

Curing the Menu Blues in Touch-tone Voice Interfaces

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ABSTRACT

This paper presents a study on touch-tone menu design. In particular, we investigated whether short or long menus route callers more efficiently to the destination that can handle the call. A short menu offers a small number of broad selections, while a long menu offers a larger number of more specific choices. Results obtained from thousands of live calls to a commercial customer service center, show that callers route themselves more effectively using the long menu. In addition, in complex voice interfaces, using long menus reduces the number of menu layers required, thus reducing the need to navigate through multiple menu layers, one of the most severe usability problems of existing touch-tone interfaces.

Keywords

Telephone voice user interfaces, touch-tone menus, speech user interfaces, multimodal user interfaces.

INTRODUCTION

Touch-tone voice interfaces are still commonly employed to serve customers in commercial call centers, even though some predicted their demise years ago [5]. While speech-enabled voice user interfaces have been deployed successfully in several commercial domains, touch-tone interaction not likely to be eliminated completely. Users appear to prefer touch-tone over speech for certain applications [2]. In addition, speech interaction has certain limitations, such as lack of privacy and deterioration of recognition accuracy under noisy conditions, which make touch-tone interaction sometimes the better choice.

One key issue in designing better touch-tone voice interfaces is proper menu design. The literature is in disagreement on how many selections a menu should offer. Derived from the capacity limit of short-term memory [3], many argue there should be no more than four choices (e.g., [4]), while others put the absolute maximum at nine items for interruptible menus [1].

LONG VERSUS SHORT MENU DESIGN

In large commercial call centers, routing callers accurately and efficiently is crucial, from both the caller's and the call center's point of view. *Routing* in this context means directing the call to the destination that is able to service the call, which may be a customer service specialist or an automated system.

Touch-tone designs employ menus to route a caller. Frequently, the call center's main menu serves a routing function. In analyzing the touch-tone system of a large telecommunication service provider, we realized that their main menu did not route callers effectively. We considered two alternatives for improving routing effectiveness. The *long menu* design presented seven very specific, well-defined alternatives to the caller. By contrast, the *short menu* design presented four broader, frequently selected choices. Figure 1 shows the menu wordings for both designs.

Long Main Menu

To direct your call, please select one of the following seven options:

For account balance and billing information, press 1.

To make a payment by credit card, press 2.

If you're having trouble placing or receiving calls in your home area, press 3.

For information about placing or receiving calls away from your home area, press 4.

For a description of optional features and how to use them, press 5.

To discontinue your service, press 6.

For all other requests, press 7.

Short Main Menu

To direct your call, please select one of the following four options:

For account balance, billing information, or to pay by credit card, press 1.

If you're having trouble placing or receiving calls, press 2.

For a description of optional features and how to use them, press 3.

For all other requests, press 4.

Figure 1: Long versus Short Menu Design

To determine which design performs better, we conducted a study that compared the two designs using thousands of live calls.

THE STUDY

Method

We employed a simulation technique that allowed us to collect live calls coming into a commercial call center without disturbing its ongoing operation. To this end, calls into the call center were rerouted to a simulation of a

modified call flow, which was hosted at our facility. After passing through the simulated part of the call flow, the call was returned to the call center to complete handling the call, which sometimes involved talking to an agent.

In this study, we simulated the capture of the caller's telephone number and the main routing menu. Upon making a selection from the main menu, the call was routed back to the telecommunication provider's call center. To compare the two designs, we divided the incoming traffic evenly between the "short" and the "long" menu design. We collected 2834 calls from the short menu and 2909 calls from the long menu design.

Data Capture

The call-flow simulation logged all prompts and caller responses. In addition, we recorded each call end-to-end, including its ultimate handling in the call center after it left the simulation.

Based on logs from the simulation and end-to-end call recordings, automated tools inferred the complete event sequence for each call. By tabulating event traces for thousands of calls, we estimated the traffic in all parts of the simulated flow using state-transition diagrams.

From the recording of the entire call we inferred the final call routing, i.e. where the call was ultimately handled. From this information we determined whether the menu selection by the caller in the simulation was correct.

Measures

We compared the short and the long menu design using the following measures.

Routing rates: Percentages of callers (who reached the main menu) that are routed to a specialist agent.

Response rate: The percentage of callers that make a valid selection from the menu, as opposed to hanging up, not responding or making an invalid selection.

Reprompt rate: The percentage of callers that listen to the main menu more than once.

RESULTS

Figure 2 compares the routing rates for the long and short menu design. As can be seen, the long menu could successfully separate broad categories of the short menu (billing, trouble, other) into finer subcategories: "credit card payment", "roaming", and "discontinue service" were identified out of the broad categories "billing", "equipment/trouble", and "other", respectively. In particular, by including "discontinue service" as an explicit category (representing 15% of the calls), the long menu reduced the rate of callers choosing the catch-all "other" category from 47.3% (for the short menu) to 30.9%. This decrease is significant ($z=11.1$, $p<0.05$)

Contrary to expectations, the long menu design did not diminish the caller's willingness to respond. The response rates for both designs were comparable - the difference between 91.6% (for the long menu) and 93.4% (for the short menu) is insignificant ($z=2.28$, $p>0.05$). The rates of timeouts and invalid responses were also comparable.

Furthermore, the reprompt rate was significantly higher for the short menu than for the long menu (5.1% vs. 1.7%; $z=6.09$, $p<0.05$). Apparently, more callers were confused about which of the broad categories on the short menu best fit their reason for calling, and therefore the callers had to listen to the menu a second time.).

Call Category	Long Menu	Short Menu
Billing	29.9%	39.0%
Credit Card	11.5%	
Equipment/Trouble	6.2%	9.1%
Roaming	4.5%	
Features	2.0%	4.5%
Other	30.9%	47.3%
Discontinue Service	15.0%	

Figure 2: Long versus Short Menu Routing

CONCLUSIONS

This study shows that a long menu with specific, clearly defined categories can identify the reason for a call more efficiently than a short menu with broad categories. This result challenges the widespread belief that menus should contain fewer than five items. Presenting more choices in a menu allows designers of touch-tone voice interfaces to avoid multi-layered menus, which are clearly one of the most dreaded characteristics of touch-tone voice interfaces. While users may generally prefer speech-enabled over touch-tone designs, the user may want a choice among several interaction modalities, including speech, (small) displays, and touch-tones. This study suggests a way to improve the touch-tone portion of future multimodal telephone user interfaces.

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