

Developing a Pattern Recognition Structure to Tailor Mid-lesson Feedback

5th GIFT Symposium
May 11, 2017

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This material is based upon work supported by the Human Research & Engineering Directorate - Advanced Training and Simulation Division (HRED -ATSD) and the Army Contracting Command (ACC) -Aberdeen Proving Ground (APG) - Research Triangle Park Division (ACC-APG-RTP), Orlando Branch under Contract No. W911NF-16-C-0063. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the ATSD.



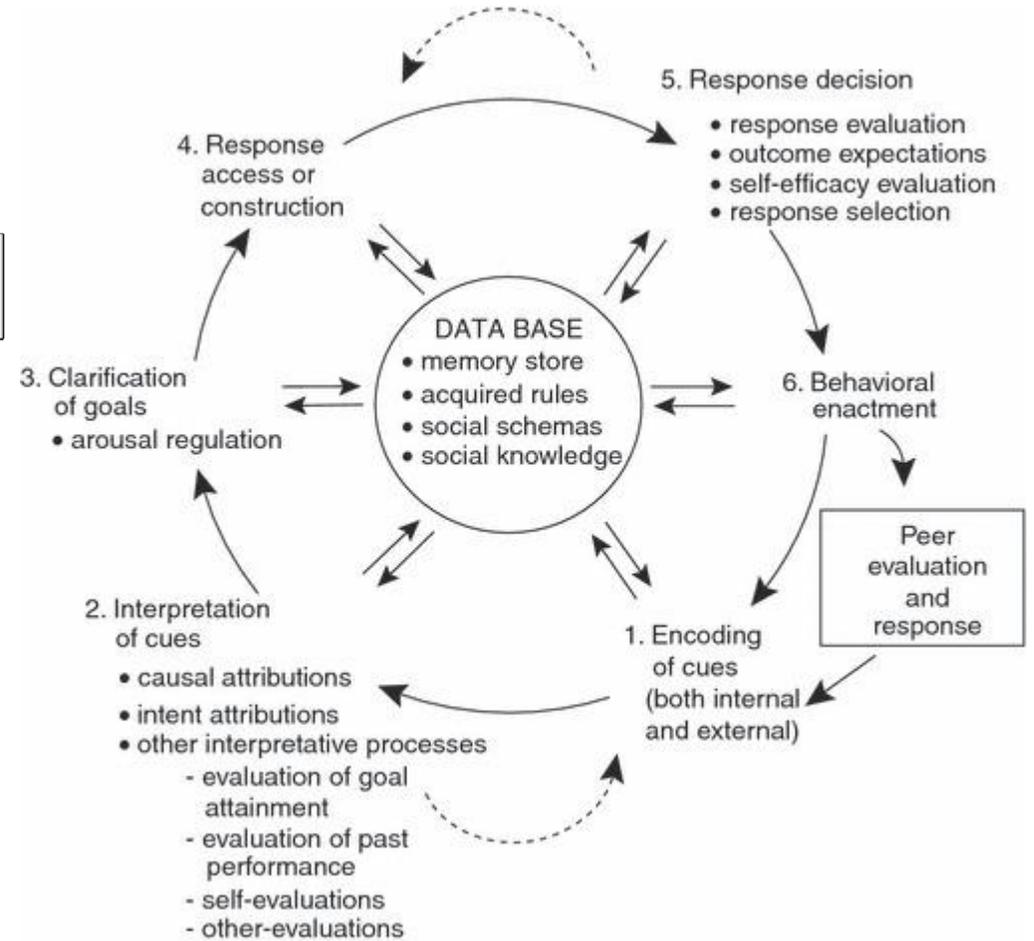
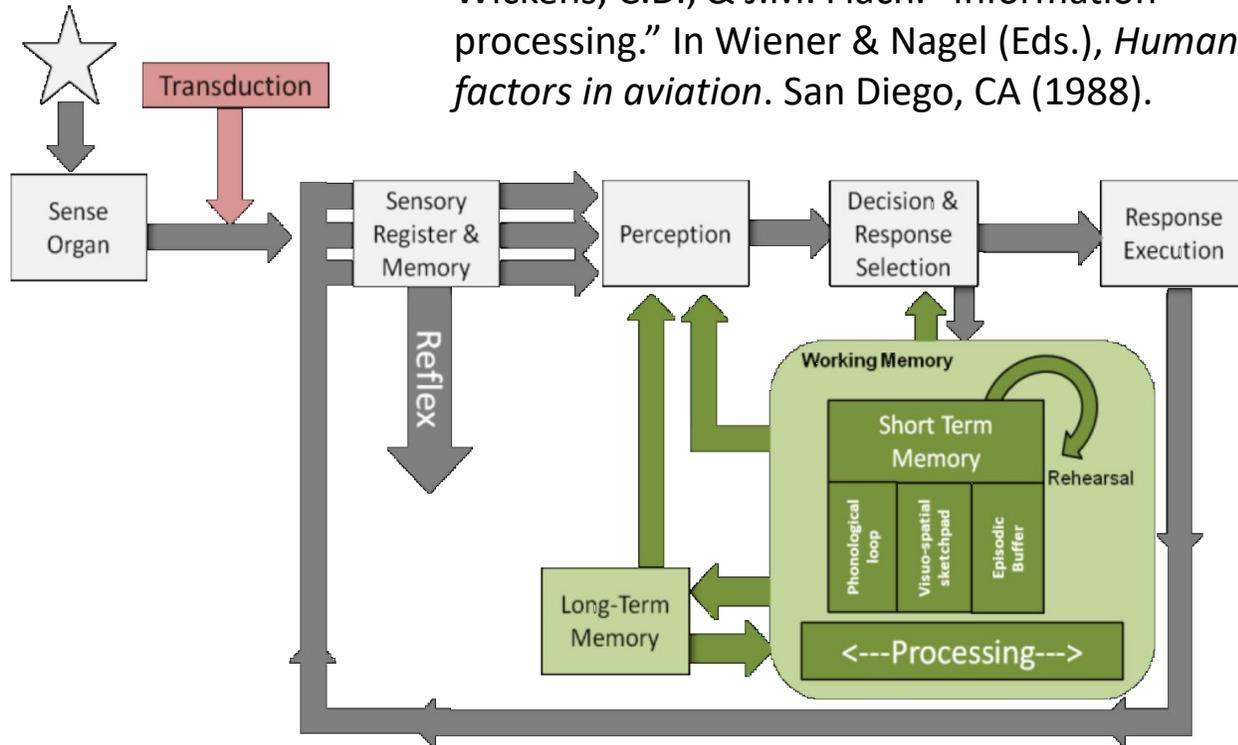
SOARTECH

Modeling human reasoning.
Enhancing human performance.

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

APACTS ▾

Illegal Weapon



◀

▶

nd a pistol series.

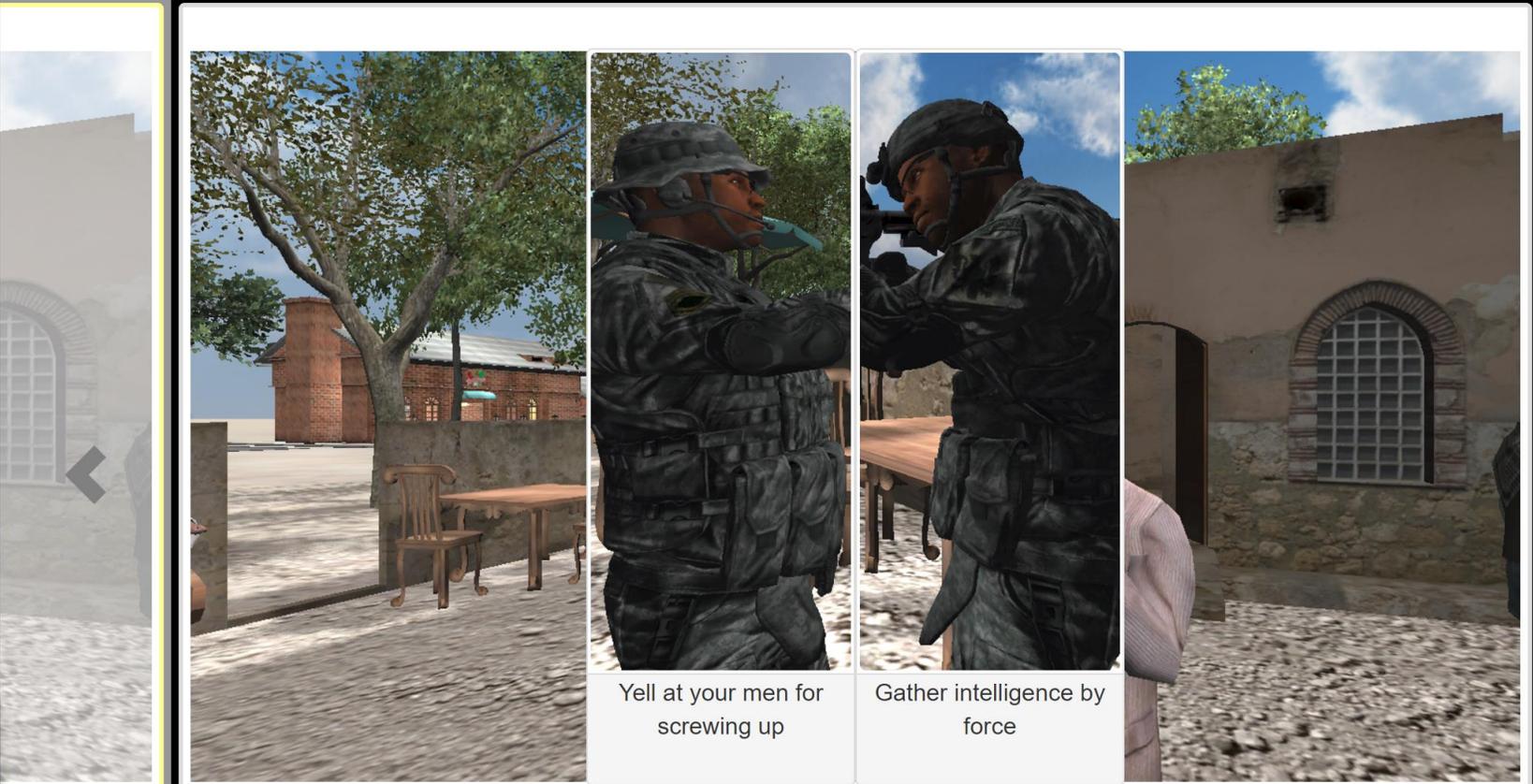
Mark everything in this image that you would investigate (by left-clicking items and selecting the menu choice).

How would y

Initial Testbed: APACTS

APACTS ▾

Cafe Conundrum: Routine Visit 1



The screenshot displays a mission scene from the APACTS testbed. On the left, a vertical navigation bar shows a greyed-out thumbnail of the scene with a left-pointing arrow. The main area contains three panels: a large background image of an outdoor cafe area with a tree and a brick building; a smaller inset image of a soldier in tactical gear shouting; and another smaller inset image of a soldier aiming a rifle. Below the soldier images are two text boxes: 'Yell at your men for screwing up' and 'Gather intelligence by force'. On the right, a grey vertical bar shows a thumbnail of a building with an arched window.

Yell at your men for screwing up

Gather intelligence by force

APACTS Feedback via AAR Only

APACTS ▾ Cafe Conundrum: Routine Visit 1

Feedback:

- ✓ You immediately assumed the perspective of your NCO.
- ✗ This course of action will make it difficult to build rapport with the locals.
- ✓ You recognized that it was appropriate to favor tactics over tact in this situation.
- ✓ You appraised the potential outcome based on your confidence in your team's judgment.

Yell at your men for screwing up

Gather intelligence by force

You decide t

Observable Behavior Patterns

Required, Optional, Forbidden

Add Flour

Add Water

Add Yeast

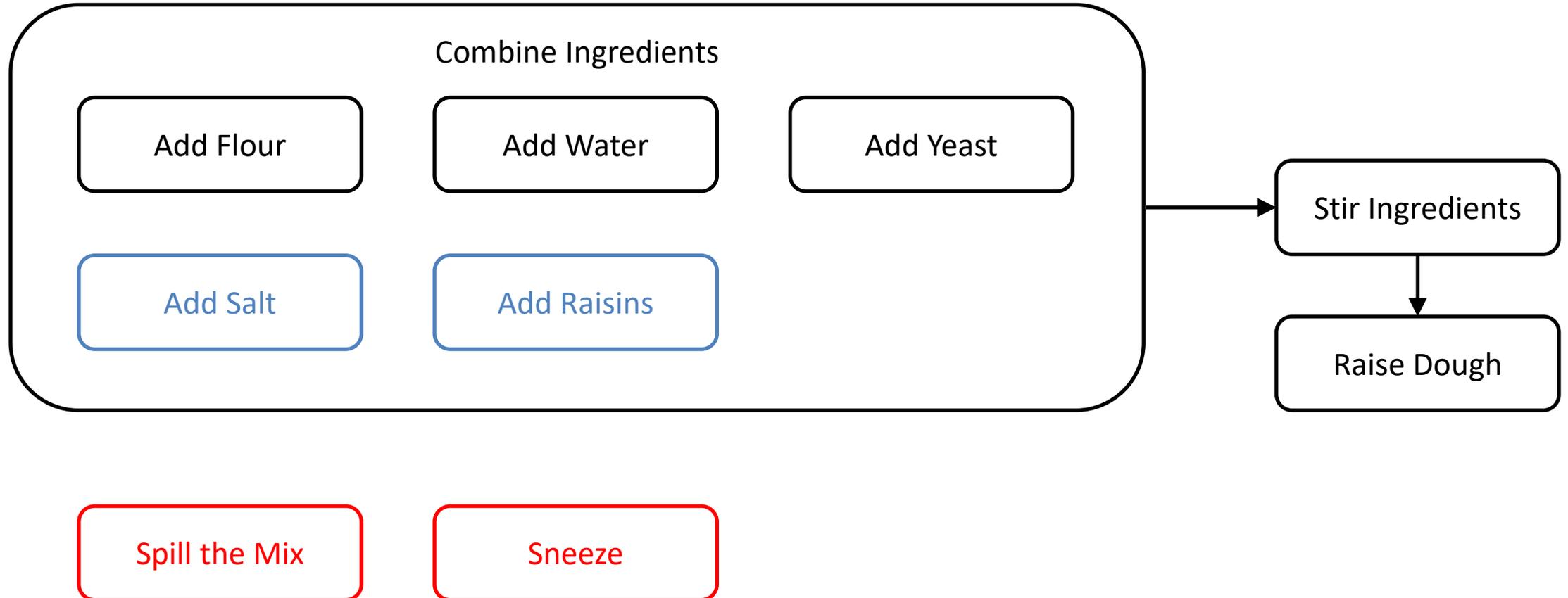
Add Salt

Add Raisins

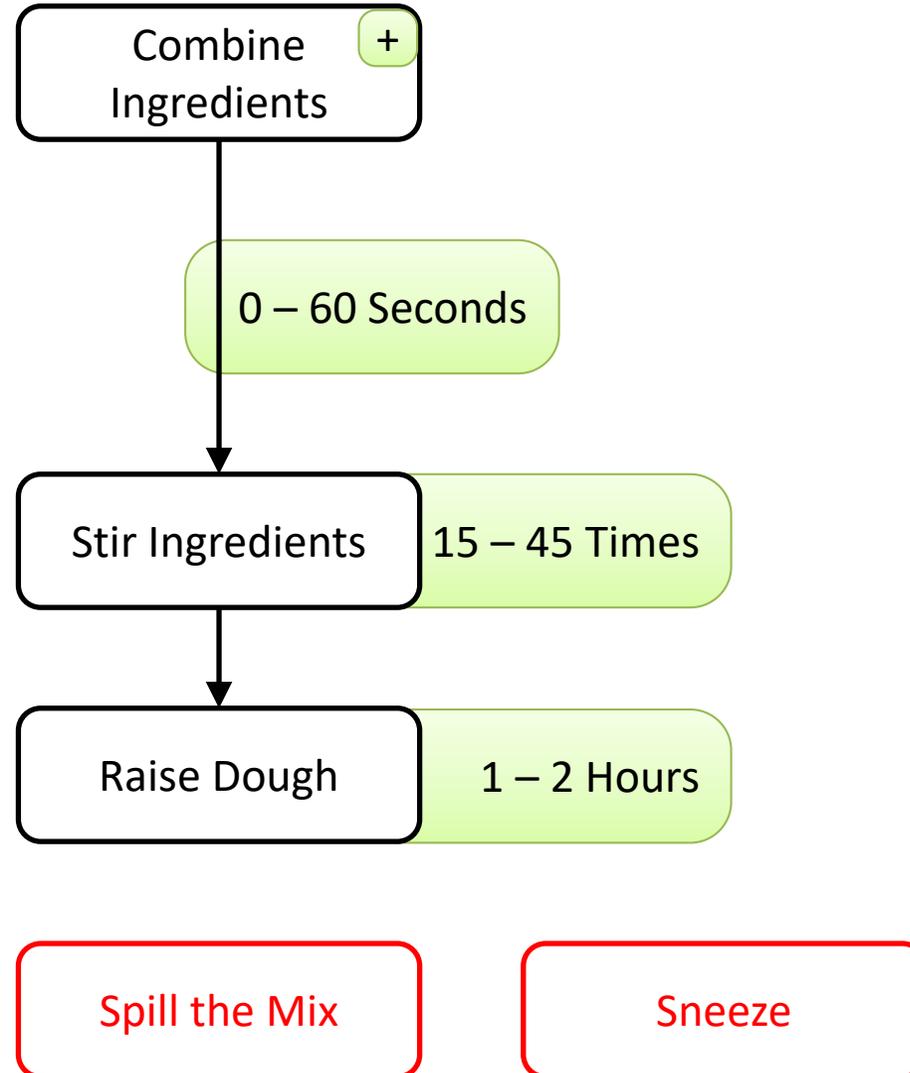
Spill the Mix

Sneeze

Clusters, Dependency, Ordering, Relevance

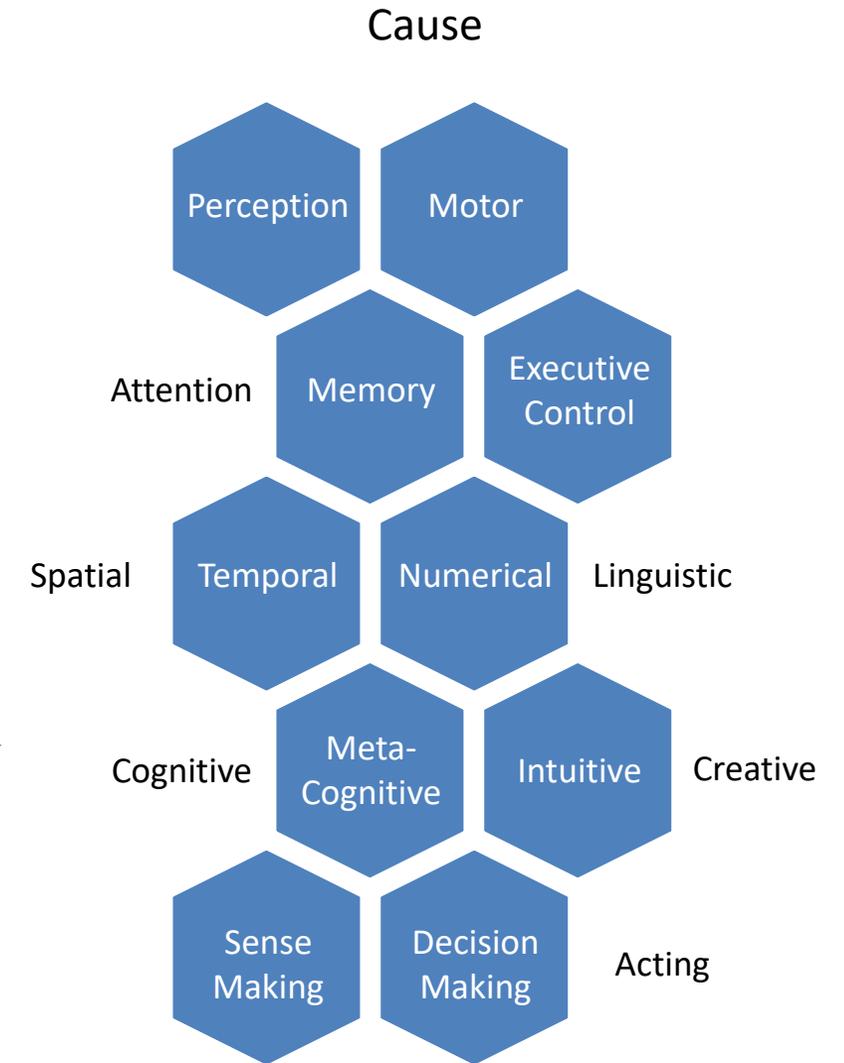
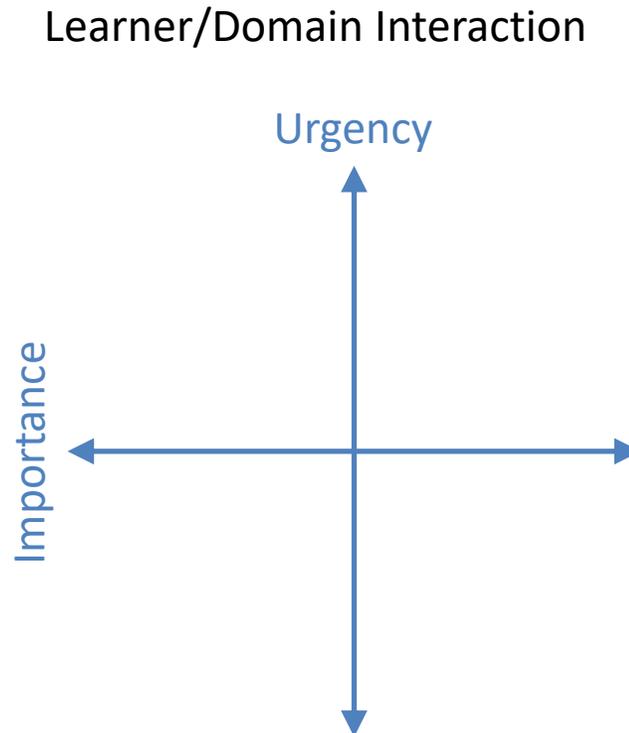
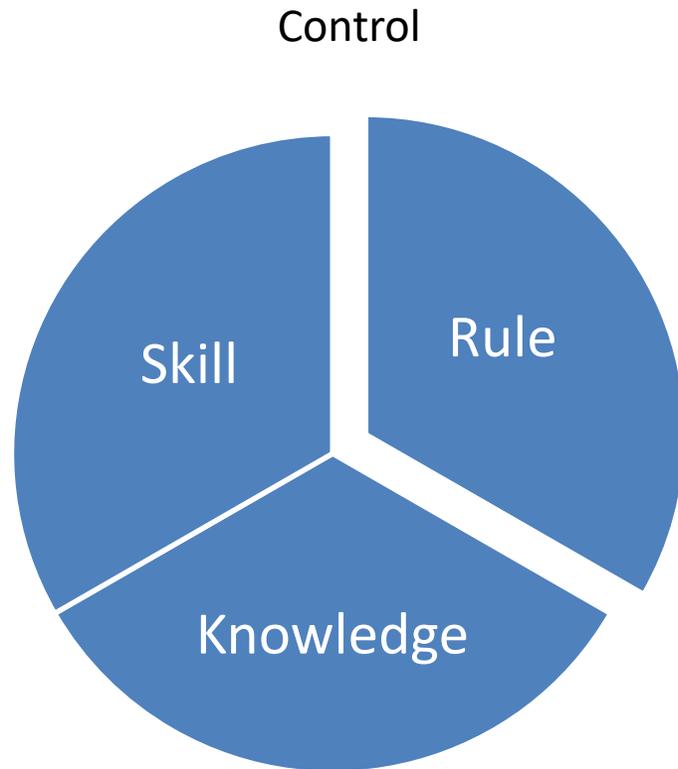


Pause, Repetition, Duration



Interpreting Patterns and Tailoring Feedback

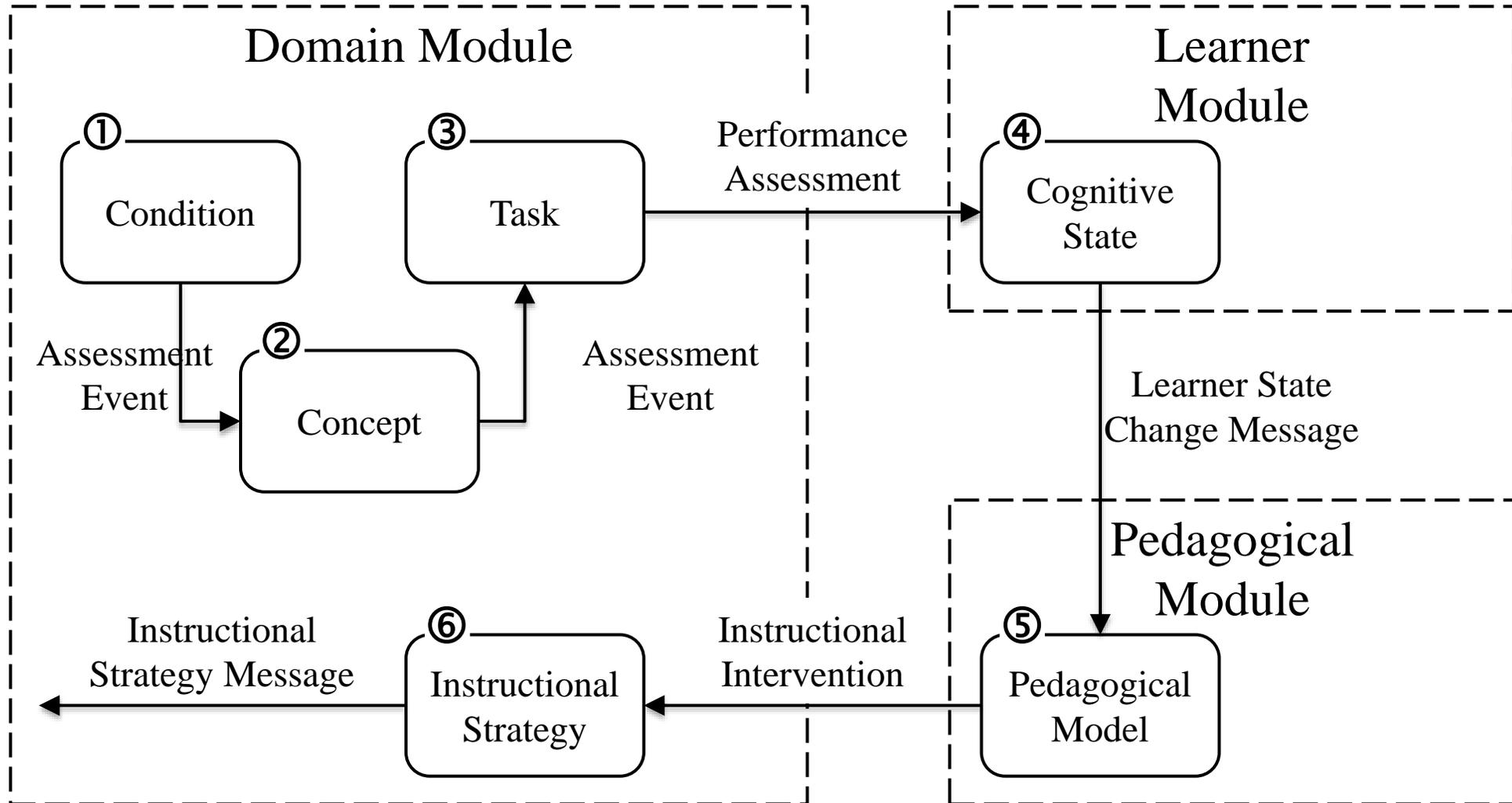
Domain-general Features of Misconceptions



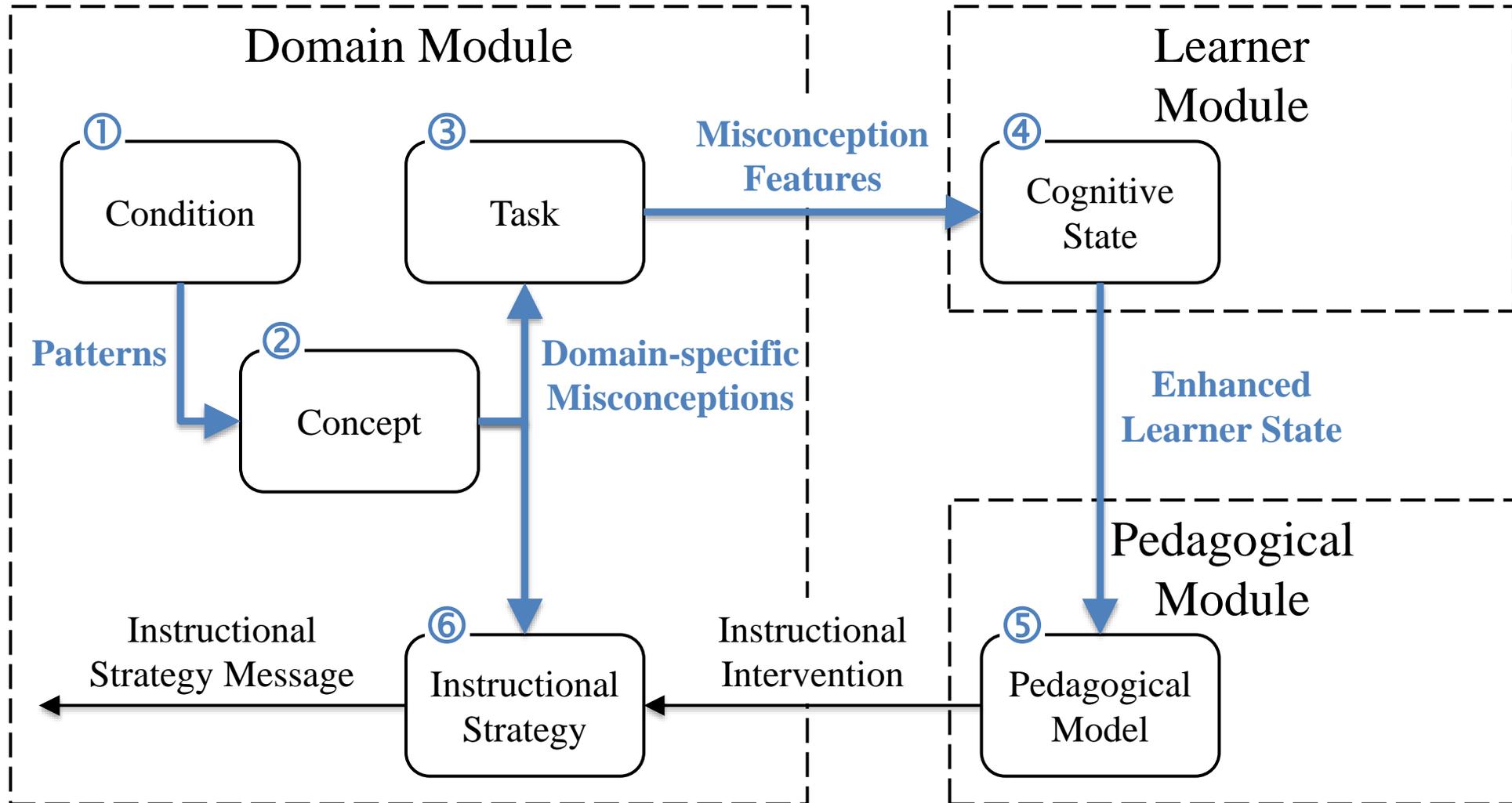
Tailoring Mid-lesson Feedback

- 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



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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