Building Artistic Computer Colleagues With an Enactive Model of Creativity

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collaborative drawing
**Creativity Support Tool**
Track history, simulate and explore alternatives to support a creative person

**Computational Creativity**
Programs that automatically generate novel, surprising, and valuable creative products

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**Computer Colleagues**
Co-creative agents collaborate with humans in *continuous* real time improvisation to enrich the creative process
enaction

perception is not a passive reception of sensory data

affordances are dynamic
enaction
cognition emerges through intentional, improvisational interaction with environment
enactive model of creativity
enactive model of creativity

components

agent roughly aware of intention and perception

world ‘out there’ and mental model

cognitive continuum: analytic (convergent) vs. associative (divergent) cognition
enactive model of creativity

inputs/outputs

sensory input + cognitive input + goals $\rightarrow$ perceptual logic* $\rightarrow$ dynamic affordances

action impacts external world and updates mental model
enactive model of creativity

*dynamic process*

center of spectrum is equilibrium

deviations from equilibrium unclamps perception (creative cognition)

attention determines position on cognitive continuum
inspecting details using local perceptual logic
identify and leverage relevant relationships using regional perceptual logic
thinking deeply and developing goals using global perceptual logic
drawing apprentice software architecture
drawing apprentice architecture

propose mechanism to monitor and guide creative trajectory

specify perceptual logic: local, regional, global
creative trajectory monitor
perceptual logic
Local Perceptual Logic

**Function**: Imitation

**Behavior**: Transform user’s input line and redraw

**Autonomy**: Fully dependent on user input
Regional Perceptual Logic

**Function:** Develop and build regional relationships

**Behavior:** Use rules of gestalt grouping (e.g. containment, proximity) to group user’s lines into separate regions. Interact with lines in active region using local perceptual logic.

**Autonomy:** Semi-autonomous: seeded in current region of user input
Global Perceptual Logic

**Function:** Determine high-level goals and intention to guide contributions

**Behavior:** Analyze entire artwork. Use stylistic rules to select region with most interesting aesthetic opportunities.

**Autonomy:** Fully autonomous
practice-based evaluation
future directions

formal evaluation of theory

further implementation of regional &
global perceptual logic

explore various implementations of
creative trajectory monitor
conclusions

proposed enactive model of creativity...
....that is potentially useful in designing computer colleagues in open-ended creative domains
...and suggests that additional layers of perceptual logic and creative trajectory monitor will increase perceived intentionality of the system

perceptual logic describes how attention shifting might enable different modes of cognition to support co-creative practice with a computer
conclusions

combining the concepts of perceptual logic with a creative trajectory allows us to think of the creative process as a narrative unfolding in time

we can now ask questions about how an agent might explore different creative behaviors over time and adjust creative strategies to adapt to the user (i.e. mirror user behavior vs. complement)
thank you!

(come see me for a demo and deeper discussion!)

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open-ended  flexible  dynamic