

Dialog Motivators

An interaction with “How May I Help You?” often takes more than one turn—dialog is necessary to confirm low-confidence interpretations, clarify ambiguities, and request missing information to complete a transaction. A *dialog motivator* is one of a small set of general principles that govern a dialog.

The following dialog example contains two invocations of the *missing information* motivator to obtain a caller’s billing method and card number:

Machine: AT&T. How may I help you?

User: I need a credit, I got the wrong number.

Machine: What was the number that you dialed?

User: I dialed four one five two eight ...

Machine: Was the call billed to the phone that you’re calling from now?

User: No, to a credit card.

Machine: What was the card number?

User: Four five six seven ...

Machine: I’ve given you credit for that call. Thank you for using AT&T.

Another example illustrates the *clarification* motivator:

Machine: AT&T. How may I help you?

User: I have a question about my June bill.

Machine: Okay, what is your question?

User: There’s a call to Tallahassee, but I don’t know anyone there.

Machine: I can help you with that. Are you calling from your home phone?

User: I’m calling from my house.

Machine: Please hold on while I transfer your call.

Dialog motivators exist for numerous other functions, including confirmation, error handling, and assumptions.

Call-type classification has several distinguishing attributes:

- It involves speech rather than text, with the inherent difficulties of speech recognition and the disfluencies of conversational-style language.
- Input is from cooperative users who are trying to communicate their needs and make themselves understood.
- The system has the opportunity to ask confirming or clarifying questions of that cooperative user.
- Collateral customer profile information is often available, which can be exploited in understanding a request—for example, cus-

tomers who want to know how to make delinquent payments on their phone bill are routed differently than other callers who want to pay their bills.

From a database we created of what customers say to operators, we observed that, although the variation in vocabulary and language is large, callers usually asked for one of 15 types of services.⁸ For example, “I want to reverse the charges on this call” is a request for a *Collect* call; “Can you tell me what time it is in Tokyo?” asks for *Time* information; and “I was trying to call my sister and dialed a wrong number” is a request for a *Billing Credit*. Automation for each of these call types is straightforward.

Queries that don’t fit into any of the predefined categories, such as “I’ve been trying to dial this number all day and can’t get through,” are classified as *Other* and directed to a human agent for resolution.

The customer care task involves very different types of questions.⁹ For example, “How much money do I owe you?” is a query for an *Account Balance*, while “I don’t recognize this phone call to Tallahassee on October 4” involves an *Unrecognized Number*.

Again, automated responses exist for both of these scenarios. However, “What’s this charge for one dollar and fifty cents?” asking about a *Charge on Bill*, and “I have a question about my bill,” a *Billing Query*, are vague. In these cases, clarification is required to properly classify the call.

The multiclass call classification task provides three traditional measures⁸ for rejection:

- the probability of false rejection—how often the system falsely rejects a request for some service or classifies it as *Other*;
- the probability of correct classification—how often a call-type classification is correct; and
- the true rejection rate—the probability that the system correctly classifies a request as *Other* and thus routes it to a human.

These three measures characterize how well the system classifies and routes customers’ calls.

DIALOG MANAGEMENT

Dialog provides the opportunity to ask confirming and clarifying questions, thus improving call-type classification compared with a single utterance. HMIHY uses a *dialog manager* to confirm the machine’s understanding when its confidence is low, to clarify ambiguities in a customer’s