

# Development of Presentation Method Suiting Cognitive Abilities of Persons with Cognitive or Intellectual Disabilities

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# Problems

To give clear instruction for persons with cognitive or intellectual disabilities

## Example

When persons are instructed the following rule in a text book:

You must leave sea coast if a tsunami warning is issued.

Some persons with cognitive or intellectual disabilities may fail to understand the instruction, because

- (1) Some persons may have difficulty in understanding the rule when it is presented by text.
- (2) Some persons may have difficulty in maintaining attention and motivation during instruction.

# Approach

## Necessities of effective instruction

- Persons who have difficulty in understanding when it is presented by text.

Comprehensible Contents

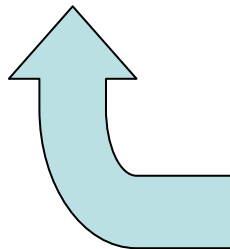
- Persons who have difficulty in maintaining attention during instruction .

Maintaining Attention

## Our Approaches

Cognitive Science

Multimedia



# Goals

## Subgoal 1: Contents

Development of  
comprehensible contents

## Subgoal 2: Attention

Development of  
Attention-attracting Technology

Comprehensible  
Contents

Database of functional  
sets of visual and/or  
audio effects

Implement  
3D audio  
in SMIL

Our goal is to provide database for designing instruction scenario suiting individual needs.

# Outline

## Subgoal 1: Contents

Development of  
comprehensible contents

## Subgoal 2: Attention

Development of  
Attention-attracting Technology

1. Analysis of knowledge utilized in case of disasters.
2. Analysis of interaction between cognitive constraints and knowledge acquisition/utilization process.
3. Development of material database for designing effective instruction .

# Outline

## Subgoal 1: Contents

Development of  
comprehensible contents

## Subgoal 2: Attention

Development of  
Attention-attracting Technology

1. Explore functional sets of visual and/or audio effects to attract observers' attention
  - Case studies of challenged persons
  - Experiments with normal people
2. Organization of a database
  - Propose a database of functional sets of visual and/or audio effects

# Subgoal 1: Contents

Development of Comprehensible Contents

## Purpose

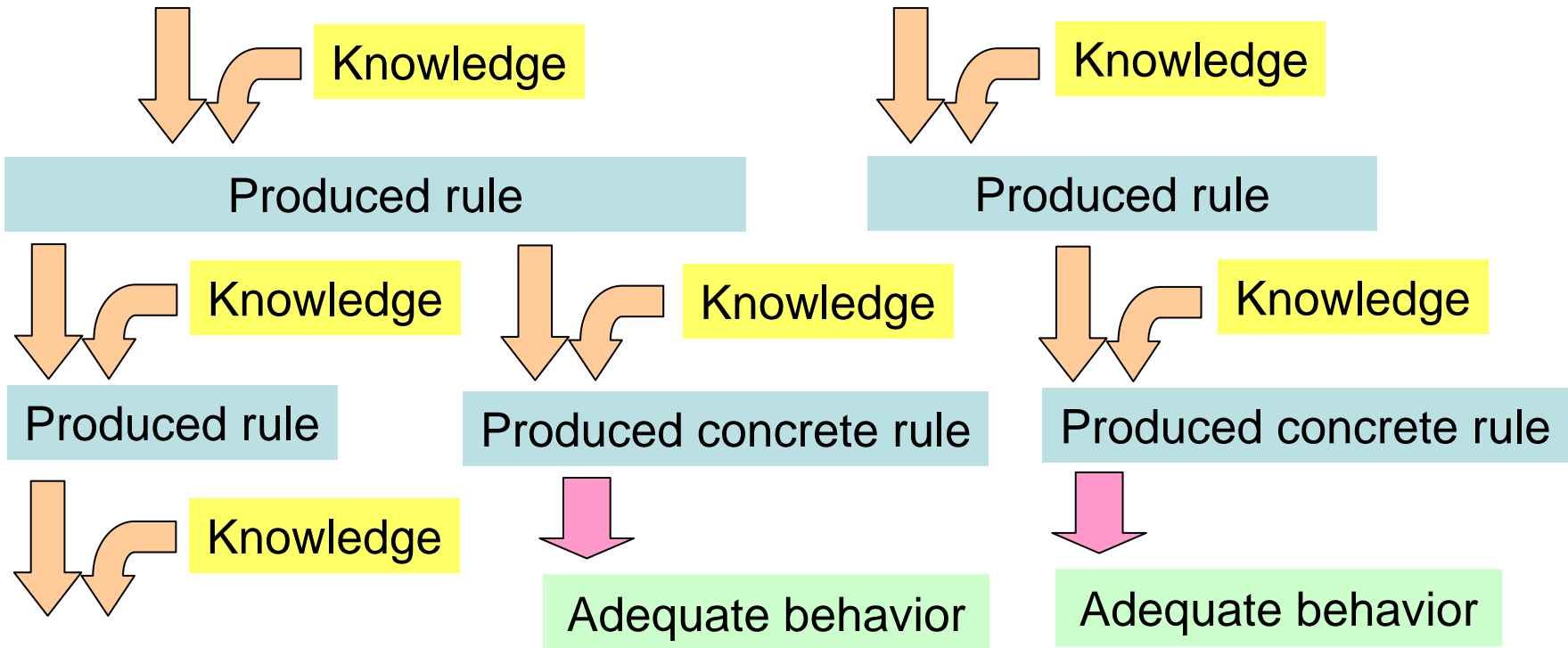
Development of database of comprehensible contents.

# Cognitive Science

Constructing *mental model* of knowledge acquisition and utilization.

## How do persons think in case of disasters?

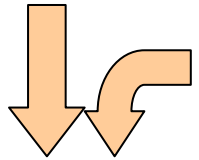
Instructed abstract rule: You must leave sea coast if a tsunami warning is issued.





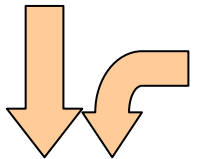
# How do persons think in case of disasters?

You must leave sea coast if a tsunami warning is issued. Instructed rule



Leaving sea coast means running to higher ground. Knowledge

You must **run to higher ground** if a tsunami warning is issued.

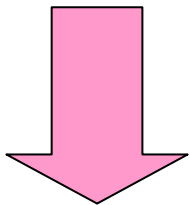


"ABC hill" is higher ground in my town. Knowledge

Produced rule

You must run to **ABC hill** if a tsunami warning is issued in my town.

Produced rule with concrete representation



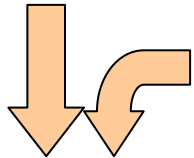
Adequate behavior

Persons should transform a instructed rule to concrete one.

# Cognitive constraints and adequate instruction

## Example 1: Persons who have difficulty of processing speed.

You must leave sea coast if a tsunami warning is issued. Instructed rule



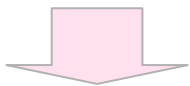
Leaving sea coast means running to higher ground.

You must **run to higher ground** if a tsunami warning is issued.



“ABC hill” is higher ground in my town.

You must run to **ABC hill** if a tsunami warning is issued in my town.



Adequate behavior

Tsunami reaches sea coast before producing concrete rule.

# Cognitive constraints and adequate instruction

Example 1: Persons who have difficulty of processing speed.

You must leave sea coast if a tsunami warning is issued. Instructed rule



Leaving sea coast means running to higher ground.

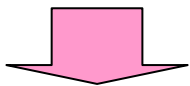
You must **run to higher ground** if a tsunami warning is issued.



“ABC hill” is higher ground in my town.

New instructed rule

You must run to **ABC hill** if a tsunami warning is issued in my town.



Adequate behavior

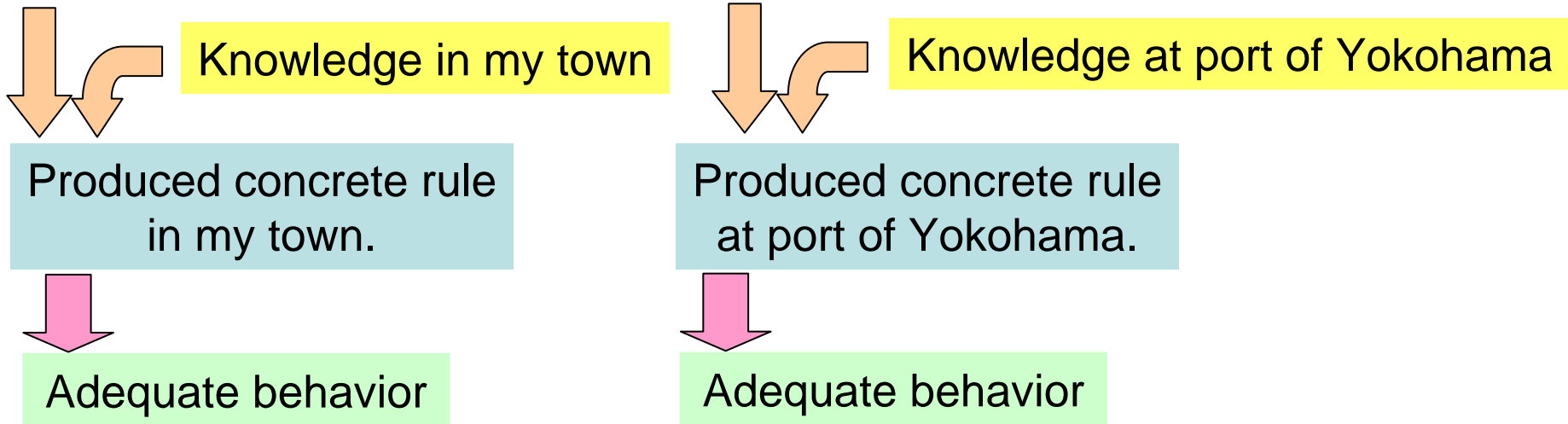
They will act adequately in my town.

Concrete rule is more effective than abstract one for them.

# Cognitive constraints and adequate instruction

**Example 2: Persons who have difficulty of acquisition of new knowledge.**

Instructed abstract rule: You must leave sea coast if a tsunami warning is issued.

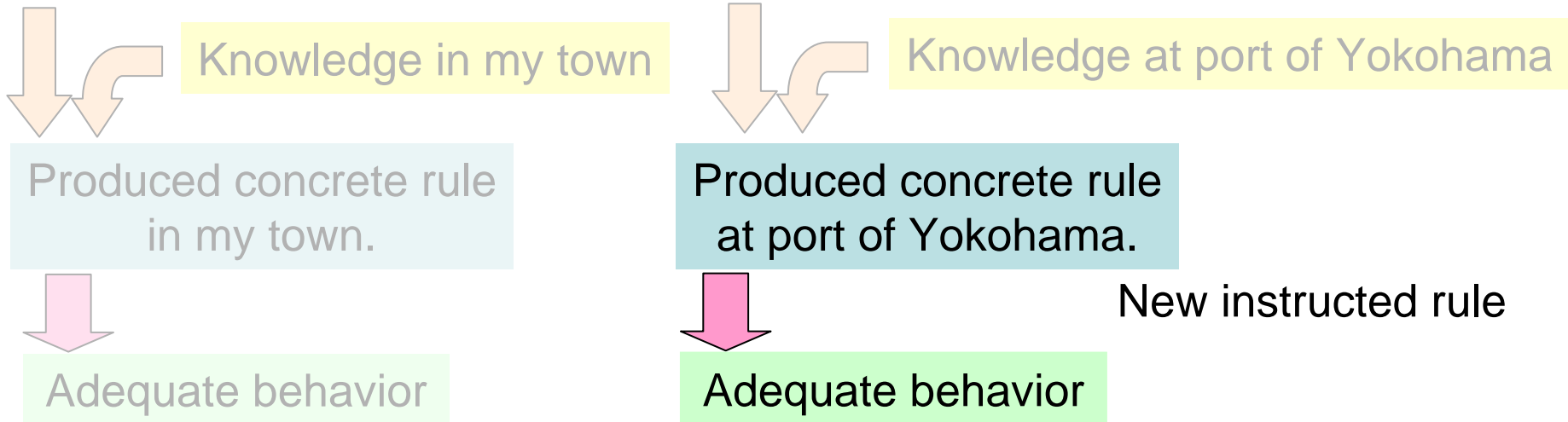


They will act adequately *both* in their town and at port of Yokohama.

# Cognitive constraints and adequate instruction

## Example 2: Persons who have difficulty of acquisition of new knowledge.

Instructed abstract rule: You must leave sea coast if a tsunami warning is issued.

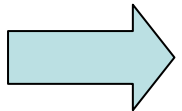


They will act adequately *only* at port of Yokohama.

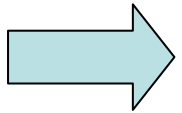
Abstract rule is more effective than concrete one for them.

# Cognitive Science

Constructing *mental model*



We clarify influences of cognitive constraints.



We propose adequate set of instruction rules.

# Multimedia

Utilizing movies for instruction

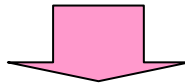
## Advantages of instruction utilizing movies

Persons with language disability

Effective learning and persuasion

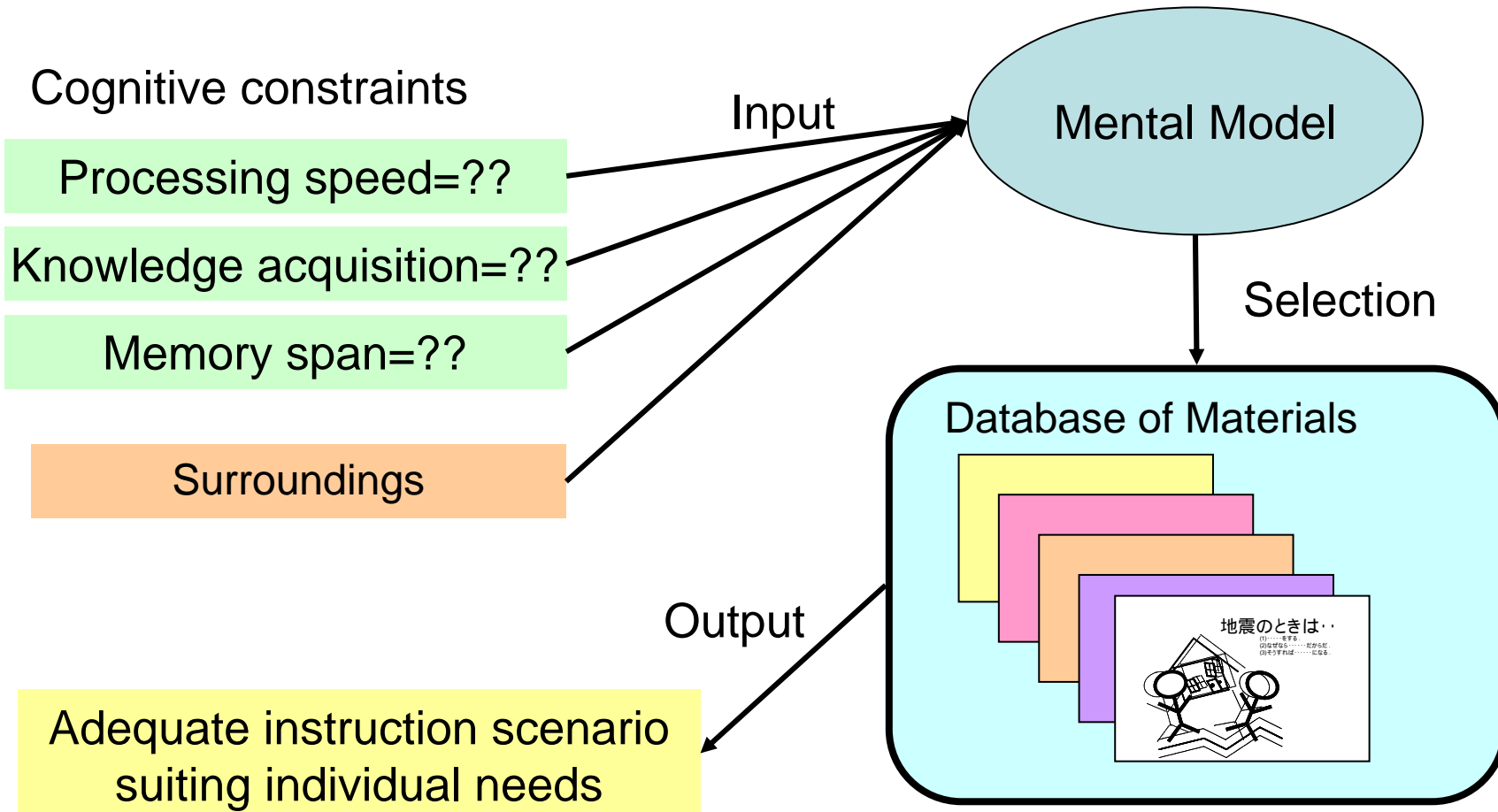
Verbal explanation  Movie

You must run to **ABC hill** if a tsunami warning is issued in my town.



Adequate behavior

# Expected Outcome



We provide more comprehensible and more efficient instruction.



# Subgoal 2: Attention

# Development of attention-attracting technology

# Outline

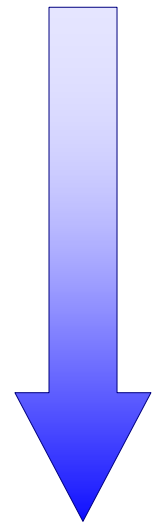
Toward the assistance to challenged persons focusing their attention on an aimed information

## 1. Explore functional sets of visual and/or audio effects to attract observers' attention

- Case studies of challenged persons
- Experiments with normal people

## 2. Organization of a database

- Propose a database of functional sets of visual and/or audio effects



# Purpose

To propose an attention-attracting technology for persons with disabilities of sustaining attention using visual and/or audio effects.

- Multimedia

- Multimedia technique (animation, 2D-3D audio, etc.)

- Cognitive science

- Evaluate the effectiveness of visual and/or audio effects on attention-attraction using technique on cognitive science.

# Multimedia

Techniques for capturing attention

- ***Visual effects***

- flash, slide-in, zoom-in/-out, luminance transition, etc.

- ***Audio effects***

- 2D-audio, 3D-audio, etc.

>>> Organize a database of functional sets of visual and/or audio effects

# Cognitive science

Measuring observers' responses to target display that was presented with visual and/or audio effects

## Objective measurements:

behavior (eye movement, etc.), brain imaging, etc.

- *Case studies of persons with disabilities*
- *Experiments with normal participants*

>>> Explore functional sets of visual and/or audio effects

# Expected outcome

## Database of functional sets of visual and/or audio effects

### Visual effects

### Audio effects

Effects Disabilities	<u>Visual effects</u>				<u>Audio effects</u>			
	Flash	Slide in	...	...	2D audio	3D audio	...	...
A	+							
B		+				+		
...	+		+					
...						+		

# Summary

## Subgoal 1: Contents

Development of  
comprehensible contents

## Subgoal 2: Attention

Development of  
Attention-attracting Technology

Comprehensible  
Contents

Database of functional  
sets of visual and/or  
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Implement  
3D audio  
in SMIL

**Contribute to new designs of user-friendly  
information presentation device**

