Chapter 2

User Interface Design for Natural Language Systems: From Research to Reality

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Abstract: Since the original version of this chapter was published in 1999, there has been quite a lot of industry attention paid to the use of natural language technology in call center environments. Many natural language applications have been deployed (and some retired) and research on how best to design the user interfaces has continued. This chapter summarizes the original research from the 1999 book chapter “Spoken Natural Language Dialogue Systems: User Interface Issues for the Future”, adding relevant updates from the literature. In addition, this chapter proposes some “lessons learned” gleaned during the last six years as the technology evolved from research-based lab prototypes to large-scale call center deployments.

Keywords:

1. INTRODUCTION

1.1 What is Natural Language?

In general, Natural Language (NL) is the term used to describe applications in which the caller can speak more than a restricted set of command words or menu choices and the system will respond appropriately. The goal of the NL system is to anticipate what a caller is likely to say at a given juncture in the dialog. The NL is prepared to recognize many
variations of callers asking for the same service or choice and route them to
the appropriate next step in the dialog. For example:

System: How may I help you?
Caller: I’d like to check the balance on my Money Market account.

The caller could have said “I need my Money Market account balance”,
or “Money Market balance, please”. Or they could have said, “Hi, this is
Mary Jones. My old Ford isn’t working like it used to so I’m thinking of
buying a new car. What is the balance on my Money Market account?”. And finally, some callers will choose to say something like “balance”.

This example points out several things. First, it is virtually impossible to
anticipate all the variants callers might use for even a relatively simple task,
like checking an account balance. Language is so infinitely flexible that
attempts to build grammars to recognize the possibilities by “hand-crafting”
the alternatives generally fail. Second, some callers will invariably provide
information in their requests that is not directly relevant to what they want to
accomplish. It is the job of the NL to spot this irrelevant information and
disregard it. More about both of these topics is discussed later.

1.1.1 Natural Language for Call Routing

Most existing NL systems are designed to be call routers. That is, the NL
technology is used during the opening few turns of the dialog to determine
the callers’ intentions. Once the system knows what the caller wants, the
call can be routed either to an automated subsystem or to an agent to handle
the call. To continue with our example:

System: How may I help you?
Caller: I’d like to check the balance on my Money Market account.
System: Account Balance, is that right?
Caller: Yes, on my Money Market.
System: Ok. As of July nineteenth your Money Market balance is
five thousand two hundred and twenty two dollars and
thirty five cents.
System: Would you like to hear that again?
Caller: No thanks.
System: Is there anything else I can do for you?
Caller: Yes, I’d like to talk to someone. I think I’m gonna need a
car loan.
System: Would you like to be transferred to the loan department?
Caller: Yes please.
System: Please hold…