# Made You Listen: The Effects of Production Effects on Automatic Attention to Short Radio Promotional Announcements

Robert F. Potter

**ABSTRACT.** This experiment tested an intuitive principle in the radio industry: that production effects (i.e., laser sounds, voice modulation, etc.) increase listener attention to messages. Professional voice talent created 5-10 second promotional announcements (promos) for nine fictitious stations. Each contained a slogan considered typical of industry practices ("Channel 97 WRRK–The Classic Rock Station"). Three of the promos were produced as announcer only, three with laser effects, and three with an echo effect. The promos systematically alternated between 2-minute segments of talk show content to resemble typical broadcast programming. Heart rate data were collected, time locked to the media presentation, from 62 participants as they listened to the stimulus. Afterwards, recognition data were collected. Results show cardiac deceleration following production effects, indicative of automatic allocation of attention. Memory data show an expected increase in recognition for information in the promos containing production effects, although not all memory tests reach statistical significance.


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## *INTRODUCTION*

Passage of the Telecommunications Act of 1996 introduced a new level of competition to the radio industry. The new law eliminated national ownership limits and allowed individuals or sole corporations to own up to as many as 8 stations in a single market (Potter, Williams and Newton, 2003). With very few restrictions on ownership, formerly small and mid-sized broadcasting corporations entered aggressive periods of merger and acquisition. In fact, Chan-Olmstead (1998) found that of all the telecommunications industries affected by the Act's passage, radio had the most aggressive merger and acquisition activity as a result. An initial effect of consolidation was a bidding war for station properties. The average purchase price increased from just under $5 million the year prior to the Act becoming law, to $14.64 million in the 12 months following.

With such a drastic increase in the financial stakes came a more urgent sense of competitive expectation among radio management at the local level. Potter et al. (2003) report data from a survey of promotion directors showing a significant perception of increases in job responsibility following recent market consolidation, along with an increase in the expectation to design promotions that generate revenue for the station.

With more responsibilities and greater expectations to do all they can to increase the bottom line, promotion directors must determine how to market their stations in such a way as to generate the highest levels of top-of-mind-awareness among the local audience. This is due to the nature of the primary data collection methodologies of Arbitron, the radio industry's standard in audience measurement. Although they have begun testing more precise measurement instruments like the Portable People Meter, Arbitron still relies on diary reports by random samples of respondents in over 250 radio markets nationwide (Webster, Phalen, and Lichty, 2000). One of the major drawbacks to this methodology is that it often relies on listeners' ability to recall the names and call letters of stations they heard much earlier. However, this methodological weakness may be converted into an advantage for promotion directors who make concerted efforts to increase the ease at which listeners can recall their station's call letters when filling out diaries.

## *PURPOSE OF THE STUDY*

This article explores one way to accomplish this. A common assumption of promotion directors is that adding production effects (i.e., laser sound effects, voice modulation, etc.) to recorded promotional announcements increases the level of attention listeners pay to it. Until now, however, the justification for this practice has been mostly intuitive. An experiment was therefore designed to vary the presence of production effects in short promotional announcements and determine the effects on cognition.

## *LITERATURE REVIEW AND HYPOTHESES*

### *Limited Capacity Theory of Media Processing*

The theoretical framework for this experiment is one of limited capacity cognitive processing proposed by Lang (2000). The theory conceptualizes human beings as cognitive processors with limited attention resources available at any one time. The total amount of resources one uses when processing a media message is a result of both controlled and automatic processes. In other words, paying attention to the radio, television, or computer screen is a result of both personal intention (i.e., "I'm interested in this program.") and automatic processes that individuals cannot consciously control (Schnieder, Dumais, and Shiffrin, 1984). These automatic processes are conceptualized as being activated by structural attributes of the message itself (Lang, 2000). For example, human beings automatically allocate cognitive resources to encoding television messages immediately following a cut–a change from one visual scene to another (Lang, Geiger, Strickwerda, and Sumner, 1993). Similarly, the occurrence of a change from one announcer to another in a radio message automatically calls cognitive resources to the task of encoding information in that message (Potter, 2000).

The limited capacity theory operationalizes this automatic allocation of cognitive resources to encoding via the orienting response (Sokolov, 1963; Lynn, 1966). The orienting response (OR), sometimes referred to as the "What is it?" response, is a reaction to the introduction of novelty or a learned signal into the environment. Physiological indicators of an OR include momentary increases in skin conductance and pupil dilation, decreases in alpha waves in the brain, and decreases in heart rate over the course of 7-10 seconds post stimulus (Lynn, 1966).

### *Orienting to Auditory Signals*

Work in the area of cognitive science has shown a fairly consistent pattern of orienting to the introduction of simple auditory signals. These include tone pips (Chase and Graham, 1967), white noise and computerized speech (Brown, Morse, Leavitt, and Graham, 1976), and short emotional sounds (Bradley and Lang, 2000). Previous research in the area of television processing also suggests that the presence of auditory effects in television messages cause viewers to orient toward the screen (Anderson and Lorch, 1983).

The task of generalizing these findings to the processing of longer-form auditory stimuli like radio messages has shown that the introduction of novel auditory features, such as production effects, causes listeners to automatically allocate cognitive resources to the task of encoding message information (Potter and Choi, in press; Potter, 2000; Potter, Lang and Bolls, 1998). It is assumed that the onset of production effects in the short promo announcements used in this study will be novel enough to elicit an orienting response, which will be operationalized by measuring listeners' cardiac activity while they listen to the radio stimuli. Therefore, the following hypothesis is proposed:

*H1*: Listeners will exhibit cardiac orienting responses to production effects in short promotional radio announcements.

### *Auditory Structural Features and Recognition*

Researchers have predicted that listeners will exhibit cardiac orienting responses to production effects in radio messages. These ORs are theoretically conceptualized as delivering cognitie resources to encoding. The limited capacity theory describes encoding as the admission of information from the environment into the cognitive system. How well encoding occurs is measured using recognition memory (land, 2000; Zechmeister and Nyberg, 1982).

However, in order to make a prediction in this study about recognition memory following orienting to production effects, we must consider two things about the radio promos used as stimuli. The first is how much new information the auditory structural features will introduce to the listener. Since the short promotional announcements will be interspersed between long radio messages (see Method section below), the production effects heard at the beginning of them introduce new information into the auditory stream. However, the overall amount of new

information is minimal because the production effects will not impart any semantic information but will merely provide novel electronic sound or computerized enhancement of existing semantic structures. Therefore, the information following the onset of a production effect is expected to require relatively few resources to encode.

The second factor to consider is the *overall* amount of resources required to process the radio stimuli. If there are too many resources being required, the limited-capacity of the cognitive system will be overloaded. The response to the orienting in this case would not be an increase in later memory, but rather a marked decrease as the demands of the radio message overload the brain's ability to process. It seems unlikely that this overload would occur in the current experiment, however. The information presented on most commercial radio stations is not particularly taxing. Moreover, the longer messages in this study were purposefully chosen to contain relatively easy topics of central focus (i.e., entertainment information, sports reports, etc.). Therefore, the task of listening to them is expected to place few demands upon the cognitive system. Similarly, the short promotional announcements being used are not cognitively difficult. They each consist of call letters and a slogan selected because of its resemblance to those used by stations across the country (e.g., "WRZK–The Classic Rock Station").

Therefore, it is predicted that overall the stimulus messages will place a relatively small drain on the limited pool of cognitive resources. This means that when listeners experience orienting responses to the production effects in promotional announcements, ample resources should remain to respond to the call for automatic allocation to encoding. Since the information following the production effects will require few resources to fully encode, the following hypothesis is made:

*H2*: Listeners will have better recognition memory for information presented in promotional announcements with production effects compared to promotional messages without production effects.

## *METHOD*

### *Design*

The overall design was a mixed 3 (Type of Production Effect) × 3 (Message) × 3 (Order of Presentation) factorial design. The between

subjects factor was Order of Presentation with three levels representing the systematic tape orders. The first within subjects factor was Type of Production Effect, with three levels: None, Echo Effect, and Laser Effect. The second within subjects factor was Message, with three levels representing different promos acting as repetitions of the type of production effect.

### *Stimulus Presentation*

All three orders of stimulus presentation began with a 2-minute message that was followed immediately by one of the short promotional messages. Thereafter the longer messages and the production effect messages continued to alternate until all production effect messages had been heard.

The three orders of presentation were designed systematically to ensure that each message occurred once in each third of the presentation order. Also, across the three orders of presentation a message was never preceded or followed by the same message.

### *Promotional Messages*

Two radio industry professionals assisted in providing voice copy for the short promotional announcements. One of the professionals produced twenty promotional announcements for fictitious radio stations. The announcements consisted of male and female professional radio announcers reading slogans considered typical industry fare (e.g., "Channel 97 WRRK–The Classic Rock Station"). The second professional provided cassette copies of actual promotional announcements used by KJR-FM in Seattle, Washington.

From this initial pool of twenty-five promotional announcements, the nine of longest duration were chosen for inclusion in the study. Female announcers read three of the nine, and these were randomly assigned to each level of the Type of Production Effect factor. The remaining six promotional announcements, read by male announcers, were also randomly assigned to each level of the factor. All nine were then digitally recorded onto a Power Macintosh computer using the audio editing program Sound Edit 16®.

In this study a production effect is conceptually defined as a synthesized auditory effect included in a pre-recorded piece of radio production. Operationally, the messages in the Echo Effect level of the Type of Production Effect factor were processed using the Sound Edit 16 Echo

Effects feature, with a 50% echo strength and .075 second delay. A Laser Effect message was operationally defined as a promotional message with a laser effect from the TM-Century Imagio® collection edited onto its beginning.

The final orders of presentation were digitally edited and then recorded onto the audio track of a time-coded VHS videotape. The time-code enabled the exact location of each production effect to be determined.

### *Dependent Variables*

*Automatic attention.* Automatic attention to the radio promos was conceptually defined as an orienting response to a novel auditory stimulus in the promos. Heart rate was used to determine if participants exhibited orienting responses to the pre-identified auditory structural features. An orienting response was operationally defined as a statistically significant decrease in cardiac activity, beginning immediately after the onset of the structural feature followed by a recovery back to baseline within 7-10 seconds (Graham, 1979).

*Encoding.* Forced-choice auditory recognition tests were used to assess the efficiency of encoding. The recognition test consisted of 2.5-second portions, or snippets, of audio that were selected from the production effect messages. Three snippets were created for each promotional message. The snippets were taken from the first 2.5 seconds of announcer copy, the last 2.5 seconds of announcer copy, and 2.5 seconds of audio from a foil promotional announcement read by the same announcer. This prevented any recognition decisions from being made entirely on the voices in the snippets.

*Apparatus.* The experiment was controlled by an Ampac 386 computer using a Recognition/Reaction Time program designed by Newhagen (1993) as the master controller. The physiology computer was an Ampac 386 with a LabMaster AD/DA board installed. Heart Rate was measured by placing a Beckman standard AG/AGCL electrode on each of the participant's forearms. Heart rate was recorded as milliseconds between heartbeats and later converted to heart rate per second for analysis.

The stimulus and recognition tapes were played by a Panasonic videocassette player through the speakers of a 19-inch Panasonic color television set. No video signal was sent to the set during the presentation of the radio stimuli. The volume of the audio from the television remained constant for all participants throughout the experiment.

Participants sat in a comfortable chair placed approximately 5 feet from the television set and were not allowed out of the chair after the electrodes were in place. They were separated from the experimenter, videocassette player, all computers, and the physiological recording equipment by a wooden wall.

*Participants*. Participants consisted of 62 undergraduates at a major Midwest university, 37 females and 25 males. All participants provided informed consent and received course credit in exchange for participation.

Physiological data were not recorded from two participants due to lightning storms during their experimental sessions. The heart rate data from another could not be cleaned and edited due to experimenter error and was therefore also excluded from the heart rate analysis (final n = 59 for heart rate analysis). Data from all participants (n = 62) were included in the recognition analyses.

### *Experimental Procedure*

The author ran each participant through the experimental protocol individually. Participants were randomly assigned to an order of presentation for the stimulus messages and audio recognition test prior to their arrival. Each participant was greeted upon arrival and told that the purpose of the experiment was to learn more about how people process media messages. A set of pre-recorded instructions was then played for the participant. The instructions explained that during the experiment they would be listening to a series of radio messages, some of which were long and some of which were short. They were instructed to pay close attention to the messages because their memory for them would be tested later in the experiment. In order to increase the likelihood that participants would pay close attention to the messages, they were also informed that they would be eligible to win a gift certificate to a local pizza restaurant if their score on the memory tests was above a national average for college students. This instruction was deceptive, since every participant who participated in the protocol was later included in a random drawing for the gift certificate.

A practice set of radio messages was played for the participant prior to beginning the actual stimulus presentation. The practice tape included the same type of media presentation as the later stimuli: a 2-minute radio message followed immediately by a short promotional announcement. Participants were told that the practice tape was not part of the experiment, but was designed only to demonstrate the difference

between the long and short messages they would hear during the actual procedure. The experimenter made any necessary adjustments to the physiology equipment during the practice period. After listening to the practice tape, the experimenter answered any questions prior to beginning the radio stimulus presentation.

Following the presentation of the radio messages, the participant completed a 45-minute distraction activity designed to clear short-term memory. The distraction task included watching a series of fourteen, 30-second television commercials and answering a battery of self-report, paper and pencil questions after each. None of the data collected during the distraction period are reported as a part of this study.

After completing the distraction activities a memory test was conducted. Pre-recorded instructions for the audio recognition test were played for the participant. The instructions began by telling the participant to hold a joystick in their dominant hand or the hand they write with. They were told to notice that the joystick had two buttons, one that could be easily pressed by the forefinger, and another that could be easily pressed by the thumb. The instructions then explained that they were about to hear a series of short snippets of radio messages, some of which they had heard earlier in the experiment and some they had not. The participant was to decide as quickly as possible whether they had heard the snippet before or not. They were to push the forefinger button on the joystick if they had heard the snippet before and the thumb button if they had not. The instructions stressed that the participant should not wait until the snippet was over, but should push the proper button as soon as they were sure of their answer. Finally, they were reminded them of the pizza gift certificate as an incentive to pay close attention to all the snippets.

After all data were collected the participant was told about the deception involving the gift certificate, thanked and dismissed.

## *RESULTS*

### *Hypothesis 1: Cardiac Orienting to Production Effects*

This hypothesis predicted that listeners would exhibit cardiac orienting responses to production effects in radio promotional announcements. To test this hypothesis separate analyses were run on the heart rate data for the 6 seconds immediately following each production effect. Graphic representation of this heart rate data is presented in Figures 1 and 2.

FIGURE 1. Cardiac Response Curve Showing Orienting to Laser Effects

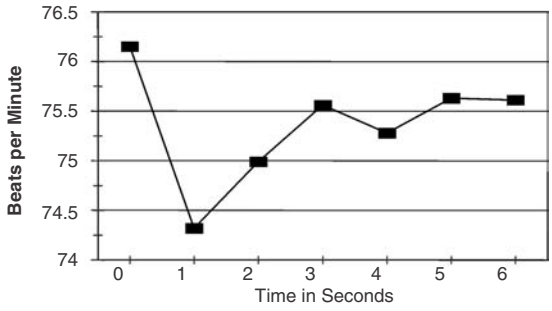
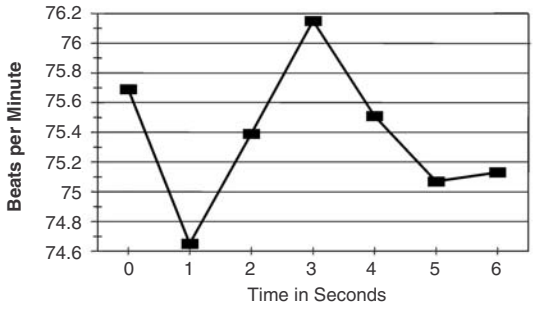



FIGURE 2. Cardiac Response Curve Showing Orienting to Echo Effects




The statistical test was a 3 (Order of Presentation) × 7 (Time) mixed design ANOVA. The main effect for Time was significant for the Laser Effect ($F$ (6, 336) = 3.02, $p$. = .007, epsilon squared = .0228) and the curve had a significant cubic trend ($F$ (1,55) = 6.02, $p$. = .017). The main effect for Time was also significant for the Echo Effect ($F$ (6, 336) = 2.14, $p$. = .048, epsilon squared = .0182) and the curve had a significant cubic trend ($F$ (1,55) = 4.48, $p$. = .039). With all analyses showing production effects causing cardiac ORs as defined by Graham (1979), Hypothesis 1 is supported.

### *Hypothesis 2: The Effects of Production Effects on Recognition*

Hypothesis 2 predicted that participants would have better recognition memory for information presented in messages with production effects

compared to information presented in messages without production effects. The recognition accuracy data were submitted to a 2 (Order of Presentation for Recognition Test) × 3 (Type of Production Effect) × 2 (Snippet Location) mixed ANOVA. The main effect for Type of Effect was not significant ($F$ (2,106) = 1.43, $p$. = .243). The means are in the predicted direction, however, with greater recognition of the snippets from the Laser Effect messages (69% correct) and the Echo Effect messages (64%) than from messages with no effects (62%).

Two post hoc analyses were conducted on the accuracy data. The first one submitted the Laser Effect and No Effect data to a 2 (Order of Presentation for Recognition Test) × 2 (Type of Production Effect) × 2 (Snippet Location) mixed ANOVA. Results show that the difference approaches significance ($F$ (1,60) = 3.49, $p$. = .067). The second submitted the Echo Effect and No Effect data to a 2 (Order of Presentation for Recognition Test) × 2 (Type of Production Effect) × 2 (Snippet Location) mixed ANOVA. Results show no effect for Type of Production Effect ($F < 1$).

All means tested for the main effects went in the predicted direction, with higher recognition memory for the production effect messages compared to the dry-voice messages. However, only one statistical test approached significance. Hypothesis 2 is therefore rejected.

## *DISCUSSION*

With competition in the radio industry being more intense than ever before, the need to create a recognizable and recallable station identity is greater than ever. For years, commercial radio promotion and production directors attempted to create this identity using promotional announcements that air on the station itself. These "promos" advertise the station's giveaways, announcers, contents, and format. When creating promos, one common creative technique is to include production effects to enhance the script. Production effects are synthesized auditory effects, such as lasers or echo effects, included in a pre-recorded piece of radio production. The intuitive assumption by industry professionals is that including these effects will cause listeners to pay more attention to the contents of the promos. This study experimentally tested that assumption.

Results suggest that listeners do automatically allocate attention, in the form of cognitive resources, to the processing of short radio promos

immediately following the onset of production effects. Strong cardiac deceleration was exhibited in response to the presence of both laser effects and echo effects. This momentary decrease in heart rate, known as the orienting response, is widely recognized as a physiological correlate to increases in allocation of cognitive resources to the task of message encoding.

It was hypothesized that this automatic allocation of attention to the promos following the onset of a production effect would result in better recognition memory for information in the promo. This is in accord with the intuition-driven techniques employed by practitioners. Here, the results are less clear. Participants were significantly ($p. < .07$) more likely to recognize audio snippets taken from messages that had been preceded by a laser production effect than from messages produced by an unadulterated voice only. On the other hand, while the information taken from promos with an echo effect was correctly recognized more often than the information taken from promos produced with only a plain voice, this difference was not significant.

## *CONCLUSIONS*

What conclusions can we draw from this set of data? Pragmatically, the fact that the means for the percentage correct data make the predicted linear trends should be encouraging regardless of whether they reach statistical significance. Radio practitioners need to do everything they can to enhance their creative productions in ways that will lead to better memory for the station and, arguably, better ratings. The linear increase in percent correct data, coupled with the obvious cardiac orienting responses suggesting an automatic allocation of attention following the onset of production effects, is strong evidence to recommend that radio promos be produced with production effects preceding important information such as call letters, names of station personalities, etc.

From a theoretical standpoint, the lack of statistical significance needs more justification. The fact that the means are in the expected direction could possibly indicate that the problem is a lack of statistical power in the experiment. Although one may argue that with 62 participants this is unlikely, it is important to point out that there were only 3 reps of each type of production effect in this experimental design. It could be that with this few repetitions of each level of the independent variable, the study was indeed under powered. Future research should

try to explore this possibility with more repetitions of the production effects factor.

Another possibility for the lack of significance in the recognition data may be due to the nature of the experimental protocol. Participants were told that they would be listening to two types of radio messages during the experimental procedure–long messages and short messages. Although this distinction was made only to provide an ease of understanding in later memory tests for each type of message, the instructions may have inadvertently discounted the importance of the "short" messages–the promotional announcements. If this was the case, then participants may have felt that the promos were superfluous and therefore been unlikely to feel a need to store any information they imparted into long-term memory. This would lead to an inhibition of memory for the contents of the promotional messages in general and may explain the lack of significance among a pattern that went in the direction predicted. This possibility should be addressed in future research, perhaps by designing an experiment that presented the short promotional announcements by themselves, without any surrounding radio programming. Although this would decrease the external validity of the procedures, it would allow for a more focused test of the memory hypotheses.

Still, the consequence of this experiment was a scientific confirmation of an intuitive practice in the radio industry: Including "cool sounding" production effects in promos do make people listen more closely. It is important to stress to practitioners, however, that the data from this study suggests that the increases in attention are immediate and short-lived. It is suggested that the placement of production effects be done strategically so as to maximize their impact.

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