

COGNITIVE LOAD AND SYNTACTIC COMPLEXITY OF PRINTED ADVERTISEMENTS: EFFECTS ON CONSUMERS' ATTITUDES

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While the extant advertising research has shown mixed findings on the impact of print advertisement complexity on marketing outcomes, one factor that consistently influences consumers as they judge the content of advertisement messages is the text's syntactic complexity. The current research attempts to explain consumers' underlying cognitive processes that occur when they read advertisements written using complex versus simple syntax. The study finds that research participants report better attitude toward advertisements written with simple syntax versus complex syntax, but when cognitive load is added, this effect disappears.

INTRODUCTION

In 2009, U.S. domestic advertisement spending reached \$125.3 billion (Adweek 2010). In spite of vast advertisement spending, we may question whether consumers actually pay attention to product information appearing in ubiquitous advertisements. Advertisement industry copywriters consider it conventional wisdom for advertisers to keep messages "short and simple" (Macklin, Bruvold and Shea 1985). This advice stems from the supposition that if text is too difficult to read, consumers will have difficulty engaging in sufficient cognitive elaboration to appropriately judge advertisement content (Petty, Cacioppo and Kasmer 1988).

Researchers have provided evidence, however, that this conventional wisdom may not always be true. Conclusions have been mixed as to whether message complexity results in positive marketing outcomes. Some research has suggested that complex messages are better. Chamblee et al. (1993) found that when advertisements display messages that have more difficult words, viewers recall more of the advertisement because reading it demands that they expend higher cognitive processing.

Anand and Sternthal (1990) found that when complex advertisements are repeated, the advertising messages will enhance the effectiveness of support argumentation.

Other researchers have suggested that complex messages are not always better. Anderson and Jolson (1980) reported that using technical wording invited more negative attitudes toward the product and purchase intentions among study participants without college educations. Lowrey (1998) showed in her first experiment that syntactically complex messages failed to produce more positive attitudes toward television advertisements. Chebat et al. (2003) also demonstrated that when text was difficult to read, study participants were unable to form more positive attitudes toward strong argument claims. Another study by Bradley and Meeds (2002) found that when the message was too syntactically complex, study participants reported decreased positive attitudes and lower recall.

Thus, extant advertising research has shown that advertising effectiveness depends on major linguistic factors such as typology, technical words, syntactic complexity, language proficiency, and semantic features of words (Wyer 2002). Linguistic factors are important to note because they affect the comprehension of messages and cognitive elaboration of messages and, in turn, may impact memory and attitude toward advertisements and brand.

In spite of mixed findings in the extant literature, advertising research on syntax complexity has consistently suggested that consumers are better able to judge the strength of arguments in advertisements that are free of complex syntax because when they encounter syntactically complex advertisements they deplete more working memory (Bradley and Meeds 2002; Lowrey 1998).

Previous research on advertisement complexity has failed to investigate syntactic complexity on marketing outcomes from the cognitive-load perspective. To fill this void, the current research attempts to explain consumers' underlying cognitive processes when they read advertisements that have complex or simple syntax. Specifically, this study examines the working memory of readers from the cognitive-load perspective (Pass 1992). The current study tests the cognitive load that syntactic structure imposes on text processing resources. By imposing cognitive load as a moderator, the study investigates the impact of syntactic complexity on consumers' attitudes toward printed advertisements.

CONCEPTUAL BACKGROUND AND HYPOTHESES

Syntax Complexity, Cognitive Load, and Working Memory

Syntactic analysis is "concerned with grammatical relations between words; parsing skills enable readers to determine the actors and actions being conveyed in a sentence. Parsing relies on several cues including word order, word class (e.g., nouns, verbs, etc.), word function (e.g., determiners, quantifiers), and word meaning" (Lowrey 1998, p. 188). King and Just (1991) claimed, "syntactic process transforms a linear sequence of words into a nonlinear (hierarchical) syntactic structure, and this transformation requires temporary storage of word representations during the left-to-right processing of a sentence" (p. 580). Thus, when syntactic structure gets more complicated, it impacts text comprehension. Limited working memory capacity may cause this effect.

According to a capacity theory of comprehension (Just and Carpenter 1992), working memory capacity is reduced when the syntactic complexity of sentence structure increases. Processing complex syntactic structure is likely to demand heavier resources than processing sentences with simple syntactic structure (Vos et al. 2001). As syntactic structure becomes more difficult, readers will have less working memory capacity because their cognitive load increases (Britton et al. 1985). Cognitive load is a combination of mental load that is imposed by text material and mental effort that is allocated to the demands of text material (Pass 1992). When syntactic complexity increases, readers experience increased cognitive load, which leaves them less working memory capacity for reading comprehension (Britton et al. 1982).

Syntactic Complexity and Advertisements

Marketing studies have demonstrated mixed results on the role of complex syntax. Bradley and Meeds (2002) found that syntactic complexity does not affect the comprehension of advertising slogans, but using simple syntax (active voice) in messages leads to higher levels of recognition. Study participants reading advertising slogans written with moderate syntactic complexity showed the most significant effect on recall and attitude toward the ad, while participants reading more syntactically complex sentences showed significantly lower free recall and attitudes toward the ad. Thus, that study showed that syntactic complexity resulted in differences in recall and attitude formation.

Lowrey (1998) examined syntactic complexity in relation to participants' motivation to process written advertisements and found that high-involvement participants reported more positive attitudes for strong claims than for weak claims, regardless of complexity levels. But low-involvement participants reported more positive attitudes for strong claims than for weak claims in simple advertisements only. Thus, syntactic complexity caused no differences in attitude formation when the level of involvement was

high, but complexity altered attitude formation when the level of involvement was low.

Chebat and colleagues (2003) jointly manipulated syntactic complexity and semantics in advertising text. Thus, their study showed that it is difficult to pinpoint the impact of syntactic complexity alone. In the author's opinion, their manipulation was closer to lexical complexity because of the method they used to derive high versus low readability; that is, they derived readability using vocabulary and length of sentences. The manipulation did not clearly indicate grammatical changes in advertisements. Though their manipulations may not have been strictly syntax-oriented, the study suggested that complex advertisements inhibit information processing and positive attitude formation. Jae (forthcoming) also recently demonstrated that study participants comprehended an advertisement better when they read a complex advertisement first and a simple advertisement second as compared with their comprehension when they read a simple advertisement first and a complex advertisement second. Readers comprehended overall advertisements much better when they read complex advertisements first because their available verbal working memory capacity was taxed initially. However, if the complexly written message was presented after the simple message, the comprehension level was reduced because readers had to devote their remaining working memory capacity to comprehending the complex message. Thus, the evidence has suggested that advertisements with complex syntax consistently affect consumers' information processing when they read printed advertisements.

Cognitive Load and Marketing Outcomes

The existing literature has shown that cognitive load tends to draw individuals' attention and thus may prevent them from achieving personal goals (Carver and Scheier 1982; Ward and Mann 2000). For example, under cognitive-load versus low-load condition, chronic dieters could eat significantly more calories than they intend to consume because their attention is distracted

from monitoring their intake (Ward and Mann 2000). Drolet and Luce (2004) showed that cognitive load disrupted appreciation of self-goals and resulted in trade-offs among attributes that are relevant to self-goals. Consumers' choice strategies were altered because the cognitive load disrupted their motivational processes. Based on the research on cognitive load and marketing outcomes, marketing researchers have suggested that attention-demanding advertisements could interfere with consumers' ability to evaluate ads correctly because of increased cognitive load.

In summary, although the research on linguistic complexity and marketing outcomes has provided mixed results on the effects of message complexity, advertisements with syntactic complexity have been fairly consistent in delivering negative marketing outcomes.

The author predicts that research participants will tax more working memory when they encounter an advertisement with more complex syntax, and thus the ad will negatively impact their attitude formation. Additionally, the author predicts that when cognitive load is imposed, participants will have significantly lower positive attitude toward advertisements versus when no load is imposed because their working memory capacity will be reduced. Reduced working memory will also cause imposed cognitive load to eliminate the benefit of an advertisement with simple syntax. Thus, the current study proposes the following hypotheses.

- H₁** Participants will display more positive attitude toward advertisements with simple syntax versus complex syntax.
- H₂** Participants will display more positive attitude toward advertisements under no-cognitive load versus cognitive-load conditions.
- H₃** Participants will display greater decrease in positive attitude toward advertisements as syntax becomes more complex under no-cognitive load versus cognitive-load conditions.

METHOD

The design of Study 2 is a 2 (syntax complexity: simple and complex) X 2 (cognitive load: load and no-load). Syntax complexity and cognitive load are within-subject factors. The study participants viewed advertisements that featured pictures and claims for four different product types. The product types for this study were adapted from Bradley and Meeds (2002). The author selected the convenience sample from introductory business classes in the large state university in the Southeast ($n = 96$). Each participant received an extra course credit for participating.

Procedure

The study was conducted on individual levels, under an investigator's direction. Participants viewed four advertisement claims (two for cognitive-load conditions and two for no-load conditions). The order of cognitive load and syntax complexity were counterbalanced. Under the cognitive-load condition, participants were asked to memorize ten words for two minutes before they viewed each advertisement. After they viewed the first advertisement, they were asked to recall the memorized words. Next they answered the questions on attitude toward the advertisement and the manipulation check for cognitive load. Then they memorized another set of words, viewed the second advertisement, and were then asked to recall the second set of words. Next they answered questions on attitude toward advertisement and manipulation check for cognitive load. Under the no-cognitive-load condition, participants did not perform the memorization task. After viewing each ad, they were asked to answer questions that measured attitudes toward advertisements, to complete a manipulation check for cognitive load, and to answer demographic questions.

Stimuli

The products in the advertisement claims were adapted from the study by Bradley and Meeds (2002) who used four products (camcorder,

water filter, inkjet printer, and mountain bike) with fictional brand names to avoid triggering brand loyalty. Using Lowrey's (1998) syntax-manipulation method (left-branching, passives, and negation) to create advertisement claims, the product attributes (hedonic and utilitarian) were investigated before advertisements for each product were created. The readability of the claims ranged from grade levels 5.3 to 7.8 (bicycle: simple for 6.8, complex for 7.2; water filter: simple for 7.2, complex for 7.8; inkjet printer: simple for 5.3, complex for 5.6; camcorder: simple for 7.8, complex for 7.5) based on the readability index of Microsoft Word's Flesch-Kincaide Grade Level Index. Participants were asked to answer, "How would you rate this claim?" The order of the advertisements and the order of cognitive load in the booklet were counterbalanced, following the Latin Square design.

Claims were written with the support of a technical copy editor who has extensive editing experience. Syntactic complexity was added by following Lowrey's (1998) syntax manipulation procedure (left-branching, passives, and negation). A pretest ($n = 29$) was conducted to investigate whether the syntax complexity manipulation was successful. The one-item 7-point semantic differential scale (*easy to read/difficult to read*) used by Lowrey (1998) was used in the present study.

Study participants rated the four advertisement claims with complex syntax as being more difficult to read than the four advertisement claims with simple syntax ($M_{\text{complex}} = 3.55$ versus $M_{\text{simple}} = 2.44$, $t = 6.052$, $p < .01$). Additionally, participants rated syntactically complex advertisements for all four products at each product level to be more difficult to read than syntactically simple advertisements (bicycle: $M_{\text{complex}} = 3.54$ versus $M_{\text{simple}} = 2.14$, $t = 5.730$, $p < .01$; water filter: $M_{\text{complex}} = 3.39$ versus $M_{\text{simple}} = 2.25$, $t = 4.147$, $p < .01$; inkjet printer: $M_{\text{complex}} = 3.68$ versus $M_{\text{simple}} = 2.64$, $t = 3.913$, $p < .01$; camcorder: $M_{\text{complex}} = 3.61$ versus $M_{\text{simple}} = 2.75$, $t = 4.076$, $p < .01$). Thus, based on the pretest, the syntax manipulation was successful.

Measures

Syntactic Complexity- Syntactic complexity was manipulated to be simple and complex. Complex advertisements included sentences that were left-branching, negative, and passive. Simple advertisements included sentences that were right-branching, affirmative, and active (Lowrey 1998). For example, "Beginners will love Dynaflex because it is so safe and stable" was written with right-branching and affirmative sentence structure. "Because it is not so unsafe and unstable, beginners will love Dynaflex" was written with left-branching and negative sentence structure. "Bicycle Magazine chose Dynaflex as the best buy for the price" was written to serve as an active sentence. "Dynaflex is chosen as the best buy for the price by *Bicycle Magazine*" was created to be a passive sentence.

Cognitive Load -Cognitive load was operationalized to influence working memory capacity as participants memorized and recalled the list of words (Drolet and Luce 2004). This particular operationalization was chosen because when participants memorized the list of words, that exercise directly competed for their working memory capacity and interfered with their reading processes. Cognitive load was manipulated by adding a secondary task to increase the cognitive load participants experienced while they were reading advertisements. Other studies have extensively used secondary tasks to affect the cognitive load of primary tasks (Britton et al. 1982; Chandler and Sweller 1996).

Participants were asked to memorize the ten words for two minutes and then, after they viewed the advertisement, to recall the memorized words. The two lists of ten words were taken from Level 1 testing of group reading in Assessment and Diagnostic Evaluation (2001).

Dependent Measures

Attitude Toward Advertisement- Hypotheses 1-3 concern the impact of syntactic complexity

and cognitive load on attitude toward advertisements. Participants completed a 9-point semantic differential scale on their attitude toward each ad they viewed (*very negative/very positive*) used by Lowrey (1998). The present study supplemented this scale with three 9-point semantic differential scales (*liked/disliked, unpleasant/pleasant, enjoyed/did not enjoy*) used by McQuarrie and Mick (1999)

Manipulation Check for Cognitive Load- A manipulation check for cognitive load was conducted by using a 7-point semantic differential scale on task difficulty (*extremely easy /extremely difficult*) used by Kalyuga, Chandler, and Sweller (1999).

RESULTS

Cognitive Load Manipulation Check

Participants completed a single 7- point semantic differential scale assessing task difficulty (*extremely easy/extremely difficult*) used by Kalyuga, Chandler, and Sweller (1999) to check whether the cognitive load manipulation was successful. A *T*-test shows that the cognitive-load condition was perceived as more difficult than the no-cognitive-load condition ($M_{cl} = 3.60$ versus $M_{ncl} = 1.84$, $t = 12.85$, $p < .001$). Thus, the cognitive-load manipulation was successful.

Reliabilities of Scales

After participants viewed each advertisement, they were asked to rate their attitude toward the advertisements. The attitude scales were four 9-point semantic differential scales on their attitude toward each advertisement (*negative/positive, liked/disliked, unpleasant/pleasant, enjoyed/did not enjoy*). The reliability ratings (alpha) in all four within-subject cells were highly reliable, reaching more than .90 (cognitive load simple syntax-.94, cognitive load complex syntax-.95, cognitive no-load simple syntax-.90, cognitive no-load complex syntax-.95).

Hypotheses Testing

Hypothesis 1 predicted that viewers will display higher liking toward ads that have simple syntax versus complex syntax. Consistent with hypothesis 1, syntax complexity showed a main effect ($F(1, 95) = 8.95, p < .01$). Participants displayed much higher attitude ratings toward simple syntax versus complex syntax ($M_{simple} = 6.77$ versus $M_{complex} = 6.16, t = 6.77, p < .001$). The main effect of cognitive load was also found ($F(1, 95) = 45.82, p < .001$). Participants displayed significantly higher attitude rating toward advertisement under no cognitive condition versus cognitive condition ($M_{cognitive\ load} = 6.35$ versus $M_{no\ cognitive\ load} = 6.58, t = 2.92, p < .01$). Hypothesis 2 was supported. Significant interaction was found between cognitive load and syntax complexity ($F(1, 96) = 32.79, p < .001$). As figure 1 depicts, participants displayed more positive attitude toward ads with simple versus complex syntax under no-cognitive load ($M_{simple} = 7.17$ versus $M_{complex} = 5.99, t = 7.41, p < .001$), yet this effect disappeared when cognitive load was imposed ($M_{simple} = 6.38$ versus $M_{complex} = 6.32, p > .5$). Hypothesis 3 was supported. Figure 1 depicts

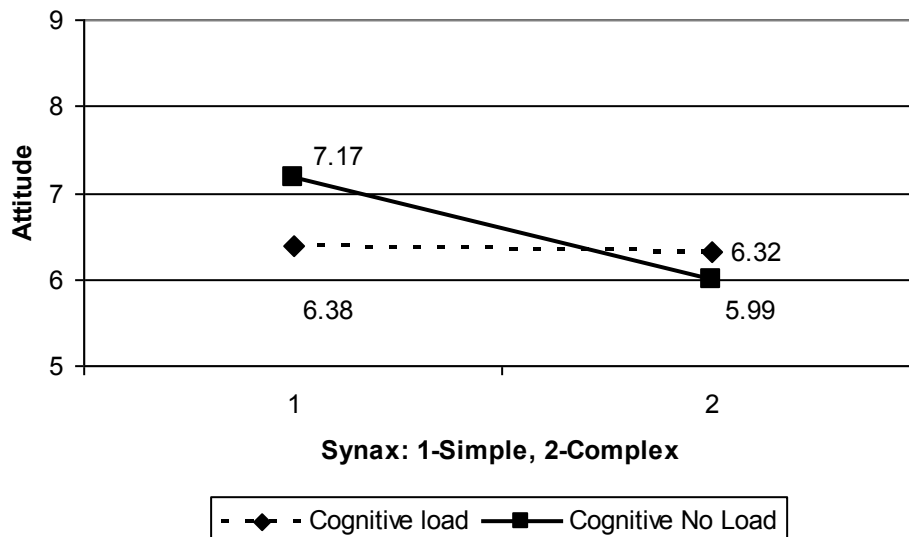
the interaction between syntax complexity and cognitive load on attitude toward advertisements.

IMPLICATIONS

The study results imply that consumers are able to engage in cognitive elaboration much more effectively when they encounter advertisements that have no complex syntax and no added cognitive load. The results suggest that complex syntax advertisements may tax consumers' working memory capacity more greatly than simple syntax advertisements do; thus respondents may be deterred from being able to judge the strength of attitude claims.

Imposing the cognitive load condition resulted in an interesting and significant interaction effect between syntactic complexity and cognitive load. When we did not impose cognitive load, research participants favored the simple advertisements over the complex advertisements. When we imposed cognitive load, however, this effect disappeared. This suggests that imposed cognitive load taxed research participants' working memory capacity and thus prevented them from

FIGURE 1
Syntax Complexity and Cognitive Load on Attitude toward Advertisements



fostering the proper attitude formation toward even simple-syntax advertisements.

The current study suggests interesting theoretical and managerial implications. While extant advertising complexity research has tended to focus on persuasion and its marketing outcomes, researchers have not studied the underlying cognitive processes in depth. By investigating the role of syntactic complexity and cognitive load, the current research adds insights into consumers' cognitive processes when they read advertisement messages that have varying syntactic complexity and cognitive-load conditions. This insight suggests that (1) complex syntax taxes more of consumers' working memory capacity because of the heavier cognitive-load demand, and (2) an artificially imposed cognitive-load condition prevents individuals from adequately evaluating even simple-syntax advertisements.

Various factors that overload consumers will thus decrease their ability to process the information presented in a printed advertisement. Advertisers should avoid using complex syntax so that consumers will be willing to read and will be capable of cognitive elaboration. Additionally, too much unrelated information could distract readers and increase their cognitive load. The results of the study demonstrate that even simply written advertisements are less effective when participants are distracted by other tasks that demand their cognitive capacity.

The current study has some limitations, so the results should be interpreted cautiously. Although the study results were attributed to the effects of working memory capacity, working memory capacity was not measured directly. Rather, the present study indirectly tested implications of working memory capacity from a cognitive-load perspective. For syntax complexity manipulation, the author proposed two levels of manipulation (simple and complex). The results show distinct difference between the two levels in terms of persuasion, but not the implications of moderate complexity. Including moderate

complexity may potentially alter results. Future study could investigate the cognitive structure of syntactic complexity of varying difficulty, including moderate complexity.

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