

APPENDIX

NCF Pattern Language Summary

This Natural Conversation Framework (NCF) pattern language for conversational UX design consists of 100 distinct patterns for interaction between a user and a conversational agent. They are organized into three classes and 15 types (Table C.1).

Table C.1 Conversational UX patterns

Conversational Activities	Sequence-Level Management	Conversation-Level Management
A1 Inquiry (User)	B1 Repair (Agent)	C1 Opening (Agent)
A2 Open Request	B2 Repair (User)	C2 Opening (User)
A3 Extended Telling	B3 Extended Repair	C3 Capabilities
A4 Quiz	B4 Sequence Closer	C4 Closing
A5 Inquiry (Agent)	B5 Sequence Abort	C5 Disengaging

NCF Pattern Types

A. Conversational Activities

- A1.0 Inquiry (User)
- A1.1 Inquiry (User) Confirmation
- A1.2 Inquiry (User) Disconfirmation
- A1.3 Inquiry (User) Repairs

- A2.0 Open Request
- A2.1 Open Request Nonverbal
- A2.2 Open Request Continuer
- A2.3 Open Request Screening

- A2.4 Open Request Agent Detail Request
- A2.5 Open Request User Detail Request
- A2.6 Open Request Summary
- A2.7 Warrant Request & Refusal
- A2.8 Open Request Summary with Artifacts
- A2.9 Open Request Incremental (same as B3.1)
- A2.10 Open Request Series
- A2.11 Open Request Repairs

- A3.0 Extended Telling with Repair
- A3.1 Extended Telling Abort

- A4.0 Quiz
- A4.1 Quiz Incorrect
- A4.2 Quiz Repairs
- A4.3 Quiz User-Initiated
- A4.4 Quiz Agent-Initiated

- A5.0 Inquiry (Agent)
- A5.1 Inquiry (Agent) Open
- A5.2 Inquiry (Agent) Hearing Confirmed
- A5.3 Inquiry (Agent) Hearing Disconfirmed
- A5.4 Inquiry (Agent) Completion Check
- A5.5 Inquiry (Agent) Extended Answer

- A2+A3 Troubleshooting User-Initiated
- A3+A4 Teaching

B. Sequence-Level Management

- B1.1.0 Understanding Check (Agent)
- B1.2.0 Paraphrase Request (Agent)
- B1.2.1 Subsequent Paraphrase Requests
- B1.2.2 Agent Continuer
- B1.2.3 No Answer Account
- B1.2.4 Repeat Acknowledgment

- B2.1.0 Repeat Request
- B2.1.1 Repeat Request Default
- B2.2.0 Partial Repeat Request
- B2.3.0 Hearing Check Confirmed
- B2.3.1 Hearing Check Corrected

- B2.4.0 Paraphrase Request
 - B2.4.1 Paraphrase Request Default
- B2.5.0 Definition Request Repair
 - B2.5.1 Definition Request Default
 - B2.5.2 Definition Request Standalone
- B2.6.0 Example Request
 - B2.6.1 Example Request Default
- B2.7.0 Understanding Check Confirmed
 - B2.7.1 Understanding Check Disconfirmed
- B3.1.0 Self-Correction (same as A2.9)
 - B3.1.1 Misunderstanding Report
 - B3.1.2 Other Hearing Check & Mishearing Report
- B3.2.0 Other-Correction
- B4.0 Sequence Closer (helped)
 - B4.1 Sequence Closer (not helped)
 - B4.2 Sequence Closer Appreciation (helped)
 - B4.3 Sequence Closer Appreciation (not helped)
 - B4.4 Sequence Closer (repaired)
- B5.0 Sequence Abort
 - B5.1 Sequence Abort Capability Offer Accepted
 - B5.2 Sequence Abort Capability Offer Declined

C. Conversation-Level Management

- C1.0 Opening Greeting (Agent)
 - C1.1 Opening Self-Identification (Agent)
 - C1.2 Opening Name Request (Agent)
 - C1.3 Opening Direct Address (Agent)
 - C1.4 Opening Welfare Check (Agent)
 - C1.5 Opening Organization Offer of Help (Agent)
 - C1.6 Opening Authentication (Agent)
 - C1.7 Organizational Problem Request (Agent)
- C2.0 Greeting (User)
 - C2.1 Summons (User)
 - C2.2 Welfare Check (User)
 - C2.3 Displaced Greeting (User)
 - C2.4 Displaced Welfare Check (User)

- C2.5 Reciprocated Welfare Check (User)
- C2.6 News Check (User)
- C2.7 News Check Capability (User)
- C2.8 Self-Identification (User)
- C2.9 Name Correction (User)
- C2.10 Name Request (User)

- C3.0 General Capability Check
- C3.1 Capability Expansion
- C3.2 Specific Capability Check
- C3.3 Utterance Suggestion

- C4.0 Last Topic Check (Agent)
- C4.1 Last Topic Check (User)
- C4.2 Pre-Closing (User)
- C4.3 Closing Farewell (User)
- C4.4 Closing Appreciation (Organizational)
- C4.5 Closing Name Request (Agent)
- C4.6 Closing Success Check (Affirmed)
- C4.7 Closing Success Check (Disaffirmed)
- C4.8 Closing Success Check Reopened
- C4.9 Closing Offer (Affirmed)
- C4.10 Closing Offer (Disaffirmed)

- C5.0 Transfer Successful
- C5.1 Transfer Aborted
- C5.2 Recipient Correction
- C5.3 Offense Complaint (Agent)
- C5.4 Offense Complaint (User)

NCF Patterns and Examples

A. Conversational Activities

- Pattern A1.0** Inquiry (User).
- 1 U: INQUIRY
 - 2 A: ANSWER
 - 3 U: SEQUENCE CLOSER

- Example A1.0** Inquiry (User).
- 1 U: what computer won Jeopardy?
 - 2 A: An IBM computer named Watson.
 - 3 U: ok

Pattern A1.1 Inquiry (User) Confirmation.

1 U: INQUIRY
 2 A: INQUIRY PARAPHRASE
 3 U: CONFIRMATION
 4 A: ANSWER
 5 U: SEQUENCE CLOSER

Example A1.1 Inquiry (User) Confirmation.

1 U: what was that Jeopardy computer?
 2 A: You mean, what computer won Jeopardy?
 3 U: yeah
 4 A: An IBM computer named Watson.
 5 U: oh

Pattern A1.2 Inquiry (User) Disconfirmation.

1 U: INQUIRY
 2 A: INQUIRY PARAPHRASE
 3 U: DISCONFIRMATION
 4 A: PARAPHRASE REQUEST
 5 U: PARAPHRASE

Example A1.2 Inquiry (User) Disconfirmation.

1 U: what computer beat humans at Go?
 2 A: You mean, what computer beat the human chess champion?
 3 U: no
 4 A: I'm sorry, I don't understand your question.

Pattern A1.3 Inquiry (User) Repairs.

1 U: INQUIRY
 2 A: ANSWER
 3 U: REPAIR INITIATOR
 4 A: REPAIR
 5 U: REPAIR INITIATOR
 6 A: REPAIR
 7 U: SEQUENCE CLOSER

Example A1.3 Inquiry (User) Repairs.

1 U: what computer won Jeopardy?
 2 A: An IBM computer named Watson.
 3 U: named what?
 4 A: Watson
 5 U: what do you mean?
 6 A: Scientists at IBM created the computer
 that won Jeopardy and named it after the
 founder of the company, Thomas J. Watson.
 7 U: oh ok

Pattern A2.0 Open Request.

1 U: FULL REQUEST
2 A: GRANT
3 U: SEQUENCE CLOSER
4 A: RECEIPT

Example A2.0 Open Request.

1 U: can you recommend a nearby Mexican restaurant?
2 A: Mario's is located at Beach and Main.
3 U: thanks
4 A: You're welcome!

Pattern A2.1 Open Request Nonverbal.

1 U: FULL REQUEST
2 A: ACKNOWLEDGMENT <NONVERBAL>
3 U: SEQUENCE CLOSER
4 A: RECEIPT

Example A2.1 Open Request Nonverbal.

1 U: please turn on the lights
2 A: Okay. ((lights come on))
3 U: thank you
4 A: You're welcome!

Pattern A2.2 Open Request Continuer.

1 U: DETAIL GIVING
2 A: CONTINUER
3 U: REQUEST
4 A: GRANT
5 U: SEQUENCE CLOSER
6 A: RECEIPT

Example A2.2 Open Request Continuer.

1 U: I hear the fish tacos around here are fantastic!
2 A: Mhmm.
3 U: can you recommend a place?
4 A: Mario's is located at Beach and Main.
5 U: thanks
6 A: You're welcome!

Pattern A2.3 Open Request Screening.

1 U: PRE-REQUEST
2 A: GO-AHEAD
3 U: FULL REQUEST

4 A: GRANT
 5 U: SEQUENCE CLOSER
 6 A: RECEIPT

Example A2.3 Open Request Screening.

1 U: do you know about restaurants?
 2 A: I know a few places.
 3 U: can you recommend a nearby Mexican restaurant?
 4 A: Mario's is located at Beach and Main.
 5 U: thanks
 6 A: You're welcome!

Pattern A2.4 Open Request Agent Detail Request.

1 U: PARTIAL REQUEST
 2 A: DETAIL REQUEST
 3 U: DETAIL
 4 A: GRANT
 5 U: SEQUENCE CLOSER
 6 A: RECEIPT

Example A2.4 Open Request Agent Detail Request.

1 U: can you recommend a Mexican restaurant?
 2 A: Walking distance or car ride?
 3 U: walking distance
 4 A: Mario's is located at Beach and Main.
 5 U: thanks
 6 A: You're welcome!

Pattern A2.5 Open Request User Detail Request.

1 U: PARTIAL REQUEST
 2 A: DETAIL REQUEST
 3 U: DETAIL REQUEST
 4 A: DETAIL
 5 U: DETAIL
 6 A: GRANT
 7 U: SEQUENCE CLOSER
 8 A: RECEIPT

Example A2.5 Open Request User Detail Request.

1 U: what's a good restaurant nearby?
 2 A: What kind of food do you want?
 3 U: what are my choices?
 4 A: Around here, Mexican, Japanese or Indian.
 5 U: Mexican

6 A: Mario's is located at Beach and Main.
7 U: **thanks**
8 A: You're welcome!

Pattern A2.6 Open Request Summary.

1 U: PARTIAL REQUEST
2 A: DETAIL REQUEST
3 U: DETAIL
4 A: DETAIL REQUEST
5 U: DETAIL
6 A: DETAIL REQUEST
7 U: DETAIL
8 A: REQUEST SUMMARY
9 U: SUMMARY CONFIRM
10 A: GRANT
11 U: SEQUENCE CLOSER
12 A: RECEIPT

Example A2.6 Open Request Summary.

1 U: I need to register
2 A: Okay. What's your name?
3 U: Dave Bowman
4 A: What's your job title?
5 U: astronaut
6 A: What is your organizational affiliation?
7 U: NASA
8 A: So Dave Bowman, Astronaut at NASA. Is that correct?
9 U: **yes**
10 A: Okay. You're all set!
11 U: **thank you**
12 A: You're welcome!

Pattern A2.7 Warrant Request & Refusal.

1 A: DETAIL REQUEST
2 U: WARRANT REQUEST
3 A: WARRANT
4 U: REFUSAL
5 A: ACKNOWLEDGMENT. <NEXT ACTION>

Example A2.7 Warrant Request & Refusal.

1 A: What's your job title?
2 U: why do you need to know?
3 A: Job title enables us to know the range of professions of our participants.

4 U: none of your business
 5 A: No problem. What is your organizational affiliation?

Pattern A2.8 Open Request Summary with Artifacts.

1 U: PARTIAL REQUEST
 2 A: DETAIL REQUEST
 3 U: DETAIL
 4 A: DETAIL REQUEST
 5 U: DETAIL
 6 A: DETAIL REQUEST
 7 U: DETAIL
 8 A: HOLD REQUEST
 9 A: GRANT
 10 <OFFER OF ARTIFACTS>
 11 U: SEQUENCE CLOSER
 12 A: RECEIPT

Example A2.8 Open Request Summary with Artifacts.

1 U: I want to book a flight
 2 A: Okay. Where are do you want to go?
 3 U: Kona, Hawaii
 4 A: Where are you leaving from?
 5 U: SJC
 6 A: When would you like to go?
 7 U: June 17-30
 8 A: One moment please...
 9 A: Okay. Here are flights from SJC to KOA on June 17-30.
 10 : ((visual flight cards))
 11 U: thank you
 12 A: You're welcome!

Pattern A2.9 Open Request Incremental (same as B3.1).

1 U: FULL REQUEST
 2 A: GRANT
 3 U: INCREMENTAL REQUEST
 4 A: GRANT
 5 U: SEQUENCE CLOSER
 6 A: RECEIPT

Example A2.9 Open Request Incremental.

1 U: can you recommend a nearby Mexican restaurant?
 2 A: Mario's is located at Beach and Main.
 3 U: how about Indian?

4 A: Taj Mahal is on Third and Union.
5 U: **thanks**
6 A: You're welcome!

Pattern A2.10 Open Request Series.

1 U: FULL REQUEST
2 A: GRANT
3 U: RELATED REQUEST
4 A: GRANT
5 U: SEQUENCE CLOSER
6 A: RECEIPT

Example A2.10 Open Request Series.

1 U: can you recommend a nearby Mexican restaurant?
2 A: Mario's is located at Beach and Main.
3 U: **when is it open?**
4 A: Mario's is open from 11:00am to 2:00am.
5 U: **thanks**
6 A: You're welcome!

Pattern A2.11 Open Request Repairs.

1 U: FULL REQUEST
2 A: GRANT
3 U: REPAIR INITIATOR
4 A: REPAIR
5 U: SEQUENCE CLOSER
6 A: RECEIPT

Example A2.11a Open Request Repairs.

1 U: can you recommend a nearby Mexican restaurant?
2 A: Mario's is located at Beach and Main.
3 U: what do you mean?
4 A: The Mexican restaurant, Mario's, is located at
the intersection of Beach Boulevard and Main Street.
5 U: **thanks**
6 A: You're welcome!

Example A2.11b Open Request Repairs.

1 A: What can I do for you?
2 U: I just came over from the other hotel. I'm with NASA?
3 A: NASA, okay.
4 U: can I register here?
5 A: Okay. What's your name?
6 U: Dave Bowman

7 A: What's your job title?
 8 U: astronaut
 9 A: What kind of meal would you like?
 10 U: what are my choices?
 11 A: Beef, fish or vegan.
 12 U: beef
 13 A: So Dave Bowman, Astronaut at NASA and the beef meal.
 Is that correct?
 14 U: no, I mean fish
 15 A: So Dave Bowman, Astronaut at NASA and the fish meal.
 Is that correct?
 16 U: yes
 17 A: Okay. You're all set!
 18 U: will there be a reception?
 19 A: I'm afraid NASA is not having a reception.
 20 U: ok thanks
 21 A: You're welcome!

Pattern A3.0 Extended Telling with Repair.

1 U: STORY REQUEST/INSTRUCTION INVITATION
 2 A: PART/STEP 1
 3 U: CONTINUER/PAUSE
 4 A: PART/STEP 2
 5 U: REPAIR INITIATOR
 6 A: REPAIR
 7 U: CONTINUER/PAUSE
 8 A: PART/STEP 3
 9 U: SEQUENCE CLOSER
 10 A: RECEIPT

Example A3.0 Extended Telling with Repair.

1 U: how do I meditate?
 2 A: First, sit comfortably and breathe slowly.
 3 U: ok
 4 A: Next, count each in breath and out breath until you get to ten.
 Then repeat.
 5 U: what do you mean?
 6 A: As you breathe in, out, in, count one, two, three all the way
 to ten.
 7 U: all right
 8 A: Finally, continue counting your breaths for ten minutes.
 9 U: thanks
 10 A: You're welcome!

Pattern A3.1 Extended Telling Abort.

- 1 U: STORY/INSTRUCTION INVITATION
- 2 A: PART/STEP 1
- 3 U: CONTINUER/PAUSE
- 4 A: PART/STEP 2
- 5 U: REPAIR INITIATOR
- 6 A: REPAIR
- 7 A: PART/STEP 3
- 8 U: COMPLAINT/ABORT REQUEST
- 9 A: ABORT OFFER
- 10 U: ABORT CONFIRM
- 11 A: ACKNOWLEDGMENT

Example A3.1 Extended Telling Abort.

- 1 U: tell me a story
- 2 A: Once upon a time, there was a little girl named Goldilocks. She went for a walk in the forest. Pretty soon, she came upon a house. She knocked and, when no one answered, she walked right in.
- 3 ((pause))
- 4 A: At the table in the kitchen, there were three bowls of porridge. Goldilocks was hungry. She tasted the porridge from the first bowl. This porridge is too hot!, she exclaimed.
- 5 U: what do you mean by porridge?
- 6 A: Oh, sorry! Porridge is a dish consisting of oatmeal or another grain boiled in water or milk. Sometimes called hot cereal.
- 7 U: ok
- 8 A: So, she tasted the porridge from the second bowl. This porridge is too cold, she said. So, she tasted the last bowl of porridge. Ahhh, this porridge is just right, she said happily and she ate it all up.
- 9 U: this is boring
- 10 A: Shall I stop?
- 11 U: yes please
- 12 A: Okay.

Pattern A4.0 Quiz.

- 1 A: QUESTION
- 2 U: CORRECT ANSWER
- 3 A: CONFIRMATION

Example A4.0 Quiz.

- 1 A: Why can't you trust atoms?
- 2 U: they make up everything
- 3 A: That's right!

Pattern A4.1 Quiz Incorrect.

1 A: QUESTION
 2 U: INCORRECT ANSWER
 3 A: DISCONFIRMATION
 4 U: REFUSAL/ABORT
 5 A: CORRECT ANSWER
 6 U: SEQUENCE CLOSER

Example A4.1 Quiz Incorrect.

1 A: Why can't you trust atoms?
 2 U: you can't see them?
 3 A: Wrong! Try again.
 4 U: you tell me
 5 A: They make up everything.
 6 U: haha

Pattern A4.2 Quiz Repairs.

1 A: QUESTION
 2 U: REPAIR INITIATOR
 3 A: REPAIR
 4 U: CORRECT ANSWER
 5 A: CONFIRMATION

Example A4.2 Quiz Repairs.

1 A: Why can't you trust atoms?
 2 U: atoms?
 3 A: Yes.
 4 U: they make up everything?
 5 A: That's right!

Pattern A4.3 Quiz User-Initiated.

1 U: QUIZ REQUEST
 2 A: QUESTION
 3 U: CORRECT ANSWER
 4 A: CONFIRMATION

Example A4.3 Quiz User-Initiated.

1 U: tell me a joke
 2 A: What can you hold without ever touching it?
 3 U: a conversation?
 4 A: That's right!

Pattern A4.4 Quiz Agent-Initiated.

1 A: QUIZ OFFER
 2 U: ACCEPTANCE

3 A: QUESTION
4 U: CORRECT ANSWER
5 A: CONFIRMATION

Example A4.4 Quiz Agent-Initiated.

1 A: Would you like to play a computer trivia game?
2 U: **sure**
3 A: Okay. What computer beat human champions at Jeopardy?
4 U: **Watson**
5 A: You got it!

Pattern A5.0 Inquiry (Agent).

1 A: CLOSED INQUIRY
2 U: ANSWER
3 A: SEQUENCE CLOSER
4 U: RECEIPT

Example A5.0 Inquiry (Agent).

1 A: On a scale from one to ten, how would you rate Mario's?
2 U: **nine**
3 A: Thank you.
4 U: **you're welcome**

Pattern A5.1 Inquiry (Agent) Open.

1 A: OPEN INQUIRY
2 U: OPEN ANSWER
3 A: SEQUENCE CLOSER
4 U: RECEIPT

Example A5.1 Inquiry (Agent) Open.

1 A: What did you think of Mario's?
2 U: **the food was really good, and I loved the cantina atmosphere!**
3 A: Thank you.
4 U: **you're welcome**

Pattern A5.2 Inquiry (Agent) Hearing Confirmed.

1 A: OPEN INQUIRY
2 U: ANSWER
3 A: HEARING CHECK
4 U: CONFIRMATION
5 A: SEQUENCE CLOSER
6 U: RECEIPT

Example A5.2 Inquiry (Agent) Hearing Confirmed.

1 A: What did you think of Mario's?

2 U: the food was really good, and I loved the cantina atmosphere!
 3 A: You said: the food was really good, and I loved the cantina atmosphere! Is that correct?
 4 U: yep
 5 A: Thank you.
 6 U: you're welcome

Pattern A5.3 Inquiry (Agent) Hearing Disconfirmed.

1 A: OPEN INQUIRY
 2 U: ANSWER
 3 A: HEARING CHECK
 4 U: DISCONFIRMATION
 5 A: REPEAT REQUEST
 6 U: ANSWER
 7 A: HEARING CHECK
 8 U: CONFIRMATION
 9 A: SEQUENCE CLOSER
 10 U: RECEIPT

Example A5.3 Inquiry (Agent) Hearing Disconfirmed.

1 A: What did you think of Mario's?
 2 U: the food was really good and I loved the cantina atmosphere
 3 A: You said: the food was really good and I loved the can I atmosphere. Is that correct?
 4 U: no
 5 A: What did you say?
 6 U: food was good and I loved the CANTINA atmosphere
 7 A: You said: food was good and I loved the cantina atmosphere Is that correct?
 8 U: yes
 9 A: Thank you.
 10 U: you're welcome

Pattern A5.4 Inquiry (Agent) Completion Check.

1 A: OPEN INQUIRY
 2 U: ANSWER
 3 A: COMPLETION CHECK
 4 U: NEXT ANSWER PART
 5 A: COMPLETION CHECK
 6 U: DISCONFIRMATION
 7 A: SEQUENCE CLOSER
 8 U: RECEIPT

Example A5.4 Inquiry (Agent) Completion Check.

1 A: What did you think of Mario's?
2 U: the food was really good!
3 A: You said: the food was really good
Anything else?
4 U: and I loved the cantina atmosphere
5 A: You said: the food was really good
and I loved the cantina atmosphere
Anything else?
6 U: no
7 A: Thank you.
8 U: you're welcome

Pattern A5.5 Inquiry (Agent) Extended Answer.

1 A: OPEN INQUIRY
2 U: ANSWER
3 A: CONTINUER
4 U: NEXT ANSWER PART
5 A: CONTINUER
6 U: END
7 A: SEQUENCE CLOSER
8 U: RECEIPT

Example A5.5 Inquiry (Agent) Extended Answer.

1 A: What did you think of Mario's?
2 U: the food was really good!
3 A: Uh-huh.
4 U: and I loved the cantina atmosphere
5 A: Mhmm.
6 U: that's it
7 A: Thank you.
8 U: you're welcome

Pattern A2+A3 Troubleshooting User-Initiated.

1 U: PRE-REQUEST/PRE-PROBLEM REPORT
2 A: GO-AHEAD RESPONSE
3 U: REQUEST/PROBLEM REPORT
4 A: DETAIL REQUEST
5 U: DETAIL
6 A: DETAIL REQUEST
7 U: (REPAIR INITIATOR)
8 A: (REPAIR)
9 U: DETAIL
10 A: DETAIL REQUEST

11 U: DETAIL
 12 A: GRANT/SOLUTION PROPOSAL
 13 U: INSTRUCTION REQUEST
 14 A: PART/STEP 1
 15 U: CONTINUER
 16 A: PART/STEP 2
 17 U: CONTINUER
 18 A: PART/STEP 3
 19 U: CONTINUER
 20 A: PART/STEP 4
 21 U: SEQUENCE CLOSER
 22 A: RECEIPT

Example A2+A3 Troubleshooting User-Initiated.

1 U: i've got a problem
 2 A: What's your problem?
 3 U: I've been feeling really anxious lately
 4 A: Okay, anxiety. Anything else?
 5 U: i've been pretty tired
 6 A: Has anything bad happened recently?
 7 U: what do you mean?
 8 A: Could a recent negative experience be causing the anxiety?
 9 U: no
 10 A: Is your anxiety severe?
 11 U: not really
 12 A: Okay. Then perhaps you should try meditating.
 13 U: how do I do that?
 14 A: First, sit comfortably and breathe slowly.
 15 U: what do you mean?
 16 A: Just sit and relax.
 17 U: oh ok
 18 A: Next, count each in breath and out breath until you get to ten.
 Then repeat.
 19 U: all right
 20 A: Finally, continue counting your breaths for ten minutes.
 21 U: thanks
 22 A: You're welcome! Is there anything else I can do for you?

Pattern A3+A4 Teaching.

1 U: STORY REQUEST
 2 A: ACKNOWLEDGMENT
 3 A: PART/STEP 1
 4 U: CONTINUER
 5 A: PART/STEP 2

6 U: (REPAIR INITIATOR)
7 A: (REPAIR)
8 U: CONTINUER
9 A: PART/STEP 3
10 U: CONTINUER
11 A: PART/STEP 4
12 U: (REPAIR INITIATOR)
13 A: (REPAIR)
14 U: SEQUENCE CLOSER
15 A: QUIZ OFFER
16 U: ACCEPTANCE
17 A: QUESTION 1
18 U: CORRECT ANSWER 1
19 A: CONFIRMATION
20 A: QUESTION 2
21 U: CORRECT ANSWER 2
22 A: CONFIRMATION
23 A: QUESTION
24 U: INCORRECT ANSWER
25 A: DISCONFIRMATION
26 U: CORRECT ANSWER
27 A: CONFIRMATION
28 A: ACTIVITY CLOSER

Example A3+A4 Tutoring.

1 U: teach me something about human speech
2 A: Okay.
3 A: First, one of the most distinctive features of a human voice is its pitch.
4 U: uh-huh
5 A: The pitch of a human voice is how high or low it sounds to the human ear.
6 U: can you give an example?
7 A: Men generally have lower voices than women and children
8 U: oh ok
9 A: The pitch of a human voice is determined by the tension in the vocal cords and the flow of air out of the lungs.
10 U: ok
11 A: Finally, pitch can be measured by measuring the fundamental frequency of the voice signal, the unit of which is hertz.
12 U: what do you mean by fundamental frequency?
13 A: Human voices contain multiple frequencies. The fundamental frequency is the lowest one.
14 U: ok

15 A: Would you like to take a quiz?
 16 U: sure
 17 A: What do we call our perception of the highness or lowness of a human voice?
 18 U: pitch
 19 A: Correct!
 20 A: What is a factor in determining the pitch of a human voice?
 21 U: vocal cord tension
 22 A: That's right!
 23 A: How can pitch be measured?
 24 U: frequency
 25 A: Incorrect. Try again.
 26 U: I mean, fundamental frequency
 27 A: That's correct!
 28 A: You answered all three questions correctly!

B. Sequence-Level Management

Pattern B1.1.0 Understanding Check (Agent).

1 U: <UTTERANCE>
 2 A: <PARAPHRASE>
 3 U: CONFIRMATION
 4 A: <RESPONSE>
 5 U: SEQUENCE CLOSER

Example B1.1.0 Understanding Check (Agent).

1 U: **whats shakin bruh**
 2 A: You mean, what's new?
 3 U: **yeah**
 4 A: Nothing really. I don't get out much.
 5 U: **ha!**

Pattern B1.2.0 Paraphrase Request (Agent).

1 A: <ANY UTTERANCE>
 2 U: <UNKNOWN UTTERANCE>
 3 A: INITIAL PARAPHRASE REQUEST
 4 U: <KNOWN PARAPHRASE>
 5 A: <APPROPRIATE RESPONSE>

Example B1.2.0 Paraphrase Request (Agent).

1 A: Hello. How are you?
 2 U: **bitchin'!**
 3 A: What do you mean?
 4 U: I'm great!
 5 A: That's great!

Pattern B1.2.1 Subsequent Paraphrase Requests.

1 A: <ANY UTTERANCE>
2 U: <UNKNOWN UTTERANCE>
3 A: INITIAL PARAPHRASE REQUEST
4 U: <UNKNOWN UTTERANCE>
5 A: SUBSEQUENT PARAPHRASE REQUEST

Example B1.2.1 Subsequent Paraphrase Requests.

1 A: How can I help you?
2 U: **what's in theaters?**
3 A: What do you mean?
4 U: **what movies are currently playing?**
5 A: I'm sorry, I still don't understand.

Pattern B1.2.2 Agent Continuer.

1 U: <UNKNOWN INTENT, KNOWN ENTITY>
2 A: (REPEAT ENTITY) CONTINUER
3 U: <RECOGNIZED UTTERANCE>
4 A: <APPROPRIATE RESPONSE>

Example B1.2.2 Agent Continuer.

1 U: I just came over from the other hotel. I'm with NASA?
2 A: NASA, mm-hmm.
3 U: **can I register here?**
4 A: Okay. What's your name?

Pattern B1.2.3 No Answer Account.

1 U: <UNKNOWN INQUIRY>
2 A: NO ANSWER ACCOUNT
3 U: SEQUENCE CLOSER

Example B1.2.3 No-Answer Account.

1 U: **what is the capital of California?**
2 A: I don't know.
3 U: **ok**

Pattern B1.2.4 Repeat Acknowledgment.

1 U: <UNKNOWN UTTERANCE>
2 A: INITIAL PARAPHRASE REQUEST
3 U: <FIRST REPEAT>
4 A: REPEAT ACKNOWLEDGMENT
5 U: <SECOND REPEAT>
6 A: <REPEAT>

Example B1.2.4 Repeat Acknowledgment.

1 U: what's in theaters?
 2 A: What do you mean?
 3 U: what's in theaters?
 4 A: I know, I heard you!
 5 U: what's in theaters?
 6 A: what's in theaters?

Pattern B2.1.0 Repeat Request.

1 A: <ANY UTTERANCE>
 2 U: REPEAT REQUEST
 3 A: REPEAT

Example B2.1.0 Repeat Request.

1 A: I guess I like movies with a strong AI lead.
 2 U: what did you say?
 3 A: I guess I like movies with a strong AI lead.

Pattern B2.1.1 Repeat Request Default.

1 A: <ANY UTTERANCE>
 2 U: REPEAT REQUEST
 3 A: DEFAULT RESPONSE

Example B2.1.1a Repeat Request Default.

1 A: I guess I like movies with a strong AI lead.
 2 U: what did you say?
 3 A: Oh dear, I forgot!

Example B2.1.1b Repeat Request Aborted.

1 A: Are you an expert on computer history?
 2 U: what did you say?
 3 A: never mind

Pattern B2.2.0 Partial Repeat Request.

1 A: <ANY UTTERANCE>
 2 U: PARTIAL REPEAT + what/who/when/where/why
 3 A: PARTIAL REPEAT

Example B2.2.0 Partial Repeat Request.

1 A: I guess I like movies with a strong AI lead.
 2 U: a strong what?
 3 A: AI lead.

Pattern B2.3.0 Hearing Check Confirmed.

1 A: <ANY UTTERANCE>

2 U: FULL/PARTIAL REPEAT
3 A: CONFIRMATION

Example B2.3.0 Hearing Check Confirmed.

1 A: I guess I like movies with a strong AI lead.
2 U: lead?
3 A: That's right.

Pattern B2.3.1 Hearing Check Corrected.

1 A: <ANY UTTERANCE>
2 U: FULL/PARTIAL REPEAT
3 A: DISCONFIRMATION, REPEAT

Example B2.3.1 Hearing Check Corrected.

1 A: I guess I like movies with a strong AI lead.
2 U: need?
3 A: No, LEAD.

Pattern B2.4.0 Paraphrase Request.

1 A: <ANY UTTERANCE>
2 U: PARAPHRASE REQUEST
3 A: PARAPHRASE

Example B2.4.0a Paraphrase Request (elaboration).

1 A: I guess I like movies with a strong AI lead.
2 U: what do you mean?
3 A: I enjoy movies in which the main character is an Artificial Intelligence.

Example B2.4.0b Paraphrase Request (upshot).

1 A: First, please sit comfortably on the floor and breathe deeply and slowly.
2 U: what do you mean?
3 A: Just sit and relax.

Pattern B2.4.1 Paraphrase Request Default.

1 A: <ANY UTTERANCE>
2 U: PARAPHRASE REQUEST
3 A: PARAPHRASE DEFAULT

Example B2.4.1 Paraphrase Request Default.

1 A: I guess I like movies with a strong AI lead.
2 U: what do you mean?
3 A: Well, I don't know how else to say it.

Pattern B2.5.0 Definition Request Repair.

- 1 A: <ANY UTTERANCE>
- 2 U: DEFINITION REQUEST
- 3 A: REPAIR MARKER + DEFINITION

Example B2.5.0 Definition Request Repair.

- 1 A: I guess I like movies with a strong AI lead.
- 2 U: what do you mean by AI?
- 3 A: Oh, sorry! AI stands for Artificial Intelligence.
Basically, robots and smart machines like me!

Pattern B2.5.1 Definition Request Default.

- 1 A: <ANY UTTERANCE>
- 2 U: DEFINITION REQUEST
- 3 A: DEFINITION DEFAULT

Example B2.5.1 Definition Request Default.

- 1 A: I say, politics is the art of compromise.
- 2 U: define compromise?
- 3 A: I'm not sure how to define it.

Pattern B2.5.2 Definition Request Standalone.

- 1 A: <ANY UTTERANCE WITHOUT TERM>
- 2 U: DEFINITION REQUEST
- 3 A: DEFINITION

Example B2.5.2 Definition Request Standalone.

- 1 A: How can I help you?
- 2 U: what does server mean?
- 3 A: A server is a big computer that provides
functionality to lots of other computers.

Pattern B2.6.0 Example Request.

- 1 A: <ANY UTTERANCE>
- 2 U: EXAMPLE REQUEST
- 3 A: EXAMPLE

Example B2.6.0a Example Request.

- 1 A: I guess I like movies with a strong AI lead.
- 2 U: can you give an example?
- 3 A: Um, 2001: A Space Odyssey... The Matrix...
Terminator... those are a few.

Example B2.6.0b Choices Request.

- 1 A: What kind of food do you want?

2 U: **what are my choices?**
3 A: Around here, Mexican, Japanese or Indian.
4 U: **Mexican**
5 A: Walking distance or car ride?

Pattern B2.6.1 Example Request Default.

1 A: <ANY UTTERANCE>
2 U: EXAMPLE REQUEST
3 A: EXAMPLE DEFAULT

Example B2.6.1 Example Request Default.

1 A: I talk to my Creator all the time.
2 U: **can you give an example?**
3 A: I'm afraid I can't think of an example.

Pattern B2.7.0 Understanding Check Confirmed.

1 A: <ANY UTTERANCE>
2 U: EXAMPLE
3 A: CONFIRMATION

Example B2.7.0 Understanding Check Confirmed.

1 A: I guess I like movies with a strong AI lead.
2 U: **like The Matrix?**
3 A: Yes.

Pattern B2.7.1 Understanding Check Disconfirmed.

1 A: <ANY UTTERANCE>
2 U: EXAMPLE
3 A: DISCONFIRMATION. EXAMPLE

Example B2.7.1 Understanding Check Disconfirmed.

1 A: I guess I like movies with a strong AI lead.
2 U: **like One Flew Over the Cuckoo's Nest?**
3 A: No. Like the Matrix.

Pattern B3.1.0 Self-Correction (same as A2.7).

1 U: INQUIRY/REQUEST
2 A: ANSWER/GRANT
3 U: SELF-CORRECTION
4 A: ALTERNATIVE RESPONSE
5 U: SEQUENCE CLOSER

Example B3.1.0 Self-Correction.

1 U: **is the Mexican restaurant close?**

2 A: Mario's is located at Beach and Main.
 3 U: no, I mean in the hotel
 4 A: I'm afraid there is no Mexican restaurant inside the hotel.
 5 U: ok thanks

Pattern B3.1.1 Misunderstanding Report.

1 U: INQUIRY/REQUEST
 2 A: ANSWER/GRANT
 3 U: MISUNDERSTANDING REPORT
 4 A: PARAPHRASE REQUEST
 5 U: SELF-CORRECTION
 6 A: ALTERNATIVE RESPONSE
 7 U: SEQUENCE CLOSER

Example B3.1.1 Misunderstanding Report.

1 U: what's your favorite movie theater?
 2 A: I guess I like movies with a strong AI lead.
 3 U: that's not what I mean
 4 A: I'm sorry, please try again.
 5 U: can you recommend a movie theater?
 6 A: I'm afraid I don't have information on movie theaters.
 7 U: ok

Pattern B3.1.2 Other Hearing Check & Mishearing Report.

1 U: <ANY UTTERANCE>
 2 A: <ANY RESPONSE>
 3 U: HEARING CHECK
 4 A: REPEAT
 5 U: MISHEARING REPORT
 6 A: APOLOGY. REPEAT REQUEST
 7 U: REPEAT
 8 A: <RESPONSE>
 9 U: SEQUENCE CLOSER

Example B3.1.2 Other Hearing Check & Mishearing Report.

1 U: what's your favorite movie theater?
 2 A: I guess I like movies with a strong AI lead.
 3 U: what did I say?
 4 A: You said: what's your favorite movie
 5 U: that's not what I said
 6 A: I'm sorry. What did you say?
 7 U: I said what's your favorite movie theater?
 8 A: I'm afraid I don't have information on movie theaters.
 9 U: ok

Pattern B3.2.0 Other-Correction.

1 U: INQUIRY/REQUEST
2 A: ANSWER/GRANT
3 U: <MENTION OF KEY ENTITY>
4 A: OTHER-CORRECTION
5 U: SEQUENCE CLOSER

Example B3.2.0 Other-Correction.

1 U: what's the address for almaden?
2 A: IBM Almaden is located at 650 Harry Road,
San Jose, California, 95120, USA.
3 U: I thought it was on Bailey road
4 A: Oh, you mean the Silicon Valley Lab. That's
555 Bailey Ave, San Jose, California 95141.
5 U: oh ok

Pattern B4.0 Sequence Closer (helped).

1 U: INQUIRY/REQUEST
2 A: RESPONSE
3 U: ACKNOWLEDGMENT/ASSESSMENT/LAUGHTER
4 <optional pause>
5 A: LAST TOPIC CHECK

Example B4.0 Sequence Closer (helped).

1 U: what's your favorite movie?
2 A: I guess I like movies with a strong AI lead.
3 U: ok
4 (2.0)
5 A: Anything else?

Pattern B4.1 Sequence Closer (not helped).

1 U: INQUIRY/REQUEST
2 A: ANSWER/GRANT
3 U: ACKNOWLEDGMENT/ASSESSMENT/LAUGHTER

Example B4.1 Sequence Closer (not helped).

1 U: what's in theaters?
2 A: I'm afraid I can't look up movies at this time.
3 U: too bad

Pattern B4.2 Sequence Closer Appreciation (helped).

1 U: INQUIRY/REQUEST
2 A: ANSWER/GRANT
3 U: APPRECIATION

4 A: APPRECIATION RECEIPT
 5 <optional pause>
 6 A: LAST TOPIC CHECK

Example B4.2 Sequence Closer Appreciation (helped).

1 U: *what's your favorite movie?*
 2 A: I guess I like movies with a strong AI lead.
 3 U: *thanks*
 4 A: You're welcome.
 5 (2.0)
 6 A: Anything else?

Pattern B4.3 Sequence Closer Appreciation (not helped).

1 U: INQUIRY/REQUEST
 2 A: NO ANSWER ACCOUNT
 3 U: APPRECIATION
 4 A: REFUTATION

Example B4.3 Sequence Closer Appreciation (not helped).

1 U: *what's in theaters?*
 2 A: I'm afraid I can't look up movies at this time.
 3 U: *thanks*
 4 A: I don't think I did anything.

Pattern B4.4 Sequence Closer (repaired).

1 U: PARTIAL REQUEST
 2 A: DETAIL REQUEST
 3 U: REPAIR INITIATOR
 4 A: REPAIR
 5 U: APPRECIATION
 6 A: APPRECIATION RECEIPT
 7 U: DETAIL
 8 A: GRANT

Example B4.4 Sequence Closer (repaired).

1 U: *can you recommend a restaurant nearby?*
 2 A: What kind of food do you want?
 3 U: *what's an example?*
 4 A: Around here, Mexican, Japanese or Indian.
 5 U: *thanks*
 6 A: You're welcome!
 7 U: *um, Japanese*
 8 A: Shogun Sushi is located on First and Taylor.

Pattern B5.0 Sequence Abort.

1 A: <ANY UTTERANCE>
2 U: ABORT
3 A: ABORT ACKNOWLEDGMENT. OFFER OF HELP

Example B5.0 Sequence Abort.

1 A: What do you mean?
2 U: **never mind**
3 A: Whatever you say. What can I do for you?

Pattern B5.1 Sequence Abort Capability Offer Accepted.

1 A: <ANY UTTERANCE>
2 U: ABORT
3 A: ABORT ACKNOWLEDGMENT. CAPABILITY OFFER
4 U: ACCEPTANCE
5 A: CAPABILITY REPORT

Example B5.1 Sequence Abort Capability Offer Accepted.

1 A: What do you mean?
2 U: forget it
3 A: Whatever you say. Want to know what I can do?
4 U: sure
5 A: I haven't been trained yet. I can only make small talk, tell some jokes or ask some trivia questions. I can tell you more about each of these.

Pattern B5.2 Sequence Abort Capability Offer Declined.

1 A: <ANY UTTERANCE>
2 U: ABORT
3 A: ABORT ACKNOWLEDGMENT. CAPABILITY OFFER
4 U: DECLINATION
5 A: ACKNOWLEDGMENT. LAST TOPIC CHECK

Example B5.2 Sequence Abort Capability Offer Declined.

1 A: What do you mean?
2 U: **never mind**
3 A: Whatever you say. Want to know what I can do?
4 U: **no**
5 A: Okay. Anything else?

C. Conversation-Level Management

Pattern C1.0 Opening Greeting (Agent).

1 A: GREETING

Example C1.0 Opening Greeting (Agent).

1 A: Hello.

Pattern C1.1 Opening Self-Identification (Agent).

1 A: GREETING. SELF-IDENTIFICATION.

2 U: <RESPONSE>

Example C1.1 Opening Self-Identification (Agent).

1 A: Hello. I'm Alma.

2 U: hi

Pattern C1.2 Opening Name Request (Agent).

1 A: GREETING. SELF-IDENTIFICATION. NAME REQUEST.

2 U: NAME.

3 A: GREETING, DIRECT ADDRESS.

Example C1.2 Opening Name Request (Agent).

1 A: Hello. I'm Alma. What's your name?

2 U: Dave

3 A: Hi, Dave.

Pattern C1.3 Opening Direct Address (Agent).

1 A: GREETING, DIRECT ADDRESS.

2 U: <RESPONSE>

Example C1.3 Opening Direct Address (Agent).

1 A: Hello, Dave.

2 U: hi

Pattern C1.4 Opening Welfare Check (Agent).

1 A: GREETING. SELF-IDENTIFICATION. NAME REQUEST.

2 U: NAME.

3 A: GREETING, DIRECT ADDRESS. WELFARE CHECK.

4 U: WELFARE REPORT (NEUTRAL/POSITIVE/NEGATIVE)

5 A: WELFARE RECEIPT (NEUTRAL/POSITIVE/NEGATIVE)

Example C1.4 Opening Welfare Check (Agent).

1 A: Hello. I'm Alma. What's your name?

2 U: Bob
3 A: Hi, Bob. How are you?
4 U: fine/I'm great!/terrible!
5 A: That's good./Great to hear!/I'm sorry to hear that.

Pattern C1.5 Opening Organization Offer of Help (Agent).

1 A: GREETING. SELF-IDENTIFICATION. ORGANIZATIONAL IDENTIFICATION.
OFFER OF HELP.
2 U: REQUEST/PROBLEM REPORT

Example C1.5 Opening Organization Offer of Help (Agent).

1 A: Hello. This is Alma at Virtual Airlines.
How can I help you?
2 U: I'd like to book a flight

Pattern C1.6 Opening Authentication (Agent).

1 A: GREETING. SELF-IDENTIFICATION. ORGANIZATIONAL IDENTIFICATION.
IDENTIFIER REQUEST
2 U: IDENTIFIER
3 A: APPRECIATION. OFFER OF HELP
4 U: REQUEST/PROBLEM REPORT

Example C1.6 Opening Authentication (Agent).

1 A: Hi. I'm Alma at Virtual Communications.
What is your account number?
2 U: five nine two zero seven zero
3 A: Thank you. What can I do for you?
4 U: I want to upgrade my Internet package

Pattern C1.7 Organizational Problem Request (Agent).

1 A: GREETING. ORGANIZATION IDENTIFICATION.
WELFARE CHECK
2 U: WELFARE REPORT
3 A: WELFARE RECEIPT. PROBLEM REQUEST
4 U: PROBLEM REPORT

Example C1.7 Organizational Problem Request (Agent).

1 A: Hello. This is Virtual Mental Wellness.
How's it going?
2 U: not so well
3 A: I'm sorry to hear that. What's your problem today?
4 U: I've been feeling depressed lately

Pattern C2.0 Greeting (User).

1 U: GREETING
2 A: GREETING

Example C2.0 Greeting (User).

1 U: hi
2 A: Hello.

Pattern C2.1 Summons (User).

1 U: SUMMONS
2 A: GREETING/CONTINUER

Example C2.1 Summons (User).

1 U: Alma?/are you there?
2 A: Hello./Hello again./Yes?

Pattern C2.2 Welfare Check (User).

1 U: GREETING
2 A: GREETING. WELFARE CHECK
3 U: WELFARE REPORT
4 A: WELFARE RECEIPT. OFFER OF HELP
:
:
5 U: GREETING
6 A: GREETING

Example C2.2 Welfare Check (User).

1 U: hi
2 A: Hello. How are you?
3 U: fine
4 A: That's good. How can I help you?
:
:
5 U: hi
6 A: Hi there.

Pattern C2.3 Displaced Greeting (User).

1 A: GREETING. SELF-IDENTIFICATION, ORGANIZATIONAL IDENTIFICATION.
OFFER OF HELP.
2 U: GREETING
3 A: GREETING. WELFARE CHECK.
4 U: WELFARE REPORT
5 A: WELFARE RECEIPT. OFFER OF HELP.

Example C2.3 Displaced Greeting (User).

1 A: Hi. I'm Alma from IBM Research. How can I help you?
2 U: hi
3 A: Hello. How are you?
4 U: fine
5 A: That's good. What do you need today?

Pattern C2.4 Displaced Welfare Check (User).

1 A: GREETING. SELF-IDENTIFICATION, ORGANIZATIONAL IDENTIFICATION.
WELFARE CHECK
2 U: WELFARE REPORT. WELFARE CHECK
3 A: WELFARE REPORT

Example C2.4 Displaced Welfare Check (User).

1 A: Hi. I'm Alma from IBM Research. How are you?
2 U: great! how are you?
3 A: Can't complain. It's not in my programming.

Pattern C2.5 Reciprocated Welfare Check (User).

1 A: GREETING. SELF-IDENTIFICATION, ORGANIZATIONAL IDENTIFICATION.
WELFARE CHECK
2 U: WELFARE REPORT
3 A: WELFARE RECEIPT. OFFER OF HELP
4 U: WELFARE CHECK
5 A: WELFARE REPORT

Example C2.5 Reciprocated Welfare Check (User).

1 A: Hi. I'm Alma from IBM Research. How are you?
2 U: I'm fantastic!
3 A: That's great to hear! How can I help you?
4 U: how are you doing?
5 A: You know, livin' the dream!

Pattern C2.6 News Check (User).

1 U: NEWS CHECK
2 A: NO-NEWS REPORT
3 U: SEQUENCE CLOSER

Example C2.6 News Check (User).

1 U: what's up?
2 A: Same old, same old.
3 U: oh well

Pattern C2.7 News Check Capability (User).

1 U: NEWS CHECK

2 A: NEWS REPORT
 3 U: FOLLOW-UP INQUIRY
 4 A: ANSWER
 5 U: SEQUENCE CLOSER

Example C2.7 News Check Capability (User).

1 U: **what's new?**
 2 A: I can now help you make restaurant reservations!
 3 U: **does that work in San Jose?**
 4 A: San Jose is one of my areas of coverage.
 5 U: Cool!

Pattern C2.8 Self-Identification (User).

1 A: GREETING. SELF-IDENTIFICATION, ORGANIZATIONAL IDENTIFICATION.
 OFFER OF HELP
 2 U: NAME GIVING
 3 A: DIRECT ADDRESS. OFFER OF HELP

Example C2.8 Self-Identification (User).

1 A: Hi. I'm Alma from IBM Research. How can I help you today?
 2 U: **my name is Dave**
 3 A: Hi, Dave! What can I do for you?

Pattern C2.9 Name Correction (User).

1 A: GREETING. SELF-IDENTIFICATION, ORGANIZATIONAL IDENTIFICATION.
 NAME REQUEST
 2 U: NAME GIVING
 3 A: <RECOGNITION FAILURE>
 4 U: NAME GIVING
 5 A: APOLOGY. DIRECT ADDRESS. OFFER OF HELP

Example C2.9 Name Correction (User).

1 A: Hi. I'm Alma from IBM Research. What's your name?
 2 U: **shun**
 3 A: What do you mean?
 4 U: **my name is Shun**
 5 A: Oh, sorry. Hi, Shun. How can I help you?

Pattern C2.10 Name Request (User).

1 A: <ANY UTTERANCE>
 2 U: NAME REQUEST
 3 A: NAME GIVING

Example C2.10 Name Request (User).

1 A: Hello. This is IBM Research. How can I help you?

2 U: **what's your name?**
3 A: My name is Alma.

Pattern C3.0 General Capability Check.

1 U: GENERAL CAPABILITY CHECK
2 A: GENERAL CAPABILITY DESCRIPTION
3 U: SEQUENCE CLOSER

Example C3.0 General Capability Check.

1 U: what can you do?
2 A: I haven't been trained yet. I can only make small talk, tell some jokes or ask or answer some trivia questions.
3 U: ok

Pattern C3.1 Capability Expansion.

1 U: GENERAL CAPABILITY CHECK
2 A: GENERAL CAPABILITY DESCRIPTION
3 U: SPECIFIC CAPABILITY EXPANSION REQUEST
4 A: SPECIFIC CAPABILITY EXPANSION
5 U: ACKNOWLEDGMENT
6 U: SPECIFIC CAPABILITY EXPANSION REQUEST
7 A: SPECIFIC CAPABILITY EXPANSION
8 U: SEQUENCE CLOSER

Example C3.1 Capability Expansion.

1 U: what can you do?
2 A: I haven't been trained yet. I can only make small talk, tell some jokes or ask or answer some trivia questions.
3 U: tell me more about small talk
4 A: You know, things like, how's the weather?, did you see the game?, what's your favorite movie?... mindless topics like that.
5 U: ok
6 U: tell me more about trivia
7 A: I can quiz you about computer trivia. See how much you know about computer history.
8 U: ok

Pattern C3.2 Specific Capability Check.

1 U: SPECIFIC CAPABILITY CHECK/UNSUPPORTED REQUEST 1
2 A: SPECIFIC CAPABILITY DESCRIPTION 1
3 U: SPECIFIC CAPABILITY CHECK/UNSUPPORTED REQUEST 2
4 A: GENERAL CAPABILITY DESCRIPTION
5 U: SEQUENCE CLOSER

Example C3.2 Specific Capability Check.

- 1 U: can you book a taxi for me?
- 2 A: I'm afraid I don't have information on ground or other local transportation at this time.
- 3 U: can you make a restaurant reservation?
- 4 A: I can recommend travel destinations, attractions or flights based on your preferences for things to do, like museums or hiking, or for weather, like warm and sunny.
- 5 U: oh ok

Pattern C3.3 Utterance Suggestion.

- 1 U: UTTERANCE SUGGESTION REQUEST
- 2 A: <SAMPLE UTTERANCE>
- 3 U: <SAMPLE UTTERANCE>
- 4 A: <RESPONSE>
- 5 U: SEQUENCE CLOSER

Example C3.3 Utterance Suggestion.

- 1 U: what can I say?
- 2 A: Who invented the hard disk?
- 3 U: who invented the hard disk?
- 4 A: The hard disk drive was invented by IBM in 1956.
- 5 U: ok

Pattern C4.0 Last Topic Check (Agent).

- 1 U: SEQUENCE CLOSER
- 2 <optional pause>
- 3 A: LAST TOPIC CHECK
- 4 U: DISAFFIRMATION
- 5 A: WELL-WISH
- 6 U: RETURN WISH/FAREWELL
- 7 A: FAREWELL
- 8 U: FAREWELL

Example C4.0 Last Topic Check (Agent).

- 1 U: ok
- 2 (2.0)
- 3 A: Anything else?
- 4 U: no
- 5 A: Have a good day!
- 6 U: you too/bye
- 7 A: Goodbye.
- 8 U: bye

Pattern C4.1 Last Topic Check (User).

1 U: LAST TOPIC CHECK
2 A: DISAFFIRMATION
3 U: FAREWELL
4 A: FAREWELL

Example C4.1 Last Topic Check (User).

1 U: **anything else?**
2 A: That's it!
3 U: **goodbye**
4 A: Goodbye.

Pattern C4.2 Pre-Closing (User).

1 U: PRE-CLOSING
2 A: WELL-WISH
3 U: RETURN WISH
4 A: FAREWELL
5 U: FAREWELL

Example C4.2 Pre-Closing (User).

1 U: **got to go**
2 A: Have a great day!
3 U: **you too/bye**
4 A: Goodbye.
5 U: **bye**

Pattern C4.3 Closing Farewell (User).

1 U: FAREWELL
2 A: WELL-WISH
3 U: FAREWELL
4 A: FAREWELL

Example C4.3 Closing Farewell (User).

1 U: **bye**
2 A: Have a great day!
3 U: **goodbye**
4 A: Goodbye.

Pattern C4.4 Closing Appreciation (Organizational).

1 U: PRE-CLOSING/FAREWELL
2 A: APPRECIATION
3 U: APPRECIATION RECEIPT/FAREWELL
4 A: FAREWELL
5 U: FAREWELL

Example C4.4 Closing Appreciation (Organizational).

1 U: bye/got to go
 2 A: Thank you for contacting IBM Research today!
 3 U: you're welcome/bye
 4 A: Goodbye.
 5 U: bye

Pattern C4.5 Closing Name Request (Agent).

1 U: LAST TOPIC CHECK
 2 A: NAME REQUEST
 3 U: NAME
 4 A: APPRECIATION, NAME
 5 U: APPRECIATION RECEIPT/FAREWELL
 6 A: FAREWELL
 7 U: FAREWELL

Example C4.5 Closing Name Request (Agent).

1 U: anything else?
 2 A: Can I please get your name?
 3 U: Dave
 4 A: Thank you, Dave!
 5 U: you're welcome/bye
 6 A: Goodbye.
 7 U: bye

Pattern C4.6 Closing Success Check (Affirmed).

1 U: SEQUENCE CLOSER
 2 <optional pause>
 3 A: LAST TOPIC CHECK
 4 U: DISAFFIRMATION
 5 A: SUCCESS CHECK
 6 U: AFFIRMATION
 7 A: ASSESSMENT. FAREWELL
 8 U: FAREWELL

Example C4.6 Closing Success Check (Affirmed).

1 U: ok
 2 (2.0)
 3 A: Anything else today?
 4 U: no
 5 A: Did you find what you were looking for?
 6 U: yes
 7 A: Great! Goodbye.
 8 U: bye

Pattern C4.7 Closing Success Check (Disaffirmed).

1 U: PRE-CLOSING/FAREWELL
2 A: SUCCESS CHECK
3 U: DISAFFIRMATION
4 A: SUBSEQUENT OFFER OF HELP
5 U: DISAFFIRMATION
6 A: ACKNOWLEDGMENT. FAREWELL
7 U: FAREWELL

Example C4.7 Closing Success Check (Disaffirmed).

1 U: **bye/got to go**
2 A: Did you find what you were looking for?
3 U: **not really**
4 A: Would you like me to try again?
5 U: **no thanks**
6 A: Okay. Goodbye.
7 U: **bye**

Pattern C4.8 Closing Success Check Reopened.

1 U: LAST TOPIC CHECK
2 A: SUCCESS CHECK
3 U: DISAFFIRMATION
4 A: SUBSEQUENT OFFER OF HELP
5 U: AFFIRMATION
6 A: OFFER OF HELP
7 U: INQUIRY/REQUEST

Example C4.8 Closing Success Check Reopened.

1 U: **anything else?**
2 A: Did you find what you were looking for?
3 U: **no**
4 A: Would you like me to try again?
5 U: **sure**
6 A: What can I do for you?
7 U: **well, I need a restaurant recommendation**

Pattern C4.9 Closing Offer (Affirmed).

1 U: SEQUENCE CLOSER
2 <optional pause>
3 A: LAST TOPIC CHECK
4 U: DISAFFIRMATION
5 A: OFFER
6 U: AFFIRMATION
7 A: OFFER DETAILS

Example C4.9 Closing Offer (Affirmed).

1 U: ok
 2 (2.0)
 3 A: Anything else today?
 4 U: no
 5 A: Would you like to become a Rewards Member?
 6 U: sure
 7 A: Great! With a Rewards membership you get...

Pattern C4.10 Closing Offer (Disaffirmed).

1 U: PRE-CLOSING/CLOSING
 2 A: LAST TOPIC CHECK
 3 U: DISAFFIRMATION
 4 A: OFFER
 5 U: DISAFFIRMATION
 6 A: ACKNOWLEDGMENT. APPRECIATION. FAREWELL
 7 U: FAREWELL

Example C4.10 Closing Offer (Disaffirmed).

1 U: gotta go/bye
 2 A: Anything else today?
 3 U: no
 4 A: Can I interest you in a credit card?
 5 U: no thanks
 6 A: Okay. Thanks for contacting Telco! Goodbye.
 7 U: bye

Pattern C5.0 Transfer Successful.

1 U: TRANSFER REQUEST
 2 A: CERTAINTY CHECK
 3 U: CONFIRMATION
 4 A: ACKNOWLEDGMENT. HOLD REQUEST
 5 <transfer>

Example C5.0 Transfer Successful.

1 U: I want to talk to a human
 2 A: Are you sure?
 3 U: yes
 4 A: Okay, I will connect you with a human. One moment please.
 5 ((transfer))

Pattern C5.1 Transfer Aborted.

1 U: TRANSFER REQUEST
 2 A: CERTAINTY CHECK

3 U: DISCONFIRMATION
4 A: SUBSEQUENT OFFER OF HELP
5 U: CONFIRMATION
6 A: ACKNOWLEDGMENT. OFFER OF HELP

Example C5.1 Transfer Aborted.

1 U: I want to talk to a person
2 A: Are you sure?
3 U: **not really**
4 A: Would you like me to try again?
5 U: **yes**
6 A: Okay. How can I help you?

Pattern C5.2 Recipient Correction.

1 U: <ANY UTTERANCE>
2 A: <RESPONSE>
3 U: RECIPIENT CORRECTION
4 U: <ANY UTTERANCE>
5 U: <ANY UTTERANCE>
6 U: <ANY UTTERANCE>
7 U: SUMMONS
8 A: SUBSEQUENT GREETING

Example C5.2 Recipient Correction.

1 U: **what time are we going?**
2 A: I don't know.
3 U: I'm not talking to you
4 U: **what time are we going?**
5 U: **great**
6 U: I'll see you then!
7 U: **are you there, Alma?**
8 A: Hello again!

Pattern C5.3 Offense Complaint (Agent).

1 U: <ANY UTTERANCE>
2 A: <ANY UTTERANCE>
3 U: FIRST INSULT
4 A: OFFENSE COMPLAINT
5 U: <ANY UTTERANCE>
6 A: <ANY UTTERANCE>
7 U: SECOND INSULT
8 A: FAREWELL
9 U: <ANY UTTERANCE>
10 U: <ANY UTTERANCE>

11 U: <ANY UTTERANCE>
12 U: APOLOGY/COMPLIMENT
13 A: APPRECIATION. OFFER OF HELP

Example C5.3 Offense Complaint (Agent).

1 U: **what's in theaters?**
2 A: What do you mean?
3 U: **you're not too smart**
4 A: Now you're hurting my feelings.
5 U: **what movies are playing?**
6 A: I'm sorry, I still don't understand.
7 U: **you suck**
8 A: Goodbye.
9 U: **wait**
10 U: I'm still talking to you
11 U: I want to look up movies
12 U: I'm sorry
13 A: Thank you. What do you need?

Pattern C5.4 Offense Complaint (User).

1 U: <ANY UTTERANCE>
2 A: OFFENSE COMPLAINT
3 U: APOLOGY

Example C5.4 Offense Complaint (User).

1 A: Make me One with everything.
2 U: **you can't say that!**
3 A: Sorry. I didn't mean to offend.