SPEECH WITHIN REACH

Dialog Strategies for Multi-parameter Search

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Agenda

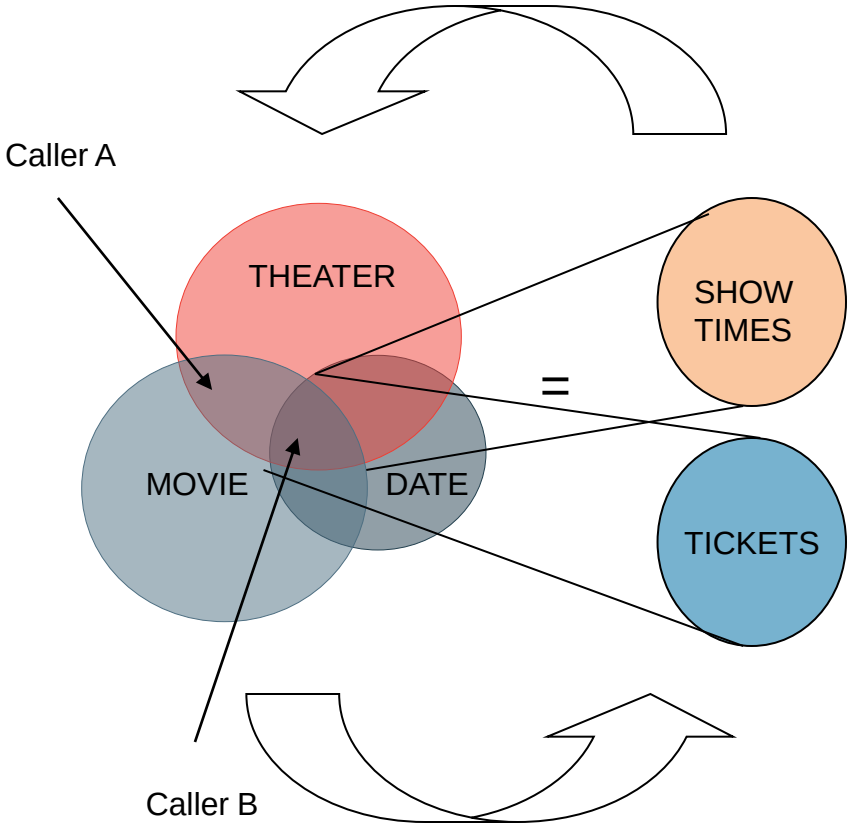
- Multi-parameter Search Overview
- Strategies to simplify multi-parameter search
- Comparison of 3 such search systems

Spoken Multi-parameter search

- Multi-parameter search – Definition:
  - Search scenario where a caller has to select several criteria to complete a search.
  - Dialog structure depends on the sequence

- Example: movie show time search:
  - At call start, listen for all main parameter types
  - Parameters: Theater, Movie name, Date
  - Theater -> Movie = List of movies at a given theater
  - Movie -> Theater = List of theaters for that movie

Spoken Multi-parameter search



Multi-dimensional search task represented in one-dimensional voice channel !

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Spoken Multi-parameter search

- **Challenge 1**: Offer different search modes without elaborate prompting
- **Challenge 2**: Multiple turn browsing:
  - which parameter selections to change
  - Which parameter selections to keep/discard if callers undertake corrective navigation (such as ‘go-back and ‘start-over)
- **Challenge 3**: What commands / parameter selection options to offer in edge cases like a movie not playing or ambiguous movie titles

Proposed Strategies

A) Lay-out each sequence of parameter selections

B) for each parameter selection, consider different way of selection

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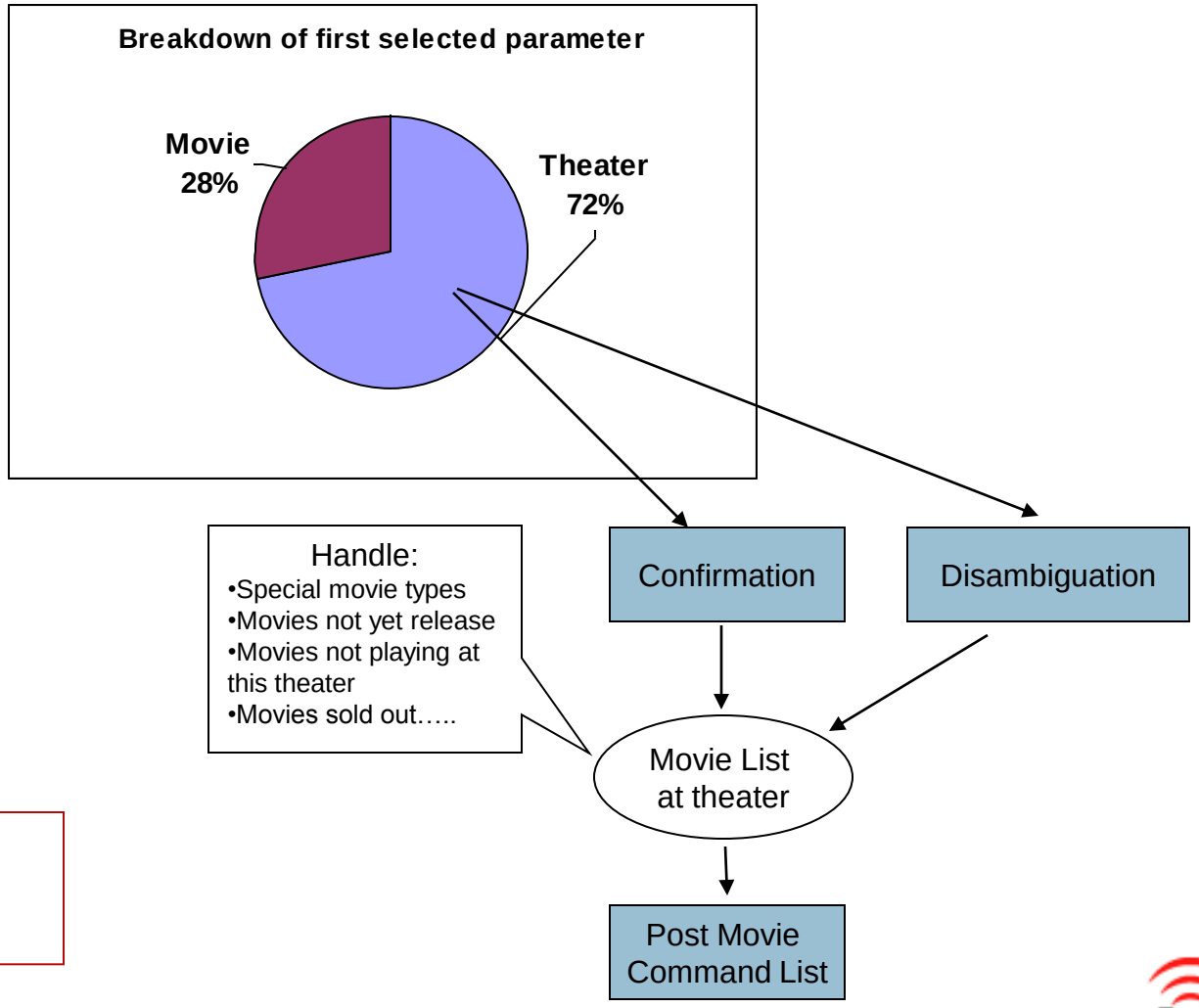
Laying out search paths: Example Theater paths

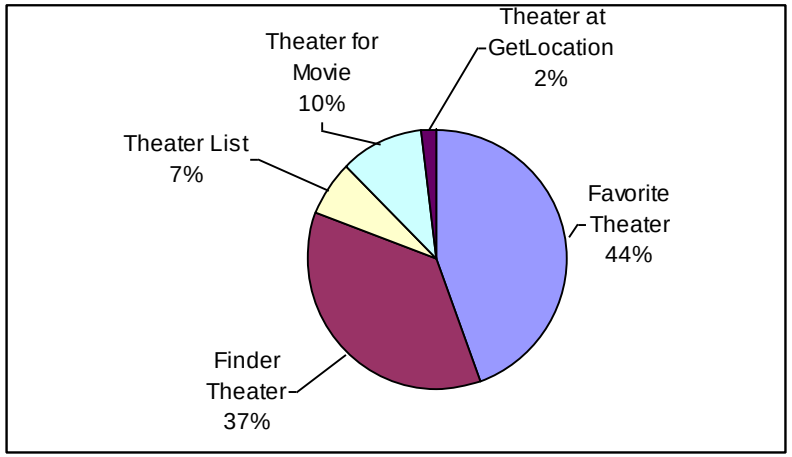


Helpful approach:
Create a use case for each scenario

Location search data sources

	Data source	Use Case
1	Local repeat caller database	Repeat caller database stores favorite theaters for a given ANI
2	Phone number based location	(a)Determines if calls is on mobile or landline (b)If landline, narrows radius of search
3	Speech	(a)Spoken city and state (b)List selection
4	DTMF	Handling performance breakdown due to noise etc
5	GPS location from a smart phone	For cellphones, easily detect caller's location

Breakdown of different location search modes



Not just a speech recognition task !

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(1) Local, repeat caller database

Use Case: Once a theater has been found, application offers caller to save this theater as a ‘favorite theater’.

If caller calls back on same phone number, system looks up favorite theater.

➡ Theater parameter found with 1 simple (yes/no) dialog turn

System	Hi! Thanks for calling XYZ Entertainment. Would you like to hear what’s playing today at the Studio 30 with IMAX?	Theater Selection
Caller	*yes*	
System	Here’s what’s playing at that theater. You can say the name of a movie at any time, or just say ‘That One’ when you hear the one you want.	Movie Selection
System	Miss Pettigrew Lives for a Day, rated PG13.	
System	10,000 BC, rated PG13.	
Caller	*That one.*	
System	Okay	
System	For 10,000 BC, here are the remaining available show times: 1:20PM, 2:50PM, 4:10PM. You can say Buy tickets or Repeat Show times. For a different movie, say Go Back.	

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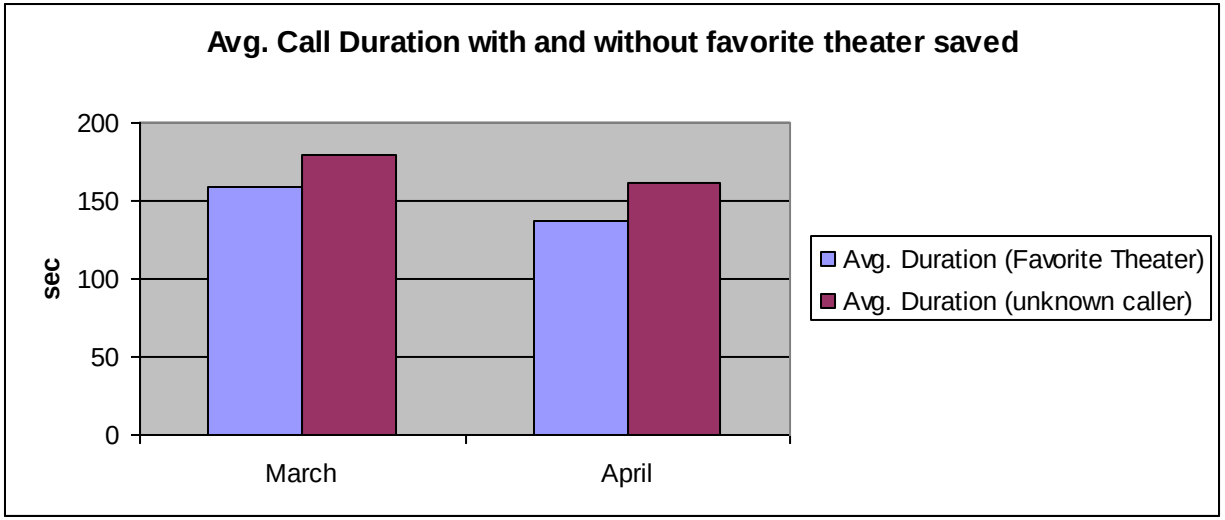
(1) Local, repeat caller database – results

- Call duration for caller's with a favorite theater is 25 sec shorter (average call duration is 120 sec).
- 53% of callers accept offer to save favorite theater
- 33% of callers have a favorite theater saved.
- 85% say 'yes' to the offer to hear 'what's playing at theater XYZ'



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(2) Phone number based location

Use case A:

System needs to find location after movie is given

- System takes local exchange location to find closest theaters

System	Thanks for calling ACME. For show times or tickets, say a movie name or a theater name.
Caller	*Carmen*
System	The Metropolitan Opera: Carmen. If that's not right, say start over.
System	You want to search in and around Kansas City, Missouri, is that right?
Caller	*Yes*
System	I found two theaters playing that movie today. When you hear the one you want, say That One.

Use case B:

Caller says name of a theater that is ambiguous

- System takes local exchange location to determine which theater
- Saves 1 dialog disambiguation turn

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(3) Speech recognition

- If nothing else is known,
  - Listen for any City/State in the US
  - Listen for any theater name in the US
  - Used for 2% of calls

- Metrozone disambiguation
  - If caller says ‘Los Angeles’
    - many theaters within that area
    - Narrow down by asking for neighborhoods/borrows like “Burbank”, “West LA”

(4) DTMF fallback

- Noise and side-speech in about 10-15% of calls
- Need for DTMF fallback for noise/side-speech
  - Limits dialog flexibility, i.e. one-dimensional search
- Use dialog memory to mediate recognition problems
    - Per call caller experience score
    - Threshold to transition to run-time configurable
    - If score over threshold, turn-off speech
    - Makes interaction slower but eliminates noise problem
- Example: Location detection via DTMF:
  - Zipcode
  - '#' selection from a list

(5) GPS driven location detection

- Alternative location detection for cellphones with GPS features
- Allows for **high accuracy** location detection, still requires to present list of theaters in that area to caller.
- Currently only in demo mode

Other parameters: Movie Selection

Three primary modes

- At call start application listens to any movie playing nation-wide (or theater)
  - Synonyms: semi-automated generation mechanism
- Once theater is selection, play list of movies
  - Offers selection alternative if movie name isn't recognized
- Multiple-turn browsing
  - Throughout application listen for movies or theaters in the background in addition to commands listed in the prompting

Other parameters

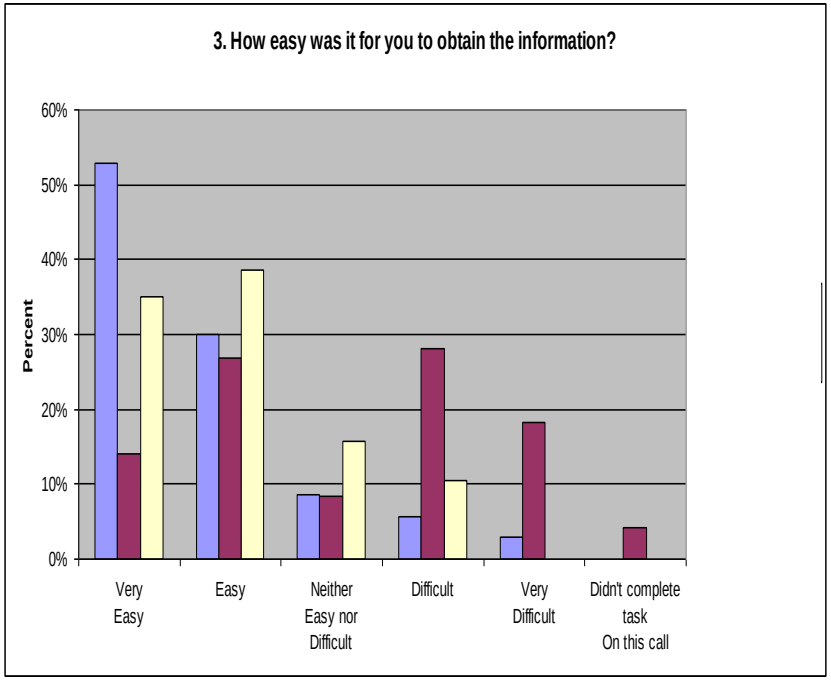
- Date
  - Callers primarily call about movies on the same day
    - Application assumes today, but offers a command to change the day
- Ticket purchase
  - Requires additional selection of
    - Movie show time
    - Ticket quantity
- Directions to a theater
- Miscellaneous
  - Gift card, lost& found, opening hours, reward card information

All these parameters / options need to be presentated where appropriate throughout call !

Comparison of 3 movie search systems

Usability study compared 3 commercial movie search systems

- System 1: Speech/DTMF/favorite theater feature
- System 2:Speech/DTMF, local exchange search
- System 3: DTMF only



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Comparison of 3 movie search systems

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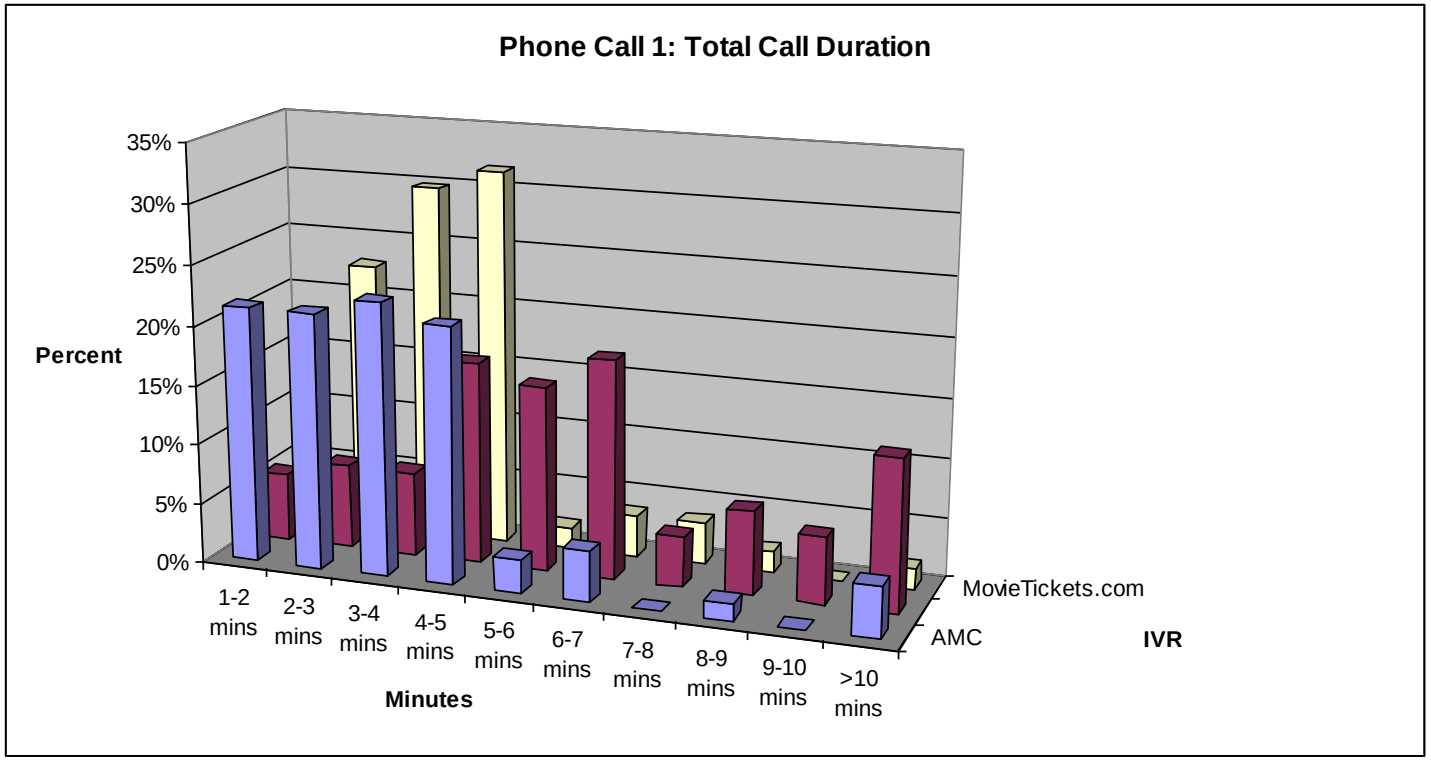

Effective search strategies shorten call duration

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Conclusion

- Discussed multi-dimensional search challenge in voice domain
- Two main strategies:
  - Give callers flexibility to search as they like: multi-dimensionality
  - Use different strategies to determine search parameters the caller is looking for in order to minimize speech recognition weaknesses