

Artificial Creative Systems

Multi-agent Simulations of Social Creativity

Rob Saunders, University of Sydney

Outline

Motivation for studying social creativity

- Why study social creativity?

- Why model social creativity?

Approaches to modelling social creativity

- What approaches have been used?

- How is computational creativity different?

An agent-based model of creative systems

- A systems view of creativity¹

- An artificial creative system

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<http://social-creativity.local/~rob/autumn/>



Why Study Social Creativity?

Why study social creativity?
What is social creativity?
How does social creativity work?

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The Four Ps of Creativity

Person
Process
Product
Press

Person
Process
Product
Press

Person
Process
Product
Press

Person
Process
Product
Press

Person
Process
Product
Press

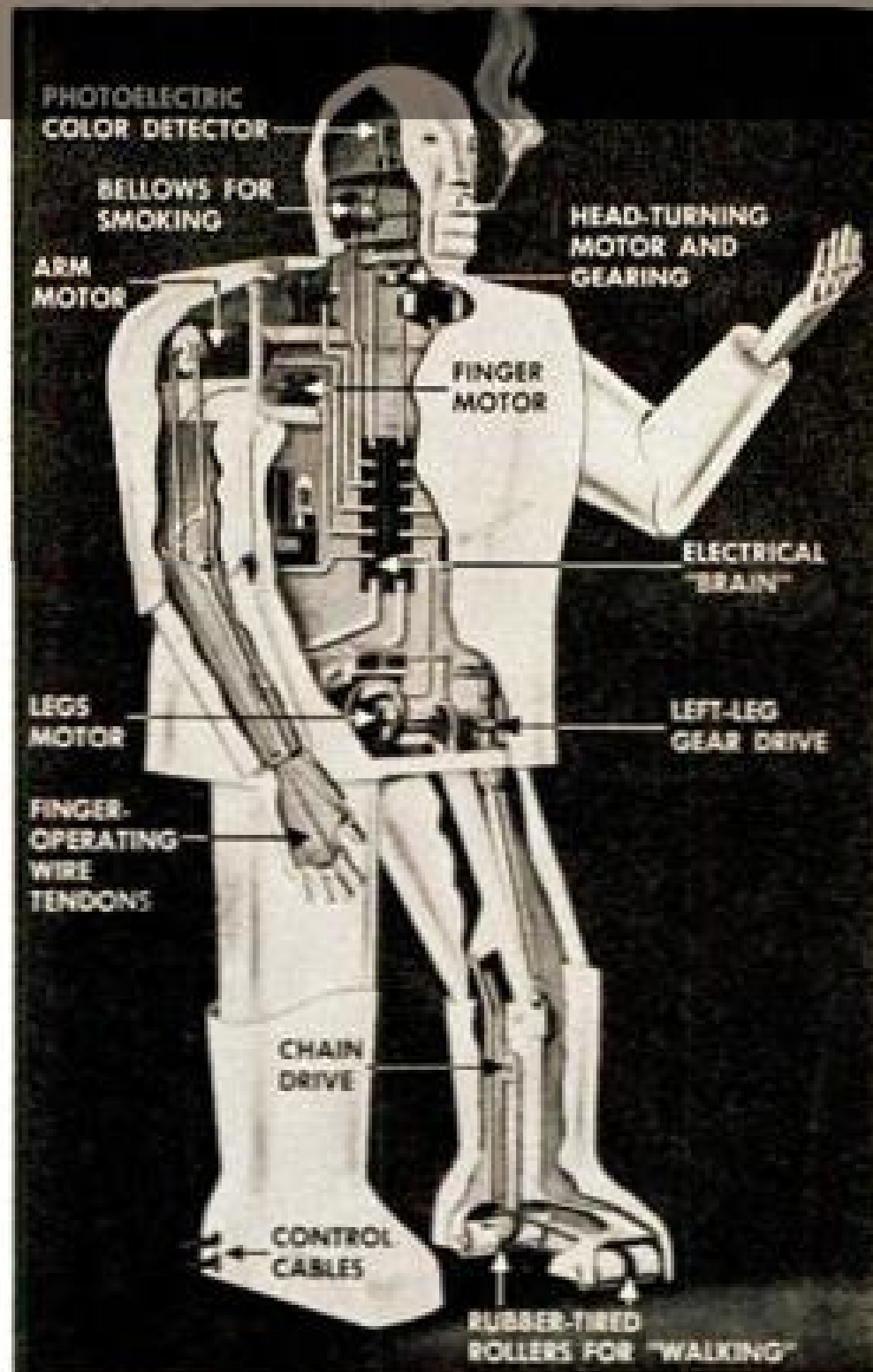
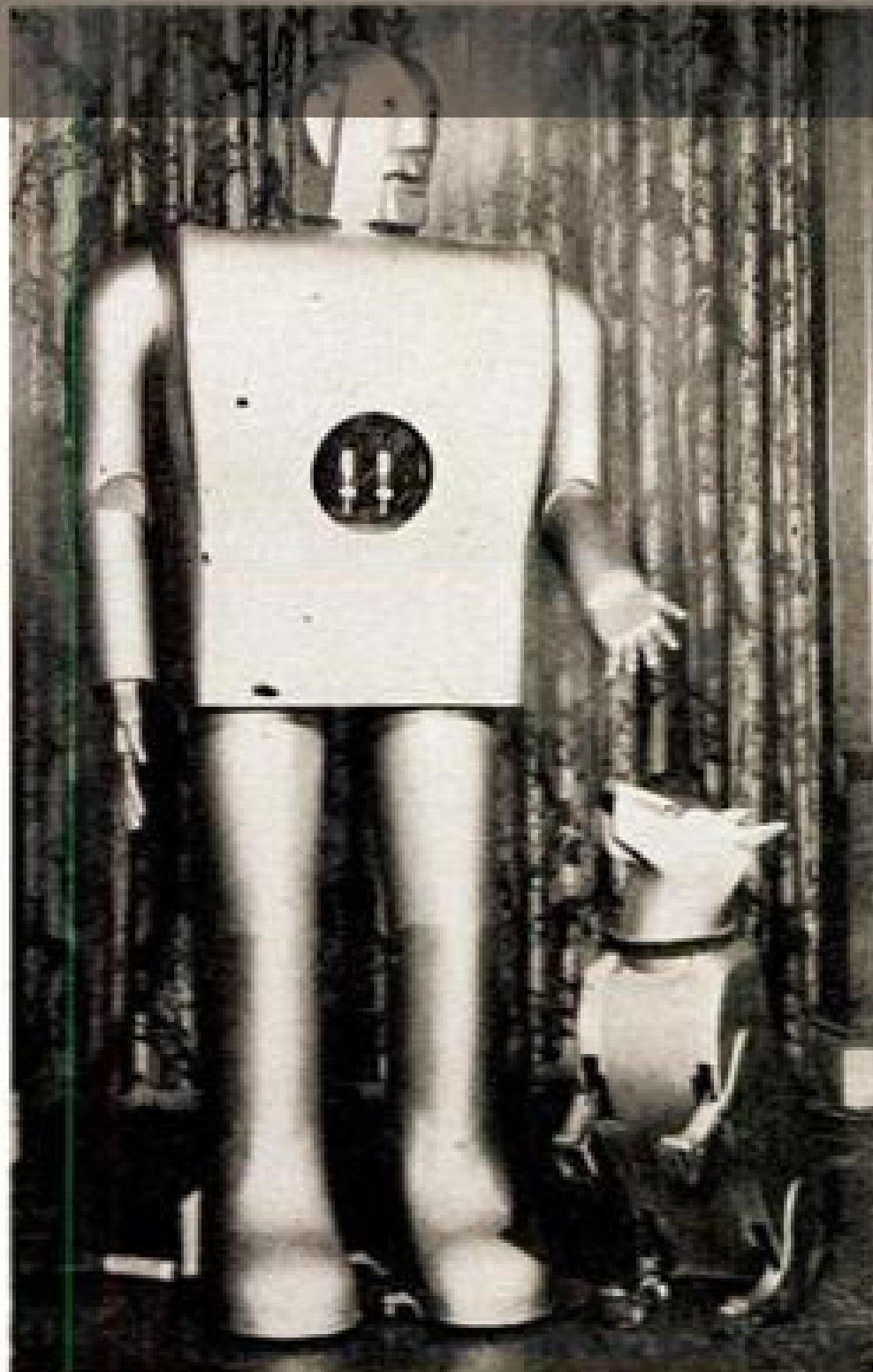
Person
Process
Product
Press

Person
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Person
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Person
Process
Product
Press









Buy Four Get One Free!



Why Model Social Creativity?

Modeling social creativity is important for understanding how individuals and groups generate novel and useful ideas in social contexts. It helps us identify factors that influence creative thinking and problem-solving in social settings.

By modeling social creativity, we can better understand the processes and mechanisms that lead to innovative solutions and behaviors. This knowledge can be applied to various fields, including psychology, sociology, and organizational behavior.

Modeling social creativity also allows us to explore the role of social factors, such as group dynamics and social norms, in influencing creative thinking. This can help us design interventions to foster creativity in social environments.

Furthermore, modeling social creativity can provide insights into the development of creative thinking skills and the identification of barriers to creativity. This information can be used to develop training programs and interventions to enhance social creativity.

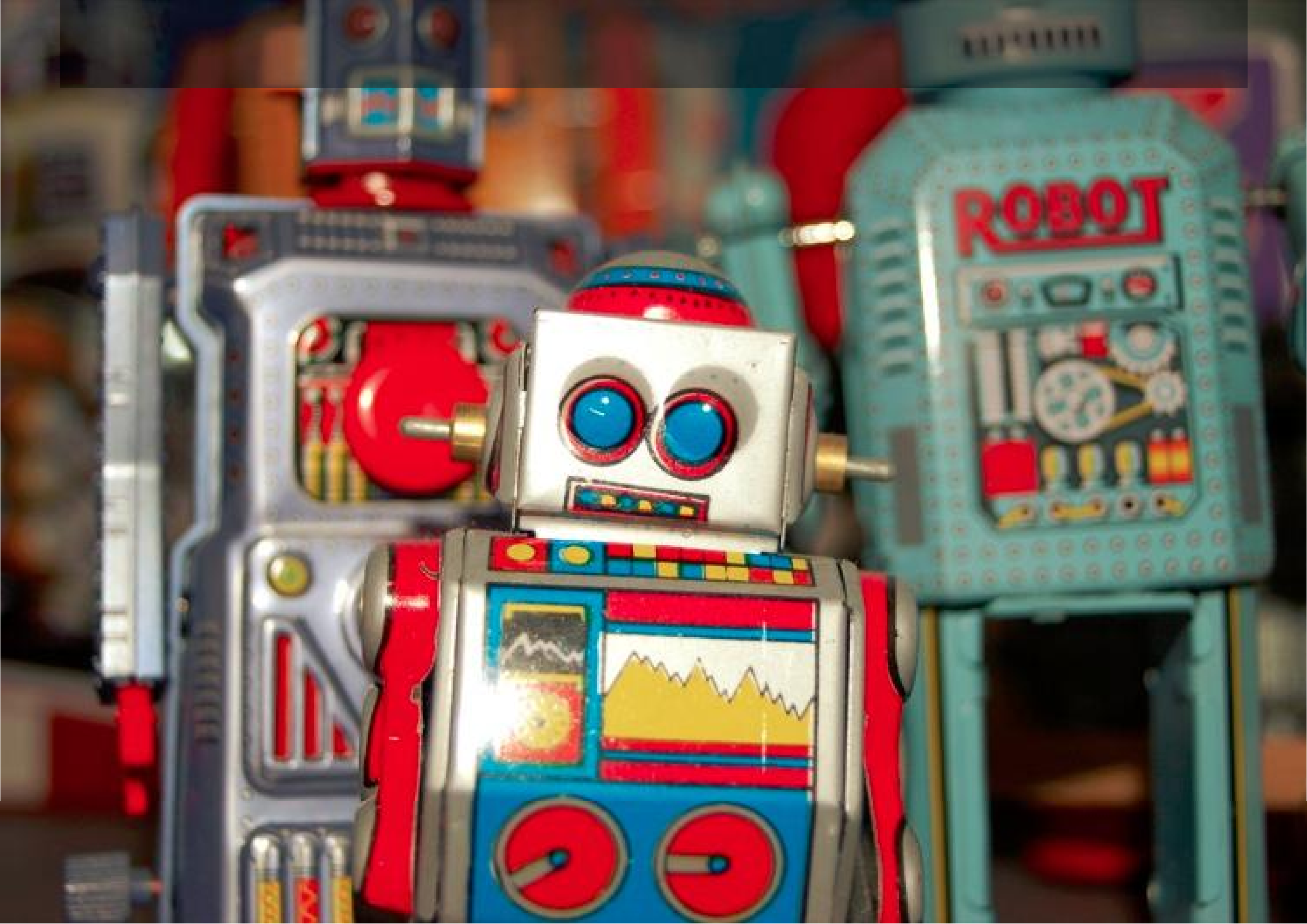
In summary, modeling social creativity is a valuable tool for understanding the complex processes of creative thinking in social contexts. It helps us identify factors that influence creativity and provides insights into the development of creative thinking skills.

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Approaches to Modelling Social Systems

Multi-agent Simulations

Autonomy

No central "top down" control.

Bounded Rationality

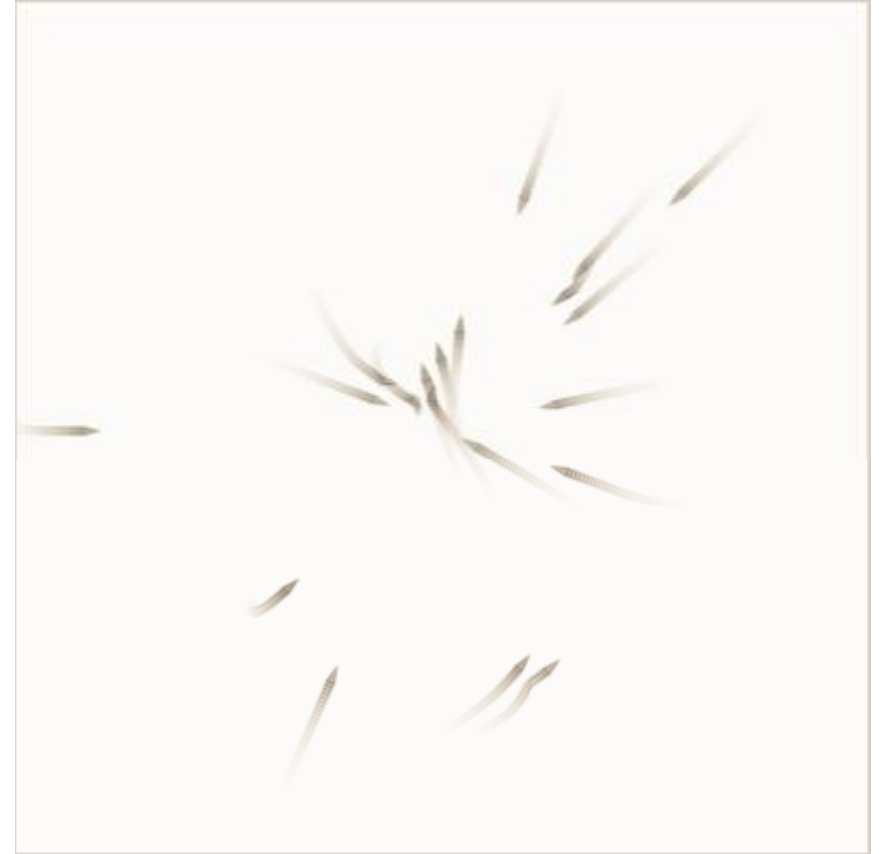
No access to global information.

Local Interactions

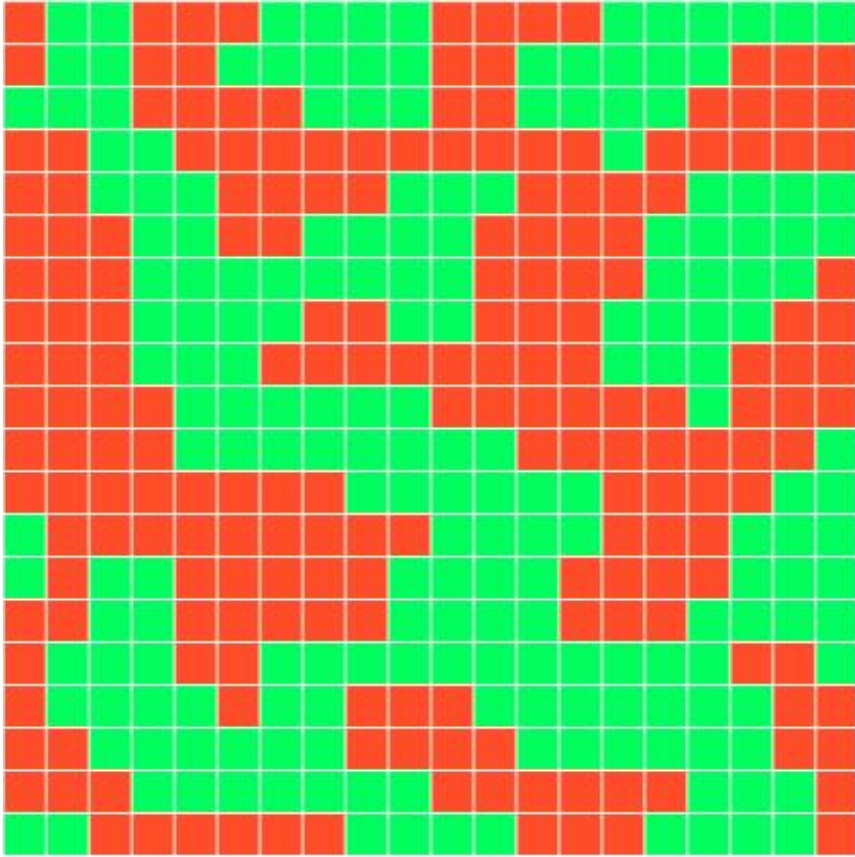
Agents interact with "neighbours".

Spatial Models

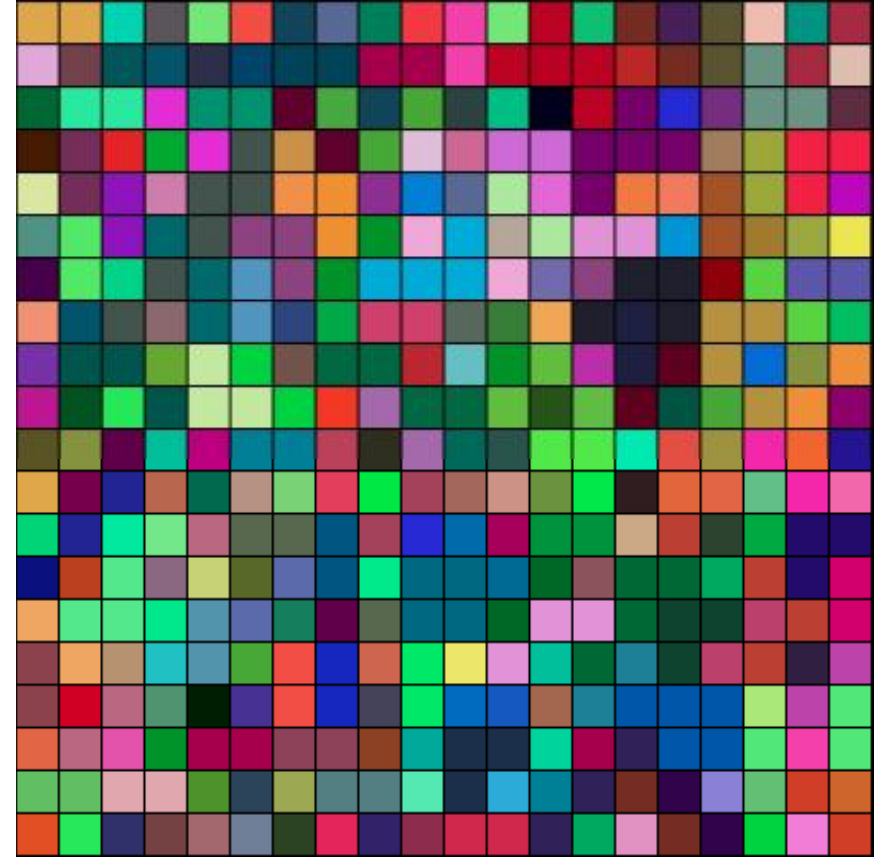
Lattices, dynamic networks, spaces, etc.



Computational Social Science



Schelling's Model of Segregation



Axelrod's Model of Dissemination

Why Computational Creativity?

The Computational Social Sciences and Economics have been doing things like this since the 1960s, so what's the big deal about modelling social creativity as part of computational creativity?

- Focus on the phenomenon of creativity

- Focus on the production of artefacts

- Multi-level modelling (individual/social/cultural)

What Has Been Done?

What Models Have Been Produced?

Bown

Multi-agent model of the evolution of music

Colton

Multi-agent model for exploring number sequences

Saunders

Multi-agent model of emergence of 'cliques'

Sosa

Multi-agent model of emergence of 'gatekeepers'

An Agent-Based Model of Social Creativity

What Could We Model?

Systems-Based Models of Creativity

Vygotsky

Cultural Systems: creators use culturally constructed symbols and tools to produce new cultural artifacts

Luhmann

Autopoietic Social Systems: communication is the essential element of the system, individuals are replaceable

Csikszentmihalyi

DIFI / Creative Systems: creativity happens in the interaction between three components of a creative system: domain, field and individual

A Systems View of Creativity

Domain

artefacts, descriptions, practices, laws

Individual

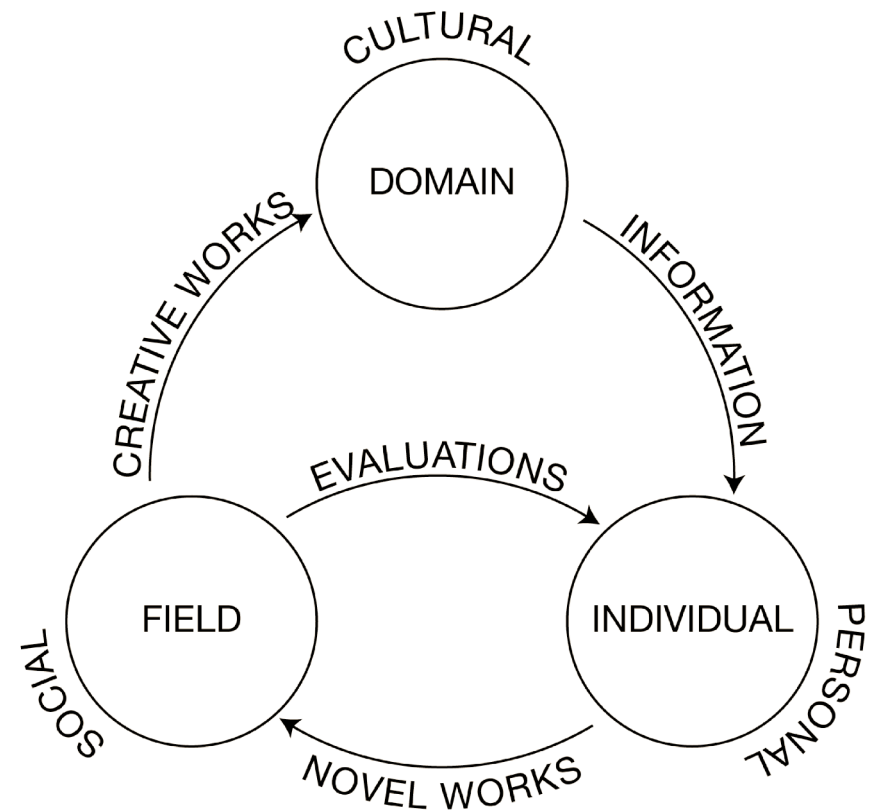
generator of novelty

Field

peers and other gatekeepers

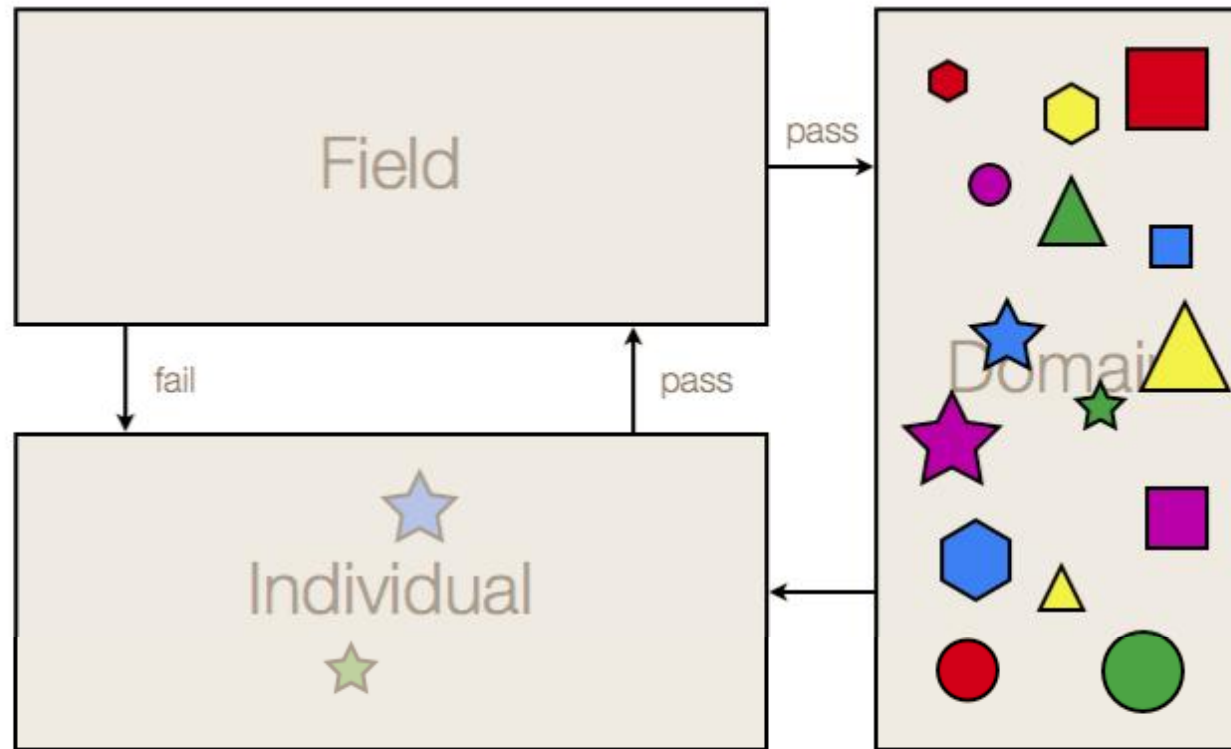
Interaction

flow of information between components

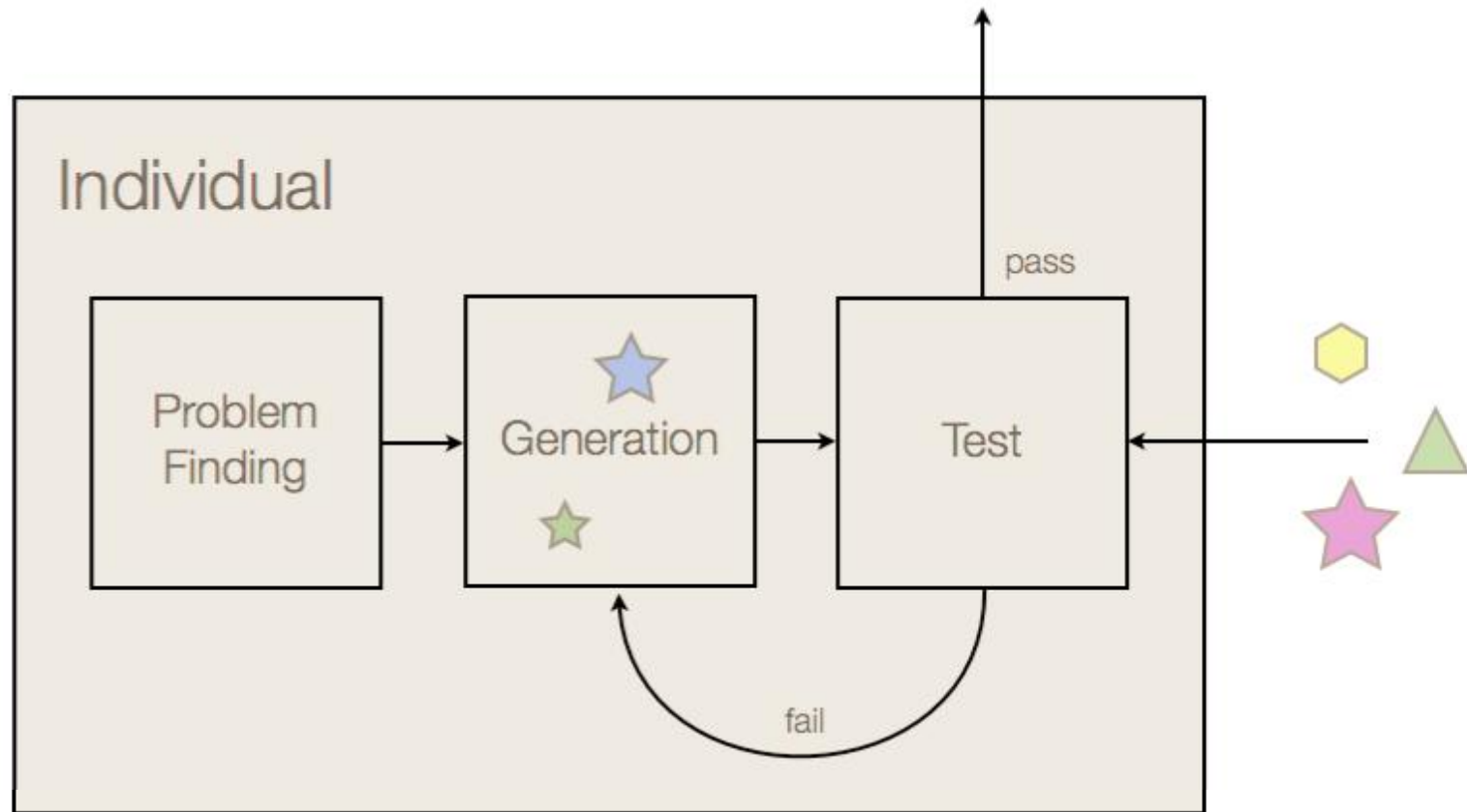


Csikszentmihalyi's System View of Creativity

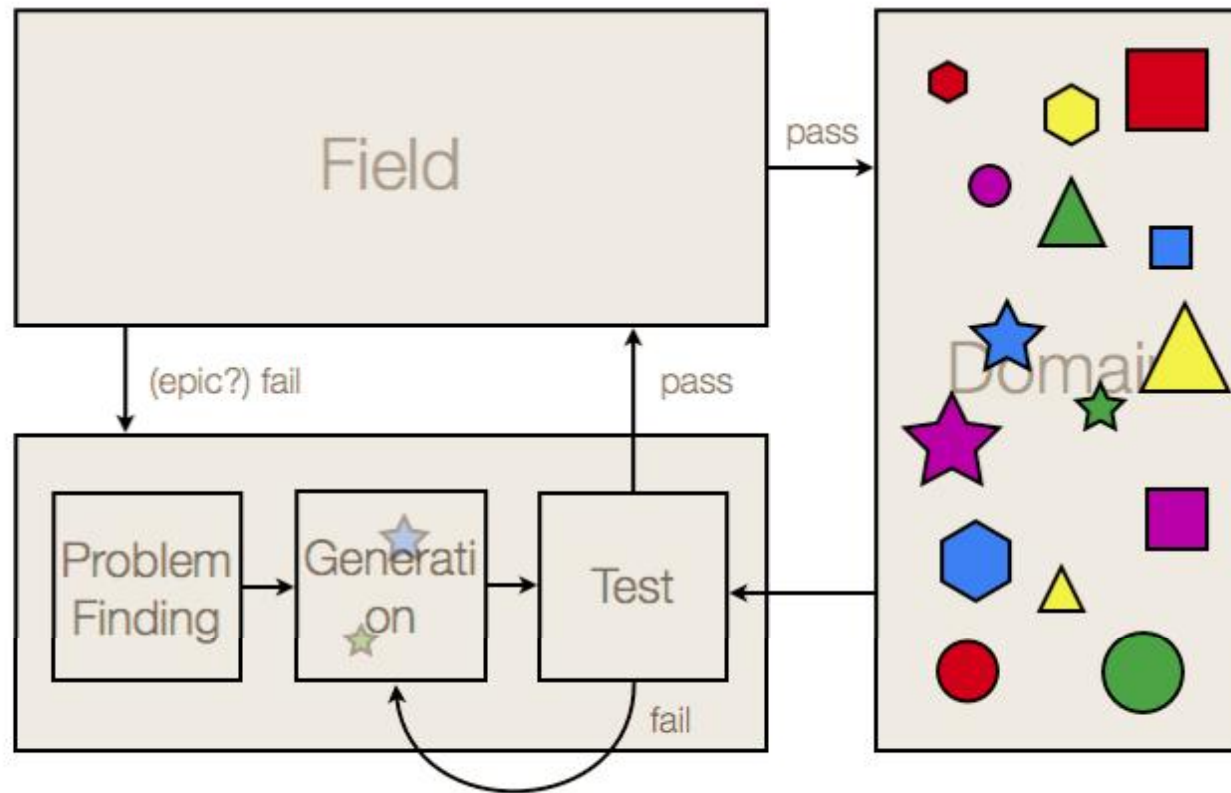
Generate-and-Test



Generate-and-Test (?)

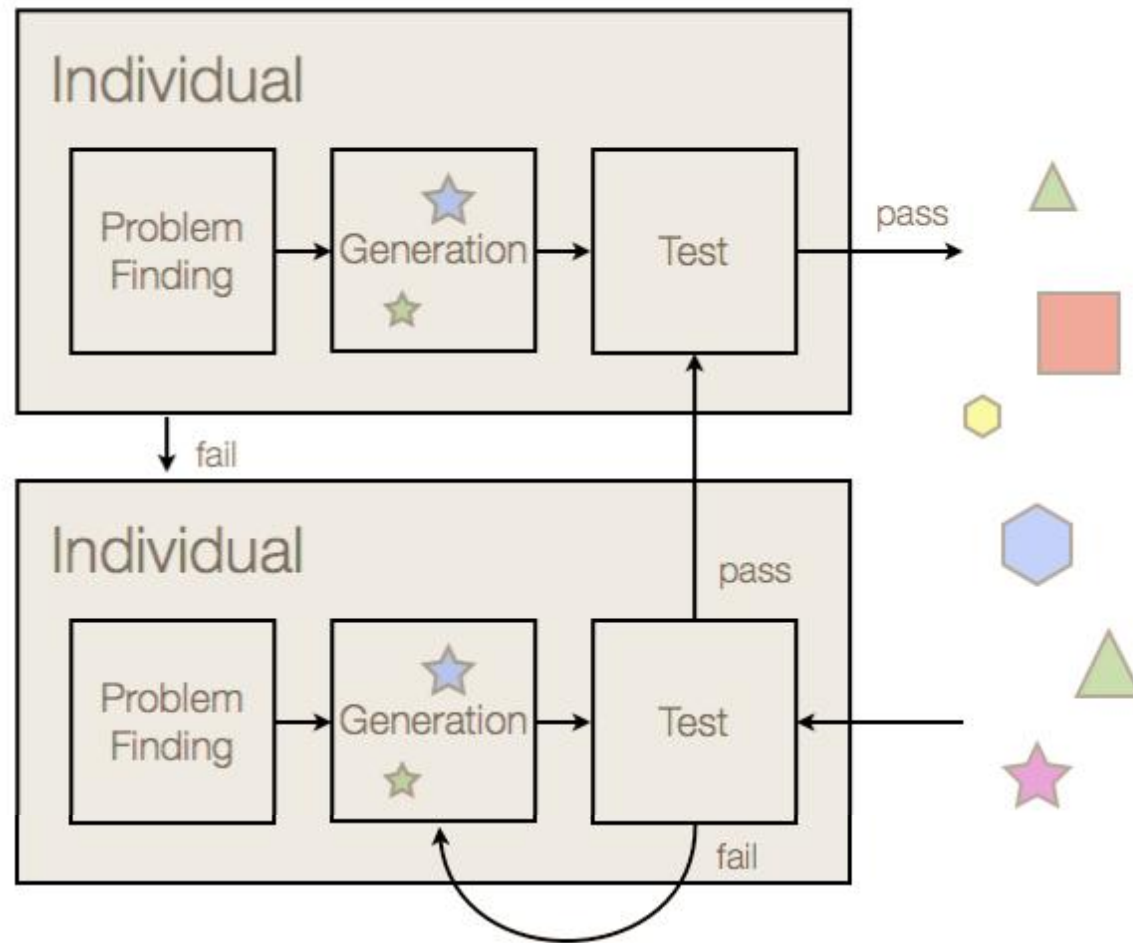


Dual Generate-and-Test

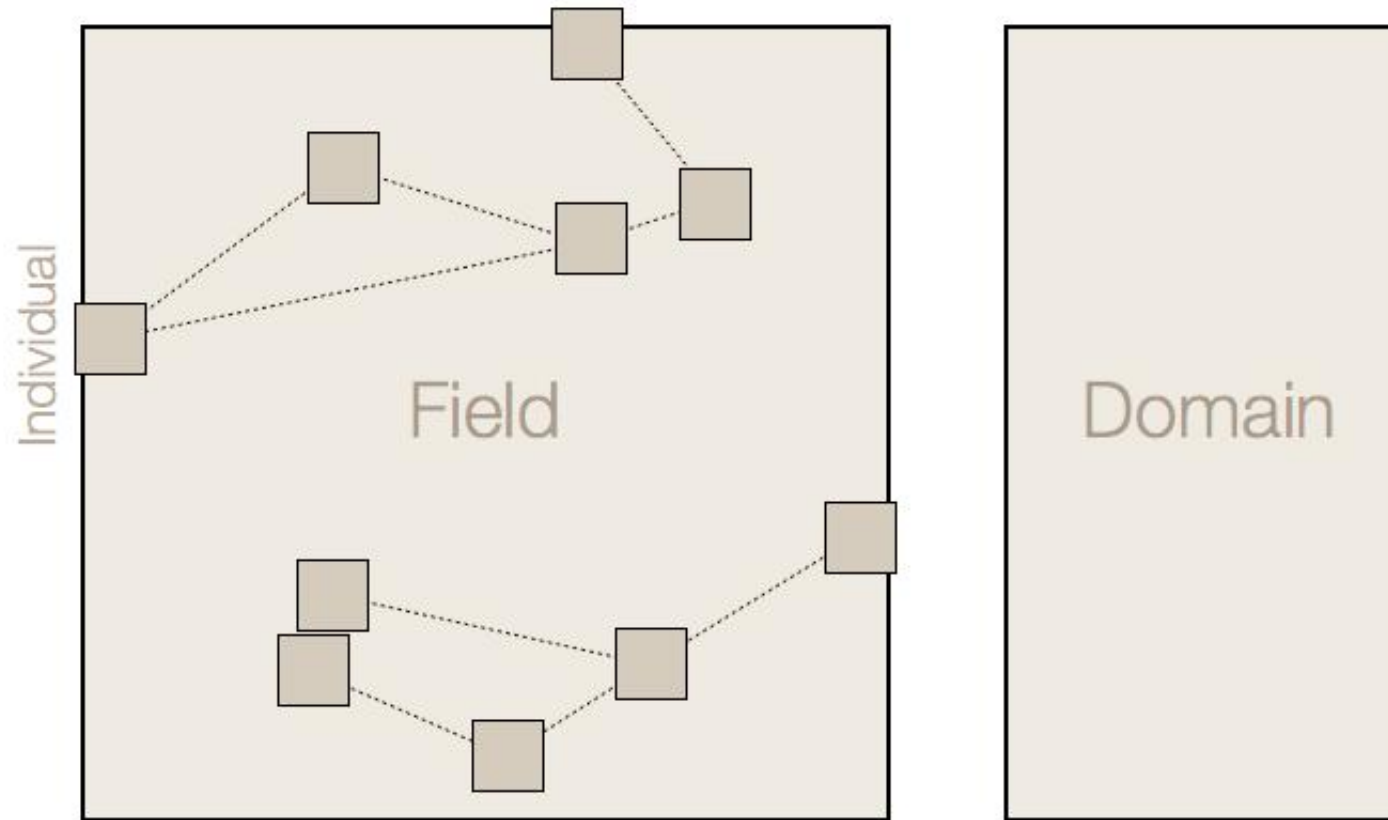


Distributing the Field

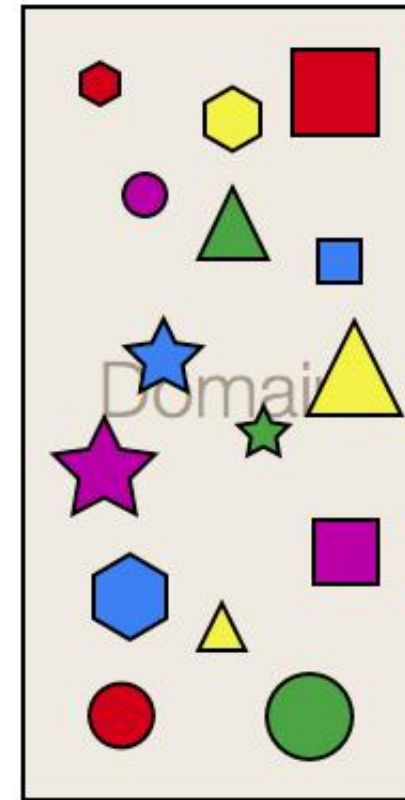
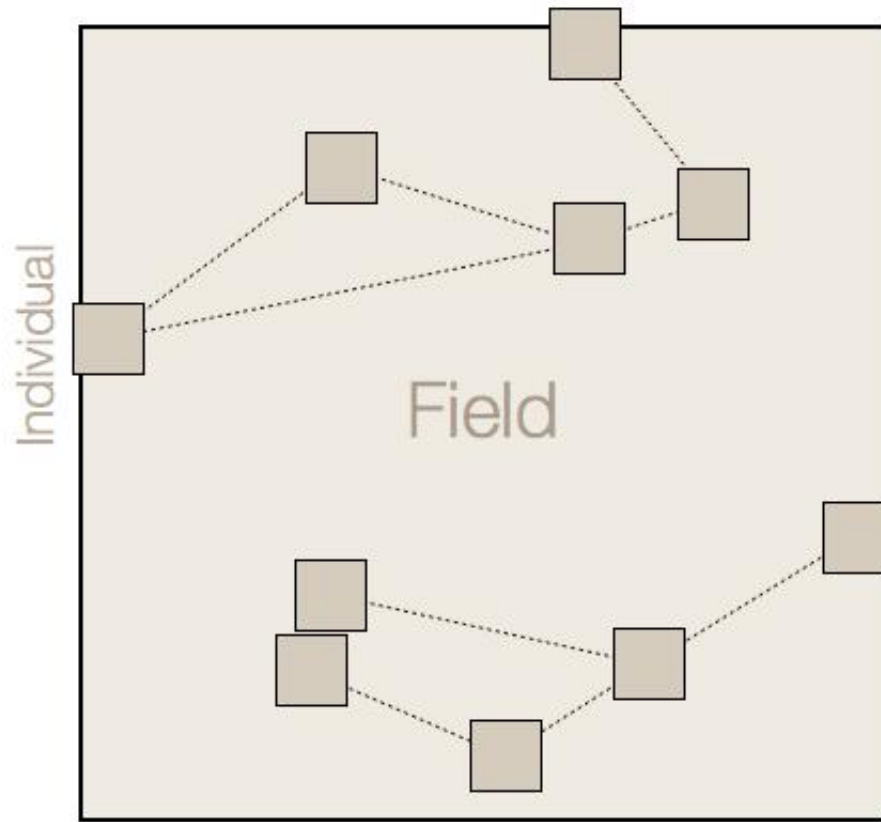
Artificial Creative Systems



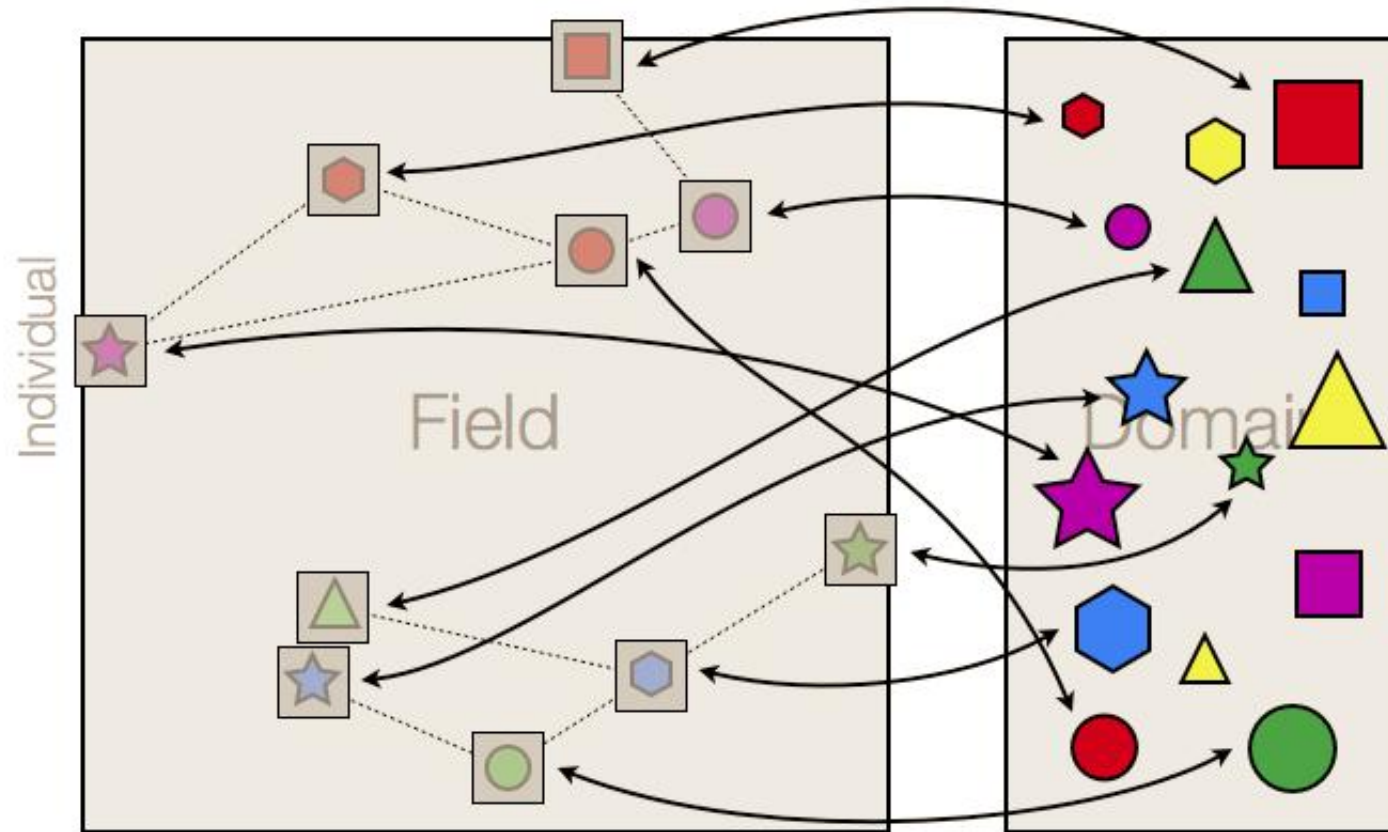
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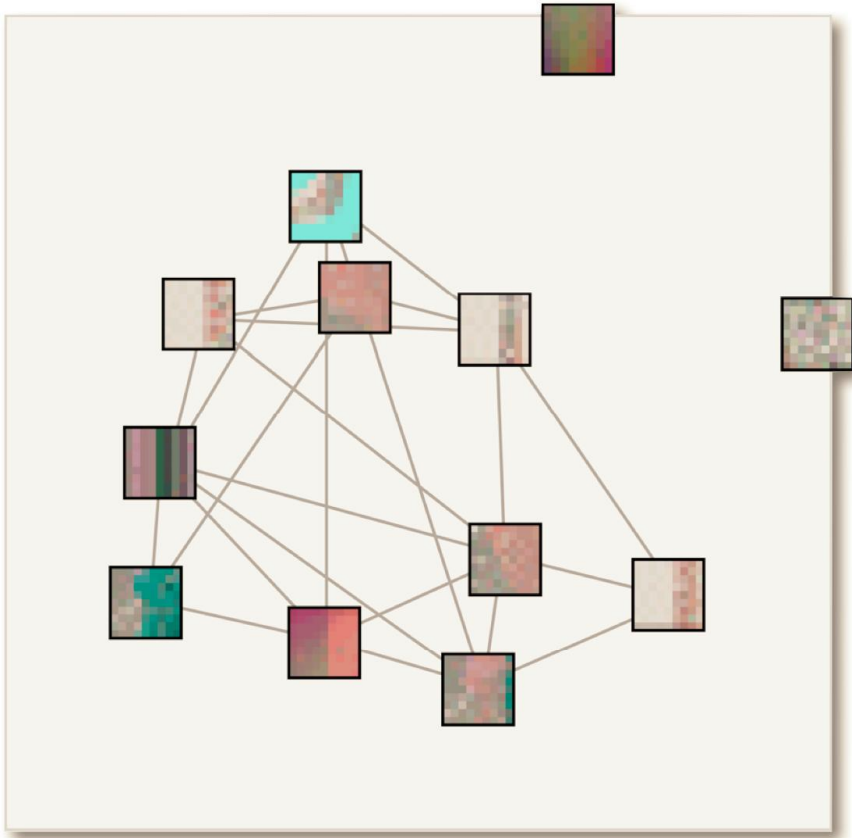
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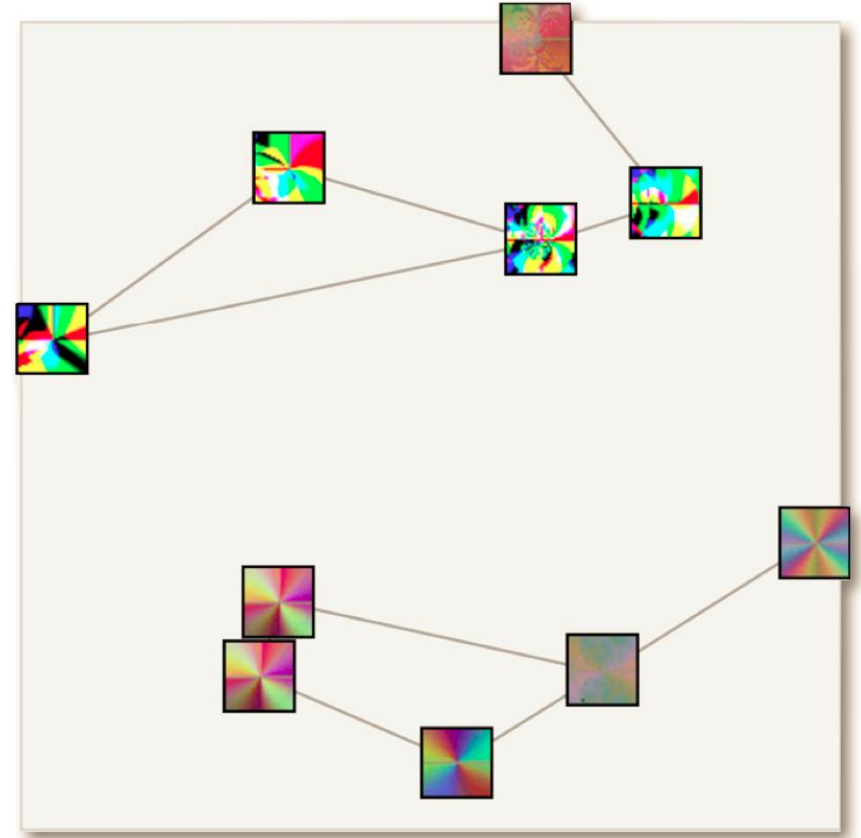
Artificial Creative Systems



The Digital Clockwork Muse



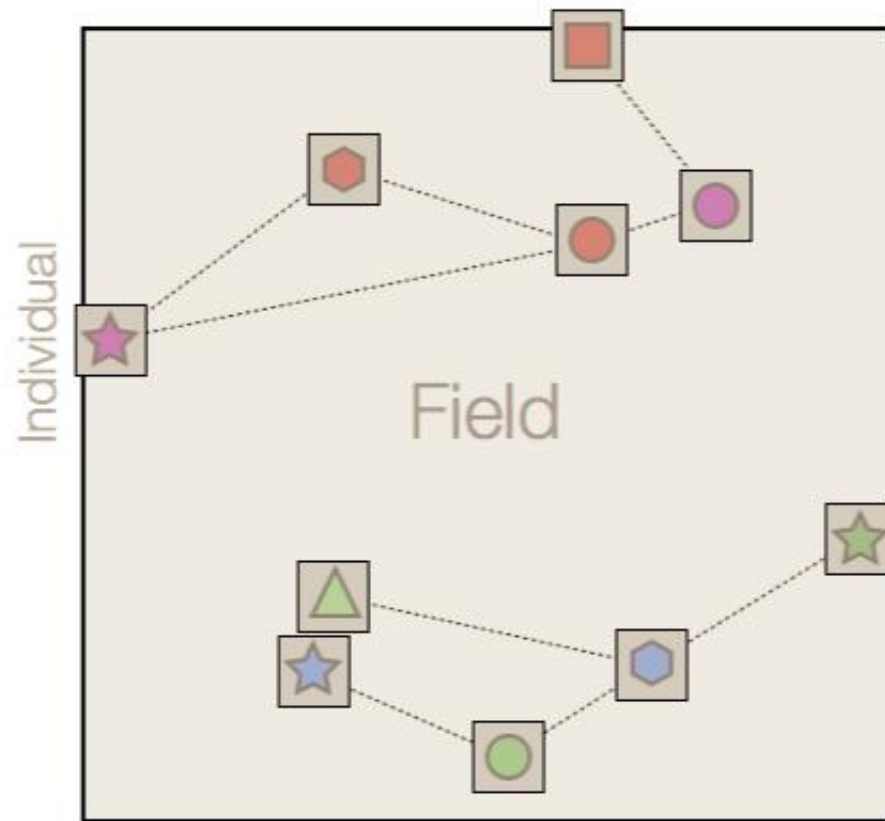
Law of Novelty



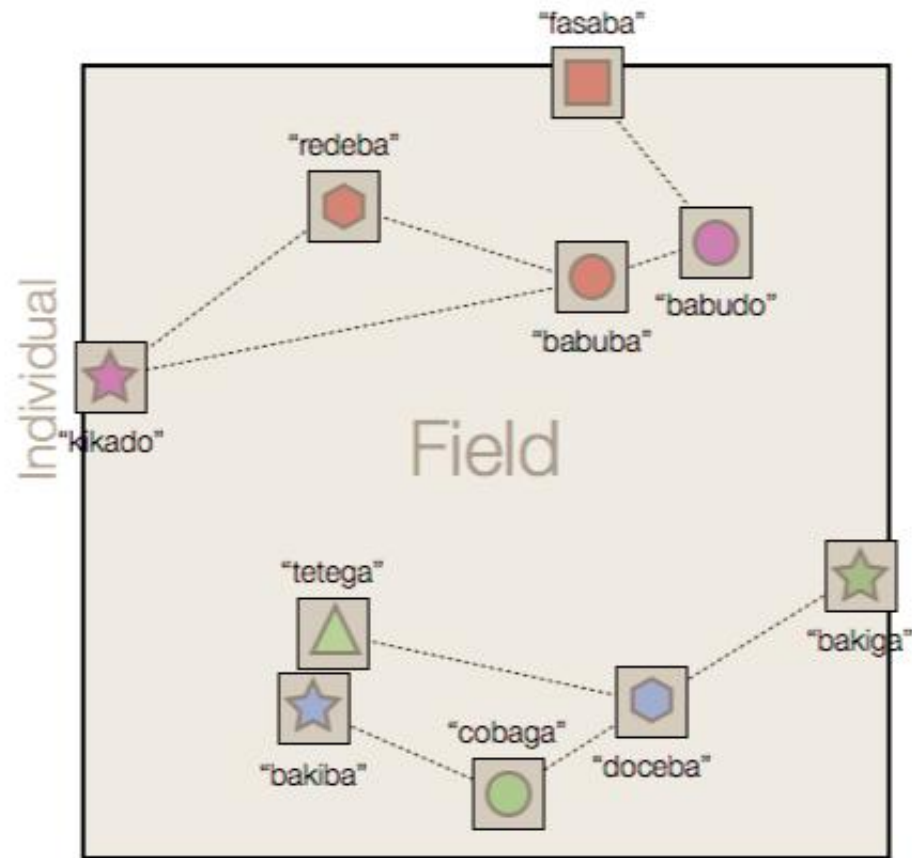
Clique Formation

Distributing the Domain

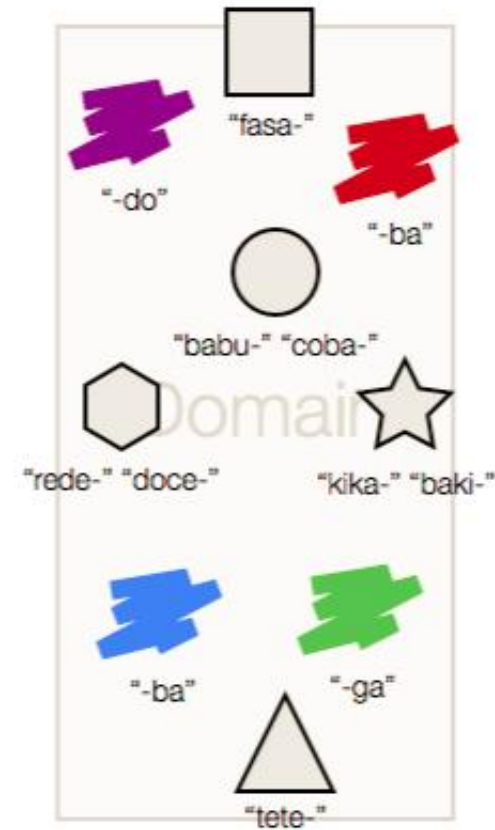
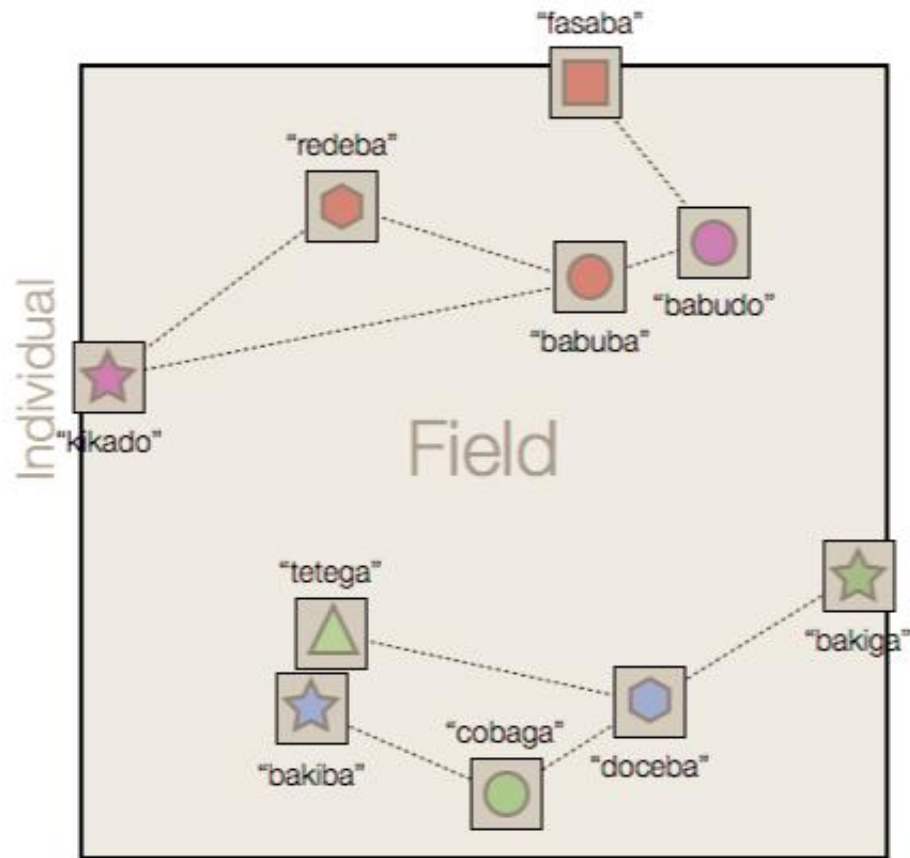
Artificial Creative Systems



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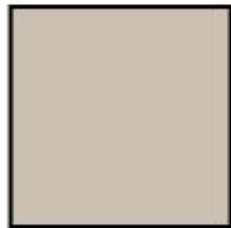
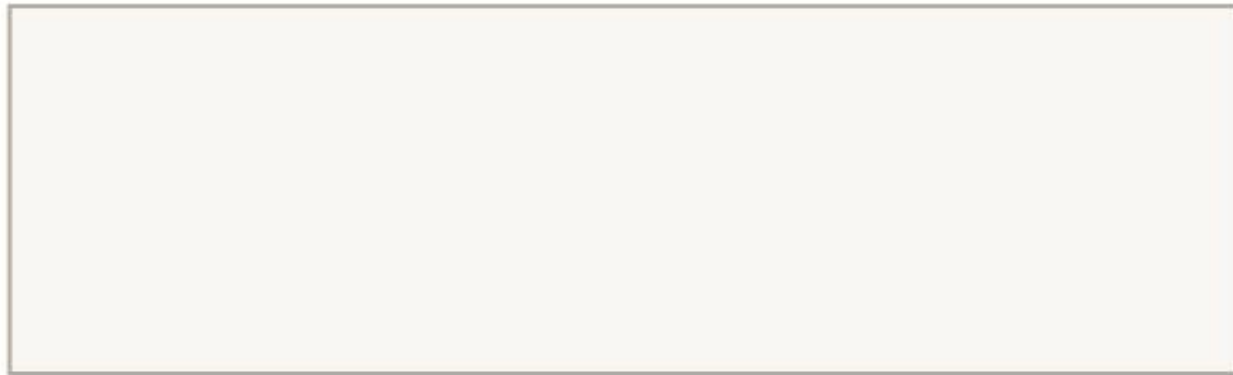
Artificial Creative Systems



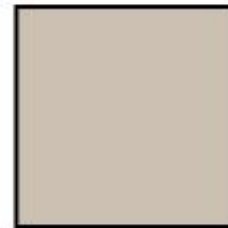
Evolution of Language

Language Games

The Guessing Game



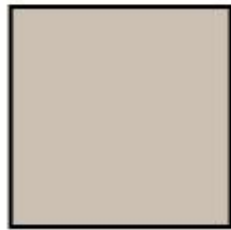
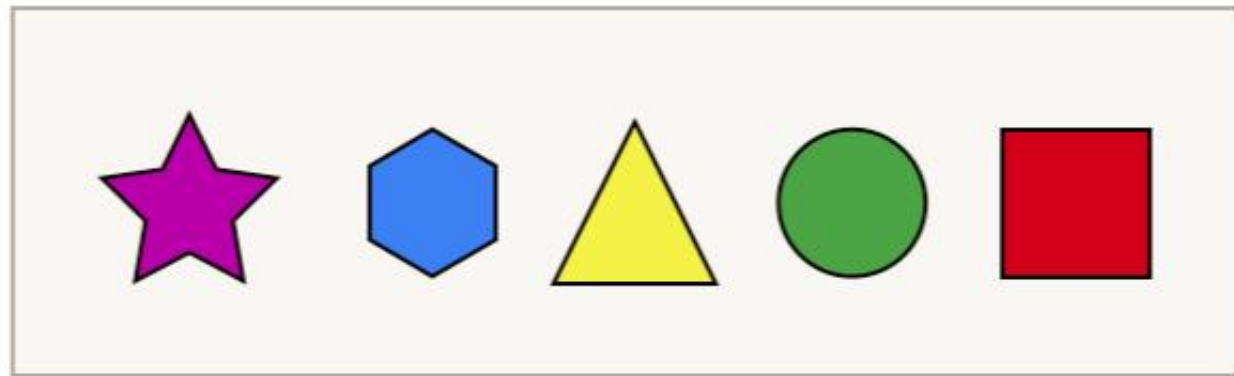
speaker



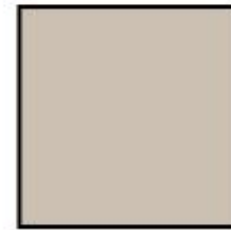
listener

Language Games

The Guessing Game



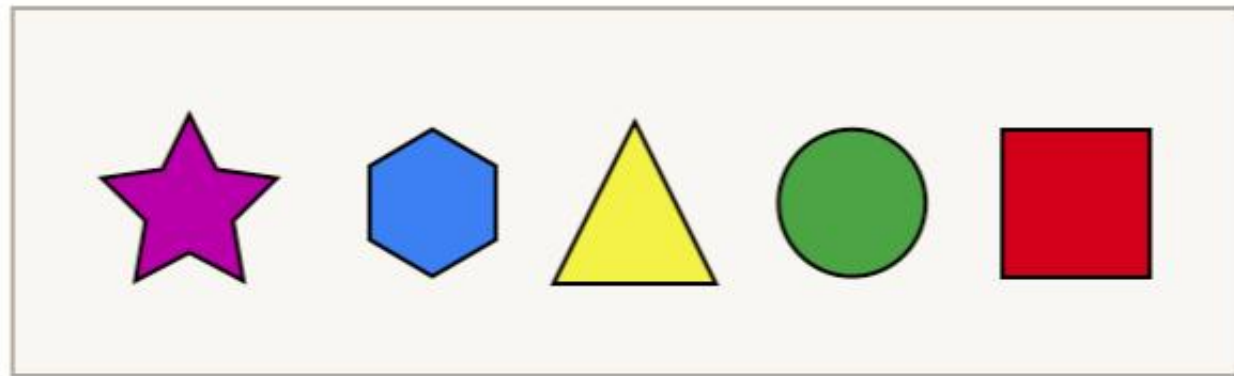
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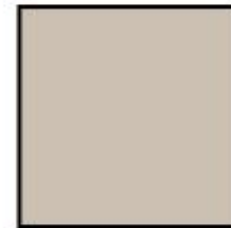
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Language Games

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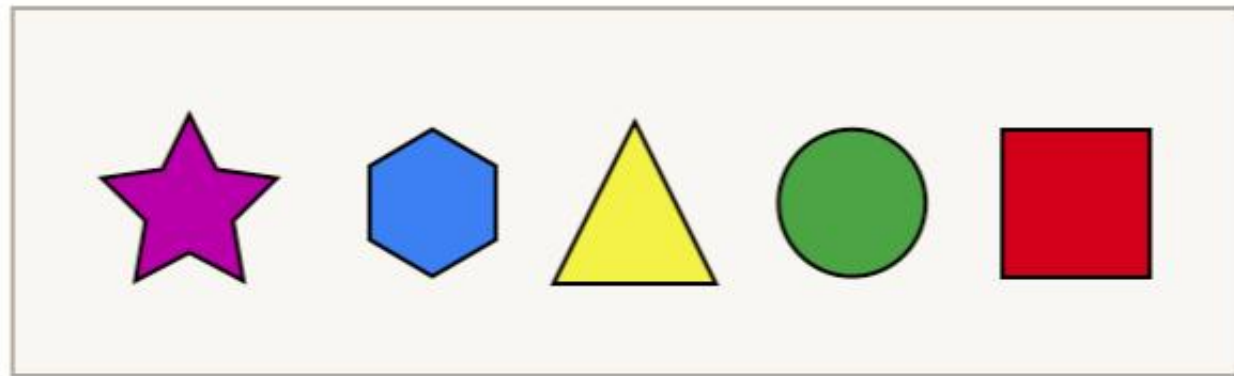
speaker



listener

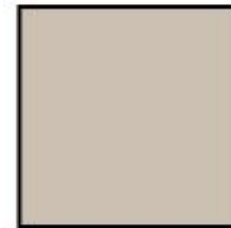
Language Games

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speaker

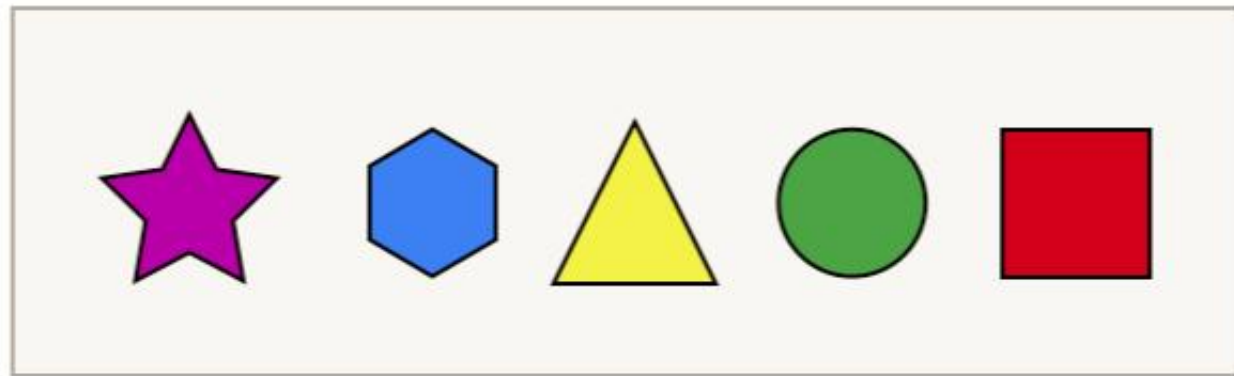
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listener

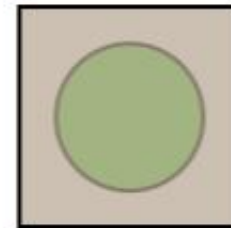
Language Games

The Guessing Game



speaker

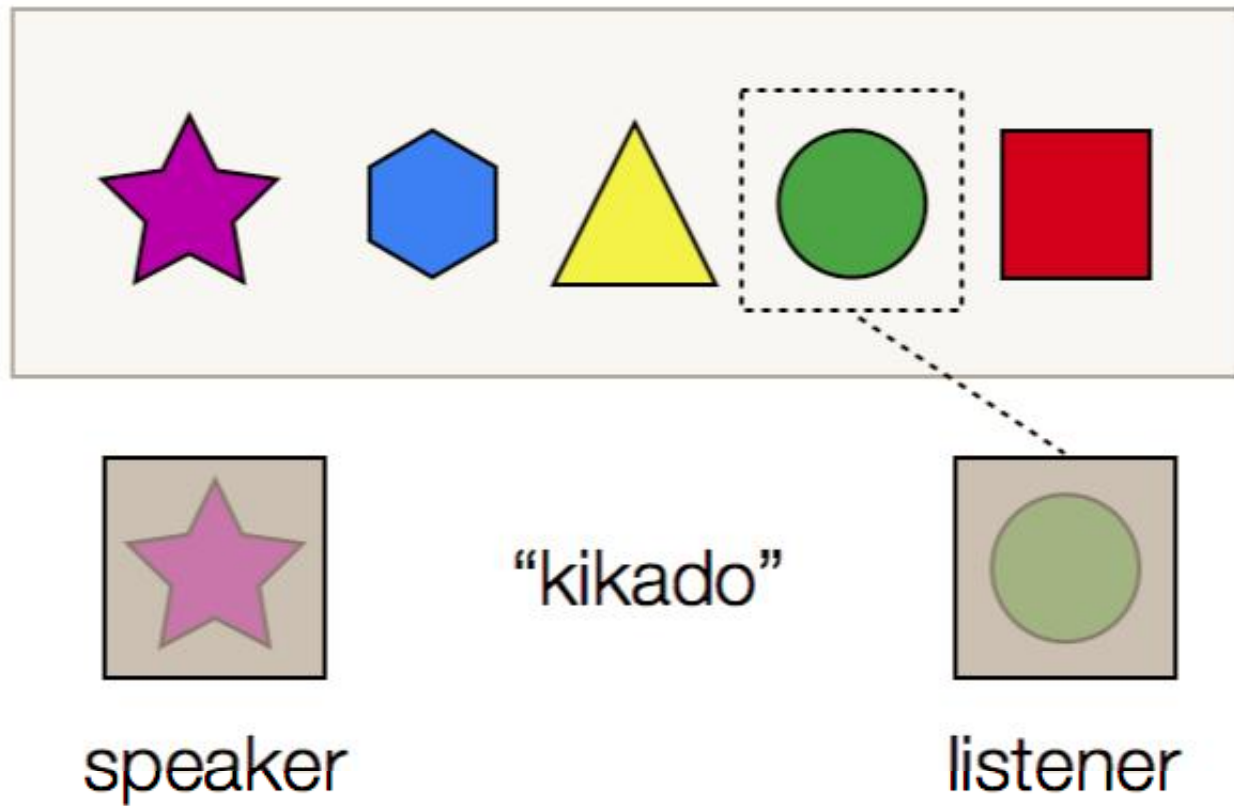
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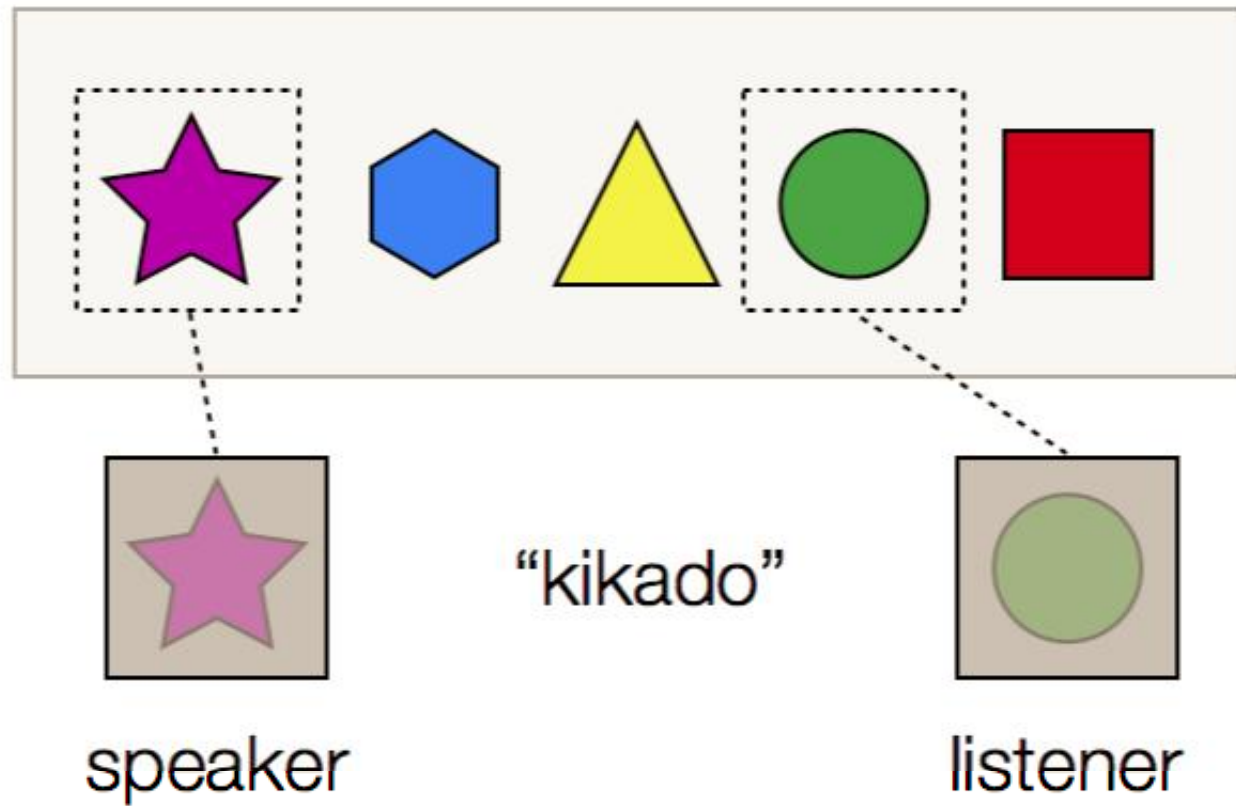
Language Games

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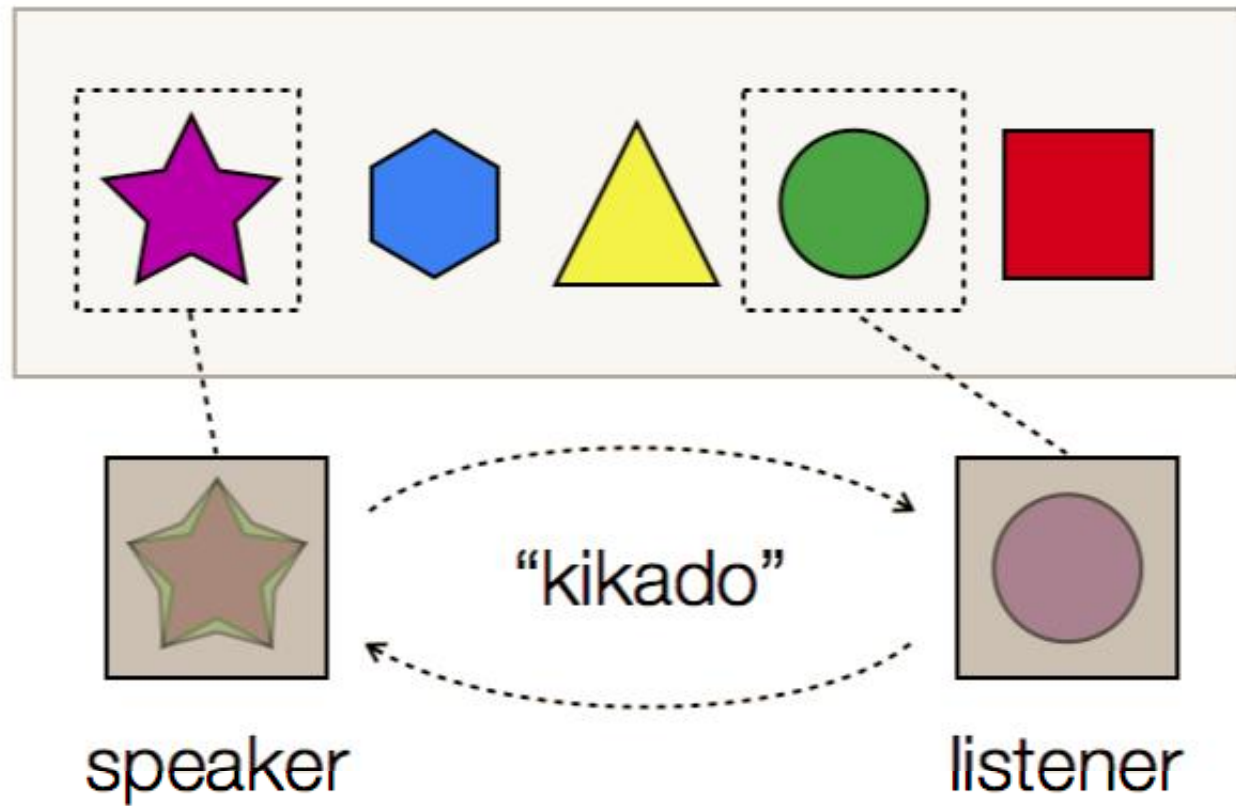
Language Games

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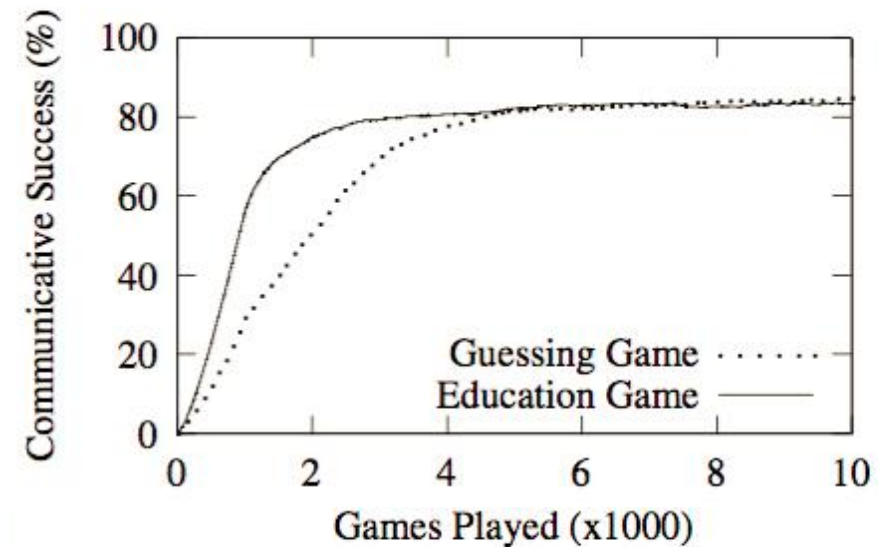
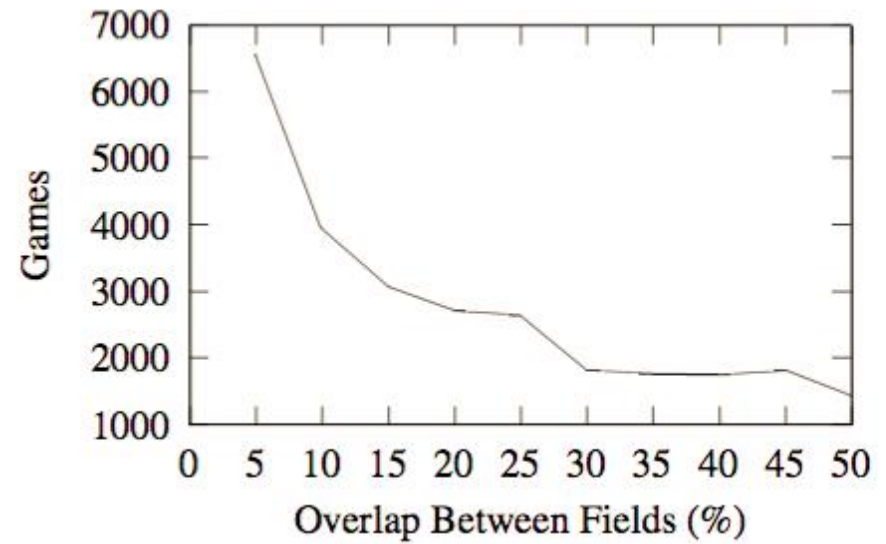
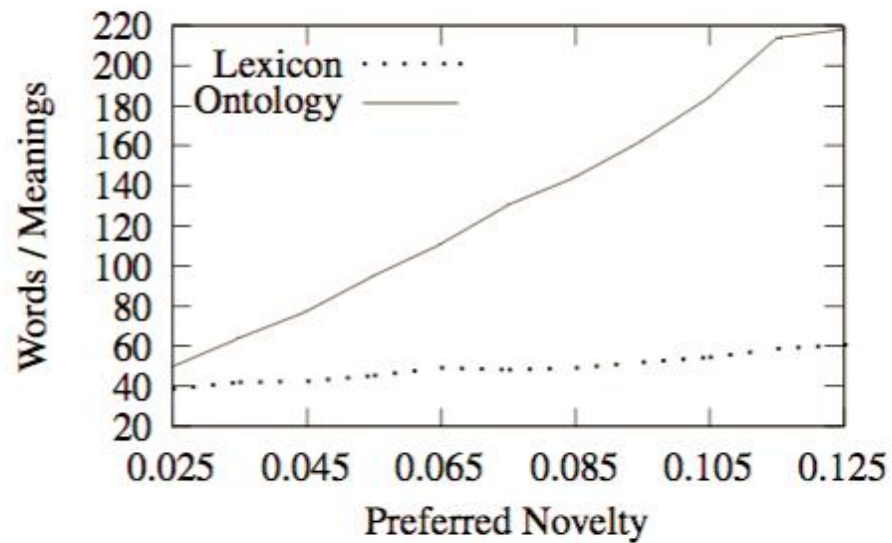


Language Games

The Guessing Game



Simulations of Domains



Where is this going?

Language Games for Artificial Creative Systems

The Generation Game to model the role of clients in a creative process where utterances are used to model requirements and multiple agents may attempt to satisfy the brief in different ways

Compositional Languages and Grammars

Languages grounded in use that can be decomposed into significant components will support modelling of the role that language plays in ideation, specific curiosity and surprise



Creative Languages

Language as generator

The ambiguity of language can be used to produce new design goals by combining concepts not previously seen before...



hovercraft

+



skateboard





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OF
ENTRANCE

