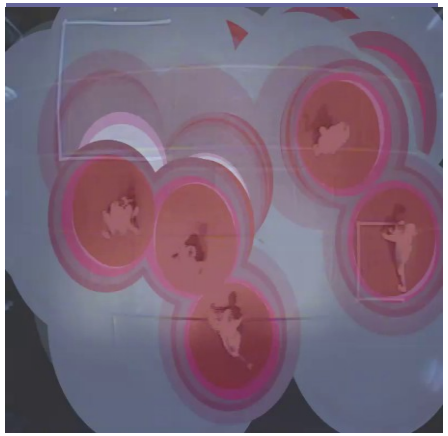
Simulation

Synthesis

Evaluation



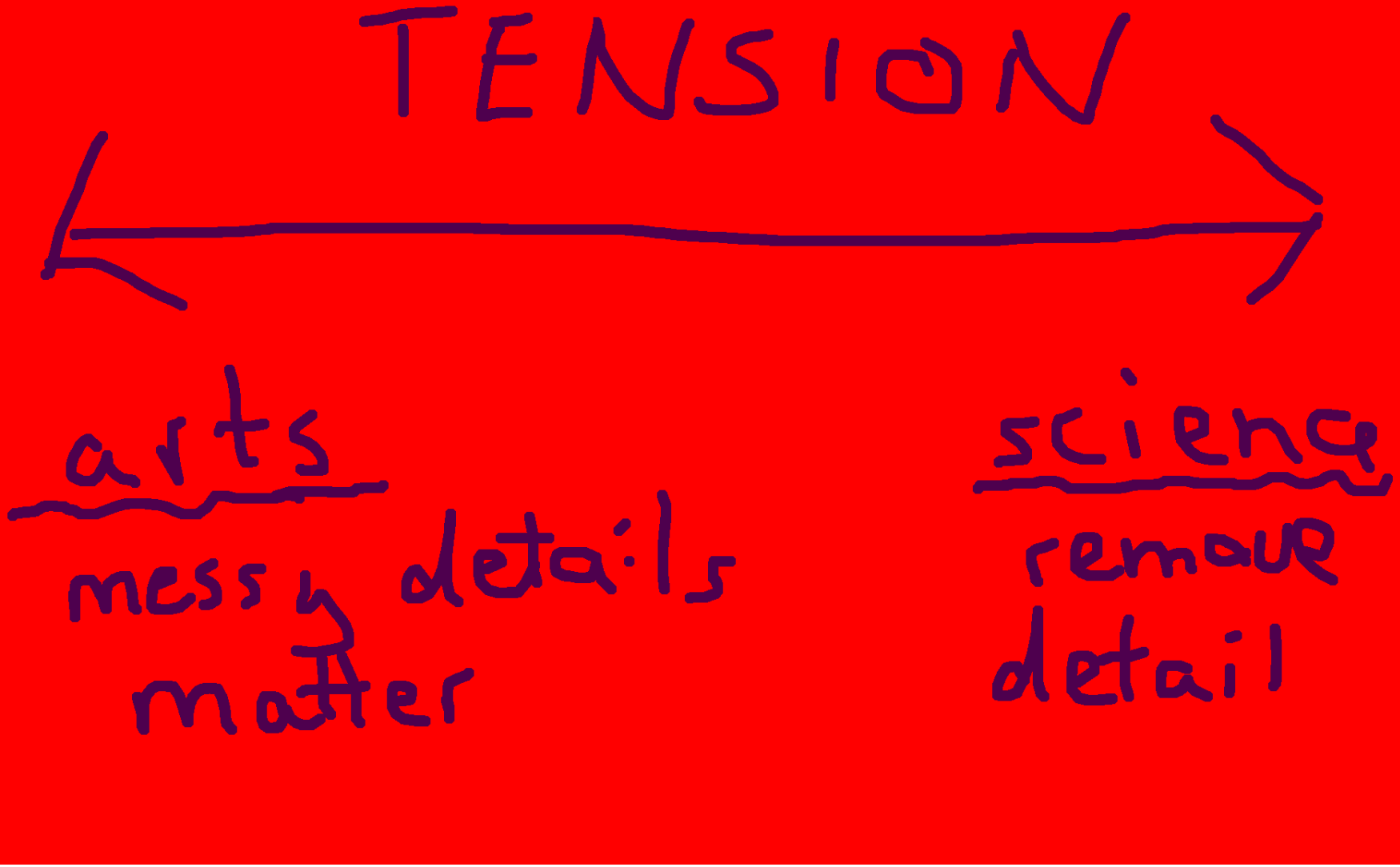
Augment

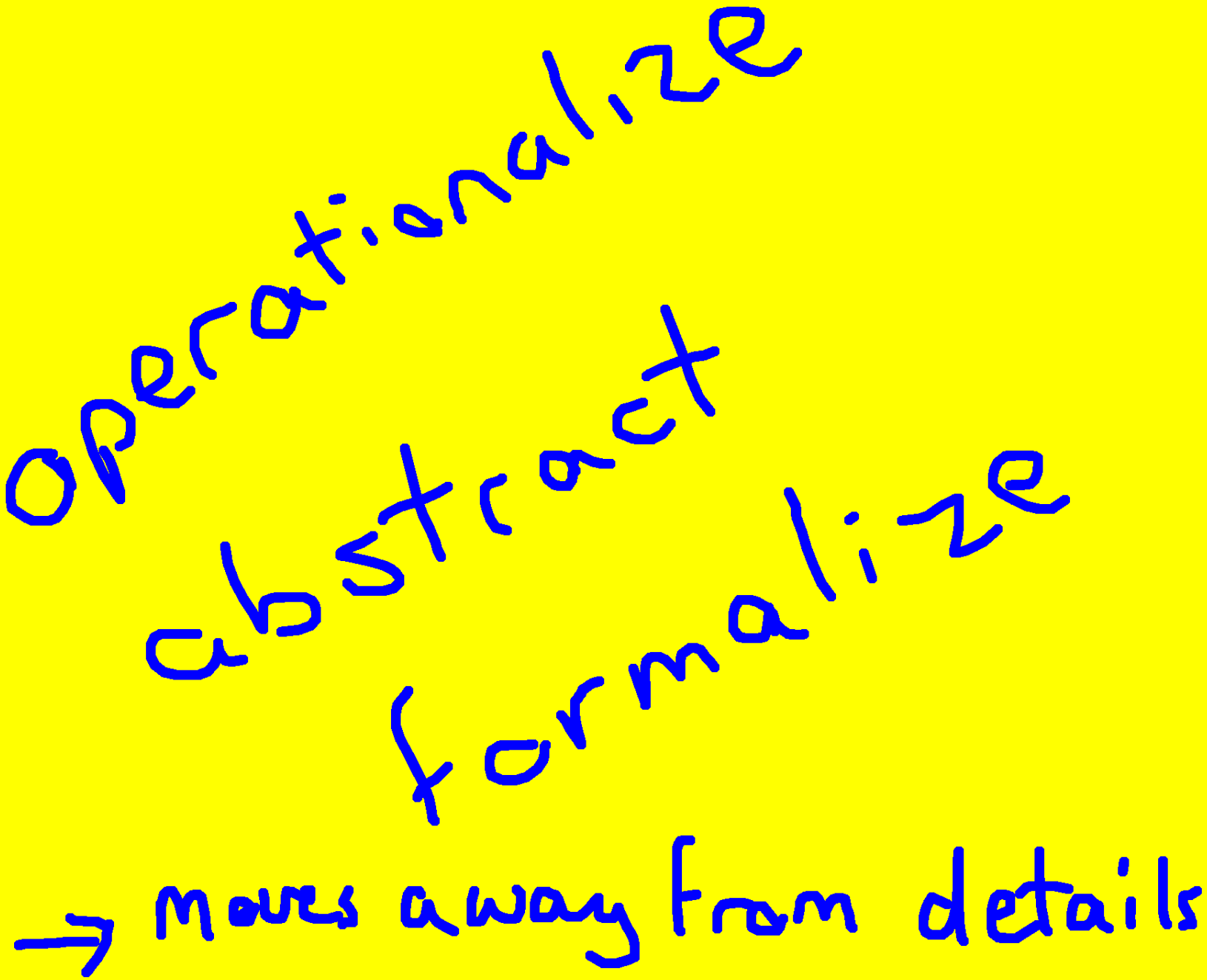
Enhance

Curious Dances:

Operationalizing aspects of creativity

Mary Lou Maher
Software and Information Systems
UNC Charlotte
August 2012


TENSION
arts
messy
matter
details
science
remove
detail


operationalize
abstract
formalize
→ moves away from details

Insights from Computational Creativity

- *Simulation*: computational models that simulate creative behavior
  - Computational interpretations of dance performances
  - Computational simulation of social creativity
- *Synthesis*: computational models that synthesize creative performances/products/artifacts/behavior
  - Curious characters learning creative behaviors
  - Co-evolutionary design
- *Evaluation*: computational models that recognize and evaluate creative outputs/products/artifacts
  - AI models of novelty, value, and surprise

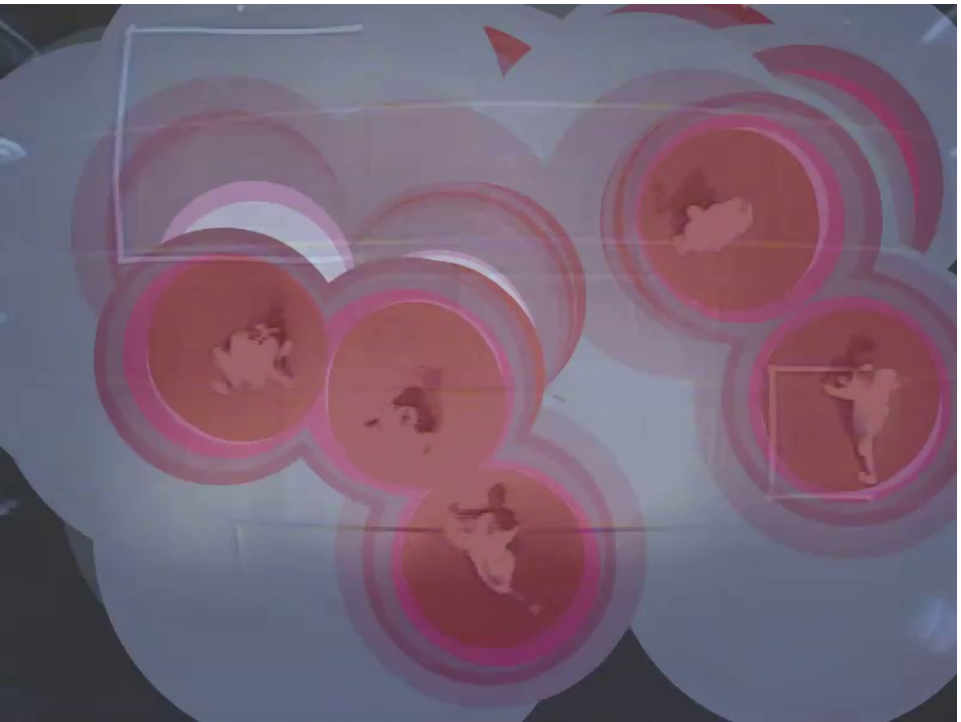
Insights from Interaction Design

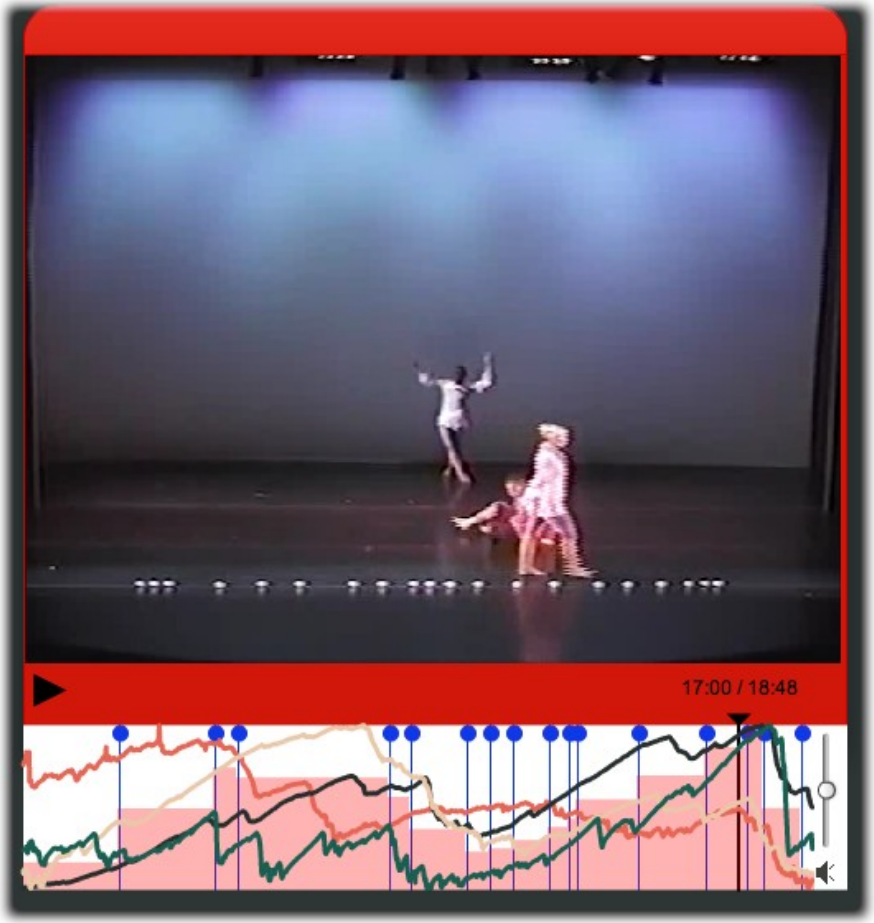
- **Augment** individual creativity: systems that affect cognition
  - perceptual interfaces that include large body movements or immersion in 2D or 3D spaces
  - intelligent feedback based on individual actions and performance
- **Enable** large scale creativity: systems that encourage large numbers of people to participate and interact
  - collective intelligence
  - crowdsourcing

+ Abstracting Dance

[Latulipe and Wilson]

Generating realtime visualizations by tracking dancers' positions and sounds using an overhead camera. Dancers responded to visualization as part of the performance.

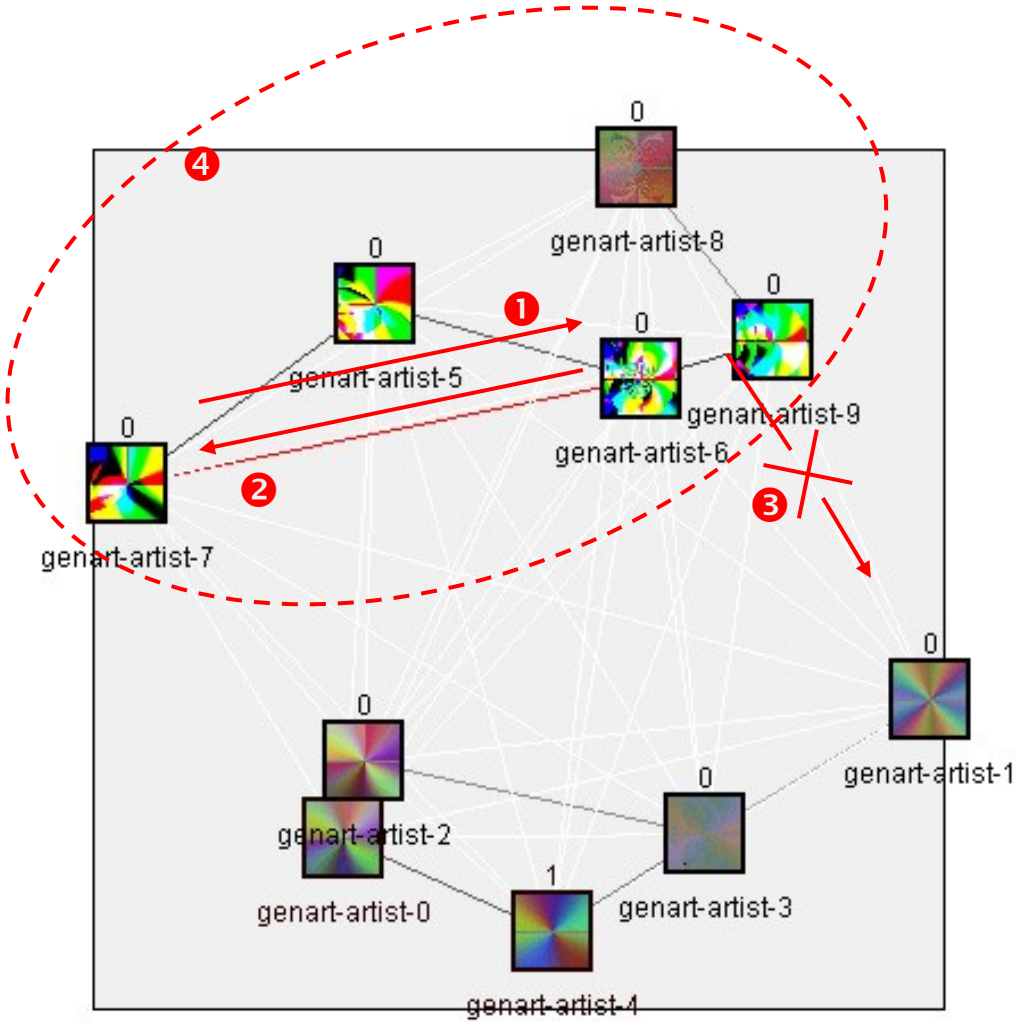




Audience engagement is tracked using galvanic skin response. Lines show individual and aggregate responses, as well as choreographer's chunks across time. Dancers are aware of this abstract view of the audience response and adjust their performance

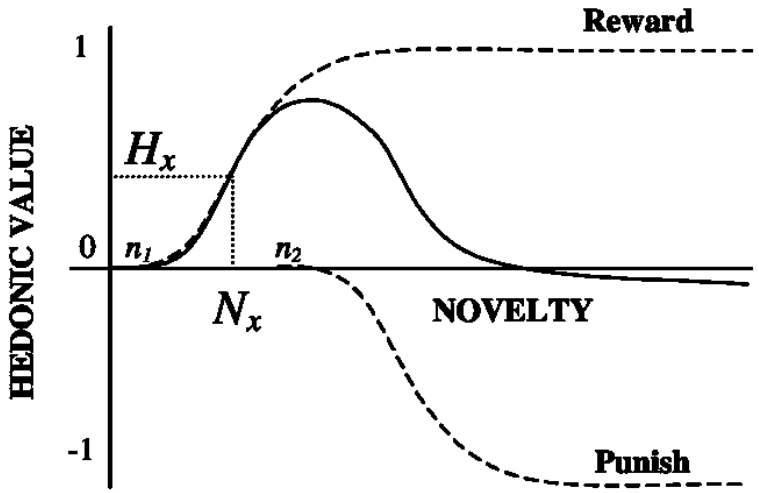
Simulations of Social Creativity

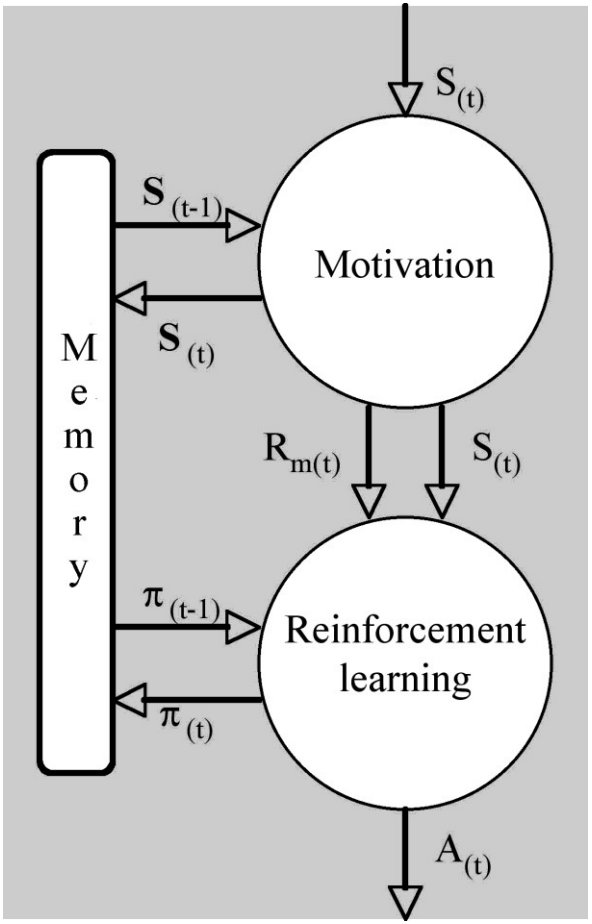
[Saunders and Gero]



- Design agents send own "artworks" they find interesting based on own experience to other agents.
- Other design agents find other's artwork interesting based on their own experience they send back expression of interest.
- Design agents have to innovate in ways that other design agents can appreciate.
- *Emergent Behavior:* Design agents that develop the same interests in the space of possibilities form "schools".

Models of Curiosity to Motivate Learning

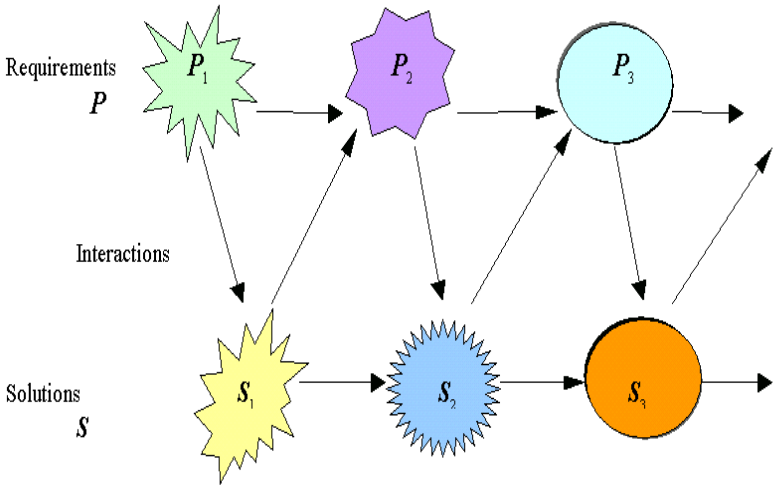


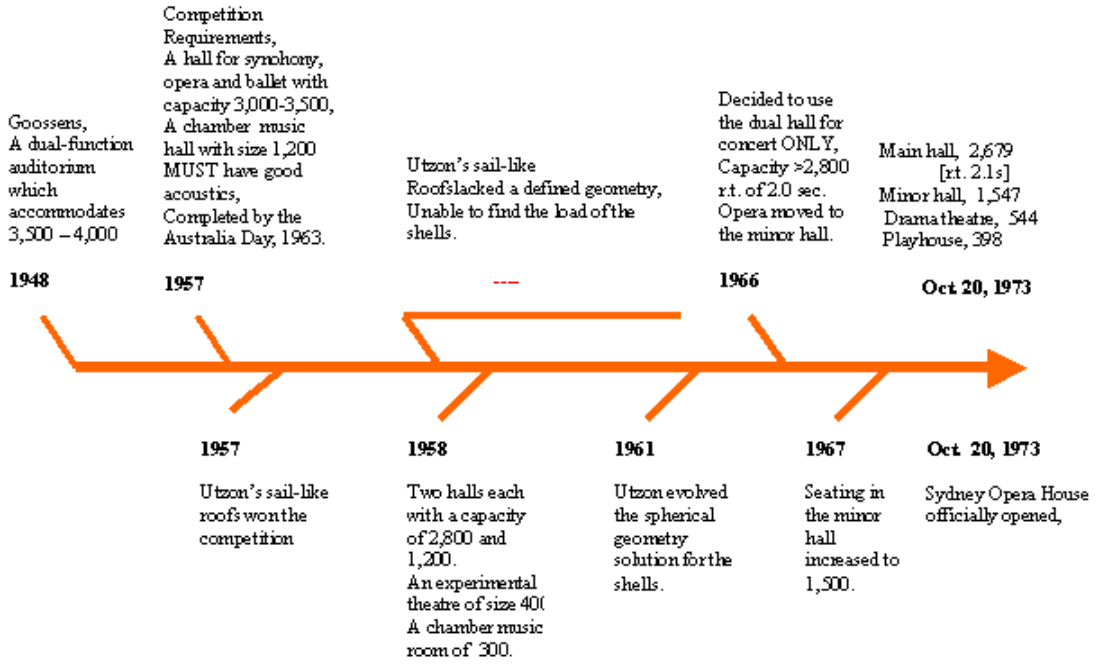


Creativity Computational

Co-evolution of Designs

Computational creativity





How do we recognize creativity?

computational creativity

When is a design creative?

Is novelty enough?

Based on research in psychology, philosophy, and artificial intelligence, a creative design has three essential characteristics: novelty, value, and surprise.

AI to evaluate creativity

Computational creativity

Novelty: Novelty is a measure of how different the design is from existing designs in its class.

Value: Value is a measure of how the design compares to other designs in its class in utility, performance, or appeal.

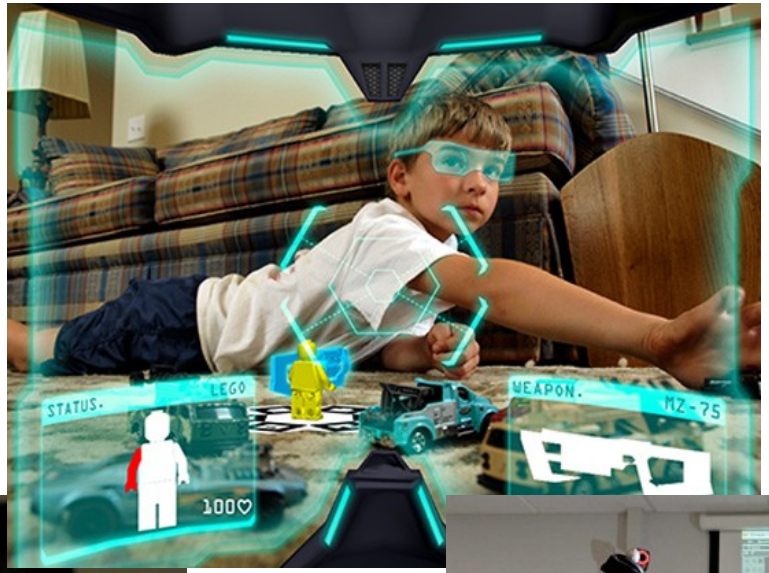
Surprise: Surprise has to do with the recent past and how we develop expectations for the next design.

Conceptual clustering algorithms operate on the state space representation to evaluate degree of "Similar but Different"

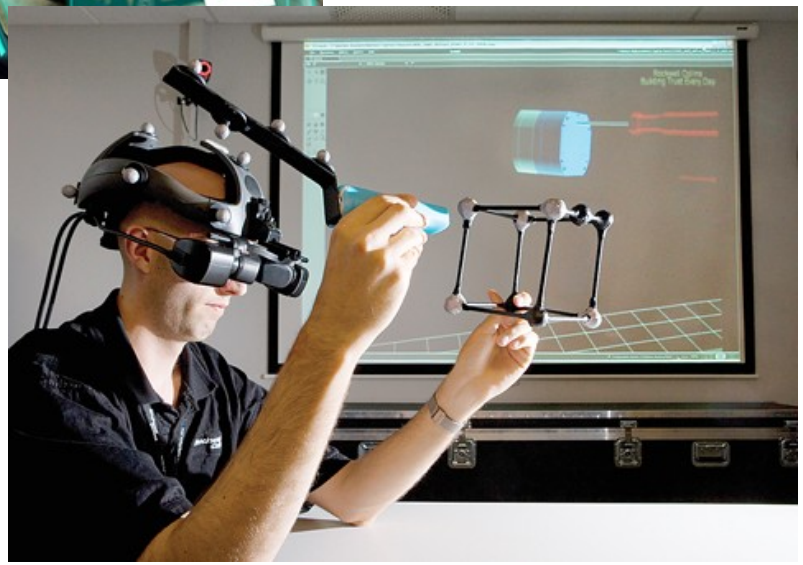
Interaction Design:
How does perception effect cognition?

Design Interaction

tangible



immersive

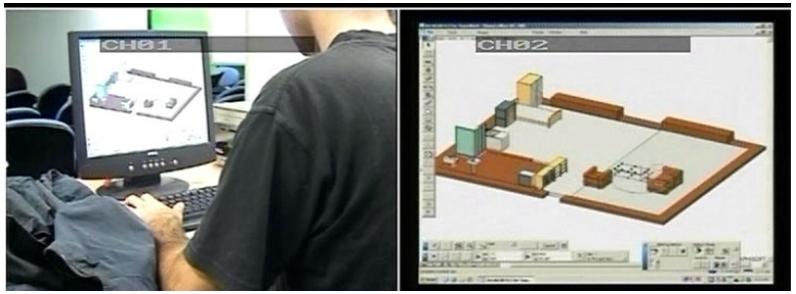


Comparing GUI and Tangibles

Design Interaction

- **TUI session**

- **GUI session**



	TUI session	GUI session
Interface	3D blocks	Mouse and keyboard
Hardware	Tabletop system and webcam	Desktop
Display space	Vertical LCD screen + horizontal table	Vertical LCD screen
Work space	Horizontal table	Vertical LCD screen
Application	ARToolKit	ArchiCAD
Training session	5-10 mins	5-10 mins
Design session	20 mins	20 mins
Participants	3 pairs of architectural design students	
Design Tasks	Home office or Design office renovation	

Interaction and Diversity: Why Crowdsource?

Design Interaction

"No matter who you are, most of the smartest people work for someone else"

Bill Joy, co-founder of Sun Microsystems

"Diversity Trumps Ability"

Page, S. 2007. Making the Difference: Applying a Logic of Diversity, Academy of Management Perspectives, 21(4): 6-20.

"On the Internet, nobody knows you're a dog."

New Yorker cartoon by Peter Steiner.

Large scale creativity: Is diversity better than ability?

Design Interaction

collaboration

crowdsourcing

- Diverse individuals bring different perspectives and heuristics to problem solving
- Work can be structured to avoid the negative aspects of diversity, such as disruptive conflict, miscommunication, and interpersonal biases
- Diversity can result in better solutions than those produced by a group of like-minded individuals.

Insights from operationalizing creativity

- Computational Creativity
  - Increase understanding of human creativity
  - A new kind of creativity that is not modeled on human cognition
  - New languages and formalisms for talking about creativity
- Interaction Design
  - Changes perception, action, and cognition
  - Diversity through crowdsourcing and collective intelligence

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