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ATINER's Conference Paper Series

MED2012-0122

**Always Take the Weather with
you, unless you want your Digital
Signage advertising to be Effective**

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URL Conference Papers Series: www.atiner.gr/papers.htm

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ISSN 2241-2891

6/09/2012

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Dr. Gregory T. Papanikos
President
Athens Institute for Education and Research

This paper should be cited as follows:

Van Loock, N., Vermeir, I. and Geuens, M. (2012) "Always Take the Weather with you, unless you want your Digital Signage advertising to be Effective"
Athens: ATINER'S Conference Paper Series, No: MED2012-0122.

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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 for consumers in everyday life, nevertheless academic research concerning the potential of this medium is scarce. One of the features that makes digital signage such a powerful form of communication is the massive load of information sources you can insert into the playlist, including news headlines, weather forecasts and advertisements, just to name a few. Two experiments are executed to test the influence of the valence of the media context on the effectiveness of the embedded digital signage ads. More specific, the experiments investigate if the context created by airing a positive or negative weather forecast (exp. 1) or a positive or negative news headline (exp. 2) influences the effectiveness of the following ad. Results show that broadcasting positive weather announcements or news generate lower brand recall scores of the succeeding ads, while broadcasting negative weather reports and news headlines result in a more negative attitude toward the ad. In the case of the weather forecast, the effect on the attitude toward the ad is mediated by message involvement. These outcomes show that media context is an important factor to take into account when using digital signage as advertising tool and as such are valuable for both the theoretical and managerial side of the story.

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1 Introduction

During the last couple of years, marketers and retailers have moved beyond traditional vehicles such as cardboard displays, printed ads, coupons at the checkout etc. and massively implemented digital signage networks in an effort to increase the impact of in-store advertising (Egol & Vollmer, 2009). The flat panel monitors that show a continuous loop of advertising and editorial material are indeed an important new channel for communicating with customers (Burke, 2009; Dennis et al., 2010; Newman, Dennis & Wright, 2010; Storz, Friday & Davies, 2006; Yim et al., 2010). While digital signage is rapidly growing in popularity, and is increasingly used in retail settings, on subway platforms, in elevators, bars and waiting rooms alike, little academic research exists on the effectiveness of this booming advertising medium. One of the features that makes digital signage such a potential powerful communication tool is the massive load of information sources you can insert into the playlist, including news headlines, weather forecasts and advertisements, just to name a few (Dennis et al., 2010; Newman, Dennis & Wright, 2010; Yim et al., 2010). Two experiments are executed to test the influence of the type of message on the effectiveness of the embedded digital signage ads. More specific, the experiments investigate if the context created by airing a positive or negative weather forecast (exp. 1) or a positive or negative news headline (exp. 2) influences the effectiveness of the following ad. That way, a valuable contribution is delivered to how the content of digital signage should look to perform best, since message content has many times been named as the most critical issue concerning the effectiveness of digital signage (Burke, 2006; Harrison & Andrusiewicz, 2004). Moreover, this study provides preliminary insights in the effectiveness of digital signage as an advertising medium in a retail setting.

2 Theoretical Background and Hypotheses

Many retailers have placed one or more screens in their store to keep up with the trend to communicate with customers by means of digital displays. On these digital screens multiple types of messages are shown including sports updates, stock prices, business news, traffic reports, news headlines, weather forecasts and so on. But for most, in retail settings the screens are used to expose customers to advertisements promoting products sold in the store in hope of influencing the consumer behavior in a positive way.

Here the marketing managers who manage the information loop on the digital screens have to make careful decisions on which sources to implement in the carousel of messages, since academic research in the past has shown that the program (broadcast media) or editorial material (print media) in which the ads are embedded can have an influence on the effectiveness of the ads (Aylesworth & Scott, 1998; Broach, Page & Wilson, 1995; Coulter, 1998; Dahlén et al., 2008; De Pelsmacker, Geuens & Anckaert, 2002; Goldberg & Gorn, 1987; Kamins, Marks & Skinner, 1991; Owolabi, 2009). So, the type of context in which the ads are displayed can be more suitable and so improve the ad effectiveness (Derks & Arora, 1993; Perry et al., 1997).

As proven by previous academic research, a context that elicits a positive feeling, or a liked context, generates less favorable consumer responses, such as less intensive ad

processing of the embedded ad. Due to the positive mood, respondents are less interested in processing the information of the stimulus they are exposed to. The cognitive capacity theory as well as the feeling-as-information theory are used to explain this occurrence (De Pelsmacker, Geuens & Anckaert, 2002; Lee & Sternthal, 1999). The cognitive capacity theory states that limited cognitive capacity is present in a positive context due to the positive mood the receiver is in which triggers a range of information in memory, resulting in a limited processing of incoming information. According to the feeling-as-information theory, people in a positive mood try to keep up this good mood and therefore avoid as much as possible stimuli, for example ads, which could shake up the state they are in. When people are in a neutral or negative mood, the reverse event occurs (Kuykendall & Keating, 1990; Owolabi, 2009; Worth and Mackie, 1987). So, when people are in a positive mood, by being exposed to a positive context such as a good weather forecast or a good news headline, they pay less attention to and process less intensive the succeeding ads, resulting in less recall. Nevertheless, other studies give indication of the fact that people who are in a good mood, are more willing to process the embedded ads and have a more positive attitude towards those ads (De Pelsmacker, Geuens & Anckaert, 2002). A first explanation for this phenomenon can be given by the excitation or affect transfer theory (Broach, Page & Wilson, 1995; Cantor, Zillman & Bryant, 1975; Goldberg & Gorn, 1987; Tavassoli, Schultz & Fitzsimons, 1995). This theory states that people transfer the positive evaluation of the context to the embedded ads, resulting in a positive attitude towards the ad. The hedonic contingency theory offers a second explanation (Dahlén et al., 2008; Lee & Sternthal, 1999). This hypothesis states that people who are in a positive mood are willing to process a stimulus more thoroughly, since they expect that the consequences of the processing will be favorable, in line with their mood. So, when people are in a positive mood, due to being exposed to a positive context such as a positive weather forecast or a positive news headline, a carry-over effect will take place to the succeeding ads, resulting in a positive attitude towards the ad. Based on the excitation transfer hypothesis it can be expected that a digital signage ad shown after a positive message, such as a good weather forecast or a good news headline, will induce higher attitudes towards the ad (Aad) scores in comparison to the same ad shown after a negative message, such as a bad weather forecast or a bad news headline. However, founded on the cognitive capacity theory, the recall scores of a digital signage ad displayed after a positive message, like a good weather forecast or a good news headline, will be lower than the recall scores of the same ad displayed after a negative message, like a bad weather forecast or a bad news headline. This information leads to the following hypotheses:

- H1: An ad aired after a positive message (e.g., a good weather forecast or a good news headline) generates higher Aad scores than an ad aired after a negative message (e.g., a bad weather forecast or a bad news headline).*
- H2: An ad aired after a positive message (a good weather forecast or a good news headline) generates lower brand recall scores than an ad aired after a negative message (e.g., a bad weather forecast or a bad news headline).*

3 Method

The hypotheses were tested in two experiments each using three conditions: a positive, a negative and a neutral (control) message. Ninety seven university students (40 male, 39 female; mean age = 23.56, SD=2.02) participated in the first experiment and forty seven university students (33 male, 41 female; mean age = 23.47, SD=4.13) participated in the second experiment.

The respondents visited 6 aisles in an online supermarket that was specially designed for this study. After each aisle, they could indicate which products/brands they would like to buy. Each respondent was randomly assigned to one of the three experimental conditions. In three of the six aisles respondents were exposed to an advertising message: two filler ad signs and one target ad sign, which were all specially designed for this study. The two fillers were traditional cardboard signs, one promotes kiwi fruit and the other promotes a laundry detergent. The test part of the study was a digital screen situated at the check-out where the respondents waited on their turn to finish up the shopping trip. On the screen a loop of messages was shown with first an informational message followed by an ad promoting a new, unknown lemonade.

In the first experiment the informational message was a good weather forecast (positive message), a bad weather forecast (negative message) or a neutral customer information message (control condition) asking customers to replace their shopping kart at the appropriate place after ending their grocery shopping. While in the second experiment the informational message was a good economic news headline (positive message), a bad economic news headline (negative message) and the same customer information message out of experiment 1. In advance, different pretests were executed to clarify which type of weather forecasts and news headlines were judged as good and bad and which customer information messages was suitable to use as neutral message.

After the respondents had finished their shopping trip, the respondents filled in an online questionnaire. In order to measure recall, subjects were asked to list all the brand names they could recall from the advertising messages they had noticed during their supermarket visit. Attitude towards the ad was measured using five seven-point scales anchored by bipolar adjectives (all Cronbach alpha >.78). Besides those dependent measures, respondents filled in socio-demographic and filler questions.

4 Results

4.1 Results experiment 1

A manipulation check confirmed that the good weather report was seen as good weather and as a positive message ($M=5.63$, $SD=1.22$), and significantly scored higher on this issue in comparison to the bad weather report which was perceived by the respondents as bad weather and a negative message ($M=2.93$, $SD=1.40$) ($t>7$, $p.<.001$).

An ANOVA test was run to test hypothesis 1, together with some t-tests. The results show a main effect of type of message on Aad ($F_{\text{Aad}}(1,55)=5.301$, $p=.025$): respondents exposed to the good weather forecast had more favorable Aad scores for the succeeding ad ($M_{\text{Aad}}=4.13$, $SD=1.15$), than those who were exposed to the bad

weather forecast ($M_{Aad}=3.43$, $SD=1.04$; $t_{Aad}=2.30$, $p=.025$). Thus, H1 is supported. When the control condition (neutral customer information message) is taken into account, the mean Aad score in the bad weather forecast condition ($M_{Aad}=3.43$, $SD=1.04$) is significantly lower compared to the neutral message ($M_{Aad}=4.24$, $SD=.99$; $t_{Aad}=-2.73$, $p=.009$), however no significant difference is found in Aad scores between the neutral ($M_{Aad}=4.24$, $SD=.99$) and the good weather message conditions ($M_{Aad}=4.13$, $SD=1.15$; $t_{Aad}=-.38$, $p=.708$) (see Figure 1 in appendix).

When a closer look is taken into the above mentioned main effect of type of message on Aad, this effect seems to be mediated by ad message involvement as shown by a bootstrapping test (Preacher & Hayes, 2008). Independent regressions show that the type of message (positive or negative message) significantly affects both Aad ($\beta=-.70$, $t(55)=-2.30$, $p=.025$) and ad message involvement ($\beta=-.74$, $t(55)=-2.30$, $p=.025$). Ad message involvement also significantly predicts Aad ($\beta=-.30$, $t(55)=-2.30$, $p=.025$). In a simultaneous regression predicting Aad, ad message involvement continues to be a significant predictor ($\beta=.68$, $t(55)=7.35$, $p<.001$), whereas the type of message becomes insignificant ($\beta=-.20$, $t(55)=-.88$, $p=.38$). Because the 95% confidence interval of the indirect effect does not contain zero (lower bound 95% $CI=-1.00$, upper bound 95% $CI=-.09$), ad message involvement significantly mediates the effect of message type on Aad. So, being exposed to a good weather forecast has a positive effect on the message involvement of the succeeding ad, resulting in higher attitudes scores for the ad, while the opposite occurs when airing a negative weather forecast.

To check the second hypothesis, Crosstabs analyses were executed since brand recall was coded as a dichotomous variable (1=yes, 0=no). Based on the results H2 is supported, since marginally significant higher brand recall scores are noted when the ad is displayed after the bad weather forecast (21.7%), than after the good weather forecast (6.2%) ($\chi_{(1)}=2.890$, $p=.089$). However, the highest recall scores are recorded at the neutral condition (33.3%), which are significantly higher than in the good weather condition (6.2%) ($\chi_{(1)}=6.858$, $p=.009$) and also higher than in the bad weather condition (21.7%) but not in a significant manner ($\chi_{(1)}=.789$, $p=.374$) (see Figure 2 in appendix).

4.2 Results experiment 2

A manipulation check confirmed that the good news headline was seen as good news and as a positive message ($M=4.50$, $SD=1.66$), and significantly scored higher on this matter in comparison to the bad news headline which was perceived by the respondents as bad news and as a negative message ($M=2.69$, $SD=1.16$) ($t>4$, $p<.001$).

As earlier an ANOVA test combined with the necessary t-tests were assessed to test the first hypothesis. The outcomes illustrate a marginally significant main effect of message type on Aad ($F_{Aad}(1,47)=3.195$, $p=.081$): respondents in the good news headline condition had more favorable Aad scores ($M_{Aad}=4.36$, $SD=.92$), than those who were in the bad news headline condition ($M_{Aad}=3.80$, $SD=1.23$; $t_{Aad}=1.787$, $p=.081$). As such, support is given to H1. Additionally, when the ad is shown after a neutral customer information message, the Aad score is significantly higher ($M_{Aad}=4.58$, $SD=1.03$) than when it is aired after the bad news headline ($M_{Aad}=3.80$, $SD=1.23$; $t_{Aad}=-2.377$, $p=.022$). Although, no significant difference in Aad was found

between airing the ad after the neutral customer information message ($M_{\text{Ad}}=4.58$, $SD=1.03$) and the good news headline ($M_{\text{Ad}}=4.36$, $SD=.92$; $t_{\text{Ad}}=-.804$, $p=.425$) (see Figure 1 in appendix).

To figure out if hypothesis 2 could find support in this experiment, Crosstab analyses were conducted. Across the three conditions, the highest recall scores are counted in the neutral customer message condition (25.9%), followed by the bad news headline condition (4.8%) and the good news headline condition (3.8%) ($\chi_{(2)}=7.548$, $p=.023$) (see Figure 2 in appendix). In line with hypothesis 2, the recall scores in the good news headline condition (3.8%) are lower than in the bad news headline condition (4.8%), but this difference is far from significant ($\chi_{(1)}=.024$, $p=.877$). So, H2 needs to be rejected.

5 Discussion & Conclusion

The results of this study indicate that the effectiveness of digital signage advertisements is influenced by the informational messages shown just prior to their presentation. For weather forecasts, as well as for news headlines the attitude scores for an ad displayed after a positive message are higher, than if the same ad is displayed after a negative version of the same informative message. This is in line with studies giving support to the excitation or affect transfer theory stating that receivers transfer the positive or negative evaluation of the context created by the weather or news report to the succeeding ads (Broach, Page & Wilson, 1995; Cantor, Zillman & Bryant, 1975; Goldberg & Gorn, 1987; Tavassoli, Schultz & Fitzsimons, 1995). Yet, the outcomes of this study specify that the negative messages have the biggest impact on the following ad, resulting in a serious drop of the attitudes towards this ad, while the positive messages only maintain more or less the same consumer attitudes as if the ad is shown after neutral messages. This result is in line with previous research stating that positive moods decrease central processing and negative moods increase central processing (Aylesworth & MacKenzie, 1998; Batra & Stayman, 1990; Bless et al., 1990; Gardner & Hill, 1988; Innes & Ahrens, 1991; Kuykendall & Keating, 1990; Mackie & Worth, 1989,1991; Sinclair & Mark, 1992; Worth and Mackie, 1987). Since the ad in the negative message context is processed more centrally, more cognitions about the ad are produced and so more weight will be given to those cognitions when forming an overall (negative) judgment of the ad (MacKenzie & Spreng, 1992).

Also, the weather forecast experiment proved that the effect of airing a weather forecast (good or bad) before an ad on the attitude towards the ad, is mediated by message involvement towards this same ad message. So, being exposed first to a good (vs. bad) weather forecast, makes the customer more (vs. less) involved with the subsequent ad, resulting in higher (vs. lower) attitude scores. One possible explanation can be that the test ad promoted a soft drink and that respondents are more in need of a soft drink in a good weather situation in comparison to a bad weather situation, resulting in higher ad message involvement in a good weather forecast circumstance and lower ad message involvement in a bad weather forecast situation.

At the memory part of the study, customer were better able to recall the brand name used in the ad when the ad was embedded in the negative weather forecast context

than in the positive weather forecast context, which is consistent with the cognitive capacity theory and the feeling-as-information theory (Aylesworth & Scott, 1998; Broach, Page & Wilson, 1995; Coulter, 1998; De Pelsmacker, Geuens & Anckaert, 2002; Goldberg & Gorn, 1987; Kamins, Marks & Skinner, 1991; Kuykendall & Keating, 1990; Lee & Sternthal, 1999; Owolabi, 2009; Worth and Mackie, 1987). However, no such difference is found when the ad is embedded in a positive or negative news headline context. Remarkably, in both situations (weather and news report), customers are well better in recalling the brand name shown in the ad when the ad is displayed after a neutral customer information message in comparison with situations where the ad was preceded by a good or bad news or weather report, which gives support to former research (Broach, Page & Wilson, 1995; Mundorf, Zillmann & Drew, 1991). This might be explained by the fact that weather and news reports, aside from their valance, ask for more cognitive effort by the customers to comprehend the message, compared to a neutral customer information message, leaving less cognitive capacity available to recall brand names (Lang, 2000; Lee & Sternthal, 1999).

In general, the found effects in this study were more manifest in the weather forecast conditions compared to the news headline conditions. Weather forecast information can be seen as more relevant for the customers since the weather situation already effects them when leaving the retail store, while a news headline in many occasion can be far-of daily life. Through this higher relevancy level, customers are likely to have an increased conscious awareness of their feelings (Petty & Cacioppo, 1986). Consequently, they are likely to attribute those feelings in a more profound way to the messages and medium they are exposed to (Coulter, 1998). Another explanation might be that weather forecast messages mostly are dominated by visual features, which are processed more easily and often more thoroughly as text features which are dominant in news headlines (Childers et al., 1986; Edell & Staelin, 1983).

The findings of this study have some managerial implications and also open the door for future research. The main implication found here is that marketing managers have to think twice when they decide which kind of material to put in the loop of a digital signage network, since it is clear that the effectiveness of digital signage ads can be influenced by the messages they are embedded in. Depending on the communication objectives managers have specified for the ads displayed on the digital signs, they may consider not airing some type of messages based on their valance. If the objective is to create a positive attitude towards the ad, it seems better to leave negative informational messages (e.g. a bad weather forecast) out of the loop since they may harm the judgment of this ad. When brand recall is indicated as the main marketing goal, they better leave out positive informational messages (e.g. a good weather forecast) as they might trigger a range of information in memory, leaving not enough cognitive capacity to process the ad deeply enough to recall the brand name at a later moment. However, many times this type of positive or negative messages trigger customers attention in retail setting and so customers take a quick look at the digital signage screens hopefully until the ads appear (Burke, 2009; Dennis et al., 2010).

Although this study gives advertisers and marketing managers for the first time an insight in how to put their message loop together to make the aired ads as effective as possible, more research is needed. First, future research could try to get a clearer look at the underlying process of the effects revealed in this study. Second, the effect on ad effectiveness of other types of messages that can be included in a digital signage

carousel could be investigated, for example sports updates, stock prices, business news, traffic reports etc. Third, a pod of different ads could be included in the test to discover if the results found here for the first ad, maintain for the second, third etc. ad in the pod. Fourth, further research could investigate whether similar results emerge for other product categories (i.e., high involvement products), since in the current study only one product category (e.g., a soft drink) as input for the test ad was used which may limit the generalization of the results. Fifth, the scope of this study could be expanded by running the experiments with a more diverse sample of respondents, since here only students were used, and to run the experiment in a real retail setting, instead of an online retail setting as was used in the current study. In that way the findings could be generalized to a broad shopping population.

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7 Appendix

Figure 1. Aad scores after weather forecast (exp.1) and news headline (exp.2)

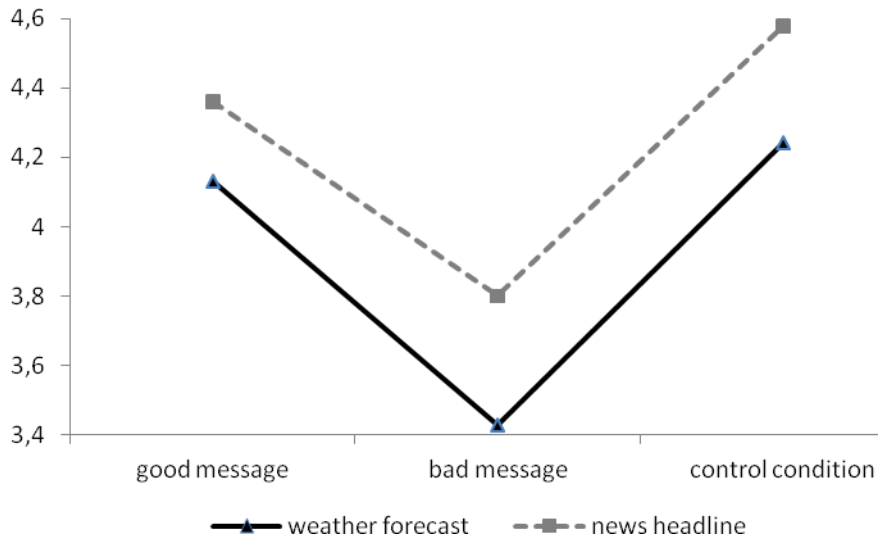


Figure 2. Brand recall scores after weather forecast (exp.1) and news headline (exp.2)

