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THE EFFECT OF DURATION, SERIAL-POSITION AND COMPETITIVE CLUTTER ON CONSUMER MEMORY FOR TELEVISION ADVERTISING: An Extension and a Test of Generalizability

Rik G.M. Pieters
Tammo H.A. Bijmolt

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Rik G.M. Pieters

and

Tammo H.A. Bijmolt

* Rik Pieters is professor of marketing, and Tammo Bijmolt is assistant professor of marketing research, both at the Department of Business Administration, Tilburg University, 5000 LE Tilburg, The Netherlands. The authors thank Initiative Media Nederland for providing the data, in particular Marianne de Klerk - Warmerdam, and Piet vanden Abeele, Michael Rothschild and Harish Sujan for their helpful comments on an earlier version.

THE EFFECT OF DURATION, SERIAL-POSITION AND COMPETITIVE CLUTTER ON CONSUMER MEMORY FOR TELEVISION ADVERTISING

An Extension and a Test of Generalizability

Abstract

Building on memory theory, we formulate hypotheses about the effect of the duration of a television commercial, its serial-position within a block of commercials, and competitive clutter on consumer memory for the commercial. We propose a multi-level logistic regression model that independently estimates the variation in consumer memory at the level of the individual commercial, and the variation in consumer memory at the level of the block of commercials. The model is tested using data about 2673 commercials that were researched in real-life settings. Our analyses confirm the hypotheses that duration has a positive effect, and competitive clutter has a negative effect on unaided and aided recall of television advertising. Also, as hypothesized, primacy and recency have significant positive effects on unaided but not on aided recall of television advertising. In addition, a significant monotonic decreasing trend in unaided but not in aided recall is found with the elapse of time from the start to the end of the block of commercials. Implications of the findings for theory and for research on consumer memory are discussed.

INTRODUCTION

Consumers are daily exposed to large and increasing numbers of television commercials that appear in blocks or strings within and between programs (Mandese 1991). Of these commercials, consumers can typically remember only a very small fraction (Franz 1986). Poor memory for advertising may be due to the content of commercials and their competitive environment (e.g., Burke and Srull 1988; Keller 1987, 1991). Poor memory for advertising may also be due to structural characteristics of commercials in their competitive environment. In the present contribution we focus on the effect of these structural characteristics. In their seminal study on the memory effects of competitive clutter, Webb and Ray (1979) examined one structural characteristic of advertising competition in particular, its sheer volume. Their results showed that increases in the number of television commercials within and between programs, the extent of competitive clutter, led to a significant reduction in the recall of individual commercials.

To date, surprisingly little research has examined the impact that other structural characteristics of television advertising, besides volume of the competition, have on consumer memory. In addition, recent research (Brown and Rothschild 1993) indicates that the effects of competitive clutter may be less pronounced as previously suggested. Moreover, the few available studies examining memory effects of structural advertising characteristics, have tended to use laboratory settings and relatively small student samples (e.g., Brown and Rothschild 1993; Patzer 1991; Webb and Ray 1979). Wells (1993) has recently reiterated that, although the laboratory experiment is the best way to separate cause from effect, it permits control that is impossible outside, and that may limit generalization of findings to real world situations. He argues for an increased use of field studies, and stresses, in addition, that findings of research "... would be substantially more credible if students were not so often the first and only choice" (Wells 1993, p.492).

Three key structural aspects of television commercials in their competitive environment are: (a) the duration of each individual commercial, (b) the serial-position of each commercial in the block, and (c) the number of individual commercials in the commercial block. The twofold purpose of the present research is to review the impact that the

structural aspects of television commercials in their competitive environment have on consumer memory, and to examine their impact in real-life settings. The aim is to extend theories of the memory effects of structural aspects of advertising in its competitive environment, and to demonstrate the generalizability of memory effects found in laboratory experiments with student samples.

First, we briefly describe measures of consumer memory for advertising, and how the measures relate to the process of retrieving information from memory. Next, the impact of structural characteristics on the measures of memory is treated.

CONCEPTUAL BACKGROUND

Measures of Memory

Unaided recall, aided recall and recognition are common measures of the memory for television advertising. In unaided recall, viewers are asked to remember the brands or products for which they have seen a commercial in a particular period. In aided recall, consumers are provided with a list of names of brands or products as a verbal retrieval cue, and they are asked to indicate for which brands or products, they have seen a commercial in a particular period. If a key scene or the whole commercial are provided as a pictorial retrieval cue in a memory task, the recognition of television advertising is assessed. Aided recall and recognition of television advertising are both cued recall tasks (Raaijmakers and Shiffrin 1992) that differ in the type of retrieval cue provided.

According to the dual-process theory of remembering (Anderson and Bower 1972), unaided recall involves two separate memory processes, retrieval and recognition. When subjects try to recall items from a list to which they have been exposed to earlier, they first retrieve prospective candidates from memory, and then decide through a recognition process, which of the candidates is correct. In an aided recall task, the first memory process, retrieval, is largely circumvented, and the second memory process, recognition, dominates, as candidates are already provided externally. Hence, aided recall and recog-

nition are easier tasks than unaided recall, and consequently they generally lead to better performance.

The ability to recognize pictures over a long period of time is striking. In an early study, Shepard (1967) exposed subjects to 612 individual pictures, including advertisements in magazines, and gave them a subsequent recognition test in which 68 pictures from the list were shown, each paired with a new picture. The subjects' task was to indicate which picture of each pair they had been exposed to previously. In an immediate recognition task, the average percentage correct recognition was 97 percent. Seven days later, the average percentage correct recognition of 68 other pictures from the original list was still well over 75 percent. Similar results were obtained by Standing, Conezio, and Haber (1970) using a pool of 2,560 color slides.

To avoid ceiling effects when assessing recognition of television advertising, the pictorial cues are sometimes presented for only brief periods (e.g., 100 milliseconds), and embedded in a mask that is shown before and after them. Even after taking such measures, recognition scores tend to be very high (Brown and Rothschild 1993).

In view of the high scores that are generally obtained in pictorial recognition tests, and in line with common practice in television advertising research (Fletcher and Bowers 1991), we focus on unaided and aided recall of television advertising in the present study.

Structural Characteristics and Consumer Memory

In addition to content characteristics, structural characteristics of a television commercial in its competitive environment may impact upon consumer memory. When commercials appear in strings or blocks within and between programs, structural characteristics of key interest are: duration of the commercial, serial-position of the commercial in the block, and level of commercial clutter. Duration is the length of the commercial in seconds, serial-position refers to the position of the commercial in the block of commercials, and competitive clutter indicates the total number of commercials present in the block.

Duration. Duration of a television commercial has a positive effect on the opportunity of viewers to attend and process it (Batra and Ray 1986), and on the probability that they will remember it. Singh, Rothschild and Churchill (1988) showed that the duration of a television commercial was positively associated with memory of the brand, of the message claim, and of the product category advertised. Similarly, Patzer (1991) found in a laboratory setting that on average 21 percent of the television viewers who saw a 30-second commercial recalled the brand unaided compared to 18 percent of the television viewers who saw a 15-second commercial. The positive effect of duration on consumer memory is expected both for unaided and for aided recall. Hence, the first hypothesis to be tested is:

H1: The duration of a television commercial has a positive effect on its subsequent aided and unaided recall.

Serial-Position. Serial-position refers to the location of a particular television commercial relative to other commercials in a string or block. Two aspects of serial-position are of relevance here. The ordinal aspect specifies the position of a commercial in the sequence, i.e., first, second, third and so forth. The elapsed time aspect specifies how much time has elapsed from the start of the block until a particular commercial comes in for its turn, i.e., after 20 seconds, 30 seconds and so forth. As commercials differ in their duration, the elapsed time before a particular commercial comes in for its turn in the block may differ across blocks even if the particular commercial takes the same ordinal position in the sequence. So far, most research on serial-position effects has examined the ordinal aspect only. However, it is likely that both the ordinal and the elapsed time aspect of serial position have an impact on consumer memory, as will be explained.

Contextual theories of memory (Murdock 1960; Greene 1986) focus on the ordinal aspect of serial-position. They predict both a primacy and a recency effect on consumer memory for items from a list. They propose that the more distinctive a trace of an item in memory is, the more easily it can be retrieved. Distinctiveness refers to the extent to which an item "stands out" from other items (Murdock 1960, p.17). An item that contrasts with the context in which it appears, will stand out from the rest, and will likely be stored

in memory together with its context. When retrieving the item from memory in an unaided recall task, the context will act as an effective internal retrieval cue for the item. Both the first and the last television commercial in a block are likely to be distinctive, as they represent transitions from a regular television program to a block of commercials and vice versa. Commercials in the middle of the block are less distinctive as they represent only transitions between commercials in the block. Since it is likely that the transition from the television program to the block of commercials and vice versa will serve as an internal retrieval cue, the first (primacy) and last (recency) commercial in a block will tend to outperform the commercials in the middle in an unaided recall task. In contrast, external retrieval cues are provided in an aided recall task (Anderson and Bower 1972), and consumers only have to recognize the television commercials they have been exposed to previously (Keller 1987). In the simpler process of recognizing television commercials, the internal retrieval cue of serial-position is likely to have no or only a small effect on memory performance.

Significant primacy and recency effects have been found in different situations. For instance, Cornell and Bergstrom (1983) generally observed primacy and recency effects in infants' memory for faces. Webb and Ray (1979) found a primacy effect on unaided recall (aided recall was not measured) of television advertising in their laboratory study. However, research to date has not systematically examined the effects of primacy and recency on unaided and aided recall of television advertising. Our analysis leads to the following hypothesis:

H2: A primacy and a recency effect are present in unaided but not in aided recall of television advertising.

Attention decrement theory focuses on the effects of the time elapsed after the start of a list on the attention and subsequent memory for particular items from the list. According to the theory (Anderson 1971), people generally pay close attention to early items and less attention to later items on a list. Attention decrement is a robust phenomenon that is reduced under specific conditions only, such as when people are explicitly instructed to hold attention until the end of a task (Crano 1977), or when people are forwarned for or

expect a memory task (Yates and Curley 1986). Attention decrement is also limited in laboratory situations that tend to create an artificially high, even level of attention (Wells 1993), analogous to a high involvement decision situation (Keller 1991). On the other hand, the attention decrement after having been exposed to the first commercial in a block may be particularly large when watching television commercials at home. Krugman (1986) notes that the first commercial in a block signals that "the commercials are coming on now". As consumers tend to be more interested in the program than in advertising, the signal will lead to a significant, motivated attention decrement, or a kind of mental tuning off.

If attention decrement occurs when watching television commercials at-home (Krugman 1986; Wells, 1993), the time elapsed between the beginning of the block of commercials and the beginning of a particular commercial in the block has a negative impact on the subsequent memory for the commercial. As we expect, analogous to the hypothesis concerning the duration of a commercial, that level of attention affects both unaided and aided recall, the following hypothesis is proposed:

H3: The time elapsed between the start of a block of commercials and the start of a particular commercial in the block has a negative effect on the unaided and aided recall of the commercial

Both hypothesis 2 and hypothesis 3 predict that the first commercial is better recalled than commercials in the middle of a block. However, while hypothesis 2 predicts that the last commercial is better recalled than commercials in the middle, hypothesis 3 predicts that the last commercial is recalled worst of all. Hence, hypothesis 2 and 3 should be tested jointly to examine the size of primacy and recency effects appropriately. Not taking the time elapsed into account when testing a primacy effect leads to an overestimation of the size of the primacy effect that is due to contextual memory processes. Not taking the time elapsed into account when testing a recency effect leads to an underestimation of its size or even a failure to find such an effect, as the attention decrement when the last commercial starts may be so substantial, that a recency effect due to contextual memory processes is obscured by it. In conclusion, it is important to

decompose serial-position in its ordinal aspect and in its time elapsed aspect, and to examine both aspects jointly when testing the significance of primacy and recency effects.

Competitive Clutter. Adding items to a list decreases memory for each of the individual items on the list (Raaijmakers and Shiffrin 1992). Increasing the number of items that compete for the limited attentional capacity of the consumer leads to weaker memory traces of the individual items, and to an increased likelihood of retrieval failure (Keller 1991). So, if the amount of competitive clutter (all nonprogram material, e.g., commercials, station calls, public-service announcements and the like) on television increases, consumer memory of each individual commercial message is likely to decrease.

To test the effects of competitive clutter on unaided recall of television advertising, Webb and Ray (1979; Ray and Webb 1978) asked 240 subjects to watch two half-hour television programs in a laboratory setting. Six groups of subjects were exposed to increasing levels of competitive clutter. The lowest competitive clutter group was exposed to sixteen nonprogram messages (all 30-second commercials) between and within the two programs. The highest competitive clutter group saw twenty-six commercials and twelve other nonprogram messages (including station identifications and public-service announcements). Afterwards, subjects in the various competitive clutter groups recalled on average virtually the same number of nonprogram messages, independent of the total number of messages they had been exposed to. Hence, memory of each individual nonprogram message decreased significantly across the clutter groups, illustrating the competitive clutter effect.

Recently, Brown and Rothschild (1993) investigated the effects of three competitive clutter levels on unaided and unaided recall, and recognition of television advertising. The lowest clutter level featured ten thirty-second commercials in a thirty-minute program, while the highest level featured twenty commercials in the same period. Contrary to the findings of earlier research by Webb and Ray (1979; Ray and Webb 1978), they found no sign of competitive clutter effects on consumer memory.

One explanation for these disparate results concerns variations in sample composition and exposure situation. Subjects in the Webb and Ray study (1979; Ray and Webb 1978) were regular consumers, predominantly women from middle-income families, who watched the television programs in a room that was set up to look like a normal living room, with a sofa, comfortable chairs, a coffee table and refreshments. Subjects were instructed to act as they would watching television at home. Every subject knew at least one other person in the room, and twenty percent of the groups consisted of actual families. In a posttest, ' .. about 70-90 percent of respondents said that the viewing was as it was at home' (Ray and Webb 1978, p.9). In the Brown and Rothschild (1993) study, subjects were undergraduate students, who were instructed to watch the program just as they might watch any other program, although no special arrangements were made to mirror a regular in-home viewing situation. It cannot be ruled out that the proficient cognitive abilities of students (Wells 1993), and the even, high levels of attention in laboratory situations (Keller 1991) may have prevented a competitive clutter effect, that may be present in in-home viewing situations of typical consumers, to emerge in the Brown and Rothschild (1993) study. Hence, for the present study, the original competitive clutter hypothesis is maintained:

H4: The level of competitive clutter has a negative effect on the unaided and aided recall of television advertising.

METHOD

Data Collection

There are three public television stations in The Netherlands with nationwide coverage. All three stations carry advertising in strings or blocks of commercials between programs, in particular before and after news broadcasts. A private station that services the Dutch market since 1990 also carries between-program advertising. The data are based on between-program television advertising on these public and private stations.

Since February 1975, the NIPO/Gallup market research company in Amsterdam measures unaided and aided recall of television advertising in The Netherlands on a regular basis. Both new and old commercials across all categories of goods and services are included. Consumers watch the commercials at home, without knowing that they will be interviewed about the commercials afterwards. Immediately after a particular commercial block has been broadcasted, about 60 trained female interviewers visit randomly sampled consumers throughout The Netherlands and interview them. Typically, the interviews start between ten minutes and about an hour after the commercial block was on the air. Per commercial block an average of 175 consumers over 18 years of age are interviewed (about three per interviewer).

From February 1975 until February 1992, consumer memory for television advertising in 224 commercial blocks was assessed. As the average sample size per commercial block under study is 175, the data of the present study are based on responses of somewhat over 39,000 consumers. A total of 2673 television commercials appeared in the 224 commercials blocks. Most commercials (96.7%) were carried by the public stations in blocks around the 7 o'clock and 8 o'clock news.

Questionnaire

After establishing contact, the interviewer first asks if the consumer owns a television set, and if s/he has watched the commercials broadcasted at X hours on station Y. If both answers are affirmative, the consumer is asked the unaided recall question, as follows: "Which television commercials can you remember having seen on station Y (at X hours)? Please name all commercials that you have seen." Next, the aided recall question is asked, as follows: "Which of the television commercials on this list can you remember having seen tonight (on station Y and at X hours)?" Commercials on the list are in random order. Some additional questions are asked, and sociodemographics are recorded. On average, the interview takes about 10 minutes to complete.

MODEL

Multi-Level Logistic Regression

In the present study, recall of commercials that appear in blocks is studied. Because commercials are nested within blocks, the variance in recall has a separate block component and a separate commercial component, and the explanatory variables lie on two different levels, the commercial-level and the block-level. In ordinary regression models, the hierarchical relationship between commercials and blocks is not taken into account, as data are pooled across blocks, and commercials are treated as independent observations. As a consequence, estimated standard errors of regression coefficients will generally be too small, and the risk of type I errors inflated (Aitkin and Longford 1986). Multi-level linear models (Goldstein 1987; Bryk and Raudenbusch 1992) explicitly represent the fact that variance and effects may exist at the commercial-level as well as at the block-level. Moreover, such models reveal how much of the total variance in recall proportions actually lies between blocks, and what part of this variance is accounted for by variables at the block-level, and how much of the total variance actually lies between commercials, and what part of this variance is accounted for by variables at the commercial-level.

Since observed and predicted proportions of unaided and aided recall lie between 0 and 1, a logit transformation, $y = \text{logit}(p) = \log[p(1-p)^{-1}]$, is applied to achieve a unit of measurement that is more nearly linearly related to the independent variables (Neter, Wasserman and Kutner 1985)[1]. Hence, non-linear (S-shaped) effects of duration, serial-position, and competitive clutter on the original recall proportions are estimated.

Decomposing Block and Commercial Variance

First, the variance in recall proportions is decomposed into variance within blocks and variance between blocks, with the help of a multi-level random ANOVA model without explanatory variables. The model is as follows:

where p_{ij} is the observed proportion of consumers who recall, unaided or aided, commercial i in block j, N_j is the number of commercials in block j and M is the number of

$$logit(p_{ij}) = \gamma_0 + e_{ij} + u_j \ , \qquad i = 1,..,N_j \ , \ j = 1,..,M \ ,$$

(1)

blocks. We assume $e_{ij} \sim N(0,\sigma_e^2)$, $u_j \sim N(0,\sigma_u^2)$, and the error terms to be uncorrelated. Equation (1) contains only three parameters to be estimated, i.e., the grand mean γ_0, and the variances σ_e^2 and σ_u^2. The intra-block correlation, which represents the proportion of variance in recall due to differences between blocks, equals:

$$\rho = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2} \ .$$

(2)

Predicting Unaided and Aided Recall

If the intra-block correlation is substantial, continuation of the multi-level approach is worthwhile. In that case, a two-level random-intercept model can be specified to explain variance in recall proportions from variables at the commercial-level and at the block-level. The following explanatory variables are included in the model:

X_{1ij} = Duration of the commercial i in block j in seconds,

X_{2ij} = Primacy effect, an effects-coded variable distinguishing the first commercial in block j (1) from the rest (-1),

X_{3ij} = Recency effect, an effects-coded variable distinguishing the last commercial in block j (1) from the rest (-1),

X_{4ij} = Time elapsed from the beginning of block j until the beginning of commercial i (in minutes),

X_{5j} = Block size, measured by the number of commercials in block j.

The explanatory variables X_{1ij}, X_{2ij}, X_{3ij}, and X_{4ij} are at the commercial-level, while X_{5j} is at the block-level. Accordingly, the final model consists of two parts: a commercial-level model and a block-level model. The commercial-level model is:

The intercept of the commercial-level model (3) is specified to vary randomly between blocks, and the slopes of X_{1ij}, X_{2ij}, X_{3ij}, and X_{4ij} are specified to be fixed. The number of

$$logit(p_{ij}) = \beta_{0j} + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \beta_3 X_{3ij} + \beta_4 X_{4ij} + e_{ij}. \quad (3)$$

commercials in a block is the explanatory variable at the block-level. Hence, the block-level model is:

$$\beta_{0j} = \gamma_0 + \gamma_1 X_{5j} + u_j. \quad (4)$$

By uniting the commercial-level model (3) and the block-level model (4), the following full multi-level logistic regression model results:

$$logit(p_{ij}) = \gamma_0 + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \beta_3 X_{3ij} + \beta_4 X_{4ij} + \gamma_1 X_{5j} + e_{ij} + u_j. \quad (5)$$

Equation (5) contains eight parameters to be estimated, i.e., the six fixed coefficients γ_0, γ_1, β_1, β_2, β_3, and β_4, and the variances σ_e^2 and σ_u^2.

RESULTS

The unit of analysis in the present study is a television commercial. The duration and serial-position of each commercial is known, as well as the number of commercials in its block, and the percentage of consumers that recalled the commercial unaided and aided. Summary information on the commercials and of their recall is provided in Table 1.

There were no systematic changes in the duration of commercials and in the size of commercial blocks over the years (1975-1992). The average duration of a commercial in the observation period varies around twenty-five seconds, and the average number of commercials in a block varies around twelve. Also, systematic increases or decreases in aided and unaided recall over the years were absent.

TABLE 1

SUMMARY INFORMATION OF COMMERCIALS AND MEMORY

Measures	Mean	Std. Dev.	Minimum	Maximum
Duration (sec.)	26.5	8.1	10	90
Elapsed time (min.)	2.6	1.7	0	6.6
Block size (n)	12.7	2.7	4	17
Unaided recall (%)	26.9	12.0	0	82
Aided recall (%)	60.8	12.6	1	93

Parameters of the multi-level random ANOVA model of recall proportions were estimated by the method of iterative generalized least squares (Goldstein 1986, 1991) with the program ML3 (Prosser, Rasbash, and Goldstein 1991). The results are presented in Table 2.

Estimates of the variance components show that although most of the variance in recall proportions is at the commercial-level (respectively 84.2% for unaided recall and 84.8% for aided recall), a substantial part is at the block-level (respectively 15.8% for unaided recall and 15.2% for aided recall). As both variance components differ significantly from zero and contribute to a considerable extent to the total variance, the multi-level approach is continued.

Next, the multi-level logistic regression model was estimated using iterative generalized least squares (Goldstein 1986, 1991) with the program ML3 (Prosser, Rasbash, and Goldstein 1991). Results of the analysis are presented in Table 3.

Several goodness-of-fit statistics are computed with respect to the original recall proportions. In combination, the explanatory variables account for 27.2% of the variance in unaided recall, and for 17.7% of the variance in aided recall. The root mean square

residual (RMSE) and the mean absolute residual (MAR) are small for unaided recall (.101 and .079 respectively) and for aided recall (.114 and .088 respectively).

TABLE 2

RESULTS OF THE MULTI-LEVEL RANDOM ANOVA
ON UNAIDED AND AIDED RECALL

Explanatory variables	Unaided recall Parameter (S.E.)	Aided recall Parameter (S.E.)
Fixed:		
Constant	-1.066 (.023)***	.495 (.019)***
Random:		
Commercial-level (σ_e^2)	.433 (.012)***	.301 (.009)***
Block-level (σ_u^2)	.081 (.011)***	.054 (.008)***
Intra-block correlation	.158	.152
- 2 Log Likelihood	5607.59	4628.12
Number of parameters	3	3

* $p < .05$, ** $p < .01$, *** $p < .001$

By comparing the random variation in the two levels in Table 3 with those in Table 2, the variance that is accounted for at each of the levels can be determined. A total of 21.5% ((1-(.340/.433))*100%) of the variance in unaided recall and 12.0% ((1-(.265/.301))*100) of the variance in aided recall on the commercial-level is accounted for by the duration of the commercial and the effects of serial-position. A total of 55.6% ((1-(.036/.081))*100) of the variance in unaided recall, and 50.0% ((1-(.027/.054))*100) of the

variance in aided recall on the block-level is accounted for by the block size. Hence, about half of the variation in recall at the block-level is accounted for by block size only.

TABLE 3

RESULTS OF THE MULTI-LEVEL LOGISTIC REGRESSION ANALYSIS ON UNAIDED AND AIDED RECALL

Explanatory variables	Unaided Recall Parameter (S.E.)	Aided Recall Parameter (S.E.)
Fixed:		
Constant	-.924 (.092)***	.557 (.081)***
Duration	.032 (.001)***	.022 (.001)***
Primacy	.069 (.023)**	-.018 (.020)
Recency	.058 (.023)*	-.004 (.020)
Elapsed time	-.067 (.009)***	-.014 (.008)
Block size	-.060 (.006)***	-.053 (.006)***
Random:		
Commercial-level (σ_e^2)	.340 (.010)***	.265 (.008)***
Block-level (σ_u^2)	.036 (.006)***	.027 (.005)***
R^2	.272	.177
RMSR	.101	.114
MAR	.079	.088
-2 Log Likelihood	4883.26	4213.11
Number of parameters	8	8

* $p < .05$, ** $p < .01$, *** $p < .001$

The effects of the explanatory variables as estimated in the multi-level logistic regression model (Table 3) confirm the hypotheses. As expected, longer commercials are recalled significantly better, both unaided and aided, than shorter commercials. Also, as hypothesized, there are significant primacy and recency effects on unaided recall, and neither a primacy nor a recency effect on aided recall. Hence, unaided recall of the first or the last commercial in a block is significantly better than unaided recall of intermediate commercials. As hypothesized, there is a significant, negative relationship between the elapsed time between the beginning of the block and the start of the commercial, and the unaided recall of the commercial. This negative trend is only marginally significant for aided recall (beta=-.014, t=1.75, p<.10). In addition, the hypothesis of a competitive clutter effect on memory for television advertising is confirmed: the larger the block size, the lower the unaided and aided recall of individual commercials in the block are.

We performed an additional analysis without the variable 'elapsed time'. As expected, the size of the primacy effect on unaided recall was substantially larger (beta=.142, t=7.10) than in the present analysis, and the recency effect was not significant (beta=-.029, t=1.45). R-squares and fit indices were close to the ones obtained in the present analysis (R2 for unaided recall .282, RMSR=.102, MAR=.080). The results concerning aided recall were virtually the same as the ones obtained in the present analysis. These findings underline the importance of decomposing the serial-position effect in its two aspects, and of examining the aspects jointly.

The effect sizes of the explanatory variables, the effects of commercial duration, serial-position, and competitive clutter on unaided and aided recall proportions are graphically displayed in Figures 1a to 1d. To ease interpretation, the scale of unaided and aided recall is in percentages. In each of the four figures, substantial shifts in unaided and aided recall due to the explanatory variables can be observed. Let, for example, a particular commercial A have a duration of 60 seconds, positioned at the beginning of a block with 6 commercials, and let commercial B have a duration of 20 seconds, positioned in the middle of a block with 14 commercials (starting 4 minutes after the beginning of the block). Then, the percentages of consumers who show unaided and aided recall differ

substantially between the two commercials, namely 65.6% and 82.4% for commercial A, versus 18.0% and 55.5% for commercial B respectively. Hence, the statistical significance of the effects obtained in the present study is not due to the power of the tests, as the absolute sizes of the obtained effects are large (Figures 1a to 1d).

FIGURE 1a

EFFECT OF COMMERCIAL DURATION

ON UNAIDED AND AIDED RECALL

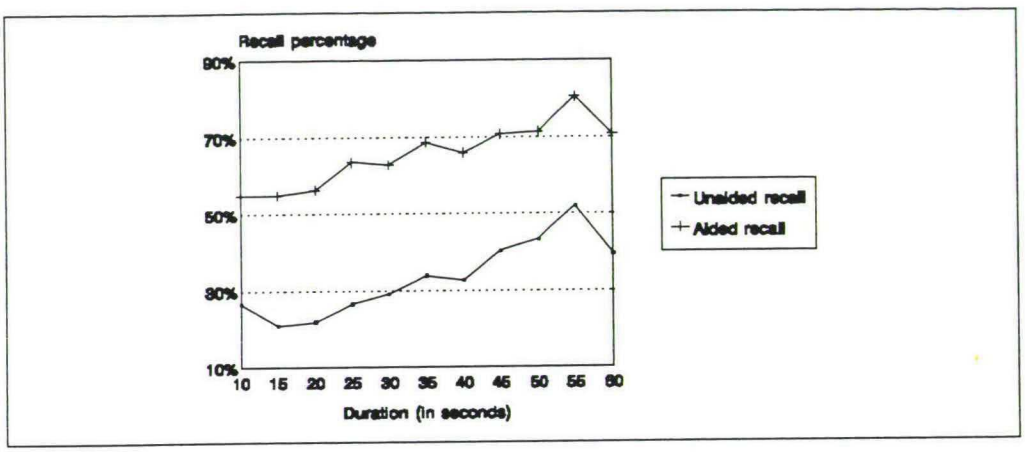


FIGURE 1b

EFFECT OF SERIAL-POSITION (PRIMACY AND RECENCY)

ON UNAIDED AND AIDED RECALL

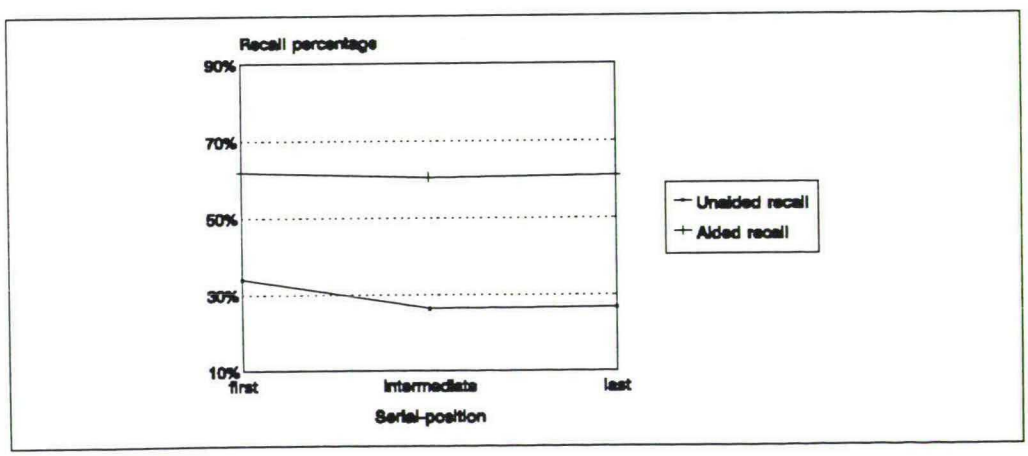


FIGURE 1c

EFFECT OF SERIAL-POSITION (ELAPSED TIME)

ON UNAIDED AND AIDED RECALL

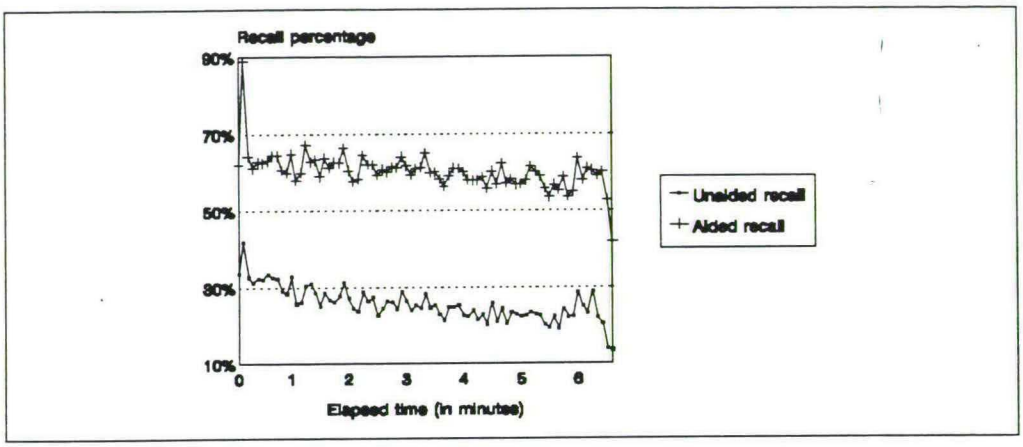
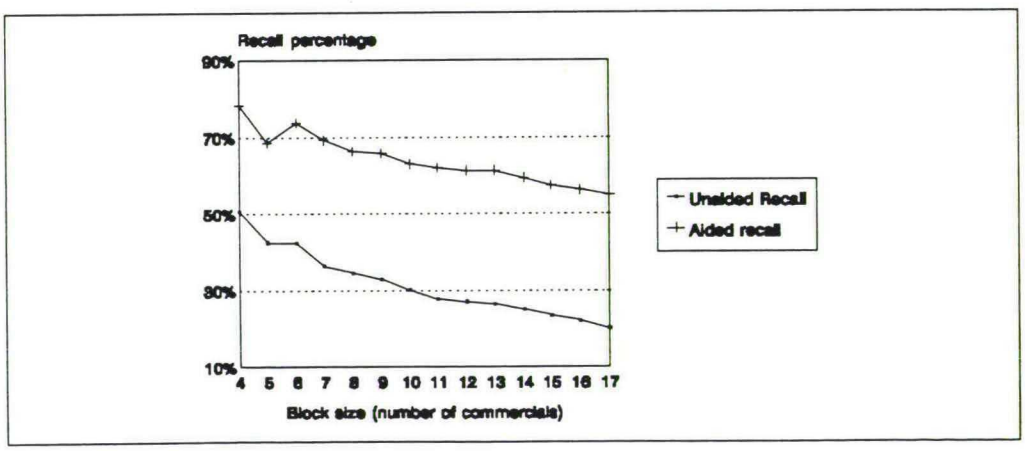


FIGURE 1d

EFFECT OF BLOCK SIZE

ON UNAIDED AND AIDED RECALL



CONCLUSION

The goal of this research was to examine the impact of three key structural characteristics of television advertising in its competitive environment on consumer memory. The results demonstrate that, as hypothesized, the duration of a commercial has a significant and positive effect on its subsequent unaided and aided recall. The results further confirm that the first commercial and the last commercial in a block of commercials have a significant and substantial advantage over the intermediate commercials in terms of unaided, but not in terms of aided recall. In addition, attention decrement causes a significant decline in unaided recall, and a marginally significant decline in aided recall, as time elapses within a block. Finally, as hypothesized, a significant and substantial effect of competitive clutter on unaided and aided recall was found.

Retrieval failure is believed to be the primary mechanism responsible for forgetting (Burke and Srull 1988; Raaijmakers and Shifrin 1992). The significant effect of primacy and recency on unaided but not on aided recall in the present study underlines the importance of contextual cues in the encoding and subsequent retrieval of information from long-term memory. If a television commercial is linked well with contextual information, such as serial-position, in long term-memory, the likelihood of its retrieval is increased. Contextual cues, such as being the first or last in a sequence, have no or less effect when retrieval cues are provided externally, as in aided recall.

The present results stress the importance of decomposing serial-position in its two aspects, the ordinal aspect that is most closely linked to contextual theories of memory, and the time elapsed aspect, that is most closely linked to attention decrement theory. So far, research on the effects of serial-position on consumer memory has mainly focused on the ordinal aspect. Our analyses show that both aspects of serial-position have a significant impact on consumer memory, and that they should be examined jointly to allow correct conclusions about the size of primacy and recency effects.

Our finding that competitive clutter has a significant impact on consumer memory deviates from the results of Brown and Rothschild (1993), who did not find such an effect.

In addition to differences in sample composition and exposure situation, differences in exposure schedules may contribute to the divergence in results of the two studies. Brown and Rothschild (1993) placed commercials in 5 blocks (of respectively 2, 3 or 4 commercials depending on the clutter level) in a 30 minute program. In our study, commercials were located directly after each other in single blocks. Research indicates that size of the interpresentation interval, i.e., the time interval between two items on a list, has a positive effect on consumer memory for the items (e.g., Bjork and Whitten 1974; Neath 1993), as longer interpresentation intervals keep the items better separated in memory. So, it might be that increasing the clutter level from 10 (5 blocks of 2 commercials) to 20 (5 blocks of 4 commercials) commercials in the Brown and Rothschild (1993) study had no significant impact on consumer memory, because the long interpresentation intervals between the 5 blocks kept at least a number of the commercials rather well separated in consumer memory. On the other hand, increases in the clutter level from 4 to 17 commercials in our study, may have had a more negative impact, because the brief interpresentation intervals between commercials led to their increasingly deteriorated separation in memory. Although it is unlikely that differences in interpresentation interval account for a large part of the divergence in results, Webb and Ray (1979) found significant competitive clutter effects, using a similar exposure schedule as Brown and Rothschild (1993), the effect of interpresentation intervals on consumer memory for advertising seems a fruitful area for future research. In particular when investigating the effect under different levels of attention.

The present findings replicate and extend those of Ray and Webb (1978; Webb and Ray 1979), and show that the deteriorating effects of competitive clutter emerge in real-life settings, across a large number of television commercials. This study demonstrates the external validity of competitive clutter effects obtained in laboratory settings. Ray and Webb (1978, p.5) have argued that simply knowing how much time is devoted to non-program material is not enough to understand the nature and magnitude of the competitive clutter effect, but that the number of competitive commercials is the key variable of interest. Our results indicate that if the number of competitive commercials within a block increases, the recall of each specific commercial decreases substantially. This competitive

clutter effect is complementary to the effect of the duration of the commercial, as both effects were found to be significant in the multi-level regression analysis.

The multi-level logistic regression analyses revealed that about 15 percent in the variation in recall proportion is due to differences between commercial blocks, and that more than half of this variation is accounted for by block size only. This demonstrates the size and importance of the commercial clutter effect: as the number of commercials in a block increases, the average recall of each individual commercial decreases dramatically. The multi-level logistic regression analysis also showed that most of the variation in recall proportions is between commercials, and that duration and serial-position effects combined account for a sizable but not very large amount of this variation. About 85 percent of the variation in recall is due to differences between commercials, and duration and serial-position combined, account for about 22 percent of the variation in unaided recall, and for 12 percent of the variation in aided recall. Obviously, less variation at the commercial-level than at the block-level is accounted for by structural characteristics of television advertising. At the commercial-level, message or content characteristics, such as types of arguments and creative tactics used, will likely have the largest effect on the variation in recall proportions. However, the present study clearly demonstrates that structural characteristics have a consistent and substantial impact on the variation in recall proportions both at the block-level and at the commercial-level.

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NOTES

1. Four commercials have an unaided recall proportion of 0. To facilitate the logit transformation, these values are replaced by 0.001.

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