

**THE EFFECT OF ADVERTISING COMPLEXITY AND REPETITION ON ATTITUDE
TOWARD DIGITAL SIGNAGE ADVERTISEMENTS**

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ABSTRACT

Digital signage is probably the most skyrocketing advertising medium of the moment, since the LCD-screens are almost impossible to avoid in everyday life for consumers. Therefore, academic research is needed to explore the potential of this medium. An experiment (2x2x2) was conducted to test the role of the level of complexity (simple/complex), the dimension of complexity (visual/lexical) and the level of repetition (one/four exposures) on the attitude toward digital signage advertisements (Aad). The results indicate a significant influence of advertising complexity on Aad, while no straightforward results could be found for the level of repetition. Simple advertisements with a dominant visual component seem to work best.

INTRODUCTION

Digital signage is all around us. The LCD-screens pop up everywhere: on subway platforms, in shops, elevators, bars and waiting rooms. A typical characteristic of digital signage is that messages appear multiple times in a very short period. The latter aspect is in contrast with, for example, a classic TV ad to which consumers also may be exposed multiple times, but with larger time gaps. To take advantage of the potential of the booming business of digital signage, advertisers should be informed on the ideal frequency and type of such messages. To partly fill this gap, this study explores the impact of the frequency of exposure and the intensity and type of complexity on the attitude toward digital out-of-home ads. More specifically, we investigate visual and lexical complexity at a low (simple) and high (complex) level for two different repetition levels (one versus four exposures).

THEORETHICAL BACKGROUND AND HYPOTHESES

Advertising Complexity

Complexity can be generally defined as “the amount of variety or diversity in a stimulus pattern” (Berlyne, 1960, p. 38). Four different complexity dimensions can be distinguished: visual, lexical, technical and informational (Stevenson et al., 2000; Bradley and Meeds, 2002, 2004; Putrevu et al., 2004; Chamblee et al., 1993). In this study, we will take a closer look at visual and lexical complexity, since those dimensions refer to the visual and verbal elements which form the basic of every digital signage advertisement. Visual complexity, the dimension that has been studied the most, can be defined as a function of the number of distinct elements in the stimuli, the dissimilarity between such elements and the degree to which the combinations of stimulus elements correspond to a single unit (Berlyne, 1958). Lexical (also called verbal or syntactic) complexity refers to the linguistic structure and semantic content of advertising messages (Lowrey, 1998, 2006; Putrevu et al., 2004). So, lexically complex ads hold compound sentences with more words and syllables than simpler ads.

For many years, ‘simplicity’ appeared to be a magic word in ad agencies when it comes to developing advertising messages (Anderson and Jolson, 1980; Shuptrine and McVicker, 1981; Chamblee et al., 1993). However, academic research cannot provide convincing evidence that simplicity overpowers complexity. With respect to visual complexity, for example, on the one hand researchers have found that consumers are more motivated to attend visually complex ads, spend more time looking at visually complex ads and process those ads more deeply (MacInnis et

al., 1991; Morrison and Dainoff, 1972; Phillips, 1997). On the other hand, complex visual elements act as strong distracters and elicit less vivid imagery than simple visual elements (Edell and Staelin, 1983; Rossiter and Percy, 1983).

Concerning the lexical dimension, some researchers suggest that the use of lexically complex messages isn't that effective since those messages necessitate more processing effort, decrease recall and have no effect on purchase intention (Bradley and Meeds, 2002; Lowrey, 1998; Macklin et al., 1985). In contrast, Chumblee et al. (1993) found that the use of complex verbal language in advertisements can help ad readership and enhance attitude formation and memory.

Advertising Repetition Effects

Berlyne (1970) suggests that affect toward a repeated stimulus is determined by two factors: habituation and tedium. A novel stimulus initially may be too unfamiliar, arousing and creates uncertainty. Initial levels of message repetition serve to enhance habituation, so the stimulus becomes familiar, appealing and less arousing by learning to know the stimulus. However, continued repetition causes tedium to arise, because of boredom and less learning. The boredom in this phase may be perceived as negative affect and may cause the message effectiveness to decrease (Anand and Sternthal, 1990).

Many studies delivered support to Berlyne's theory and proved respondents' attitudes toward the advocacy can enhance by multiple exposures and that a decline in brand evaluations can set in after a certain level of message repetition (e.g. Anand and Sternthal, 1990; Cacioppo and Petty, 1979; Nordhielm, 2002). However, several researchers could not discover an effect of message repetition on judgements and attitudes (Belch, 1982; Burke and Srull, 1988; Rethans et al., 1986). A possible explanation for these contradictory results may be the complexity level of the stimuli used in the different studies as Berlyne already pointed out in 1970 (Anand and Sternthal, 1990; Cox and Cox, 1988). He suggested that simple stimuli (e.g., a simple advertisement) would allow quicker learning, so the maximum affective response should be reached with fewer exposures, whereas complex stimuli (e.g., a complex advertisement) offers more opportunity to learn, so more exposures might be needed before boredom sets in (Janiszewski and Meyvis, 2001). Our study aims to investigate whether the effectiveness of digital signage advertisements indeed differs for different levels (simple/complex) of visual and lexical complexity at different levels of exposures (one/four). The number of exposures is studied since the frequency of exposure to a digital signage ad can be very different depending on the place where a LCD-screen is located (for example in a bar or on a subway platform). As such we hope to make a valuable contribution to the field of academic complexity and repetition effects research.

Hypotheses Development

Based on Berlyne's theory of repeated exposure (two-factor model), it might be expected that attitude toward an advertisement increases with repeated exposures because the uncertainty decreases (Cox and Cox, 1988).

H1: Repeated exposures to an advertisement will have a positive effect on Aad.

As noted earlier in this paper, mixed results are delivered concerning the effectiveness between the use of a simple or a complex ad. Research indicates that, on the one hand, simple ads appear to gather higher Aad scores, while, on the other hand, complex ads also appear to gather higher Aad scores (Anderson and Jolson, 1980; Chumblee et al., 1993; Lowrey, 1998, 2006; Morrison and Dainoff, 1972; Phillips, 1997; Rossiter and Percy, 1983). However, more studies indicate that simple ads score better on Aad than complex ads do, which results in the next hypothesis:

H2: Simple ads will score higher on Aad than complex ads will.

When combining Berlyne's theories of repeated exposure and stimulus complexity, it seems likely that the attitude toward a high-complex advertisement increases with repeated exposures (because of decreasing uncertainty) (Cox and Cox, 1988). For a low-complex advertisement little new about the ad can be learned (because of its simplicity and tedium that arises), so repeated exposures could decrease the attitude toward a simple advertisement. This information leads to the following hypothesis:

H3: Repeated exposures will have a positive (versus negative) effect on Aad for a complex (versus simple) advertisement.

Several researchers have studied the effects (e.g. recall, recognition and attitude) of visual versus verbal components of advertisements and the dissimilar ways in which these two components are processed cognitively (Childers et al., 1986; Edell and Staelin, 1983; Mitchell and Olson, 1981; Obermiller, 1985; Rossiter and Percy, 1983). Although there are mixed results, it can be stated that the visual component generates better attitudes, recall, recognition and product beliefs than the verbal component (Edell and Staelin, 1983). As such, we expect the visual ads (with a dominant visual component) to score better on Aad than the lexical ads (with a dominant text component):

H4: Visual ads will score higher on Aad than lexical ads will.

Childers et al. (1986) proved that more elaborative encoding occurs for the visual versus the verbal (lexical) portion of the ad. Obermiller (1985) mentioned that uncertainty reduction occurs as a result of increasing the elaboration of encoding. Combining those two facts offers us an interesting vision concerning the uncertainty reduction, repetition effects and the complexity dimensions of ads. Since the visual component of an ad is processed more thoroughly and easier than the verbal component of an ad, it might be expected that a decrease of Aad occurs for the visual ads after repeated exposures (because of fast uncertainty reduction where tedium sets in quickly), while an increase of Aad might be expected for the lexical ads (because of slow uncertainty reduction where habituation enhances) (Childers et al., 1986; Edell and Staelin, 1983). This leads to the following hypothesis:

H5: Repeated exposures will have a negative effect on Aad for a visual advertisement and a positive effect on Aad for a lexical advertisement.

As mentioned earlier, respondents might appreciate simple ads above complex ones. So, we expect more positive Aad scores for the visually simple ad than for the complex version (due to the uncertainty experienced by the respondent). Also for the lexical ads we expect more positive Aad scores for the simple ad than for the complex ad. However, a very small, probably not significant, difference is expected between these two ads since the respondents will experience more or less the same uncertainty when exposed to a lexically simple or complex ad, because for both versions thorough elaboration of the verbal part is needed, even for the simple one. This might result in roughly equal Aad scores for the lexically simple and complex ads. This leads to our final hypothesis:

H6: Visually simple ads will score higher on Aad than visually complex ads, while there will be no significant difference in Aad scores between lexically simple and complex ads.

METHOD

The hypotheses were tested in an experimental study using a 2 (complexity dimension: visual vs. lexical) x 2 (complexity intensity: simple vs. complex) x 2 (level of repetition: one vs. four exposures) design. One hundred and forty University students (84 female, 56 male; mean age=19.40, SD=1.156) took part in the study.

The respondents were all seated in front of a computer screen and were told that they were going to see a typical digital signage ad show of one minute and forty seconds. The slideshow consisted of two test ads and two filler ads. The test ads were shown one or four times and the filler ads two or three times which always resulted in a loop of 10 advertisements. All ads were rotated and counterbalanced for order and repetition level. The respondent saw one visual and one lexical ad at opposite level of complexity: a simple visual and a complex lexical or a complex visual and a simple lexical ad, where one of the test ads was shown one time and the other four times. The test ads were specially designed for this experiment. USB flash drive (visual ads) and print cartridges (lexical ads) were selected as the test-product categories since those types of products, as well as those of the filler ads, are part of respondents' field of interest. The visually simple ad was one where the respondents could determine that it was a USB flash drive ad immediately upon exposure (the dominant feature was a picture of the USB flash drive), while the visually complex version required respondents to make sense of the message before identifying it as a USB flash drive ad (the background was full of small USB flash drives which were not easy to identify as USB flash drives upon exposure) (Rossiter and Percy, 1983; Putrevu et al., 2004). The lexically complex ad holds compound sentences with more words and syllables (68 words, 3 sentences, 16 to 29 words per sentence (mean of 22.67), mean of 51 syllables per sentence) than the simple ad (48 words, 5 sentences, 7 to 20 words per sentence (mean of 9.6), mean of 17.4 syllables per sentence). A pre-test confirmed that the complexity level manipulations of the test ads were adequate, since the complexity scores of the simple ads were significantly lower than those of the complex ads ($t > 4$, $p < .05$ for all paired comparisons). When the slideshow was finished, the respondents were asked to fill in a questionnaire. Besides some filler questions, attitude toward each ad was measured using six sets of seven-point bipolar adjectives (Cronbach alpha=.66). Finally, the respondents' gender and age were recorded.

RESULTS

A manipulation check revealed that the complexity level manipulation of the advertisements was successful. The complexity scores of the simple ads were significantly lower than those of the complex ads ($t > 2$, $p < .05$ for all paired comparisons).

The results of a 3-way analysis of variance do not indicate a main effect of ad frequency (see Table 1). They do show a significant main effect for complexity intensity and complexity type. The Aad scores for the low complexity ads ($M=4.38$, $SD=1.13$) are significantly higher than the Aad scores for the high complexity ads ($M=3.77$, $SD=1.09$), supporting H2 ($F(1,139)=23.00$, $p=.000$). Further, the visual ads score higher on Aad ($M=4.42$, $SD=1.15$) than the lexical ads ($M=3.72$, $SD=1.05$), supporting H4 ($F(1,139)=30.88$, $p=.000$).

More importantly, the former main effects are qualified by two interaction effects. A marginal significant interaction effect emerged between repetition and type of complexity ($F(1,139)=3.45$, $p=.064$) (see Figure 1). After four exposures (in comparison to one exposure) the Aad scores for the visual ads diminished ($M1=4.58$, $SD=0.97$; $M4=4.27$, $SD=1.30$; $t=1.92$, $p=.58$), while the Aad scores for the lexical ads rose ($M1=3.64$, $SD=1.08$; $M4=3.80$, $SD=1.03$; $t=-0.69$, $p=.492$), lending

support for H5. A significant interaction effect was also found between intensity and type of complexity, which gives support to H6 ($F(1,139)=4.98, p=.026$) (see Figure 2). Visually simple ads score significantly higher on Aad ($M=4.87, SD=0.99$) than visually complex ads ($M=3.98, SD=1.12$) ($t=5.10, p=.000$), whereas no significant difference on Aad scores can be found between lexically simple ads ($M=3.88, SD=1.05$) and complex digital signage ads ($M=3.56, SD=1.03$) ($t=1.87, p=0.063$). Finally, no interaction effect appeared between repetition and level of complexity ($p>.05$) and as such H3 is rejected.

To summarize, a main effect was found for intensity and type of complexity, where type of complexity seems to be more important for digital signage ads than intensity of complexity. No main effect was found for repetition. Interaction effects were found between repetition and complexity type and between intensity of complexity and complexity type but not between repetition and intensity of complexity. So, hypotheses 2, 4, 5 and 6 are supported and hypotheses 1 and 3 have to be rejected.

CONCLUSIONS

The current study was a test of the hypotheses that advertising complexity and repetition affects the attitude toward digital signage advertisements. Our results confirm the influence of different levels and dimensions of complexity on Aad for advertisements on digital signage networks and are in line with previous researches performed with print advertisements (Anderson and Jolson, 1980; Shuptrine and McVicker, 1981; Chamblee et al., 1993; Lowrey, 1998, 2006; Morrison and Dainoff, 1972; Phillips, 1997; Rossiter and Percy, 1983; Stevenson et al., 2000; Bradley and Meeds, 2002, 2004; Putrevu et al., 2004). However, the effect of repeated exposures was only partly supported.

The Aad scores in this study indicate that advertising professionals better keep in mind the complexity level and dimensions of messages when designing digital-out-of-home advertisements. Simple messages seem to outperform complex ones and ads with a dominant visual component outperform ads with a dominant verbal component and as such bear out prior research (Anderson and Jolson, 1980; Lowrey, 1998, 2006; Morrison and Dainoff, 1972; Phillips, 1997; Rossiter and Percy, 1983; Childers et al., 1986; Edell and Staelin, 1983). Furthermore, visually simple ads get higher attitude scores than visually complex ads, while there are no differences between lexically simple and complex ads, probably due to the intensive elaboration that is needed to encode the text component in a digital environment even for simple lexical ads. However, after repeated exposure consumers' attitude scores seem to increase for lexical ads and decrease for visual ads. Hence, the number of times a consumer is exposed to a digital sign advertisement must be taken into account by advertising professionals.

The current results provide preliminary evidence that the level and dimension of advertising complexity has an influence on the attitude toward advertisements on digital-out-of-home networks where visual and simple ads seem to get the highest scores. However, we have to keep in mind that only ICT-equipment was used as product category in our study and this may limit the generalization of the results. So, more research is needed. First, further research should investigate whether similar results emerge for other product categories. Second, further research should examine the technical and informational dimensions of advertising complexity. Third, further research should include higher levels of repeated exposures.

REFERENCES

- Anand, P., Sternthal, B. (1990). Ease of message processing as a moderator of repetition effects in advertising, Journal of Marketing Research, 27 (August), 345-353.
- Anderson, R.E., Jolson, M.A. (1980). Technical wording in advertising: implications for market segmentation, Journal of Marketing, 44, 57-66.
- Belch, G.E. (1982). The effects of television commercial repetition on cognitive response and message acceptance, Journal of Consumer Research, 9 (June), 56-65.
- Berlyne, D.E. (1958). The influence of complexity and novelty in visual figures on orienting responses, Journal of Experimental Psychology, 55 (3), 289-296.
- Berlyne, D.E. (1960). Conflict, arousal, and curiosity, New York: McGraw-hill.
- Berlyne, D.E. (1970). Novelty, complexity, and hedonic value, Perception & Psychophysics, 8 (5A), 279-286.
- Bradley, S.D., Meeds, R. (2002). Surface-structure transformations and advertising slogans: the case for moderate syntactic complexity, Psychology & Marketing, 19 (7-8), 595-619.
- Bradley, S.D., Meeds, R. (2004). The effects of sentence-level context, prior word knowledge, and need for cognition on information processing of technical language in print ads, Journal of Consumer Psychology, 14 (3), 291-302.
- Burke, R.R., Srull, T.K. (1988). Competitive interference and consumer memory for advertising, Journal of Consumer Research, 15 (June), 55-67.
- Cacioppo, J.T., Petty, R.E. (1979). Effects of message repetition and position on cognitive response, recall and persuasion, Journal of Personality and Social Psychology, 37 (January), 97-109.
- Chamblee, R., Gilmore, R., Thomas, G., Soldow, G. (1993). When copy complexity can help ad readership, Journal of Advertising Research, 33 (3), 23-28.
- Childers, T.L., Heckler, S.E., Houston, M.J. (1986). Memory for the visual and verbal components of print advertisements, Psychology & Marketing, 3 (March/April), 137-150.
- Cox, D.S., Cox, A.D. (1988). What does familiarity breed? Complexity as a moderator of repetition effects in advertisement evaluation, Journal of Consumer Research, 15 (June), 111-116.
- Edell, J.A., Staelin, R. (1983). The information processing of pictures in print advertisements, Journal of Consumer Research, 10, 45-61.
- Geissler, G.L., Zinkhan, G.M., Watson, T.C. (2006). The influence of home page complexity on consumer attention, attitudes, and purchase intent, Journal of Advertising, 35 (2), 69-80.
- Janiszewski, C., Meyvis, T. (2001). Effects of brand logo complexity, repetition, and spacing on processing fluency and judgment, Journal of Consumer Research, 28 (June), 18-32.
- Lowrey, T.M. (1998). The effects of syntactic complexity on advertising persuasiveness, Journal of Consumer Psychology, 7 (2), 187-206.
- Lowrey, T.M. (2006). The relation between script complexity and commercial memorability, Journal of Advertising, 35 (3), 7-15.
- MacInnis, D.J., Moorman, C., Jaworski, B.J. (1991). Enhancing and measuring consumers' motivation, opportunity, and ability to process brand information from ads, Journal of Marketing, 55 (October), 32-53.
- Macklin, M.C., Bruvold, N.T., Shea, C.L. (1985). Is it always as simple as keep it simple, Journal of Advertising, 14 (4), 28-35.
- Mitchell, A.A, Olson, J.C. (1981). Are product attribute beliefs the only mediator of advertising effects on brand attitude?, Journal of Marketing Research, 18 (August), 318-332.

- Morrison, B.J., Dainoff, M.J. (1972). Advertisement complexity and looking time, Journal of Marketing Research, 9 (4), 396-400.
- Nordhielm, C.L. (2002). The influence of level of processing on advertising repetition effects, Journal of Consumer Research, 29 (December), 371-382.
- Obermiller, C. (1985). Varieties of mere exposure: the effects of processing style and repetition on affective response, Journal of Consumer Research, 12 (June), 17-30.
- Phillips, B.J. (1997). Thinking into it: consumer interpretation of complex advertising images, Journal of Advertising, 26 (2), 77-87.
- Putrevu, S., Tan, J., Lord, K.R. (2004). Consumer responses to complex advertisements: the moderating role of need for cognition, knowledge, and gender, Journal of Current Issues and Research in Advertising, 26 (1), 9-24.
- Rethans, A.J., Swasy, J.L., Marks, L.J. (1986). Effects of television commercial repetition, receiver knowledge, and commercial length: a test of the two-factor model, Journal of Marketing Research, 23 (February), 50-61.
- Rossiter, J.R., Percy, L. (1983). Visual communication in advertising, in: Harris, R.J. (ed.), Information Processing Research in Advertising, Hillsdale, NJ: Lawrence Erlbaum Associates, 83-126.
- Shuptrine, F.K., McVicker, D.D. (1981). Readability levels of magazine ads, Journal of Advertising Research, 21 (5), 45-51.
- Stevenson, J.S., Bruner, G.C., Kumar, A. (2000). Webpage background and viewer attitudes, Journal of Advertising Research, 40 (1-2), 35-42.

TABLES

Table 1: Results of a 3-way ANOVA taking ad frequency, complexity intensity and complexity type as independent variables and Aad as dependent variable

Source of variance	F-value	p-value	Hypothesis
Ad frequency	.351	.554	H1 not supported
Complexity intensity	23.002	.000	H2 supported
Ad frequency x complexity intensity	.748	.388	H3 not supported
Complexity type	30.880	.000	H4 supported
Ad frequency x complexity type	3.454	.064	H5 supported
Complexity intensity x complexity type	4.978	.026	H6 supported

FIGURES

Figure 1: interaction effect between repetition and type of complexity.

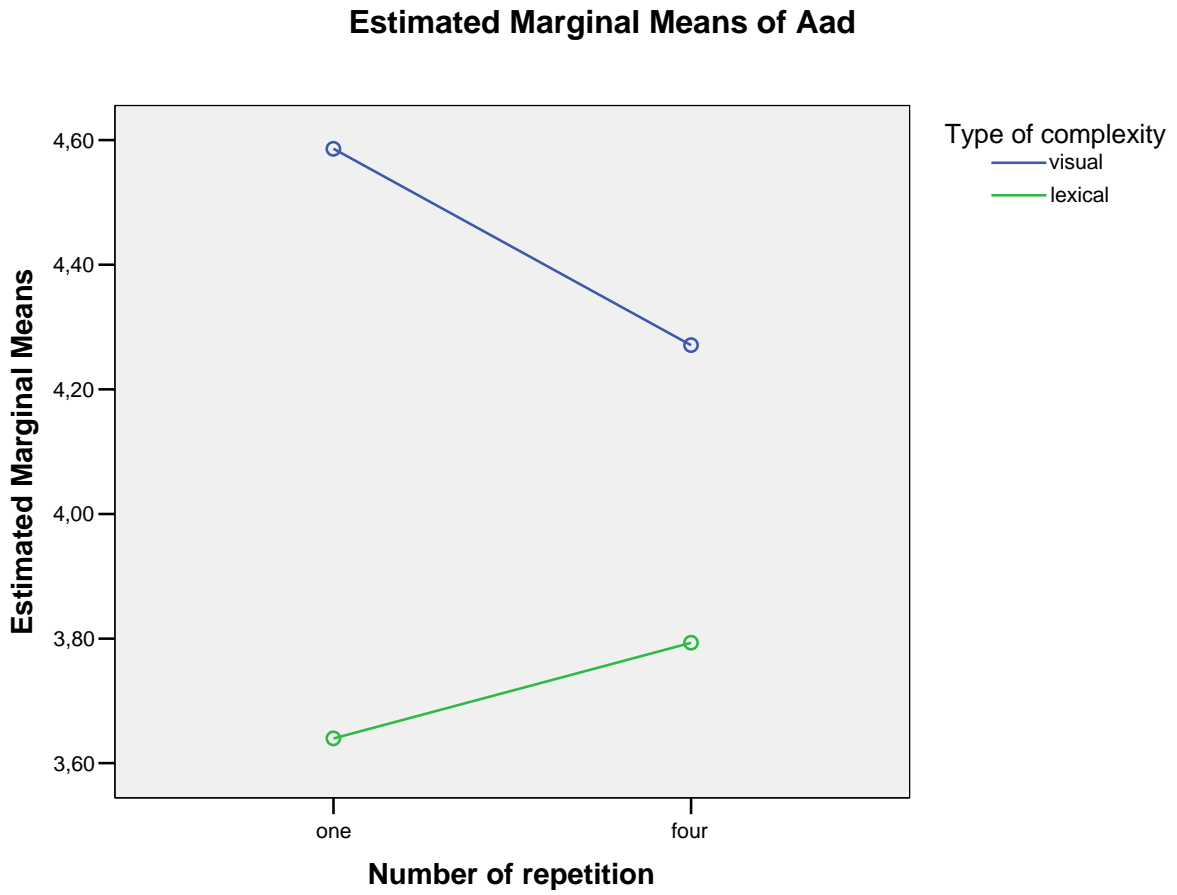


Figure 2: interaction effect between intensity and type of complexity.

