

# NTU Chinese 2.0: A Personalized Recursive Dialogue Game for Computer-Assisted Learning of Mandarin Chinese

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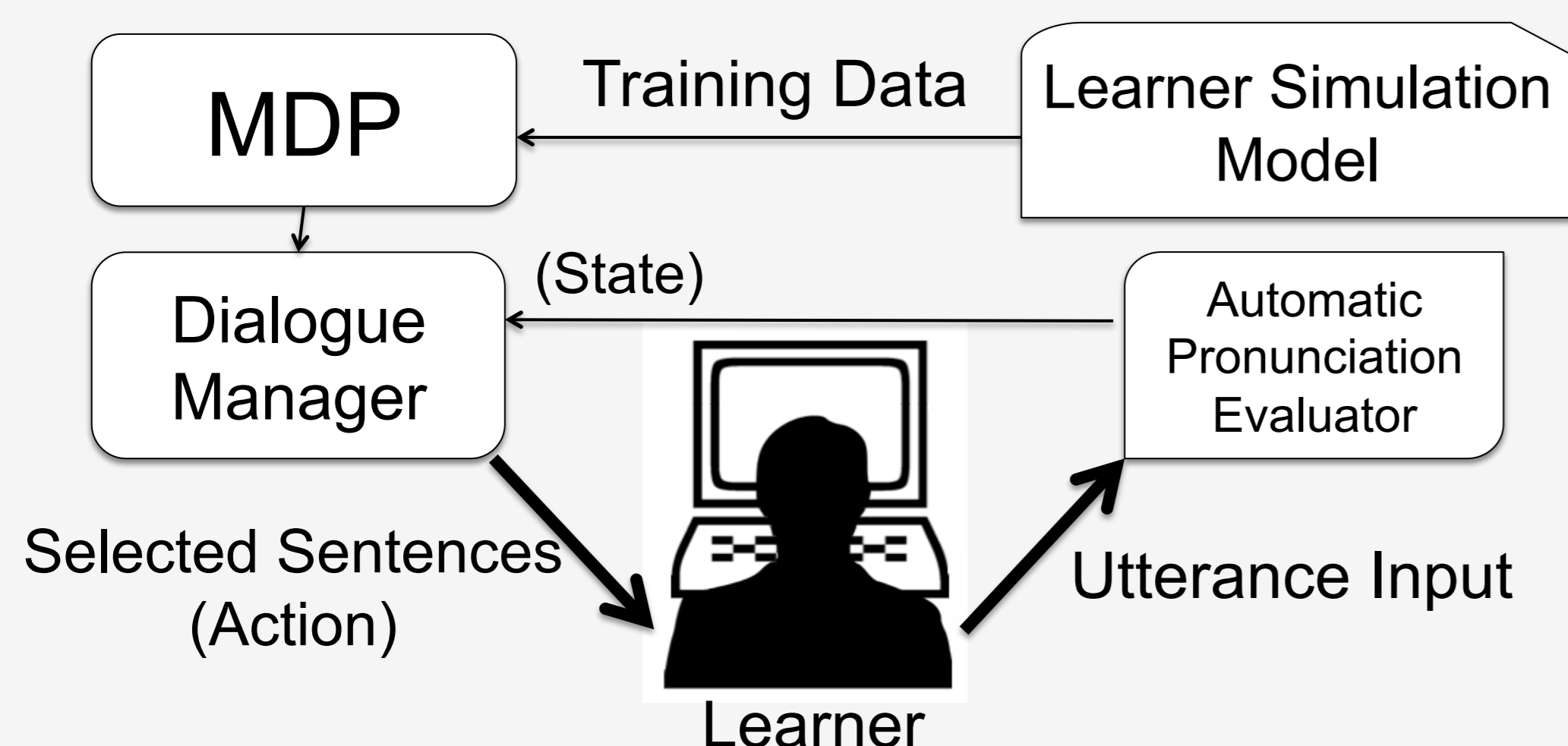


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## Summary

- A dialogue game system with **pronunciation feedback** over **personalized learning materials**
  - ✓ **Feedback:** Automatic pronunciation evaluation by NTU Chinese [1], scores all pronunciation units in an utterance
  - ✓ **Personalization:** System policy on Markov Decision Process providing learning materials with more practice on Poorly pronounced units
  - ✓ **System Goal:** Learner's selected focused pronunciation units over the recursive dialogue script have scores exceeding 75 over 7 times in min num. of turns
- More interesting: **Repeated practice** of the same units in **different sentences**, no need to repeat the same sentences

## System Framework



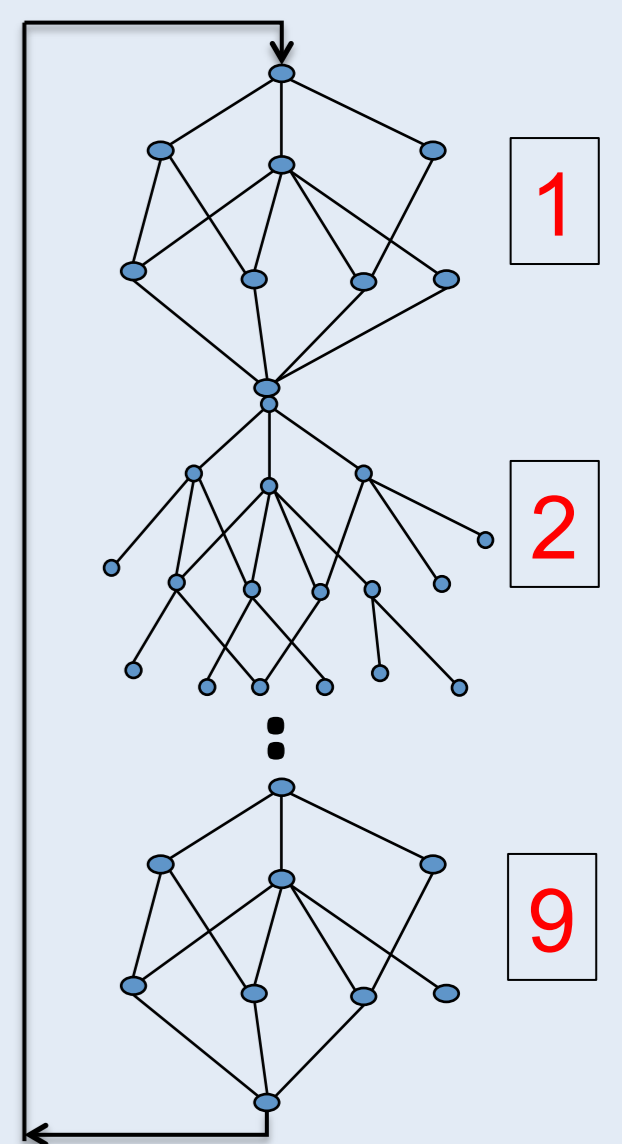
## Technical Details

### 1. Tree-structured turn-taking dialogue script

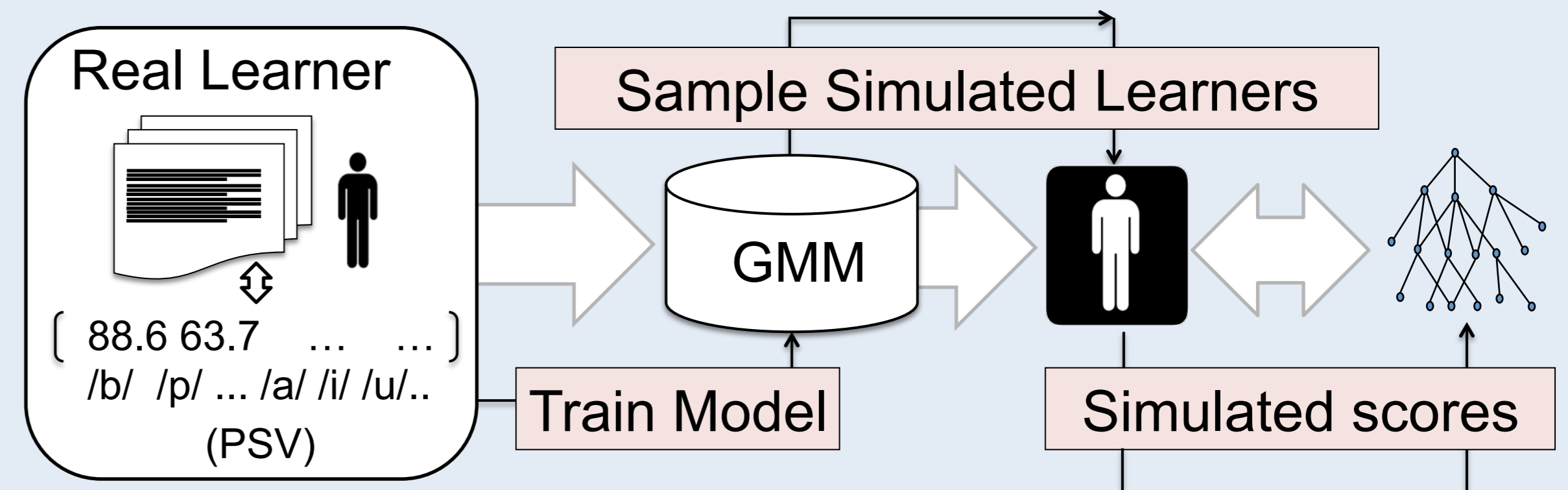
- Nine sub-dialogues in restaurant scenario
- Each turn contains several sentence choices

### 2. Markov Decision Process

- State: (high-dimensional continuous space)
  - Present dialogue turn
  - Avg. scores of each unit so far
- Action: Sentences to be selected
- Reward:
  - Cost -1 for every state transition (dialogue turn)
  - Game ends when system goal reached
- Policy Training: Fitted Value Iteration with regularization



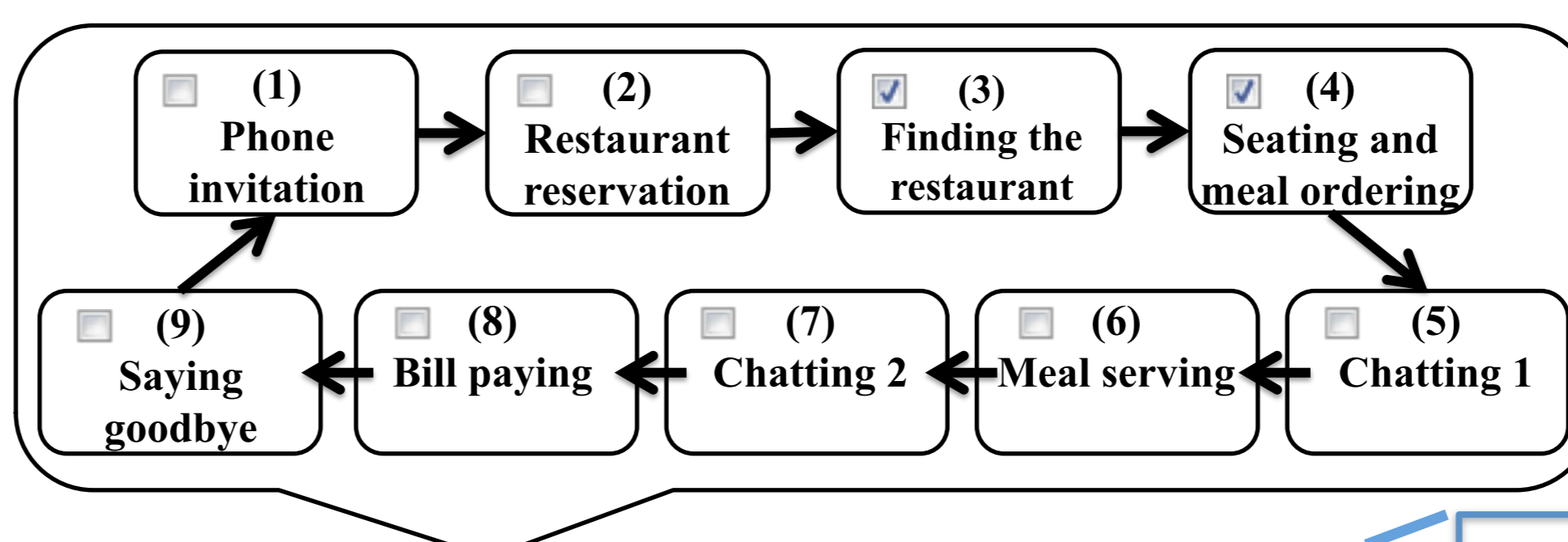
### 3. Learner Simulation



## Demonstration

- Cloud-based system: webpage version
- Policy trained with different sets of **focused units**:
  - All units considered (no specific focused unit)
  - Retroflex only (four special Mandarin units)
    - ㄐ(j), ㄑ(ch), ㄒ(sh), ㄩ(r)
- Demo scenario:

Here we test on Retroflex-specific learners, whether system provide unit practice in needed



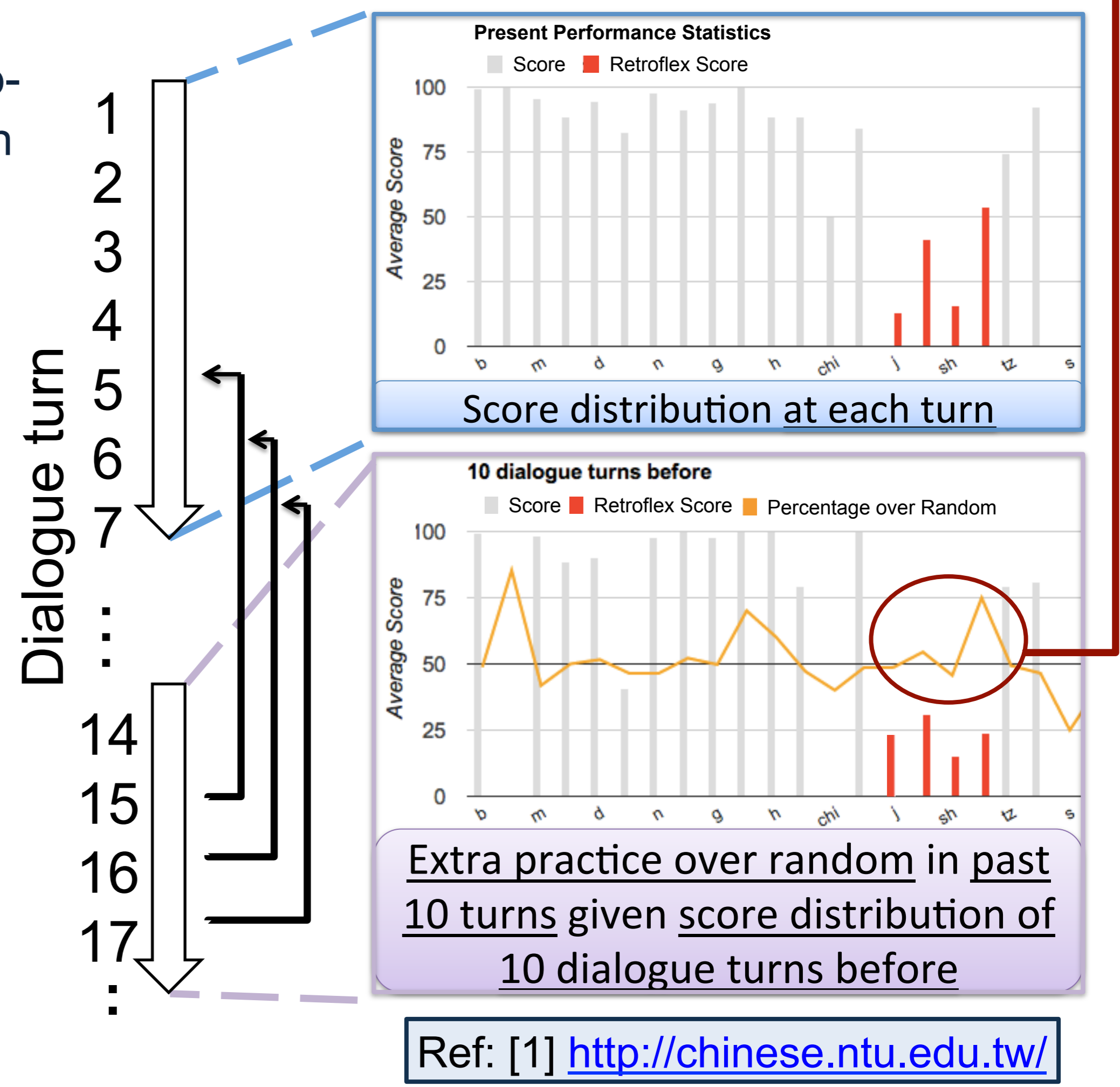
Any combination of sub-dialogue can be chosen

➤ Effective practice opportunities on focused units than random in the near future of each turn!

The screenshot shows a dialogue context with a 'Previous' message: '這兒的交通真亂!' and a 'Current' message: '不要緊的，我們走吧!'.

The screenshot shows a 'Please Select' interface with a sentence: '嗯，跟著我走就對了！(OK, just follow me!)'. Below the sentence is a 'Detail Analysis of produced sentence' table.

Total	Pronun.	Tone	Timing	Emphasis				
62	88	0	57	67				
	不	要	緊	的	我	們	走	吧
Initial	b	sic	ji	d	sic	m	tz	b
Final	u	iau	in	e	uo	an	ou	a
Tone	60	0	0	92	0	100	100	0



Ref: [1] <http://chinese.ntu.edu.tw/>