

Design for Creativity

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Agenda

- What is creativity
- Creativity Support Tools
- Example of Human-AI Co-Creation
- Example of AI for Group Collaboration

Activity

1. What do you consider as creative activities?
2. Who and what tools are involved during those activities?
3. What is Creativity?

Individualist view: Creativity is a new mental combination that is expressed in the world.

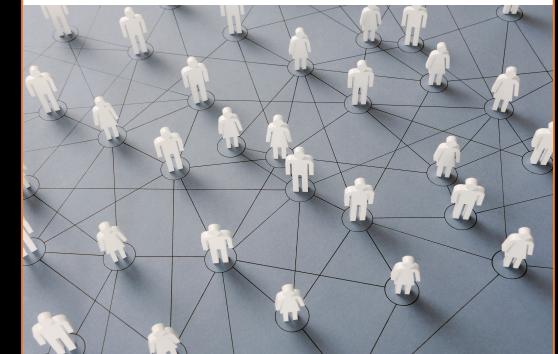
Personality



Internal mental process



Creative social systems



Sociocultural view: Creativity is the generation of a product that is judged to be novel and to be appropriate, useful, or valuable by a suitable nonweldable social group.

Samples of classes of creativity support tools and samples or product

Ben Shneiderman. 2007. Creativity support tools: accelerating discovery and innovation. Commun. ACM 50, 12 (December 2007), 20–32. DOI:<https://doi.org/10.1145/1323688.1323689>

Individual and Group Creativity Support Tools	
Information visualization tools	Spotfire, SAS JMP, DataDesk, ManyEyes, Digg
Specialized visualization tools: GIS	Google Maps, ArcInfo
Specialized visualization tools: gene expression analysis	GeneSpring, DNASTAR
Mathematical manipulation	MatLab, Mathematica
Engineering, architectural, industrial, product design	Autocad Inventor, DataCAD, SolidWorks
Simulation	SPICE, Tierra
New media development environments	Max/MSP, Pd, processing
Animation and interaction	Flash, FLEX, OpenLaszlo
Music	Cinescore, Cakewalk Sonar
Video editing	Premier, Final Cut Pro, Lightworks, iMovie, Windows MovieMaker
Concept mapping	Inspiration, MindMapper, MindManager, Axon
Group and Social Creativity Support Tools	
Software development	Eclipse, JDeveloper, Visual Studio
Wikis	Wikipedia, Wikia
Citizen journalism	Blogger, Ohmynews, Slashdot
Media sharing	Flickr, YouTube
Music	Garageband, MacJams

Design Principles for Creativity Support Tools (CSLs)

Support exploratory search

Enable collaboration

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Design Principles for Creativity Support Tools (CSLs)

Support exploratory search

Enable collaboration

Provide rich history-keeping

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Design Principles for Creativity Support Tools (CSLs)

Support exploratory search

Enable collaboration

Provide rich history-keeping

Design with low thresholds, high ceilings, and wide walls

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Author	Year	Analog	Phone	Tabletop	Wall display	Devices	Tablet	Laptop/PC	Tangibles	No device	Complex.	Low complexity	Mid complexity	High complexity	Not available	Needs special hardware	Online, but setup req.	Readily available	Design Fiction	Maturity	Lo-fi prototype	High fidelity prototype	Public release	Widely publicly adopted	Pre-ideation	Idea generation	Evaluation/critique	Implementation	Iteration	Meta/project management	User group	Novice	Casual	Expert	Unspecified	No evaluation	Hypothesis-driven	Exploratory	Students evaluation	Evaluation	Evaluation	Collab.	Machine creativity
Fischer	1999																																										
Streitz et al.	1999																																										
Prante et al.	2002																																										
Abrams et al.	2002																																										
Bryan-Kinns	2004																																										
.....																																											
Yeh & Kim	2018																																										
Gilon et al.	2018																																										
Clark et al.	2018																																										
Sun et al.	2018																																										
Wang et al.	2018																																										
Smit et al.	2018																																										
Maiden et al.	2018																																										

Jonas Frich, Lindsay MacDonald Vermeulen, Christian Remy, Michael Mose Biskjaer, and Peter Dalsgaard. 2019. Mapping the Landscape of Creativity Support Tools in HCI. *Proceedings of the 2019 CHI*. DOI:<https://doi.org/10.1145/3290605.3300619>

AI in Co-Creation Process

- Human-AI co-creation
 - Drawing
 - Creative writing
 - Graphic Design
 - Video game content
 - GUI
 - ...

Example: Visual Blend

How to support the process? How much AI? How much human control?

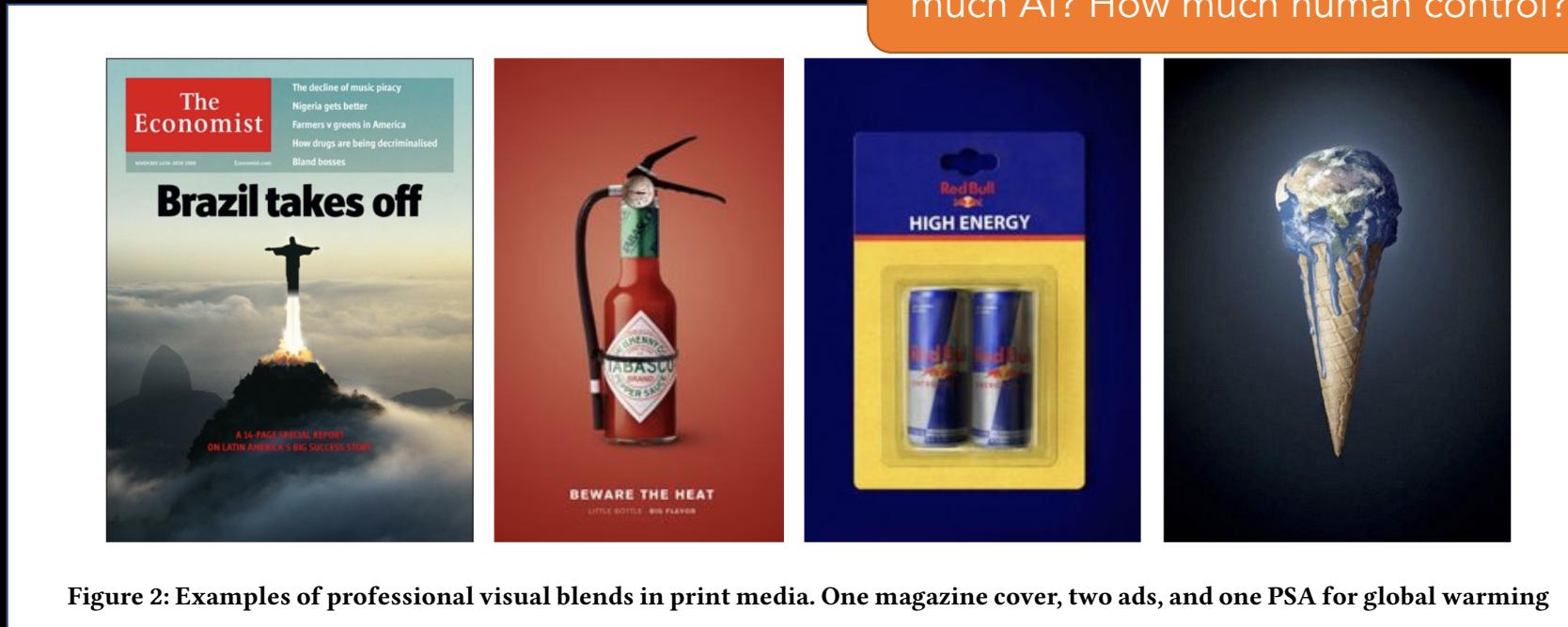
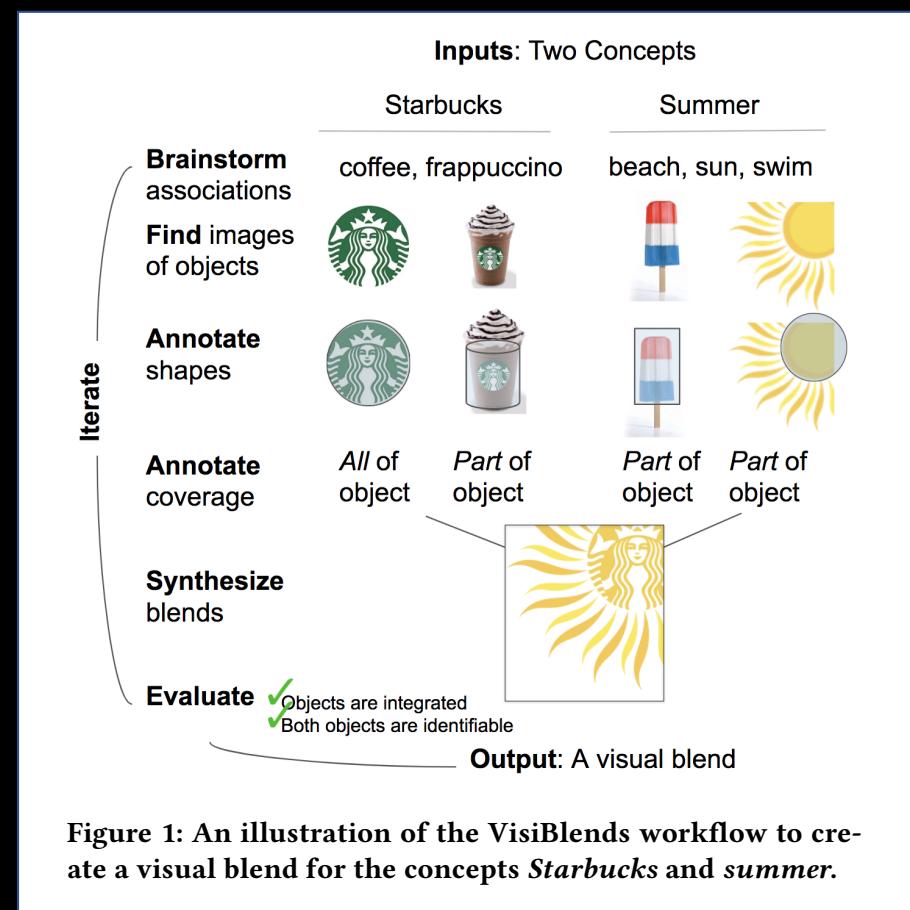


Figure 2: Examples of professional visual blends in print media. One magazine cover, two ads, and one PSA for global warming

Lydia B. Chilton, Savvas Petridis, and Maneesh Agrawala. 2019. VisiBlends: A Flexible Workflow for Visual Blends. Proceedings of CHI 2019. DOI:<https://doi.org/10.1145/3290605.3300402>

Example: Visual Blend



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Example: Visual Blend

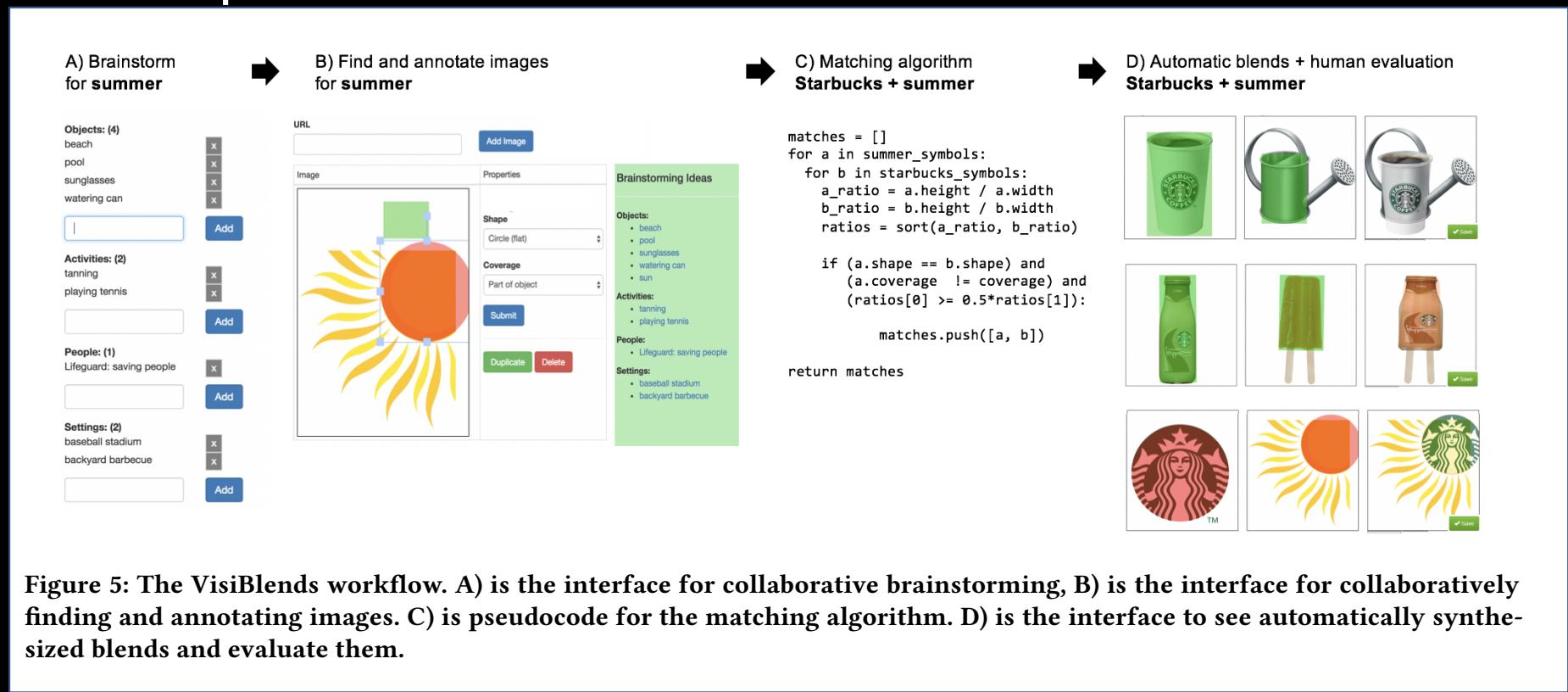


Figure 5: The VisiBlends workflow. A) is the interface for collaborative brainstorming, B) is the interface for collaboratively finding and annotating images. C) is pseudocode for the matching algorithm. D) is the interface to see automatically synthesized blends and evaluate them.

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More on Designing the User Experience

- Who should take the initiative?
- How detailed should the communication between AI and user?

More on Designing the User Experience

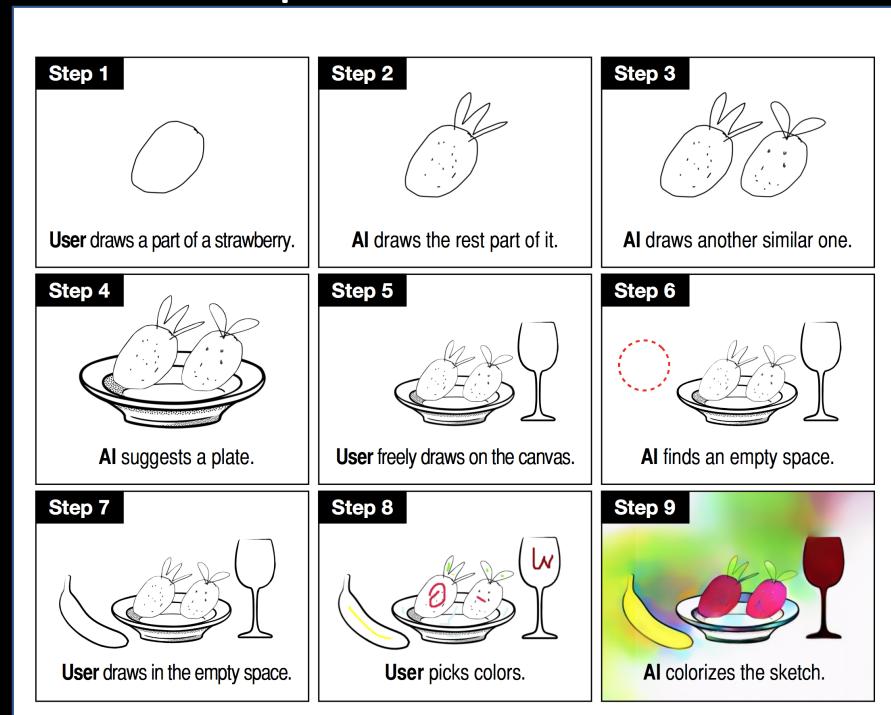


Figure 1. Drawing using DuetDraw in the Lead mode. With DuetDraw, users and AI can collaboratively draw pictures.

Changhoon Oh, Jungwoo Song, Jinhan Choi, Seonghyeon Kim, Sungwoo Lee, and Bongwon Suh. 2018. I Lead, You Help but Only with Enough Details: Understanding User Experience of Co-Creation with Artificial Intelligence. Proceedings of Chi2018. DOI:<https://doi.org/10.1145/3173574.3174223>

More on Designing the User Experience

Most participants prefer detailed instructions. But detailed mode did not guarantee a good experience.

Participants always want to LEAD.

Participants were pleased with unexpected results.

Participants felt confused when the ability of the AI differed across functions.

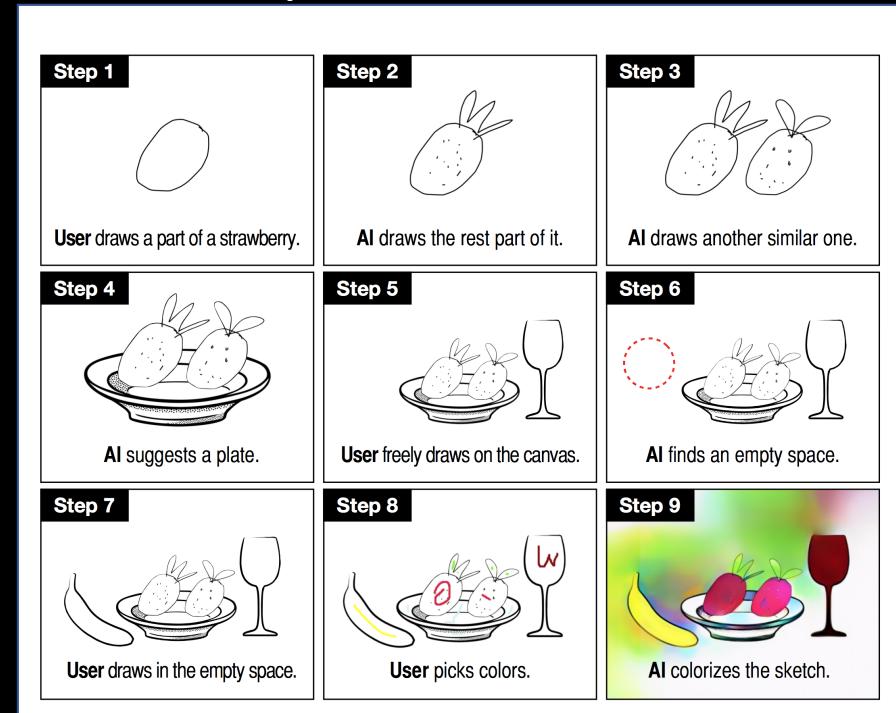


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AI in Co-Creation Process

- Human-AI co-creation
- AI for Group Collaboration
 - As collaborate teammates
 - As mediator of teamwork

How AI could affect collaborative dimensions such as interpersonal dynamics, impression formation, trust and conflict?

Example: Cococo

The screenshot shows the Bach CoCoCo application interface. At the top, there's a title bar with the text "Bach CoCoCo". Below it is a control panel with buttons for "VOLUME", "OCTAVE", "TEMPO", and "DEPTH". On the left, there's a vertical stack of buttons labeled "S", "A", "T", and "B". The main area displays a musical score with multiple staves. Several horizontal bars of different colors (green, blue, red) are overlaid on the staves, representing generated musical sequences. These bars are numbered (1) through (7) with purple boxes. To the right of the score, there's a "GENERATE" button with a musical note icon, labeled "(3)". Below it, a section titled "3 sequences" includes sliders for "Conventional" (blue dot) and "Surprise" (grey dot), and buttons for "Minor" (yellow emoji), "Major" (blue emoji), "Similar" (blue dot), and "Different" (grey dot), all enclosed in a purple box labeled "(4)". Further down, there's a box labeled "original" and three smaller boxes labeled "(5)" containing short musical snippets. At the bottom right, there's a "CHOOSE" button. The bottom of the interface has a toolbar with icons for play, stop, and repeat, and dropdown menus for "Bass Voice" (set to "Bass") and "Quantization" (set to "1/8"). A "C MAJOR" button is also present.

Minhyang (Mia) Suh, Emily Youngblom, Michael Terry, and Carrie J Cai. 2021. AI as Social Glue: Uncovering the Roles of Deep Generative AI during Social Music Composition. Proceedings of CHI 2021. DOI:<https://doi.org/10.1145/3411764.3445219>

Example: Cococo

Impact of AI in the co-creation process

Additional decision-making points on when, where, and how to use AI in their collaboration

- 1) deciding where and when to request that the AI generate content (voices and time segments);
- 2) deciding what quality of music they wanted in that segment by adjusting the sliders;
- 3) evaluating and selecting which of the N AI-generated options sounded best;
- 4) deciding which partner would be the main driver of these decisions above, each time they occurred.

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Example: Cococo

Role of AI in the co-creation process

AI as common ground

"AI's generated output provided a seed for discussion that participants found helpful for finding common ground. It also provided initial momentum for getting the composition started. "

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Example: Cococo

Role of AI in the co-creation process

AI as common ground

AI as a psychological safety net.

"AI may help provide psychological safety by offloading the burden of generating acceptable content, acting as a safety net that re-mediates or smooths over human-created rough edges, and introducing an air of playfulness through its surprises and idiosyncrasies."

Minhyang (Mia) Suh, Emily Youngblom, Michael Terry, and Carrie J Cai. 2021. AI as Social Glue: Uncovering the Roles of Deep Generative AI during Social Music Composition. Proceedings of CHI 2021. DOI:<https://doi.org/10.1145/3411764.3445219>

Example: Cococo

Role of AI in the co-creation process

AI as common ground

AI as a psychological safety net.

AI as a force for progress.

"AI helped the co-composition process move forward more quickly, providing initial content as a starting point, narrowing a large decision space to a few concrete decision parameters, generating alternative ideas when users were stuck, and filling in large chunks of unfinished work, all of which enabled participants to speed up their progress."

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Example: Cococo

Role of AI in the co-creation process

AI as common ground.

AI as a psychological safety net.

AI as a force for progress.

AI as social lubricant.

"AI helped uncover and mitigate latent friction, both by offering a path for moving forward, and by shifting social dynamics away from human-human differences towards human-AI differences."

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Example: Cococo

Role of AI in the co-creation process

AI as common ground.

AI as a psychological safety net.

AI as a force for progress.

AI as social lubricant.

AI altering the creative and collaborative roles of humans.

"AI could limit their depth of collaboration, despite it enhancing their ease of collaborating together. Intrinsic constraints of the AI algorithm itself may have limited users' creative scope and freedom"

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Review

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Next on Tuesday

Design for Inclusiveness