



Office of Inspector General | United States Postal Service

RARC Report

# Advertising Effectiveness and Age

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# Executive Summary

Reaching the right consumers is an ongoing struggle for businesses, both large and small. Companies need to understand their target audiences and find effective ways to communicate with them. Customizing advertising efforts to specific consumers, including using demographic variables such as age, is a long-standing component of marketing strategies. But with the ascendance of digital media, companies need to understand if and how their new and traditional advertising efforts resonate with younger, digitally native consumers. At the same time, baby boomers remain a key consumer group. Representing over a third of U.S. consumer expenditures, it is crucial for marketers to understand how best to reach them. As advertising mail is an important source of revenue for the Postal Service — \$20 billion in fiscal year 2017 — it is also important that USPS understand mail's effectiveness across age groups.

Recognizing the importance of age segmentation for advertisers, the U.S. Postal Service Office of Inspector General (OIG) recently conducted a neuromarketing study with Temple University to compare physical and digital advertising's effectiveness with younger and older consumers, ranging from ages 18 to 68. We found that print advertising was effective for leaving a lasting impression of ads and brands across age cohorts. For both the younger and older participants, the physical format proved more effective than digital in measures of ad recognition, brand recall, brand discrimination, and in memory of specific details from ads. On the other hand, while all age groups processed digital ads faster than physical ads, the difference for younger participants was larger since they spent more time processing physical ads than the older participants. This finding could indicate that digital ads are more advantageous with younger consumers in instances when attention spans and marketing budgets are limited.

The OIG also found some noteworthy differences in the effectiveness of basic advertising design categories across age cohorts. For younger participants, the ads designed to elicit an emotional response were generally more effective than the ads that focused on describing a product's function. Yet, this was not the case

## Highlights

Regardless of age, physical ads were more effective than digital in leaving a lasting impression.

All age groups processed digital ads more quickly than physical, which could be advantageous with limited attention or time.

Emotional ads were more effective than functional ads for younger adults, but functional ads in physical format were more effective for older adults. Metaphorical ads were effective across age groups.

for older adults, for whom the functional appeals were more effective, especially when presented in physical format. Ads that used metaphors were consistently effective across all ages.

These findings expand on the OIG's prior neuromarketing work to provide scientific evidence that physical ads found in advertising mail can leave a lasting impression with both young and old consumers. They also show that there may be important nuances in how consumers from different age cohorts react to the category design of advertisements. It is important that the Postal Service identify how, when, and with whom mail is an effective advertising medium. This research can help the Postal Service better understand mail's enduring value, and can inform future advertising effectiveness research.

# OIG Synopsis

## Introduction

Gone are the days of one-size-fits-all advertising. To stay competitive today, companies of all sizes rely on data analytics and market research to segment customers and tailor their advertising efforts accordingly. One important segmentation dimension is age. Even products or services with broad appeal might require different marketing strategies for distinct age cohorts; what leaves a lasting impression with a middle-aged adult may not be as effective with someone in their early 20s.

With the rise of digital media, companies need to assess if and how their media mix resonates with younger audiences who were raised with digital devices. At the same time, baby boomers remain an important segment – representing over a third of total U.S. consumer expenditures – and so advertisers also need to understand how different ad media resonate with older consumers.<sup>1</sup> Differences in the effectiveness of digital media versus physical media across age cohorts could be important in helping advertisers tailor their campaign to the right audience.

Recognizing the need to understand how different ad media formats, including mail, are effective across age cohorts, the U.S. Postal Service Office of Inspector General (OIG) looked to investigate physical and digital advertising's effectiveness with younger and older consumers. Do print and digital advertisements have the same impact on older versus younger consumers? And does consumer age influence the effectiveness of an ad's strategic design? This white paper reports the results of a recent OIG neuromarketing study examining these questions.

## Understanding Age Effects

In 2015, the OIG kicked off a series of neuromarketing studies investigating the effectiveness of physical and digital advertising. Subsequent OIG neuromarketing studies considered mail and digital advertising's effectiveness for ad sequencing

## What's all this about neuromarketing?

Neuromarketing is a method for investigating consumers' conscious and subconscious responses to advertising stimuli. It pairs traditional measures of ad effectiveness with neurophysiological tools – such as functional Magnetic Resonance Imaging (fMRI), eye tracking, and biometrics – to scientifically test consumers' reactions to products, commercials, brands, etc. Companies use neuromarketing to help shape marketing efforts by better understanding what resonates with consumers, beyond stated preference.

and as a tool for brand advertising.<sup>2</sup> This new report takes the inquiry one step further by examining the role of consumer age on basic measures of ad effectiveness.

For this study, the OIG again partnered with the Center for Neural Decision Making (CNDM) at Temple University's Fox School of Business for a neuromarketing study. The research had two primary objectives:

1. Assess the relative effectiveness of physical and digital formats, referred to as “ad format,” across age cohorts,
2. Assess the relative effectiveness of different advertisement design strategies — functional, emotional, or metaphorical — referred to as “ad category,” across age cohorts.

<sup>1</sup> U.S. Bureau of Labor Statistics, *Fun Facts about Millennials: Comparing Expenditure Patterns from the Latest through the Greatest Generation*, March 2018, <https://www.bls.gov/opub/mlr/2018/article/fun-facts-about-millennials.htm>, Table 2.

<sup>2</sup> 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> and OIG, *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> and OIG, *Using Mail to Build Brands*, Report No. RARC-WP-18-013, September 5, 2018, <https://www.uspsoig.gov/sites/default/files/document-library-files/2018/RARC-WP-18-013.pdf>.



The study confirmed and expanded on the OIG’s prior research, finding that physical ads leave a lasting impression of ad contents and brands for both younger and older participants. Across age cohorts, the physical format proved more effective than digital in measures of ad recognition, brand recall, brand discrimination, and in memory of specific details from ads.

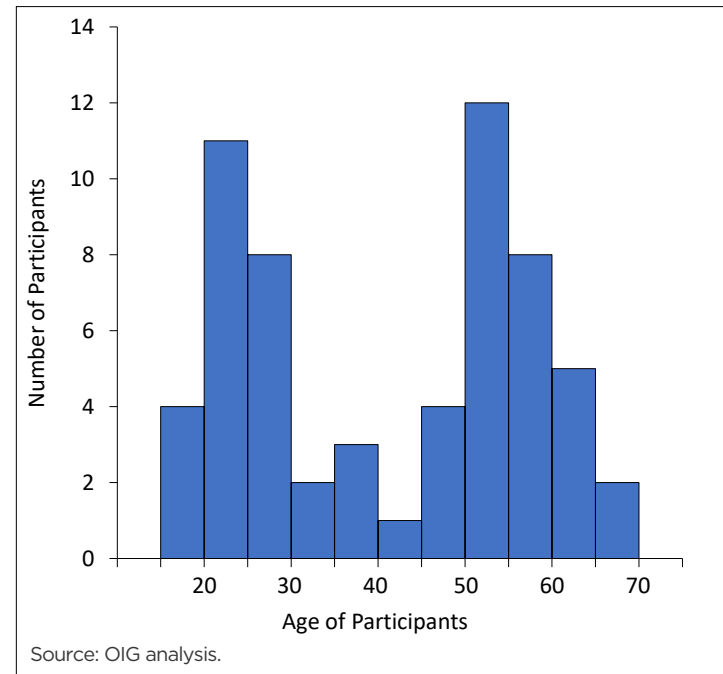
There were also interesting differences across age cohorts in terms of advertising design category. For younger participants, the ads designed to elicit an emotional response were generally more effective than the ads that focused on describing a product’s function. However, this was not the case for older adults; the functional appeals were more effective with older participants, especially when presented in physical format. As was the case with prior OIG research, the ads that used metaphors were effective across all measures, regardless of age.

## Methodology

This study was conducted in the Spring and Summer of 2018. Researchers recruited 60 participants distributed between 18 and 68 years of age. Twenty-five of the participants were millennials (ages 18-31), 12 were Gen X (ages 38-52), and 23 were baby boomers (ages 53-68).<sup>3</sup> See Figure 1 for the distribution of ages. Twenty-seven participants were men and 33 women.

The experiment used the same procedure employed in the OIG’s previous neuromarketing paper, *Using Mail to Build Brands*, and again used self-reported measures, behavioral responses, eye tracking, and functional Magnetic Resonance Imaging (fMRI) technology.<sup>4</sup> However, unlike the prior study, this time the researchers evaluated importance of age in the effectiveness of an ad’s format: physical versus digital.<sup>5</sup> Most analyses compared a two-group split: the younger group included participants aged 41 and younger (n = 29), and the older group included participants aged 47 and older (n = 31).<sup>6</sup>

**Figure 1: Age Range of Study Participants**



The researchers also analyzed the role of age in the effectiveness of three distinct design categories: functional, emotional, and metaphorical.<sup>7</sup>

- **Functional ads** 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.

<sup>3</sup> Researchers recruited participants using ads placed at community centers and public libraries in the greater Philadelphia area, as well as through the Oshler Lifelong Learning Institute at Temple University.  
<sup>4</sup> See OIG, *Using Mail to Build Brands*, Report No. RARC-WP-18-013, September 5, 2018, <https://www.uspsog.gov/sites/default/files/document-library-files/2018/RARC-WP-18-013.pdf>, p. 3. The experimental data recorded during the *Using Mail to Build Brands* experiment represent the basis for the 25 millennial participants and 5 of the Gen X participants reported in this study.  
<sup>5</sup> The physical ads were printed on high-quality, large postcards and the digital ads were viewed on a Microsoft Surface tablet.  
<sup>6</sup> A separate analysis of the oldest participants in the study, ages 53 and older, was also conducted. These findings are reported in the Examining the Effects of Advertising on Baby Boomers section of the CNDM report.  
<sup>7</sup> The researchers selected real-life ads as the advertising stimuli for the study. The ads were the same ads used in the *Using Mail to Build Brands* study. For examples of ads from each design category, see *Using Mail to Build Brands*, pp. 3 and 40.

The study was conducted across two weeks. In the first week, participants viewed 60 ads split into two evenly counterbalanced sets of ads: 30 physical ads and 30 digital ads.<sup>8</sup> The time participants spent viewing each ad was measured with special eyewear. After reviewing a full set of ads, researchers tested participants on measures of brand recall, brand message association, brand discrimination, and a general attitude survey of brand attitude and affinity. Table 1 describes Week 1 tasks and what they measured.<sup>9</sup>

**Table 1: Week 1 Measures**

Week 1	Ad Exposure	Brand Recall	Message Association	Brand Discrimination	General Brand Attitude Survey
<ul style="list-style-type: none"> <li>■ Self-Reports</li> <li>■ Eye Tracking</li> </ul>	View 60 ads in two counter-balanced blocks (30 print and 30 digital ads)	Recall as many brand names as possible from each block of ads	Identify the brand names associated with messages featured in the ads	Correctly attribute images from an ad/foil to the target brand	Identify attitudes on ads/brands (brand loyalty and brand awareness, etc.)

Source: OIG analysis.

A week later, researchers tested the same participants on the accuracy of their recall of the ads they had seen the previous week. Participants also performed a series of tasks related to brand association and brand recognition. As participants performed the tasks, the researchers used fMRI to examine effects at the subconscious, neurological level. Participants also completed a post-fMRI survey to test the vividness of their memories of specific details from the ads.<sup>10</sup> Table 2 summarizes the Week 2 tasks.<sup>11</sup>

**Table 2: Week 2 Measures**

Week 2	Ad Recognition	Context Recognition	Brand Association	Brand Recognition	Post-Scan Survey
<ul style="list-style-type: none"> <li>■ Behavioral Tests</li> <li>■ fMRI Scans</li> </ul>	Identify if ad snippets (36 targets, 18 foils) were or were not seen during Week 1	Identify the Week 1 format (physical or digital) for the ads seen during Week 1	Choose the brand names associated with the ads seen during Week 1	View 24 brand names from Week 1 ads and recall ad details/rate vividness of memories	Complete survey testing memory of details from ads seen during Week 1 (e.g. ad content, color, location of design features)

Source: OIG analysis.

<sup>8</sup> 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.

<sup>9</sup> See the Session 1 Tasks and Measures section in the CNDM report for a more detailed discussion of the measures used in Week 1.

<sup>10</sup> Note that the fMRI adaptation tests performed in the *Using Mail to Build Brands* white paper are not reported in this paper because the older participants had challenges completing the adaptation task, resulting in insufficient data.

<sup>11</sup> See the Session 2 Tasks and Measures section in the CNDM report for a more detailed discussion of the measures used in Week 2.

## Format Findings: Physical and Digital

Several of the findings in this study confirm and build upon the OIG's prior research. Once again, physical outperformed digital in terms of leaving a lasting impression of the ad and the brand, regardless of age.<sup>12</sup> However, processing time was one area in which younger and older participants responded differently to physical and digital advertising.<sup>13</sup>

The following are the key findings regarding format:

- **Across age groups, the physical format proved more effective than digital in leaving a lasting impression.** The experiment indicated that regardless of age, the physical ads were more effective at creating strong memories of the ads and the brands. During Week 1, physical proved more effective for brand recall and brand discrimination across age groups; during Week 2, physical was more effective for ad recognition, the vividness of brand recognition, and the ability to recall specific details about the ads during the post-scan memory test. These findings are consistent with the OIG's prior research. They are also an indication that physical ads retain effectiveness with young adults for eliciting a lasting memory of ads and brands.
- **Across age groups, neuroimaging analysis demonstrated the effectiveness of physical ads.** During Week 2, researchers measured neural activity as participants attempted to recall the ads and brands they had seen a week earlier. The fMRI findings indicated greater activation in the bilateral hippocampus – an area of the brain associated with memory formation and retrieval – for physical ads versus digital ads. This is consistent with

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*Physical advertising outperformed digital in terms of leaving a lasting impression of the advertisement, regardless of age.*

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the self-response and behavioral measures indicating stronger memory and brand associations for physical ads. Critically, these differences in the bilateral hippocampus between physical and digital ads did not vary as a function of age.

- **Both age cohorts processed the digital ads faster than the physical.** Though both groups processed physical ads longer than digital ads, the difference was much larger for the younger adults than the older group. The researchers found that exposure time, which was self-selected by participants, accounted for some of the effectiveness of physical over digital. This may mean that in instances of limited audience attention, digital could have greater benefits with younger participants. However, it is noteworthy that the younger participants 1) voluntarily chose to spend more time with the physical than the digital ads and 2) spent longer with physical than their older counterparts. Perhaps a greater novelty of physical advertisements for younger participants required and/or piqued an interest to spend more time with the physical ads than the digital. This is a valuable subject for future research.<sup>14</sup>

## Category Findings: Functional, Emotional, and Metaphorical

While the study was consistent with prior OIG research in terms of format effectiveness, it revealed interesting differences regarding the effectiveness of an ad's category – whether it was functional, emotional, or metaphorical – across consumer age groups. Understanding how different audiences, including age cohorts, react to ad design categories is crucial for advertisers' campaign strategies.

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*Understanding how different audiences, including age cohorts, react to ad designs is crucial for advertisers' campaign strategies.*

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<sup>12</sup> For all results, researchers conducted a 2 (age, between-subjects) x 2 (format, within-subject) x 3 (category, within-subject) repeated-measures ANOVA (Analysis of Variance) for each of the dependent measures, unless specified otherwise in the CNDM draft. Unless otherwise noted, findings in this paper are drawn from the statistically-significant results ( $p < .05$ ).

<sup>13</sup> Regardless of format and category differences, this study found that, in general, age has significant effects on most measures pertaining to advertising effectiveness. Across nearly all measures of ad and brand recall, the older participants remembered fewer ads and brands, and were less successful in brand message association and brand discrimination. The study also found that neural activation in the prefrontal cortex (measured while participants were recalling ads during Phase 2) decreased with age. These age effects findings are consistent with existing research, and were, therefore, not surprising to the researchers.

<sup>14</sup> In addition to the exposure time finding, areas of difference between younger and older participants for the format analysis were the ad relevancy and context recognition measures. These findings are noted and discussed in the CNDM report.

Table 3 below summarizes the findings regarding ad category.

**Table 3: Summary of Ad Category Findings**

Age	Ad Category		
	Functional	Emotional	Metaphorical
Older Adults (ages 47-68)	<p>Functional ads were more effective than emotional for measures related to brand and ad recall.</p> <p>There was greater neural activation for functional ads in areas of the brain associated with identifying of objects, indicating stronger retrieval of details.</p> <p>Functional ads drove the effectiveness of physical format over digital for boomers.</p>	<p>Emotional ads were less effective than functional, relative to younger adults, in measures related to brand and ad recall.</p> <p>The cognitive association between emotional appeals and consumer recall of specific ad details may be weaker in older adults than younger adults.</p>	<p>Metaphorical ads were consistently effective across measures in the study.</p>
Younger Adults (ages 18-41)	<p>Functional ads were the least effective across all three categories in measures related to brand and ad recall.</p>	<p>Emotional ads were more effective than functional in measures related to brand and ad recall.</p>	<p>Metaphorical ads were consistently effective across measures in the study.</p>

Source: OIG analysis.

The following are the key findings regarding category:

- **Functional ads in the physical format were more effective with the older participants.** The study found that functional ads in the physical format were relatively more effective for older adults than the younger adults in measures related to brand recall and ad recognition. For these measures, the emotional and metaphorical categories proved more effective than functional with the younger adults.<sup>15</sup> However, for the older adults, the functional ads were either equally or more effective than emotional ads. Researchers also found that as boomers were recalling details of the ads and brands, the functional ads were associated with greater activation in the bilateral anterior insula, prefrontal cortex, and fusiform regions — together indicating a stronger retrieval of details for functional ads than emotional ads; this was not the case for the younger cohort.<sup>16</sup>

<sup>15</sup> These measures include brand recall, brand discrimination accuracy (marginally significant), and ad recognition – for both context accuracy and brand name (marginally significant).

<sup>16</sup> The fusiform area is commonly associated with representation of objects and items generally, indicating a stronger retrieval of these details for functional ads than emotional ads. Similarly, the increased activation in the



One potential explanation for these age effects is that the emotional appeal elicits a strong association with details of the advertisement for younger adults, but less so for older adults. The power of emotional designs in creating strong memories is well documented, but this research indicates that the association between emotional appeal and recall of specific ad details may vary with age, especially over time (approximately one week in this experiment).<sup>17</sup> That is, the emotional appeal may have diminished efficacy for older adults, relative to functional appeals, in eliciting long-term memories of ads and brands.

- **For boomers, the stronger recall of physical ads was driven by the functional category.** The researchers conducted a specific examination of how the oldest participants, in the boomer generation (n=23), reacted to the ads. While physical ads were associated with greater brand recall than digital ads for both the younger and older groups, for boomers this effect was driven by functional ads. That is, boomers recalled brands from the physical-functional ads much better than brands from the digital-functional ads. In fact, with boomers there was generally no difference across categories for digital ads, but functional and metaphorical ads were generally more effective than emotional ads in the physical format. These findings are in contrast with the millennials, who showed higher brand recall for metaphorical and emotional ads, and lowest brand recall for functional ads. While more research is needed, this is another indication that the functional category is relatively more effective than the emotional category with older adults when it comes to brand recall.
- **Metaphorical ads performed well across age groups on most measures.** Of the three categories tested, the metaphorical ads proved consistently effective across measures of ad effectiveness – including recall of ad snippets, brand names, and specific attributes of the ad designs – for both younger

and older adults. This finding provides substantial evidence that, overall, metaphorical ad designs are particularly effective.

## Further Exploration

This research gives important insights into how both advertising formats and categories are effective across age groups. The strategic design of an ad campaign will always come down to an individual advertiser's target audience and objectives. Still, future research efforts could provide further insight into when and how mail could be a valuable marketing tool. In addition to neuromarketing, further exploration could use other methods and ask new questions.

For instance, ethnographic experiments could investigate how consumers, including those of different age cohorts, typically spend time with different ad media, including mail, in the home.<sup>18</sup> Studying how consumers interact with ads outside of a laboratory environment would be instructive in understanding how neuromarketing insights translate to the real world. Such research could also give insight into how habits around media are transferred between generations. In addition, by partnering with advertisers, the Postal Service could develop actual use cases to demonstrate the enduring value of mail, how to best integrate mail into a multi-channel campaign, or the effectiveness with different audiences, including various age cohorts.

On the horizon, new technologies may also make it possible to employ the scientific rigor of neuromarketing outside of the lab by utilizing smaller, less intrusive portable and wearable devices to measure neurological and physiological reactions to advertising material. New technologies may soon merge the best of both worlds, allowing researchers to observe emotions and unconscious responses in real time, and in natural environments.<sup>19</sup>

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prefrontal and insular regions also indicate the stronger associations between the various contents for functional than emotional ads.

17 The one-week time gap in this study is longer than many similar studies investigating advertising effectiveness.

18 Royal Mail has conducted some ethnographic research into the use of mail in the home. See: Royal Mail, *The Private Life of Mail*, February 2015, [https://www.mailmen.co.uk/sites/default/files/Private\\_Life\\_of\\_Mail\\_RESEARCH\\_BOOK\\_A4\\_ONLINE.pdf](https://www.mailmen.co.uk/sites/default/files/Private_Life_of_Mail_RESEARCH_BOOK_A4_ONLINE.pdf).

19 Some recent literature has referred to this new frontier in advertising research as “nanomarketing.” See: Antonio Mileti, Gianluigi Guido, and M. Irene Prete, “Nanomarketing: A New Frontier for Neuromarketing,” *Psychology & Marketing*, 33 (July 2016): pp.664-74.

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## Conclusion

This study builds on prior OIG research by exploring how physical and digital advertisements are effective across age cohorts. Confirming our prior research, we found that physical ads were effective for leaving a lasting impression of ads and brands, for both younger and older consumers. Across age cohorts, the physical format proved more effective than digital in measures of ad recognition, brand recall, brand discrimination, and in memory of specific details from ads. Yet, younger participants processed digital ads faster than physical ads relative to boomers. This could be an advantage for digital, with younger consumers, in instances of limited attention span. At the same time, it raises interesting questions as to why consumers, across our neuromarketing body of research, voluntarily engaged longer with the physical ads.

The OIG also found some noteworthy differences in the effectiveness of advertising design categories across age cohorts. For younger participants,

the ads designed to elicit an emotional response were generally more effective than the ads that focused on describing a product's function. Yet, this was not the case for older adults, for whom the functional appeals were more effective, especially when presented in physical format. Ads that used metaphors were equally effective across all ages. These findings provide insight into how different age cohorts react to categories of ad designs, which is important for advertisers looking to optimize the effectiveness of their ad campaigns.

Age segmentation is a common strategy for companies seeking to understand and improve the effectiveness of their advertising efforts. In light of the rise of digital media, it is important that the Postal Service identify how, when, and with whom mail is still an effective tool for advertisers. Taken together, this research sheds light on ways advertising mail can continue to maintain lasting relevance as a medium for marketers.

# CNDM Report

## EFFECT OF AGE ON BRAND MARKETING: ROLE OF ADVERTISING FORMAT AND ADVERTISING CATEGORY

### Introduction

There are roughly 75 million Baby Boomers currently living in the U.S. and they spend close to 50 percent of all consumer-packaged goods (CPG) dollars.<sup>20</sup> However, less than 5 percent of advertising is geared towards them. Notably, Baby Boomers also control about 70 percent of the disposable income in the U.S. Baby Boomers spend more time online than Millennials, with about half of Baby Boomers spend at least 15 hours per week online compared to 41 percent of Millennials. Interestingly, one third of all tablets are owned by people 50 years and older and about half of these users made a purchase online after searching on the tablet. Finally, Baby Boomers also watch 174 hours of television a month, which is 63 percent more than Millennials. These statistics argue that the Baby Boomers are a very important and often neglected segment of consumers in terms of advertising, and contrary to popular beliefs that older adults are less technology-savvy and prefer print media, the numbers clearly suggest otherwise. Therefore, it is crucial for marketers to understand these market segments better, and target their advertising efforts appropriately across different ages.

In this study, we explicitly focus on whether consumers across different age segments respond differently to advertisements. Specifically, we seek to understand how Baby Boomers and Millennials form their brand perceptions based on advertisements presented in different formats (print vs. digital) and advertising categories (functional, emotional, metaphorical), and how marketers can use this information to target and enhance the value of a brand across consumers of different ages. In a previous report titled *Using Mail to Build Brands*, we elucidated the role of physical (print) and digital (electronic) formats on key measures of brand marketing like brand recognition, brand recall, and brand attitude using a multi-methodological approach. We seek to examine the effectiveness of physical and digital advertising messages across ages by studying the effects of age on self-reported measures like ad liking, ad relevance and purchase intent; on emotional, cognitive and memory measures obtained using functional Magnetic Resonance Imaging (fMRI); plus self-reported responses (e.g., brand attitudes). Individuals across different ages may respond differently to physical and digital media in

<sup>20</sup> Immersion Active, "24 Stats Marketers Need to Know about Baby Boomers in 2017," June 19, 2017.  
<https://www.immersionactive.com/resources/24-stats-marketers-need-to-know-about-baby-boomers-in-2017/>.

marketing communications, leading to differences in how these communications impact their response to the products features in the ad. Recently, the U.S. Postal Service Office of Inspector General (OIG) focus group study with Digital Natives<sup>21</sup> found that young participants applying for college preferred receiving both mail and emails about important deadlines and events. Similarly, physical media and communications provide the means for brands to break through the increasing clutter of the digital space, thus appealing to younger generations in a less intrusive manner. Yet, the effectiveness of different marketing formats across ages, particularly older adults, has not been systematically evaluated. Accordingly, we hope to understand when and why physical mail can be an appropriate choice for enhancing a company's brand using marketing communications across different age segments, and suggest how advertisers should effectively use physical and digital communications in their advertising campaigns to enhance their brand based on the age segments that are being targeted. Finally, we seek to examine whether, how, and why advertising category (functional, emotional, metaphorical) plays a role in enhancing a company's brand across different age segments. Specifically, we seek to understand if specific types of advertisements would be more effective for older adults (such as Baby Boomers) relative to younger adults (such as Millennials) in terms of brand building.

## METHODS

A total of 60 participants participated in this study<sup>22</sup> (Mean age = 42 yrs, sd = 16.2, 33 females) – 25 Millennials (ages 18-31), 12 Generation X (ages 38-52) and 23 Baby Boomers (ages 53-68).<sup>23</sup> All participants were screened to make sure they were eligible for an fMRI scan, such as having no non-removable 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.

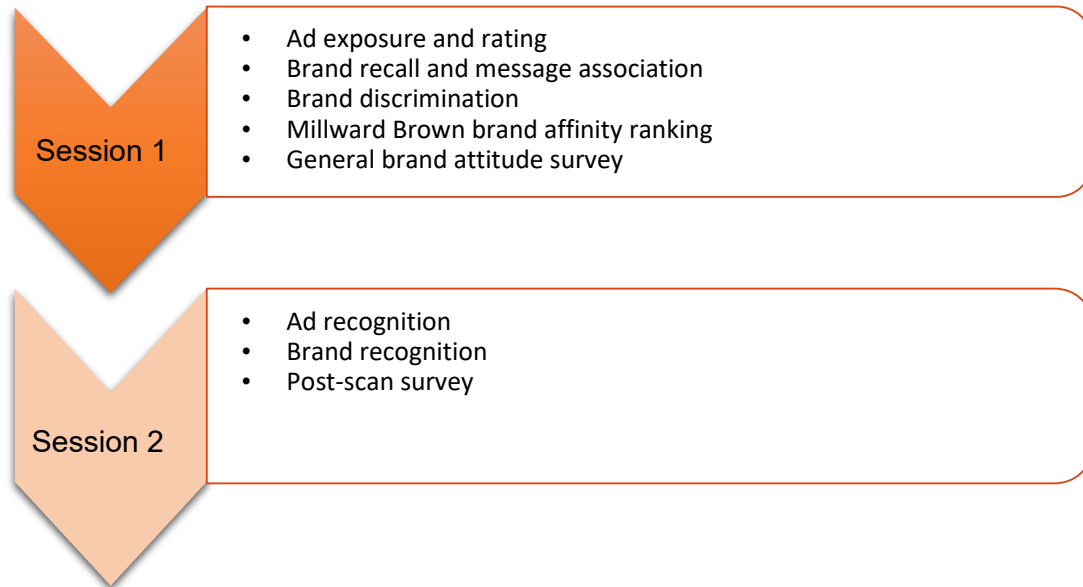
Participants came to the lab for Session 1 one week after screening. In this session, participants viewed 60 advertisements in two different formats (30 physical and 30 digital ads). The ads were selected equally from the three different categories (functional, emotional, and metaphorical) and were available in either physical or digital format to the participant. Physical ads were printed on oversized post cards while digital ads were presented on a Microsoft Surface tablet.

<sup>21</sup> *Enhancing Mail for Digital Natives*, U.S. Postal Service Office of Inspector General RARC Report No. RARC-WP-14-001, November 18, 2013.

<sup>22</sup> Data from 30 of these participants (all 25 Millennials and 5 of the younger Gen X participants) from the younger cohort were presented as part of the previous RARC report titled *Using Mail to Build Brands*.

<sup>23</sup> Baby Boomers are typically defined as people born between the years 1946-1964. Since the data was collected in early and middle of 2018, some of these participants were still 53 years old during data collection.

Each participant was randomly assigned to one of two groups – physical-first or digital-first. 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 format and Set B in physical format, 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.



**Figure 1: Protocol Summary**



## Session 1 Tasks and Measures

### ***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 Task***

At the end of each block, participants 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 condition, they typed the brands on the tablet using an extendable keyboard. For the physical 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 message-association task for six brands in each format (two from each category), where they were shown a message from the ad and were asked to identify the corresponding brand name. After completing both blocks, 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 brand. 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.

### ***Millward Brown Brand Affinity Ranking Task***

This task was adapted from a survey metric for brand affinity developed by Millward Brown.<sup>24</sup> 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 they included six physical ads and six 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 much they liked that brand. They could place multiple brands on the same scale point, if desired. We then 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).

### ***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 and measured attitudinal equity, attitudinal loyalty, brand awareness, brand favorability, brand trust, and brand loyalty.

## **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 and a brand recognition task. They also completed a post-scan survey outside of the scanner.

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<sup>24</sup> Alagon, J., & Samuel, J. "The Meaningfully Different Framework – a Breakthrough in Holistic Brand Equity Measurement." Millward Brown, April 2013. [http://www.millwardbrown.com/docs/default-source/insight-documents/articles-and-reports/MillwardBrown\\_MeaningfullyDifferentFramework\\_April2013.pdf](http://www.millwardbrown.com/docs/default-source/insight-documents/articles-and-reports/MillwardBrown_MeaningfullyDifferentFramework_April2013.pdf)

### ***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. 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. The rationale behind this approach is that if participants could 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.

### ***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 they 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 seconds interval, 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;
- (4) Remember all details about the ad.

Vividness was also verified by a post-scan survey.

## **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. 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 (e.g., negative attitudes towards advertisements, preference for communications by email, preference for taking notes on paper and preference for books over e-books). Using cross tabulation (chi-square tests), we found no statistically significant differences across any of these pre-attitude measures between younger and older adults.

For all analyses of age presented here, we split our sample into two groups: younger adults (N= 29,<sup>25</sup> ages 18 to 41) and older adults (N = 31, ages 47 to 68).<sup>26</sup> We next sought to investigate the effect of age (younger or older), advertising format (physical or digital), advertising category (functional, emotional, and metaphorical), and their interactions on each of the measures obtained in Session 1 and Session 2. For all results presented below, we conducted a 2 (age, between-subjects) x 2 (format, within-subject) x 3 (category, within-subject) repeated-measures Analysis of Variance for each of the dependent measures, unless specified otherwise. While we focus mainly on the statistically significant results ( $p < 0.05$ ), we also highlight findings that were marginally significant ( $p < 0.1$ ) as the direction of these effects may still provide valuable insights that may hold with increased statistical power.

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<sup>25</sup> One 47-year-old Gen X participant was included in the previous RARC report, leading to 30 young participants reported there. However, that participant was moved to the older sample in this report (younger Gen X was treated as ages 38-42 in this report).

<sup>26</sup> Most results replicate when analyzing the data using just two groups – Millennials (ages 19 to 34) and Baby Boomers (ages 53 to 68). Some of the data from Baby Boomers is presented separately later in this report.

## Session 1 Results

### *Ad Exposure and Ratings*

The exposure time and ratings across formats and age groups are summarized in Table 1. For exposure time, there was a significant effect of ad format ( $F(1,53) = 22.52, p < .001$ ),<sup>27</sup> with physical ads being processed for a significantly longer time than digital ads. There was also a significant interaction between age and format ( $F(1,53) = 7.01, p = .011$ ). Though both groups showed significantly longer processing times for physical than digital ads, the difference was much larger for younger than older adults. Lastly, we also found a significant effect of ad category ( $F(2,106) = 5.61, p = .005$ ). Functional ads were processed significantly longer than metaphorical ads across both age groups (Figure 2).

For ad liking, there was a significant main effect of age ( $F(1,58) = 12.09, p = .001$ ) with older adults liking the ads more than younger adults overall (Table 1). There was also a marginally significant effect of format ( $F(1,58) = 3.93, p = .052$ ) with participants liking digital ads more than physical ads. We did not find a significant effect of advertising category or any interactions with age.

For ad relevancy, there was no significant effect of age or format but a marginally significant interaction between age and format ( $F(1,58) = 3.69, p = .060$ ). Older adults rated digital ads higher than physical ads on ad relevancy, whereas younger adults rated digital ads lower than physical ads on ad relevancy. There was also a significant effect of advertising category ( $F(2,116) = 42.28, p < .001$ ). Functional ads were rated as more relevant than metaphorical ads, which in turn were rated as more relevant than emotional ads. Again, there were no interaction effects with age.

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<sup>27</sup> We excluded data from five participants (three younger adults, two older adults) from this analysis due to technical problems with video recording that prevented us from estimating exposure times for physical ads.



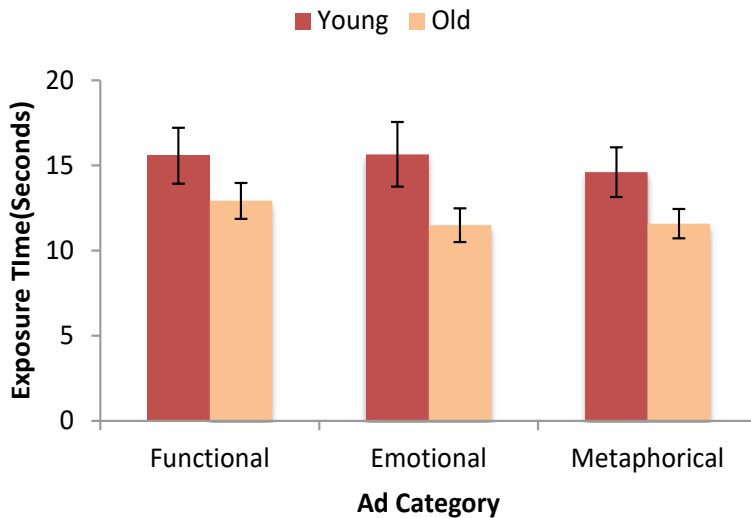
**Table 1. Results Summary of Ad Exposure and Ratings**

	Younger		Older		Statistics (F-value)		
	Physical	Digital	Physical	Digital	Age	Format	Age * Format
Exposure Time	18.02 (10.30)	12.45 (8.41)	12.96 (5.49)	11.16 (5.78)	2.43	22.52***	7.01**
Ad Liking	4.60 (0.63)	4.72 (0.89)	5.27 (0.84)	5.41 (0.82)	12.1**	3.93*	.03
Ad Relevancy	4.33 (0.65)	4.20 (0.69)	4.44 (0.91)	4.57 (0.94)	1.49	.00	3.69*
Familiarity	5.50 (0.48)	5.63 (0.48)	5.56 (0.80)	5.67 (0.76)	.10	2.91*	.04
Purchase Intention	3.91 (0.75)	3.81 (0.78)	4.10 (1.00)	4.11 (1.02)	1.26	.47	.75

Note: Numbers in parentheses are standard deviations. \* p<0.1, \*\* p<0.05, \*\*\* p<0.001

For brand familiarity, we found a marginally significant effect of format ( $F(1,58) = 2.91, p = .094$ ). Participants were more familiar with digital ads than physical ads. There was a significant effect of ad category ( $F(2,116) = 36.34, p < .001$ ). Emotional and metaphorical ads were significantly higher than functional ads in terms of familiarity. In addition, we found a significant interaction effect between age and advertising category ( $F(2,116) = 3.17, p = .046$ ). Both older and younger adults rated functional ads the lowest, but older adults rated emotional ads as more familiar than metaphorical and younger adults rated metaphorical ads as more familiar than emotional ads.

Finally, for purchase intention, there was a significant effect of advertising category ( $F(2,116) = 23.00, p < .001$ ). Functional ads were significantly higher than metaphorical ads, which were in turn significantly higher than emotional ads on purchase intention.



**Figure 2. The Interaction of Age and Ad Category on Exposure Time**

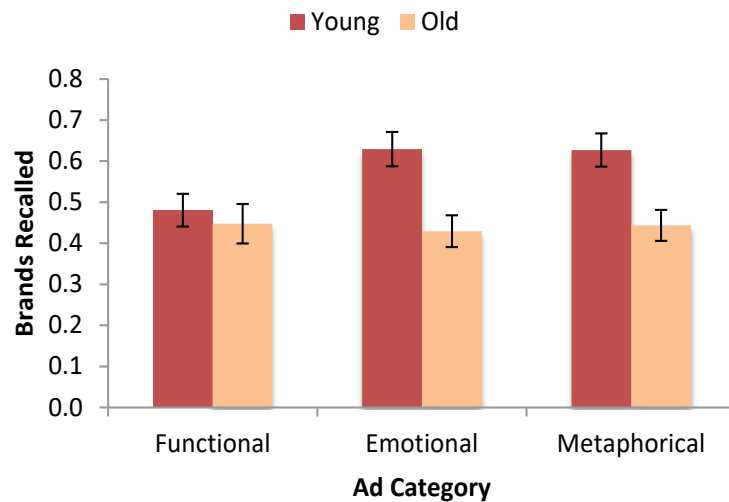
### ***Brand Recall***

We found a significant effect of age ( $F(1,58) = 6.87, p = .011$ ) on brand recall, with younger adults recalling more brands than older adults overall (Table 2). There was a significant effect of format ( $F(1,58) = 10.861, p = .002$ ). Physical ads were associated with better brand recall compared to digital ads. We also found a significant effect of category ( $F(1.7,101.5) = 7.03, p = .002$ ). Participants had higher brand recall for metaphorical and emotional ads than functional ads, but there was no difference between metaphorical and emotional ads (Figure 3). There was also a significant interaction effect between age and category ( $F(2,116) = 9.53, p < .001$ ). For younger adults, participants had higher brand recall for metaphorical and emotional ads compared to functional ads. There was no significant difference between metaphorical and emotional ads. However, for older adults, there was no significant difference between the ad categories on brand recall.

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

	Younger		Older		Statistics (F-value)		
	Physical	Digital	Physical	Digital	Age	Format	Age * Format
Brands Recalled (Proportion)	0.61 (0.23)	0.55 (0.19)	0.48 (0.25)	0.40 (0.20)	6.87**	10.86**	0.27
Accuracy: Msg. Association	1.20 (0.54)	1.11 (0.42)	0.89 (0.53)	0.83 (0.40)	8.15**	1.19	0.01
Accuracy: Brand Discrimination	0.83 (0.12)	0.80 (0.13)	0.75 (0.11)	0.70 (0.13)	12.74**	4.29**	0.74
RT: Brand Discrimination	2.01 (0.71)	2.01 (0.67)	2.58 (0.77)	2.57 (0.68)	11.96**	0.00	0.00
Brand Affinity Ranking	0.68 (1.19)	0.99 (1.29)	1.49 (1.24)	1.34 (1.15)	4.96**	0.20	1.70

Note: Numbers in parentheses are standard deviations. \* p<0.1, \*\* p<0.05, \*\*\* p<0.001



**Figure 3. The Interaction of Age 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 age was significant ( $F(1,58) = 8.15, p = .006$ ) with younger adults associating more messages correctly with their corresponding brands. There were no significant effects of advertising format, advertising category, or any interactions with age for message association.

### ***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 age on this brand discrimination accuracy was significant ( $F(1,58) = 12.74, p = .001$ ), with younger participants discriminating more brands than older adults. The effect of format was significant ( $F(1,58) = 4.29, p = .043$ ), with discrimination accuracy being higher for physical ads than digital ads. There was also a significant effect of category ( $F(2,116) = 8.65, p < .001$ ). Participants had a marginally significant higher brand discrimination accuracy for metaphorical ads compared to emotional ads, and significantly higher brand discrimination accuracy for both metaphorical and emotional ads compared to functional ads. Critically, we also found a marginally significant interaction between ad category and age ( $F(2,116) = 2.94, p = .057$ ). For both groups, accuracy for metaphorical ads was the highest. However, while accuracy for emotional ads was higher than functional ads, no such difference was found in the older group.

**Reaction Time:** For each brand, we estimated the mean reaction time as the time it took participants to classify the six stimuli as old or new (Table 2). The lower the reaction time, the stronger the association between the images and the brand. In terms of reaction time for brand discrimination, there was a significant effect of age ( $F(1,58) = 11.96, p = .001$ ). Younger participants had smaller brand discrimination reaction time than older participants. Moreover, the effect of advertising category was significant ( $F(1.5, 88.5) = 10.61, p < .001$ ). Specifically, significantly longer time was needed to discriminate functional ads, as compared to emotional and metaphorical ads across all participants.

### ***Millward Brown Brand Affinity Ranking***

The main effect of age on brand affinity was significant ( $F(1,58) = 4.96, p = .030$ ). Older adults had significantly higher brand affinity ratings than younger adults. We also found a significant effect of ad category ( $F(2,116) = 27.91, p < .001$ ). Specifically, metaphorical ads had higher brand affinity ratings than functional ads, while functional ads had higher brand affinity ratings than emotional ads. However, we found no significant effect of format or interactions with age.

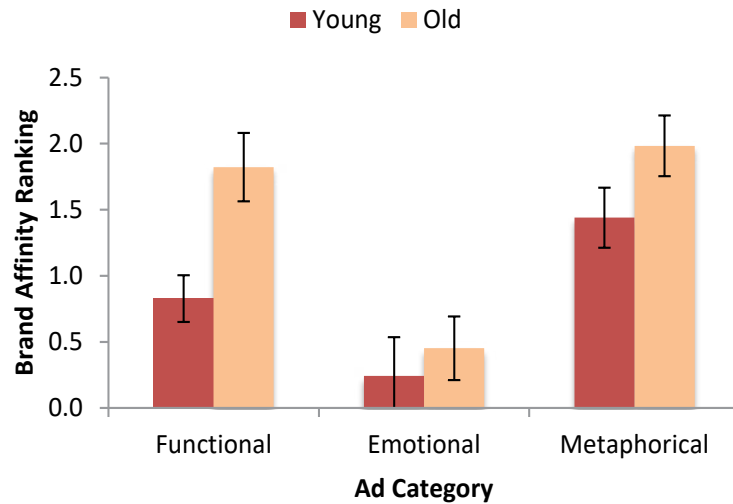


Figure 4. The Interaction of Age and Ad Category on Brand Affinity Ranking

Brand Attitudes

Table 3. Results Summary of Brand Attitudes

	Younger		Older		Statistics (F-value)		
	Physical	Digital	Physical	Digital	Age	Format	Age * Format
Attitudinal Equity	3.84 (0.93)	3.91 (0.92)	4.44 (1.11)	4.35 (1.14)	4.06**	0.01	1.41
Attitudinal Loyalty	3.14 (1.07)	3.17 (1.07)	3.67 (1.18)	3.70 (1.13)	3.58*	.33	.00
Brand Awareness	4.32 (0.58)	4.36 (0.80)	4.41 (0.90)	4.39 (0.97)	0.10	0.02	0.11
Brand Favorability	4.70 (0.64)	4.73 (0.83)	4.81 (0.77)	4.67 (0.85)	0.01	0.68	1.74
Brand Trust	4.31 (0.91)	4.39 (0.91)	4.76 (1.09)	4.74 (1.07)	2.59	0.15	0.48
Brand Loyalty	3.33 (0.75)	3.38 (0.64)	3.53 (0.66)	3.52 (0.48)	1.20	0.27	0.39

Note: Numbers in parentheses are standard deviations. \* p<0.1, \*\* p<0.05, \*\*\* p<0.001



The means from the brand attitude measures for each of the constructs across formats are summarized in Table 3. Age had a significant direct effect on attitudinal equity ( $F(1,58) = 4.06$ ,  $p = .048$ ), and a marginally significant effect on attitudinal loyalty ( $F(1,58) = 3.58$ ,  $p = .064$ ). In general, older adults had significantly higher attitudinal equity and attitudinal loyalty ratings than younger adults. We also found significant effect of ad category on attitudinal loyalty ( $F(2,116) = 4.21$ ,  $p = .017$ ; participants had higher attitudinal loyalty ratings for metaphorical ads than emotional ads), brand awareness ( $F(2,116) = 31.56$ ,  $p < .001$ ; participants had higher brand awareness ratings for metaphorical ads and emotional ads, compared to functional ads), brand favorability ( $F(2,116) = 8.63$ ,  $p < .001$ ; participants had higher brand favorability ratings for metaphorical ads, compared to emotional and functional ads), brand trust ( $F(2,116) = 5.90$ ,  $p = .004$ ; participants had higher brand trust ratings for metaphorical ads and emotional ads, compared to functional ads) brand loyalty ( $F(2,116) = 12.11$ ,  $p < .001$ ; participants had higher brand loyalty ratings for functional and metaphorical ads, compared to emotional ads) and a marginally significant effect of ad category on attitudinal equity ( $F(2,116) = 3.08$ ,  $p = .05$ ; participants had higher attitudinal equity ratings for metaphorical compared to functional ads).

## Session 2 Results

In Session 2, approximately a week after Session 1, participants were shown snippets from the same ads and were asked to retrieve other associations about the ad, like the context (format) in which it was presented and the brand name associated with the ad. The results from the ad recognition, brand recognition, and post-scan survey are summarized in Table 4.

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

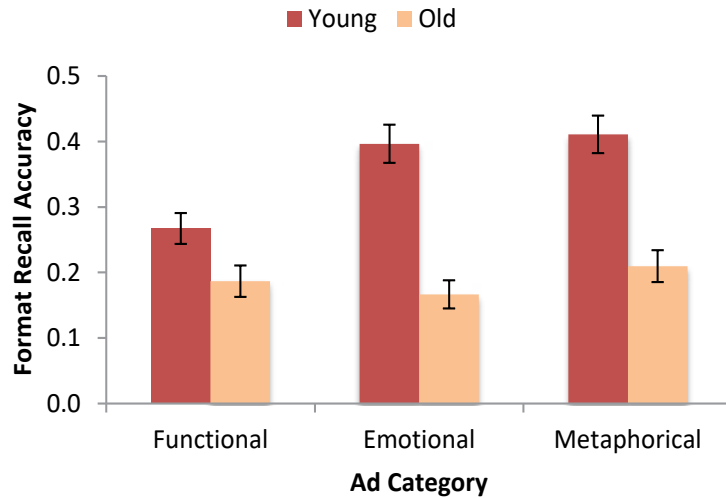
	Younger		Older		Statistics (F-value)		
	Physical	Digital	Physical	Digital	Age	Format	Age * Format
Ad Recognition: Snippet Accuracy	0.74 (0.16)	0.61 (0.12)	0.49 (0.18)	0.42 (0.19)	36.98***	17.81***	1.75
Ad Recognition: Context Accuracy	0.43 (0.13)	0.29 (0.15)	0.20 (0.13)	0.18 (0.12)	44.08***	10.75**	6.24**
Ad Recognition: Brand Name Accuracy	0.43 (0.16)	0.38 (0.15)	0.14 (0.11)	0.13 (0.09)	86.37***	2.65	1.73
Brand Recognition: Vividness	2.37 (0.54)	2.33 (0.44)	2.63 (0.55)	2.46 (0.58)	2.54	2.82*	1.27
Post-scan Memory	4.81 (0.41)	4.70 (0.39)	4.41 (0.27)	4.34 (0.25)	24.49***	5.16**	0.40

Note: Numbers in parentheses are standard deviations. \* p<0.1, \*\* p<0.05, \*\*\* p<0.001

#### **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 participants were exposed to the corresponding ads in physical or digital format in Session 1). There was a significant main effect of age ( $F(1,56) = 36.98, p < .001$ ). Specifically, younger adults recognized more snippets accurately than older adults. There was also a significant effect of ad format ( $F(1,56) = 17.81, p < .001$ ) with snippets from physical ads being recognized more accurately than digital ads. Moreover, the main effect of ad category was also significant ( $F(2,112) = 11.84, p < .001$ ). Specifically, functional ads had lower snippet recognition accuracy compared to metaphorical and emotional ads.

### Ad Recognition: Context Accuracy



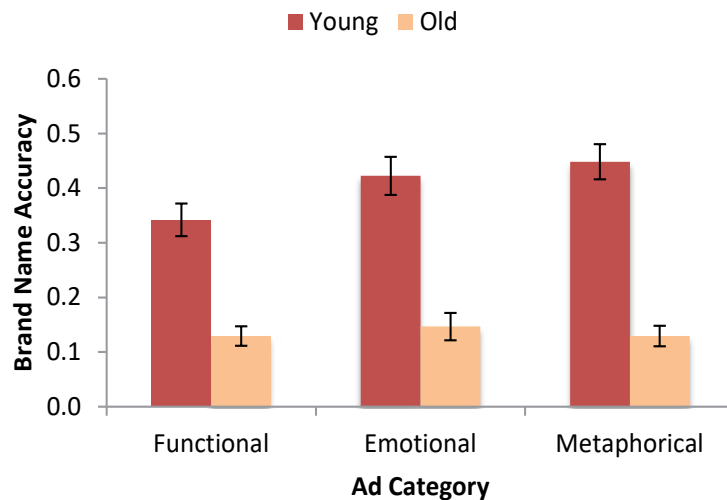
**Figure 5. The Interaction of Age and Ad Category on Context Recognition**

We next estimated whether participants correctly identified the format (physical or digital) in which the snippets were presented to them in Session 1 (Figure 5).<sup>28</sup> There was a significant effect of age ( $F(1,56) = 44.08, p < .001$ ). Specifically, younger adults performed better than older adults on context recognition accuracy. There was a significant effect of ad format ( $F(1,56) = 10.75, p = .002$ ). Physical ads had higher format recognition accuracy than digital ads. There was also a significant interaction effect between age and advertising format ( $F(1,56) = 6.24, p = .015$ ). While context recognition accuracy in younger adults was significantly higher for physical ads than for digital ads, there was no such difference in older adults. Moreover, we found a significant effect of ad category ( $F(2,112) = 7.72, p = .001$ ). Functional ads had lower context recognition accuracy compared to metaphorical and emotional ads. Finally, the interaction effect between age and ad category was also significant ( $F(2,112) = 6.77, p = .002$ ), as illustrated in Figure 5. While functional ads had lower context recognition accuracy compared to metaphorical and emotional ads in younger adults, no differences across categories were found in older adults.

<sup>28</sup> Note that if participants did not recognize the snippets correctly, then they would automatically be marked inaccurate for the brand name and context accuracy analyses.

### **Ad Recognition: Brand Name Accuracy**

We then estimated whether participants correctly identified the brand names associated with the snippets (Figure 6). There was a significant effect of age ( $F(1,56) = 86.37, p < .001$ ). Specifically, younger adults performed better than older adults on brand name recognition accuracy. We also found a significant effect of ad category ( $F(2,112) = 3.69, p = .028$ ). Functional ads had lower brand name recognition accuracy compared to metaphorical and emotional ads. The interaction effect between age and ad category was marginally significant ( $F(2,112) = 3.03, p = .052$ ), as illustrated in Figure 6. For older adults, there was no significant difference in terms of format recognition accuracy. For younger adults, functional ads had lower format recognition accuracy compared to metaphorical and emotional ads.



**Figure 6. Interaction of Age 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 the vividness of their memory recall (on a scale of 1 to 4). Though not significant, we found that older adults had higher vividness ratings than younger adults. We found a marginally significant effect of ad format on these vividness ratings ( $F(1,57) = 2.82,$

$p = .099$ ), with directionally higher vividness rating for physical ads than digital ads (Table 4). Moreover, the main effect of ad category was significant ( $F(2,114) = 9.34, p < .001$ ). Specifically, emotional and metaphorical ads had higher vividness ratings than functional ads.

### **Post-scan Memory For Ad Details**

Finally, participants were also presented with a series of statements that measured the depth of their knowledge and memory for the various ads presented to them in Session 1. Based on their responses, we calculated a post-scan memory score for the details of the ad. There was a significant effect of age ( $F(1,55) = 24.49, p < .001$ ). Younger adults remembered more details about the ad than older adults. We also found a significant effect of format on post-scan memory ( $F(1,55) = 5.16, p = .027$ ). Participants remembered more details from physical ads than digital ads. We also found a significant effect of ad category ( $F(2,110) = 10.67, p < .001$ ). Participants remembered more details for metaphorical ads than functional or emotional ads. Functional ads exhibited marginally significantly higher post-scan memory relative to emotional ads.

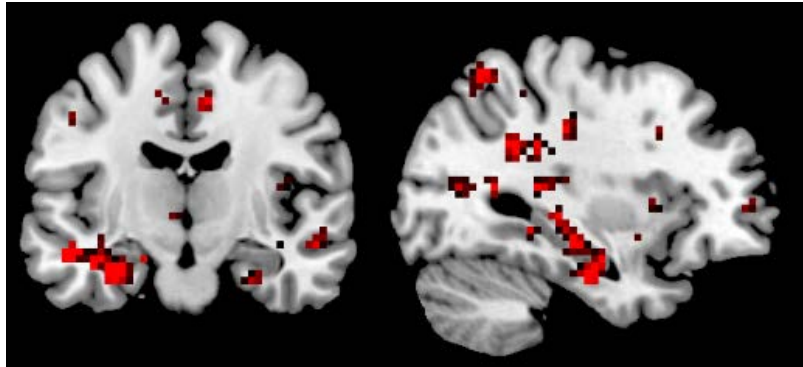
### **FMRI Results on Ad Recognition**

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 the brand. Across all participants, we found significantly greater activation in bilateral hippocampus (a region in the brain associated typically with encoding and retrieval of memory associations) for physical compared to digital ads, consistent with improved memory associations for physical ads as seen in our previous studies (Figure 7).<sup>29</sup> Critically, these differences in the bilateral hippocampus between physical and digital ads did not vary as a function of age. However, we found an age-related decrease in activation in the prefrontal cortex, a region associated with executive function and cognitive processing (Figure 8). We also found age-related reduction in activation in the parahippocampal region, a region shown in our previous study<sup>11</sup> and other studies to be associated with the retrieval of contextual associations in memory. These reductions in activation in prefrontal and parahippocampal regions as a function of age was consistent across ad formats and ad categories, explaining the reduced ability of older adults to retrieve associations

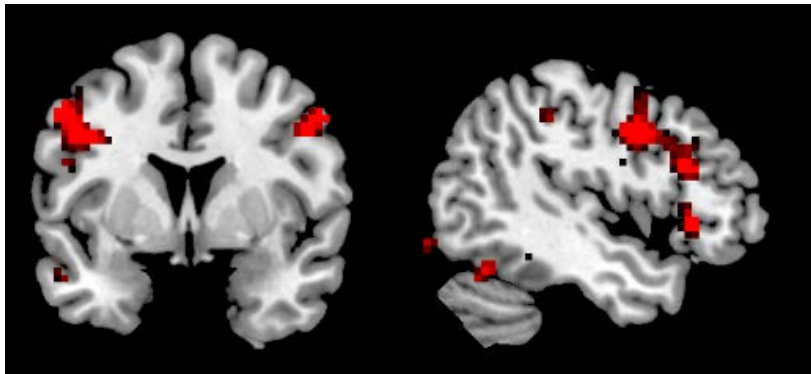
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<sup>29</sup> *Using Mail to Build Brands*, U.S. Postal Service Office of Inspector General RARC Report No. RARC-013; *Enhancing the Value of Mail: The Human Response*, U.S. Postal Service Office of Inspector General RARC Report No. RARC-15-012.

based on the snippets, and as a result, the reduced overall memory accuracy observed in our study for older adults.



**Figure 7: Across all Participants, There Was Increased Activation in the Hippocampus for Physical than Digital Ads**



**Figure 8: Older Adults Were Associated with Reduced Activation in the Prefrontal Regions During Recognition Across all Three Categories of Stimuli**

## **Integrating Session 1 and Session 2**

In Session 1, we found that physical ads were processed significantly longer than digital ads across both groups, though the effect was much stronger for younger than older adults. We sought to understand if this difference in exposure time could explain some of the differences

in recognition accuracy across advertising format and age in Session 2. To test these effects, we ran a series of mixed-effect linear regression models using statistical package in R, where variables were nested first by ad and then by participant. We focused primarily on exploring the effects of advertising format (physical and digital) and age (young, old), collapsing across advertising categories. Consistent with the effects above, we found a significant effect of format on snippet recognition accuracy ( $b=0.48$ ,  $se = 0.10$ ,  $p<0.001$ ), but not on context or brand name recognition. We also found a significant effect of age on snippet recognition ( $b=1.07$ ,  $se=0.14$ ,  $p<0.001$ ) and brand name recognition ( $b=1.43$ ,  $se=0.19$ ,  $p<0.001$ ) with younger people having greater accuracy than older people. Critically, we only found a significant age and format interaction only for context accuracy ( $b=0.58$ ,  $se = 0.23$ ,  $p = 0.011$ ).

Next, we ran these regressions again by including exposure time as an additional regressor, to see if these differences across advertising format and age can be explained by differences in exposure times in Session 1. We found that exposure time was a significant predictor of both snippet recognition ( $b=0.04$ ,  $se=0.01$ ,  $p<0.001$ ) and brand name recognition ( $b=0.02$ ,  $se=0.01$ ,  $p = 0.005$ ) with longer exposure times leading to higher accuracy. Critically, the effect of format on snippet recognition was still significant ( $b=0.36$ ,  $se=0.14$ ,  $p = 0.009$ ), and so was the effect of age on all three measures. These results suggest that while exposure time partially mediated the recognition accuracy, it did not fully explain the differences across format and age. Other factors like brand familiarity could also play a critical role in explaining some of these differences. We return to these in the discussion on Baby Boomers in the next section.

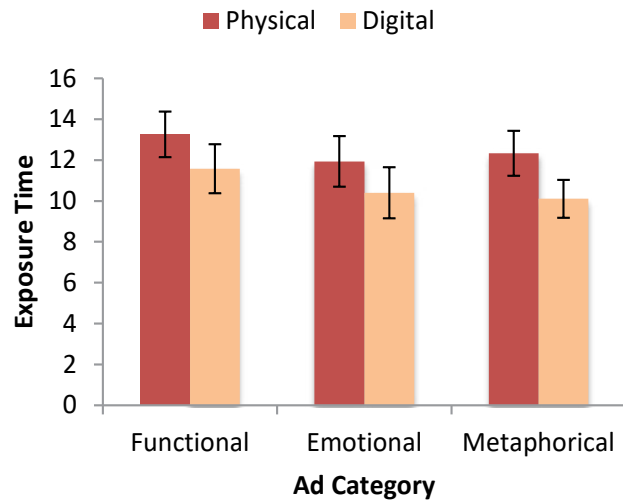
## Examining the Effects of Advertising on Baby Boomers

In this section, we focused mainly on the effect of ad format and ad category on Baby Boomers. We performed a 2 (ad format) x 3 (ad category) repeated-measures ANOVA on key memory dependent measures, focusing only on the 23 participants between the ages of 53 and 68<sup>30</sup>. We were primarily interested in understanding which category of advertising was more effective for this important segment of the population and critically, how format of advertising influenced the effectiveness of these categories using both behavioral and fMRI measures.

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<sup>30</sup> To address concerns about small sample size, we ran a power analyses using G\*power. To reliably detect differences with an effect size as small as 0.3 using a minimum of 4 advertisements per condition, and with power of 0.9 (90% chance of detecting an effect that exists) in a repeated-measures analysis, we need a sample size of 22.



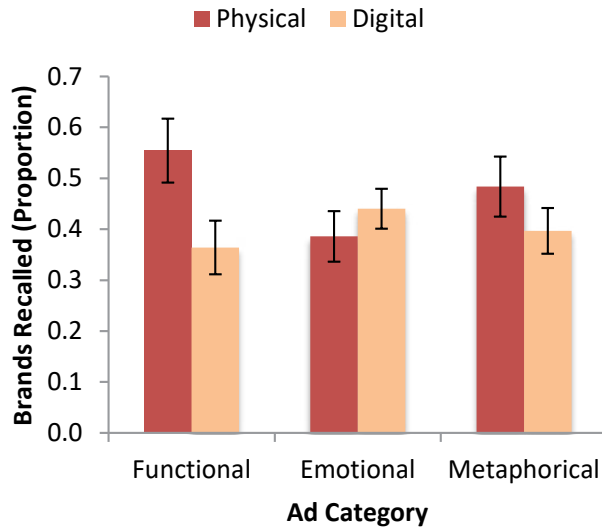


**Figure 9. Interaction of Format and Ad Category on Exposure Time for Baby Boomers**

We found a significant effect of advertising format ( $F(1,21) = 4.84, p = .039$ ) for exposure time (Figure 9), with physical ads being associated with longer exposure time than digital ads for Baby Boomers. We also found a significant effect of advertising category ( $F(2,42) = 5.10, p = .010$ ), with functional ads associated with longer exposure times than emotional and metaphorical ads. The interaction between format and advertising category was not significant.

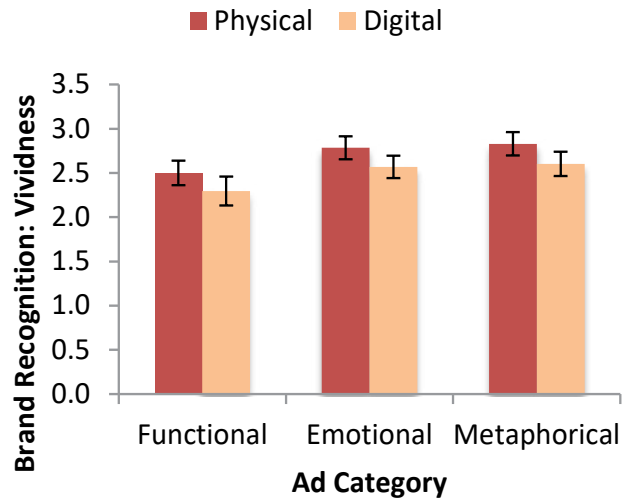
For brand recall (Figure 10), we found a marginally significant effect of format ( $F(1,22) = 4.28, p = .051$ ) and an interaction between format and category interaction ( $F(2,44) = 5.92, p = .005$ ). Using post-hoc tests, we found that while physical ads were associated with greater brand recall than digital advertisements, this effect was primarily driven by differences in functional ads ( $t(22) = 3.46, p = .002$ ), and not emotional or metaphorical advertisements. There was no significant difference between advertising format for emotional and metaphorical ads. In general, there was no difference across categories for digital ads, but functional and metaphorical ads were better than emotional ads in the physical format. These findings are in contrast with the Millennials, who showed higher brand recall for metaphorical and emotional ads, and lowest brand recall for functional ads.

In general, functional ads seem to work well for Baby Boomers, particularly when presented in physical format. In terms of brand discrimination accuracy, we found a significant effect of category ( $F(2,44) = 7.67, p = .001$ ), but no effect of format or an interaction effect. Brands from the metaphorical ads were discriminated more accurately than functional and emotional ads.



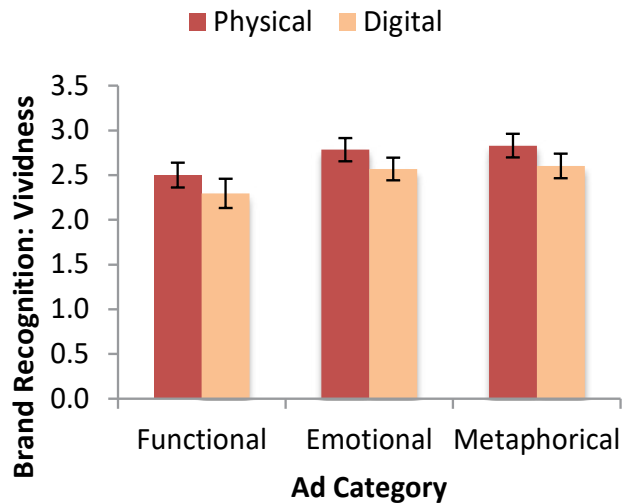
**Figure 10. Interaction of Format and Ad Category on Brand Recall for Baby Boomers**

In terms of brand vividness ratings (Figure 11), when participants were trying to recall as many details from the ad for a given brand as possible, we found a significant main effect of ad category ( $F(2,42) = 4.98, p = .011$ ) and a significant effect of ad format ( $F(1,21) = 4.42, p = .048$ ), but no significant interaction effect. Participants rated as recalling details for physical ads better than digital ads, and details from metaphorical and emotional ads as better than functional ads.



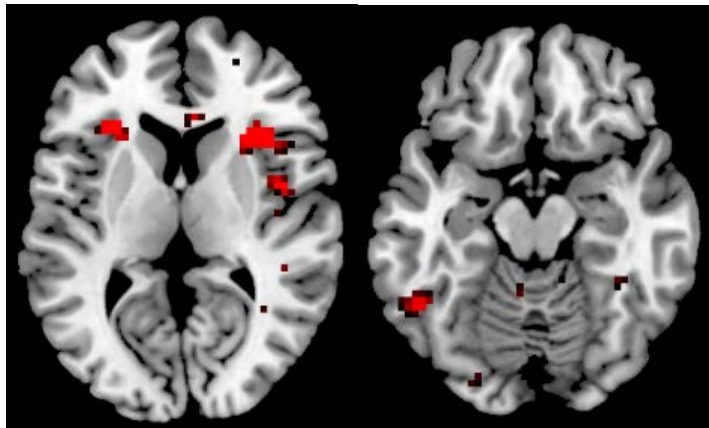
**Figure 11. Interaction of Format and Ad Category on Brand Vividness for Baby Boomers**

When we then explicitly tested their memory for details from the ad at the end of the study though, we again found a main effect of category ( $F(2,40) = 3.69, p = .034$ ). However, participants now remembered fewer details from the emotional ads relative to both functional and metaphorical ads. This was particularly driven by reduced memory for emotional ads presented in digital format (Figure 12).



**Figure 12. Interaction of Format and Ad Category on Post-Scan Memory for Baby Boomers**

To understand these differences further, we looked at the fMRI data between categories when participants were trying to recollect details from these ads. While participants rated emotional ads as more vivid than functional ads, we found functional ads to be associated with greater activation in the bilateral anterior insula, prefrontal cortex, and fusiform regions as they were retrieving this information relative to those from emotional ads (Figure 13). The fusiform area is commonly associated with representation of objects and items generally, indicating a stronger retrieval of these details for functional ads than emotional ads. Similarly, the increased activation in the prefrontal cortex and bilateral anterior insular regions also indicate the stronger associations between the various contents for functional than emotional ads, which corroborate the findings from the post-scan memory measures where participants are better at recalling details from functional than emotional ads.



**Figure 13. Increased Activation in Bilateral Anterior Insula (left) and Fusiform Gyrus (right) for Functional than Emotional Ads During Brand Recognition**

Overall, these differences between the vividness and explicit memory ratings across categories are worthy of further discussion. Together with the brain data, they suggest that participants may remember certain salient aspects of the ad more accurately for emotional ads, making them believe that they remember more details about the ad. However, this strength of associations between the various contents of the ad is indeed stronger for functional and metaphorical ads, which is likely why they lead to greater memory for details from the ad. To test this further, we looked at the effects of exposure time on vividness and explicit memory ratings using linear

mixed effects regression model. Exposure time was not a significant predictor of vividness but was a significant predictor of post-scan explicit memory consistent with the notion that vividness ratings are based on superficial aspects of the ad and are not impacted by engagement or degree of processing.

## DISCUSSION

This multi-methodological study combines behavioral and neurophysiological methods to examine age effects in advertising communications across different advertising formats and categories. The study explicitly manipulates the advertising *format* (physical versus digital) and advertising *category* (functional, emotional, and metaphorical), and examines the effects of age 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) measures of advertising effectiveness, such as ad liking, ad relevancy, ad familiarity and purchase intention,
- (c) self-reported measures, such as brand affinity, brand awareness, brand favorability, brand trust, brand loyalty, brand recognition, brand recall,
- (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 have summarized all results in Table 5. As seen from Table 5, age had significant effects on most behavioral and self-reported measures pertaining to advertising effectiveness. At the outset, these findings may not seem surprising given the documented effects of aging on cognitive capabilities and memory. Specifically, older adults exhibited poorer brand recall, brand discrimination, ad recognition (snippets, brands and context) and memory for details featured in the ad, compared to the younger adults. Yet, we also found some surprising effects. First, we did not find any significant differences in general attitudes towards physical and digital materials across age. Second, older adults liked the ads presented in this study better overall, and they showed greater brand affinity. Third, there were no significant differences in exposure times across age, indicating that older adults were equally engaged as the younger participants in processing the ads. Finally, we did not find any age effects on the general attitudes towards the

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brands featured in this study. Therefore, despite the poor memory for the information presented in the advertisements, older adults do seem to show strong engagement and positive attitudes towards advertising in general, stressing the importance of accounting for age in advertising and explicitly focusing on the responses of older adults to advertising.

**Table 5. Results Summary of Effects of Age, Ad Format, Ad Category, Interaction between Age and Ad Format, and Interaction between Age and Ad Category across all Behavioral and Self-Reported Measures**

	Effects				
	Age	Ad Format	Age* Ad Format	Ad Category	Age* Ad Category
Exposure Time		***	**	**	
Ad Liking	**				
Ad Relevancy				***	
Familiarity				***	**
Purchase Intention				***	
Brands Recalled (Proportion)	**	**		**	***
Accuracy: Msg. Association	**				
Accuracy: Brand Discrimination	**	**		***	
RT: Brand Discrimination	**			***	
Brand Affinity Ranking	**			***	
Attitudinal Equity	**				
Attitudinal Loyalty				**	
Brand Awareness				***	
Brand Favorability				***	
Brand Trust				**	
Brand Loyalty				***	
Ad Recognition: Snippet Accuracy	***	***		***	
Ad Recognition: Context Accuracy	***	**	**	**	**
Ad Recognition: Brand Name	***			**	
Brand Recognition: Vividness				***	
Post-scan Memory	***	**		***	

\*\* p<0.05, \*\*\* p<0.001



Consistent with the findings from our previous report on younger adults (*Using Mail to Build Brands*), advertising format (print versus digital) continued to have a significant effect on a multitude of behavioral and self-reported measures, notably exposure time, brand recall, brand discrimination, ad recognition, and post-scan memory. Participants across both age groups recalled and accurately discriminated more brands from physical than from digital ads, and they showed greater memory for details from physical versus digital ads, even a week after they were exposed to the ads. They also processed digital ads for significantly lesser time than physical ads, which partially explained the memory advantages for physical over digital ads. Critically for the purposes of this study, we also found significant interaction effects between advertising format and age, particularly in terms of exposure time, ad relevancy, and context recognition. While younger adults processed physical ads for significantly longer than digital ads during exposure, older adults did not show such stronger differences across advertising format. Older adults processed both format of ads for equal durations unlike younger adults, who were significantly faster in processing digital ads. Similarly, younger adults showed significantly better context memory for physical than digital ads, unlike older adults who showed no difference in accuracy across formats. Together with the finding that increased exposure times leads to better memory in general, and in Baby Boomers specifically, it may be possible to improve advertising effectiveness in older adults by increasing their level of engagement and processing times during exposure through the use of more relevant messaging and appropriate ad categories for their age, as discussed further below.

Advertising category (functional, emotional, metaphorical) had a significant effect on almost all measures in our study. Since the brands were randomly assigned to each of the different ad categories prior to the start of the study, some of the differences in brand attitudes across categories may be related to the apriori allocation of the specific brands to these categories. Nonetheless, we found significant interaction effects between advertising category and age for familiarity, brand recall, brand discrimination accuracy, and ad recognition (context accuracy and brand name). In general, we found that younger adults showed greater differences across the different categories compared to older adults. In the previous study (*Using Mail to Build Brands*), we found that younger adults were significantly better at remembering information from metaphorical and emotional ads, relative to functional ads. However, the pattern of findings was different for older adults.

We explored further the effect of advertising category among Baby Boomers. In general, we found that Baby Boomers processed functional ads for significantly longer than emotional and

metaphorical ads, and physical ads longer than digital ads. They also exhibited between brand recall and recollected more details from functional and metaphorical ads than emotional ads. Strikingly, they seemed to rate their vividness higher for emotional than functional ads. Together with the brain data, these findings suggest that Baby Boomers may remember certain salient aspects of the ad more accurately for emotional ads (consistent with increased vividness for these ads), but they remember few other details from emotional ads. However, the strength of associations between the various contents of the ad is much stronger for functional and metaphorical ads, which is likely why they lead to greater memory for details from the ad. Critically, these differences were stronger for physical ads than digital ads. In summary, these findings suggest that functional ads in the physical format may be the most effective format for Baby Boomers, especially with respect to remembering the associations between the various elements of the ad. Given the importance of targeting Baby Boomers differently from Millennials and other consumer age groups, understanding what advertising formats would better cater to Baby Boomers in terms of brand building would be an important practical implication.

## Contributions

In sum, this study makes two unique contributions to the advertising literature and practice:

*First*, we add to the understanding of the effectiveness of physical and digital advertising messages across age segments by studying the effects of age on self-reported measures of ad effectiveness, such as ad liking and ad relevance, plus other emotional and cognitive measures obtained using both self-reported responses (e.g., brand attitudes). We also demonstrate these differences for fMRI measures using brain data, such as activations in the hippocampus and prefrontal cortex. The effectiveness of ad formats across ages, particularly older adults, has not been systematically evaluated, and there is a gap in the literature in terms of how Baby Boomers interact with physical and digital advertising. Therefore, our first contribution is to improve our understanding of when and why physical advertising can be an appropriate choice for enhancing a firm's brand using marketing communications across different age segments, particularly among older adults in terms of liking and recognizing ads.

*Second*, we provide valuable insights to advertisers on how to effectively use physical and digital ads in their advertising campaigns to enhance their brand, based on the age segments that are being targeted across different ad categories (functional, emotional, and metaphorical). This is especially true for marketers seeking to target Baby Boomers given their differential

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sensitivity to information presented across different ad categories, specifically the superiority in terms of processing functional ads compared to emotional, and most importantly, metaphorical ads.

In sum, in terms of dealing with different advertising formats and different advertising category, this study clearly shows that age is an important factor that needs to be explicitly accounted for in advertising campaigns in terms of whether different categories of ads are presented across different ad formats to different ages, specifically Baby Boomers that increasingly represent an important segment of the consumer population.

# Appendix: Management's Comments

STEVEN W. MONTEITH  
VICE PRESIDENT, MARKETING



February 20, 2019

Amanda Martinez  
Manager, RARC Central, Risk Analysis Research Center  
U.S. Postal Service Office of the Inspector General

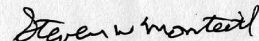
SUBJECT: Final Review Draft – *Advertising Effectiveness and Age*  
(Report Number 2018RARC014 – January 31, 2019)

Thank you for the opportunity to review the final draft of the white paper on “Advertising Effectiveness and Age.”

Marketing has reviewed the report and found value in the results and have no suggestions or changes to the draft.

- The Postal Service agrees with the OIG that reaching the right consumers is an ongoing struggle for businesses, both large and small and that companies need to understand their target audience and find effective ways to communicate with them.
- The Postal Service understands that customizing advertising efforts to specific consumers, including demographic variables such as age, is a long-standing component of marketing strategies.
- The Postal Service has and will continue to use market research and other studies on the generational differences regarding advertising effectiveness.

Advertising mail is an important source of revenue for the Postal Service and a great tool for businesses. We will continue to drive the growth and benefits of mail with our customers.

  
Steven W. Monteith

cc: Sally Haring, Manager, Corporate Audit Response Management  
Freddy Diaz, RARC, USPS OIG  
Amanda Stafford, Director, Customer Segmentation, RARC, USPS OIG  
E-FOIA, USPS OIG

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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).**