

# A Proposal for Disaster Evacuation Manuals that Consider Spatial-Temporal Structure of Learner's Everyday Life

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## Abstract

Current disaster evacuation manuals do not provide sufficient retrieval cues to recall appropriate rules when a disaster occurs. In order to resolve this, we propose a new manual with a spatial-temporal structure of the learner's everyday life based on the consideration that people recognize their own situations at all times and that the situation is embedded in a spatial-temporal structure. We expect that organizing knowledge by the spatial-temporal structure will enhance recallability of evacuation rules and help learners make appropriate survival decisions. This paper reports an implementation of a disaster evacuation manual for children that represents evacuation rules in the spatial-temporal structure of the learner's everyday life.

## Introduction

### Importance of disaster evacuation manuals

- We require self-made decisions in surviving disasters.
- Appropriate self-made decisions require that people have knowledge in order to decide what to do to survive.
- A disaster evacuation manual is a primary source of knowledge.



### Recallability Problem

- People fail to recall evacuation rules when necessary, that is,
  - Evacuation rules such as "you must evacuate to high ground when an earthquake occurs because a tsunami may strike" often don't work properly though people know the rules.

### Purpose of This Study

- Pointing out that people facing a disaster would have difficulty recalling general evacuation rules from the perspective of **cognitive science**
- Developing a "usable" disaster evacuation manual for children by using **multimedia**

## Solving the Recallability Problem

### Two Problems: Low Activation and Conflict

- **Low Activation:** The description of the rule is not specific enough to be activated when necessary.
- **Conflict:** The rules may conflict because the rules are too general and multiple rules may match the situation.

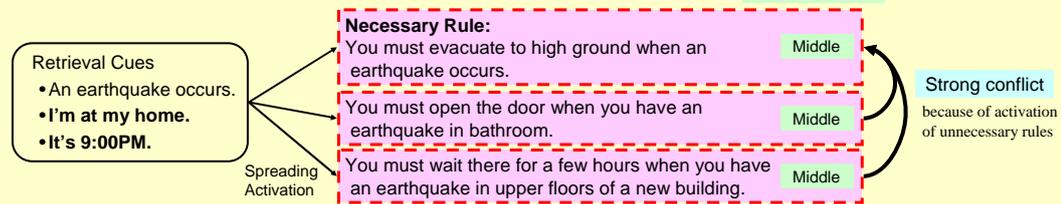
### A Solution

- A situation typically consists of location and time information.
- We are aware of our own situation such as "*now, it is 6 o'clock, and I am at my friend's home*" at all times in order to behave in the appropriate manner for a given situation.
- Recallability problems are caused by the lack of specificity of the rules.
  - Specific rules are more activated when necessary.
  - don't cause conflict because unnecessary rules aren't activated.

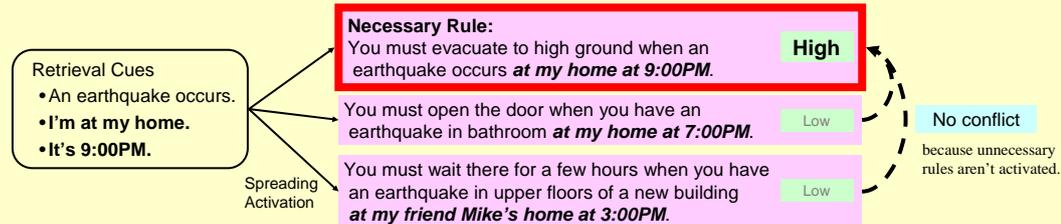


Proposing a manual including a spatial-temporal structure of the learner's everyday life as retrieval cues of rules.

### When Learning **Abstract** Rules without Location or Time Information



### When Learning **Specific** Rules Embedded in a Spatial-Temporal Structure



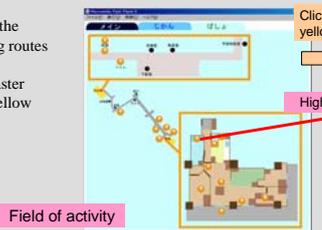
## Prototype

### Implementation

- A prototype that considered spatial-temporal structure for two children was constructed.
  - 6 and 8 years old
  - Investigation of their field of activity in their everyday lives
  - Embedment of the rules in the spatial-temporal structure

### Location Page for Spatial Information

- Investigation of the room layout of the houses and schools, and the walking routes
- Making a map
- Identifying the risk points for a disaster
- Representing the points by round yellow buttons on the location page



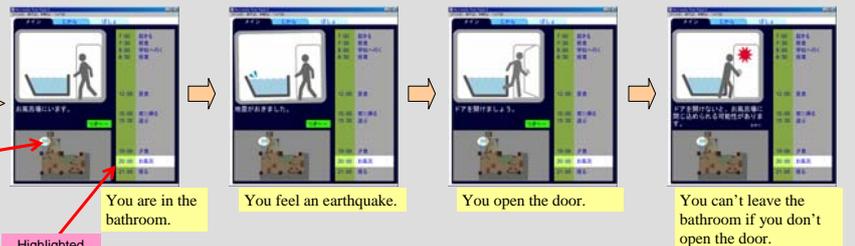
### Time Page for Temporal Information

- Investigation of their typical schedules
- Identifying the risks in relation to the location
- Making icons representing the risk points
- Representing the schedule as a list of events with icons



### Evacuation Rules

- The children learn the rules by evacuation rule page.
  - Using animated illustrations and captions in the form of SMMAPS [1]
  - The pages explain how to evacuate from bathroom when an earthquake occurs.



### Integration of Spatial-Temporal Information and Evacuation Rules

- The children **MUST** go through the location page or the time page to access the rule page.
  - The rules can be accessed either from the location or time page by clicking the round yellow buttons on the location page or icons on the time page.
  - They can reinforce associations between rules and spatial-temporal information by repeating such access.
  - The related location and time on rule pages are highlighted to organize this information.

### Evaluation

- The evacuation rules are embedded in a spatial-temporal structure.
- Thus, the children began to use location and time information as retrieval cues to recall an appropriate rule for a situation when disaster occurs.

## Conclusion

People need knowledge about how to survive crises. We demonstrated that the combined approach of cognitive science and multimedia greatly facilitate organizing such knowledge. We hope, beyond disaster evacuation, that the approach will be utilized to solve various educational problems.

### Reference

[1] Shimada, H., Kitajima, M.: SMMAPS: Scenario-based Multimedia Manual Authoring and Presentation System and its Application to a Disaster Evacuation Manual for Special Needs. Proceedings of CHI2006 Conference on Human Factors in Computing Systems (2006) 1313–1318.



Figure: The manner of learning. They seemed to favor the prototype.