

THE EFFECT OF AUDITORY PROGRESS BARS ON CONSUMER'S ESTIMATION OF TELEPHONE WAIT TIME

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This paper describes the evaluation of four auditory progress bars (APB's) to see if they had the potential to garner high satisfaction scores from users while simultaneously having a positive impact on those callers' perception of hold time during a call to a customer service representative. The APB's varied by sound dimension (pitch/duration change), polarity (increasing/decreasing) and wait time. APB did not impact wait perception significantly for sound dimension or polarity. Analysis of the first call a participant made to the system showed a strong interaction affect, with better performance in the increasing condition for the duration APB, and better performance for the decreasing condition in the pitch APB. However, extremely low customer satisfaction scores for all of the APB's indicated that participants were unhappy with the stimuli. The data provide guidance for the continuing exploration into the proper design of both effective and desirable auditory progress bars.

INTRODUCTION

Being placed on hold while on the telephone is a common experience for customers in today's world. Because of this, there have been significant efforts in trying to make this hold time as palatable as possible. One of the most common methods has been the use of music that is played while the customer waits. Many researchers have demonstrated that different types of music can positively affect both the satisfaction of the customer and the amount of time that customer perceives they have been on hold (North, Hargreaves and Mckendrick, 1999, Gueguen and Jacobs, 2002). Knott, et al (2003) showed that other types of stimuli, such as voice web browsing, can also have a positive affect on customers satisfaction and perceived wait time.

Another method for occupying the callers hold time is to provide information concerning the probable remaining time left in the queue. This is commonly done only at the beginning of the queue (for example "your estimated wait is 5 minutes"). Although this provides the caller with initial queue information, it does not provide the caller with continuing information about the remaining hold duration. Polasky and Lewis (2002), experimented with continuous non-verbal queues by presenting different 'tick' frequencies to users on hold over the duration of the call. Unfortunately, they found that users were generally unsatisfied with the stimuli. Their research, however,

suggested that there could be tonal cues that continuously convey information about the time left in the hold queue. We have coined the term "auditory progress bar" (APB) to describe this type of stimuli and believe that these types of stimuli have certain advantages over traditional stimuli used while callers are on hold. First, they can provide the user with a method for determining the amount of time left in the hold queue. Second, they might allow a user to devote fewer attentional resources to this information so that they could more efficiently multi-task while on hold.

The goal of the experiments described in this paper was to evaluate four candidate auditory progress bars to see if they had the potential to garner high satisfaction scores while simultaneously having a positive impact on caller's perception of the amount of time they were on hold.

METHOD

Participants

36 participants (24 Females, 12 males) were selected for participation in the trial. A broad age spectrum was recruited (range 18-67) with an average age of 30.6 years. All of the participants had self-reported normal hearing.

Apparatus and Stimuli

Four different APB's were generated for use in the study. APB 1 was a series of 500 Hz tones that decreased in duration as the end of the hold period became closer. The longest tone was 2,016ms and the shortest was 25ms, with the duration of the tones decreasing by 25% with each step. There was a 15s interval between the beginnings of adjacent tones. APB 2 was similar, except that the duration of the tones *increased* as the caller neared the end of the hold time.

APB 3 was a series of constant 1500ms duration tones that exhibited decreasing pitch as the caller neared the end of the hold period. The tones ranged in pitch from 1700 Hz to 100 Hz, with each individual tone having a 100 Hz linear pitch decrease over the 1500ms tone duration. As before, there was a 15 second interval between the beginnings of adjacent tones. APB 4 was the mirror of APB 3, with *increasing* pitch as the caller neared the end of the hold period.

Each APB had 4 hold time durations (30s, 60s, 120s and 240s) and the number of tones presented decreased as the hold time intervals decreased. Within each of the APB presentations the tone a participant heard at a given time from the end of the completion of a call was always the same. For example, regardless of the total duration of the wait time, a participant would hear the same tone at the 30 seconds-to-end-of-call point within a specific APB. 30 second calls heard 2 tones, 60 second calls heard 4, 120 second calls heard 8 tones and 240 second calls heard all 16 tones. The amplitudes for all of the tones were adjusted so they exhibited equal loudness across the range of frequencies used in the study. Participants placed calls over the PSTN, using an analog phone.

Design

A mixed factorial design was employed for this experiment with two between subject variables and one within subject variables. The two between subject variables were associated with the APB itself, specifically, sound dimension (2 levels: duration and pitch) and polarity (2 levels: increasing and decreasing). Hold time was manipulated as a within subject variable and had four levels (30s, 60s, 120s, and 240s). Thus, each participant heard only one APB, but they heard that APB with four different hold time conditions.

Procedure

Participants were given a brief overview of the study upon arrival and were then given an informed consent form to read and sign. To conceal the purpose of the study, the participants were simply told that they would be making 4 brief calls to an automated telephone system. They were also told that they might experience some delay in reaching the automated systems because of the number of users who were calling into the systems. Participants were also asked to remove their watches and place them in a drawer in the testing room.

For each call, participants heard a brief hold-queue announcement and then were placed on hold. While on hold, they heard one of the APB's. At the end of the hold period, they interacted with a voice response system to obtain their bill balance. The same task was used for each call and, as mentioned before, each participant heard only 1 APB over the course of the 4 calls, but heard that APB for each of the 4 hold times (the presentation order of the hold times was counterbalanced across subjects).

After each call, participants were asked to estimate the time they were on hold, in minutes and seconds. They then completed a customer satisfaction questionnaire

RESULTS

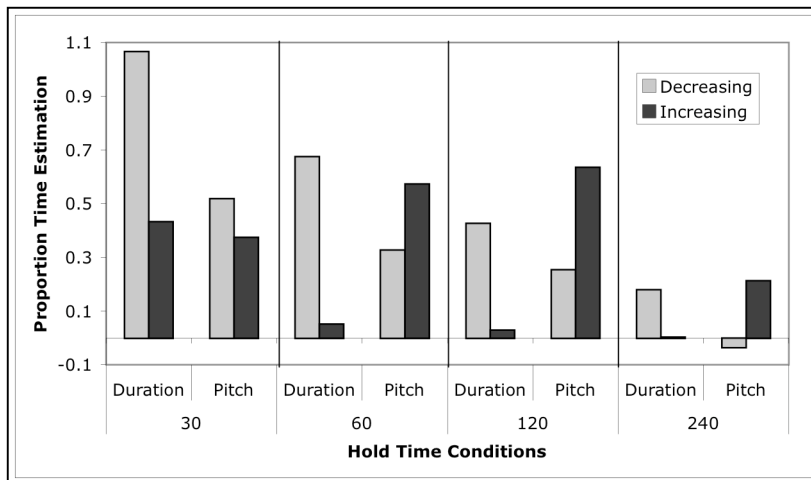
Figure 1 shows how accurate participants were with estimating the wait time by sound dimension, polarity, and wait time. The actual hold time was subtracted from each participant's estimate of the hold time and this value was divided by the actual

hold time to give a proportion of the participation's time estimation. In this graph, the values above the zero line indicate an over-estimation of wait time, and values below the zero line indicate an under-estimation. Participants' estimate of the wait time did not differ by APB. Specifically, there was no significant difference in wait estimation as a function of sound dimension ($F(1, 31) < .001, p = .997$) or polarity ($F(1, 31) = .021, p = .422$), although actual wait time (unsurprisingly) did significantly impact participants' accuracy when estimating wait time ($F(3, 29) = 11.6, p < .0001$).

As seen in Figure 1, in the 30s condition the decreasing APB resulted in more over-estimation of wait than did the increasing APB, for both the pitch and duration change conditions. For the 60, 120 and 240 second conditions, the benefits of an increasing tone differed based on the sound dimensions

tones. This interaction of sound dimension by polarity approached significance, $F(1, 31) = 3.591, p = .067$.

There is some evidence that the first time estimation (a retrospective estimation) made in this type of study, before the user becomes aware of the purpose of the study, provides a better picture of actual field performance than subsequent estimates (prospective estimations). Using this knowledge, a 2x2 ANOVA (duration /pitch x increasing/decreasing) was conducted to look solely at the first call a participant made to the system. As can be seen in Figure 2, there is a strong interaction in this case, $F(1, 32) = 6.94, p = .013$, with better performance in the increasing condition for the duration APB, and better performance for the decreasing condition in the pitch APB. A Student's t comparison was conducted and found that, at $p > .05$, the decreasing duration APB had significantly



used in the APB. Time estimation was better for increasing tones in the duration APB, but just the opposite for the pitch APB, where decreasing tones were better than increasing

worse performance than both the increasing duration and the decreasing pitch APB. No other differences were significant.

Figure 1: Results for each APB. Points above the zero line indicate an over-estimation of hold time (proportion over-estimation); points below indicate under-estimation. The four APBs are represented in each hold time condition. For example, the four bars in 30s hold time condition represent the two duration conditions (decreasing and increasing) and the two pitch conditions (increasing and decreasing).

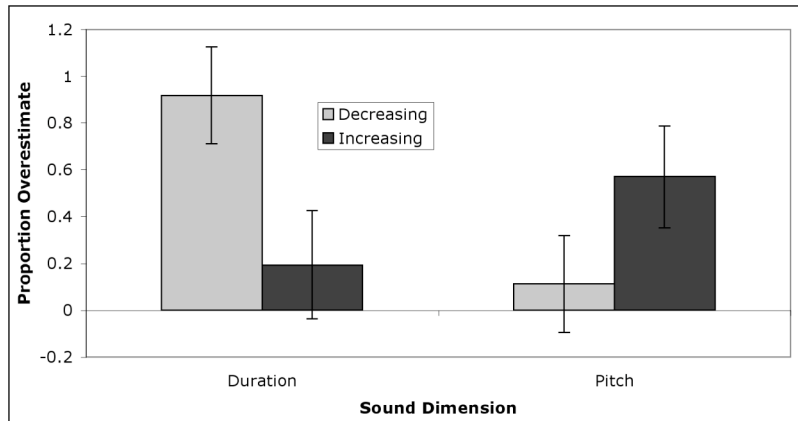


Figure 2: Proportion of over-estimation for first calls only as a function of sound dimensions and polarity.

DISCUSSION

The increasing duration and pitch APB's performed quite well in aiding users with the accurate estimation of time-on-hold. This result is important because it demonstrates that certain forms of APB's can be highly effective in improving caller's accuracy with hold time estimation, an important factor in increasing customer satisfaction. The magnitude of this accuracy can be highlighted by comparing it to the average 42% overestimation that was found when callers were exposed to silence during the wait period (Knott, et al, 2003). Unfortunately, even with these positive results, the low satisfaction scores (shown in Figure 3) associated with all of the APB's suggest that the current tones were not well received by callers.

The data do provide guidance for the continuing exploration into the proper design of APB's:

- 1) The high over-estimation in the 30 second conditions suggests that the number and nature of the tones presented in this short time is

insufficient to allow the caller to establish a temporal pattern that conveys meaning to the tones.

- 2) The interaction effects found in the 'first-call' data suggest that the property of polarity (increasing/decreasing) is not an independent dimension from the type of tonal stimulus that is being used. This has implications for selecting the direction of the change that should be presented to the user.
- 3) The customer preference data clearly shows that callers were dissatisfied with the stimuli in general, and that other more salient, pleasurable APB schemes need to be explored. Indeed, Leplâtre and McGregor (2004) have begun exploring the relationship between aesthetics and task performance in the auditory display domain. They have found that particular dimensions of sound can impact the perceived aesthetics of the sound, but that these relationships differ for different tasks.

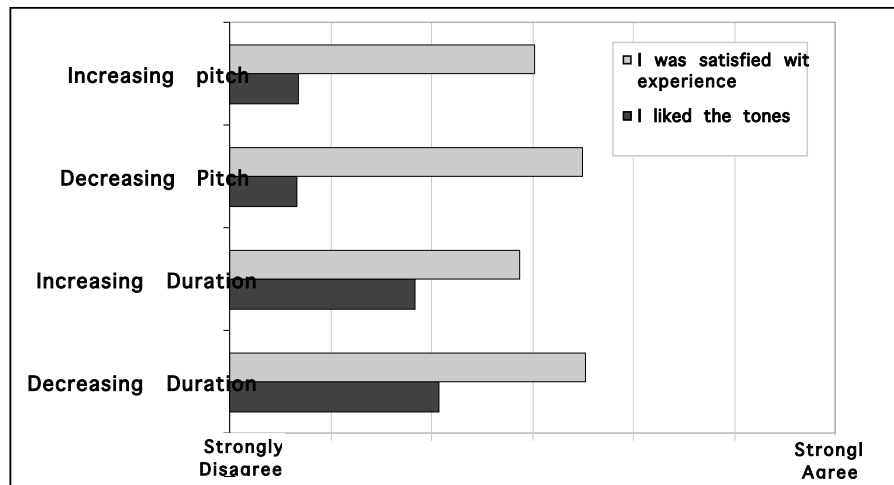


Figure 3: Preference data for each of the APB's. Scores are a measure of agreement with the questions "I liked the tones I heard" and "I was satisfied with the experience".

This study points to the need for further research in the pursuit of an effective, desirable APB. First, considerations must be made for short wait times to help callers establish a temporal pattern. Next, a more systematic exploration of the dimensions that affect the salience of the time passage cues should be done. Finally, a greater understanding of consumer preferences needs to be achieved to help insure that efficient APB's are also perceived favorably by callers.

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