



Design Recommendations for Augmenting Creative Tasks with Computational Priming

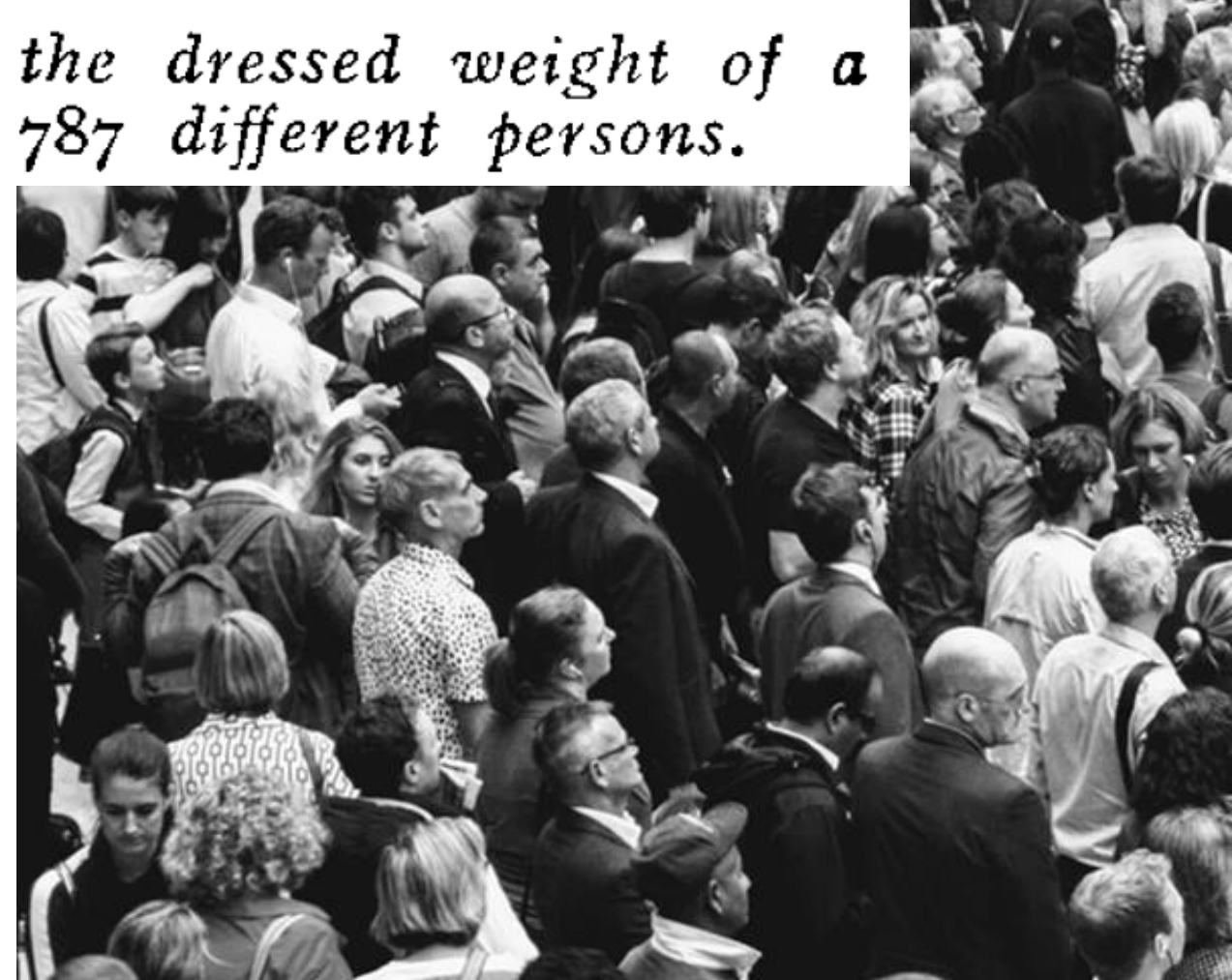
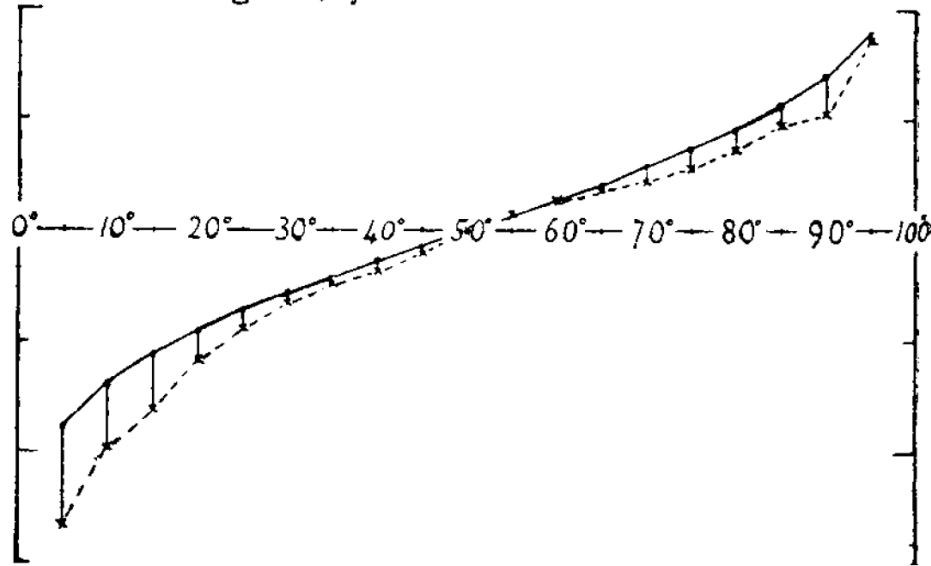
Jonas Oppenlaender and Simo Hosio
University of Oulu, Finland



Wisdom of the Crowd

Distribution of the estimates of the dressed weight of a particular living ox, made by 787 different persons.

Diagram, from the tabular values.



Francis Galton. 1907. Vox Populi, Nature 75, 450–451.

Jonas Oppenlaender, MUM '19, Pisa, Italy, Nov 28, 2019



Wisdom of the Single Individual

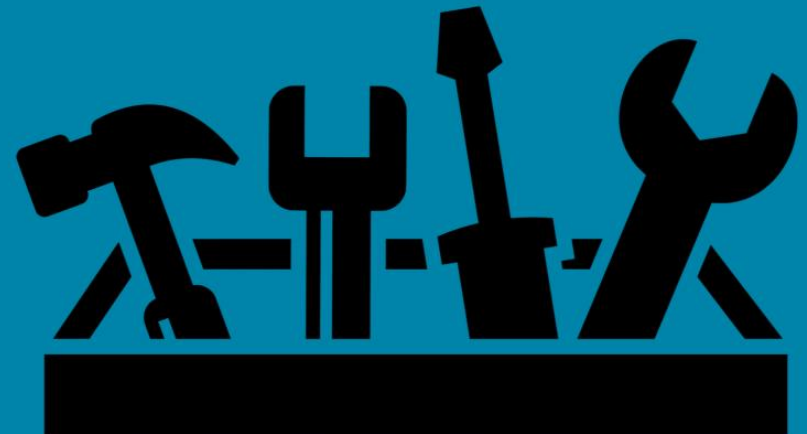
- Humans “can also reason about beliefs which would arise under hypothetical scenarios.” *
- Prior work suggests that idea generation performance can be augmented with stimuli and tools

* Dražen Prelec, H. Sebastian Seung, and John McCoy. 2017. A Solution to the Single-question Crowd Wisdom Problem. Nature 541.

Jonas Oppenlaender, MUM '19, Pisa, Italy, Nov 28, 2019



Creativity Support Tools



Computational Priming

- Alter behaviour via exposure to a stimulus
- Affective computing
- Augmenting the creativity of creative individuals by assuming roles



Key Related Work

- **Chandler & Kapelner (2013)**

Framing a task may increase quantity and quality of task outcome

- **Lewis et al. (2013)**
Morris et al. (2012)

Affective priming with text and images

Enter as many unique and unusual uses as possible for a **QUARTER** (the coin).
(Minimum: 10)

1.
2.
3.
4.
5.



- **Teevan & Yu (2017)**

Priming with roles

Please go to the Internet and find three useful ideas a [role 1], [role 2], and [role 3] might have that could inspire good solutions for the above problem.

Two Complementary

Studies

1. Interviews
(n = 8)

2. Online Experiment
on a paid crowd-
sourcing platform
(n = 60)



Research Questions & Hypotheses

Study 1:

RQ1: How do different strategies of selecting roles compare?

Study 2:

RQ2: Does assuming a role help workers in producing ideas that are more creative?

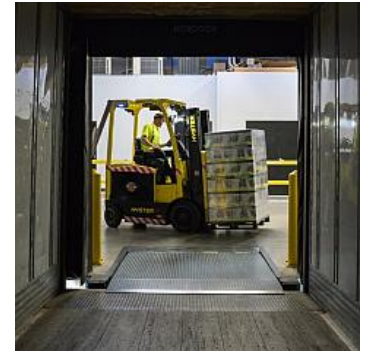
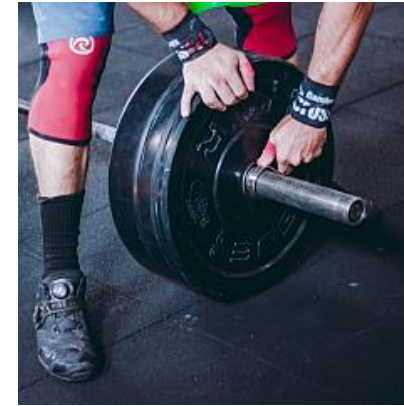
H1: Positive attitude towards the roles \Rightarrow more creative ideas

H2a: Role \Rightarrow less time taken to ideate

H2b: Role & image \Rightarrow even less time taken to ideate

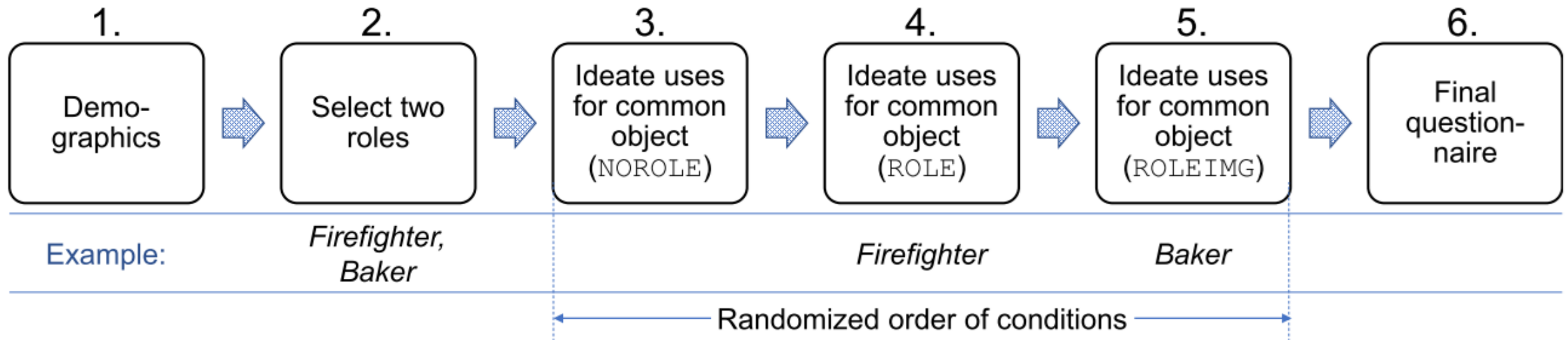
Study 1: Assuming Roles

- Task: Create alternative uses for a brick 🧱 or paperclip 📎
- Dyadic interviews (n = 8)
- Three strategies:
 1. Choose multiple roles
 2. Choose one role
 3. Use assigned role



Study 2: Online Experiment

- 60 participants recruited from Prolific (www.prolific.co)
- Task: Alternative uses for a brick 🧱 or paperclip 📎
- Within-subject: 1 task, 3 conditions, randomized order
- Custom web-based survey instrument



Study 2: Task

Catchphrase

ROLE, ROLEIMG

Depiction of the role

ROLEIMG

Task instructions

NOROLE, ROLE, ROLEIMG

Imagine you are a Baker



As a Baker, think of *unique and unusual* uses for a **BRICK**.

For example, using a brick as an earring is an unusual and unique use. However, using a brick to build a wall is not unique or unusual.

This task is spread over 3 stages. Stage 1 is below.

Your answers must, however, be **unique** across all stages.

Please provide at least 4 *different* answers - one answer per textbox below.

There is no minimum or maximum word count, simply explain the use case concisely.

DO NOT (!) use any external sources (e.g., websites, people) to complete this task.



Use 1

Study 2: Roles



22 roles, adapted from Yu et al.*

* Lixiu Yu, Aniket Kittur, and Robert E. Kraut. 2016. Encouraging “Outside-The-Box” Thinking in Crowd Innovation Through Identifying Domains of Expertise. CSCW’16.

Study 2: Examples

- *“Sticking the paperclip between two piano notes as a makeshift boundary so that you know not to go past that note.”*
(ROLE: Pianist)
- *“remove pits from fruit”*
(ROLEIMG: Baker)
- *“leave a message on my girlfriend's bike”*
(NOROLE)



Study 2: Evaluation

1. Evaluation on Mechanical Turk
in triplets (“unusualness”)
2. Idea length (words)
3. Task completion times
4. Perception of the roles
(attitude & perceived usefulness)

Which of the following uses
for a brick is most unusual?

Use 1	Use 2	Use 3
build a kennel	Using a brick as a foot massager	use the indent to place money in

Select an option

Use 1	1
Use 2	2
Use 3	3



Key Findings



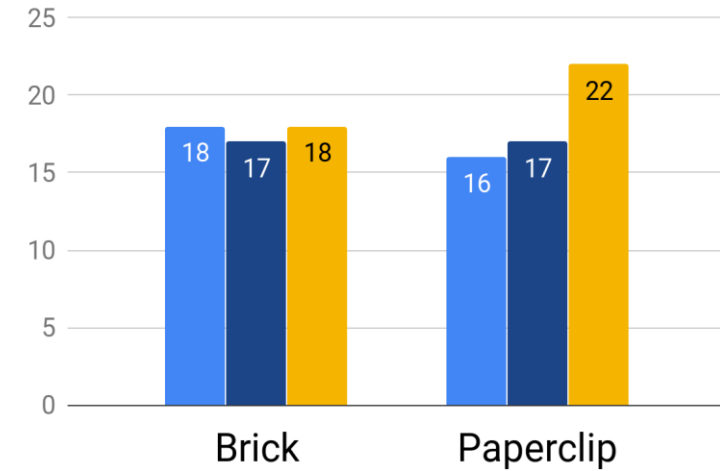
Study 1 (Interviews)

- Roles as a tool to overcome an impasse in the flow of ideas
- Selecting a single role is best strategy
- Selecting multiple roles may cause choice overload:
cognitive cost of working with multiple roles

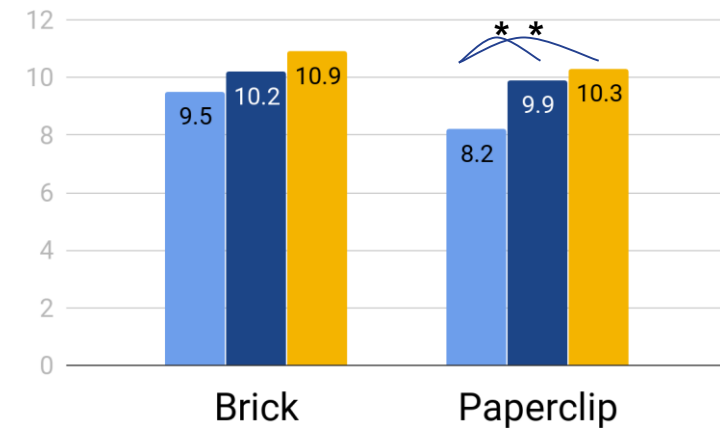
Study 2 (Online)

1. None of the conditions produced the most unusual idea
2. Words per idea greater with roles under the paperclip condition
3. Roles slightly increased average task completion times

“Unusualness” of ideas



Idea length (words)



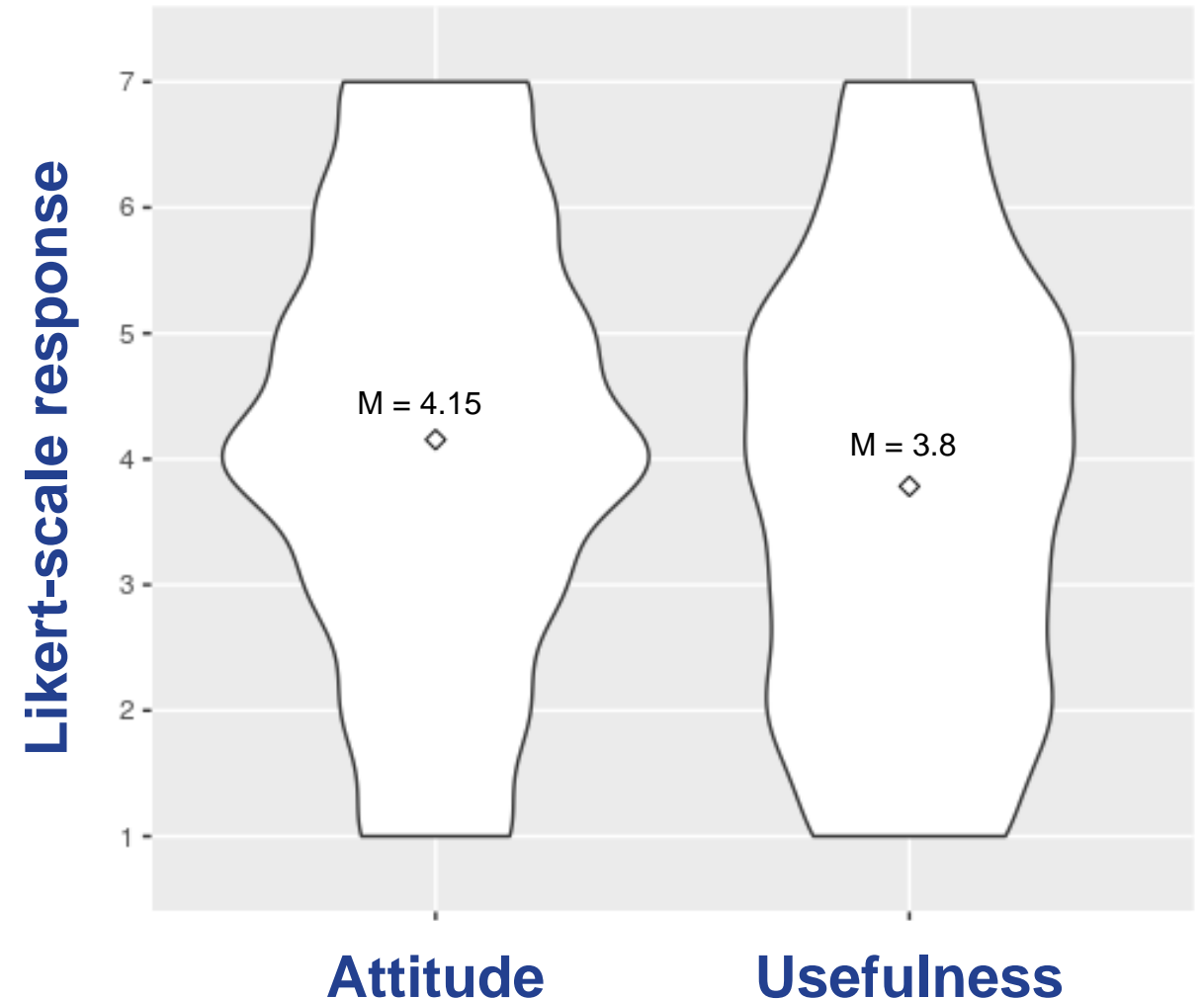
■ NOROLE ■ ROLE ■ ROLEIMG

* $p < 0.05$

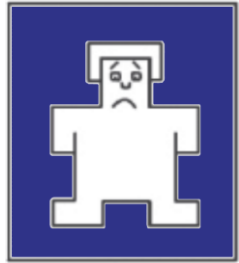


Study 2: Perception of Roles

- Slightly positive attitude towards the roles
- Participants not entirely decided on whether the roles were useful in completing the task



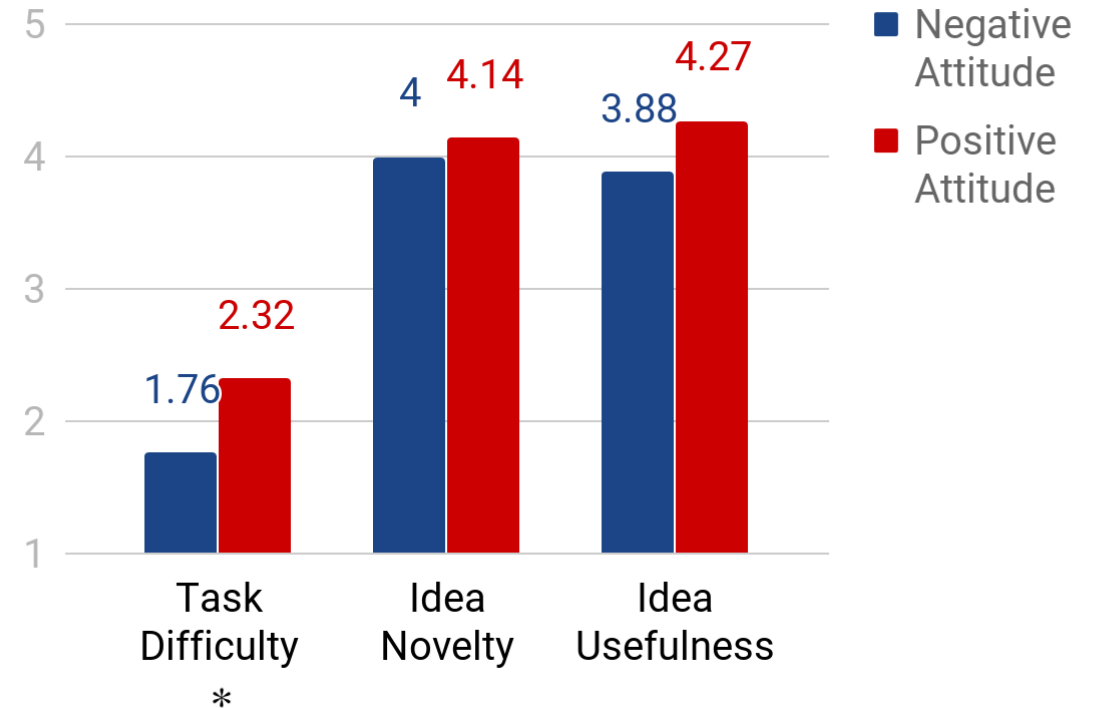
Study 2: Perception of the Roles



Negative attitude towards the roles
(Likert ratings 1–3, n = 17)



Positive attitude towards the roles
(Likert ratings 5–7, n = 22)



* ($p < .05$)

Explanation

Participants of the online experiment were **engaged** and **concentrated**, but did not find the roles to be **useful** to complete the task

- Simple task did not manage to isolate an effect of roles
- “Low-hanging fruit” (path of least resistance)
- Only 4 ideas per condition → repository of ideas not depleted
- Evaluating creativity is hard

⇒ Roles are **not a silver bullet** for augmenting creativity



Design Recommendations

Use roles to overcome an **impasse** in the flow of ideas



Choose the right time point for priming



Let workers self-select a suitable role



Prevent over-exposure to other contexts



Prevent over-commitment to the role



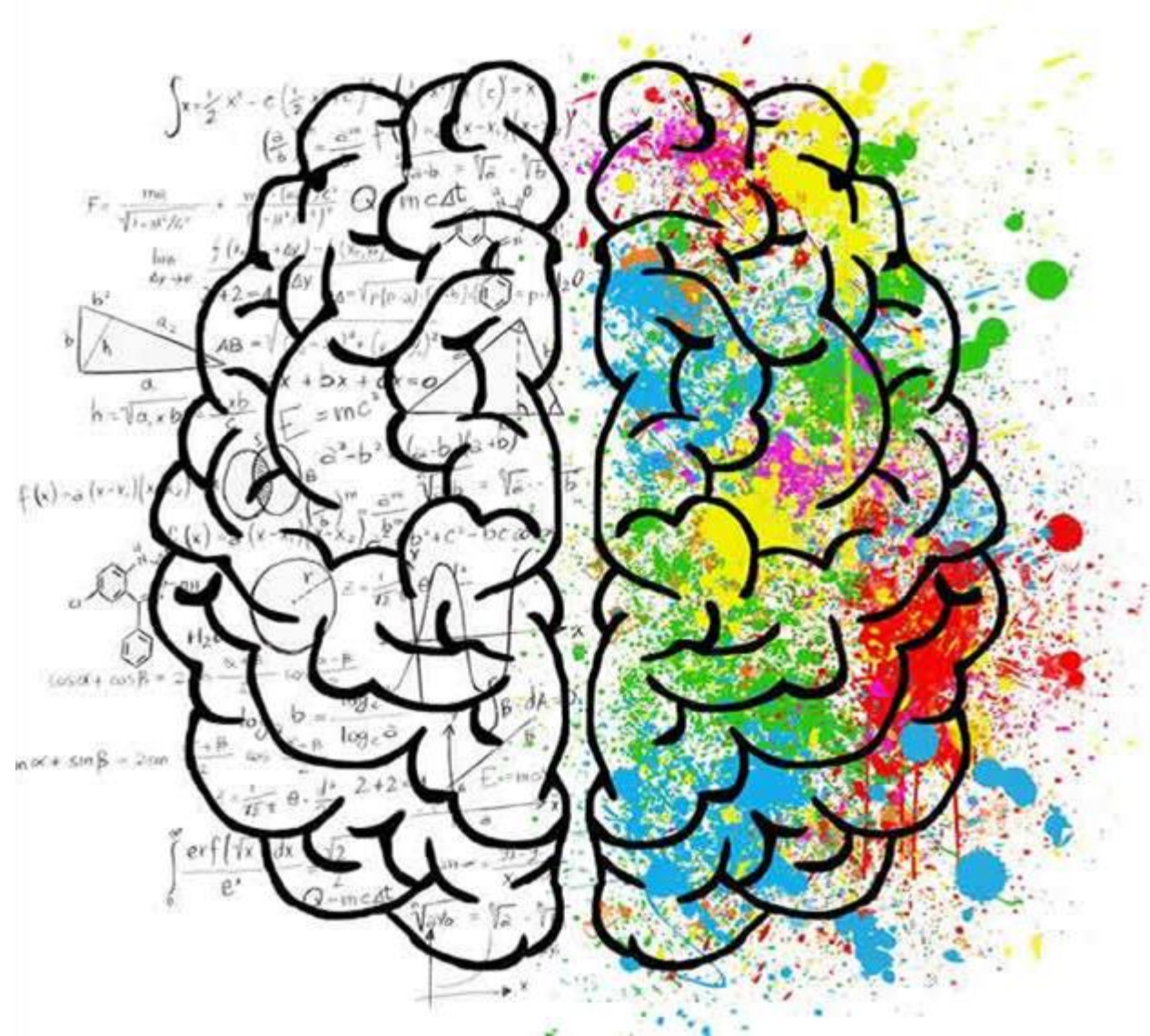
A narrowly focused task may inspire more targeted ideas

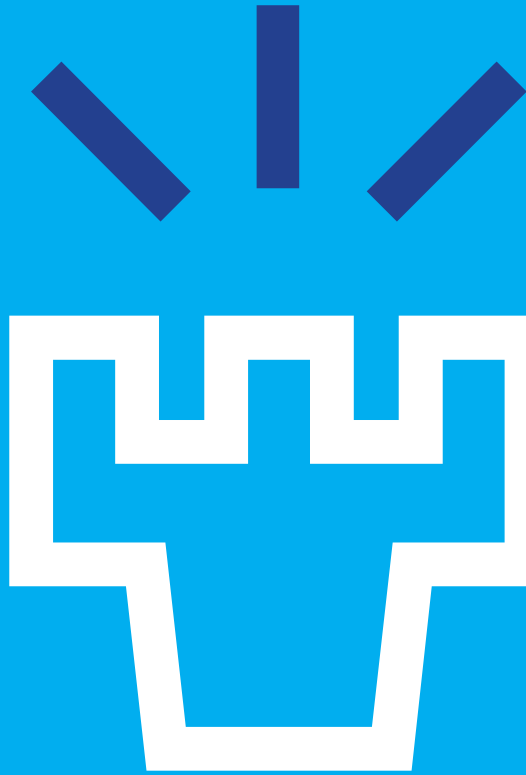
The screenshot shows the Amazon MTurk worker interface. At the top, there's a navigation bar with 'amazonmturk Worker', 'HITs', 'Dashboard', and 'Qualifications'. Below this, there's a section for 'HIT Groups (1-20 of 993)'. A table lists various HITs with columns for 'Requester', 'Amount', and 'Actions'. The table includes HITs from 'Computer Vision Turk' and 'Shanif Dhanani'.

Requester	Amount	Actions
Computer Vision Turk Spot All Objects of a Particular Type	\$0.20	Preview Qualify
Computer Vision Turk Verify Object Boundaries	\$0.16	Preview Qualify
Shanif Dhanani Find the name, email, and LinkedIn profile ...	\$0.02	Preview Accept
James Billings Market Research Survey	\$0.01	Preview Accept
Alexander Elias What type of instagram account is this?	\$0.03	Preview Accept

Crowdsourcing Creativity?

Still a lot to be learned about creativity in paid microtask crowdsourcing platforms





Questions?

jonas.oppenlaender@oulu.fi