



Multi-eco-agent Modeling of Situated Discourse

现场即席话语的复生态、多元代理建模

from sign-based to agent-based
representation of discourse

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The Project

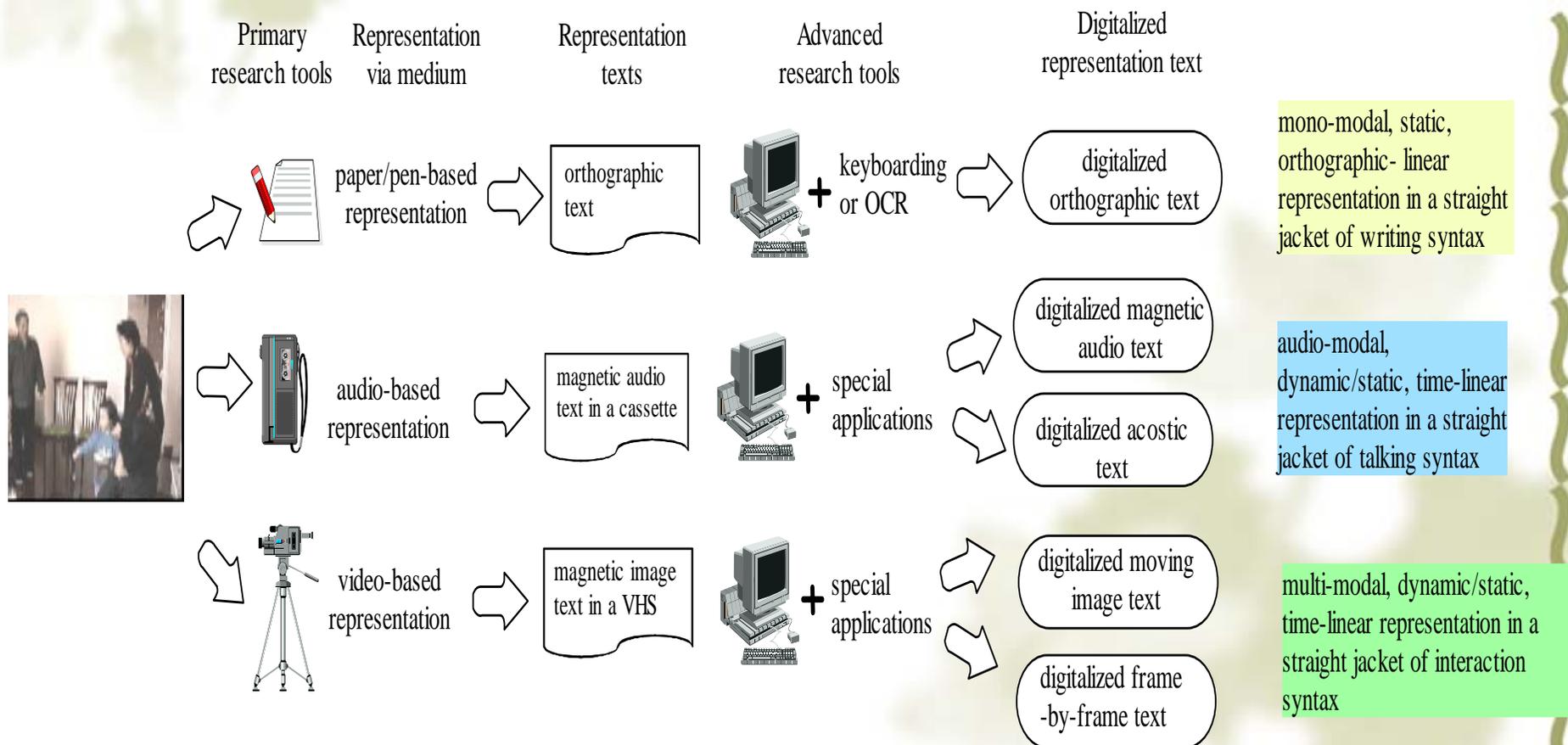
- ❖ The Project trigger:
 - ↪ extremely unhappy with the way situated discourse is represented by an orthographic text written in paper;
 - ↪ “less extremely” unhappy with the way situated discourse is represented by an audio text representation;
- ❖ The Project aim:
 - ↪ attempt to construct a simulation of situated discourse through the concepts of multiple-agents acting in a multiple-eco-environment. It involves a multimodal text representation of situated discourse;
- ❖ The Project data:
 - ↪ the Spoken Chinese Corpus of Situated Discourse (SCCSD)



1

Three Representations:
Strengths and Weaknesses
现场即席话语的三种表征及其优劣

An overview of a piece of real-life situated discourse represented in three different ways via different tools and media



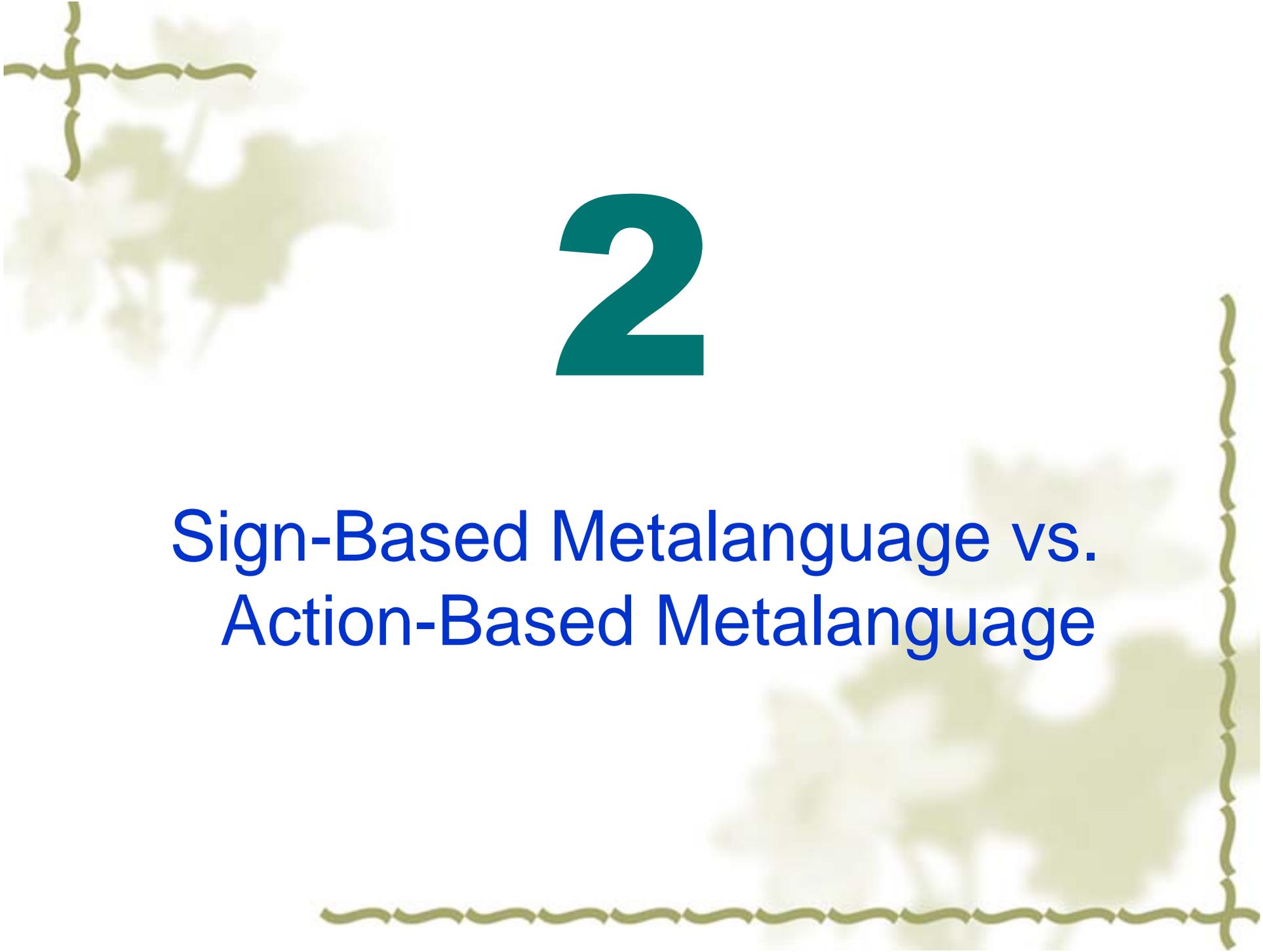
Three representations contrasted in terms of information loss and trade-offs

Contrasted from the researcher & interpreter's perspective

Mono-modal, static, orthographic- linear representation in a straight jacket of writing syntax -- single	audio-modal, dynamic/static, time-linear representation in a straight jacket of talking syntax	multi-modal, dynamic/static, time-linear representation in a straight jacket of interaction syntax
Information-losing	Information-losing compared	Information-losing compared:
Situatedness:	Situatedness:	Situatedness:
Behavioral setting: complete loss	Behavioral setting: heavy loss	Behavioral setting: mostly reserved
The on-going activities: disconnected	The on-going activities: disconnected	The on-going activities: disconnected
Situational goals: sterilized, lost, becoming opaque	Situational goals: sterilized, lost, becoming opaque	Situational goals: alive, easily to be reconstructed;
Situational goal-attaining schema: extremely difficult to reconstruct	Situational goal-attaining schema: less difficult to reconstruct	Situational goal-attaining schema: fairly easy to be reconstructed;
De-individualization:	De-individualization:	De-individualization:
(a) sterilize consciousness;	(a) sterilize consciousness;	(a) sterilize consciousness;
(b) cut off life-history;	(b) partially cut off life-history;	(b) somehow cut off life-history;
(c) stereotype personality;	(c) partially stereotype personality;	(c) somehow stereotype personality;
(d) lose performance style;	(d) partially lose performance style;	(d) retain performance style;
(e) sterilize and stereotype roles	(e) partially sterilize and stereotype roles	(e) somehow sterilize and stereotype roles
The intersubjective world -- extremely difficult to reconstruct;	The intersubjective world -- less difficult to reconstruct;	The intersubjective world -- much less difficult to reconstruct;
Interdependency relations: natural ties mostly lost;	Interdependency relations: natural ties being loosened or even lost;	Interdependency relations: natural ties easily reconstructable;

Continued

audio information: complete loss	audio information: retained	audio information: retained
individualized voice quality	individualized voice quality	individualized voice quality
ffective features	ffective features	ffective features
prosodic features	prosodic features	prosodic features
segmental features	segmental features	segmental features
Video information: complete loss	Video information: complete loss	Video information: retained
behavioral	behavioral	behavioral
kinetic	kinetic	kinetic
spatial	spatial	spatial
Authenticity: complete loss	Authenticity: partial loss	Authenticity: retained
Validation: extremely difficult	Validation: less difficult	Validation: easy
Trade-off benefits	Trade-off benefits compared:	Trade-off benefits compared:
Highly discretized	voice streams, discretization now much easier, but still costly	image streams, discretization still difficult and costly
Lexicalized (conceptualized) perception (vs. analog perception)	a lot of features difficult to be lexicalized, or even non-lexicalizable;	a lot of features difficult to be lexicalized, or even non-lexicalizable;
Highly friendly to abstract thinking	less friendly to abstract thinking, but friendly to musical thinking;	less friendly to abstract thinking, but friendly to gestalt thinking;
Easily processible	still difficult to process	very difficult to process



2

Sign-Based Metalanguage vs.
Action-Based Metalanguage

The Nature of Transcription

- ❖ An orthographic transcription is static, sign-based, and linear.
- ❖ It models a product, not a process.
- ❖ Interactivity, inheritance, independency, and dynamic behavioral process are basically lost.

Key Concepts of Action-Based Metalanguage

- ❖ Agency 代理
- ❖ Operational eco-environment 操作生态环境
- ❖ Cognition 认知状态
- ❖ Goal-directed behavior 有目的的行为
- ❖ Interactivity 互动性
- ❖ Learnability 自我改进性

Mono-modal, static, linear modeling

A complex sentence structure

Clause 1

Clause 2

If

then

This is a book .

Subject

Predicate

is a book .

Link-verb

Complement

it must be very thin .

Subject

Predicate

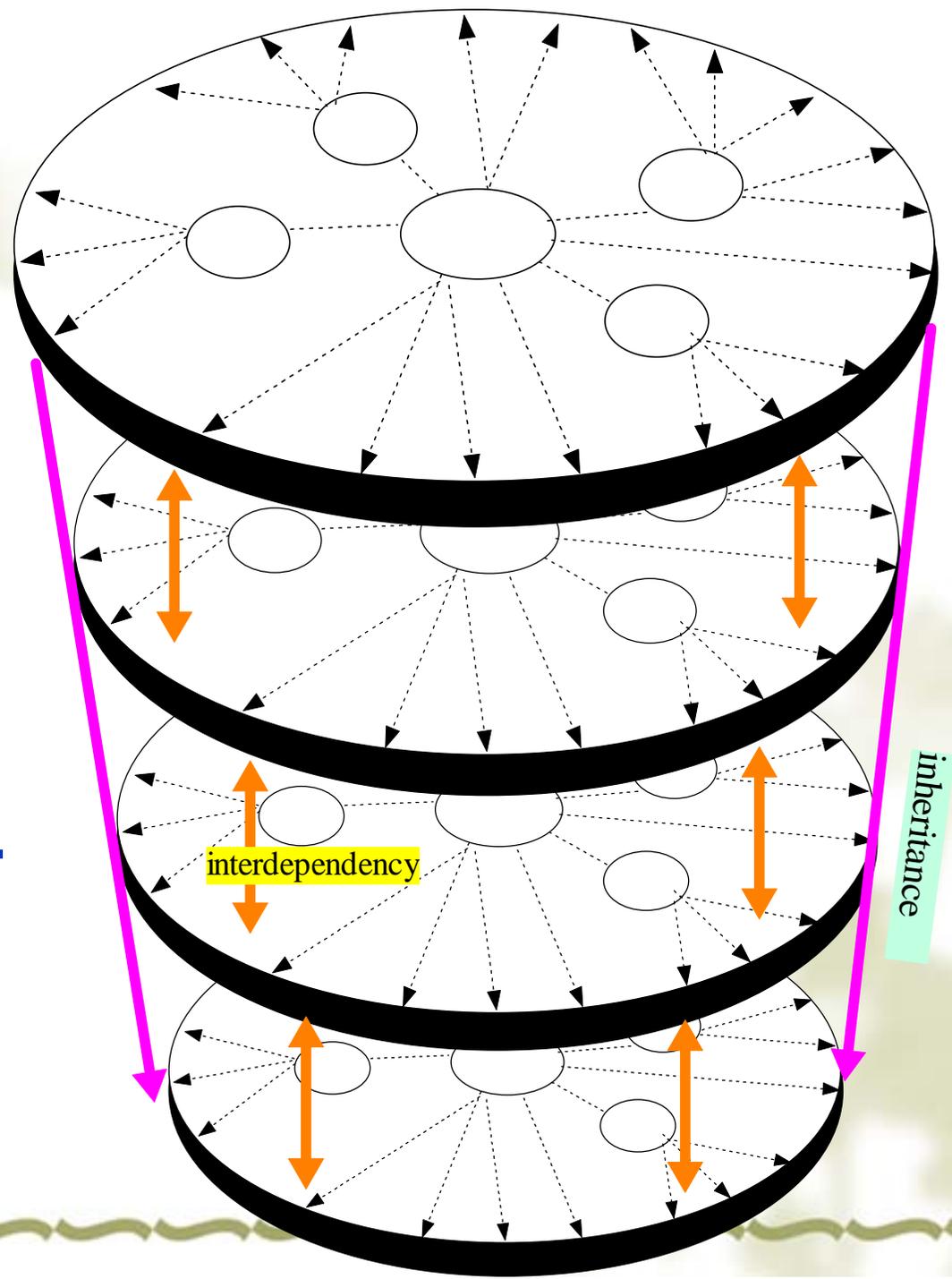
must be very thin .

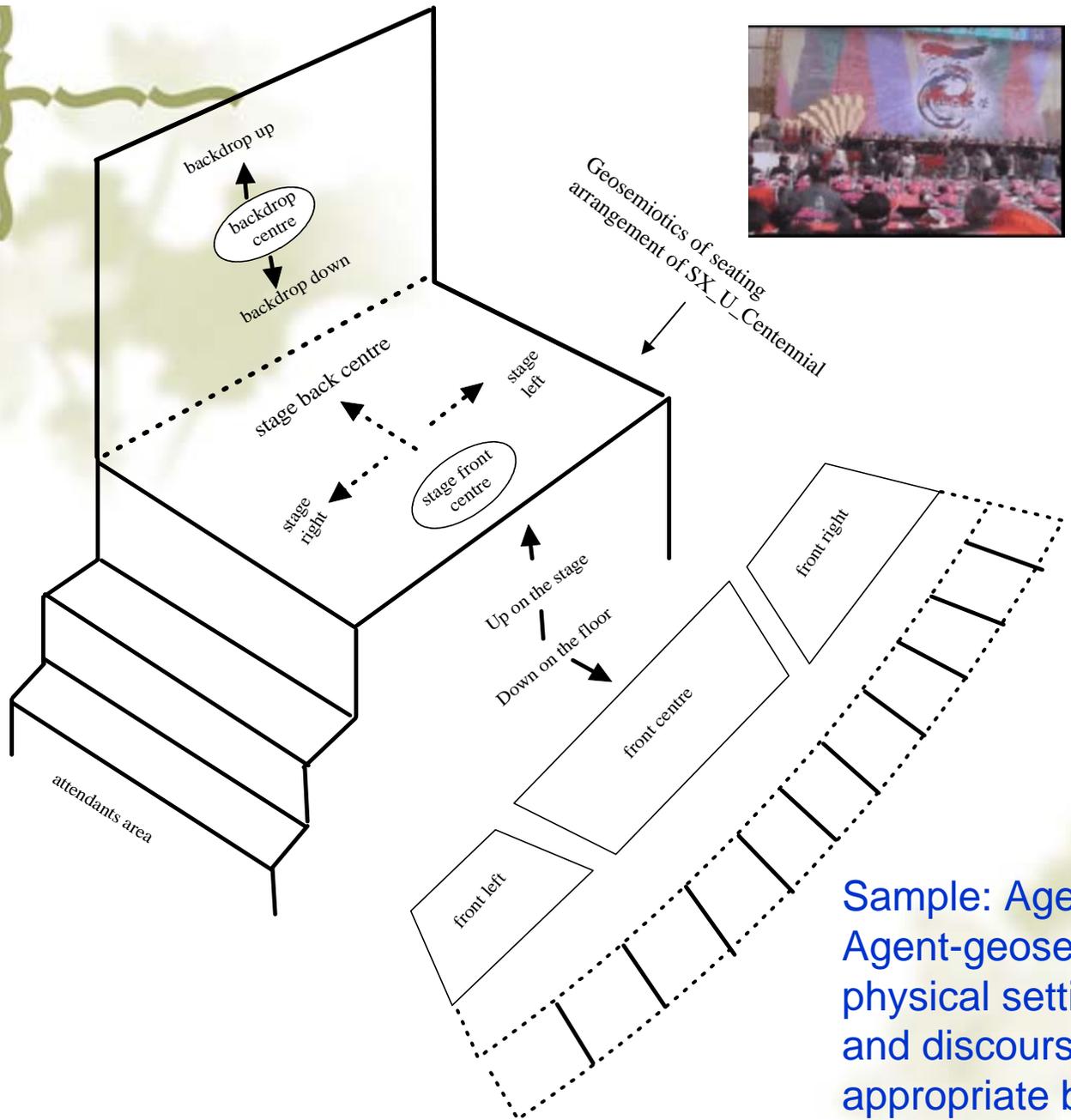
Modal-verb

Link-verb

Complement

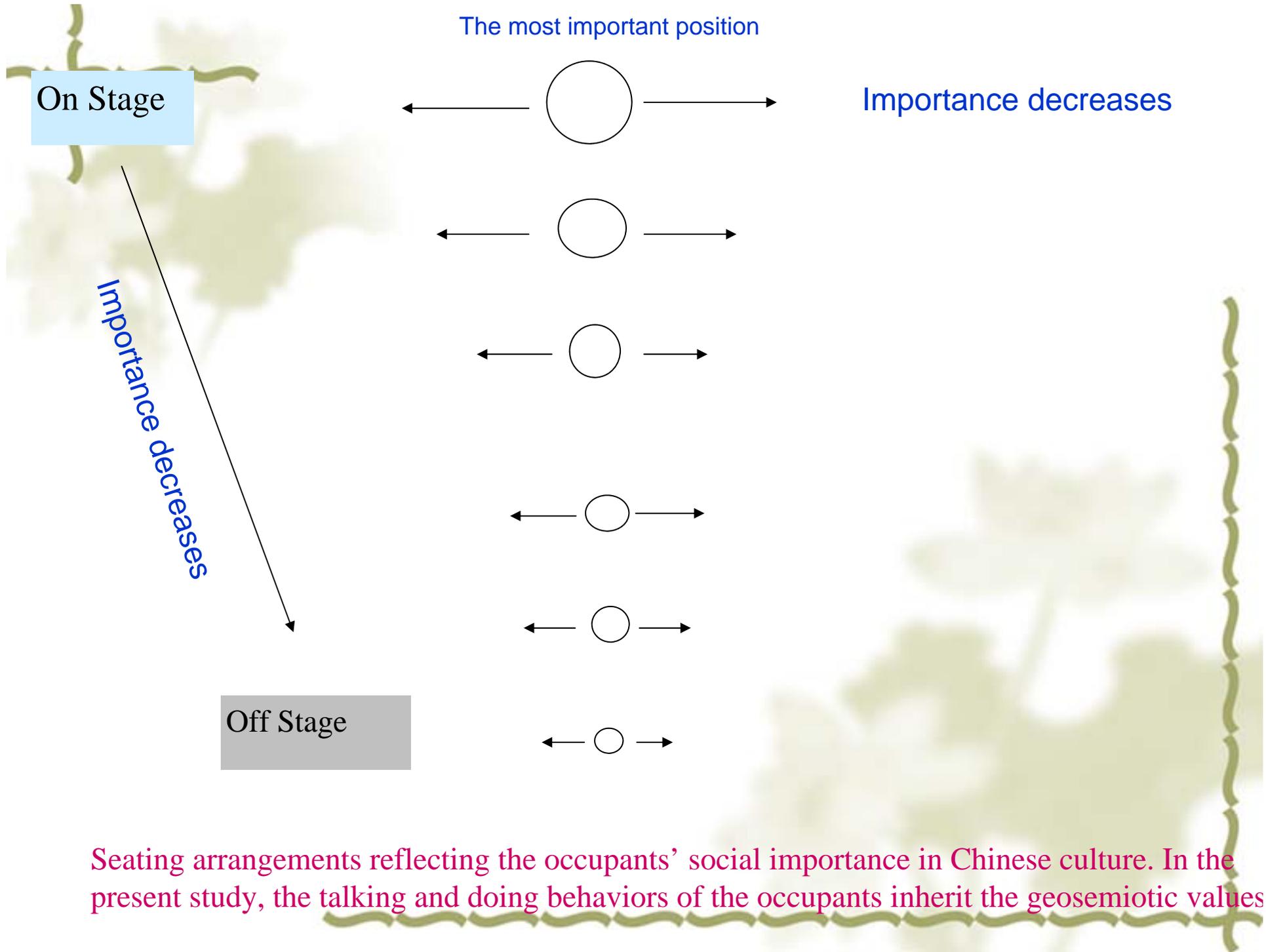
Multi-eco-agent modelling





Sample: Agent-beh_setting and Agent-geosemiotic managing physical setting mapped with social and discursal roles, and generating appropriate behavior patterns

To be continued



Seating arrangements reflecting the occupants' social importance in Chinese culture. In the present study, the talking and doing behaviors of the occupants inherit the geosemiotic values

Agent_{-talking_doing} at work

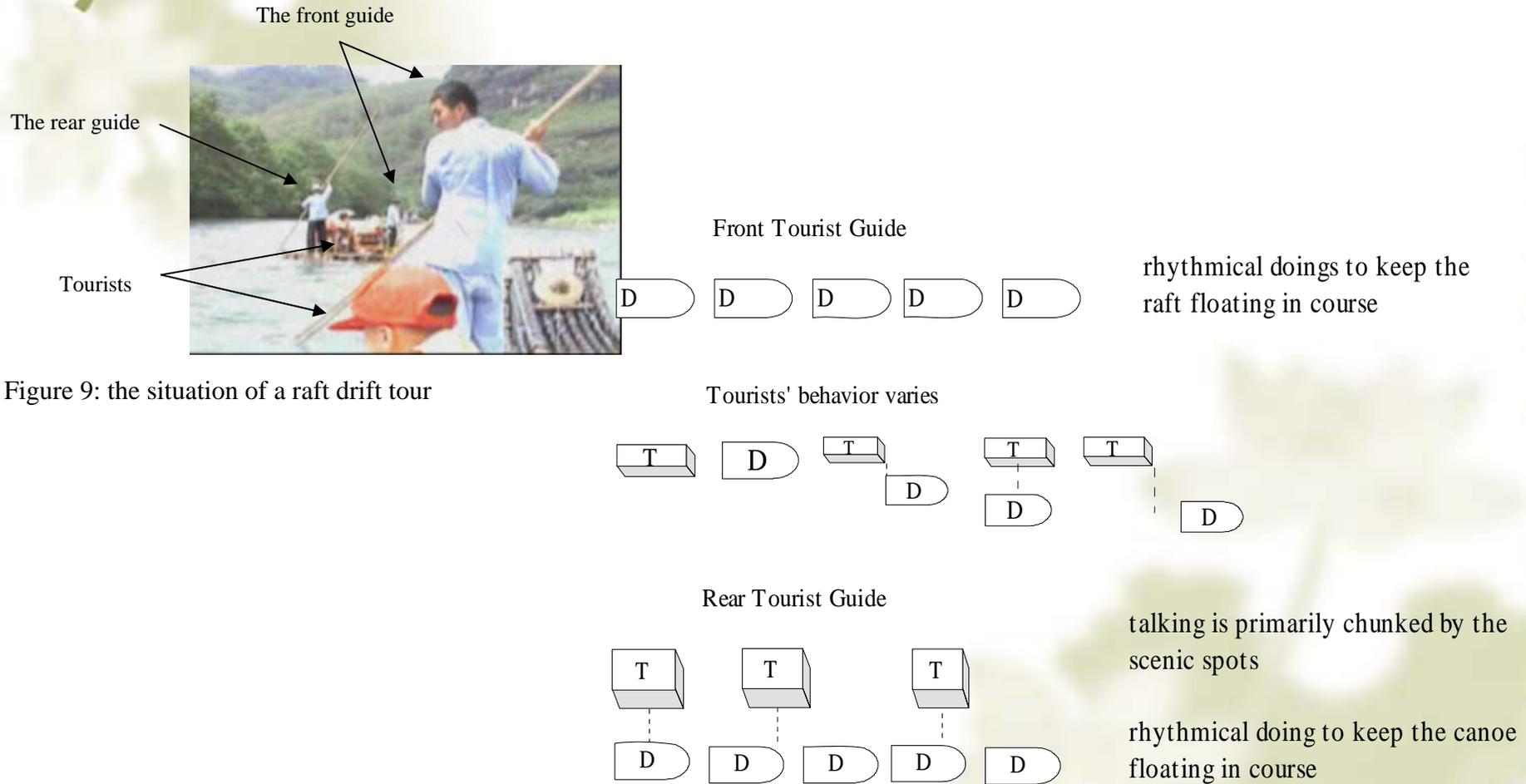
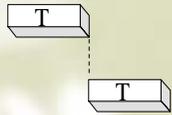


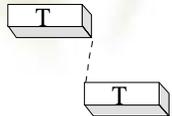
Figure 9: the situation of a raft drift tour

Agent_{-talking_doing} manages the configuration of talking and doing

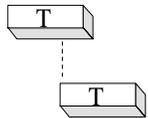
Agent-turn-taking at Work



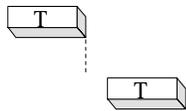
normal exchange with a normal transition



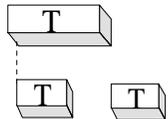
normal exchange with a faster transition



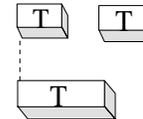
exchange with some overlapping



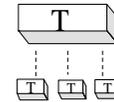
exchange with some silent break



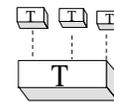
simultaneous start with B giving up



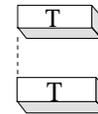
simultaneous start with A giving up



A keeps talking with B inserting



B keeps talking with A inserting



total overlapping

Agent-turn-taking manages the turn-taking configurations and their pragmatic significance.

Agent-interdependency at work

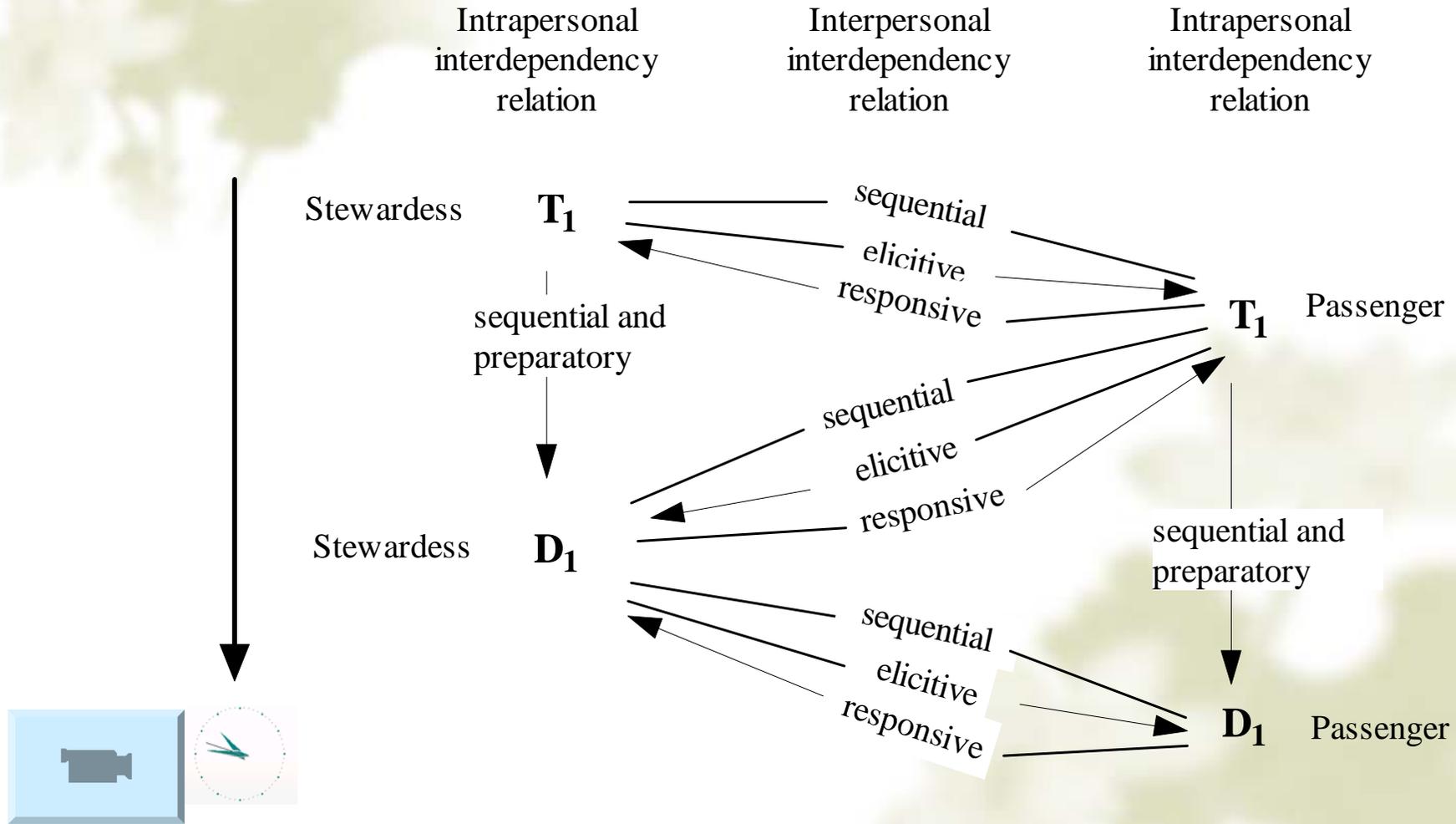
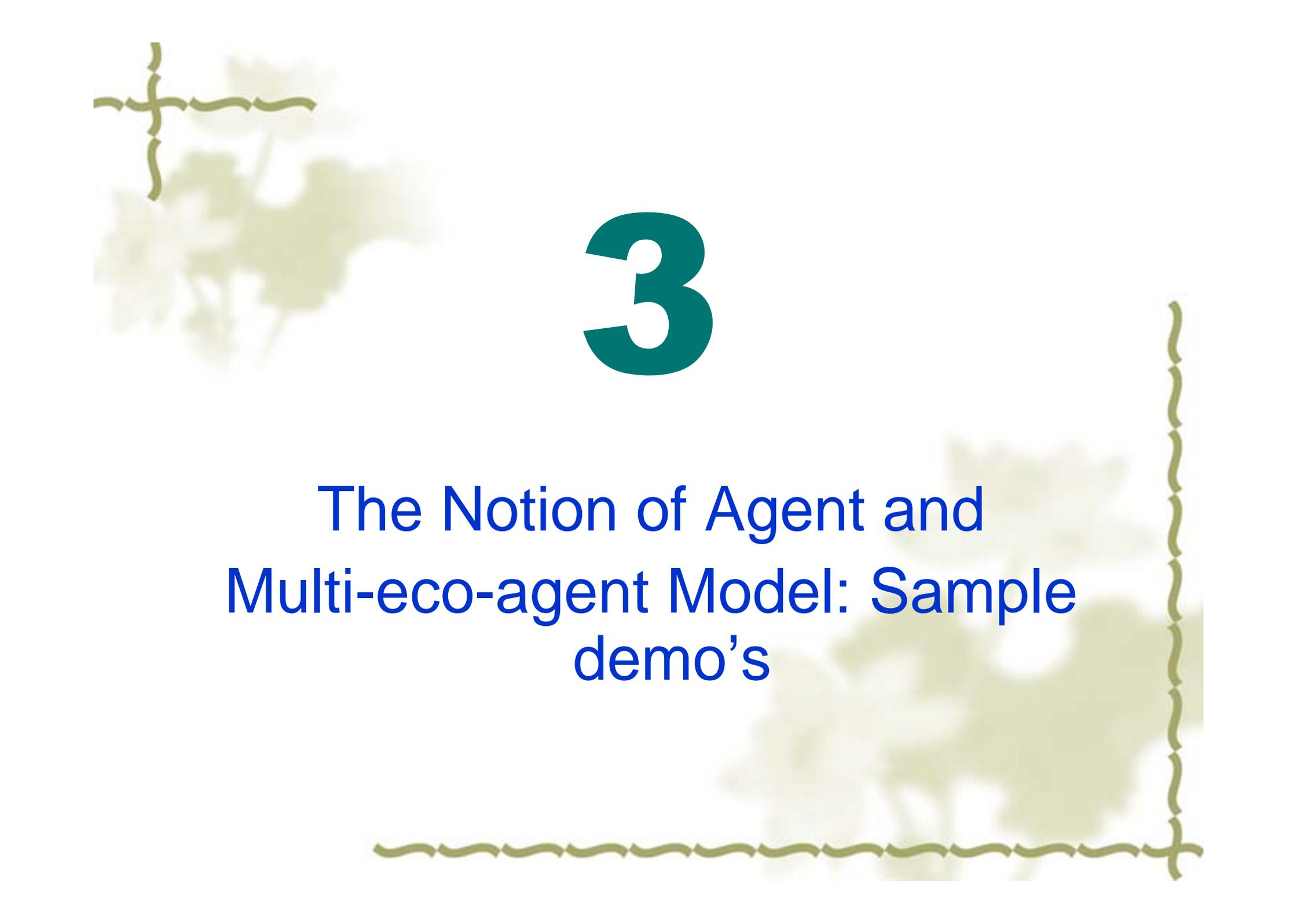


Figure 14: interdependency relations in a transaction between a stewardess and a passenger



3

The Notion of Agent and
Multi-eco-agent Model: Sample
demo's

Agent

- ❖ The notion of agent is adapted from artificial intelligence research:
 - ☞ “An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators.” Stuart J. Russell and Peter Norvig, 2003. *Artificial Intelligence: A Modern Approach*. New Jersey: Pearson Education, Inc. pp. 32)
- ❖ In the current project, agents are theoretical constructs (equal to programmable variables) used to model some particular aspects of situated discourse. All agents have a range of scope. Agents at different levels are allowed to have their own parent agents as well as child agents, as required by the complexity of situated discourse.
- ❖ There is a default inheritance value of scope between parent and child agents. That is, child agents inherit the scope of their parent agent. Other inheritance values between the two have to be specified and declared.

Multiagent Tree Structure

- Socio-cultural-political Agent
 - Eco-Lingo-Agent (modeling speech community)
 - Situation/activity type Agent (modeling social situations and activity types)
 - Task/episode Agent (modeling tasks and episodes)
 - Person-Agent (modeling individual human participants)

human political geography

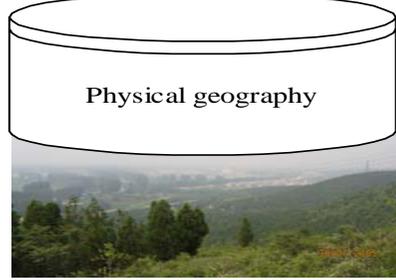
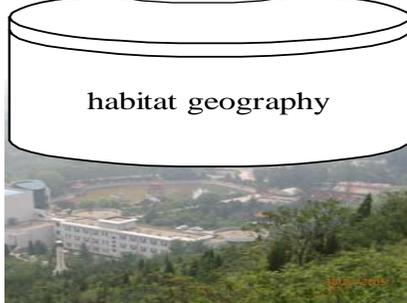
- o control of ideology
- o regional power distribution
- o control of mass media
- o control of policy-making

human social geography

- o social stratification
- o social networks
- o social status
- o social discrimination
- o access to education
- o access to healthcare

human economic geography

- 5 Quinary activities
 - Executive decision making
- 4 Quaternary activities
 - information
 - research
 - management
- 3 Tertiary activities
 - retail and wholesale trade
 - personal and professional services
- 2 Secondary activities
 - manufacturing
 - processing
 - construction
 - Power production
- 1 Primary activities
 - agriculture
 - gathering industries
 - extractive industries



Political, and ideological space and order are carried out

Social geography frames and at the same time enables the formation of political geography

Social initiatives, social maintenance, social order, etc. are carried out

Economic geography frames and at the same time enables the formation of social geography

Economical activities are carried out in local habitats and globally

Habitat geography frames and at the same time enables human activities

Humans adapt themselves to it, and transform it, and migrating over it

The physical environment frames and at the same time enables human settlements

Observable, describable collective activities

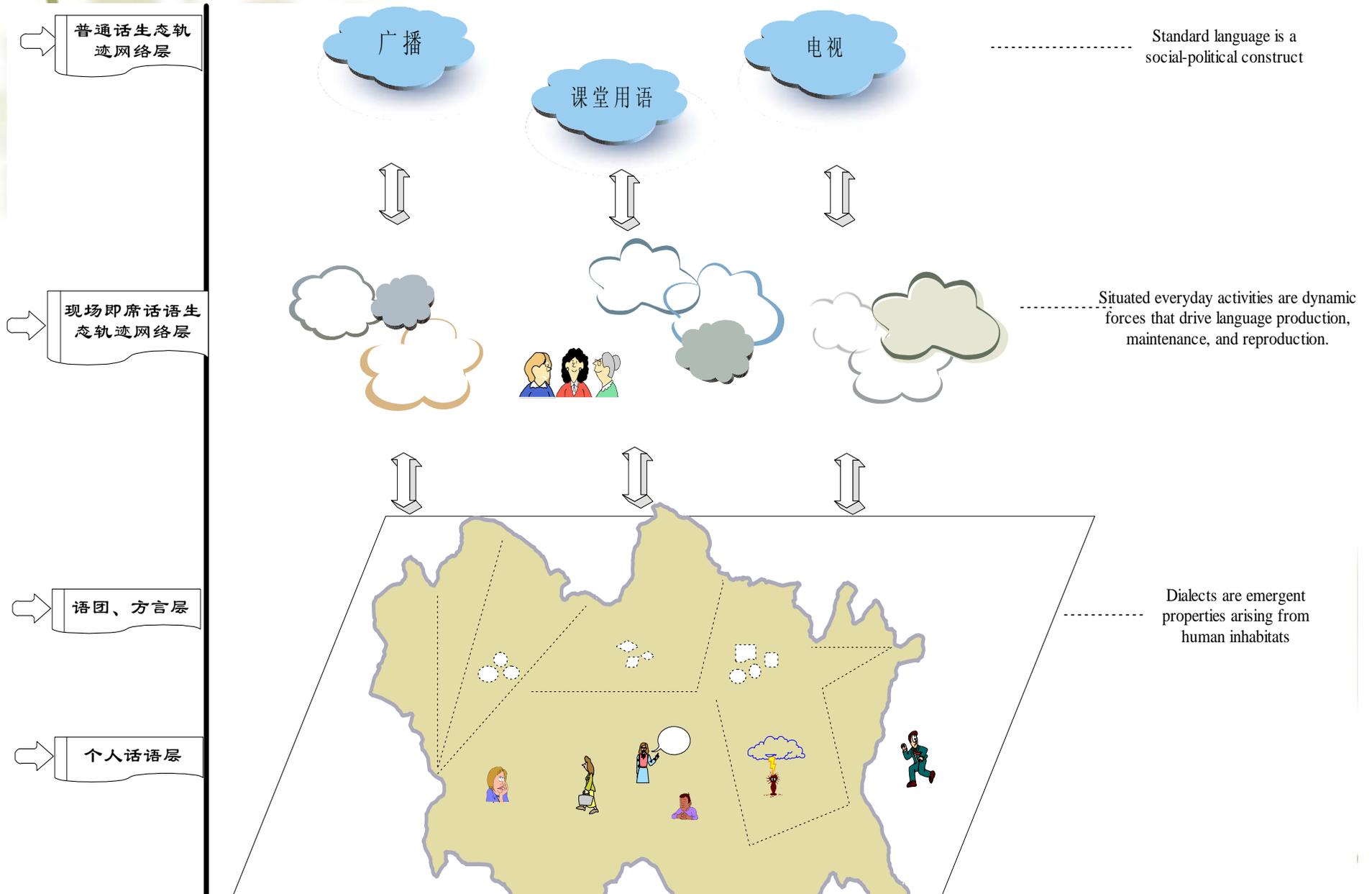


Private and personal behavior





语言生态学模型



Agent-situ_act (Social situation/activity type Agent)

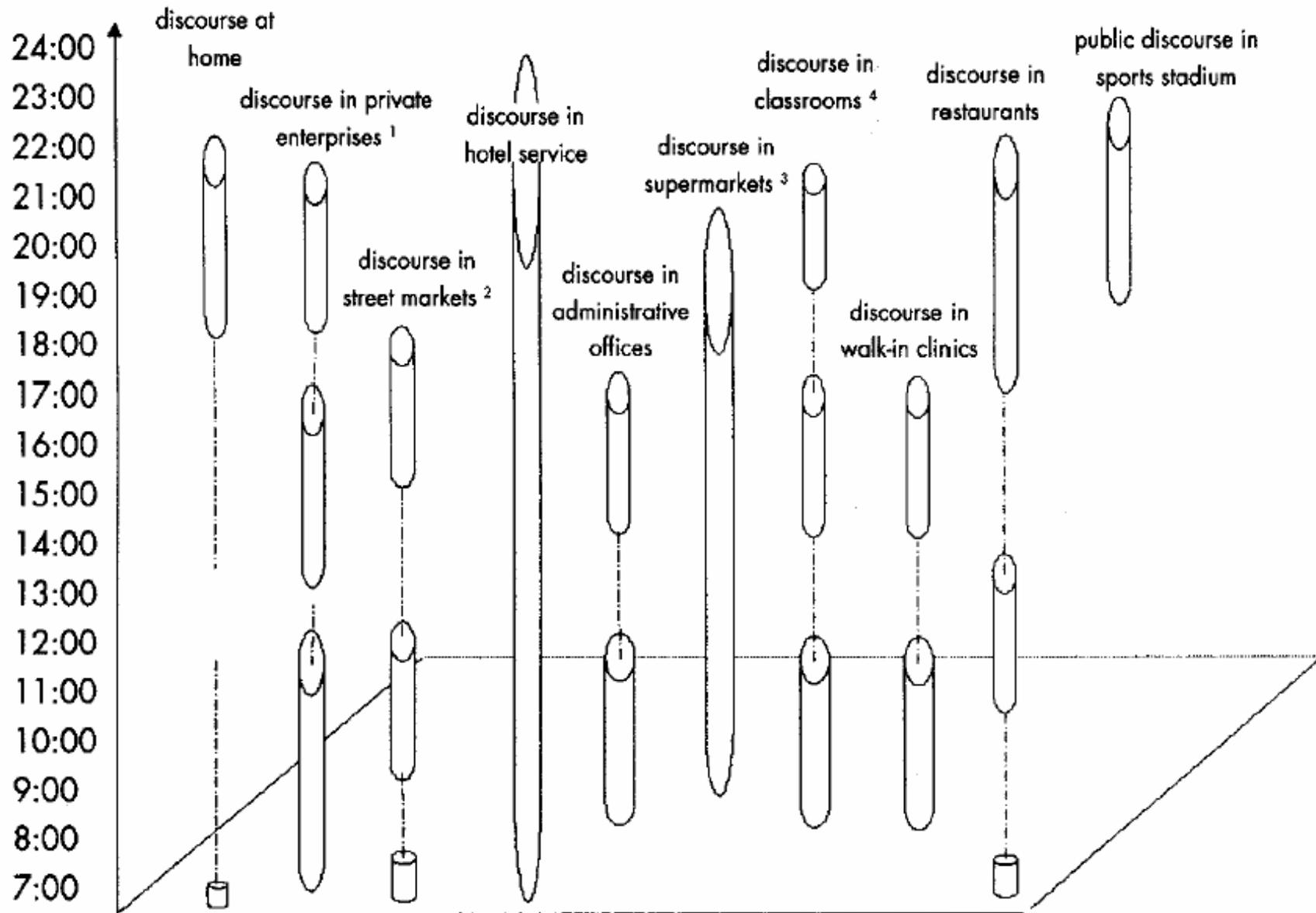
- ❑ Agent-beh_setting: property conf, layout conf, function conf, etc.
- ❑ Agent-geosemi: social value conf, behavioral impact conf, etc.
- ❑ Agent-partici: age conf, gender conf, role conf, edu conf, dialect conf, etc.
- ❑ Agent-norm: e.g. workplace rules, regulations, morals, etc.
- ❑ Agent-situ_goal: forming, negotiating, readjusting, configuring, proceduralizing, etc.
- ❑ Agent-situ_behv: activity type conf, task/episode conf
- ❑ Agent-semi_resrce: language, signs, symbols, music, etc.
- ❑ Agent-T_budget: time allocation, time spent, date inf
- ❑ Agent-inheritance: (1) inter-Agents-parent,(2) inter-Agents-child, (3) inter-Agents-parent and Agents-child
- ❑ Agent-interdep: interdependency types conf, degrees of interdependency, interdependent agents conf.
- ❑ Agent-interact: capturing the interactions between situations/activity types, e.g. intruding visitors, telephone call embedding,
- ❑ Agent-life_his: evolutionary information about situations/activity types.

Sample: Agent_{-situ_act} ---Agents modeling social situations /activity types

Agent_{-situ_act} (Social situation/activity type Agent)

- ⦿ Agent_{-beh_setting}: property conf, layout conf, function conf, etc.
- ⦿ Agent_{-geosemi}: social value conf, behavioral impact conf, etc.
- ⦿ Agent_{-partici}: age conf, gender conf, role conf, edu conf, dialect conf, etc.
- ⦿ Agent_{-norm}: e.g. workplace rules, regulations, morals, etc.
- ⦿ Agent_{-situ_goal}: forming, negotiating, readjusting, configuring, proceduralizing, etc.
- ⦿ Agent_{-situ_behv}: activity type conf, task/episode conf
- ⦿ Agent_{-semi_resrce}: language, signs, symbols, music, etc.
- ⦿ Agent_{-T_budget}: time allocation, time spent, date inf
- ⦿ Agent_{-inheritance}: (1) inter-Agents_{-parent}, (2) inter-Agents_{-child}, (3) inter-Agents_{-parent} and Agents_{-child}
- ⦿ Agent_{-interdep}: interdependency types conf, degrees of interdependency, interdependent agents conf.
- ⦿ Agent_{-interact}: capturing the interactions between situations/activity types, e.g. intruding visitors, telephone call embedding,
- ⦿ Agent_{-life_his}: evolutionary information about situations/activity types.

Eco-lingo-Time-Agent at Work





Implementation in XML



4

Other Applications



From Text to Dramatized Representation

- ❖ Originally in print text: Excerpt from the Dream of Red Chamber
- ❖ Dramatized in TV series.
- ❖ Use the agent-based representation to make an intertextuality study.

From Textbook to Classroom Teaching, to Online Delivery

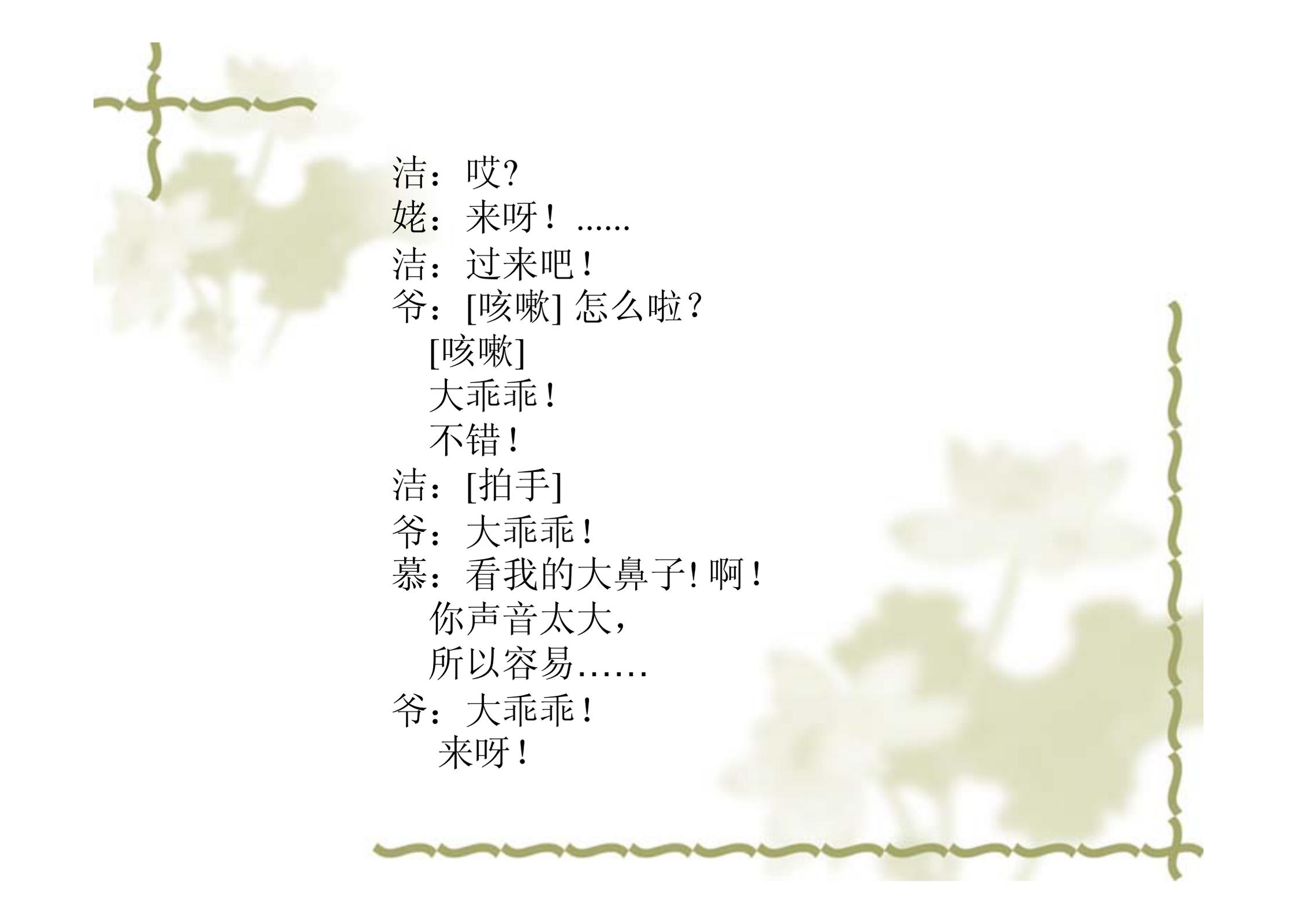
- ❖ The agent-based representation can be used to analyze the transferring process from a print textbook to classroom teaching, and to online delivery.
- ❖ This will be different from the current semiotic sign-based approach.



谢谢!

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洁：哎？

姥：来呀！……

洁：过来吧！

爷：[咳嗽] 怎么啦？

[咳嗽]

大乖乖！

不错！

洁：[拍手]

爷：大乖乖！

慕：看我的大鼻子！啊！

你声音太大，

所以容易……

爷：大乖乖！

来呀！