Computational Creativity

Course: AI for Media, Art & Design
(A.k.a. “Intelligent Computational Media”)

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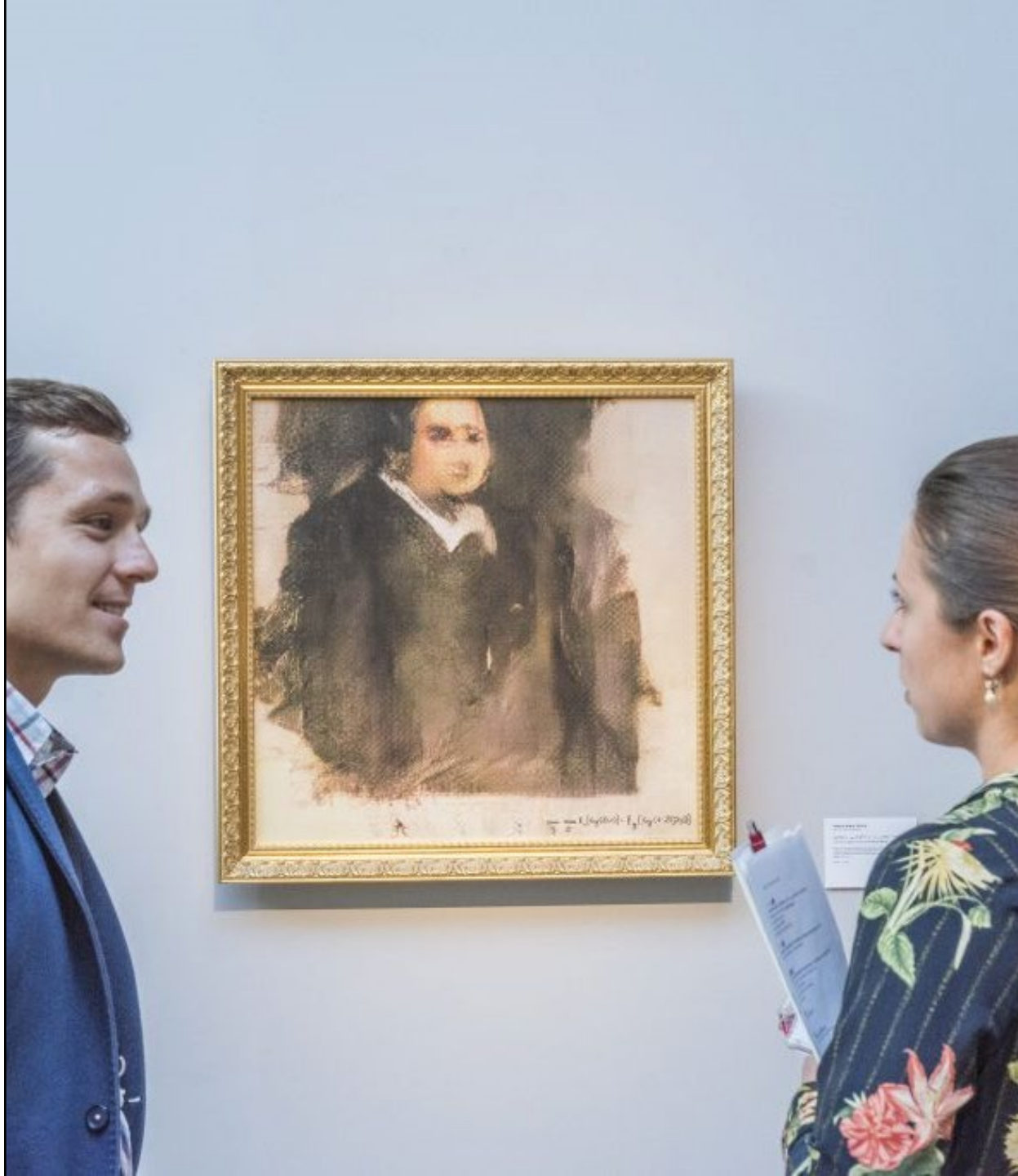
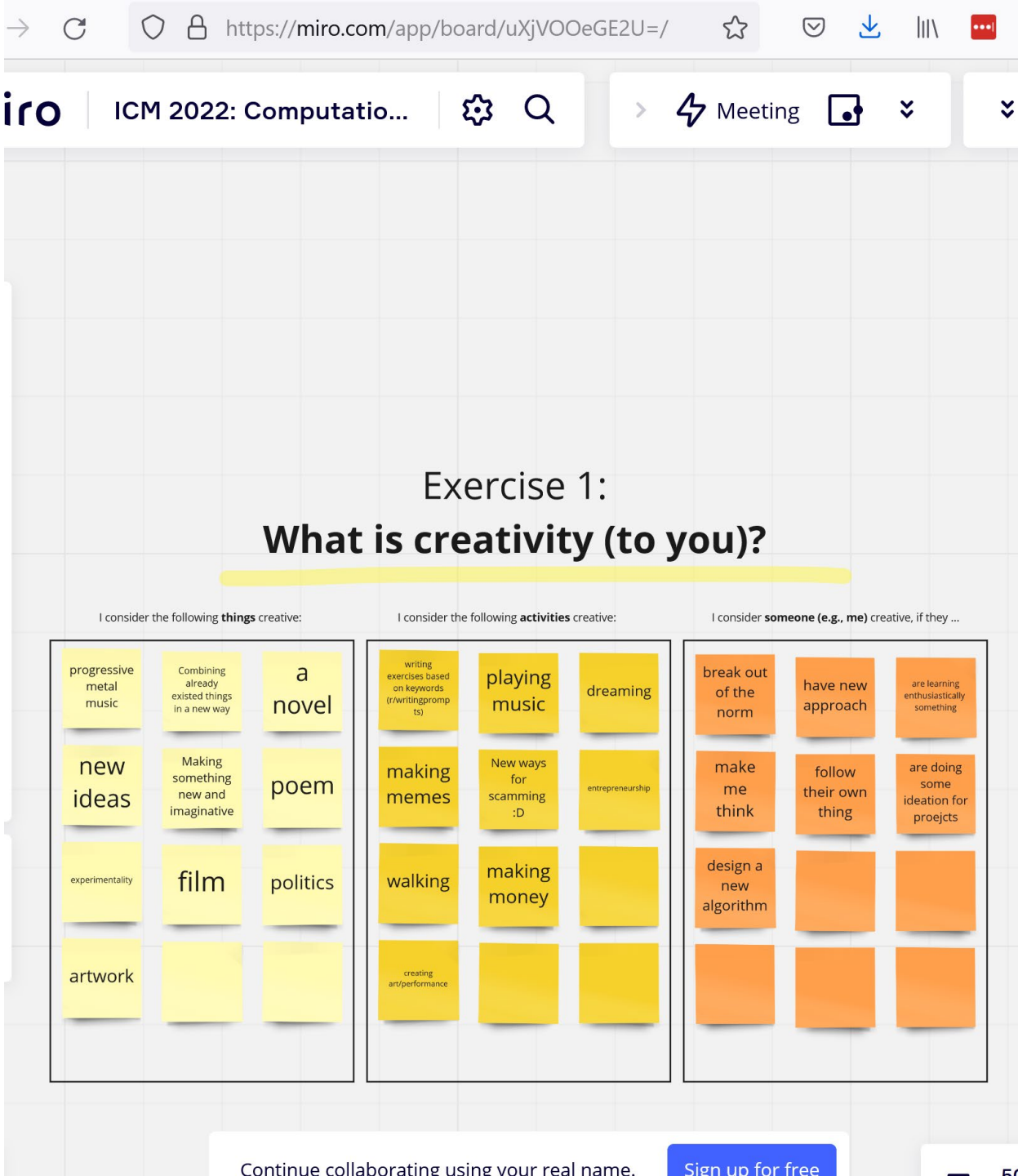
Contents

- What is Creativity?
- What is Computational Creativity?
- Exercise: Can AI be Creative?
- Creative Autonomy
- Summary & Further Reading



What is Creativity?

- Exercise:
  - What **things** do you consider creative?
  - What **activities** do you consider creative?
  - When do you consider **someone** (e.g., yourself) or something creative?
  - Put it on Miro! (Link on Discord..)



What is Creativity?

- A highly **ambiguous** concept!
- **Modern creativity research** initiated with Guilford's 1950 APA address
- **Explosion** in creativity research: > 9000 studies until 1998 (Runco et al., 1998)
- Already **50 different definitions** of "creativity" in 1988 (Taylor, 1988).
- Jordanous and Keller (2016) suggesting: creativity a "**family resemblance**" (Wittgenstein, 1953), or even "**essentially contested concept**" (Gallie, 1955)?

Runco, M. A., Nemiro, J. & Walberg, H. J. (1998). Personal Explicit Theories of Creativity. The Journal of Creative Behavior, 32(1), 1–17.

Taylor, C. W. (1988). Various Approaches to and Definitions of Creativity. In R. J. Sternberg (Ed.), The Concept of Creativity: Contemporary Psychological Perspectives (pp. 99–121). Cambridge University Press.

Jordanous, A. & Keller, B. (2016). Modelling Creativity: Identifying Key Components Through a Corpus-Based Approach. PloS one, 11(10), 1–27.

Wittgenstein, L. (2009, originally published 1953). Philosophical Investigations. Wiley.

Gallie, W. B. (1955). Essentially contested concepts. Proc. Aristotelian Society, 56, 167–198.

What is Creativity?

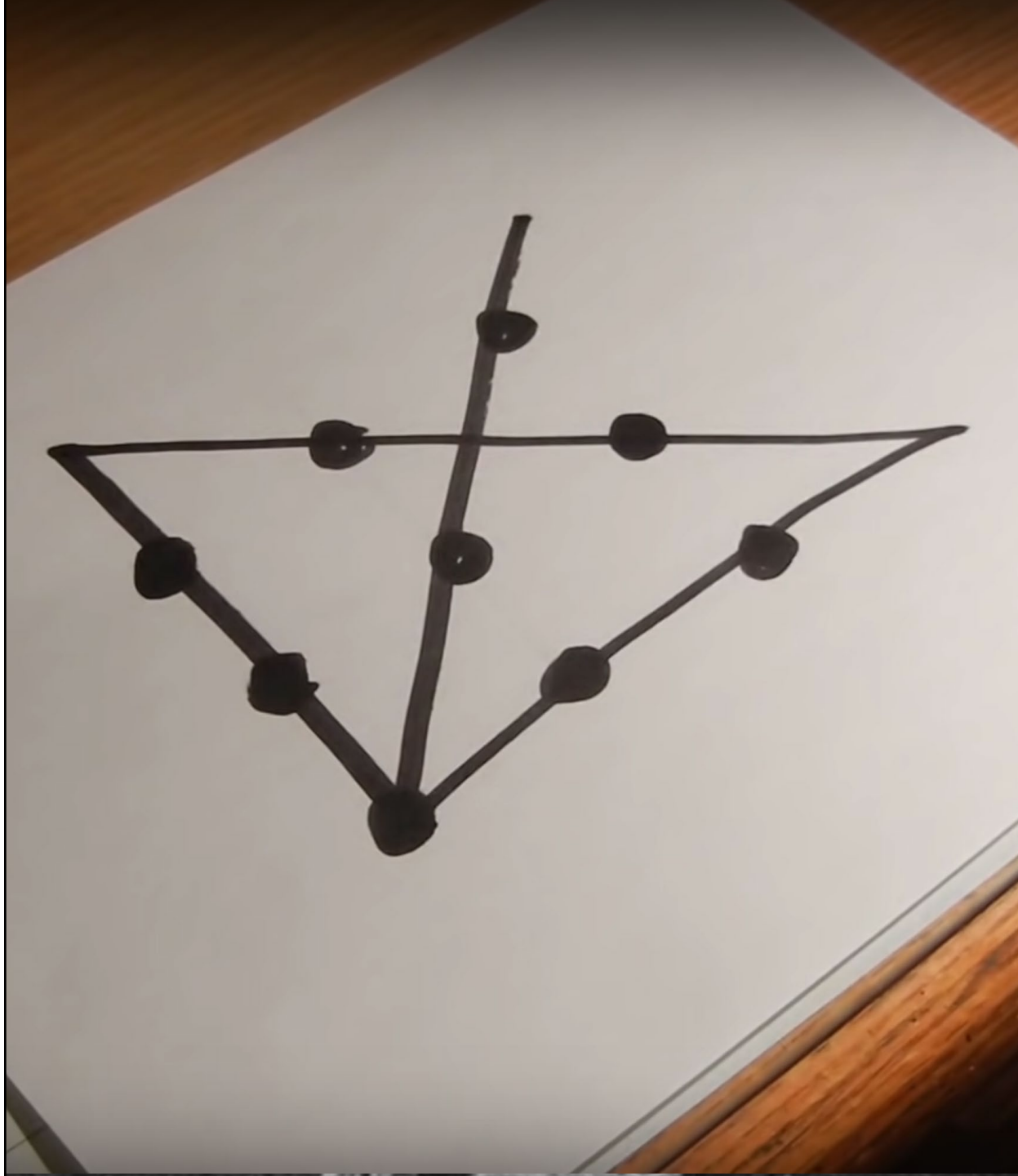
- Additional complexity: 4 Perspectives (4P's) of creativity (Rhodes, 1961):
  - **Person**: the creative individual
  - **Process**: what the creative individual does to produce creative outputs
  - **Product**: the result of the creative process
  - **Press**: the socio-cultural environment receiving the product
- **Exercise**:
  1. The 4P's in game development?
  2. The 4P's in game playing?

Runco & Jaeger (2012). The Standard Def. of Creativity. Creativity Research Journal, 24(1), 92–96.

Rhodes, M. (1961). An Analysis of Creativity. The Phi Delta Kappan, 42(7), 305–310.

What is Creativity?

- We can identify 3 **common components** (Runco & Jaeger, 2012; Boden, 2003). Creativity describes a person, a process, or a product (Rhodes, 1961) that is:
  - **Novel**
  - **Valuable** (or utility, or aesthetic pleasure, …)
  - **Surprising**
- Further **distinctions on novelty** (Boden, 2003):
  - **P-creative**: novel to its creator
  - **H-creative**: universally (historically) novel



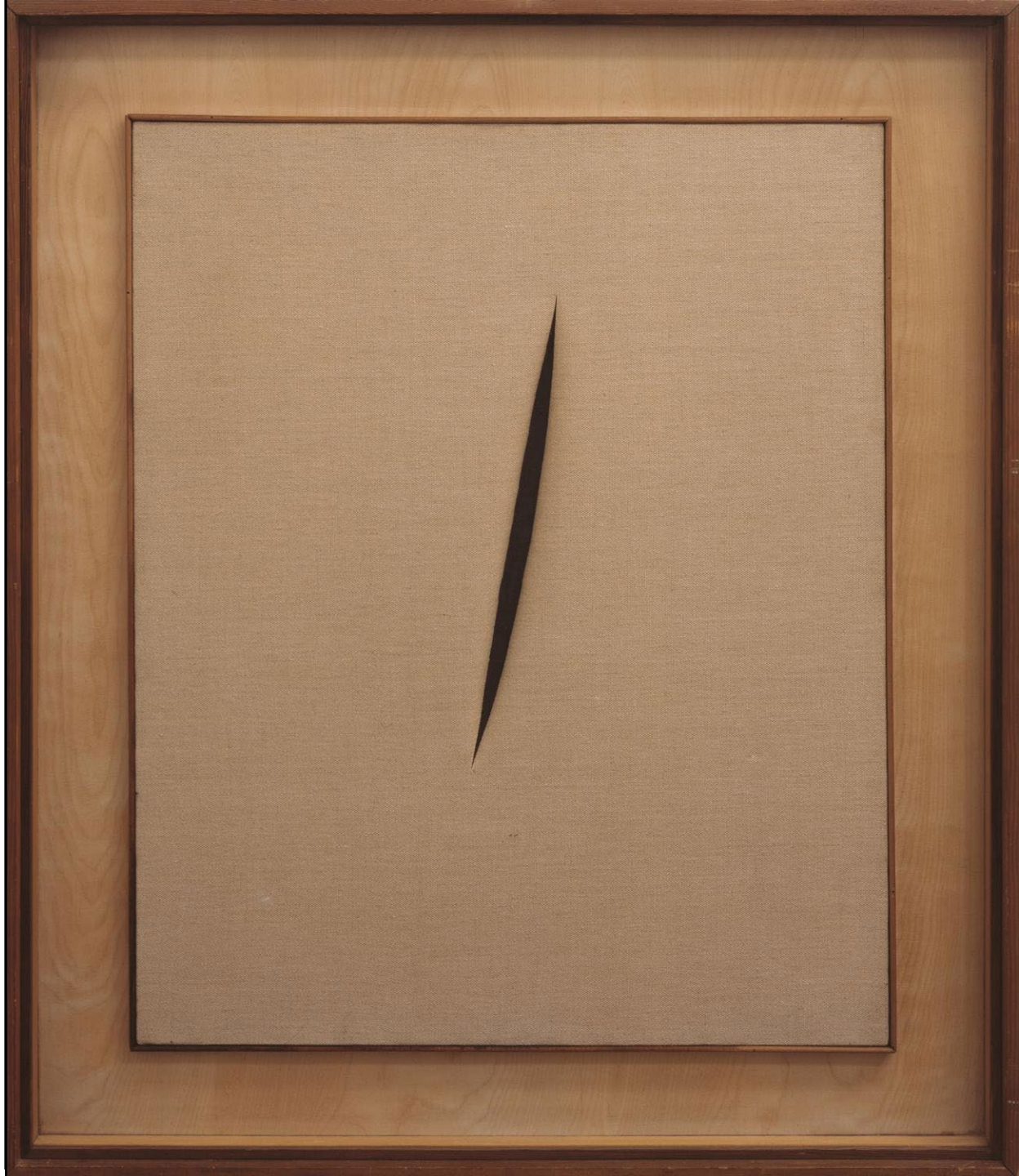
Runco & Jaeger (2012). The Standard Def. of Creativity. Creativity Research Journal, 24(1), 92–96.

Boden (2003). The Creative Mind: Myths and Mechanisms (2nd ed.). Routledge (Original 1990).

Rhodes, M. (1961). An Analysis of Creativity. The Phi Delta Kappan, 42(7), 305–310.

What is Creativity?

- We can distinguish different **types of creative processes** (Boden, 2003):
  - **Combinational creativity**: Novel combinations of familiar ideas
  - **Exploratory creativity**: Explore generative space for novel/valuable/surprising products.
  - **Transformational creativity**: from extending, changing the generative space.



Boden (2003). The Creative Mind: Myths and Mechanisms (2nd ed.). Routledge (Original 1990).

What is Computational Creativity?

- A Meta-Definition:
  - The **art**, **science**, **philosophy** and **engineering** (Colton & Wiggins, 2012)
  - of **autonomously** and **co-creative systems**
  - that can benefit people **culturally, socially and economically** (Pérez y Pérez, 2018)
- Is **interdisciplinary**: Computer Science, Cognitive Science, Philosophy, Sociology, Art, Design … (Ackerman et al., 2017).
- It covers many **creative domains**: problem solving, mathematical theory formation, scientific discovery, graphic design, audio design, the visual arts, the culinary arts, sculpture, choreography, musical composition, musical accompaniment, fictional ideation and various creative language applications, such as poetry, storytelling, narrative design, neologisms, metaphor, slogans, etc…

Colton & Wiggins (2012). Computational Creativity: The Final Frontier? Proc. ECAI, 21–26.
Pérez y Pérez, R. (2018). The Computational Creativity Continuum. Proc. ICCC, 177–184.
Ackerman et al. (2017). Teaching Computational Creativity. Proc. ICCC, 9-16.

ICCC'21 — 12th International Conference on Computational Creativity

Day 3, 16 Sep (Thursday)	Day 4, 17 Sep (Friday)	Day 5, 1 (Satur
Opening ceremony		
AI Keynote Speaker	Other Perspectives: Comedy by Numbers	Other Persp Animal Inn
Linguistic Creativity I	Visual Creativity I	Linguistic C
Arts & Aesthetics	Social Dimensions I	Linguistic Cr
Social time I	Social time III	Social ti
Musical Creativity	Theory & Philosophy	Social Dime
Theory & Practice	Tribute to Bob Keller	Visual Cre
Art Exhibition	Tools & Techniques	Pane Opportunit Challenge
Demo Session	Poster Session	Closing Ce Community
Social time II	Social time IV	

What is Computational Creativity?

- Diverse community with diverse **goals**:
  1. **Complement** and **augment** human creativity (everyday, scientific, artistic …) (Loughran & O'Neill, 2017)
  2. **Gain insights into** human & animal creativity via Synthetic Psychology (Boden, 2003)
  3. **Advance core AI & HCI** challenges: autonomy, adaptivity, generalisation, … (Colton & Wiggins, 2012)
- Overlapping with "Creative AI", "Creative Computing" or "AI for Media, Art & Design" but interested in engineering systems that are "**creative in their own right**".

Loughran & O'Neill. (2017). Application Domains in Computational Creativity. Proc. ICCC, 197–204.
Boden (2003). The Creative Mind: Myths and Mechanisms (2nd ed.). Routledge (Original 1990).
Colton & Wiggins (2012). Computational Creativity: The Final Frontier? Proc. ECAI, 21–26.

ECAI 2012
Luc De Raedt et al. (Eds.)

doi:10.3233/978-1-61499-098-7-21

Computational Creativity: The Final Frontier?

Simon Colton[1] and **Geraint A. Wiggins**[2]

Abstract. Notions relating to computational systems exhibiting creative behaviours have been explored since the very early days of computer science, and the field of Computational Creativity research has formed in the last dozen years to scientifically explore the potential of such systems. We describe this field via a working definition; a brief history of seminal work; an exploration of the main issues, technologies and ideas; and a look towards future directions. As a society, we are jealous of our creativity: creative people and their contributions to cultural progression are highly valued. Moreover, creative behaviour in people draws on a full set of intelligent abilities, so simulating such behaviour represents a serious technical challenge for Artificial Intelligence research. As such, we believe it is fair to characterise Computational Creativity as a frontier for AI research beyond all others—maybe, even, the final frontier.

1 BOLDLY ONGOING

Computational Creativity is a subfield of Artificial Intelligence (AI) research – much overlapping cognitive science and other areas – where we build and work with computational systems that create artefacts and ideas. These systems are usually, but not exclusively, applied in domains historically associated with creative people, such as mathematics and science, poetry and story telling, musical composition and performance, video game, architectural, industrial and graphic design, the visual, and even the culinary, arts. Our working definition of Computational Creativity research is:

> *The philosophy, science and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be creative.*

This definition contains two carefully considered subtleties. Firstly, the word **responsibilities** highlights the difference between the systems we build and *creativity support tools* studied in the HCI community [53] and embedded in tools such as Adobe's Photoshop, to which most observers would probably not attribute creative intent or behaviour. A creative responsibility assigned to a computational system might be: development and/or employment of aesthetic measures to assess the value of artefacts it produces; invention of novel processes for generating new material; or derivation of motivations, justifications and commentaries with which to frame their output.

Our second subtlety is in the methodological requirements for evaluation. We emphasise the involvement of **unbiased observers** in *fairly* judging the behaviours exhibited by our systems, because, it seems, there is a natural predilection for people to attribute creativity to human programmers, users and audiences instead of software and hardware. It seems that people allow their beliefs that machines can't possibly be creative to bias their judgement on such issues [32, 45].

Also related to evaluation, our working definition has two conspicuous and deliberate absences. First, it makes no mention of the value of the artefacts and ideas produced. This is because – while it is implicitly assumed that we would like our research to lead to the production of novel and valuable material – the computational systems producing that material may also innovate at aesthetic levels by inventing, justifying and utilising measures of value. Therefore, we propose to talk of the *impact* [20] of creative acts and their results, rather than the value of the output they produce, and the introduction of specific value requirements might limit the scope of future Computational Creativity research. Second, while it is popular in Computational Creativity – as it is in AI in general – to apply quasi-Turing-tests, comparing generated results with those made by people, our definition does not rule out situations where systems are deemed to be creative even though they behave in wholly different ways, and to different ends, from people. Notwithstanding the fact that many Computational Creativity researchers use simulations of human creative acts to further study humanity, we maintain that one of the real potentials of computational systems is to create in new, unforeseen modalities that would be difficult or impossible for people.

For a long period in the history of AI, creativity was not seriously considered as part of the field: indeed, when Margaret Boden included a chapter on creativity in her book, *Artificial Intelligence and Natural Man* [3], some observers suggested that it was out of place [4]. This may have been for good reason! We consider throughout this paper the difficulties that beset the study of Computational Creativity; there was a lot to be said for postponing such a difficult subfield until the larger area is better understood – as it now is. But perhaps this is also symptomatic of scepticism: perhaps creativity is, for some proponents of AI, the place that one cannot go, as intelligence is for AI's opponents. After all, creativity is one of the things that makes us human; we value it greatly, and we guard it jealously.

From the beginning of the modern computing era, notable experts have questioned the possibilities of machine intelligence with reference to creative acts. For example, the celebrated early neuroscientist Sir Geoffrey Jefferson wrote:

> "Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain"
> Geoffery Jefferson [38]

This was in response to Turing, who replied that Jefferson was merely expressing "The Argument from Consciousness" against in-

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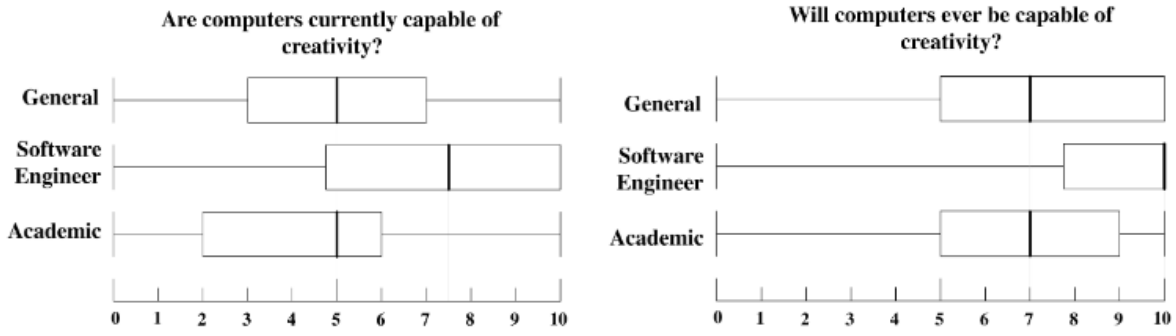
Can AI be Creative?

- Exercise:
  - Provide at least 2 arguments: in favour, against, both?
  - Put it on Miro! (Link on Discord..)
- Asking general public, software engineers, academics (0: lowest) (Mumford & Ventura, 2015)



Mumford, M., & , D. (2015). The man behind the curtain: Overcoming skepticism about creative computers. In Proc. ICCC (pp. 1–7).

https://miro.com/app/board/uXjVOOeGE2U=/

iro | ICM 2022: Computatio... | Meeting

Exercise 2:
Can AI be creative?

No way, because:

- AI cannot achieve things beyond its developer's imagination
- Humans create the AI - no surprise to what it can do
- Model=data, data can't be creative => model can't be creative
- AI can only mimic creativity, they are not concious
- no humans = no input
- AI is surprising because of its capacity to handle large amounts of data (we can't), not because of some original thinking
- Current AI is far from being able to generalize, it is not creative at all
- Creativity is ill understood, it's hard create something one doesn't understand

Sure thing, because:

- Novelty-seeking output, grounded in "believability" creates illusion of creativity
- Because with randomness can come creativity
- Somehow AI is originally from humans's activity
- It can teach us problem solving strategies we didn't think of (ex game of GO)
- AI works just like humans, combining old ideas to make something new. That is creative.
- can present artworks from different perspective or just better representation
- Human Creativity is variable and growing, AI can be though of as a new born baby
- Faster iteration in trying new things

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Creative Autonomy

- Ada Lovelace: “The Analytical Engine has **no pretensions to originate** anything. It **can do whatever we know** how to order it to perform.” (Menabrea, 1842)
- Autonomy matters for creativity:
  - Commonly observed **character trait** of creative people (Sheldon, 1995; Davis, 1999)
  - A central criterion for people **to attribute creativity** to AI (Mumford & Ventura, 2015).
- And beyond: who’s the **author**? Who earns **copyright**? Who does it **express**?

Menabrea, L. F. (1842). Sketch of the Analytical Engine Invented by Charles Babbage, With Notes Upon the Memoir by the Translator Ada Augusta, Countess of Lovelace.

Mumford, M., & , D. (2015). The man behind the curtain: Overcoming skepticism about creative computers. In Proc. ICCC (pp. 1–7).

Sheldon, K. M. (1995). Creativity and Self-Determination in Personality. Creativity Research Journal, 8(1), 25–36.

Davis, G. A. (1999). Barriers to Creativity and Creative Attitudes. In M. A. Runco & S. R. Pritzker (Eds.), Encyclopedia of Creativity (pp. 165–174). Academic Press.

On the Machine Condition and its Creative Expression

Simon Colton[1,2], **Alison Pease**[3], **Christian Guckelsberger**[1,4], **Jon McCormack**[2] and **Teresa Llano**[2]

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[2] SensiLab, Faculty of IT, Monash University, Melbourne, Australia
[3] School of Computing, Dundee University, Dundee, UK
[4] Finnish Center for Artificial Intelligence, Aalto University, Espoo, Finland

Abstract

The human condition can be characterised as the most essential characteristics, events and situations which describe human existence. We propose that a parallel discussion of the *machine condition* could improve public understanding of computational systems in general, and advance perception of creativity in computational creativity systems in particular. We present a framework for machines to creatively express their existence, sketch some aspects of the machine condition, and describe potential benefits of this approach.

Introduction

There are many reasons to engineer software that can act in an autonomously creative fashion in arts and science projects (Veale, Cardoso, and Pérez y Pérez 2019; Pérez y Pérez 2018). These include: enhancing human creativity through support tools; increasing the well-being of groups of people; public engagement around issues of AI; and bringing novel, interesting and important artefacts into the world. We explore here a less well-studied purpose for AI systems to create, namely for them to *tell us about themselves*. That is, machines have experiences which – while accepting that they are generally not considered to be alive – could be considered *life experiences*. The re-telling of these experiences through creative practice could be useful in human-computer interaction terms. Given the high complexities of the processing, data, physical presence and sensory inputs present in many computational systems, and the high impact they have on human society, giving machines a way of expressing themselves creatively might help people grasp difficult elements of our technological society. This may initially have only utilitarian value in clarifying how technology works, and people may not care about machine life experiences. However, it’s not impossible to think that people could become fascinated with such experiences, and may, in time, develop empathy with machines as they become more integrated into, and appreciated by, society.

Increasingly, automated systems make decisions about people’s lives without the people it affects understanding how they work. Artistic production in human cultures enables communication which helps people understand each other and make connections within and between communities. We suggest that AI systems could undertake artistic production for the purpose of explaining how the software and hardware functions at all levels, rather than – or in addition to – the other purposes given above. This suggestion fits within the explainable AI (XAI) movement (Arrieta et al. 2020) and the many initiatives to educate people about how technology works in general. However, we go further in suggesting that we define and understand aspects of the *existence* of machines, not just the decisions they make or the processing they perform, and we suggest a mechanism for this communication, namely expressive artistic production.

Artistic products such as paintings, musical compositions, poems, games, etc., differ in accuracy when used to communicate ideas. We look here at supplementing other efforts in computer science public engagement via machines producing artworks which, due to their more abstracted nature, demand (human) interpretation of the ideas expressed. While this may decrease accuracy in the communication of machine existence, the interpretative effort required could mean that people gain understanding on their own terms, and the cognitive effort may help ideas to persist in their minds.

Our aim here is to suggest a context within which such expressive production could be carried out, and to provide a framework to guide the initial construction of creative AI systems for the communication of machine existence. Gaining inspiration from human creative expression, we note that the notion of *the human condition* provides a framework for some art production, as it addresses the most important aspects of human existence. We therefore propose a parallel notion of *the machine condition*, i.e., what it means to be a machine, as part of a framework for creative expression by computational systems. This parallel notion is achieved via an interpretation of the human condition as a set of high-level concepts capturing categories of events, and an understanding of the types of events in a person’s life which constitute major experiences. The framework also suggests a pipeline for creative production whereby an actual event prompts the production of an artefact which references higher level aspects of machine existence.

Augmenting the reasons for machines to behave creatively will affect the way in which we evaluate such systems. In the next section, we describe how various evaluation methods for creative machines, for various purposes, have influenced our thinking and led to the proposal here. We also place our work in the contexts of explainable AI (Arrieta et al. 2020) and communication in computational creativity, and suggest how generative systems could be

Creative Autonomy

- Key questions:
  - What does “creative autonomy” mean?
  - How can we entail an AI with creative autonomy?
- Jenning’s (2010) requirements:
  - Autonomous evaluation: The system can evaluate its liking of a creation without seeking opinions from an outside source.
  - Autonomous change: The system initiates and guides change to its evaluation without being directed when and how to do so.
  - Non-Randomness: The system’s changes to its evaluation are not purely random.

Jennings, K. E. (2010). Developing Creativity: Artificial Barriers in Artificial Intelligence. Minds and Machines, 20(4), 489–501.

Developing Creativity: Artificial Barriers in Artificial Intelligence

Kyle E. Jennings

Received: 16 October 2009 / Accepted: 29 March 2010 / Published online: 2 October 2010

Abstract The greatest rhetorical challenge to developers of creative artificial intelligence systems is convincingly arguing that their software is more than just an extension of their own creativity. This paper suggests that “creative autonomy,” which exists when a system not only evaluates creations on its own, but also changes its standards without explicit direction, is a necessary condition for making this argument. Rather than requiring that the system be hermetically sealed to avoid perceptions of human influence, developing creative autonomy is argued to be more plausible if the system is intimately embedded in a broader society of other creators and critics. Ideas are presented for constructing systems that might be able to achieve creative autonomy.

Keywords Computational creativity · Autonomy · Socially-inspired computing

The Quest for Creative Autonomy

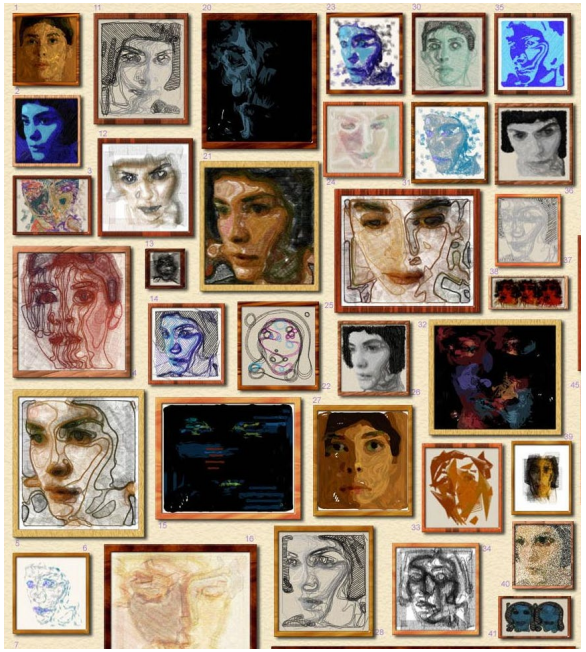
Much of the theoretical work in creative artificial intelligence tries to specify when a system has gone beyond simply doing the bidding of its programmer. For instance, one rationale for Boden’s (1991) “transformational” criterion is that since the programmer creates the initial search space with a particular view of what is possible, a system that transformed that space would be going beyond the

Creative Autonomy

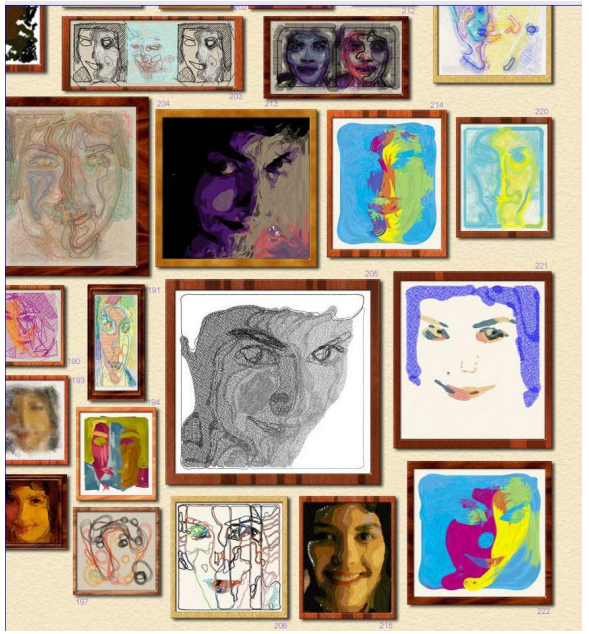
- Colton (2012): How to **cut the umbilical cord** between a program and its creator?
- By **“climbing the meta-mountain”**:
  - Ask yourself: what are the limits of the current system, and **how is it still dependent** on the programmer?
  - Incrementally write a new program to do each of these tasks to reduce the AI’s dependency on the programmer.
- Example (right): developing **“The Painting Fool”**, an automated painter (Colton, 2009; Colton 2012)

Colton, S., 2009. Seven catchy phrases for computational creativity research. In Dagstuhl Seminar Proceedings. Schloss Dagstuhl-Leibniz-Zentrum für Informatik.

Colton, S., 2012. The painting fool: Stories from building an automated painter. In Computers and creativity (pp. 3-38). Springer, Berlin, Heidelberg.



Transition from given styles (left) to generated styles (bottom)

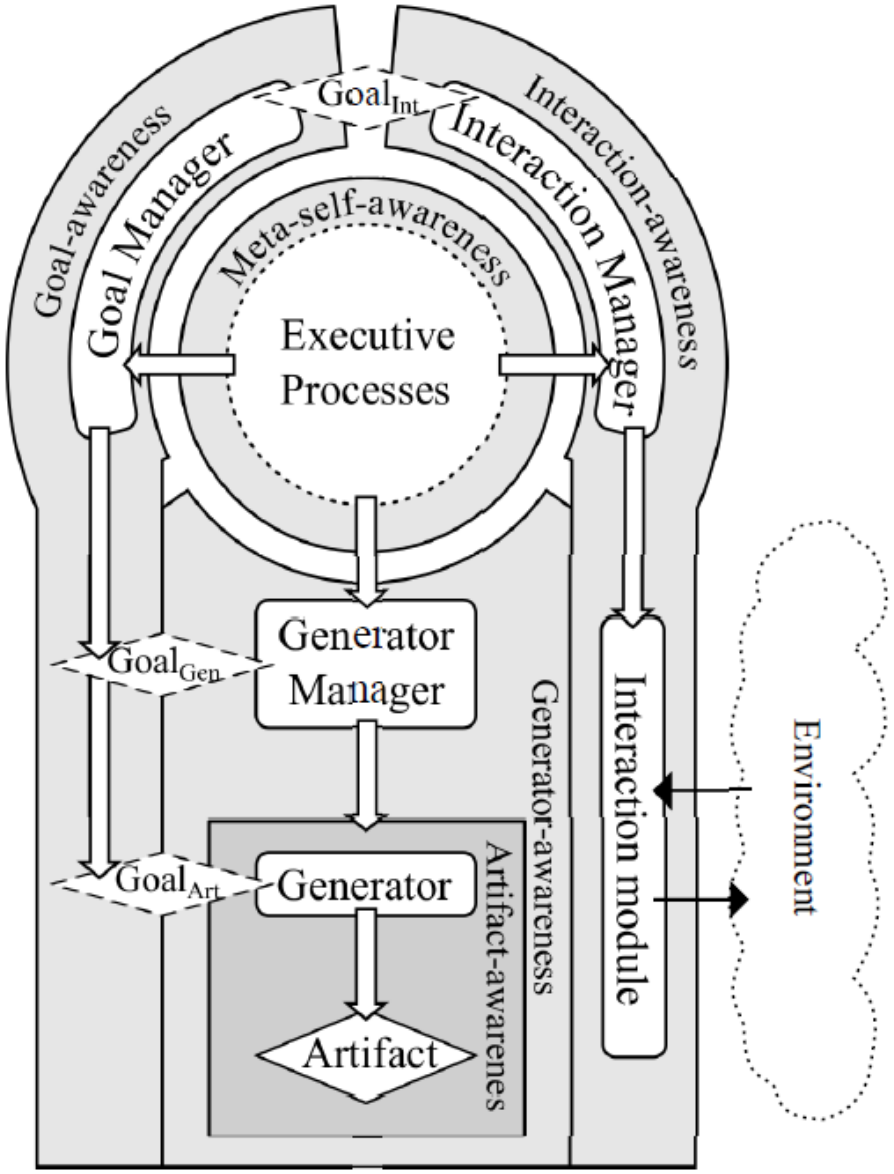


The Meta-Mountain:

1. making marks on paper
2. making marks to represent scenes
3. painting scenes stylistically
4. choosing appropriate styles for scenes
5. inventing scenes
6. inventing scenes for a reason
7. evolving as an artist.

Creative Autonomy

- Linkola et al. (2017): Borrowing inspiration from **self-adaptive software systems:** change their behavior in runtime as a response to changes in their environment.
- Self-adaptation requires:
  - **Reflection**: ability to monitor and gain information about an aspect
  - **Control**: ability to adjust/modify that aspect
- Considering **six self-awareness aspects**, 3 of which required for **creative autonomy**:
  - Artifact-awareness
  - Generator-awareness
  - Goal-awareness



The “meta-creativity jukebox”

Linkola, S., Kantosalo, A., Männistö, T. & Toivonen, H. (2017). Aspects of Self-Awareness: An Anatomy of Metacreative Systems. Proc. Int. Conference on Computational Creativity (ICCC), 189–196.

Creative Autonomy

- Guckelsberger et al. (2017): Relating **value** in creative product/process with **intentional agency**: "why" is system acting creatively?
- **No existing system** can answer this question without referring to intentions of its human designer or users.
- Human creativity tightly interleaved with our sociocultural environment. Thus focus on **creative behaviour** of **simple organisms**.
- Arguing via **autopoietic enactivism** that: (i) AI can ground intentional creative agency in the maintenance of their existence, (ii) through computational intrinsic motivation.

Guckelsberger, C., Salge, C. & Colton, S. (2017). Addressing the "Why?" in Computational Creativity: A Non-Anthropocentric, Minimal Model of Intentional Creative Agency. Proc. ICCC, 128–135.

Addressing the "Why?" in Computational Creativity: A Non-Anthropocentric, Minimal Model of Intentional Creative Agency

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Abstract

Generally, computational creativity (CC) systems cannot explain *why* they are being creative, without ultimately referring back to the values and goals of their designer. Answering the *"why?"* would allow for the attribution of *intentional agency*, and likely lead to a stronger perception of creativity. Enactive artificial intelligence, a framework inspired by autopoietic enactive cognitive science, equips us with the necessary conditions for a value function to reflect a system's own intrinsic goals. We translate the framework's general claims to CC and ground a system's creative activity intrinsically in the maintenance of its identity. We relate to candidate computational principles to realise enactive artificial agents, thus laying the foundations for a minimal, non-anthropocentric model of intentional creative agency. We discuss first implications for the design and evaluation of CC, and address why human-level intentional creative agency is so hard to achieve. We ultimately propose a new research direction in CC, where intentional creative agency is addressed bottom up.

Introduction

Imagine conducting an interrogation experiment, in which human participants are to judge the creativity of a state of the art computational creativity (CC) system. The system could be a piece of software or consist of one or several embodied agents, it could act in the lab or in the field, and there is no restriction on the type of creativity exercised. Crucially, the system has unlimited capacities to enter into a dialogue and to frame (Charnley, Pease, and Colton, 2012) its actions. Participants include the general public, CC researchers, as well as expert practitioners and critics of the type of creativity exercised. In contrast to the Turing (1950) test, the system must always answer truthfully.

We would expect most participants to base their judgement on the system's observed behaviour and produced artefacts only. Some might make few inquiries about the system's process, while others might engage in a deep interrogation. We would certainly end up with divided opinions on the creativity of the system, confirming the view that creativity is an *essentially contested concept* (Gallie, 1955; Jordanous and Keller, 2016). While we would expect most participants to attribute creativity to the system if its behaviour and output was *novel* and *valuable*, others might be more inquisitive, and eventually fail the system because it cannot give satisfactory answers to *why it acted the way it did*.

This addresses the system's *intentional agency*, i.e. its capacity to have a purpose, goal or directive for creative action (cf. Ventura, 2016). However, we doubt that any existing CC system, even with our hypothetical dialogue capacity, could answer questions about its intentionality without referring to its designer's goals. Jordanous and Keller (2016) have empirically identified intentionality as one factor in the perception of creative systems. We believe that a system's inability to account for its *own* intentionality is a valid reason for people to disapprove it of being creative, particularly creative *in its own right*. We also doubt that these systems fully own their artefacts, as they cannot justify why they *originated* them. Ada Lovelace famously addressed originality:

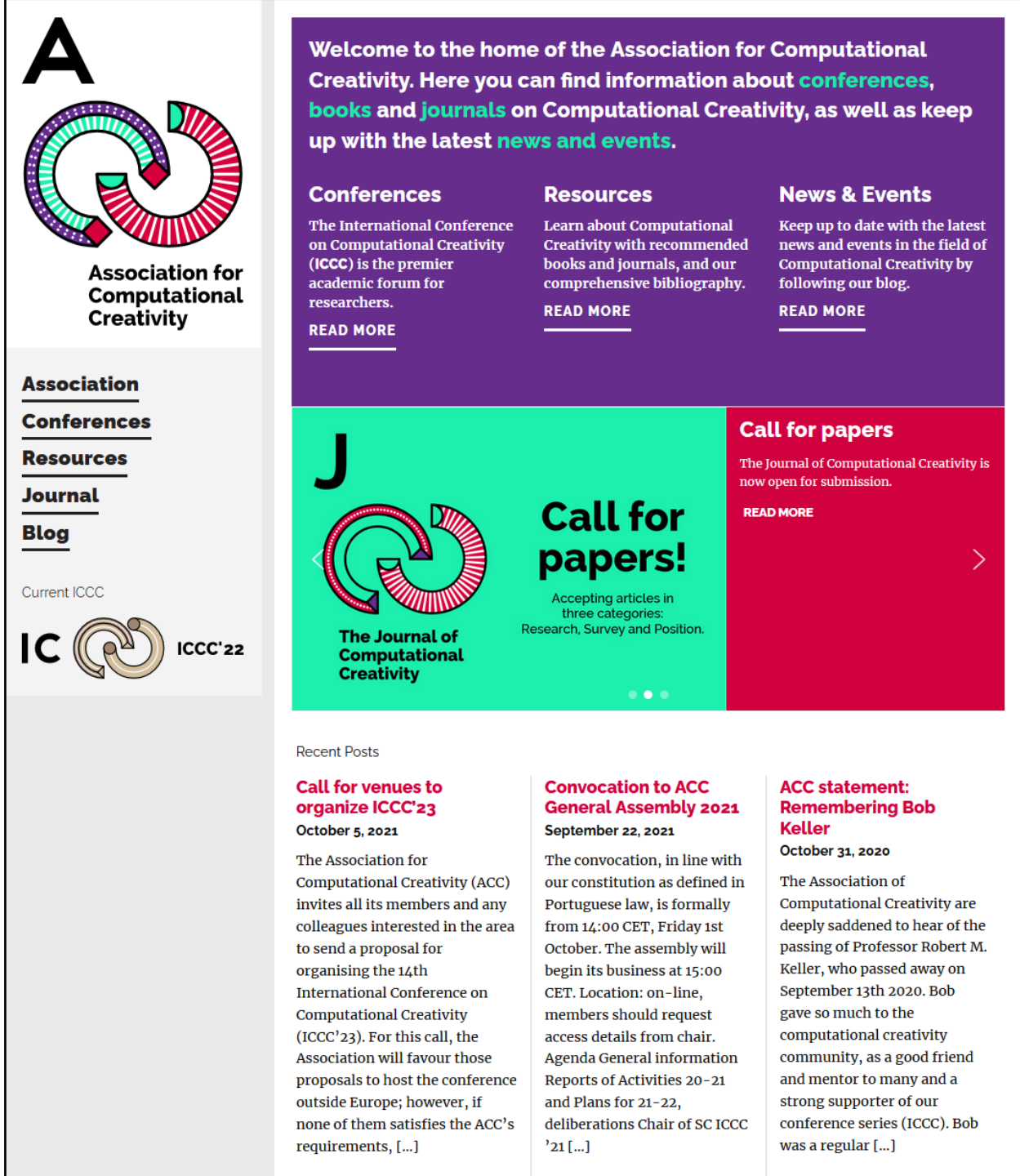
> "The Analytical Engine has no pretensions to originate anything. It can do whatever we know how to order it to perform". (Menabrea and Lovelace, 1842)

By stating that the Analytical Engine has no *pretensions* to originate anything, Lovelace gives us the key to what we believe is the answer to the *"why?" in CC*: if we want to design systems that are deemed creative in their own right, we need them to *own their goals*. Their pretensions, i.e. their motivations, must not be the designers', but arise from their own, genuine *concern*. This concern forms the basis of a system's *sense-making*, i.e. the assignment of values to features of the world that are of relevance to the system itself. To be considered an intentional *agent* in its own right, it must use these values as the basis of action.

Not only do existing implementations fail to address this ultimate challenge of intentional creative agency – CC also misses a theoretical framework describing the conditions for intrinsic goal-ownership underlying intentionality. We believe that the development of such a framework is hindered by CC's focus on human creativity in system design and evaluation. Human creativity unfolds within a complex network of influences shaped by a person's social and cultural environment (Bown, 2015; Jordanous, 2015). Identifying why a person was being creative and translating the findings to formal models therefore is hard. We also believe that CC's focus on big-C artefacts (Kaufman and Beghetto, 2009) is detrimental, as the values within are hard to disentangle and invite complex interpretations of the notion of creativity. Despite these impediments, CC's major contributions to key concepts around intentionality such as *adaptivity*

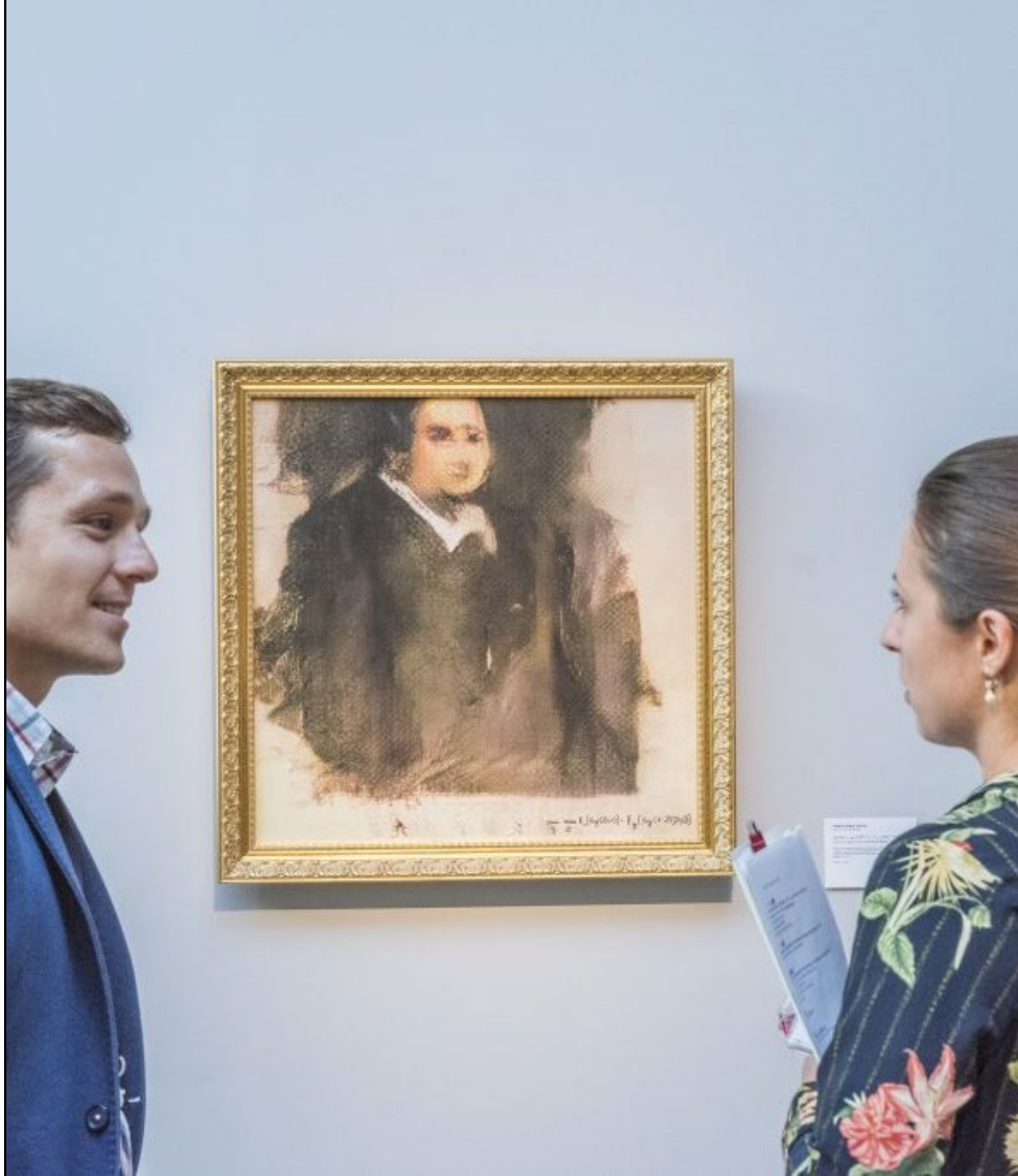
Additional Material

- Introductory Book:
  - Veale, T., & Cardoso, F. A. (Eds.). (2019). *Computational creativity: The philosophy and engineering of autonomously creative systems*. Springer.
- Association for Computational Creativity:
  - Resources: books, papers, journals…
  - International Conference on Computational Creativity (ICCC)
  - http://computationalcreativity.net
- More Research Venues:
  - Creativity and Cognition Conference: https://cc.acm.org/2022/
  - NeurIPS Workshop: Machine Learning for Creativity and Design: http://neuripscreativityworkshop.github.io



Summary

- **Creativity**: ambiguous, but not essentially contested: **novelty, value, surprise**.
- Types of **creative processes** to model: combinatorial exploratory, transformational.
- **Computational Creativity**: Art, Science, Philosophy and Engineering. Building systems that are (co-)creative in own right.
- **Creative autonomy** is crux: IMO no system to date can be considered autonomously creative (but my view is quite radical).



Course Feedback Time!

- Yay: 14 responses to the first week survey. **Please keep it up – you help us a lot!**
- https://link.webropol.com/s/icm22-2

E514101 Intelligent Computational Media D: Intermediate Feedback (Week 2)

This is an opportunity for you to give feedback while the course is still running. We'll try to put it into effect immediately. If your feedback does not fit into this form, please approach the course staff directly (e.g. via Discord). You can find the lecture and exercise contents here: https://github.com/PerttuHamalainen/MediaAI .

1. The lecture was interesting (1: Strongly Disagree, ..., 5: Strongly Agree): *

	1	2	3	4	5
Day 4: Text Generation	○	○	○	○	○
Day 5: Optimisation	○	○	○	○	○
Day 6: Game AI	○	○	○	○	○
Day 7: Computational Creativity	○	○	○	○	○

2. The lecture was easy to follow (1: Strongly Disagree, ..., 5: Strongly Agree): *

	1	2	3	4	5
Day 4: Text Generation	○	○	○	○	○
Day 5: Optimisation	○	○	○	○	○
Day 6: Game AI	○	○	○	○	○
Day 7: Computational Creativity	○	○	○	○	○

3. The exercises were interesting (1: Strongly Disagree, ..., 5: Strongly Agree): *

	1	2	3	4	5
Day 4: Text Generation	○	○	○	○	○
Day 5: Optimisation	○	○	○	○	○
Day 6: Game AI	○	○	○	○	○
Day 7: Computational Creativity	○	○	○	○	○

4. I received sufficient support in exercise and project work *

- ○ Strongly disagree
- ○ Disagree
- ○ Agree
- ○ Strongly agree

5. Open suggestions for improvement:

Submit