

Double the Units:
How Increasing the Number of Advertisements while Keeping the Overall Duration of
Commercial Breaks Constant Affects Radio Listeners

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Recently a major radio station ownership group has pressured the advertising industry to transition the accepted unit of advertising from the 60-second commercial to 30-second spots. This transition has shown signs of being successful, and as a result, it is possible for stations to play twice as many individual ad units while keeping the overall duration of commercial breaks constant. This within-subjects experiment tests the effects of such a circumstance on variables including listener cognitive effort, arousal, attitudes and memory. Results suggest that breaks with more ad units lead to cognitive disengagement, increased duration estimates for the ad breaks, and more negative attitudes compared to ad breaks with fewer units.

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All commercial media outlets face the common frustration of having essentially two groups of customers that they must keep happy. The first group is the audience itself. Television programmers select shows they feel are the most entertaining and the most likely to attract a large viewer base. Newspapers and magazines include stories and create entire sections on the hope of establishing a connection with a larger readership. Commercial radio outlets also exist to please the listening audience. Overall formatic decisions (i.e. "should we be a Country station or a top 40 station?") are primarily made according to which audience in the market is currently being underserved (Newton, 2005). Even at stations with established music formats, thoughts of satisfying the listeners continue to influence decisions surrounding which individual songs to play (Ahlkvist, 2001).

But the satisfaction of the audience is not the only concern for commercial programmers. In fact, many argue that the aggregation of large audiences is merely a means to an end in order to attract the second customer base -- individual advertisers and/or the advertising agencies representing them (Webster & Phalen, 1997). Advertising agencies look to place their clients on stations that attract the greatest number of listeners within a particular target demographic and psychographic. A radio station essentially sells that audience to those agencies. Of course, it is precisely this advertiser base that, through the allocation of marketing budgets, provides the capital necessary for the broadcast station to remain viable and on the air. Their only interest in the station, however, is as a source of a large (and hopefully loyal) listenership to be exposed to their

marketing message during commercial breaks. If the size of the audience is large enough, the station should have little trouble in finding advertisers to purchase the set number of commercial units the station schedules per hour. If the size of the audience is small, however, the station may find it difficult to convince advertisers to include it as a worthwhile part of a marketing plan.

Now, it is rare indeed for radio listeners to say that they tune to a station in order to hear the commercials that it plays. In fact, listeners are more likely to tune out during commercial breaks (Elliot & Speck, 1998). What they tune in for is the music or talk show that provides entertainment and/or pertinent information to their lives. If the station can maximize this sense of programming functionality, and do so better than competitors in the market, audience size should grow. With that growth the attractiveness of that station to advertisers will also increase.

This is where a delicate and difficult balance must be struck by radio station programmers who, unlike local television programmers (Affe, 2005), have both some flexibility and the authority to determine how many commercials are played per hour and when they occur. Although individual local radio programmers used to be much more autonomous in their decision-making, ownership consolidation has resulted in larger group-ownership situations where programming decisions are made more centrally, often by regional programmers who are responsible for commonly-owned stations across formats. Such was the case in July, 2004, when Clear Channel Communications announced a change in their corporate formatting strategy. The new strategy dubbed "Less is More," was an attempt to reduce the audience's perception of commercial clutter by making three changes. The first was an overall decrease in the number of commercial

minutes per hour, a more traditional definition of commercial clutter (Ha, 1996).

Secondly, Clear Channel decreased the number of commercial breaks per hour on their stations, essentially limiting the number of times the entertainment or information programming was interrupted. Academic researchers have studied this strategic change and its impact on perceptions of clutter, with mixed results (Potter, Chambers, Edison, & Potter, in press; Potter, Callison, Chambers, Chung, & Lee, 2005). The final portion of the "Less is More" initiative attempted to reduce perceptions of clutter by forcing radio producers to be more brief in their creative constructions -- communicating the unique selling position of their client in only thirty seconds. Traditionally, an overwhelming percentage of radio advertising has consisted of 60-second commercials. Understandably therefore, the reaction to this announcement by advertising creatives has been one of tremendous reluctance. Still, Clear Channel has gone on record as saying that they will transition the radio industry toward primarily using 30-second commercials and away from those that are one minute in duration. Clear Channel suggests that this new format is better for both listeners and ad agencies because listeners get more of what they want and it will create an environment promoting more competition in the marketplace.

There seems to be indication that the radio industry is beginning to accept this insistence on shorter commercial units (Media Monitors, 2007). If Clear Channel is successful in transitioning the industry from a dependence on 60-second commercials toward the use of shorter ads, managers may attempt to increase overall revenue by keeping the duration of each advertising break consistent but filling that time with twice as many 30-second ads as they did 60-second ads in the past. Some may correctly argue this is contrary to Clear Channel's original "Less is More" strategy, which instead calls

for initial reductions in the number of commercials per hour and higher than traditional prices for the shorter units (Allan, 2007). Nevertheless, Clear Channel is by no means the only radio group with pressures to generate short-term profits. In other words, some program directors and sales managers for other stations may be tempted to double the number of commercial units while keeping the overall duration of their advertising breaks consistent. The goal of the current study is to investigate the effects of such a decision on listener perceptions of advertising clutter and engagement to persuasive messages in the commercial breaks.

Theoretical Approach and Hypotheses

To investigate possible effects of doubling the number of commercial units, while keeping the overall duration of the ad break consistent, this study is primarily guided by Lang's Limited Capacity Model of Motivated Mediated Message Processing (LC4MP; Lang, 2006). This model conceptualizes human beings as information processors, whose cognitive system consists of a limited resource pool, the content of which is allocated simultaneously and dynamically across three subprocesses. The encoding subprocess is the gateway to cognition, essentially moving information from the sensory store to what has been often referred to as short-term memory. The retrieval subprocess activates memory networks in long-term memory, making information within them available for manipulation by the short term memory system. Within LC4MP, the task of processing a media message, such as a radio commercial, is described as encoding information from the message while simultaneously retrieving information stored in long-term semantic memory networks. This retrieval is done in order to make sense of the message being processed, and to make subsequent memory network linkages between previous

knowledge and new information that has been encoded. If this new information is then deemed relevant to the individual (either due to their interests, or motivationally relevant to the listener as a biological organism), the storage subprocess transfers the new associations back into long-term memory networks.

According to the model, encoding details of a radio message occurs through the interplay of top-down and bottom-up cognitive processes. We are perhaps more intuitively aware of the top-down influence; we are driving to work and have a *need* to hear the traffic report, we are in the market for a new sofa, and therefore are *more aware* of commercials telling us about a big sale of the local furniture store, etc. However, encoding can also come about as an automatic response to structural features of the message itself, regardless of content, through the orienting response (OR). The OR is a biological mechanism that responds to learned signals or changes in the immediate environment (Ohman, 1979). Using a precursor to the LC4MP as a theoretical guide, Potter and his colleagues showed that structural changes within auditory messages provided the requisite environmental change to elicit an OR which resulted in automatic encoding of information in the first few moments following to structural onset (Potter, Lang & Bolls, *in press*). Furthermore, this elicitation occurred in both radio listeners who were paying close attention to the message and those who merely have the radio playing in the background (Potter, Lang, & Bolls, 1998). The structural features identified in this work have included changes in announcers, sound effects, production effects such as laser sounds and echo, music onsets, and commercial onsets.

These findings can help us make predictions about the specific situation under investigation in the current study. Consider, for example, a five-minute commercial

break. Traditionally, this time would be conceivably filled with five, 60-second commercials. The same total duration could also be obtained by airing 10, 30-second messages. Doubling the number of units doubles the number of commercial onsets, and the number of times that the listener's cognitive system automatically encodes information as a result of orienting to them. Initially, this will likely be beneficial to the task of processing sequential persuasive messages. Automatic orienting brings the listener back to the task of processing the message, and because the message is new, they spend at least a brief amount of time processing it in order to make sense of it. Therefore, it is expected that in the early portion of a commercial break, having more and shorter commercials will increase cognitive effort spent on the processing of the advertising break. However, it also follows that each time a listener orients to the onset of a new commercial (recognized through the presence of an entirely new announcer, perhaps new music, and new semantic content) it increases an awareness of how many sequential commercials they have been exposed to. As the awareness that the number of commercials being played sequentially is increasing and reaching a total that is quite high, media users become more likely to tune out. If the physical ability to tune out is not available, it is likely that listeners will mentally disengage from the processing of the persuasive messages. Although orienting to structure will still occur (in fact, by definition, cannot be suppressed), controlled processing of information following the structural onset is predicted to be actively avoided. If this is the case, it is expected that in a condition where the number of commercial onsets is doubled, listener disengagement occurring later in the commercial break will result in decreased cognitive effort applied to the processing of the advertising break. Therefore, the first hypothesis follows:

H1: There will be a number of units by time interaction on cognitive effort. Early in the five-minute commercial break subjects listening to the station playing 10 units will show greater cognitive effort than subjects listening to the station playing five units. This effect will diminish over time, however, as subjects disengage from the 10-unit station.

It is assumed that listeners will be keeping some sort of internal tally of the number of sequential commercials they are exposed to. By design, that tally will increase more rapidly in the 30-second condition. It is predicted that, along with cognitive disengagement will come negative affect and higher arousal as listeners become annoyed with the station with double the number of units as it plays more and more individual commercials. Therefore,

H2: There will be a number of units by time interaction on negative affect such that listeners will have greater negative response as time goes on during the station playing ten, 30-second units while negative affect will remain comparatively constant for the station playing five, 60-second units.

Because experimental participants typically exhibit a substantial decrease in autonomic arousal levels in the research laboratory as they become more accustomed to the procedures and their surroundings, an absolute increase in arousal is not predicted for the doubled-units condition. A prediction is made, nevertheless, for an interaction in relative deceleration across the number-of-units conditions:

H3: There will be a number of units by time interaction on autonomic arousal such that listeners will have less skin conductance level deceleration over time when exposed to the station playing ten, 30-second units compared to the station playing five, 60-second units.

It is expected that the physiological reactions predicted in the first three hypotheses will also manifest themselves in attitudes toward the stations playing the commercials. Psychological research in the area of time estimation has shown that increasing the number of discrete units in a set duration leads to an increase in subsequent

retrospective evaluations of how long that duration truly lasts (Predebon, 1996; Tse, 2004). Although most of this work is in the area of cognitive science and has focused in the time domain of milliseconds, it is possible that it can also be generalized to longer durations. If a commercial for a specific product is viewed as an individual unit, such a generalization is represented in the following hypothesis:

- H4: There will be a main effect of number of units on time estimation for the commercial break, with the station playing ten, 30-second ads receiving higher estimations than the station playing five, 60-second ads.

Previous research on advertising clutter has also shown negative appraisals are to be expected toward media outlets perceived to be more cluttered (Elliot & Speck, 1998). Because the prediction made in H4 *and* the combination of those made in H1 through H3 both indicate an increase in perceived clutter during exposure to the ad break with double the number of units:

- H5: There will be more negative attitudes toward five-minute ad breaks containing 10 units than those containing five units.

Method

Design

In order to test these hypotheses, a mixed 2 (Number of Units) x 4 (Order of Presentation) factorial-design experiment was conducted. Number of Units was a within subjects factor, with two levels representing whether the 5-minute commercial break was comprised of ten, 30-second commercials or five, 60-second commercials. Each participant was exposed to each level of this factor, using different stations as media vehicles to deliver the manipulation. Order of presentation was a between subjects variable representing the four systematic presentation orders that were designed to

decrease the likelihood that the effects found were due to order of music or commercial presentation of the station.

Participants

Forty-seven (N = 47) telecommunications undergraduate students from a large Midwestern university were given course credit for their participation. All provided informed consent according to approved protocols by the university's Institutional Review Board. Eighteen males (38.3%) and 29 females (61.7%) participated, with none withdrawing.

Stimulus Materials

The stimuli consisted of sample segments from two supposedly actual radio stations that had contracted a research institute to obtain listener responses to their programming. Each segment was about 20 minutes in length and took the following general format: each opened with a station identification sounder, followed by two songs, then another station sounder, five minutes of commercials, a third station sounder, two songs, and a final station sounder.

Songs used in the stimuli were selected by a pretest. Pretest participants were asked to rate 24 Top-40 song clips in terms of arousal, valence, liking, and how tired they were of the song. In total, eight songs were selected for the current experiment. Songs were chosen by subtracting the burn-out scores from the liking scores, with the highest values chosen while attempting to mimic actual music rotations on Top-40 stations taking into consideration valence, arousal, and tempo arousal.

Ten target, 60-second advertisements and five, 30-second filler advertisements, were collected from out-of-town radio markets in order to reduce familiarity. Ads were

selected promoting products within categories of interest to the age demographic of the experimental subjects (i.e., beer, pizza restaurants, sports cars, dance clubs, etc.). Each target ad was originally 60-seconds in duration. Research associates with professional audio editing experience used a digital editing program to create 30-second versions of all the target ads. Care was taken in this process to ensure that as little product information was removed from the original commercial as possible.

The Number of Units manipulation was achieved in each within-subjects condition by selecting five of the 60-second target ads to comprise the five-unit station condition. The edited 30-second versions of the other five target ads were then randomly ordered along with the five filler ads in the commercial break of the other station -- thereby creating the ten 30-second ads condition. Each participant heard each product advertisement only once. No orders contained both a 30 and 60 second advertisement for the same product.

Two orders began with the five-unit station, the other two with the ten-unit station. Station identification was chosen from outside the local market and also varied so that neither station moniker ("Power 95" and "The River") was associated with a particular level of the number-of-units factor.

Apparatus

This experiment was controlled using Media Lab software (Jarvis, 2004) running on a Pentium IV computer with Windows XP installed. Media Lab was also used to collect self-reported attitude data. Physiology data were collected using a Coulbourn Lablink V system and the VPM software package (Cook, 1999). Subjects listened to the

radio station stimuli through headphones, with the volume determined and kept constant by the experimenter.

Dependent Measures

Cognitive Effort. Heart rate is recognized as an indication of cognitive effort (Lang, Potter & Bolls, *in press*). Slower heart rate indicates greater cognitive effort being paid to a media message. In this study, heart rate data were collected using 3 AG/AGCL electrodes filled with conductive gel; two of which were attached to the participant's forearms and the third (acting as a ground) on the non-dominant arm (Stern et al., 2001). Heart rate was calculated as inter-beat intervals (IBIs) recorded in milliseconds.

Arousal. Skin conductance level provided an operational definition of physiological arousal during the commercial break (Lang, et al., *in press*). Data were collected using 2 AG/AGCL electrodes filled with neutral gel. These were placed on the palm of the participant's non-dominant hand after it was hydrated with distilled water. The skin conductance signal was sampled at a rate of 20 times per second and output every second.

Negative Affect. The corrugator supercilli muscle group lies just above the eyebrow in humans (Tassinary & Cacioppo, 2000). Activation of the muscle group is identified as a psychophysiological correlate of negative affect (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Bradley & Lang, 2000). Several studies have validated the use of corrugator EMG to provide real-time assessment of negative affect in response to mediated messages (Bolls, Lang, & Potter, 2001; Potter, LaTour, Braun-LaTour, & Reichert; Hazlett & Hazlett, 1999). In this study corrugator EMG data were collected by placing two small AG/AGCL electrodes over the corrugator muscle group above the

subject's left eyebrow, after cleaning and slightly abrading the area with a cotton pad containing pumice and saturated with isopropyl alcohol. Signals were sampled 20 times per second, sent to a bioamplifier and smoothed using a contour integrator set at 800ms.

Advertising Attitudes. Participants were asked a series of 7-point Likert scale items pertaining to how they felt about advertisements and commercial breaks in general. They reported how much they agreed with the statement, which was presented on a computer screen. An example of these questions is: "When a radio station goes to a commercial, the commercial break disrupts my listening experience." After both the 10-unit and five-unit stimuli segments they were asked identical questions about the stimulus they were just exposed to.

Procedure

Upon arrival, participants signed an informed consent form. They were informed that the research would consist of them listening to two separate radio stations and providing their feedback on each. Next the electrodes that measured physiology variables were applied. After ensuring that the subject was comfortable, and addressing any questions, the subject put headphones on and the experimenter left the room.

Subjects first answered a set of questions focused on demographics, radio listening, and general advertising attitude items. When finished with these, participants were exposed to the first radio segment, listening while seated comfortably for a session that lasted about 20 minutes. After that, participants completed a questionnaire containing items referring to their attitudes toward the station they had just heard, including the attitude questions focusing on the commercial break.

After attitude data were collected for the first station, the researcher reentered the room and explained that the subject would now listen to a second station -- one that was

unrelated to the first and even broadcast in an entirely different city -- and that they would be asked their attitudes and opinions toward it afterwards as well. The second radio segment was played and followed by the same attitude questionnaire.

When finished with the final station questionnaire, the electrodes were removed, the subject was thanked for their participation and dismissed.

Data Cleaning, Preparation and Analyses

IBIs in the heart rate data were cleaned and converted to heart rate in beats per minute (bpm) for each second using an algorithm from Cook (1999). For all physiological dependent variables, 299 change scores were calculated by subtracting the heart rate during the first second of the commercial break from each subsequent second. These change scores were then aggregated into fifty-nine 5s segments, with the last 4s not being used in analysis due to the inequality of segment duration. Experimenter or apparatus error prevented psychophysiological data from being properly collected. As a result, final number of subjects varied across dependent variable: self-report (N=47), heart rate (N = 42), skin conductance (N = 43), and corrugator EMG (N = 36).

Attitude items were coded so that a higher score indicated a more favorable attitude toward the commercial break. Factor analyses were completed for the index administered after each station segment. Both had high Cronbach's alpha values ($\alpha_{5\text{-unit}} = .922$; $\alpha_{10\text{-unit}} = .921$) and values were therefore collapsed prior to analysis.

The impact of the Order of Presentation between-subjects factor was not statistically significant in any analysis, and has been removed from all statistics reported below.

Results

Doubling the Units and Cognitive Effort

The first hypothesis predicted that listeners would initially allocate more cognitive effort processing ads in the 10-unit break compared to those in the 5-unit break.

However, it was also hypothesized that this effect would interact with time and eventually listeners would disengage from processing the 10-unit break. Operationally, change in cardiac activity over time was used as a physiological correlate of cognitive effort. This hypothesis was statistically tested using a 2 (Number of Units) x 59 (Time in 5-second increments) repeated-measure MANOVA. Results show a significant main effect for Number of Units ($F(1,58) = 4.874, p. < .033, \text{Eta}^2 = .106$) and a significant Number of Units x Time interaction ($F(58, 2378) = 2.424, p. < .001, \text{Eta}^2 = .056$).

---Insert Figure 1 About Here---

The interaction can be seen in Figure 1. As predicted, there is clear disengagement occurring during the 10-unit condition with heart rate trends steadily increasing -- suggesting less attention being paid to the ad break--from approximately time segment 22 (111 seconds into the ad break). Meanwhile, cardiac activity diverges in the 5-unit condition, showing cardiac activity almost entirely below baseline levels suggesting cognitive engagement throughout the course of the commercial break. For this reason, hypothesis one is only partially supported; although there was disengagement from the 10-unit station there was not the initial increase predicted to occur in response to more frequent commercial onsets.

Doubling the Units and Negative Affect

It was predicted that increasing the number of units twofold would result in greater negative affect even if the overall duration of the commercial break was held constant. Expectations were for a significant Number of Units X Time interaction on the corrugator change scores from baseline. Statistical results show now significant main effects or interactions (F -values < 1). Hypothesis two is rejected.

Doubling the Units and Autonomic Arousal

Becoming comfortable during experimental procedures usually results in a marked decrease in skin conductance levels over the course of time within the media laboratory. It was predicted that the comparatively rapid succession of orienting responses to commercial onsets expected to occur in response to the 10-unit station, along with an awareness that the overall number of commercials they were being exposed to was rapidly increasing, would prevent subjects from experiencing such deceleration while listening to those stations compared to when listening to the 5-unit station. This hypothesis was also tested using a 2 (Number of Units) x 59 (Time in 5s increments) MANOVA. This resulted in a non-significant main effect and interaction. However, after visual inspection of the change scores (see Figure 2), a subsequent analysis was conducted for time segments 7 through 24. This returned a main effect of Number of Units that approached marginal significance ($F(1,42) = 2.680, p. = .11$), with the expected pattern of a less marked decrease in arousal occurring during processing of the 10-unit station.

---Insert Figure 2 About Here---

Effect of Doubling the Units on Time Estimation

Hypothesis four predicted a main effect of number of units on time estimation, with subjects approximating the duration of commercial breaks with 10 units as longer than those containing 5 units. There was a significant main effects of Number of Units on time estimation ($F(1,46) = 20.271, p. < .001, \text{Eta}^2 = .306$). Breaks with 10 units were estimated to be an average of 277.28s ($s.d. = 19.24$) compared to only 229.57s ($s.d. = 13.61$) for breaks containing 5 units. This hypothesis is supported.

Doubling the Units and Attitudes

After the presentation of each radio segment participants completed a 10-item index measuring their attitudes toward the commercial break to which they were just exposed. Each item asked how much they agreed with a statement given on the screen. Examples of these statements are “The commercial break I just heard was irritating.” and “The commercial break I just heard made me want to change the station.” Hypothesis 5 predicted more negative attitudes toward the 10-unit ad break than the 5-unit break. Analysis returned a significant main effect ($F(1,46) = 20.271, p. < .001, \text{Eta}^2 = .195$). In support of this hypothesis, 5-unit commercial were judged more favorably ($M = 3.211, s.d. = .183$) than their 10-unit counterparts ($M = 2.685, s.d. = .184$).

Discussion

This study uses the theoretical underpinnings of a cognitive model of mediated message processing (Lang, 2006) and work in the psychology of time estimation (Predebon, 1996; Tse, 2004) as tools to investigate possible listener reactions to an actual current phenomenon within the radio industry. As part of its “Less is More” campaign designed to decrease listener perception of advertising clutter, Clear Channel Communications is trying to change the standard advertising vehicle in the industry from

the 60-second commercial announcement to the 30-second announcement. They have, in fact, even begun selling 15-second “ad-lets” and 5-second “blips” to clients interested in primarily raising brand awareness among the listening audience. While the stated strategy of Clear Channel is to reduce the hourly number of units on stations they own, if they are able to transition the industry into accepting shorter individual units, competing stations may be tempted to keep the overall duration of commercial breaks constant while dividing them into ever-finer discrete units. Market pressures may then even lead Clear Channel stations to abandon their planned rollback in total units in favor of doubling the number of units per advertising break. Results from the current experiment suggest that doing so may actually backfire and lead to detrimental results for both the station and its advertisers.

Results show that keeping the commercial break itself at five minutes but filling that time with 10 commercials resulted in subjects self-reporting longer estimates of time devoted to advertising compared to when that time was filled with five commercials. Furthermore, attitudes toward the commercial break were more negative when twice the number of commercial units occurred. Stations interested in increasing their bottom-line by migrating entirely to 30-second commercials without making an adjustment in overall commercial break durations should move cautiously as the increased revenue is likely to be offset by negative feelings among listening audiences. As mentioned in the beginning of this paper, advertisers are only interested in stations to the extent that they deliver a large and loyal listening audience of particular demographic and psychographic composition. The offshoot of the migration to shorter units may in fact be *increased* perceptions of clutter on stations, if these shorter units are scheduled without a subsequent decrease in

the overall duration of the ad break itself. Exactly what the overall duration trade-off must be if stations are to expect no negative listener perceptions after migrating to a shorter unit is a question left for future research.

Physiological data in the current study also provide reason for advertisers to be skeptical about the move to shorter individual ad units unless they also take an active role in scheduling where in the break their messages appear. Based upon previous work identifying auditory structural features that cause orienting responses (Potter et al., in press) it was expected that the onset of each new commercial would result in momentary automatic encoding of the beginning of the new message. Coupling this with the work of Tse (2004), it was expected that on the 10-unit stations where commercial onsets occurred more frequently, listeners would become increasingly aware of the cluttered nature of the break and eventually cognitively disengage from processing. According to the cardiac data in Figure 1 this occurred at approximately 110s, after which heart rate levels began a steady positive trend indicative of less cognitive effort being paid. After this point in time—for more than half of the presentation period—listeners' heart rates were *above* baseline levels. Cardiac response to the same five minute period containing 5 units resulted in cardiac levels *below* baseline throughout the commercial break. In fact, subjects were cognitively engaged more than 90% of the time in the ad breaks containing 60-second commercials, based on change from baseline.

Interestingly, it is also during the early part of the ad break, just prior to when cardiac data shows disengagement from processing the 10-unit stations, when listeners showed a difference in arousal responses between the two conditions. Perhaps the greater arousal experienced during the station playing more units was in result to a feeling of

agitation with the sense that the break was overly cluttered. Although corrugator data did not support this explanation, it is something that future studies should continue to explore not only using physiological measures but also other real-time measures like continuous response (Biocca, 1993). Researchers may want to design studies that allow participants the ability to change radio stations during advertising breaks as a way of identifying behavioral effects beyond the psychophysiological results reported here.

These results also provide further support for the claim by Allan (2007) that advertisers who begin utilizing 30-second commercials in their radio marketing plans should, to as much extent possible, negotiate for placement of these messages early in commercial breaks. While Allan presented memory data to support the primacy effect in an advertising pod, the current physiological data show that after approximately 110 seconds listeners become cognitively disengaged.

Beyond merely offering practical recommendations, results from this study add to the theoretical literature by continuing to enrich the conceptualization of commercial clutter. While past work showed the impact of operationalizing clutter as the frequency with which entertainment content is interrupted (Potter et al., *in press*), this study demonstrates that even *within* a single commercial pod both listener attitudes and online cognitive processing are impacted by how finely-grained individual messages. Furthermore, the support of the current set of hypotheses seem to suggest that results from perceptual studies exploring increases in the number of discrete units of extremely short duration (e.g., Tse, 2004) may be able to cross levels of analysis to make predictions about longer durations such as commercial breaks. Future research should

continue to investigate the variables affecting perceptions of clutter, including duration of individual units as well as the structural and content complexity of those units.

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Figure 1: Number of Units X Time Interaction on Cardiac Change Scores

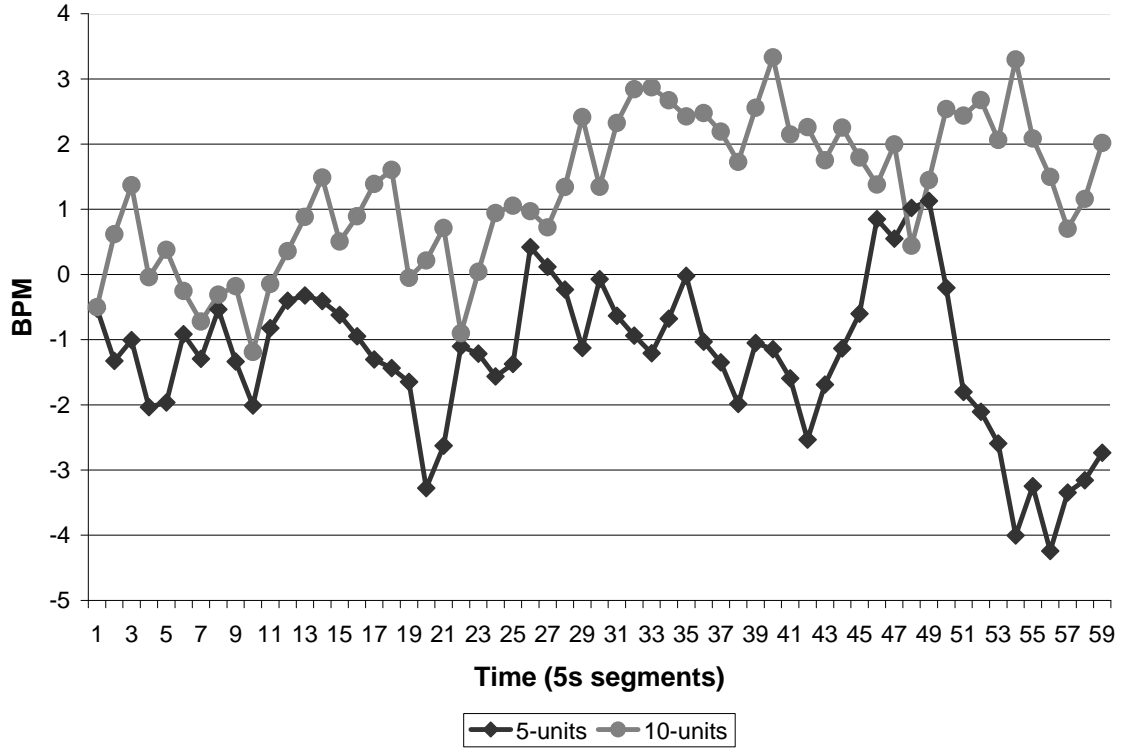


Figure 2: Number of Units X Time on Skin Conductance Level Change Scores

