TOWARDS A TUTOR FOR GENERALIZATIONS FROM PATTERNS

Haggai Mark
Stanford University

Manolis Mavrikis
London Knowledge Lab

PSLC – Summer School - 2008

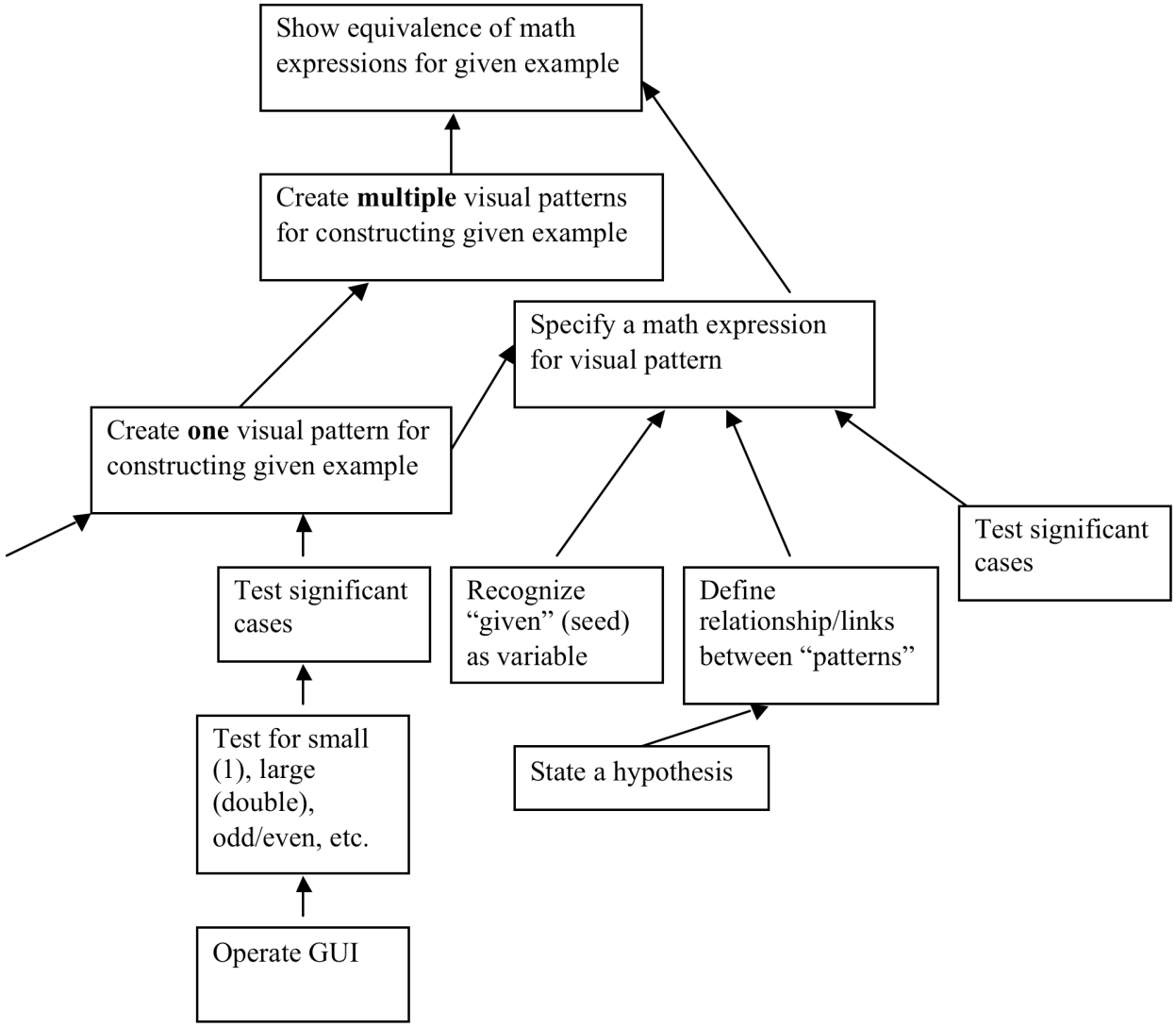
The context

- Guided exploration
- Math concepts like
  - Explore patterns
  - Identify dependent/independent variables
  - Construct algebraic expressions
- Need for intelligent support

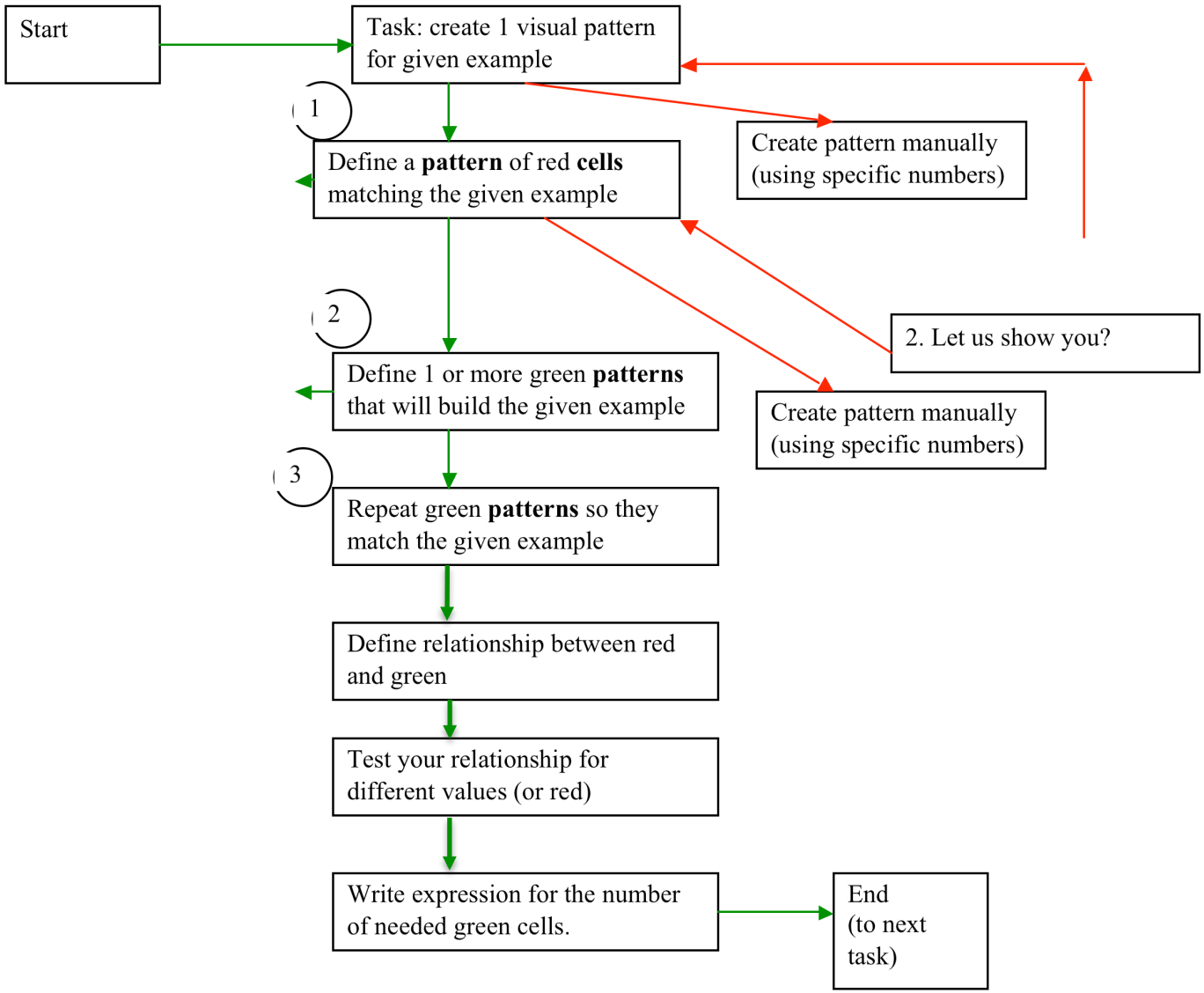
What we did

- Learning objective analysis
- Cognitive Task Analysis
- State transition diagrams
- CTAT – eXpresser integration
- Cognitive tutor (JESS)
  - flexibility
  - dealing with uncertainty in student behaviour

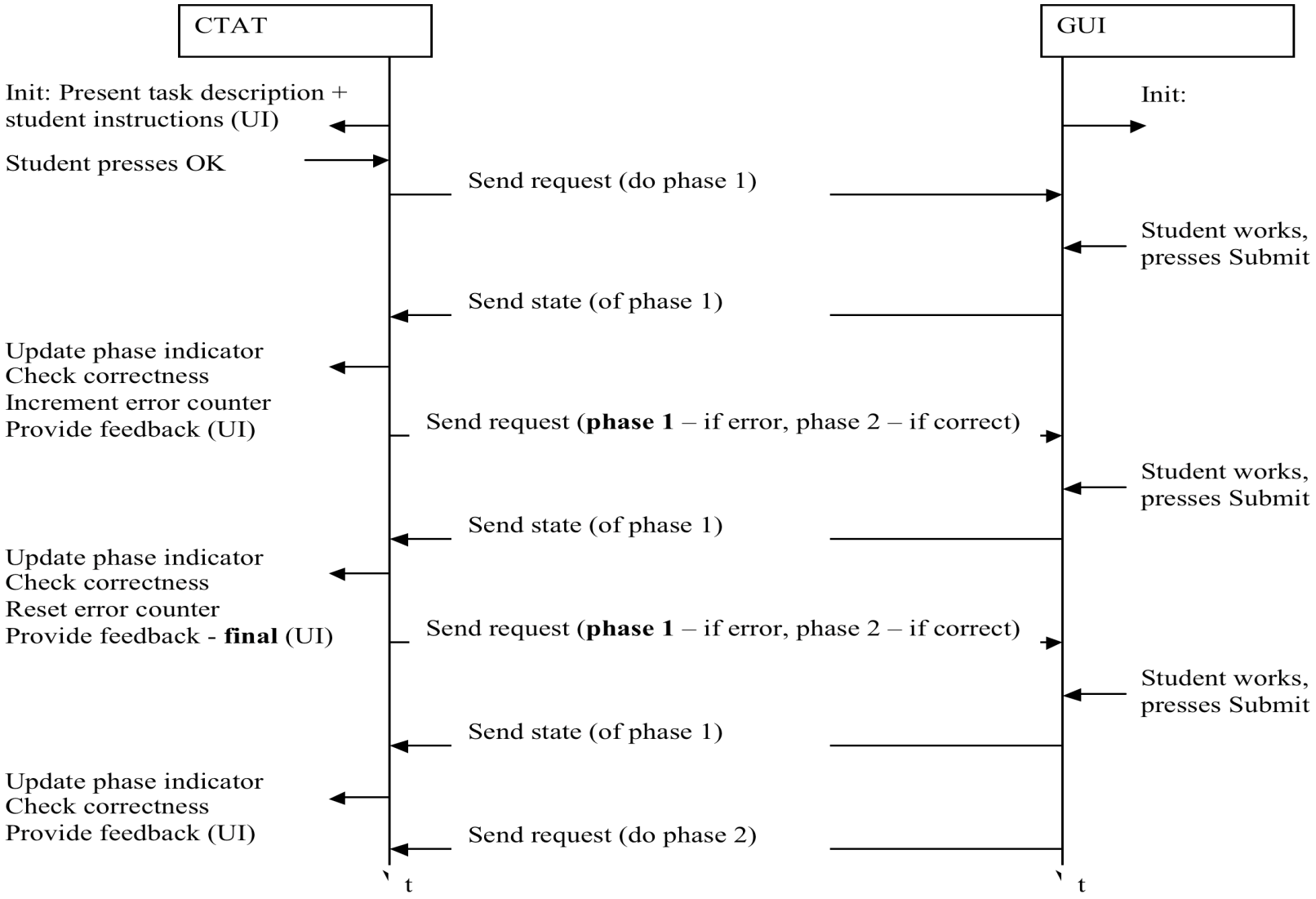
Learning Objectives Analysis



Cognitive Task Analysis



State Transition Diagram



KEY TAKE-AWAYS

- Time consuming ☺
- Good debugging and support tools
- Possible integration with other Java-based systems
- Powerful capabilities with JESS

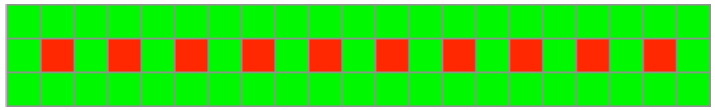
  (after you wrap your head around the syntax)

Student Interface

Student

Instructions:

Find a rule for calculating the number of green tiles for any chosen number of red ones.



Start

Messages

Done Help << >>

MiGen

Grid Size: 20

What would you like to do:

<choose one> <choose one> <choose one>

Add

Progress indicators

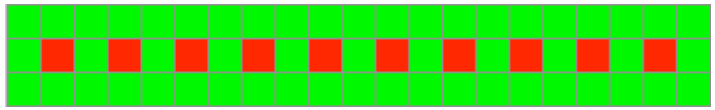
Final answer:

Student Interface

Student

Instructions:

Find a rule for calculating the number of green tiles for any chosen number of red ones.



Start

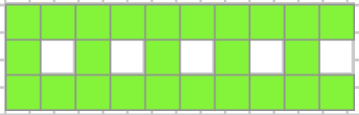
Messages

First you need to draw a pattern; then you can test its boundary conditions.

Done Help << >>

MiGen

Grid Size: 20



What would you like to do:

Draw the boundary condition of the green cells
Draw the pattern of the red cells

Draw the | pattern of | the red cells

Add

Progress indicators

correctGreen

Final answer:

Future work

- Add self-explanation and reflection
- Support collaboration with other students
- Improve efficiency of JESS code
- Integrate with TuTalk & NLP
- Move more of the knowledge representation from eXpresser to JESS