though the differences were not significant. These findings are consistent with metaphorical ads leading to the formation of the strongest associations between the various contents of the ad.

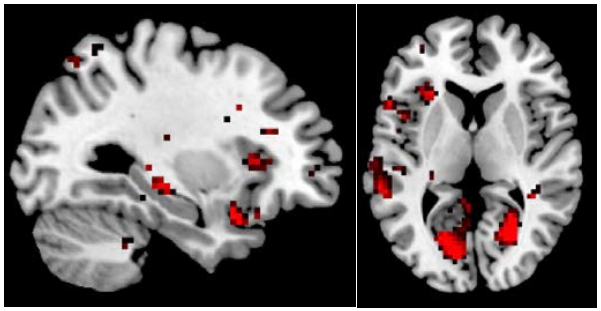


Figure 14a. Increased Brain Activations for Physical over Digital during Ad Recognition

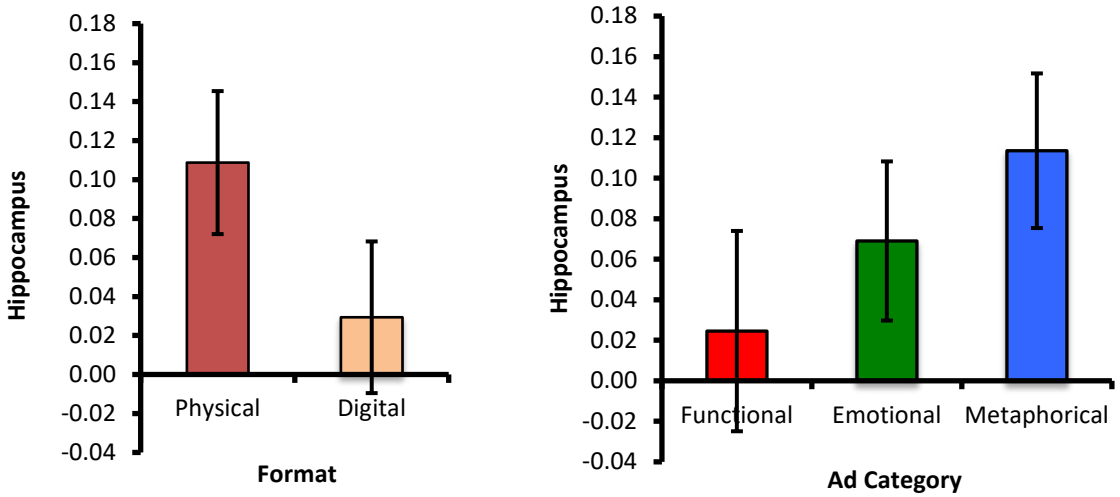


Figure 14b. Hippocampus Activation during Ad Recognition by Format and Category

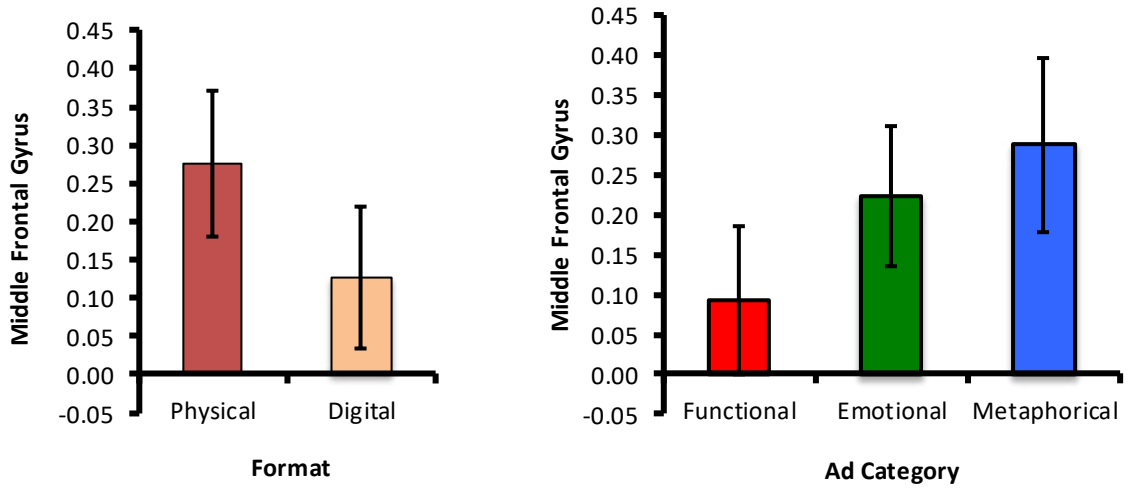


Figure 14c. Middle Frontal Gyrus Activation during Ad Recognition by Format and Category

FMR Adaptation Task

Physical ads showed greater fMR adaptation effects on brand associations. Participants automatically retrieved the brand when the ad category was shown to them, leading to reduced brain activation when the corresponding target brand appeared. Figure 15a below shows several key areas of the brain, including the parietal cortex, prefrontal cortex and anterior cingulate cortex, where the difference between target (dotted lines) and control (solid lines) trials was greater for physical ads than digital ads (Figure 15b). In other words, physical ads showed the strongest association between the category and brand names for target brands, thus leading to lower activation. However, physical ads showed higher activation for control brands in the hippocampus, due to superior explicit memory for these brands. Together, these results suggest that physical ads lead to the formation of stronger brand associations, relative to digital ads. We did not have a sufficient number of trials to study adaptation effects across ad categories.

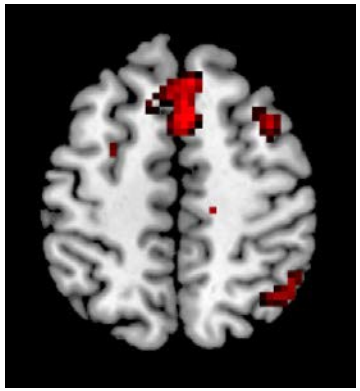


Figure 15a. Brain Activation during fMR Adaptation Task

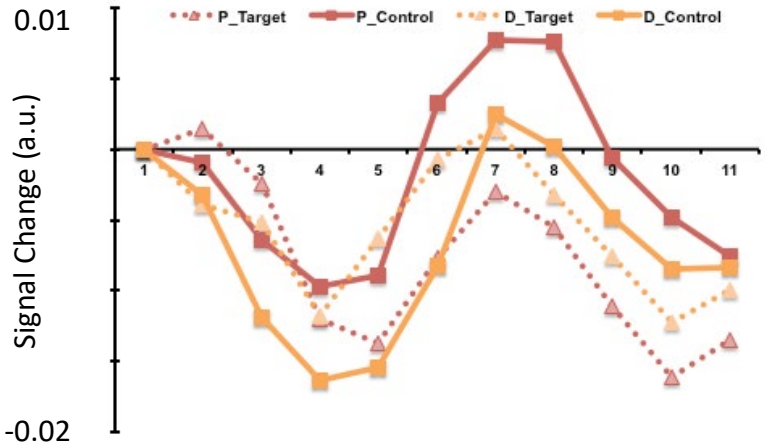


Figure 15b. Signal Changes during fMR Adaptation Task

DISCUSSION

This multi-methodological study combines behavioral and neurophysiological methods to examine brand effects in advertising communications with physical and digital media. The study manipulates the advertising *format* (physical versus digital) and advertising category (functional, emotional, and metaphorical) and examines their effects on a multitude of advertising and marketing measures.

Measured effects include:

(a) neural and attentional processes triggered from brand effects (cognitive and memory measures are captured with activations of specific brain regions using fMRI),

(b) self-reported measures of brand awareness, brand recognition, brand recall, brand affinity, brand trust, brand loyalty, and brand attitudes,

(c) measures of advertising effectiveness, such as ad liking, ad relevance, and purchase intention, and

(d) behavioral responses, including the performance in different tasks, such as the accuracy and the reaction time in a brand discrimination task.

Key Results

We found some key differences across formats for several measures in both sessions. Specifically, in Session 1, participants processed digital ads much faster relative to physical ads. However, they exhibited better recall of brand names presented in physical ads. One week later in Session 2, participants were also better at recognizing the snippet of the ad, brand name, as well as the context from Session 1. The self-reported memory advantage of physical format over digital format was also supported by the fMRI results, which shows that participants had a stronger association network, as well as better memory retrieval for physical ads compared to digital ads. Also, physical ads led to the formation of stronger brand associations, relative to digital ads. In sum, these results imply that physical ads have several broad advantages over digital ads in terms of enhancing brand marketing. Critically, digital ads were processed much faster and did not vary in effectiveness on several key brand attitude measures. In fact, the brand affinity ranking was better for brands featured in digital ads than physical ads, though the difference was not significant. Additionally, when we controlled for differences in exposure time, participants were better at recognizing the brand names for snippets in Session 2 from digital ads than physical ads, suggesting that the faster processing did not have a significant impact on the ability to recognize information from digital ads.

In terms of ad category, the findings support the effectiveness of metaphorical ads in enhancing brand marketing. Specifically, in Session 1, both metaphorical and emotional ads performed better than

functional ads in terms of brand recall. Metaphorical and emotional ads were more successfully and more quickly discriminated from foils than functional ads. In Session 2, metaphorical and emotional ads also performed better than functional ads in terms of snippet recognition accuracy, brand name recognition accuracy, as well as context accuracy. Moreover, participants had better brand recognition for metaphorical and emotional ads. These results were also validated by differences in key memory and cognitive areas of the brain, which showed significantly higher activations for metaphorical and emotional ads than functional ads. Critically, metaphorical and functional ads performed better in detailed post-scan memory of the ads, relative to emotional ads. For functional ads, we argue that participants would be more effective in registering the attributes and features, but would not be motivated to process the ad information if they do not find the ad relevant to them. Therefore, fewer ads are remembered, but in a more detailed manner. On the other hand, emotional ads are better suited to raise consumer involvement with the ad, but they lead to processing the overall gist of an ad with reduced emphasis on the details. Hence, emotional ads performed better than functional ads on most of the measures related to memory retrieval and association; however, they perform worse than functional ads for details. However, metaphorical ads are associated with intrinsically higher motivation to process the information presented in an elaborate manner, resulting in the superior performance of these ads across most measures across sessions.

Contributions

In sum, this study makes two unique contributions. First, we inform the literature on how physical and digital marketing communications can enhance brand marketing by analyzing their differential and complementary effects on key measures of brand recognition, brand recall, and brand attitudes. Second, we provide insights into the effectiveness of different types of marketing communications across different ad categories.

Taken together, the findings of this study can help advertisers to decide whether and how they should use physical and digital communications in their advertising campaigns across different ad categories to enhance their brand marketing.

APPENDIX A: Pretest

The goal of the pretest was to identify 60 ads (20 from each category) that distinctly belonged to those categories. To achieve this, we obtained ratings for 98 advertisements – 29 functional, 30 emotional and 39 metaphorical. We recruited a total of 119 participants on Amazon Mechanical Turk. We split the ads into four groups, each containing approximately an equal proportion of ads from the different categories. Each participant was randomly assigned to one of the four groups. All participants were provided examples of the different categories of ads. Subsequently, they rated the ads on the following five questions using a 1-100 slider scale:

1. This ad is functional.
2. This ad is emotional.
3. This ad represents a metaphor.
4. This ad is complex.
5. This ad is familiar.

We used attention checks to make sure they were paying attention. Seven participants were excluded from the analysis for failing these attention checks. This ensures that the data was reliable and robust. In the final dataset, each ad was rated by at least 27 participants.

Using a combination of k-means cluster analysis and visual inspection of the mean ratings, we shortlisted a total of 55 ads – 20 functional, 17 emotional and 18 metaphorical. These ads were rated higher on the corresponding category relative to the other two categories (Figure A1). Critically, the final set of shortlisted ads was balanced in familiarity across categories. We also reviewed the complexity ratings of the shortlisted 60 ads. The metaphorical ads were generally rated as more complex – this is not surprising given the nature of these ads. Lastly, we supplemented the 55 ads selected from the pretest with 3 new emotional and 2 metaphorical ads, resulting in 20 ads for each of the categories for the final study.

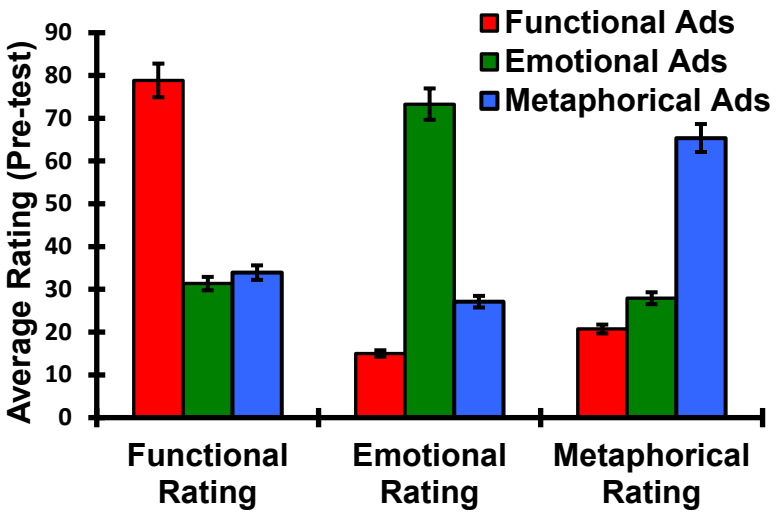
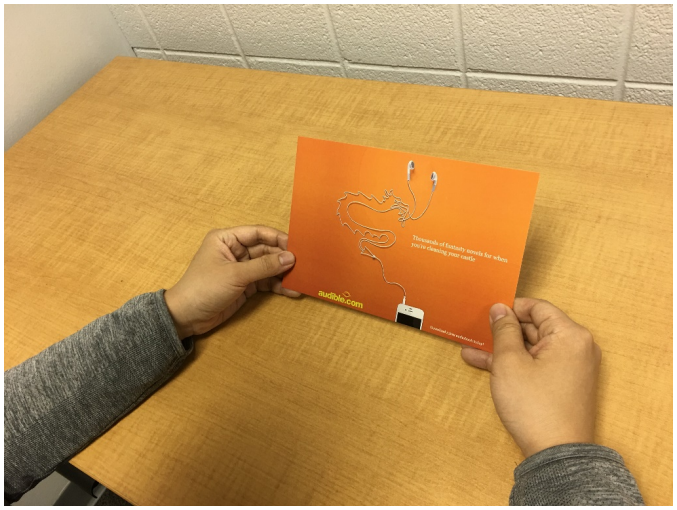


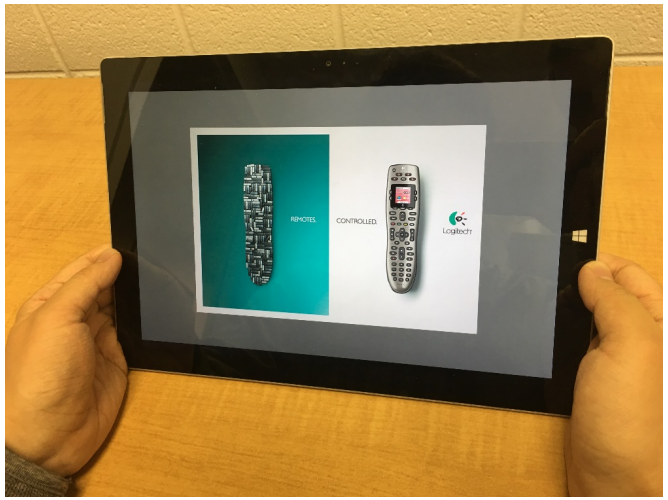
Figure A1: Summary of Pre-test Rankings across the Different Ad Categories

APPENDIX B: Examples of Physical and Digital Ads

Physical Ads



Digital Ads



APPENDIX C: Example of Brand Discrimination Task

Full Advertisement

	Color	Message	Snippet
Target		All new ways to do all kinds of things	
Foil		The next big thing is already here	

APPENDIX D: Key Brand Attitude Measures

General Brand Attitude Survey (Session 1)

Each question was asked on a 7-point scale (disagree-agree).

Attitudinal Equity

- This brand fits the idea of a perfect (category, like shoe)
- I feel close to this brand

Brand awareness

- I have used this brand
- I have considered this brand in the past

Brand favorability

- I have positive opinions about this brand

Brand Trust

- The brand meets my expectations for this category
- I feel confidence in this brand

Attitudinal loyalty

- I feel committed to this brand
- I would be willing to pay a premium to purchase this brand

Brand Loyalty

- I am likely to recommend this brand to my friends
- As long as the brand meets my expectations, I will not switch to another brand
- I prefer other brands for this (category) (reverse-coded)

APPENDIX E: Sample Post-Scan Survey (Session 2)

Below is an example of an ad shown in Session 1 and sample questions used for this ad during the post-scan survey in Session 2.

For each of the questions below, state whether you agree or disagree (7-point scale) about the statements provided about the ad for that brand (* questions were reverse coded)

Hilton

1. This ad makes a reference to Bangkok
2. This ad makes a reference to golfing (*)
3. There is a female model featured in this ad
4. There is a picture of a Hilton property featured in this ad (*)
5. This ad is set in a spa
6. The primary background color of the ad is red (*)
7. The Hilton logo is positioned in the bottom right corner of the ad

Appendix: Management's Comments

STEVEN MONTEITH
VICE PRESIDENT, MARKETING

UNITED STATES POSTAL SERVICE

August 28, 2018

Amanda Martinez,
Manager, RARC Central
Risk Analysis Reserch Center

SUBJECT: Using Mail to Build Brands (Project Number 2018RARC004)

Thank you for the opportunity to respond to the final review draft of the white paper "Using Mail to Build Brands"

We generally agree with the papers assessment of physical versus digital. The increase in Omni-channel marketing has led to shifting budgets due to an increasing number of channels. The value of providing the means for the consumer to accept an offer through the channel of their choosing becomes more critical. The results of this study relative to brand will be a valuable tool as the postal service looks to promote the value of mail within this changing environment.

As technologies change and evolve, the Postal Service must continually implement customer–centric products and services that optimize the overall customer experience. The results of this study will help us on this journey.

Steven W. Monteith

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We conducted work for this white paper in accordance with the Council of the Inspectors General on Integrity and Efficiency's Quality Standards for Inspection and Evaluation (January 2012).