



Team Communication and Mental Models

INFLUENCE OF COMMUNICATION ON MENTAL MODELS

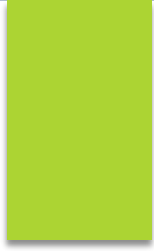
PASCAL JÄGER
21.11.12

Overview

- ▶ Introduction
- ▶ What is a Mental Model?
- ▶ My Thesis
 - ▶ Basic Agent I/O and Information Communication
 - ▶ Influencing Factors
 - ▶ Evaluating Mental Models
 - ▶ Objectives and Thesis Structure

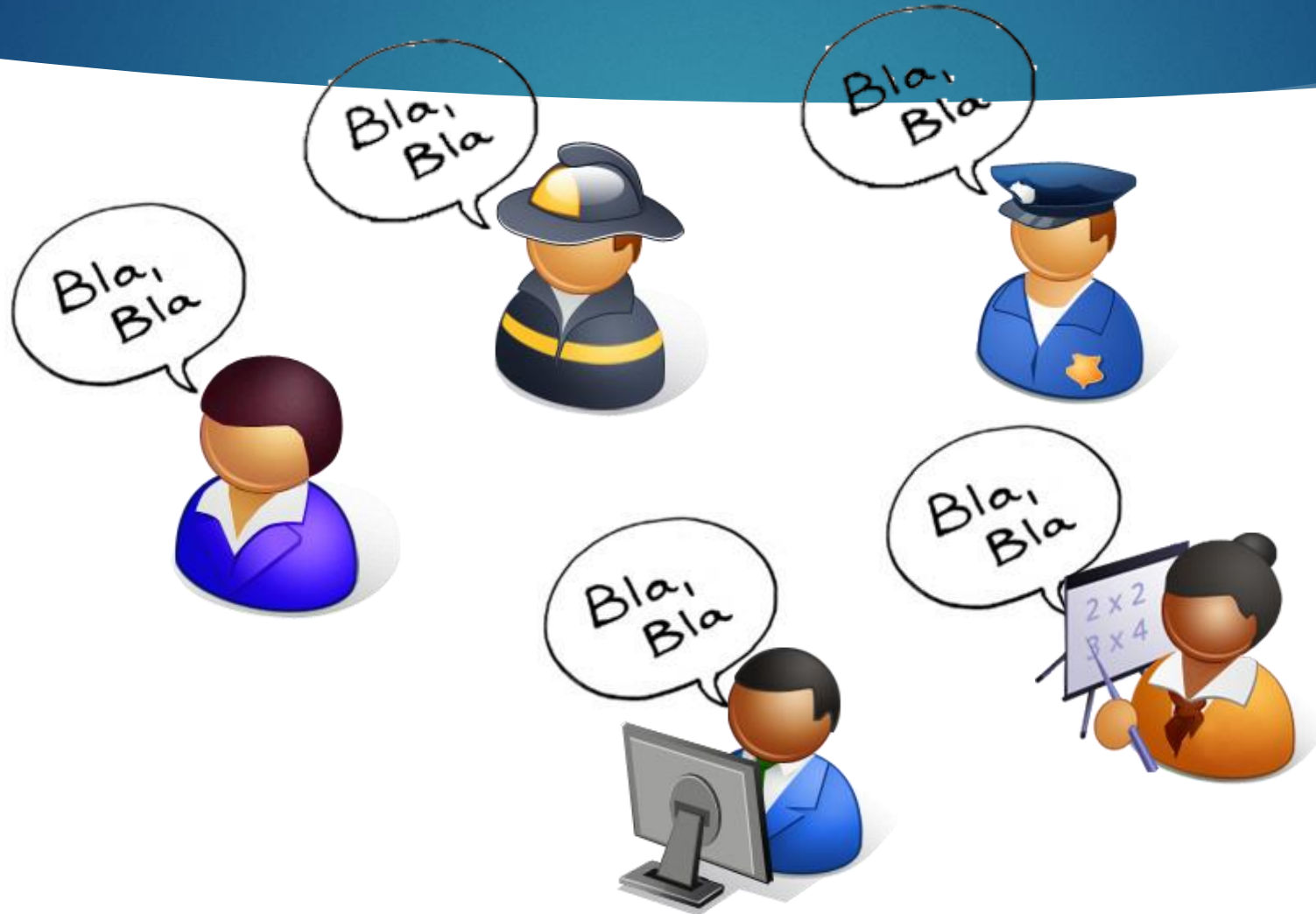
Introduction



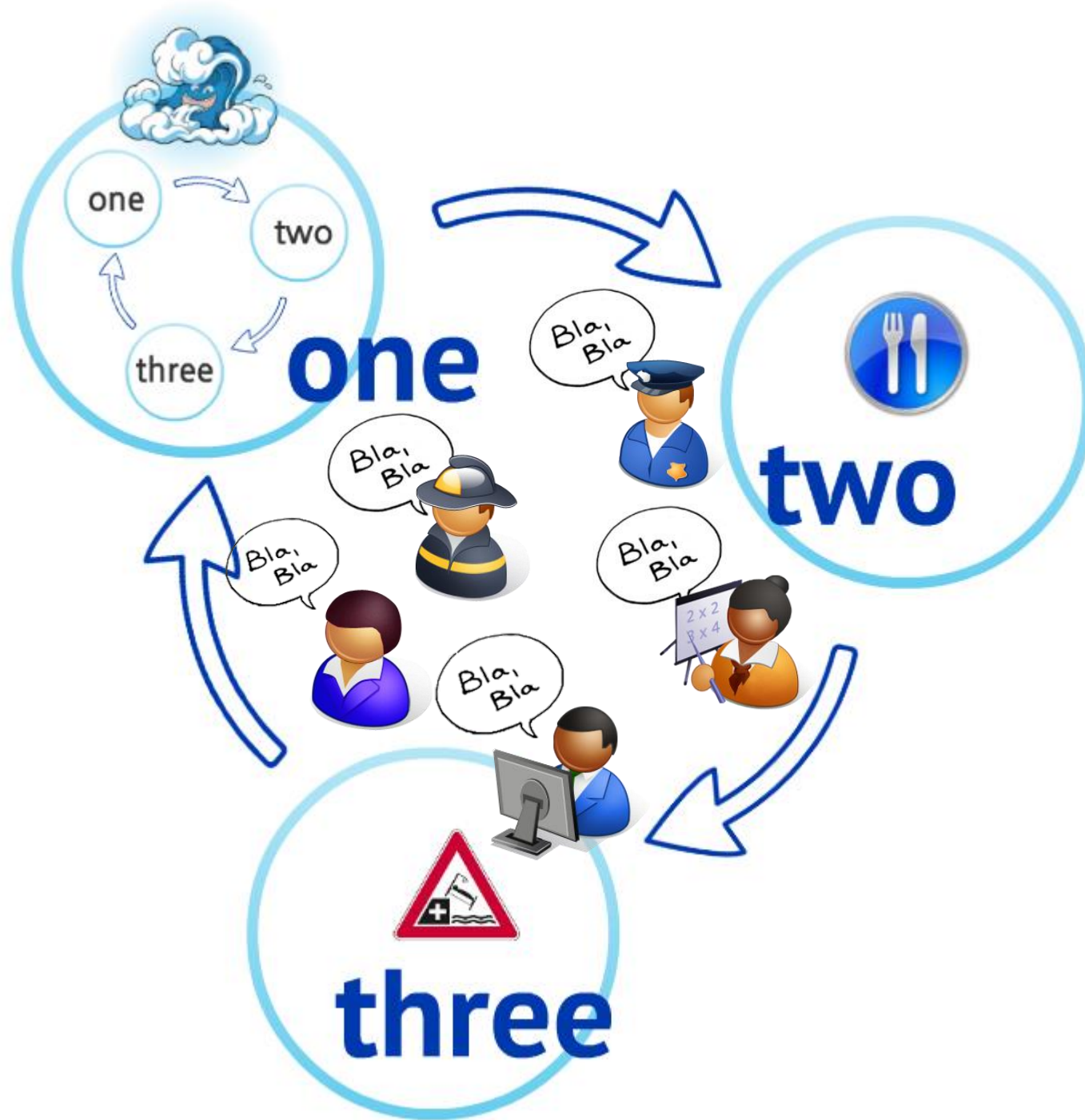


Research processes and influencing factors in crisis management teams on setting up a shared mental model using a multi agent simulation.

Crisis Management Team



Complex World



What is a
Mental Model?



What is a Mental Model?


- ▶ *structures* held by members of a team that enable them to form accurate *explanations* and *expectations* for the *task*, and, in turn, coordinate their actions and *adapt their behavior* to demands of the task and other team members.[1]
- ▶ Mental models are the mechanisms whereby humans are able to generate *descriptions of system purpose and form*, explanations of system functioning and observed system states, and *predictions of future system states*. [2]

Shared Mental Models ...

- ▶ are split over each agent's „mind“ (including the extended mind)
- ▶ do not (and will not) look the same in each mind
- ▶ can be compared by asking the agent questions and comparing the answers

My Thesis





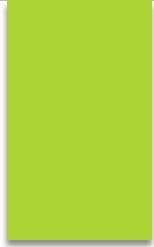
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Basic Concepts

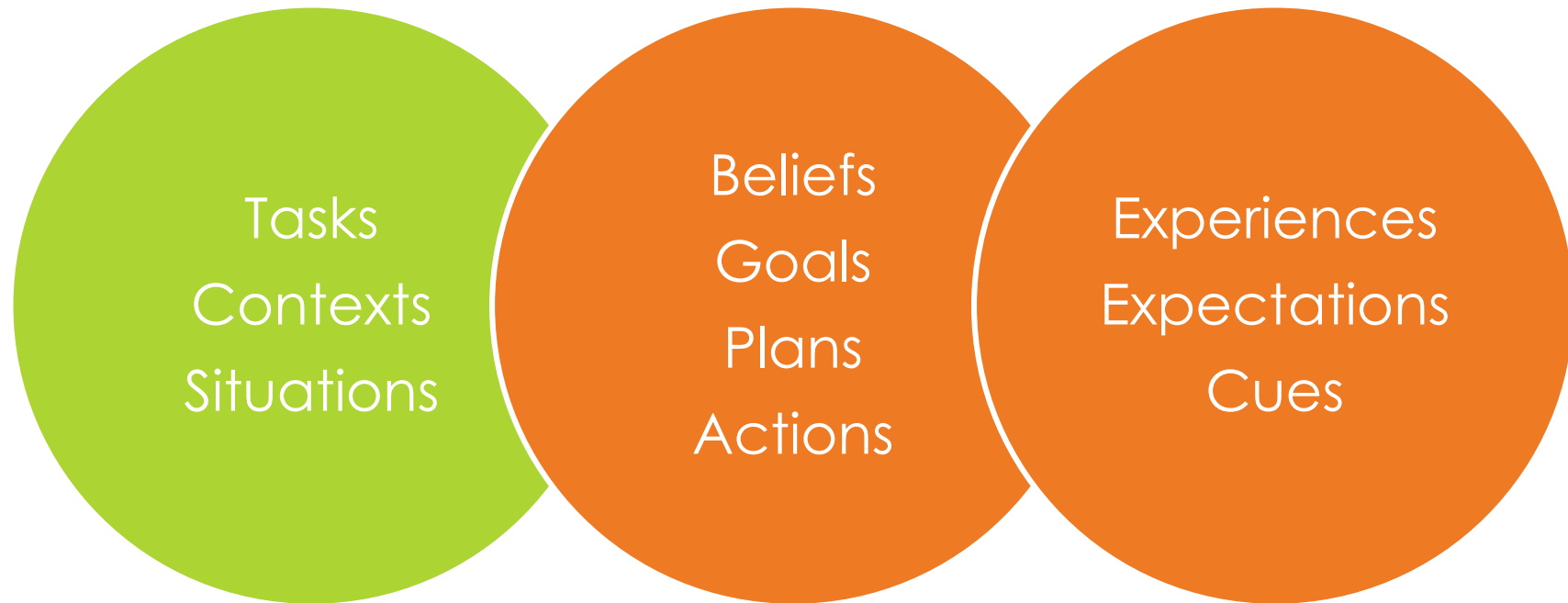


Group Planning

Naturalistic Decision Making



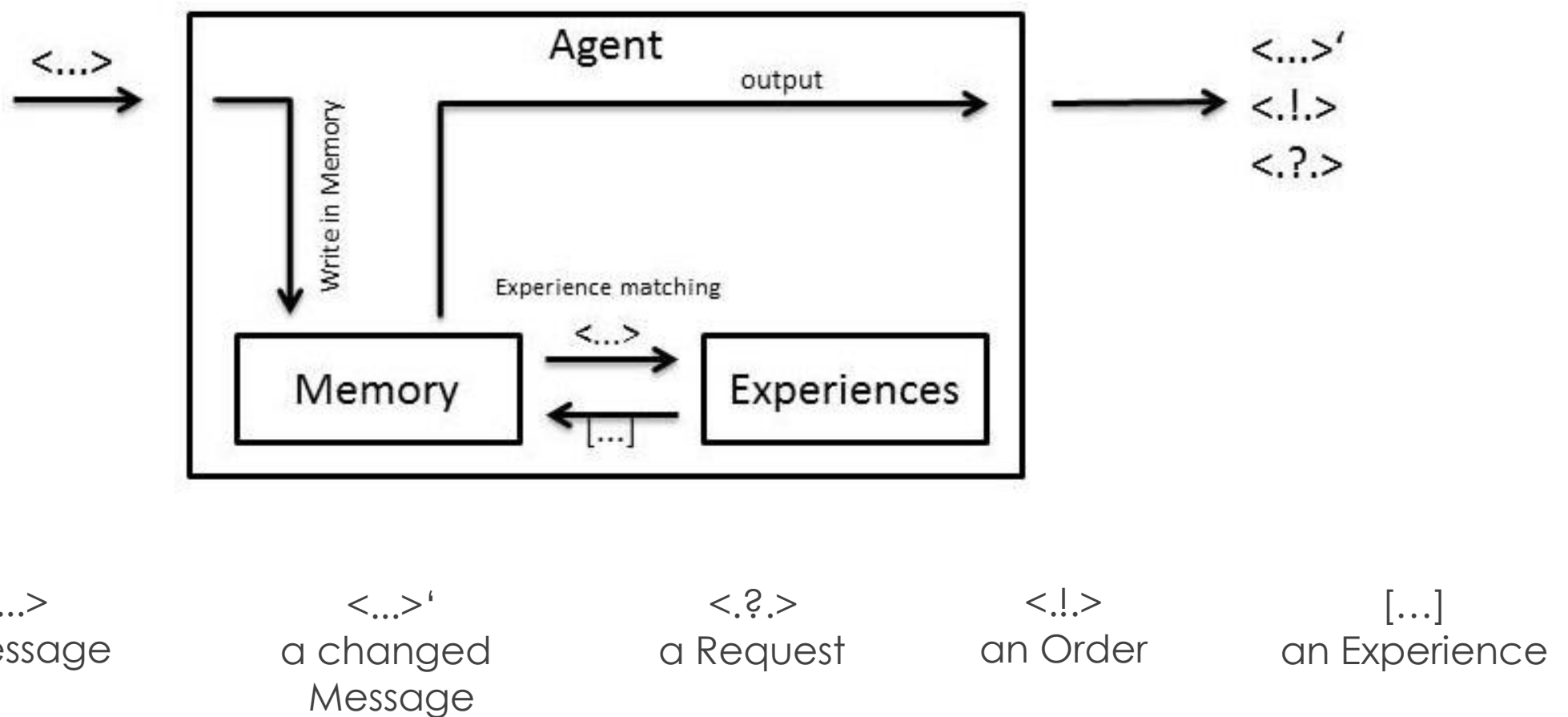
Basic Concepts



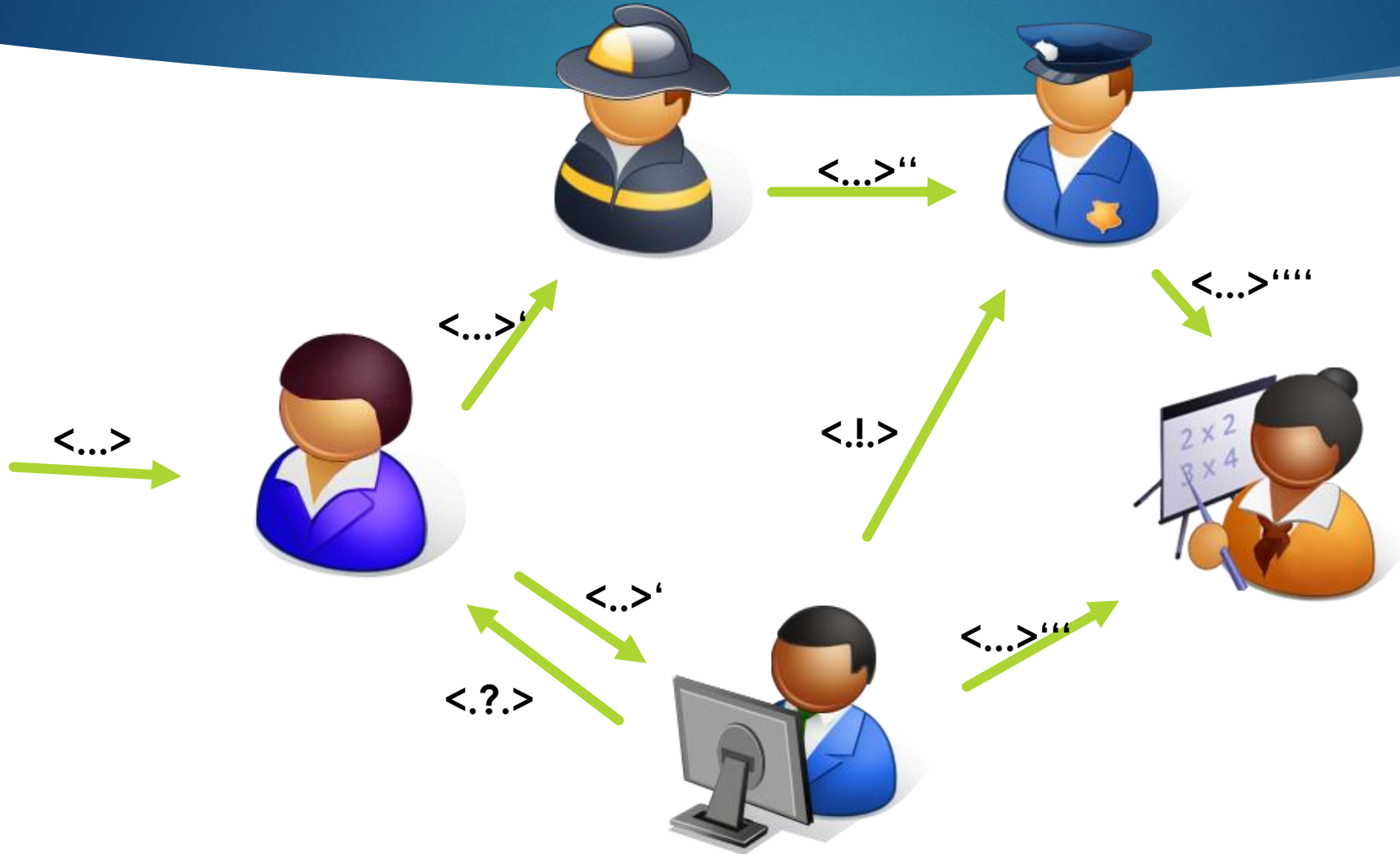
Group Planning

Naturalistic Decision Making

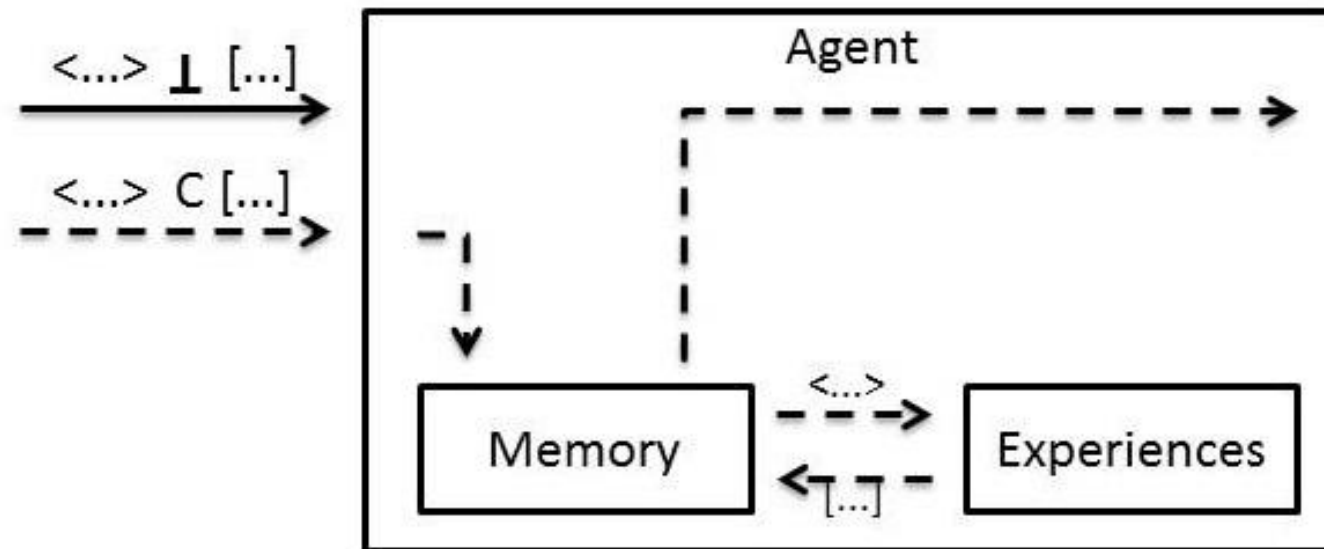
Basic Agent I/O



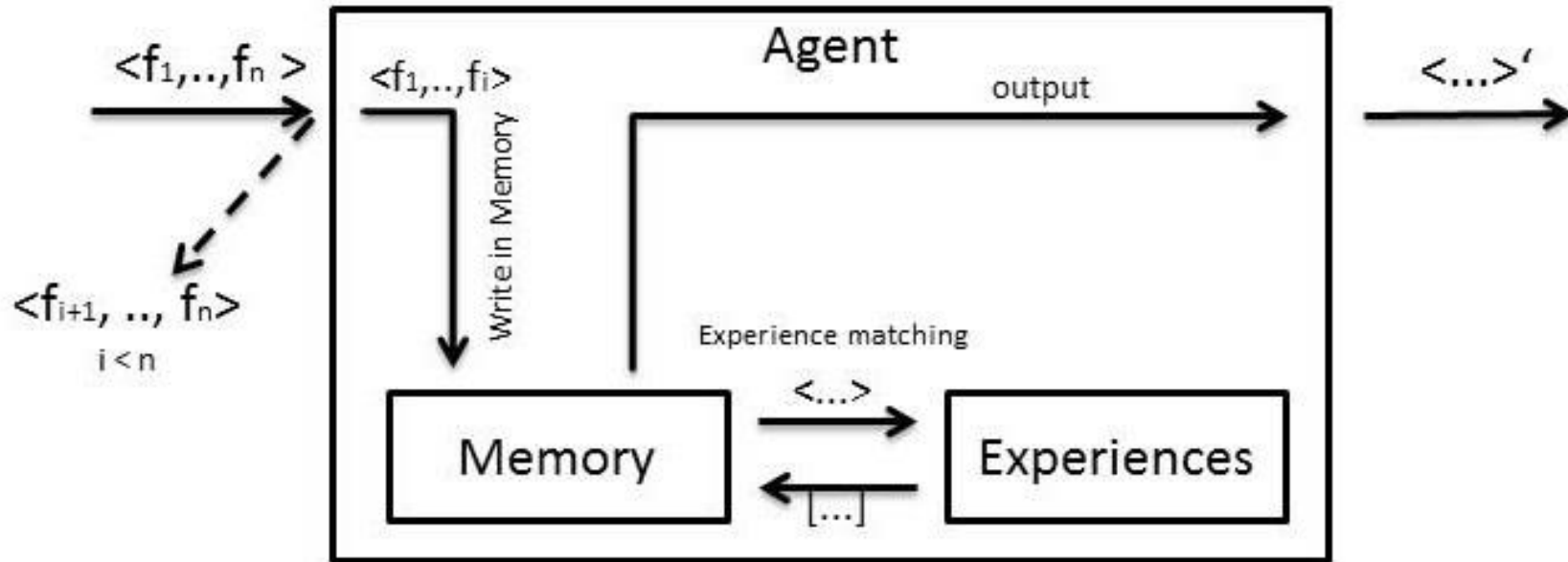
Team Communication



Influence: Cognitive Dissonance



Influence: Retentiveness



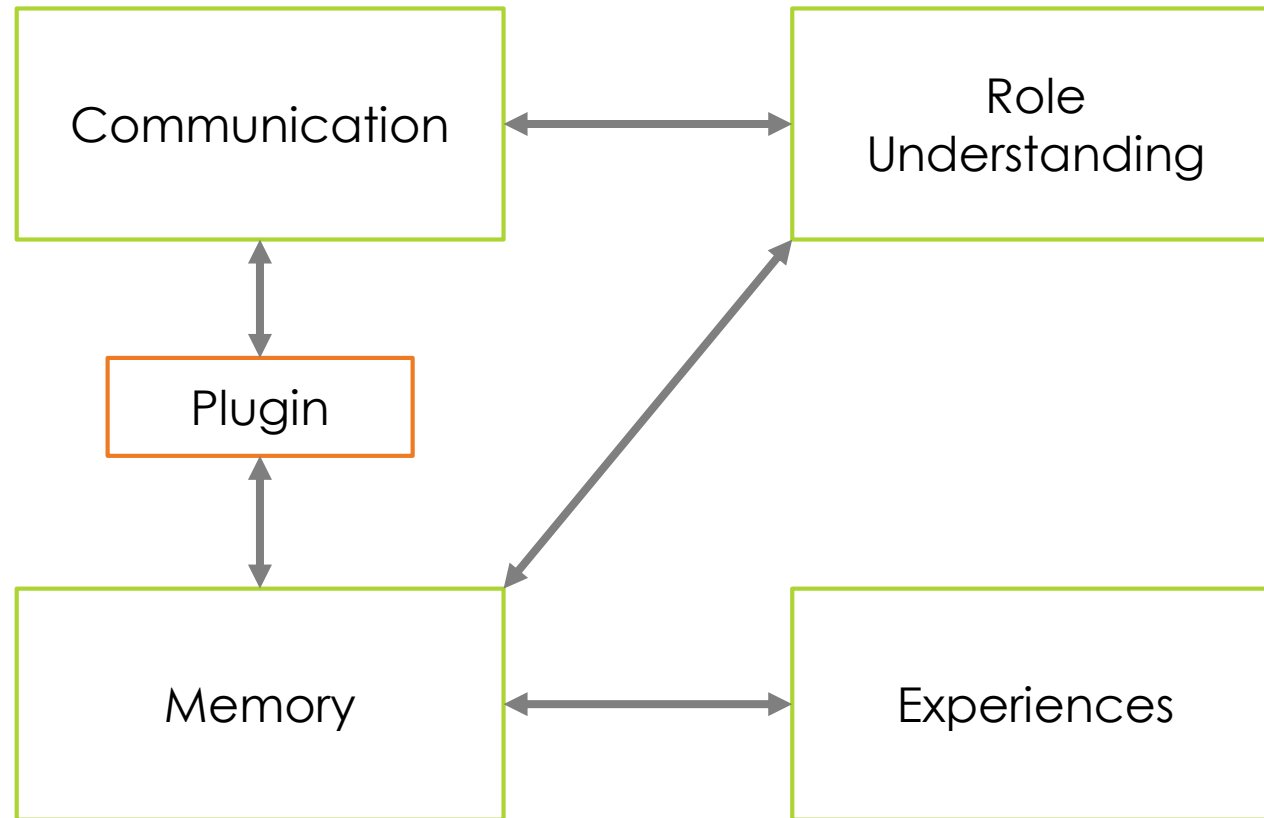
Influencing Factors



Agent Architecture

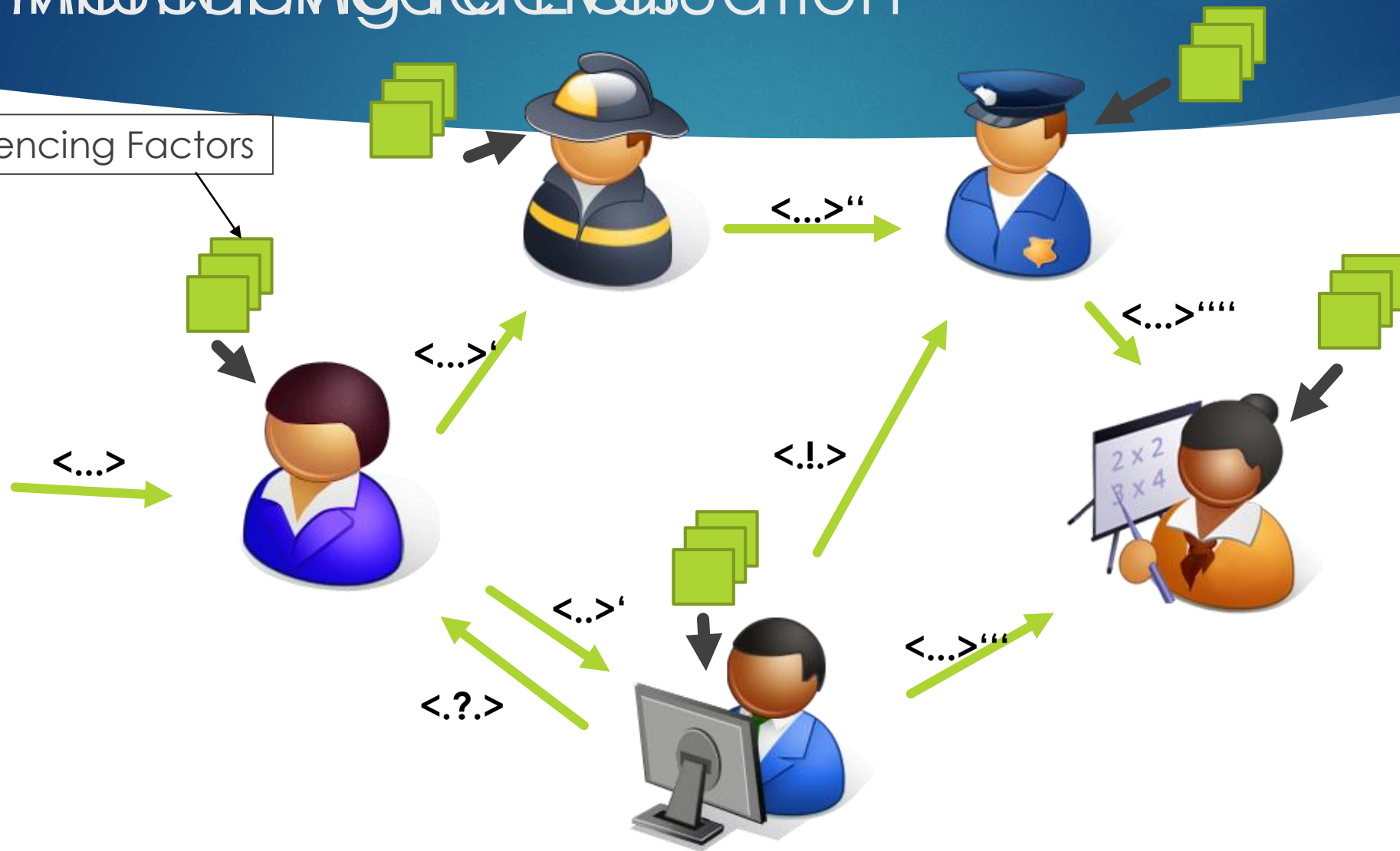
- ▶ Basic Agent I/O (Memory, Experiences, Information Processing)
- ▶ Influencing Factors (-Plugins)
- ▶ RPD Model

Agent Architecture



Multi-lingual Evaluation

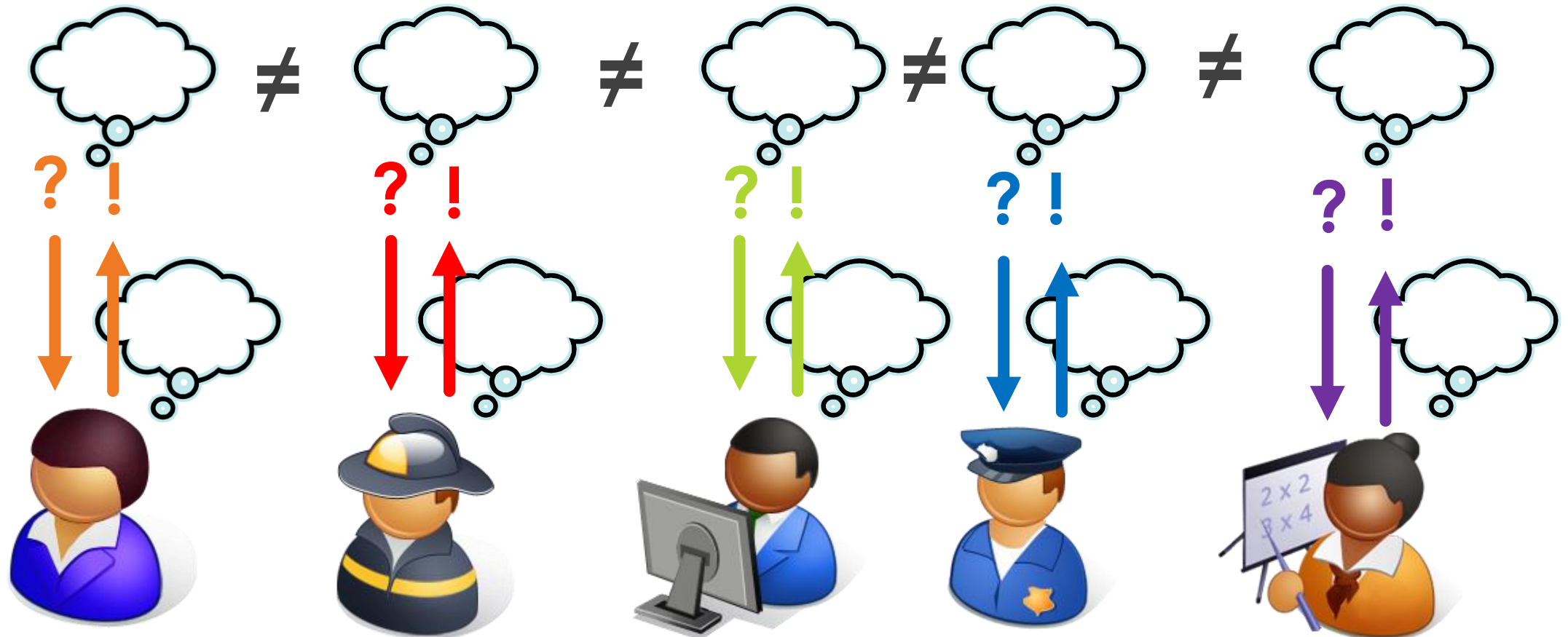
Influencing Factors



Querying and Comparing Mental Models (1)



Querying and Comparing Mental Models (2)



Objectives

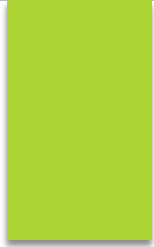
- ▶ Develop agent architecture based on RPD with plug-in points for influencing factors
- ▶ Define and develop influencing factor plugins
- ▶ Develop outside world scenario
 - ▶ Information scenario
 - ▶ Input scenario
- ▶ Develop reference models for each team member
- ▶ Gather simulation result

Thesis Structure

- 1) Introduction / Motivation
- 2) Background and Related Work
- 3) Agent Architecture
- 4) World Architecture
- 5) Evaluation and Visualization
- 6) Defining Influencing Factor Plugins
- 7) Test Scenarios
- 8) Test Evaluation
- 9) Conclusion

Literature

- ▶ [1] Iris Van De Kieft, Catholijn M Jonker, and M Birna Van Riemsdijk. Explaining Negotiation: Obtaining A Shared Mental Model of Preferences. In 24th International Conference on Industrial Engineering and Other Applications of Applied Intelligent Systems (IEA/AIE'11), pages 120–129. Springer, 2011.
- ▶ [2] W. Rouse and N. Morris. On looking into the black box: Prospects and limits in the search for mental models. Psychological Bulletin, pages 349–363, 1986.



Thank you for your attention !