Developing a Pattern Recognition Structure to Tailor Mid-lesson Feedback

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Enhancing human performance.

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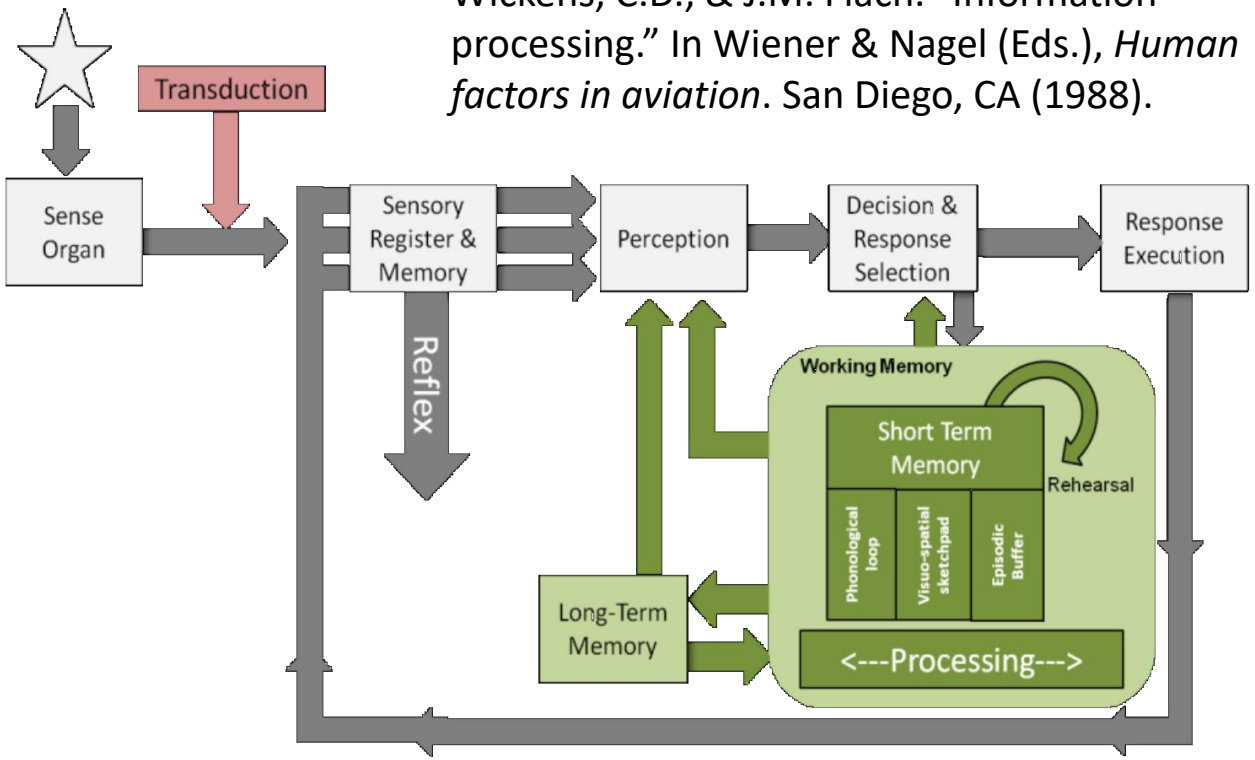
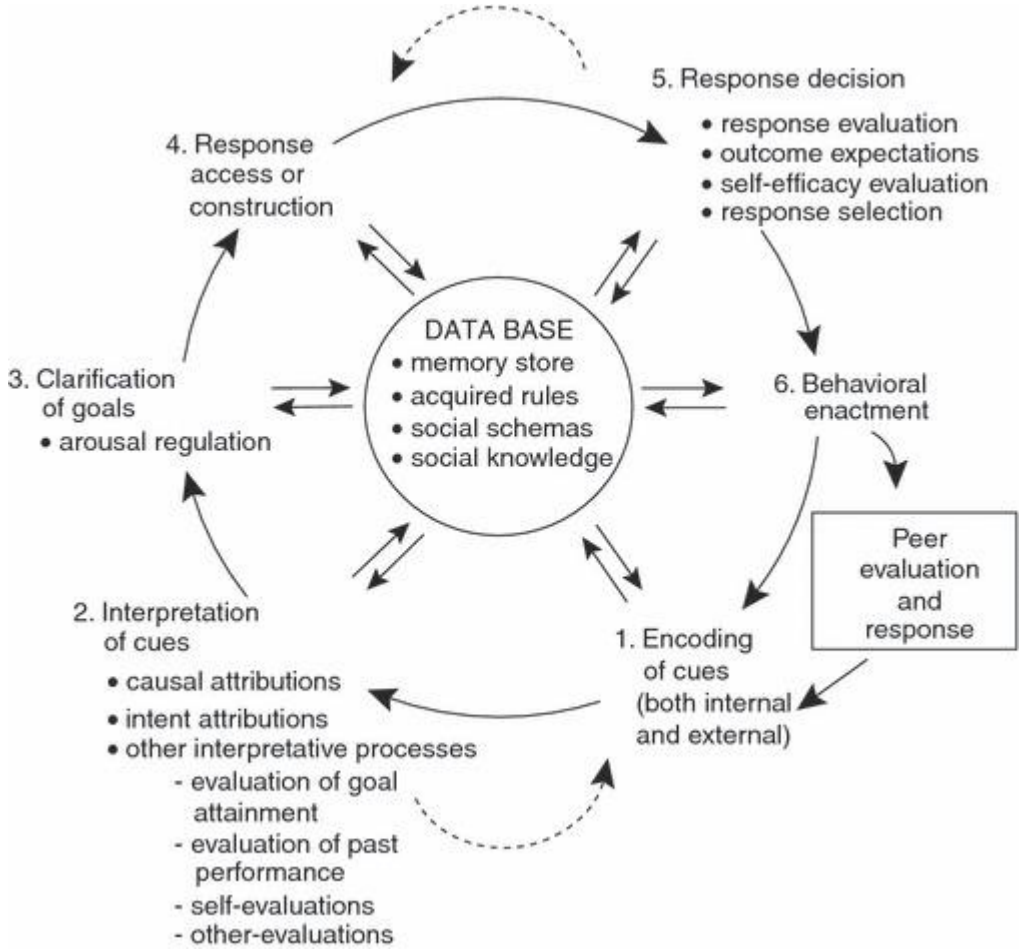
Cognitive-Perceptual Training

Selected Cognitive-Perceptual Frameworks



Wickens, C.D., & J.M. Flach. "Information processing." In Wiener & Nagel (Eds.), *Human factors in aviation*. San Diego, CA (1988).

Boyd, John R. "Organic design for command and control." *A discourse on winning and losing* (1987).



Crick, Nicki R., and Kenneth A. Dodge. "Social information-processing mechanisms in reactive and proactive aggression." *Child development* 67.3 (1996).

Need for Tailored Mid-lesson Reporting

- Immediate presentation to learner during a GIFT course
- Overlaid over an existing GIFT course, not requiring a rewrite
- Feedback, interventions, comparisons to others, or simply progress reports
- Tailored with a domain-general and widely reusable understanding of learners

- Native processing within GIFT
- Compatible with GIFT Cloud

Initial Testbed: APACTS

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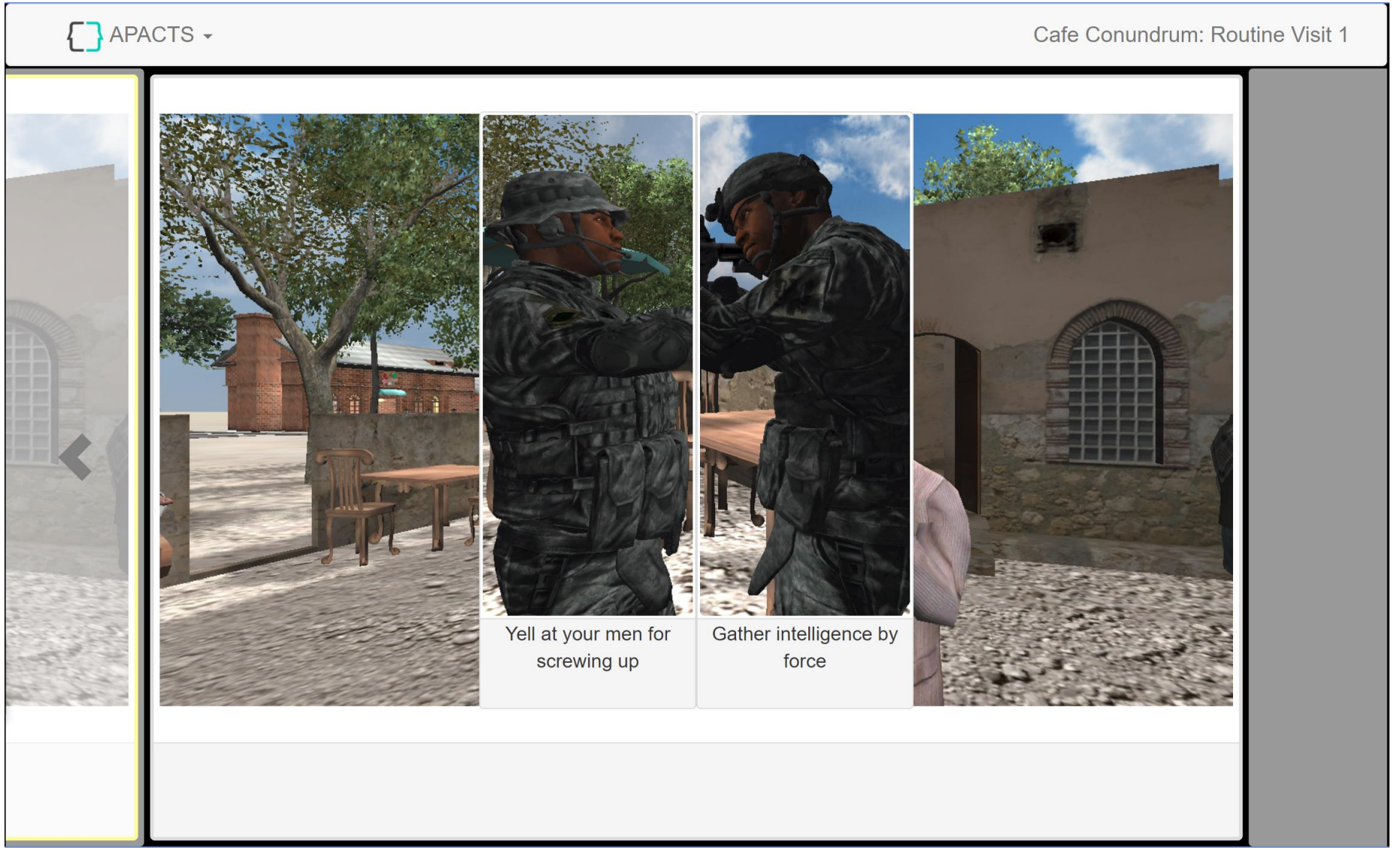
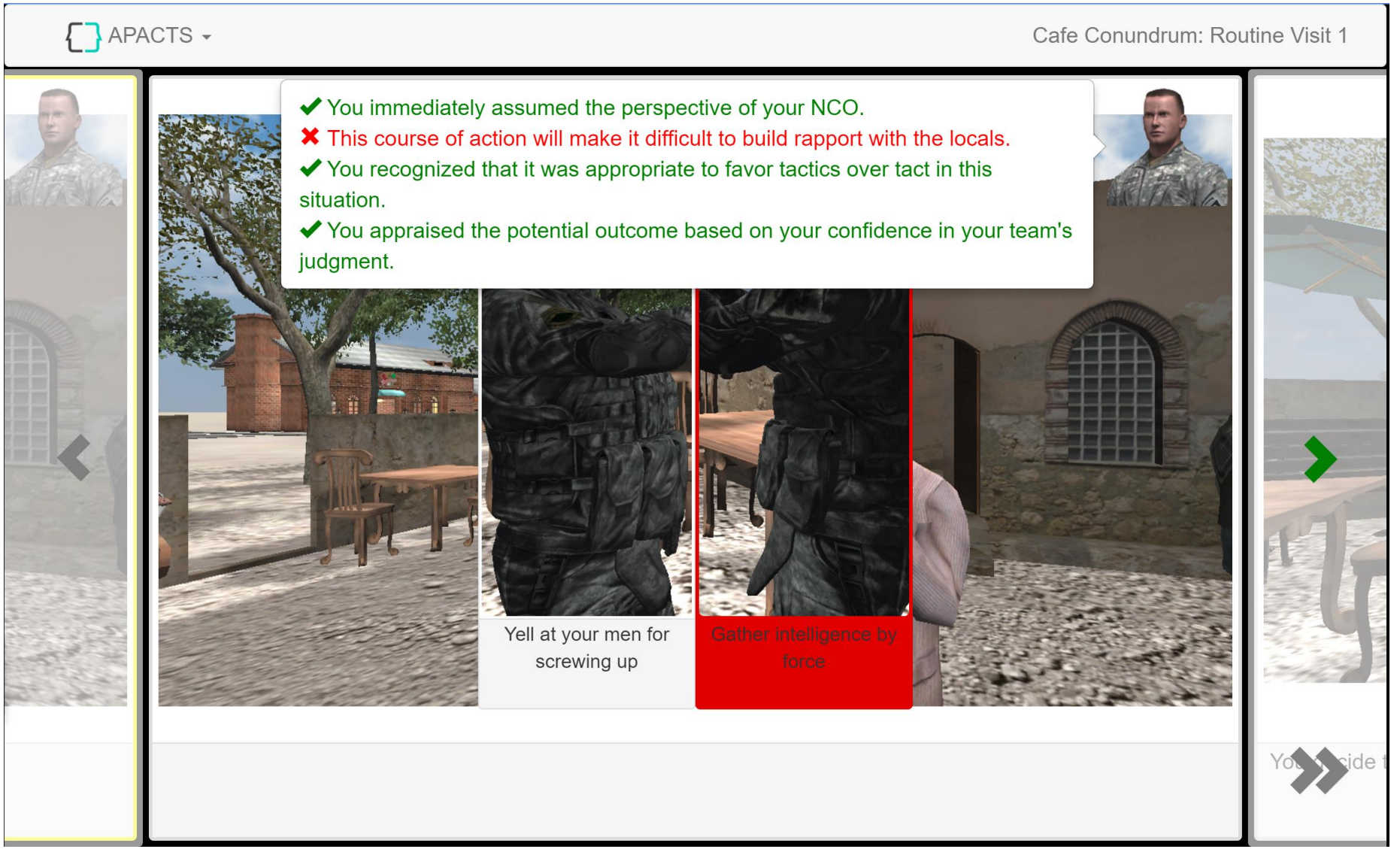


APACTS Feedback via AAR Only



Observable Behavior Patterns

Required, Optional, Forbidden

Add Flour

Add Water

Add Yeast

Add Salt

Add Raisins

Spill the Mix

Sneeze

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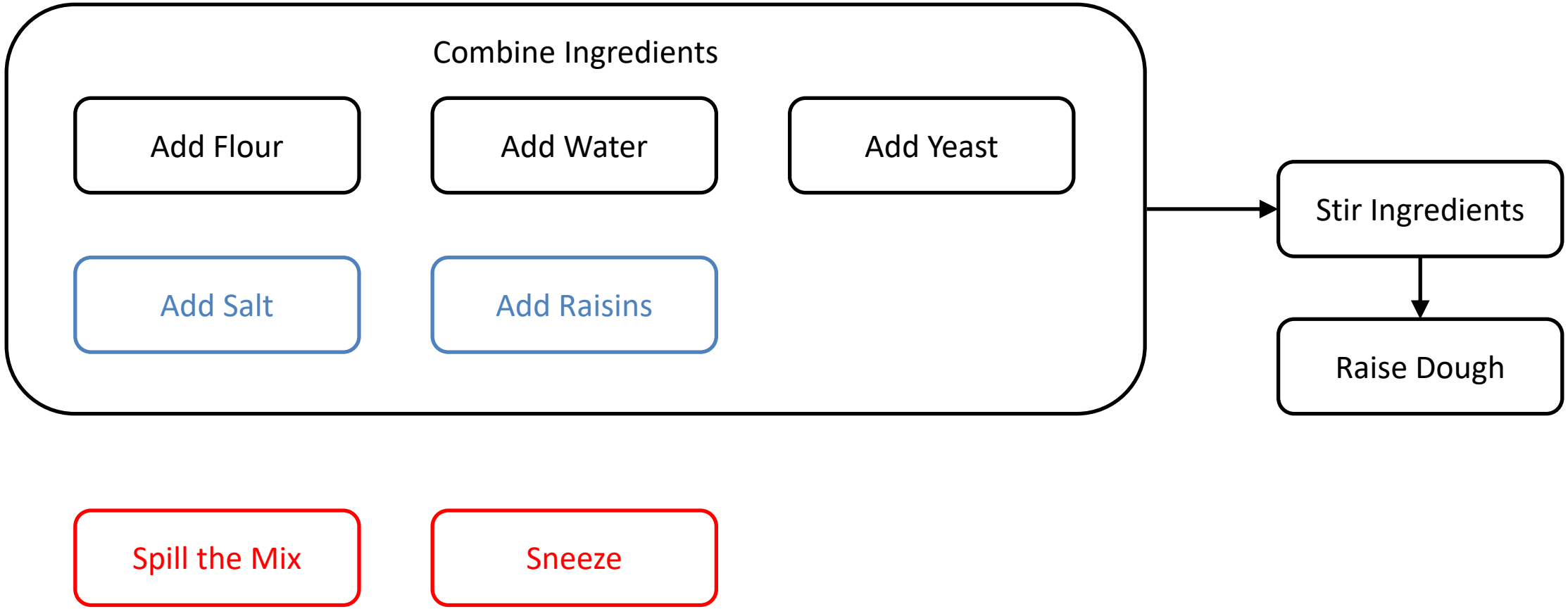
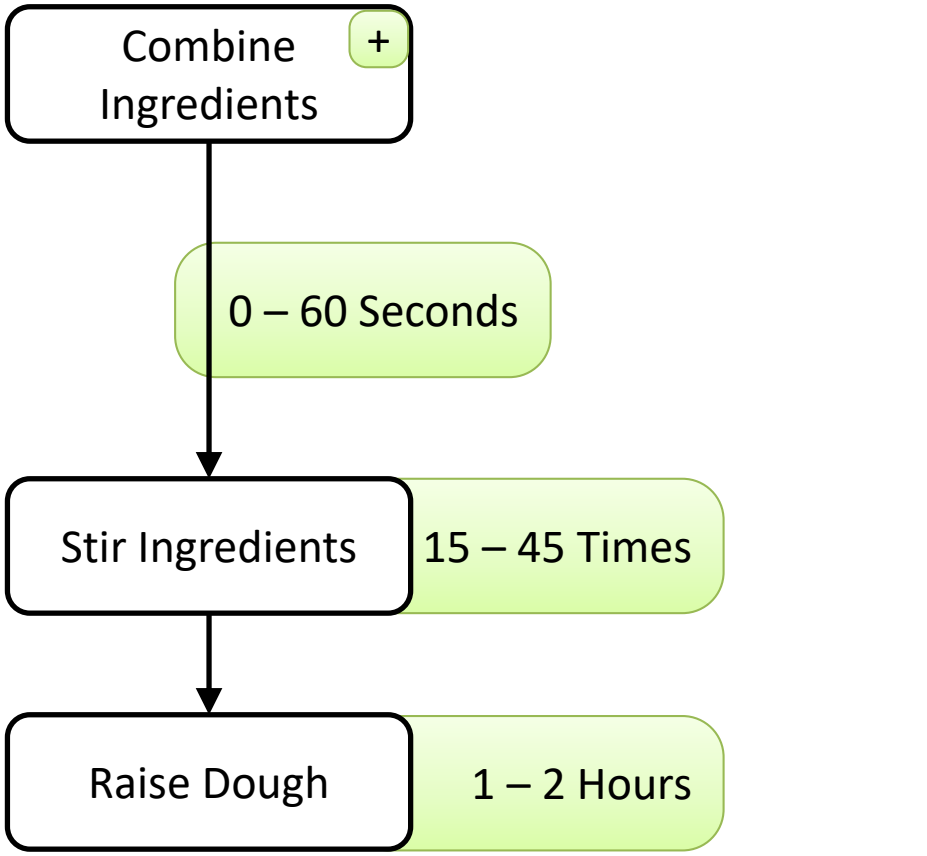
Clusters, Dependency, Ordering, Relevance



Pause, Repetition, Duration



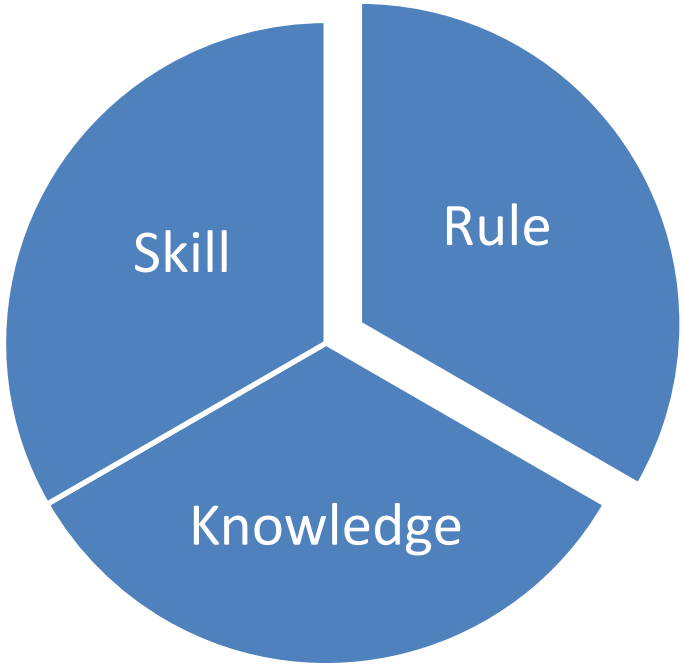
Spill the Mix

Sneeze

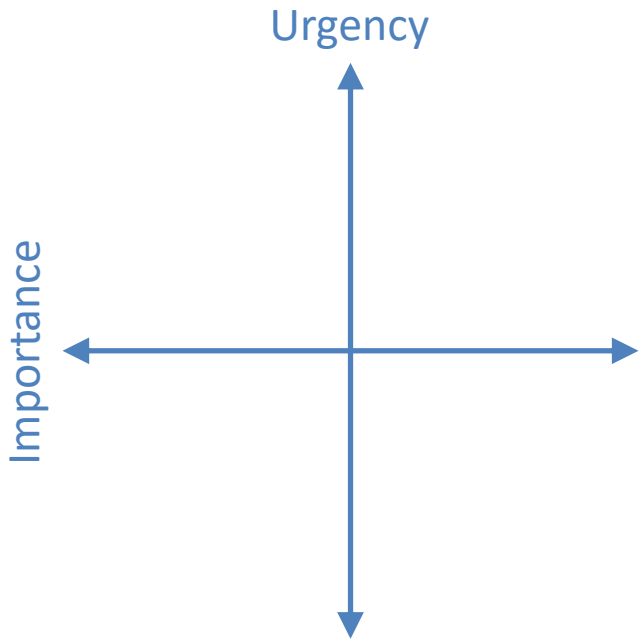
Interpreting Patterns and Tailoring Feedback

Domain-general Features of Misconceptions

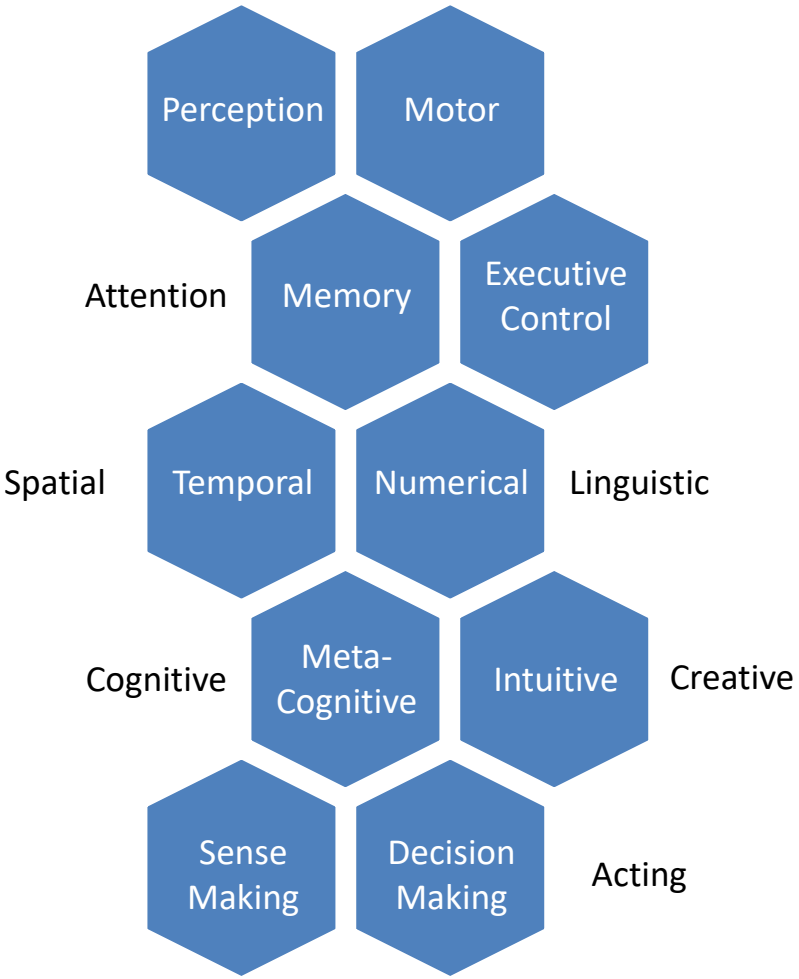
Control



Learner/Domain Interaction



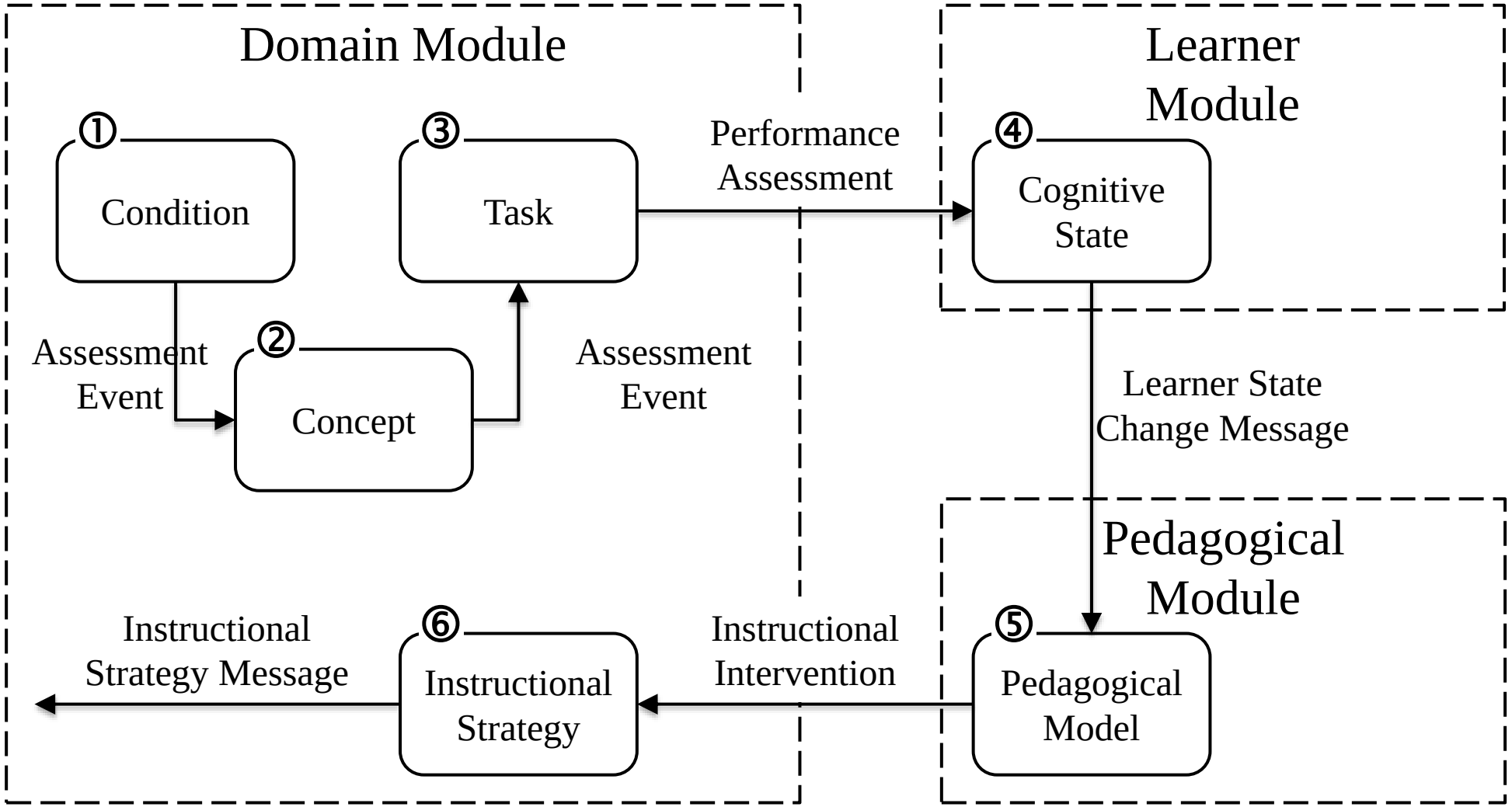
Cause



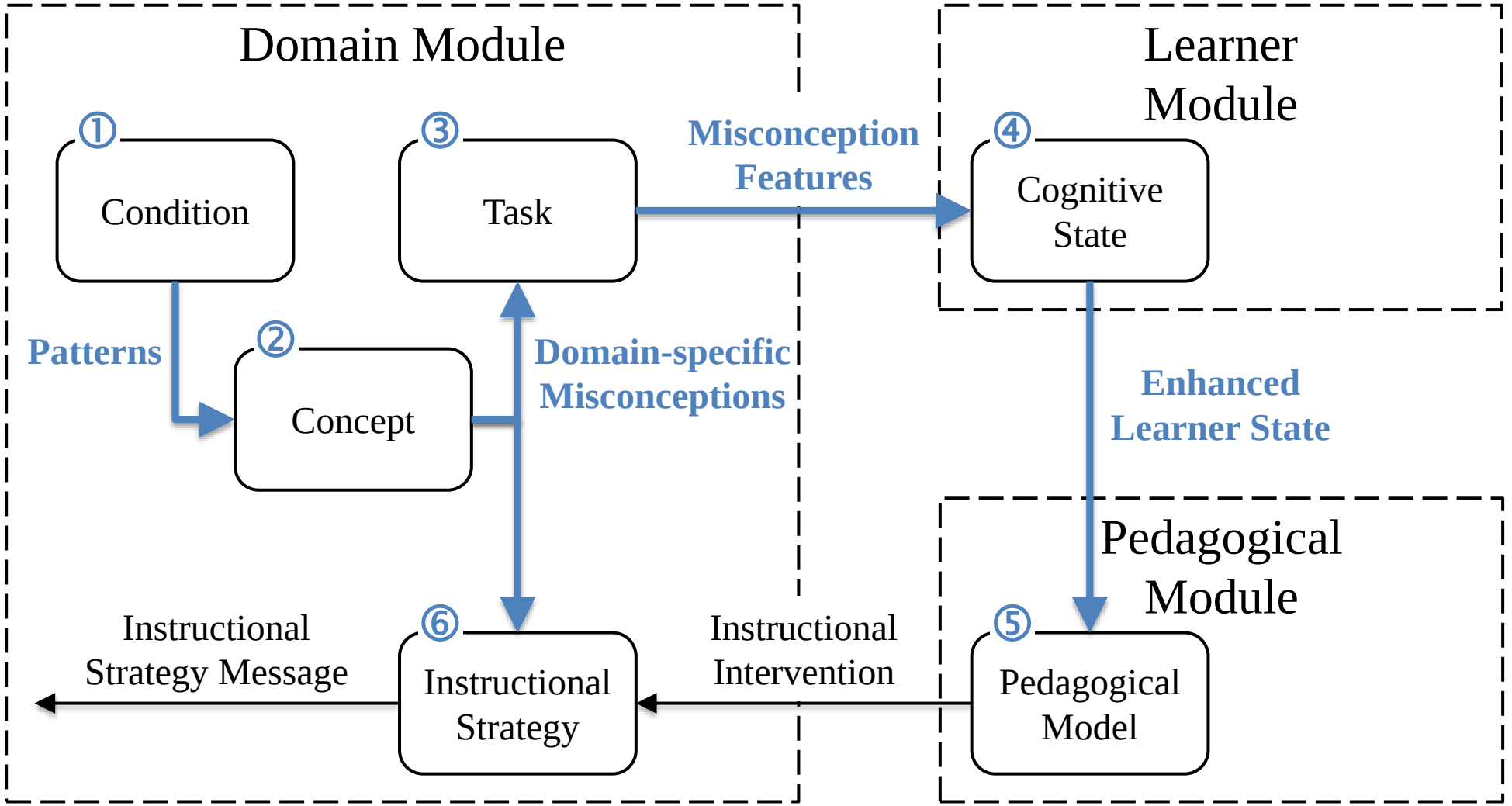
Tailoring Mid-lesson Feedback

- Specific performance correction – Confront misconception – General rule
- Learning the content – Learning how to learn
- Intervention timing, withholding, number and selection
- Surface level of detail, vocabulary, word count, emphasis, graphic presentation

High-level Data Flow: GIFT SOA



High-level Data Flow: Additions



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Example

Conclusions

Technical Path Forward and Future Work

- Define GIFT behavior patterns for APACTS scenarios
- Human-participants study
  - Usability and technology acceptance
  - Efficacy of new, mid-lesson, tailored feedback
- Extend to VBS scenario – generality of the approach
- Define how to add behavior patterns in GIFT authoring

- Machine learning of patterns such as response times
  - Population-specific norming and feedback
  - Measuring automaticity and differentiating cognitive pathways
- Incorporate GIFT research efforts e.g. active and constructive interventions

Questions?

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- Thanks and Acknowledgement

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