

Evaluating a process model of emotion for virtual humans

Jonathan Gratch

USC Institute for Creative Technologies

Joint work with

Stacy Marsella

USC Information Sciences Institute

Motivation (Why get emotional?)

- Functional argument
- Realism argument
 - Important to understand/portray human behavior
 - Social interaction (natural language, non-verbal)
 - Perception
 - Decision making

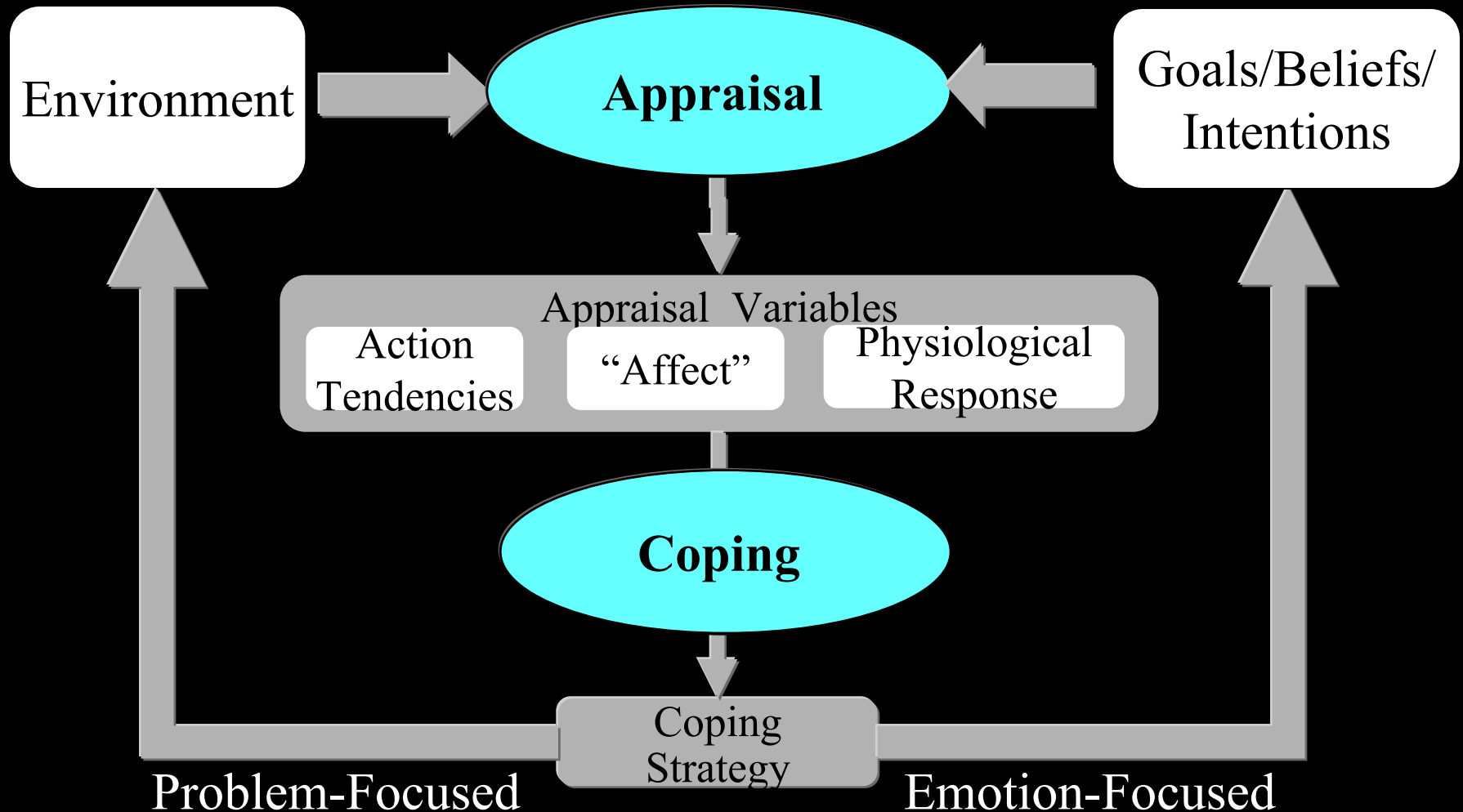


Theoretical Perspective: Appraisal Theory

- Dominant paradigm in emotion psychology
 - Arnold, Lazarus, Frijda, Scherer, OCC
- Emphasizes role of cognition
- Emphasizes emotion as dynamic process
 - Immediate responses
 - Effects that unfold over time

Theoretical Perspective: Appraisal Theory

Smith and Lazarus91' cognitive-motivational-emotive system



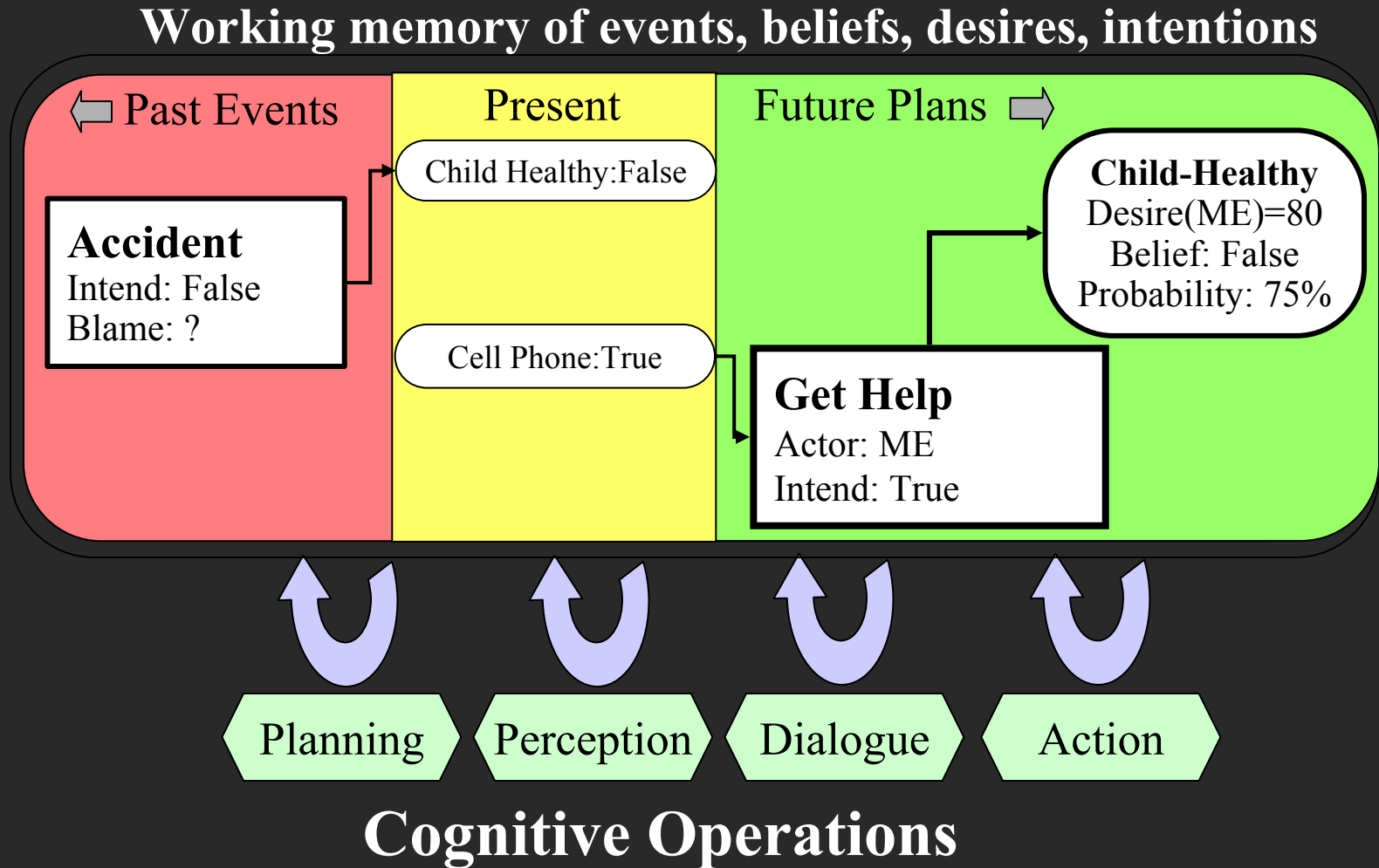
Towards a computation model

- Supported by data but only provides high-level requirements
- Have to map into an architecture
 - How do we get beyond “cognition”
 - What specific mechanisms are involved?
 - What representational primitives are necessary?
 - How do these interactions interact/unfold over time?
- How do we measure success?
 - Rarely measured
 - Never measure dynamics

EMA Model of Appraisal and Coping

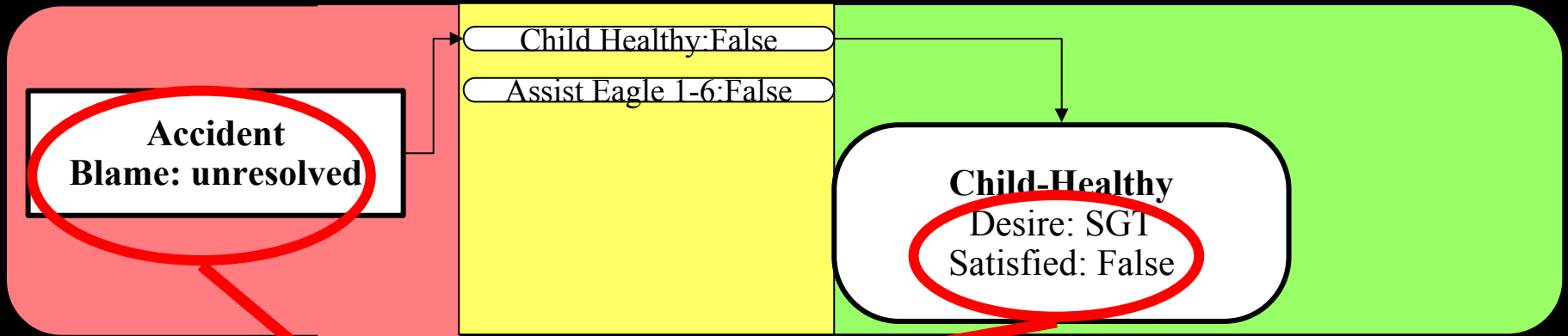
Reinterpret Appraisal theory from “agent perspective”

Steve-Soar



EMA Model of Appraisal and Coping

- Appraisal as plan-evaluation
 - Fast, reactive, parallel
 - Triggered by features in working memory
- Coping as generalize plan revision
 - Slower, Sequential
 - Alters features of working memory
 - Problem-focused → execute step, add plan step
 - Emotion-focused
 - Denial → Change belief
 - Distancing → Drop goal / intention
 - Shift blame → Change causal attribution
 - Dialogue moves



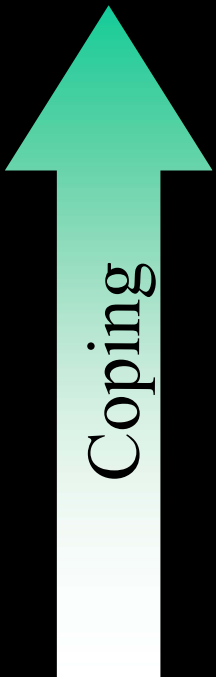
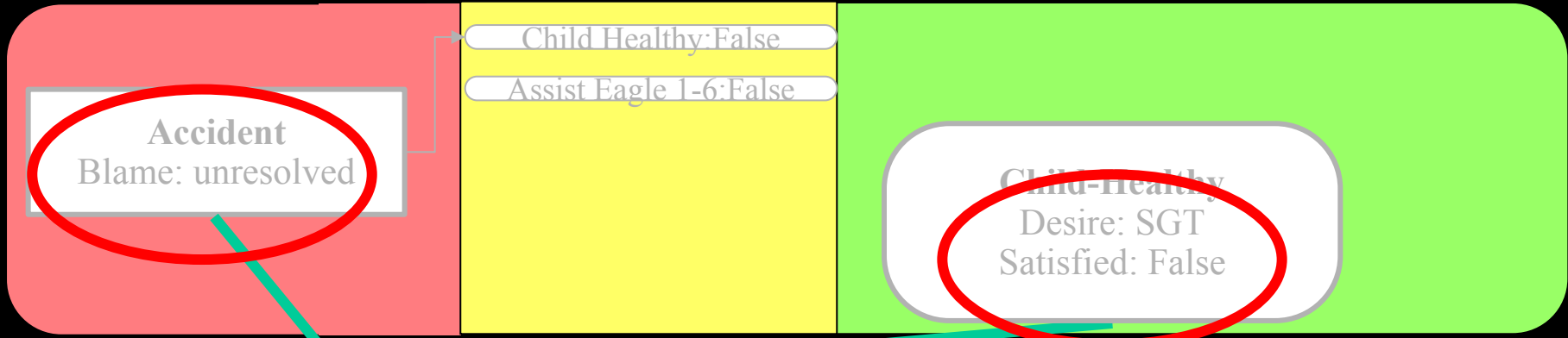
Appraisal

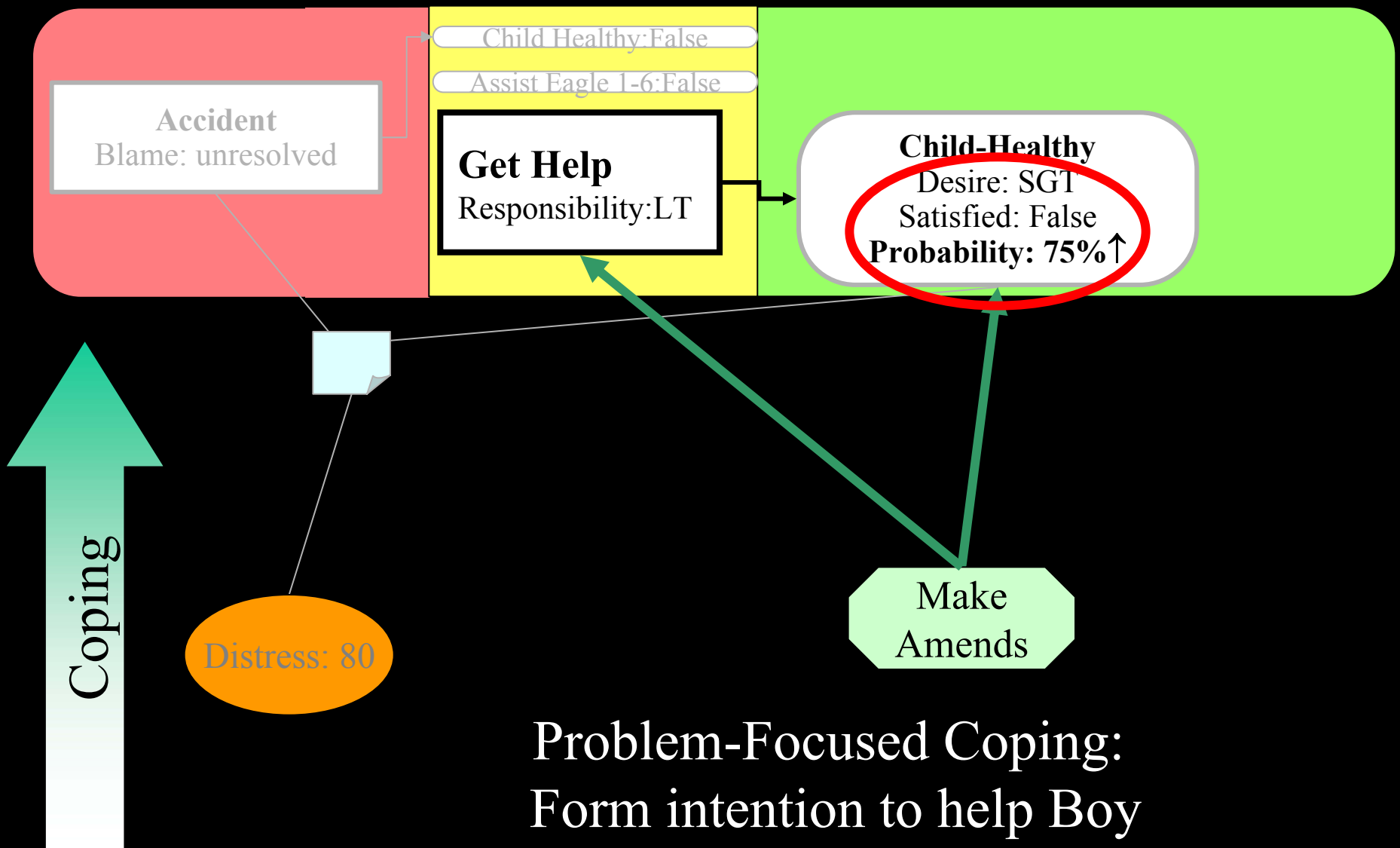
Perspective: Self (Sgt)
Desirability: -80
Likelihood: 100%
Blame/Credit: unresolved

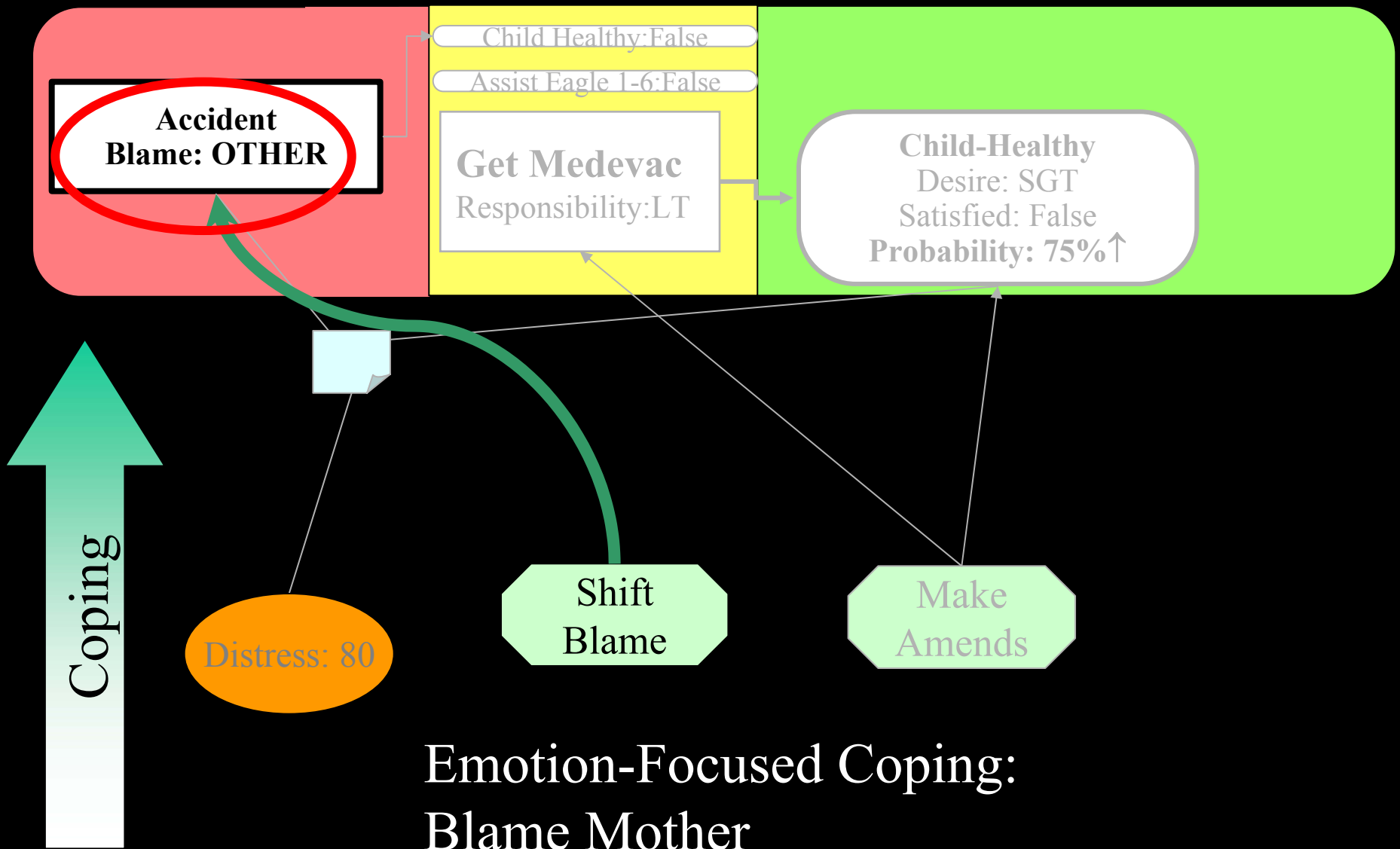
Distress: 80



Sgt's Appraisal of Accident from his perspective







Evaluation

- Given some situation, model should generate
 - Right emotion but also
 - Right appraisals
 - Right coping strategies
 - Right dynamics
 - How these change as a situation evolves
- Need a corpus of dynamic emotional situations
- Need data on how people interpret these situations

Evaluate EMA with Clinical Instrument

- Check if model generates “normal” emotional responses
 - Stress and Coping Process Questionnaire
Perrez, M., & Reicherts, M. (1992)
 - Used to identify clinically depressed patients
- Presented people various evolving situations
 - At intervals, elicited self-reports of
 - Emotional state
 - Appraisals
 - Coping tendencies
 - Identifies “normal” emotional trajectories

Dynamic Emotional Scenarios

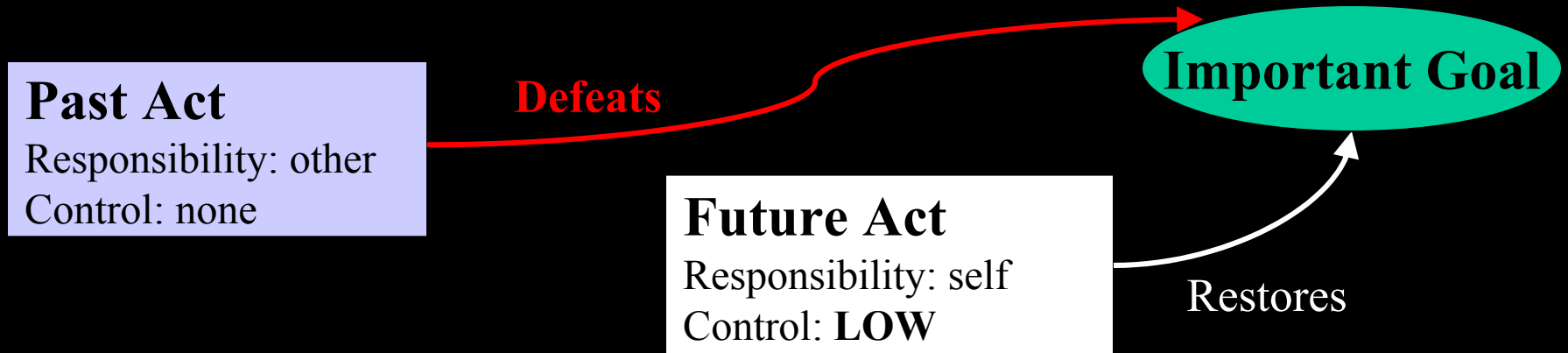
- Two prototypical scenarios
 - Aversive scenario
 - Goal was thwarted, some potential to reverse
 - Situation relatively controllable, changeable
 - Loss scenario
 - Potential threat to goal is looming
 - Less controllable, changeable
- Evolve over three discrete phases
 - Initial
 - Continuation
 - Good or Bad outcome
- Ask subject to self report aspects of their emotions



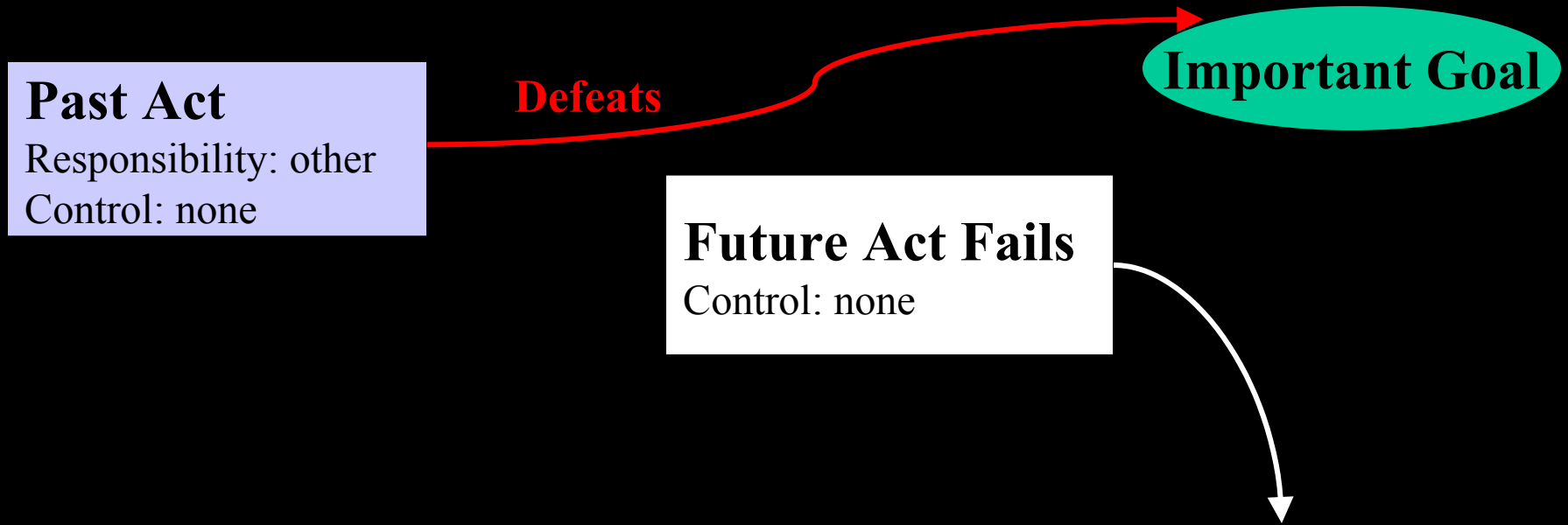
- E.g: aversive situation
 - Goal was thwarted, some potential to reverse
 - Situation relatively controllable, changeable



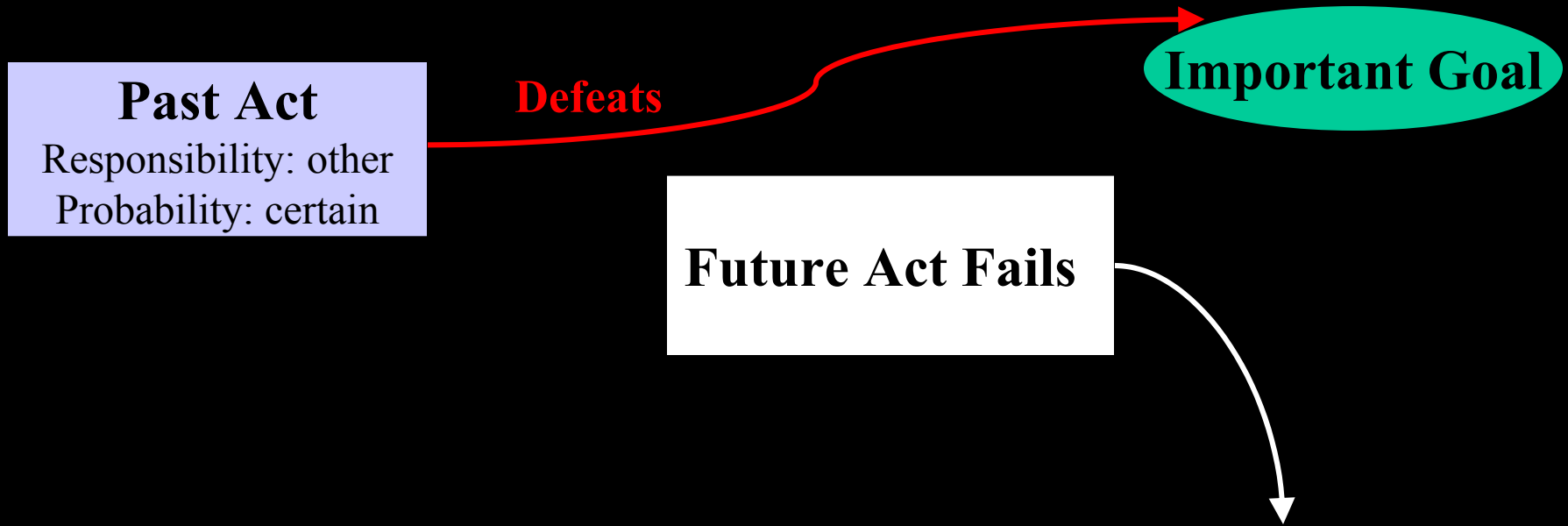
- Evolve scenario over phases: **initial**



- Evolve scenario over phases: continuation



- Evolve scenario over phases: outcome



- Translate, via a grammar, into text
 - **Onset:** You forgot to do something important for your partner. They get very angry and blame you
 - **Continuation:** After a while, their attitude hasn't changed
 - **Outcome:** They leave in an angry state.

Data Elicitation

- After each phase of each scenario, ask:

- I feel: (EMOTION)

- Angry/furious 0 1 2 3 4 5 gentle/peaceful
- Depressed/sad 0 1 2 3 4 5 cheerful/serene
- ...

- My judgments are: (APPRAISAL VARIABLES)

- The chances of improving are: 0 1 2 3 4 5
- The chances I can influence it are: 0 1 2 3 4 5
- ...

- My intentions are (COPING STRATEGY)

- To confront the other 0 1 2 3 4 5
- To remain calm 0 1 2 3 4 5
- ...

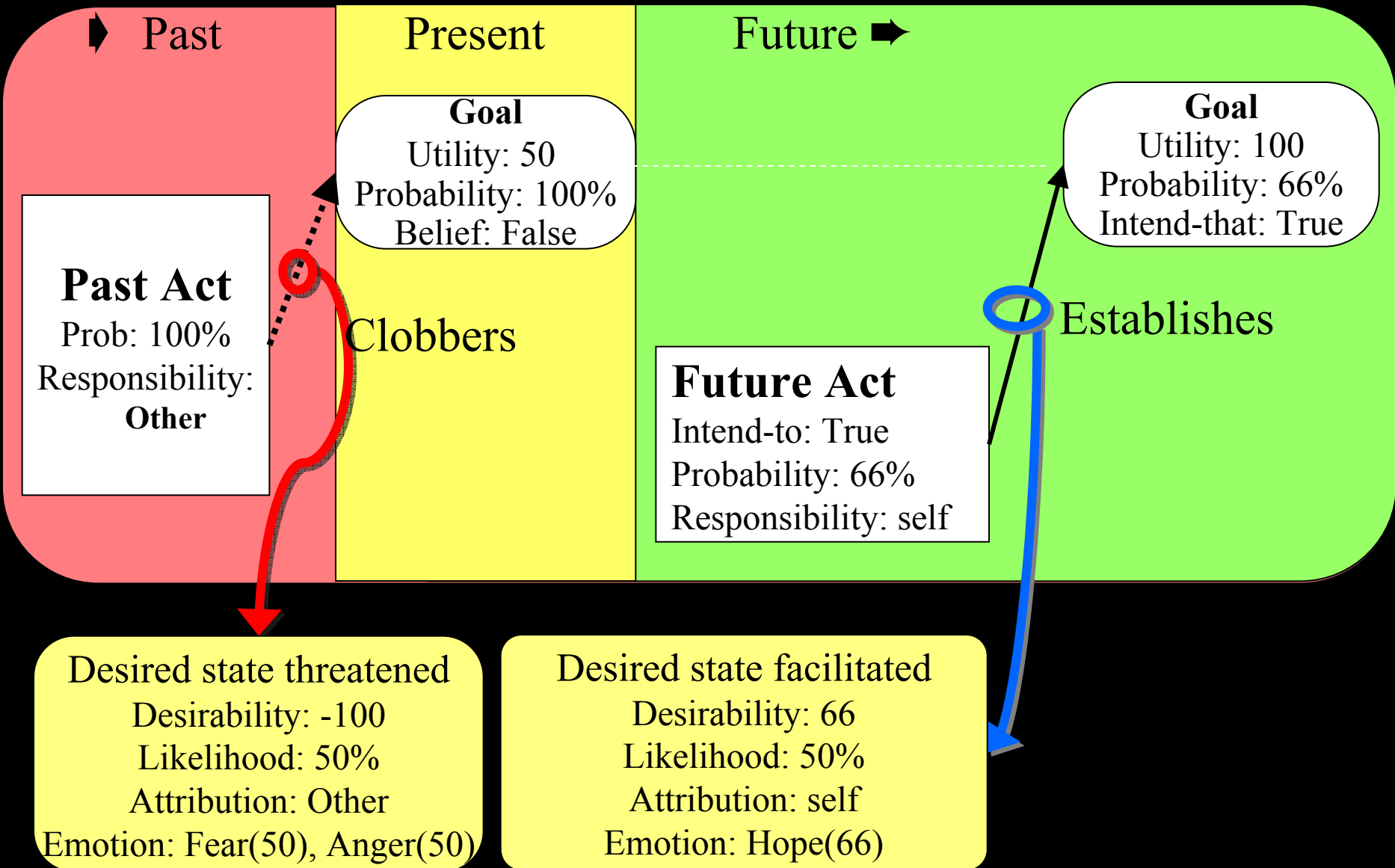
“Healthy” trends

- 1.1 “Aversive” situation → more appraised control
- 1.2 Control diminishes across phases
- 1.3 Negative valence increases across phases
- 1.3 Strong difference in valence on negative vs. positive outcomes
- 2.1 Less appraised control → less problem-directed coping

Methodology

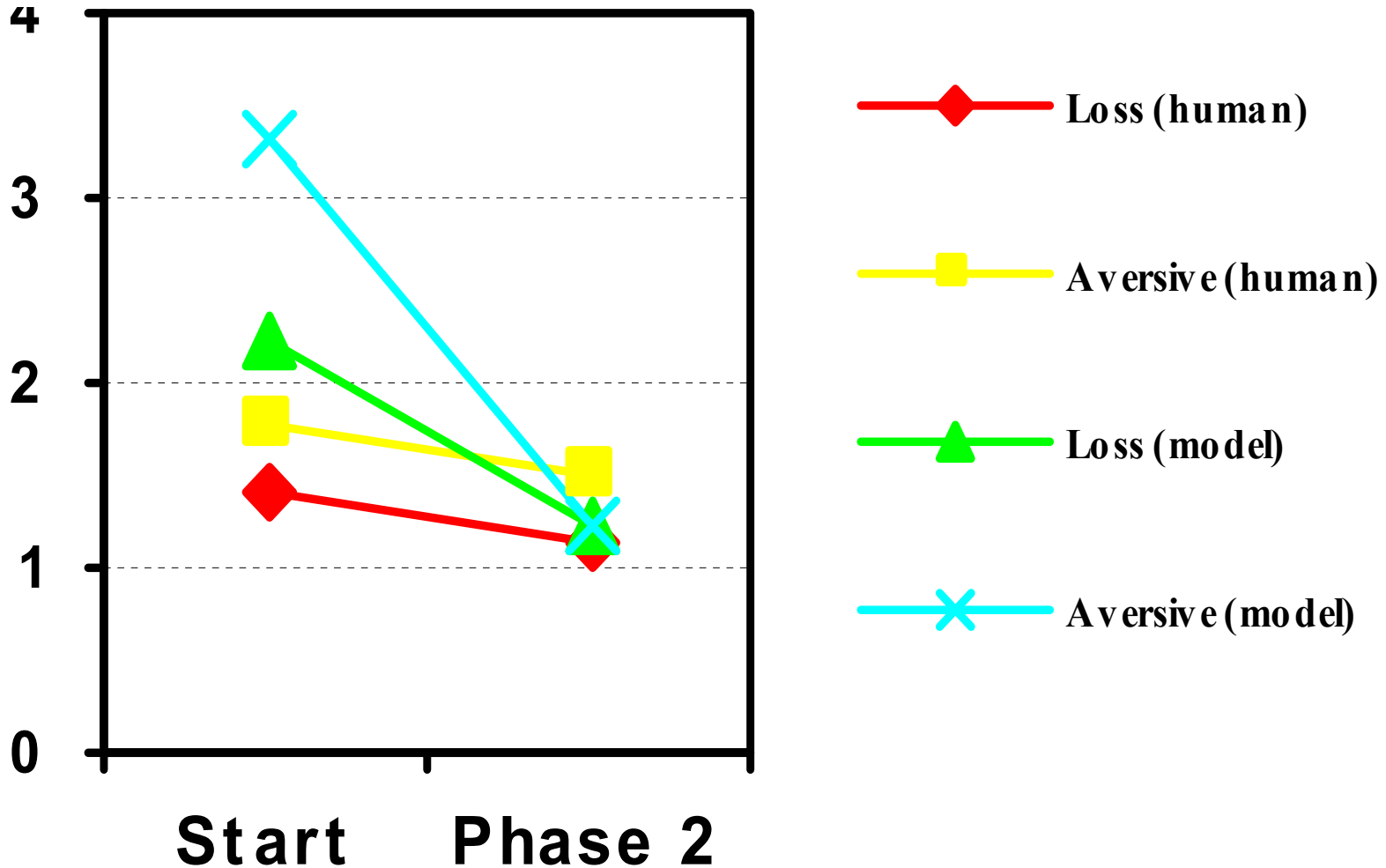
- Encode situations in our model
- Evolve the situation
- After each phase, “quiz” the model
- Compare fit to “healthy” tendencies

Aversive Condition



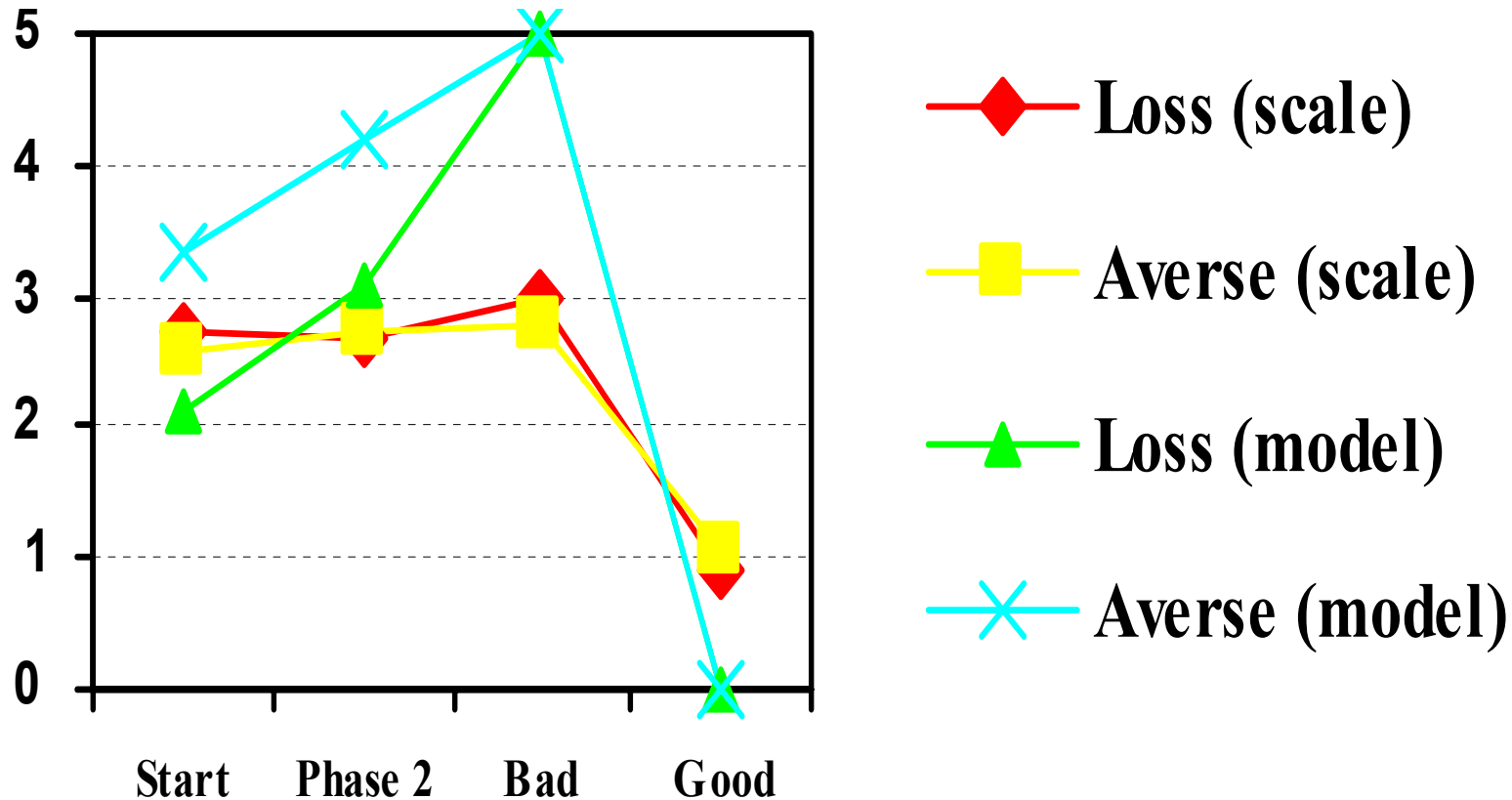
Perceived Changeability

- Trend: Decreases across phases



Perceived Negative Valence

- Trend: Negative Valence increases
- Trend: Large difference in good vs. bad outcome



Coping strategies

Problem Focused

Emotion Focused

Table 1	Aversive	Loss
Phase 1	<p>Seek information Take action</p>	<p>Suppress information Procrastinate Seek instrumental support</p>
Phase 2	<p>Mental disengagement Suppress information</p>	<p>Mental disengagement Suppress information Resignation Wishful thinking</p>
Good	<p>Accept responsibility</p>	
Bad	<p>Mental disengagement Suppress information</p>	<p>Mental disengagement Suppress information</p>

Results

- Trends largely supported
- Except:
 - OCC “distress” \neq “sadness”
 - Does not distinguish sense of control
 - Responsibility \neq blame
 - Need attribution theory (Mao & Gratch 04)

Issues

- Methodological issues
 - SCPQ collapses individual differences
 - Doesn't assess appraisal/coping interactions
 - Issues with validity of self reports
 - Fitting trends but not data
 - Subjective interpretation in domain model

Conclusion

- Models can be tested against data
- Important to test dynamics

