



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Εθνικόν και Καποδιστριακόν
Πανεπιστήμιον Αθηνών

Computerlinguistik

Lehrinheit 8a: Banking
and Money-related Transactions

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Banking and Money-related Transactions

T09: Introduction to Practical Speech
User Interface Design for Interactive
Voice Response Applications

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Σκοποί

Παρουσίαση Παραδειγμάτων /
Συστημάτων από Έργα



IBM Software Group: Examples of Speech User Interface Styles

Directed dialog

Sys: How may I help you?

Natural

User: How's my Fidelity doing these days?

commands

Sys: The price of Fidelity Magellan is \$58.75. What else can I do for you?

Natural language understanding

User: I'd like to buy some more.

(NLU)

Sys: How many shares?

User: 200.

Sys: Ready to purchase 200 shares of Fidelity Magellan. Select Confirm or Cancel.



IBM Software Group: Examples of Speech User Interface Styles-2

Sys: Ready to purchase 200 shares of Fidelity Magellan. Select Confirm or Cancel.

User: No, let's make that 300.

Sys: Ready to purchase 300 shares of Fidelity Magellan. Select Confirm or Cancel.

User: Confirm transaction.

Sys: Done. Purchased 300 shares of Fidelity Magellan. Anything else?



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Using Global Commands (1/2)

Tell users about 2-3 most important commands in introduction

- “Welcome to Bank by Phone. You can always say Repeat, Help, or Go
- Back, and you can interrupt me at any time.”
- More useful for repeat than first-time callers

At some point in help messaging, tell user about all global commands

- “At any time you can say Repeat, Help, Go Back, Start Over, Transfer to Agent, or Exit.”



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Using Global Commands (2/2)-I

These commands are easily understood without additional explanation

List key global commands at task terminal points

Either as last choices in a short menu or following a pause in longer menus

- “You’ ve transferred \$1000 from savings to checking. The confirmation
- number is 6 5 4 3 2 1. Select Repeat, Perform Another Transaction, Go
- Back, Main Menu, or Exit.”

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Using Global Commands (2/2)- II

These commands are easily understood without additional explanation

List key global commands at task terminal points

- “You’ ve received one new message from David Jones. Select Play
- Message, Reply, Reply to All, or Delete Message. <2000 ms pause> At any
- time you can say Repeat, Help, Go Back, Main Menu, Transfer to Agent, or
- Exit.

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Choosing a Help Style (1/2)-I

Help mode or self-revealing contextual help?

- Help modes can introduce mode-related usability problems
- Help modes rarely answer the user's need
- Preferred practice is to provide self-revealing contextual help
- Maximizing the benefits of self-revealing contextual help
- Due to momentary confusion or distraction, callers might request help



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Choosing a Help Style (1/2)-II

Help mode or self-revealing contextual help?

- Due to momentary confusion or distraction, callers might request help
- In the self-revealing approach, try to write help messages that work for all possible triggers – explicit request, noinput, or nomatch
- Allows reuse of messages and code – simpler to code than help mode
- Properly designed, it provides a sense of continuing to move forward



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Choosing a Help Style (2/2)-I

For example:

System: Welcome to Name Dialer. You can always say Help or Exit. Who do you want to call?

Caller: [Interrupting] Help

System: To start, please say the desired name and location.

User: [Silence timeout]



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Choosing a Help Style (2/2)-II

User: [Silence timeout]

System: For example, you could say “Call Joe Smith in Kansas City.”

User: [Coughs – system interprets as nomatch]

System: At any time you can say Help, Repeat, Start Over, or Exit. To continue, please say the desired name and location.

User: Ed Black in Poughkeepsie.



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Writing Prompts (1/2)-I

Directive Prompts

- Highly directive
- “Say Yes, No, or Repeat.”
- “Select Checking, Savings, or Money Market.”



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Writing Prompts (1/2)-II

More conversational

- “Do you want to work with your checking, savings, or money market account?”
- “What’s your departure date?”
- More conversational leads to greater response variability
- More conversational provides better match to service behavior expectations
- More conversational version is longer (18 vs. 11 syllables – 64% longer)



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Writing Prompts (2/2)

Non-Directive Prompts

- Used with natural command grammar or NLU applications
- Combination of open-ended prompting with examples
- System: What are your travel needs?
- User: <Nomatch or noinput for 3 seconds>
- System: For example, you might say “I want to go from New York to Orlando on May 1.”
- User: I want to go from Chicago to Los Angeles on March 15.
- Use above for frequent callers, if infrequent, start with examples



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Avoiding Touchtone-Style Initial Prompting (1/2)-I

- Touchtone style is “For <option>, say <label>”
- Touchtone style initial prompts are longer than they need to be
- In SUI initial prompting, the option should be the label
- For example,

Use:

- “Select Marketing, Finance, Human Resources, Accounting, or Research.”



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Avoiding Touchtone-Style Initial Prompting (1/2)-II

Rather than:

- “For the Marketing department, say Marketing. For Finance, say Finance. For
- Human Resources, say Human Resources. For Accounting, say Accounting.
- For Research, say Research.”



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Avoiding Touchtone-Style Initial Prompting (2/2)

- **If menu items are difficult for users to remember, might need to use touchtone-style prompting**
- Touchtone-style prompting works well for first-level help messages
- Slows things down
- Gives users more time to consider options



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Avoiding “Press or say <x>” Prompting (1/2)

- **Use of “Press or say <x>” prompting is common practice**
- “For Checking, press or say 1. For Savings, press or say 2. For Money Market, press or say 3.”
- **It’s common, but avoid it**
- **Better than plain touchtone user interface**
- No need to move handset during use



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Avoiding “Press or say <x>” Prompting (2/2)-I

- **But inherit weaknesses of touchtone UI without most benefits of SUI**
- “Press or say” prompts are wordier than well-designed speech prompts
- Example above has 23 syllables
- “Select Checking, Savings, or Money Market.” has 11 syllables
- “Press or say” prompts double the demand on users’ working memory



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Avoiding “Press or say <x>” Prompting (2/2)-II

- “Press or say” prompts double the demand on users’ working memory
- Need to remember the content of the choice
- Need to remember the number associated with the choice
- **Why so popular?**
- Conceptually easy for former touchtone app designers, feels less risky



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Using the Right Words (1/2)

Adopting user vocabulary

Potential sources: call center calls, call center scripts, corporate web site

Avoid lengthy lead-ins to menus

- Use: “Select Checking, Savings, or Money Market.”
(minimal, 11 syllables)
- Rather than:
- “Please make one of the following choices: Checking, Savings, or Money Market.” (19 syl.)



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Using the Right Words (2/2)-I

Phrase prompts as questions rather than statements

- Use: “Transfer how much?” (4 syllables)

Rather than:

- “Please state the amount you would like to transfer.”
(11 syllables)



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Using the Right Words (2/2)-II

Use pronouns, contractions, and ellipsis to avoid excessive repetition

- Use: “You have three new messages. The first’ s from John Doe. Second, Jane Doe. Third, Robert Jones.” (20)

Rather than:

- “You have three new messages. The first message is from John Doe. The second message is from Jane Doe. The third message is from Robert Jones.” (33 syllables)



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Stepping Stones and Safety Nets

(1/2)-I

For users who don't respond successfully to an initial prompt.

- For example:
- System: Which best describes why you're calling? Select New Claim, Life Policy, or Other Insurance Products.
- User: <help, noinput, or nomatch event>
- System: Please let us know why you're calling. To report the death or disability of an insured, say New Claim (or press 1). For service or questions on an existing life insurance policy, say Life Policy (or press 2). For all other insurance products, including annuities and mutual funds, say Other Insurance Products (or press 3).



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Stepping Stones and Safety Nets

(1/2)-II

- System: Please let us know why you're calling. To report the death or disability of an insured, say New Claim (or press 1). For service or questions on an existing life insurance policy, say Life Policy (or press 2). For all other insurance products, including annuities and mutual funds, say Other Insurance Products (or press 3).
- User: <help, noinput, or nomatch event>
- System: At any time you can say Repeat, Help, Go Back, Start Over, Transfer to Agent, or Goodbye. <2 sec pause> To continue, please say New Claim (or press 1), Life Policy (2), or Other Insurance Products (3).



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Stepping Stones and Safety Nets (2/2)

Callers who successfully engage with initial prompt move quickly

For less successful callers, the safety net pops open

- **Less concise, touchtone-style reprompting**
- **Presentation of global commands**
- **Final concise reprompt (possible switch to touchtone or agent here)**
- **You can run on stepping stones, but you can't run in a safety net**



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Immediate Confirmation: Separate Dialog Turns

Simplest strategy – provide confirmation for each item

Advantages: no ambiguity and high user success rate

Disadvantage is lengthened call and sluggish interaction

The more items to confirm, the greater the disadvantages

For example :

System: Which fund?

Caller: Fidelity Magellan

System: Was that Fidelity Magellan?

Caller: Yes

System: Buy how many shares?

Caller: 100

System: Was that 200?

Caller: No

System: Buy how many shares?

Caller: 100

System: Was that 100?

Caller: Yes



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Delayed (Batch) Confirmation: Basic (1/2)

Play all collected data in a single step

Advantage is, if no errors, increased speed of interaction

For example:

System: Which fund? **Caller:** Fidelity Magellan

System: Buy how many shares? **Caller:** 100

System: Was that 100 shares of Fidelity Magellan? **Caller:** Yes

If more than two errors, correction process is very lengthy



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Delayed (Batch) Confirmation: Basic (2/2)-I

The more the number of items to confirm, the greater the problem. Example:

System: Which fund? **Caller:** Fidelity Magellan

System: Buy how many shares? **Caller:** 100

System: Was that 200 shares of Fidelity No Load? **Caller:** No

System: Which item do you want to change? **Caller:** The number of shares

System: To how many shares? **Caller:** 100

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Delayed (Batch) Confirmation: Basic (2/2)-II

System: Which item do you want to change? **Caller:** The number of shares

System: To how many shares? **Caller:** 100

System: Was that 100 shares of Fidelity No Load? **Caller:** No

System: Which item do you want to change? **Caller:** The fund

System: Change to which fund? **Caller:** Fidelity Magellan

System: Was that 100 shares of Fidelity Magellan? **Caller:** Yes

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Delayed (Batch) Confirmation: Improved (1/2)-I

Eliminate repeated playing of the full confirmation message

If no errors, effect is same as basic delayed confirmation

If full confirmation not required, use immediate confirmation for errors

System: Which fund? Caller: Fidelity Magellan

System: Buy how many shares? Caller: 100

System: Was that 200 shares of Fidelity No Load? Caller: No

System: What do you want to change first? Caller: The number of shares

System: To how many shares? Caller: 100



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Delayed (Batch) Confirmation: Improved (1/2)-II

System: What do you want to change first? Caller: The number of shares

System: To how many shares? Caller: 100

System: Was that 100 shares? Caller: Yes

System: Change anything else? Caller: Yes, the fund

System: Change to which fund? Caller: Fidelity Magellan

System: Was that Fidelity Magellan? Caller: Yes



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Delayed (Batch) Confirmation: Improved (2/2)

If full confirmation required, do not use immediate confirmation for errors

System: What do you want to change first? **Caller:** The number of shares

System: To how many shares? **Caller:** 100

System: Change anything else? **Caller:** Yes, the fund

System: Change to which fund? **Caller:** Fidelity Magellan

System: Was that 100 shares of Fidelity Magellan? **Caller:** Yes



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Recovering from Errors (1/2)

Most error recovery handled with self-revealing contextual help

Some strategies for specific situations

Incorrect number of digits for numeric entry

- State problem without blaming user, then reprompt
- Consider reprompting for keypad use
- “Hmm, I didn’t get nine digits. Please use your keypad to enter the social security number.”



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Recovering from Errors (2/2)

Recognition error fed forward

Include Go Back command in first level help

System: Pay how much?

Caller: \$43.15

System: Paying \$53.50, with electronic check or credit card?

Caller: That's not right <nomatch>

System: To change the amount, say Go Back. To continue, select Electronic Check or Credit Card.



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Using Confidence Levels and n-best Lists (1/2)

What are they?

- **Confidence levels**
- Values produced by speech recognizers
- Results with close matches to known words get higher scores
- **n-best lists**
- Made up of the top n recognition results ranked by confidence level
- Match with highest confidence is the one given to the application
- Often, there is no need to complicate dialog processes with these
- But are some cases in which the complication is worthwhile



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Using Confidence Levels and n-best Lists (2/2)-I

Can refine implicit confirmation by feeding forward on high confidence

- **High confidence**
- **System:** Which stock? **Caller:** Texaco (**high confidence reco**)
- **System:** How many shares of Texaco? **Caller:** 500
- **System:** Sell 500 shares of Texaco? **Caller:** Yes



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Using Confidence Levels and n-best Lists (2/2)-II

- **Low confidence**
- **System:** Which stock? **Caller:** Texaco (low confidence reco)
- **System:** How many shares? **Caller:** 500
- **System:** What was that stock? **Caller:** Texaco
- **System:** Sell 500 shares of Texaco? **Caller:** Yes



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- Το παρόν εκπαιδευτικό υλικό έχει αναπτυχθεί στο πλαίσιο του εκπαιδευτικού έργου του διδάσκοντα.
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Έχουν προηγηθεί οι κάτωθι εκδόσεις:

- Έκδοση διαθέσιμη εδώ. <http://eclass.uoa.gr/courses/GS158/>



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