UK Creativity Researchers 2023 Conference

Poster Presentations

UKCR - About Us

UK Creativity Researchers is a collaborative community open to anyone with an interest in the psychology of creativity. We are a network that facilitates the organisation of annual creativity conferences, to bring together researchers, practitioners, academics, students, and any other interested parties. The conferences are not-for-profit events organised by volunteer committee, one of whom normally hosts at their home institution, see our HISTORY for more information. We aim to keep our registration fees low, to be as inclusive as possible, and put all fees back into the costs of the conference events.

UK Creativity Researchers was founded by Dr Lindsey Carruthers at Edinburgh Napier University, Dr Gill Hill at University of Buckingham, and Dr Shelly Kemp at Kings College London.

2023 Organising Committee

This year's conference was organised by Tanvi Patel, Wendy Ross, Patrick Avery, Shelly Kemp, Gillian Hill and Lindsey Carruthers.

Throughout this book, any text in red will take you to the relative talks or open up the appropriate email. If there are any problems, corrections that are needed or just general questions around the book, please contact Patrick Avery.

Keynote Address - Associative Abilities of the Creative Mind

Roger Beaty - *Pennsylvania State University*

Creativity has long been conceived as an associative process in memory: connecting concepts to form ideas, inventions, and artworks. Yet associative thinking has been difficult to study, due to limitations in modeling memory structure and retrieval processes. Recent advances in the computational modeling of semantic memory allow researchers to examine how people navigate a semantic space of concepts when forming associations, revealing key search strategies associated with creativity. In this talk, I will synthesize cognitive and neuroimaging research on creativity and associative thinking. The talk will highlight distinctions between free- and goal-directed association, illustrate the role of associative thinking in the arts, and link associative thinking to brain systems supporting both semantic and episodic memory—offering a new perspective on a longstanding creativity theory.

Click here to watch the presentation

Roger Beaty is the Dr. Frances Keesler Graham Early Career Professor and Director of the Cognitive Neuroscience of Creativity Lab at The Pennsylvania State University. Dr. Beaty completed his doctoral degree at UNC at Greensboro and his postdoctoral training at Harvard University. His lab studies the psychology and neuroscience of creativity using a combination of psychometric, computational, and brain imaging methods. Dr. Beaty received the Berlyne Award for his early career contributions to creativity research from the American Psychological Association. His research on creativity neuroscience and measurement is currently funded by grants from the National Science Foundation. He is an Associate Editor for Creativity Research Journal, and he serves on the Executive Committee of the Society for the Neuroscience of Creativity.

Panel Discussion - Measuring Creativity at Scale

This year's panel consists of scholars and practitioners who are all concerned with the practicalities of measuring creativity at scale, whether that is the administration of large online studies, the use of AI tools to rate intelligence or the interaction between measures of individual level creativity and the emergent phenomenon of group and organisational creativity. We will be addressing four key questions: the use of online tools to measure individual creativity levels, the use of large language models to rate creative responses, the difference between group and individual level creativity and creativity in complex social systems such as organisations or even countries.

The Panel

Wendy Ross is a Senior Lecturer in Psychology at London Metropolitan University. Her research examines the interaction of cognitive states and environments in creative cognition, particularly the case of the prepared mind in serendipitious thinking. She draws from the theoretical perspective of 4E cognition and has active research collaborations with anthropologists, philosophers and cognitive psychologists. Her published work uses a range of different methods from theoretical and methodological contributions through experimental manipulations to ethnographic work. She is co-chair of the Serendipity Society, vice president of the Possibility Studies Network and an elected member of the Cognitive Section of the British Psychological Society. She is Associate Managing Editor of Possibility Studies and Society and has edited two volumes relating to serendipity, The Art of Serendipity (2021) and Serendipity Science (2023). In 2021, she was awarded the Frank X Baron award by Division 10 of the American Psychological Association.

Theo is a skilled, energetic Culture Futurist™ and innovator with 25 years of senior-level strategic national and international leadership experience spanning the private, public, and nonprofit sectors. A seasoned communicator, Theo's unconventional background traverses and connects scholarly research with pop culture across scientific disciplines, data analytics, creativity, and cultural well-being in the places we work, learn, heal, and explore. As Directing co-founder of CU Denver's Imaginator Academy - a cultural analytics, strategy, and futurist innovation hub, Theo is a weaver of ideas who scouts global networks of entrepreneurs, companies, scientists, artists, creative innovators, and change-makers of all kinds in order to find hidden opportunities that others miss.

Theo serves on the national board of directors for Americans for the Arts, the advisory board for Euro-Mediterranean Economists Association, co-leads the creativity sciences work group for the global Brain Capital Alliance, is lead culture strategist for Energize Colorado's Small Business Resiliency Index. An experienced builder of industry-university collaborations, Theo and collaborators have been recognized across many areas – from "Trailblazer" awards in research for culture analytics innovation inside a National Science Foundation-sponsored lab to many national grants and vision awards in arts and creative economy.

An artist, poet, and entrepreneur, Theo grew up in a nine-generation Appalachian family in southeastern Kentucky. Before moving to Denver, Colorado in 2021, Theo lived many professional lives in France, New York, Hawaii, Louisville, and New Orleans. In 2015, Southern Living Magazine named Theo one of "50 People Changing the Face of the South" for the futurist leadership demonstrated in launching the arts and culture innovation non-profit IDEAS xLab, with husband Josh Miller.

Today, Theo is the cultural well-being and creativity sciences lead for a diverse range of international initiatives operating at the intersection of creative industries, public health, neuroscience, and economics. Having served 2021-2022 academic year as Associate Dean for Transdisciplinary Research & Innovation in CU Denver College of Arts & Media, Theo returned to a hands-on innovation role as a research faculty team member in the College of Liberal Arts & Sciences' Master of Humanities and Master of Social Science programs (MHMSS).

Janet Rafner is a postdoctoral researcher at Aarhus University, Dept. of Linguistics, Cognitive Science and Semiotics and the Center for Hybrid Intelligence and affiliated with the Interacting Minds Center and the Center for Aesthetics of AI Images. She holds a PhD in Information Communication Technology (2022) and her current research focuses on citizen science, participatory futures, psychometric creativity assessment, computational co-creativity, and human-AI interaction. She is a Salzburg Global fellow and formerly a US Fulbright Fellow.

Dr George Georgiou is a Senior Lecturer in Psychology, teaching at undergraduate and postgraduate levels. George has lectured in the Department of Psychology at the University of Hertfordshire since 2000 and has also previously lectured at University College London (2002-2004).

George did his first degree in Psychology with Artificial Intelligence at Middlesex University and then completed an MSc Research Methods in Psychology followed by a PhD in Psychology at the University of Hertfordshire. George's doctoral programme was in experimental cognitive psychology, for which he was awarded the Chancellor's Medal for Outstanding Achievement in a Doctoral Research Programme. George then completed an ESRC funded Postdoctoral Research Fellowship with Prof. Ken Gilhooly investigating incubation effects in creative problem solving. George's research interests span across the areas of cyberpsychology, cognition, occupational and health psychology.

George is a Chartered Psychologist with the British Psychological Society (CPsychol - DARTP), an Associate Fellow of the BPS (AFBPsS), and a committee member of the BPS Cyberpsychology Section & the BPS Cognitive Psychology Section. George is also a Chartered Scientist (CSci) with The Science Council, and he is listed on The Register of Qualifications in Test Use (RQTU).

Sarah Harvey is an Associate Professor in the UCL School of Management. Sarah studies the dynamic processes through which groups and teams engage in creative and knowledge work. She is particularly interested in how interdisciplinary groups synthesize knowledge, identify creative ideas and decide which ideas to pursue. Sarah's research appears in leading international academic publications including Administrative Science Quarterly, Academy of Management Review, Journal of Experimental Social Psychology, Research in Organizational Behavior, and Small Group Research. She is on the editorial boards of the Academy of Management Review, Administrative Science Quarterly, Journal of Organizational Behavior, and Small Group Research. Sarah has developed and taught courses on creativity, organizational behaviour, leadership, team effectiveness, negotiations, and research methodology at UCL, the London School of Economics, and London Business School.

Sarah holds a PhD from the London Business School and a BComm (Hons) from Queen's University in Canada. Prior to her PhD, Sarah worked for the Boston Consulting Group.

Sarah's research interests include creativity, innovation, dynamic processes, decision making, and diversity in small groups and teams. In particular, Sarah is interested in the processes through which interdisciplinary and cross-functional teams integrate members' knowledge to produce new ideas and make decisions.

Sarah's research examines how teams develop ways of understanding creative problems and evaluate creative responses to those problems, and the implications for group creativity. That research re-casts idea evaluation in groups as a generative activity that facilitates the integration and elaboration of novel ideas, whereas most research in this area focuses on divergent idea generation and assumes that evaluation disrupts this process. This provides a novel view of the process of group creativity.

A related stream of research investigates the effects of diversity and changes in diversity in cross-functional and interdisciplinary teams. It finds that diversity, although often assumed to improve creativity and decision-making, can also disrupt a groups' ability to converge around ideas.

Sarah's research focuses particularly on exploring the development of teams and team processes over time through qualitative research methods that examine the ongoing interactions between group members.

Margaret Webb (Australia) is an honorary fellow at the University of Melbourne, internationally recognised for her research in feelings of insight (also known as aha moments or lightbulb moments). The question that drives her is whether some people are biased towards leaping to conclusions based on their feelings during problem solving. To investigate this, she has developed creativity tasks that have been completed by people in almost every country of the world.

Lightning Poster Session 1

Individual Differences in Creativity

Click here to watch the presentations

Malevolent Creativity and Personality Malevolent Creativity and Personality Malevolent Creativity and Personality

Jasmyn Davidson - *Edinburgh Napier University*

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Research surrounding the idea of malevolent creativity, defined as creativity used for harm of others, has increased in frequency within recent times, with researchers aiming to differentiate it from benevolent creativity. This study aimed to investigate the effect of two personality traits, schizotypy and Machiavellianism, on malevolent creativity. Schizotypy has relations to creativity with divergent thinking, and Machiavellianism is a dark personality trait characterised by doing whatever it takes to achieve one's goals. Machiavellianism and schizotypy have controversial links to malevolent creativity, which the current study aims to resolve. This study had N=101 belonging to the general population, majority of whom were young females. This study measured the above traits via the Multidimensional Schizotypy Scale – Brief (MSS-B), Malevolent Creativity Test (MCT) and MACH-IV. It was found that Machiavellianism was a moderately negative predictor of malevolent creativity. Schizotypy was not a significant predictor of malevolent creativity. The results of this study show that personality is a predictor of malevolent creativity when measured via creative idea production. Finding predictors of malevolent creativity could lead to predicting certain extremist crimes, and future studies will benefit from strengthening the research in this area as it is critically under researched.

MALEVOLENT CREATIVITY AND PERSONALITY

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INTRODUCTION

Key Terms:
Malevolent Creativity - Intentional antisociality to reach one's own negative goals [1].
Schizotypy - Personality trait describing those with deviant or unregulated thought processes [2,3].
Machiavellianism - Dark Triad personality trait characterised by antisocial behaviours with manipulation and amoral disposition, extreme self-interest [4,5].

Past Literature:
Machiavellianism linked more (compared to other Dark Triads) via higher intelligence and willingness to delay rewards when risk present [6,7].

Schizotypy linked a handful of times via overinclusive thinking, which is a lack of idea filter within the brain. [3]
All three linked previously separately, controversial [8,9,10]. No one has combined all three factors. Schizotypy and Machiavellianism are correlated via introversion and antisociality [9].
MC has been linked to lower emotional intelligence (EI), low EI found in hgih Machiavellian and Schizotypal personalities.)

AIM/RQ'S/RATIONALE

Aims and RQs:
To investigate the relationship between schizotypy, Machiavellianism and levels of malevolent creativity

RQ1: To investigate the relationship between malevolent creativity and Machiavellianism
RQ2: To investigate the relationship between schizotypy and malevolent creativity
RQ3: To investigate a relationship between schizotypy, Machiavellianism and malevolent creativity

I want to further research into predictors of Malevolent Creativity, this could apply to prevention of certain crimes (e.g. terrorism)

METHOD

Participants: N=101, suitable for multiple regressions desired **effect size** [2]
Requirements: 18+, normal/corrected vision, fluent in English
Design: Within-subjects correlational, Qualtrics.com
Study Design: based on seminal paper by **Perchtold-Stefan et al. (2021)** [11]
Materials: Malevolent Creativity Test (MCT) [11], Multidimensional Schizotypy Scale - Brief (MSS-B) [12], Machiavellianism Scale (MACH-IV) [13,14]
Procedure: Demographics (age & gender) are collected, then participants are given the MCT, MSS-B and MACH-IV in a random order. MCT requires participants to come up with original, 'revenge' stories for proposed vignettes in which they'd been wronged.

ANALYSIS AND RESULTS

Analysis: Multiple Linear Regressions via JASP
Normativity: Q-Q plots, corrections via Bonferroni
Presentation of Data: tables, graphs, charts
An **independent rater** and researcher scored MCT results from 1-4 for originality and malevolence (averaged), fluency was totalled. Interrater reliability was .94 and .91 respectively.
Sample: N=101, mostly young females

RQ1: There was a significant, negative relationship between MACH and MCT scores ($t=-.388$, $p<.001$)

RQ2: There was no relationship between MCT scores and MSS-B ($p=.633$)

RQ3: The overall regression was statistically significant $F(2,98) = 8.109$, $p<.001$, $R = .377$

DISCUSSION

General sample - effect size met
Scoring for MC had little variation (2.5-3.3)

MSS-B reliable, but new, might have caused no relationship.
Overinclusive thinking =/= MC thinking

MCT may not be suited to Machiavellians, need longer to articulate more convoluted answers.
More females, men are often more Machiavellian.
Machiavellian driven by self-gain, no self-gain in this study.

Future research should use larger, more diverse sample and experiment with different ways of using MCT (online vs in-person) and Schizotypy.
Establish motivations for MC.
Using non-self-report measure for MC was good practice (high IR).

PRACTICAL / ETHICAL ISSUES

Data is **anonymous** - this negates pressure to participate
Negative personality traits - given resources to research these traits and learn more about them academically
80 to 100 participants is a **high expectation** - social media and other resources outside of university will be used to gather as many as possible (achieved!)

The Dark Triad - Two Sides of the Same Coin, Risk Perception and Negative Creativity as Predictors of Financial and Ethical Risktaking

Lydia Perryman - *Open University*

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The study explored the Dark Creativity of the Narcissistic personality within the context of everyday risktaking behaviour. Multiple regression was used to model risktaking behaviour using a 100 item, Qualtrics designed self-report questionnaire. With eighty two respondents, 13 males and 69 females aged between 21-77 years, participating in the survey. Overall the model was a significant predictor and explained 45% of the variance in risktaking behaviour. The final predictive model demonstrated a strong negative relationship between risk behaviour and risk perception, supporting Weber, Blais' and Betz's (2002) hypothesis that in general most people tend to be cautious when considering risky behaviour. However, domain specific regression analysis revealed some surprising predictor-outcome correlations. Narcissism was significantly predictive of financial risktaking, while negative creativity was significantly predictive of unethical risktaking behaviour. Narcissists were seen as having an unconventional, even reckless attitude to financial risk. While those who were willing to risk their assets for personal gain, would often behave in ways that others would consider both immoral, dishonest or even criminal while doing so.

Two Sides of the Same Coin – Risk Perception and Negative Creativity as Predictors of Financial and Ethical Risktaking

Lydia Perryman

Introduction

Background

The study explored the Dark Creativity of the Narcissistic personality within the context of Everyday Risktaking behaviour. Used to describe the 9/11 terrorist attacks, Kaufman and Cropley (2008) defined Malevolent/Dark Creativity as actions that are 'intentionally harmful in original ways'. That human element has meant that measuring MC has proved notoriously problematic, and required a quite different approach from measuring 'Creativity' as we know it. The three scales used for this study needed to capture individual differences in Narcissism, Creativity, and Risk Perception/Behaviour. The emphasis was on the 'everyday', situations that might require a creative response, and that was reflected in the measure that was used.

A study by Buelow and Brunell's (2014) using Weber and Blais' (2002); (2006) DOSPERT scales/subscales, found that facets of grandiose Narcissism and 'interpersonal exploitation' predicted a significant relationship between this personality type and their problematic, often compulsive ('financial, social and health and safety'), risky' behaviour. Narcissists are one of Paulhus and Jones (2002) 'Dark Triad'. They are ambitious, live life on the edge, they don't care, they would go there. Key features, include entitlement and superiority, measured using Raskin and Hall's (1979) (NPI). However, Jonason et al. (2015) were unable to establish any correlation between the Dark Triad/'Narcissism' and Creativity, and suggested using a scale measuring 'divergent thinking' (DT), ideas, as described by Guilford (1967), which is why this study went with Runco, Plucker and Lim's (2001) Ideational Behaviour Scale (RIBS). It is the combination and interaction of personality traits that make us unique as individuals.

Hypotheses

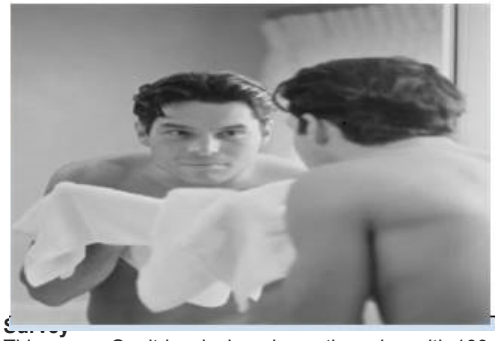
H1 Individual differences in Narcissism will explain a significant amount of variance in risktaking behaviour.

H2 Individual differences in Creativity will explain a significant amount of variance in risktaking behaviour.

H3 Individual differences in Risk Perception will explain a significant amount of variance in risktaking behaviour.

H4 A significant amount of the overall variance in risktaking behaviour will be explained by individual differences in Narcissism, Risk Perception and Creativity combined.

Methods



Survey

This was a Qualtrics designed questionnaire, with 100 items, and comprised of three validated psychometric measures with Likert ratings scales. **For example**: Ames, Rose and Anderson's (2006) Narcissistic Personality Inventory (NPI-16) with 16 paired items; Select the answer that describes you best 'I am an extraordinary person' or I am no better or worse than most people'.

Respondents have a 'binary choice' between two alternatives.

Measures

(i) Ames, Rose and Anderson's (2006) Narcissistic Personality Inventory (NPI-16) with 16 paired items; with a published α of 0.72. As a binary choice scale it proved impossible to obtain a current alpha.

(ii) Runco, Plucker and Lim's (2001) Ideational Behaviour Scale (RIBS) 5pt. 23 items; with a published α of 0.92 and a current α of 0.93.

(iii) Weber and Blais' (2006) Domain Specific Risktaking Scale (DOSPERT), 7pt. 30 item, measuring Risktaking Attitude and Risktaking Behaviour; with a published α of 0.71-0.86, and a current α of 0.85.

Recruitment

Eighty two adults (13 males and 69 females) aged between 21-77 years, (M=39.89, SD=11.8) were recruited via the EPW, Friends and Family of OU DE300 students and the DE300 FB Page.

Ethics

The study was carried out in accordance with The BPS (2013) Ethics Guidelines for Internet-mediated Research.

Results

The final predictive model demonstrated a strong negative relationship between risk behaviour and risk perception, supporting Weber, Blais' and Betz's (2002) hypothesis that in general most people tend to be cautious when considering risky behaviour.

However, domain specific regression analysis revealed some surprising predictor-outcome correlations. Narcissism was significantly predictive of financial risktaking, while negative creativity was significantly predictive of unethical risktaking behaviour. Narcissists were seen as having an unconventional, even reckless attitude to financial risk.

Analysis

- IBM SPSS – all assumptions were met, including the normal distribution of the residuals (see above) and homoscedasticity
- 'Reliability', was established using Cronbach's alpha and the data analysed using Multiple Regression

Results

- The final model was a significant predictor F (3, 78) = 21.6, p= .001 and explained 45% of the variance in 'Risktaking' Behaviour.
- Although risk perception was a significant contributor to the model $\beta_1 = -.58$, $p < 0.01$), 'narcissism' $\beta_2 = 1.905$, p=.10) and creativity did not reach significance $\beta_2 = .190$, p=.08).

Subscales

- Both ethical risk perception $\beta_1 = -.36$, $p < 0.01$), and 'creativity', $\beta_2 = -.56$, $p <= 0.05$) were significant predictors of financial risk behaviour, although 'narcissism' ' $\beta_3 = -.016$, p=0.52) was not. was not.
- Both financial risk perception $\beta_1 = -.55$, $p < 0.01$) and 'narcissism' $\beta_2 = -.77$, p=0.05) were significant predictors of financial risk behaviour although 'creativity' $\beta_3 = -.033$, p=.36) was not.

Conclusions

Future Research

This study into Individual Differences and Dark Creativity flags up the need for scales that fully represent the construct that we are measuring. Also, with relevance to this study, Miitchell and Reiter – Palmon (2023) differentiate between Dark Creativity/Negativity. In general, those measures of Dark Creativity currently available still need further refinement to be representative.

This also applies to measuring both Narcissistic traits and other members of Međedović and Petrović (2015) Dark Tetrad, the researchers stress the importance of using a multi-methodological approach drawing from different sources (peers-longitudinal-case studies) when developing scales/ and other measures.

It would be useful to extend this study of risk behaviour and risk perception using a different combination of Weber and Blais (2006) Dospert Scale domains such as Health & Safety and/or Recreation. Or using a measure of Dark Creativity with an emotional component like Mitchell and Reiter – Palmon's (2023) 'vignettes'/ hypothetical scenarios that draw on the Neuroscience.

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What Does It Take To Make It: The Dark Side of The Performing Arts

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To investigate the relationship between the Dark Triad personality traits (Machiavellianism, Narcissism, Psychopathy) and involvement and achievement in the Performing Arts. The Dark Triad and the Performing Arts have been explored in psychology through creativity, theory of mind and emotional intelligence among other research which provides reason for a possible link between them. This study was a within-subjects quantitative correlational design investigating the relationship between involvement and achievement in music, dance and acting and the Dark Triad traits. A survey including an adapted version of the Creativity of Achievement Questionnaire (CAQ) and the Short Dark Triad (SD3) were distributed by snowballing techniques, on social media and through the Edinburgh Napier University Participant Pool using Qualtrics (N= 121). This study used three Spearman's correlations and six linear regressions, the results show significant positive correlations between involvement and achievement in the three Performing Arts and the Dark Triad traits. Linear regressions show that Narcissism positively predicted involvement and achievement in all three performing arts and Machiavellianism predicted achievement in dance. The main finding of this research is the significant relationship between narcissism and achievement and involvement in the three performing arts domains. This study may allow for future prediction of the achievement of people who aspire to participate in the performing arts, through their level of narcissistic traits. One limitation of this research is the small range of performing arts representation. Overall, this research provides a significant novel contribution to psychology through the exploration of Dark Triad personality and the Performing Arts.

What Does It Take To Make It: Dark Triad Personality And The Performing Arts

Melissa McMullan - Edinburgh Napier University

Supervised by Dr Rory MacLean

Aim: This study aimed to investigate the relationship between the Dark Triad personality traits and level of involvement and achievement in the performing arts.

Research question 1 (Main research question): Will there be relationships between each of the Dark Triad personality traits and level of involvement and achievement in the performing arts?

Research question 2: Can involvement and achievement in the performing arts be predicted by the level of Dark Triad traits?

Background information:

There is currently ***a gap in research*** where the Performing Arts has not been linked to the Dark Triad

- Personality and the Performing Arts (Lee & Ashton, 2014).
- Dark Triad at work (Vedel & Thomsen, 2017; Rocziewska & Bakker, 2016)
- Creativity and the Dark Triad (Carson et al., 2005)
- Performing Artists ability to understand emotion deeply, without heightened empathy (Goldstein et al., 2002)

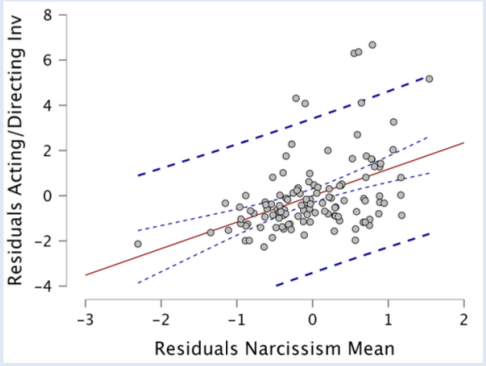
Results and example figures

- Significant positive correlations between involvement and achievement in the three performing arts and Machiavellianism and Narcissism.
- Significant positive correlations with psychopathy and music involvement
- Machiavellianism could predict achievement in dance (p=.027)
- Narcissism could predict involvement and achievement in dance, music and acting/directing.

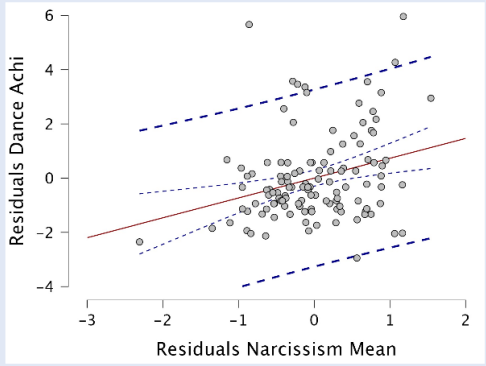
Methods:

A survey distributed by Qualtrics online:

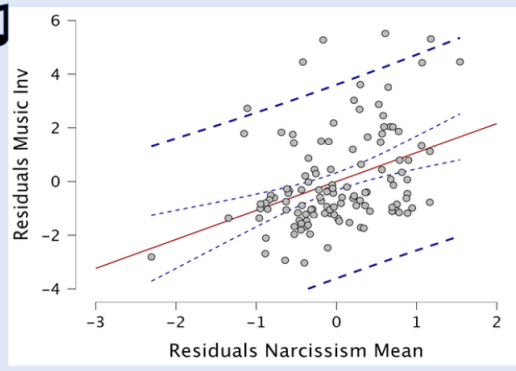
- Adapted version of the creativity of achievement questionnaire (CAQ) - Adding questions regarding involvement in the performing arts
- The Short Dark Triad (SD3)



$[R^2 = .31, \mathrm{F}\,(3,117) = 17.49, \mathrm{p} < .001]$



$[R^2 = .298, F\,(3,116) = 16.38, p < .001]$



$[R^2 = .237, F\,(3,117) = 12.14, p < .001]$

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Are Creative Hobbies Correlated with Spatial Skills?

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Recent developments in educational practices have identified the teaching of STEM areas as important (Science, Technology, Engineering, and Mathematics), but this emphasis on STEM fields has sacrificed educational focus on the arts (Cohen, 2016). This is a significant loss, not only to the teaching of humanities in itself, but through the potential loss of foundational competencies that may be developed through practice in artistic areas. One such competency, spatial skill, includes the ability to mentally manipulate objects and identify relationships among objects. Studies have found spatial skills to be correlated with many domains both in the arts and in STEM (Kozhevnikov et al., 2013 and Wai et al., 2009). The present study investigated the relationship between the frequency of engaging in eight creative activities (specifically: literature, music, arts-and-crafts, creative cooking, science and engineering, sports, visual arts, and performing arts) and increases in spatial skills. The Inventory of Creative Activities Assessment (ICAA, Diedrich et. al., 2018) served as a measure of creative activity whereas the Santa Barbara Solids Test (SBST, Cohen & Hegarty, 2012) was used as a spatial skill psychometric. Pearson correlations with a Bonferroni adjusted alpha of .00625 revealed that engagement in music, and arts & crafts are indeed positively correlated with spatial skills. Our sample consisted of 80 undergraduate students from Florida, but more data is currently being collected. Knowledge gained concerning the relationship between spatial ability and creative pursuits may not only support education within artistic fields, but also within science, academia, and industry. In future studies we will continue to investigate the relationship between pursuing creative hobbies and developing spatial skills as well as its transference to STEM related subjects.

The Relationship Between Creative Hobbies and Visual Spatial Ability

Victoria M. Alexander[1] and Shannon N. Whitten[2]

1. The University of Maryland 2. The University of Central Florida

Abstract

Is it possible that frequent participation in some creative hobbies implicitly train spatial ability? And if so, can this be transferred into spatial abilities needed to succeed in STEM? The current study aims to explore these questions by investigating the connection between the frequency of engaging in eight extracurricular activities (specifically, literature, music, arts-and-crafts, creative cooking, science and engineering, sports, visual arts, and performing arts) and spatial ability.The future implications may suggest that integrating the study of the Arts will facilitate the goal of the National Science & Technology Council: creating world leaders that are not only well versed in their prospective STEM subject but those that are able to communicate clearly and think innovatively (Executive Office of the President, 2018).

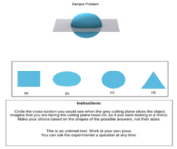
Background

- **Spatial Ability:** Spatial ability can be defined as the cognitive ability to interact with mental images: including production, manipulation, and interpretation (Jeunet, N'Kaoua, & Lotte, 2016). Spatial ability is complex and multifaceted, allowing us to complete seemingly mundane tasks (e.g., navigating our way to turn on the light in the dark) to more astounding accomplishments (e.g., designing the Leaning Tower of Pisa). Due to the immense diversity within its execution, researchers believe spatial ability involves three primary factors (Thurstone, 1950): 1. the ability to recognize the identity of object in various positions and angles, 2. the ability to imagine movement and transformations of an object, and 3. the ability to understand elements of an object relative to one's own orientation. The first and third factors are commonly referred to as spatial orientation, whereas the second as spatial visualization (McGee, 1979).

- **Spatial Ability & STEM:** Within STEM, researchers have found significant correlations among academic learning, success in industry, and spatial ability (Gilligan, Hodgkiss, Thomas, & Farran, 2018; Humphreys, Lubinski, & Yao, 1993; etc.).It is predicted that if students are able to strengthen spatial abilities, they may have higher achievements in STEM (Uttal, et al., 2013).

- **Creativity & STEM:** Long ago Einstein said, "The greatest scientists are always artists as well" (as cited in Rolling, 2016, p.5). Creativity is an indispensable tool in STEM when formulating hypotheses, designing projects, and solving problems (Daker, Cortes, Lyons, & Green, 2020). Creative education is needed in schools, but instead of reinventing the wheel, it is beneficial to utilize the tools we know to naturally induce creativity – the Arts. In this sense, the Arts may serve to be a bridge between creativity and STEM (Conradty, Sotiriou, & Bogner, 2020).

- **Hobbies and skills that that correspond with types of spatial ability:**
  - **Orientation**:
    - Dance
    - Sports
  - **Visualization**
    - Visual Arts
    - Arts and Crafts
    - Science
    - Music
  - **No known connection with Spatial Ability**
    - Cooking
    - Literature



references available upon request

Hypotheses

Research Questions: Does training in any aspect of spatial ability (e.g. visualization vs. orientation) give an advantage to individuals in spatial ability tasks despite the domain? If so, people who frequently engage in hobbies that rely on spatial orientation (e.g. dance and sports) will have a correlation with spatial visualization tasks

H1: People who engage in hobbies more frequently that rely on spatial visualization (e.g. visual arts) will perform the higher on a test of spatial visualization tasks (e.g., SBST)
H2: People who frequently engage in hobbies unrelated to spatial ability (e.g., cooking and literature) will not show a correlation with spatial visualization ability.

Methods

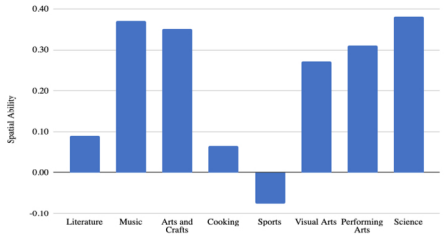
Participants: Approximately 32 undergraduates from the University of Central Florida are being recruited through the UCF SONA subject pool. The average age of participants was 20.94 with a standard deviation 4.24 and 59.38% were female. Furthermore, 59.6% identified as Caucasian, 15.6% Hispanic/Latino, 12.5% Black/African American, 3.1% American Indian/Native American, and 3.1% undefined.
Procedure: The study was administered online through the qualtrics system. The study was administered in a single session. Participants viewed an online version of the consent form and provided digital consent. This will reminded them that they could end the study at any point. The study included the following three tasks in the order below. Between tasks, were given an opportunity to take a break.

- **Santa Barbara Solids Test (SBST):** A 30-item spatial cutting task in which participants are asked to imagine what the cross-sections of three-dimensional images would look like as two-dimensional images.
- **Inventory of Creative Activities Assessment (ICAA):** A questionnaire that assesses personal and public real-life creativity across 8 domains. Within the eight domains, six activities and eleven levels of achievement are assessed. Participants are asked to answer based on experience within the last decade
- **Demographics Questionnaire:** A background questionnaire assessing basic demographical data of particpiants, including educational level, age, major, ethnicity, and sex.

Results

Pearson Bivariate correlations were conducted on the 8 subscales of the ICAA with the SBST. Due to a lack of participation, results were calculated for the creative activity subscale of the ICAA only (not the creative achievement subscale). A one-tailed test with an alpha level of .05 determined statistical significance. A bar graph representing the correlation coefficient of each subscale of the ICAA with the SBST is presented below. Four subscales showed a statistically significant relationship with spatial ability at the .05 level.

- Increased activity in science was positively correlated with spatial ability, r (31) = .38, p = .017.
- Increased activity in music was positively correlated with spatial ability, r (31) = .37, p = .019.
- Increased activity in arts & crafts was positively correlated with spatial ability, r (31) = .35, p = .025.
- Increased activity in performing arts was positively correlated with spatial ability, r (31) = .31, p = .046.
- All other subscales were not significantly correlated with spatial ability.



Discussion

While this study appears to yield positive results, the small sample size serves as a limitation in making affirmative conclusions. As data continues to be collected, it is expected that some trends may change. However, many of the results align with what has previously been found in literature. For example, participants who indicated increased activity in the science subscale performed the best on the spatial task compared with those of any other domain. This is consistent with observations from Gohm, Humphreys, & Yao (1998) in which they noted spatial ability tasks are used as a predictive measure within physics and engineering.

•The first hypothesis has mixed support so far. It was expected that those who engage in visual arts would perform better on spatial visualization task. This was true for arts and crafts, and though the correlation for the visual arts was not significant, it did approach significance in the right direction (r = .27). More data (collection in progress) will reveal whether or not these correlations are reliable.

•The second hypothesis is trending towards significance. There were no statistically significant correlations between spatial ability and cooking or literature.

Limitations of the Current Study
•It would be beneficial to administer more traditional spatial tasks such as mental rotation so that results can be more easily compared to results found in literature.
•A larger sample size would better solidify the effects.
•Further research is needed to explore how specific activities within subdomains may increase spatial ability.

Applications of this Research
•This study begins bridging the gap between STEM and the Arts by investigating a cognitive ability each domain has in common: spatial ability. Identifying a relationship between frequent engagement in creative activities, such as performing arts, provides a stronger case for maintaining or increasing the Arts in education. The findings may also suggest that such activities can be used to build cognitive skills necessary for success and retention in STEM.

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Lightning Poster Session 2

Cognitive and Computational Approaches to Creativity

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The Language of Creativity: Evidence from Humans and GPT-3

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Recent developments in computerized scoring via semantic distance have provided automated assessments of divergent thinking that are highly correlated with human ratings of originality. Here, we sought to characterize more precisely the features of creative text. We hypothesize that, in addition to semantic diversity, the degree to which a story includes perceptual details, thus transporting the reader to another time and place, would be predictive of creativity. Furthermore, we explore whether short stories generated by GPT-3, a generative large language model, differ from human stories in terms of their creative quality. We collected a total of 600 short stories from human participants and GPT-3, subsequently randomized and assessed on their creative quality. Results indicate that perceptual detail, in conjunction with semantic diversity, was significantly predictive of creativity ratings. We do not observe any significant difference between human and GPT-3 stories in terms of their creativity. Implications and future directions are discussed.

The Language of Creativity:
Evidence from Humans & Large Language Models

William Orwig, Emma Edenbaum, Joshua Greene, Daniel Schacter
Harvard University, Department of Psychology

BACKGROUND

- Recent developments in computerized scoring via semantic distance have provided automated assessments of divergent thinking that are highly correlated with human ratings of originality.
- Current theories suggest that both semantic and episodic memory processes contribute to the emergence of creative idea.[1]
- In this study, we further define the features of creativity using computational linguistic analysis tools and explore the contributions of episodic and semantic memory to creative writing.

METHODS

Sample: We analyzed data from 50 healthy adults (29 females; age range: 18-35, *M*=27.71), collected online via Prolific. Additionally, we collected stories from GPT-3's davinci-003 engine, following an established protocol developed in a recent study.[2]

Creative Writing Task: Participants were given a three-word prompt and asked to include all three words when writing a short story approximately five sentences in length. Participants were given a total of six prompts, with five minutes to write each story.

- **Creative Assessment:** an independent sample of raters online were then asked to score their creative quality from 1 (not creative) to 5 (very creative).
- **Perceptual Detail:** computed via Linguistic Inquiry and Word Count (LIWC), reflects the presence of perceptual process statements in each story.[3]
- **Divergent Semantic Integration (DSI):** assesses the extent to which a story connects divergent ideas, based on distributional semantic models.[4]

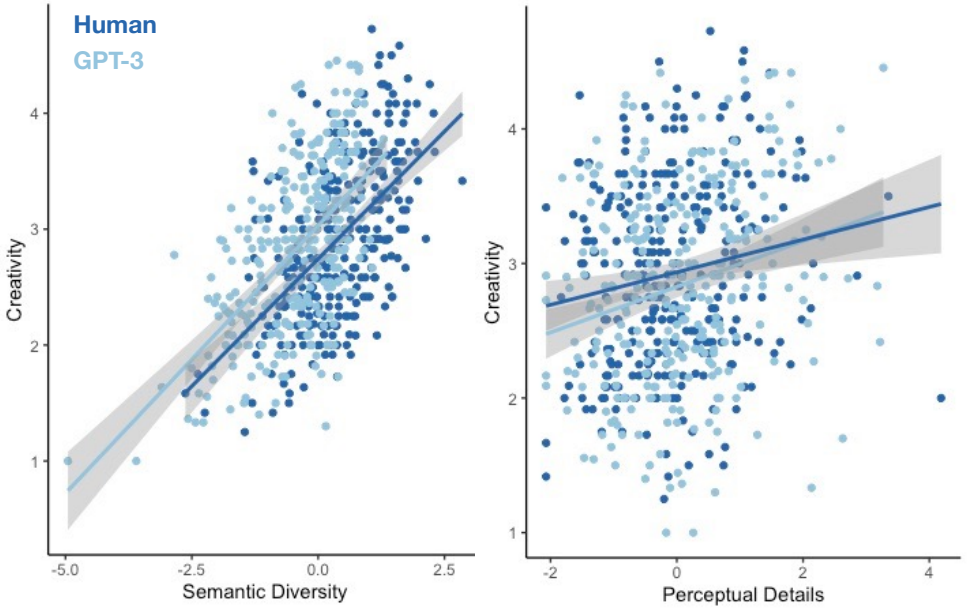
HYPOTHESES

1. We expect that semantic diversity and the degree to which a story incorporates perceptual details will be predictive of creativity in short stories.
2. We further hypothesize that this pattern will hold within stories written by humans and GPT-3.
3. Lastly, we explore whether prompt manipulations (drawing on semantic or episodic retrieval) will lead to enhanced creativity.

RESULTS

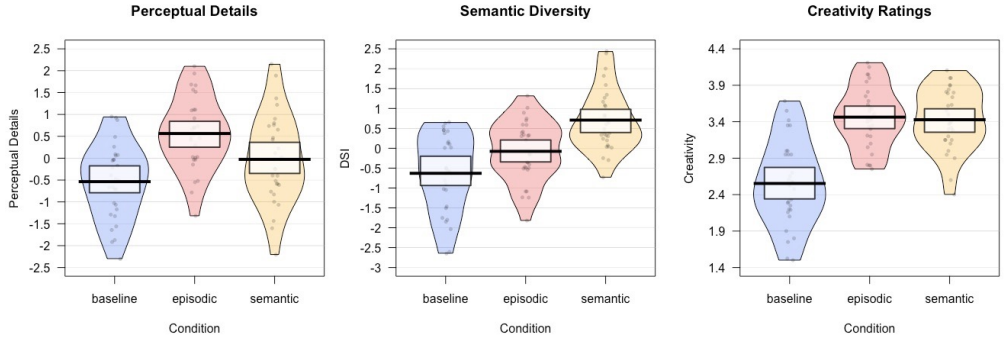
Study 1: Defining Features of Creative Writing

We observed a robust positive correlation between DSI and creativity within the sample of human (r = .56) and GPT-3 stories (r = .59). Additionally, we found a moderate association between perceptual details and creativity within stories generated by humans (r = .16) and GPT-3 (r = .24). Mixed-effects models indicate that both DSI and perceptual details were predictive of creativity and interact with each other to produce maximally creative stories.



Study 2: Prompt Engineering

We manipulated task instructions for GPT-3 to selectively enhance perceptual detail and semantic diversity, relative to a baseline condition. Results showed that episodic-based prompts boosted the degree of perceptual details, whereas semantic prompts yielded higher DSI. Both manipulations boosted subjective creativity ratings.



DISCUSSION

- Our results indicate that creative writing involves the integration of semantically divergent concepts with perceptual details.
- We also found that manipulation of task instructions can lead GPT-3 to generate more semantically divergent and perceptually descriptive stories.
- We do not wish to claim that GPT-3 has the same experience of episodic remembering that humans do, rather we suggest that creative writing in both humans and language models makes use of perceptual details that are similar to sensory details typically ascribed to episodic memory in humans.
- This study contributes to the growing body of research on the cognitive and memory processes that underlie creative thinking.
- Future research should aim to disentangle the distinct episodic and semantic features that contribute to creative writing and explore the potential for human-AI collaboration.

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ACKNOWLEDGEMENTS

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Does Task-Switching Enhance Creative Problem-Solving Performance?

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Research on task-switching has primarily focused on its negative impact on performance, but recent studies suggest that it could be beneficial when solving creative problems (e.g., Lu et al., 2017; Sio et al., 2017; Smith et al., 2015). However, these studies have methodological limitations, such as using homogeneous samples and presenting only a small number of items, which are likely to limit the robustness and generalizability of their findings. They also focused mainly on problem-solving performance, without fully exploring how task-switching impact creative problem solving. To address these issues, we conducted two online studies with a diverse sample of participants to examine the effect of task-switching on creative problem-solving. Both studies used Remote Associates Test (RAT) problems as the creative problem-solving tasks. In each study, participant solved RAT problems in both a switching and a no-switching conditions. In the switching condition, RAT problem-solving sessions were interleaved with each other. In the no-switching condition, the problems were presented sequentially. We compared the RAT problem-solving performance, measured in terms of accuracy and response time, between the two conditions. We also measured the semantic similarity between participants' guesses made during RAT problem solving to examine if the search process differs between the two conditions. The results will be discussed during the conference.

Task Switching and Creative Problem Solving

Ut Na Sio, Sheffield University Management School

Introduction

Recent studies suggest that task-switching could be beneficial for creative problem solving (e.g., Lu et al., 2017; Smith et al., 2015)

However, these studies have methodological limitations, e.g.,

- homogeneous samples
- presenting only a small number of items
- focus on the effect on performance

We conducted an online task-switching studies with a larger and more diverse sample of participants.

We examined the effect of task-switching on RAT problem-solving performance.

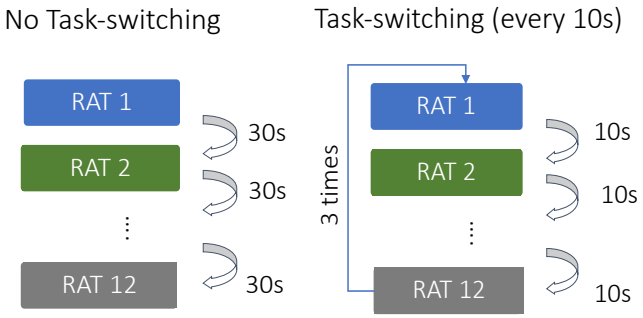
We examined the effect of task-switching on the scope of search conducted by comparing the semantic similarity between adjacent responses across the two conditions.

Methods

Participants. One hundred native English speakers (47 females, 53 males) residing in North America were recruited via MTurk, with a mean age of 34.17 years (SD = 12.72).

Tasks. 24 Remote Associates Test (RAT) problems were selected (Bowden & Jung-Beeman, 2003).

Procedures. This study used a within-subject design that participants solved two sets of RAT problems: one in a no-switching condition and the other set in a switching condition. In



Results

Participants solved fewer problems in the task-switching condition than the no task-switching condition, $p = .01$

No difference between the two conditions in terms of RAT problem solving solution time, $p = .64$

The semantic similarity scores were in general lower in the task-switching condition than in the no task-switching condition, $p = .007$

Discussion

Opposite to the findings of previous studies, we observed a negative effect of task-switching on RAT problem-solving accuracy.

Participants conducted a broader search when they were in the switching condition compared to the no-switching condition.

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Computational Mechanisms of Human Creativity

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Creativity is an important, yet elusive, human characteristic. Despite strides in understanding creativity as a cognitive ability, there is a paucity of computational studies associated with it. Our work aims to fill this gap with a computational investigation of the mechanisms underlying little-c creative artistic work, from a reward learning perspective. We define tractably constrained experimental settings involving binary 5x5 pixel patterns. We develop a taxonomy with two types of creativity – static and dynamic, crossed with two modes of creativity – evaluation and production, resulting in four experimental conditions for investigation. We outline various possible underlying computational mechanisms such as (1) an immediate value function for static creativity, (2) a long-run value function for dynamic creativity, (3) the history-dependent nature of evaluation and (4) a search process guiding the production. We design a series of behavioural experiments based on our taxonomy and propose directions for data analyses. Through this we aim to enrich the computational understanding of product and process creativity.

Computational Modelling of Human Creativity

Surabhi S Nath, Peter Dayan

Introduction

Despite strides in understanding creativity as a cognitive ability, there is a paucity of computational analyses. Our work aims to fill this gap with a computational investigation of the mechanisms underlying little-c artistic creation.

We define tractably constrained experimental settings involving binary 5x5 pixel patterns (Figure 1).

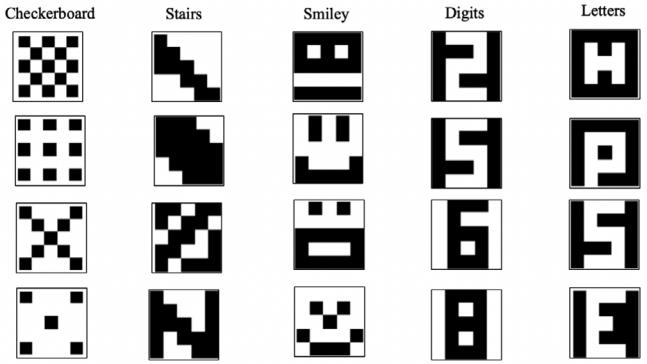

Figure 1: Example classes identified in 5x5 pixel patterns produced by people

We develop a taxonomy with 2 types—static & dynamic, and 2 modes—evaluation & production of creativity (Figure 2).

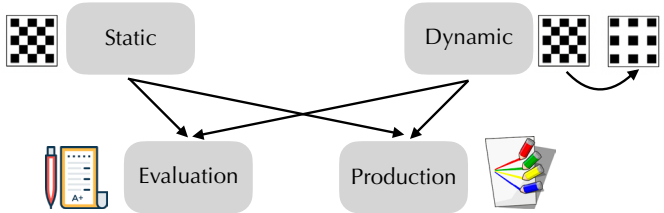

Figure 2: Taxonomy resulting in 4 conditions for investigation

Computational Components

We outline possible underlying computational components:

(1) An immediate value function for static creativity
(2) A long-run value function for dynamic creativity
(3) The history-dependent nature of evaluation
(4) A structured search process guiding the production

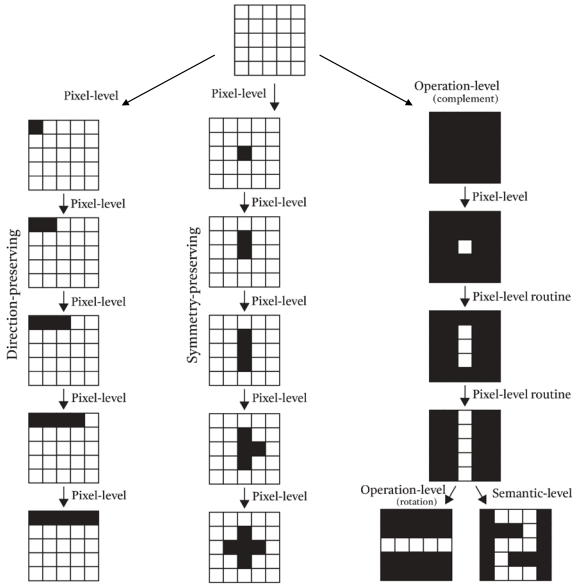

Figure 3: Moves at different levels

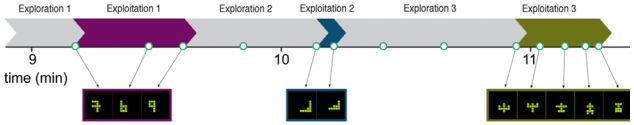

Figure 4: Phases of exploration and exploitation (Figure borrowed from Hart et al., 2017)

Hypotheses

In line with work from Hart and colleagues (2017), we hypothesise that people:

(1) produce moves at different levels such as pixel-level, operation-level or semantic-level (Figure 3)
(2) display phases of exploration and exploitation (Figure 4)
(3) produce patterns by iterating over semantic distance (Figure 5)

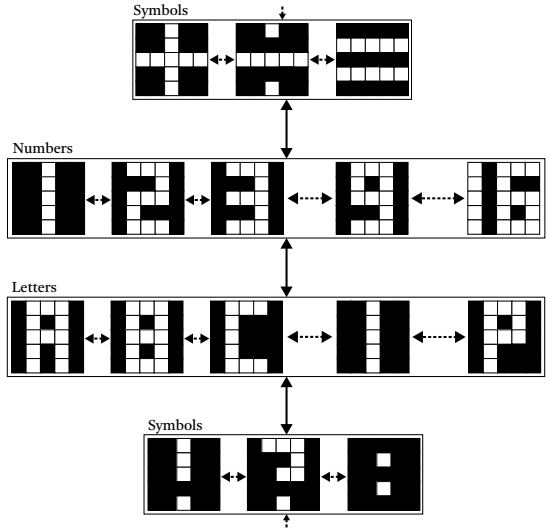

Figure 5: Example semantic hierarchy

Directions

Based on the taxonomy and the computational components specified, we design behavioural experiments to test for the above mentioned hypotheses. Through this, we aim to enrich the computational understanding of product and process creativity.

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The Divergent Association Task Lacks Convergent Validity

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The Divergent Association Task Lacks Convergent Validity The divergent association task (DAT) is described as a creativity test and more specifically as a measure of divergent thinking. In the DAT, participants are asked to name 10 words that are as semantically unrelated as possible. Prior research has reported moderate to strong correlations with other putative measures of divergent thinking, offering evidence of convergent validity. In this study, I aimed to replicate prior research using a larger sample size and a greater number of so-called creativity tests. The DAT correlated weakly to moderately with divergent thinking, convergent thinking, and many other types of tasks (e.g., vocabulary). The DAT may be assessing processes that are important for creative thinking but it is either not measuring the same processes as other creative thinking tasks or it is measuring them poorly.

The Divergent Association Task Lacks Convergent Validity

David Martinez, PhD
Applied Research Lab for Intelligence and Security (ARLIS),
University of Maryland, College Park

Introduction

The Divergent Association Task (DAT) is described as a brief measure of divergent thinking.

Participants are asked to name 10 words that are as semantically unrelated as possible.

In theory, more creative individuals should be better able to identify remote associates.

Olson et al. (2021) reported that the DAT correlated strongly to moderately with the alternate uses test and weakly with convergent thinking items.

Materials and methods

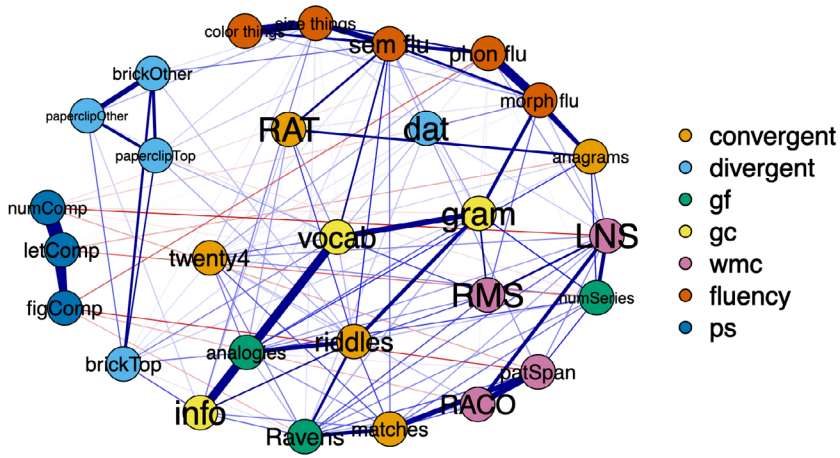
Preliminary data from ongoing project.

334 participants recruited from Prolific attended three 2-hour proctored sessions on Zoom.

Completed a number of tasks assessing divergent thinking, convergent thinking, intelligence, working memory, fluency, and perceptual speed.

Results

Psychometric network analysis



Correlations between DAT and other tasks (ordered by magnitude)

morph .28	riddles .21	raco .15
sem .27	matches .19	anagrams .14
phon .25	analogies .19	numSeries .13
gram .24	numComp .18	color .13
vocab .24	twenty4 .18	rat .11
size .24	info .18	letComp .10
ravens .22	rms .17	brickOther .08
lns .22	patComp .16	paperclipTop .02
patSpan .22	brickOther .16	paperclipOther .01

Conclusions

- DAT is weakly correlated with alternate uses (scored using fine tuned GPT-3 model; Organisciak et al., 2022)
- DAT is most strongly correlated with verbal fluency and gc tasks.
- Current automated scoring methods likely impart too much error.

Literature cited

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Acknowledgments

This work is funded by an Office of Naval Research grant, N000142112220, awarded to Dr. David Martinez.

Further information

Please see our OSF page for a draft methods doc and videos of all tasks. More info will be added as we complete the study. https://osf.io/5njbs/

Examining Convergent Thinking Through Cultural Differences and Neural Mechanisms

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Creativity is a cultural and social phenomenon, entailing that culture significantly impacts individual creativity. Accordingly, research is gradually becoming oriented toward investigating creativity within the scope of social culture. Although numerous current cross-cultural studies have focused on divergent thinking (DT), there is a lack of evidence regarding convergent thinking (CT). In the present study, we focused on studies involving the remote associates test (RAT), which is one of the most popular and classical test of CT, and summarized the similarities and differences in CT between Eastern and Western cultures from the perspectives of the versions of the RAT (Chinese vs. English), cultures, thinking aspects and control styles. In addition, we performed a comparison between C-RAT and E-RAT to provide evidence on brain activation patterns to support our propositions. We concluded that performance discrepancies indeed exist for different RAT problem sets; benefiting from a more holistic thinking style and a bias towards cognitive persistence as well as relative lower flexibility, Easterners may have advantages in CT, and Westerners with high-level spontaneous flexibility may perform well in making associations of cues, which gets in the way to final solution in turn; there are similarities and differences regarding the neural basis in two cultures, and extra regions activated only in E-RAT can be put down to the fact that Westerners experience more conflicts or competition of ideas induced by overactive flexibility and higher loads in working memory.

A Review and Meta-Analysis of Convergent Thinking: A Perspective Informed by Culture and Neurocognitive Mechanisms

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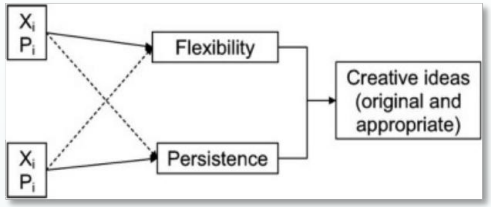
Introduction

Research is gradually moving towards investigating creativity within socio-cultural contexts. Currently, many cross-cultural studies have focused on divergent thinking (DT) but lack evidence on convergent thinking (CT). In this review and meta-analysis, we summary the cultural aspects of CT, specifically studies involving the Remote Associates Test (RAT). Additionally, we performed summary from the brain activation patterns of C-RAT and E-RAT to support our propositions. We proposed a theoretical framework that differs from previous conclusions.

Comparison of the Contents of Various Versions of the Remote Associate Test (RAT)

	RAT	CRAT	CCRAT	CWRAT
Language	English	English	Chinese	Chinese
Format				
Cue	Word	Word	Character	Word
Solution	Word	Compound words	Two-cha word	Word
Example				
Cue	Same-fire-head	Flower-Friend-Scout	板-洞-色	市场-结束-日落
Answer	Match	Girl	黑	黄昏
Association	1 Synonymy 2 Semantic associations 3 Compound words	Compound words	Compound words	1 Synonymy 2 Semantic association 3 Compound words

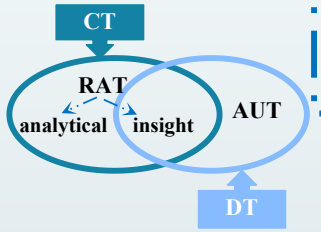
The Influence of Culture in Different Creative Processes



The dual pathway to creativity model according to Nijstad et al. (2010).

- Divergent Thinking --- AUT --- Cognitive Flexibility
- Convergent Thinking --- RAT --- Cognitive Persistence

(Mekern et al., 2019; Razumnikova, 2007; Hommel, 2015)



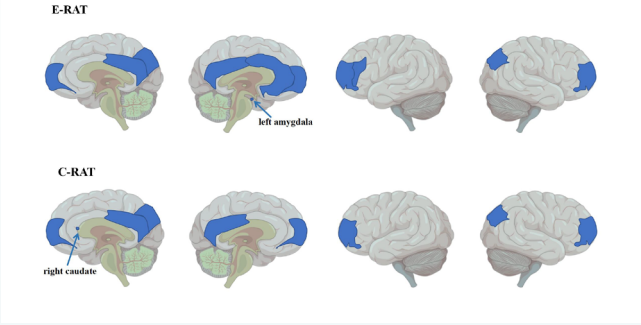
(Zhang et al., 2020; Kounios, 2014)

Westerners:
- better performance in DT
- strengths in DT and cognitive flexibility

Easterners:
- emphasizing the usefulness
- employing a holistic and zhongyong thinking

HYPOTHESIS 1)Westerners benefit from a bias towards **flexibility**, facilitating the formation of more remote associations to promote CT; 2)Easterners, prioritize the **usefulness** of solutions and tend to engage in a **holistic thinking** style to foster CT.

The Comparisions in Neural Basis Between C-RAT and E-RAT



The general brain patterns of E-RAT and C-RAT

Common regions (i.e. PCC, right precuneus, caudate, amygdala)
- DMN & emotional net
- flexibility & positive emotion

Extral regions in E-RAT (i.e. ACC, DLPFC)
- salience & control net
- remote associations
- ideas evaluation

Assumptions

- The common neural activation across cultures supports the partial reliance of CT on flexibility, while the additional activation observed only in E-RAT can be attributed to individual's cognitive effort to suppress close thoughts in order to form remote associations, and reach a unique solution by the evaluation of potential candidate ideas.

Contact Imformation

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Lightning Poster Session 3

Applied Research: Creativity in Education and Design

Click here to watch the presentations

Examining the Creativity Knowledge of Practicing Teachers

Dr. Jeb S. Puryear - *University of Montana*

jeb.puryear@umontana.edu

Creativity has been prioritized as an essential skill for 21st century learning. Yet, myths and inaccurate beliefs about creativity continue to swirl around the construct (Benedek et al. 2021). Teachers report valuing creativity in the classroom; however, many struggle to accurately identify characteristics and behaviors associated with creativity (Mullet et al., 2016). Research on creativity myths has gained traction in other research fields recent years (Benedek et al., 2021; Dekker et al., 2012); and multiple studies have been done on teacher perceptions/beliefs of creativity (Kettler et al., 2018; Mullet et al., 2016; Rubenstein et al., 2013). Research supports the impact of teacher beliefs on educational practice; this study examined the prevalence of creativity myths and teachers' beliefs of creativity with current practicing teachers. It is hoped that we can relate these and other factors to a broader appreciation of creativity-learning connections (as articulated Cropley, et al., 2019), providing a mechanism by which schools can improve support for classroom creativity in the future.

UK Creativity Researchers Online Conference
1 June, 2023

Examining the Creativity and Knowledge of Practicing Teachers

Jeb S. Puryear & Kristen N. Lamb
University of Montana & University of Alabama

Rationale

Creativity has been prioritized as an essential skill for 21st century learning. Yet, myths and inaccurate beliefs about creativity continue to swirl around the construct (Benedek et al., 2021). Teachers report valuing creativity in the classroom; however, many struggle to accurately identify characteristics and behaviors associated with creativity (Mullet et al., 2016). Research on creativity myths has gained traction in other research fields in recent years (Benedek et al., 2021; Dekker et al., 2012); and multiple studies have been done on teacher perceptions/beliefs of creativity (Kettler et al., 2018; Mullet et al., 2016; Rubenstein et al., 2013). Research supports the impact of teacher beliefs on educational practice; this proposed study was designed to examine the prevalence of creativity myths among teachers' beliefs of creativity with current practicing teachers. It is hoped that we can relate these and other factors to a broader appreciation of creativity-learning connections (as articulated Cropley et al., 2019), providing a mechanism by which schools can improve support for classroom creativity in the future.

Research Questions

RQ1a: How does the knowledge of creativity facts and myths among teachers compare to the general population?

RQ1b: What factors predict creativity knowledge of teachers?

These questions fuse work of Dekker and colleagues (2021) which examined neuromyths in educator populations with the recent work by Benedek and colleagues relating to creativity myths and facts in the general population.

RQ2a: To what extent does knowledge of creativity myths and facts relate to educator support for links between creativity and education?

RQ2b: Does this knowledge of creativity myths and facts offer predictive power beyond other creativity and demographic variables?

These questions investigate the usefulness of creativity knowledge as a predictor of teacher beliefs about creativity-education links (as conceived by Cropley et al., 2019).

Methods

Sample: Teachers in the Pacific Northwest and Southeastern United States. Across primary and secondary classrooms and administration. Expected to have roughly 250 participants.

Demographic Data Collected: Gender, subject area taught, level of education, years teaching, sources of technical knowledge (modeled after data collected in Dekker and Benedek's work)

Scales Used:

- Connections of Creativity and Education: 8 scale of items based on Cropley et al., 2019
- Short Scale of the Creative Self – 11 item scale relating to creative personal identity and creative self-efficacy (Karwowski, 2011)
- Neuromyths and Facts Questionnaire – 10 items used by Benedek et al. as a measure of background scientific knowledge
- Creativity Myths and Facts Questionnaire – 30 items used by Benedek et al. to assess understanding of research on creativity

The E(ducation)-Pizza Project: Collaboration and Play in Curriculum Design

Dr Chrissi Nerantzi - *University of Leeds*

c.nerantzi@leeds.ac.uk

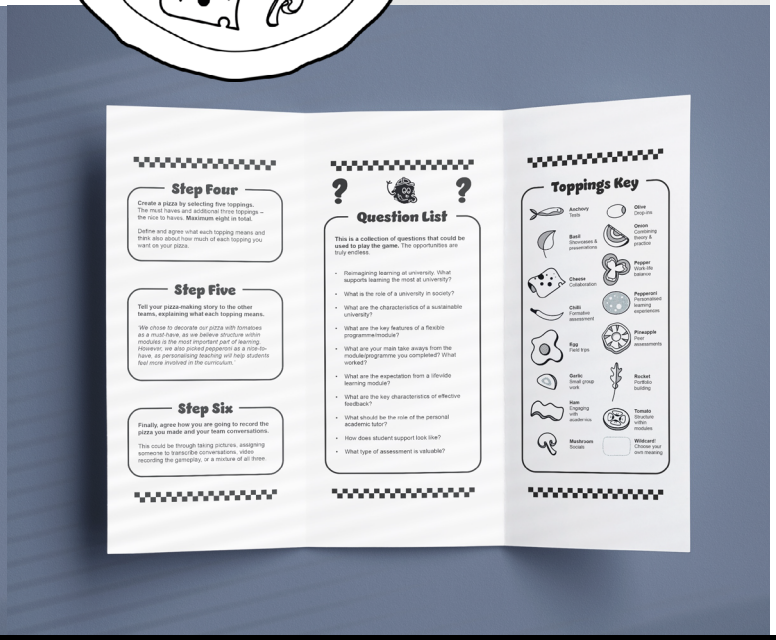
This poster reports on the co-creative process of the e(ducation)-pizza game – a tool for curriculum development using design thinking through educator and student partnership. A cross-disciplinary project team of educators and students from the School of Education and Design as well as the Digital Education Service at the University of Leeds have come together to design this game to diversify curriculum and learning design conversations using play. The game can be used during design sprints and related activities by diverse teams and has the potential to lead to curriculum transformation. Grabill, Gretter & Skogsberg (2022) highlight the importance of talking to each other about learning, teaching and assessment. This playful approach will not only foster such conversations it will also enable pan-participation and surface genuine, diverse perspectives without the fear of being judged, being wrong or feeling silly (Kessels, 2016). Play makes us feel safe and brave at the same time, to challenge and problem-solve, question and break free from norms and traditions and generate fresh ideas and make novel connections (Bateson & Martin, 2013; Nielsen & Thurber, 2016) but also help us develop as creative and critical thinkers and doers (Resnick, 2017). We are exploring play through the e-pizza game to engage in challenging but important conversations with educators and students to spice up and transform the curriculum and make space to awaken curiosity, imagination and creativity. Note: Our intention is for students to lead this contribution and we will update the abstract and details if accepted.

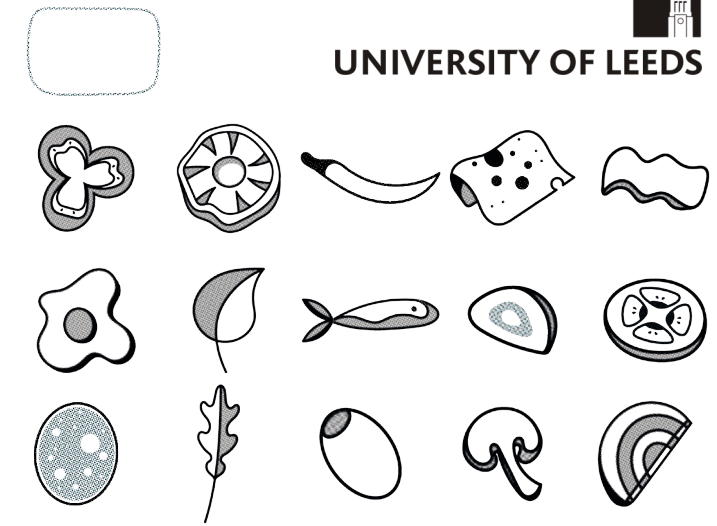
E(ducation)-pizza game

for curriculum and learning design conversation and transformation

The problem to address: How might we improve and transform the curriculum, learning, teaching more generally to make it fit for our students and society, the future?

The solutions: “Making the **classroom a democratic setting** where everyone feels a responsibility to contribute is a central goal of transformative pedagogy.” (hooks, 1994, 39)





e-pizza team: Chrissi Nerantzi, John Hammersley, Damian McDonald, Sarah Briggs, Matthew Lickiss, Mavis Brew, Joseph Gilmore, Laura Gooch, Martha Binks Iturriagagoitia, Charles Reader and Antonio Martinez-Arboleda

References

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The project is supported by the Learning Design Agency, Curriculum Redefined and the School of Education, University of Leeds

The ‘Build A Monster’ Task: A New Methodology for Measuring the Four P’s of Creativity and Creativity in Children

Bethan Garratt - *University of Buckingham*

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Creativity is recognised as being multidimensional, spanning several aspects of behaviour. The Four P’s model encapsulates this and identifies the creative ‘Person’, the cognitive ‘Process’, the ‘Product’, and ‘Press’ (environment) as dimensions. It is apparent that there is interplay between these, but they are often researched in silos rather than viewed holistically. ‘Process’ research tends to focus on well-established areas and less on processes like embodied creativity, creative searching, and serendipity. Additionally, research often recruits child participants to study the development of creativity, focusing on infants, rather than how older children express it. To address these points, this study pilots a new methodology: the ‘Build A Monster’ task. Parent-child participant pairs were instructed to build one monster together using LEGO; the child then built another monster while their parent completed questionnaires (the Children’s Playfulness Scale and the Test of Playfulness). The task used mixed-methods to gather results, including video- and audio-based Verbal Protocol Analysis (VPA), and interviews, questionnaires, and observations, which were used to support the VPA data. The ‘Product’ was assessed using the Consensual Assessment Technique (CAT). Results indicated the identified ‘Processes’ of embodied creativity, serendipity and creative searching were successfully observed. Findings for ‘Person’ varied depending on the participants’ personalities; several children outperformed their parents in idea generation. ‘Press’ results explored variations within parent-child dynamics. The ‘Product’ assessment was less successful: CAT scores revealed low inter-rater reliability. This is an overview of the entire research thesis; however, the poster will explore specific findings from the study.

School of Psychology

THE UNIVERSITY OF BUCKINGHAM

The ‘Build A Monster’ Task: A New Methodology for Measuring the Four P’s of Creativity, and Creativity in Children.

Bethan Garratt, Kathryn Friedlander, and Gillian Hill

UK Creativity Researchers’ Annual Conference, 1st June 2023

Background

- Creativity is multidimensional: Four P’s model encapsulates this (Rhodes, 1961 – see below).
- Tendency for research to focus on one ‘P’ at a time.
- Focus on well-established areas and less on other ‘Processes’ like:
  - Embodied creativity (Stanciu, 2015)
  - Creative searching (Pandza & Thorpe, 2009)
  - Serendipity (André et al., 2009).
- Creativity research in children often focuses on infants’ development.
- The ‘Build A Monster’ task was developed to:
  - Holistically measure the Four P’s in one central task
  - Target older children in creativity research.

Findings and Discussion

- The ‘Build A Monster’ task captured and measured the Four P’s in parent/child dyads and in children.
- **PROCESS:** identified embodied creativity, serendipity, creative searching, and insight moments (Wallas, 1926). Measures person-environment-process interactions (Pike, 2002).
- **PERSON:** findings varied depending on participants’ personalities and abilities (see monsters in diagram for broad talents of the children). Paradigm can be used to explore playfulness, which was done using questionnaires as ancillary data to the task.
- **PRESS:** explored variations within parent-child dynamics during the first condition and how this may affect creative output. Findings varied depending on the individual and their previous experiences with LEGO (i.e. how comfortable they were playing with it).
- **PRODUCT:** used Consensual Assessment Technique (Hennessey et al., 2011) to evaluate the monsters which revealed low inter-rater reliability due to the researcher having a greater understanding of the construction process.
- In conclusion, with some refinements, the ‘Build A Monster’ task has the potential to provide a novel, child-friendly paradigm for investigating the multidimensionality of creativity.

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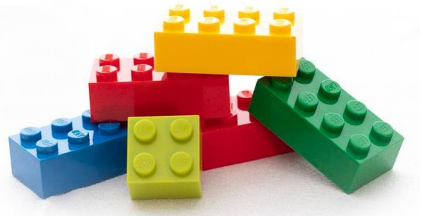
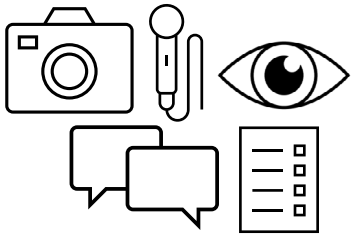


LEGO was chosen as the task’s construction material because it is familiar to many, and it has been shown to facilitate enjoyment and creativity (Freeman, 2003).



The ‘Build A Monster’ task uses multiple methods to collect data, including:
- Video- and audio-based recordings (for Verbal Protocol Analysis (VPA))
- Observations
- Semi-structured interviews
- Questionnaires

In the first condition, the parent and child build a LEGO monster together. They are interviewed about the experience after.

The monsters and collected data are used to assess the participants against the Four P’s of Creativity. This was done using VPA and observations for ‘Process’, ‘Person’ and ‘Press’, which were supported by semi-structured interviews and questionnaires. The Consensual Assessment Technique (CAT) and observations were used to assess the ‘Product’.

The ‘Build A Monster’ Task

In the second condition, the child builds a LEGO monster on their own while their parent completes a series of questionnaires. The child is interviewed about the experience after.

Measuring Creativity in Preschool: Is it a Domain-Specific or Domain General Skill

Violet Cieslik - *University of Victoria*

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Creativity is a multifaceted construct that involves four domains: fluency (i.e., idea production), originality (i.e., unusual idea production), flexibility (i.e., production of ideas from different categories), and elaboration (i.e., ability to include details within an idea). This multifaceted nature of creativity facilitates the development of creative abilities in a variety of different modalities (e.g., behavioral, verbal, graphical, and practical. Previous research looking at creativity in adults and school aged children has determined that creativity is a domain specific skill; however, as there is limited research on preschoolers' creativity, it is unclear whether creativity can be categorized as a domain-specific or domain-general ability. Hence, the goal of this study was to examine the overall structure of creativity and whether it is domain-specific or domain-general ability in preschool. Eighty preschoolers between the ages of four and five years participated in this study. Creativity was measured with four performance-based measures: Torrance Test of Creative Thinking (TTCT), the Torrance Thinking Creatively in Action and Movement (TACM), the Alternative Use Task (AUT), and the Ball and Jar task. To analyze the structure of creativity a CFA with a four-factor solution was conducted. The extraction of one factor indicates that creativity is domain general, whereas the extraction of multiple factors indicates creativity is domain specific. Results will shed light on the structure creativity and contribute to the conceptualization and assessment of creativity in early childhood. Complete results will be detailed on the poster presentation at UK Creativity Researchers' Conference, 2023.

Measuring Creativity in Preschool: Is it a Domain-Specific or Domain-General Skill?

Violet Cieslik BA & Ulrich Mueller PhD
Department of Psychology, University of Victoria (Victoria, BC)

University of Victoria

Child Development Lab

BACKGROUND

Creativity

- Creativity in preschool is defined as divergent thinking used in the production of new and unique ways to play, create, and solve problems.
- Exploration aids in the development of divergent thinking in a variety of different areas (e.g., drawing, writing, dancing, etc.; Evans et al., 2021).
- Fours domains are used to measure creativity: fluency (i.e., idea production), originality (i.e., unusual idea production), flexibility (i.e., production of ideas from different categories), and elaboration (i.e., ability to include details within an idea; Yildiz & Yildiz, 2021; Evans et al., 2021).
- Focus of this study on the two widely recognized domains of creativity.
- For example, the Alternative Use Task (AUT) is commonly used to measure preschoolers' creativity in the two domains of fluency and originality. Children are asked to produce different uses for 6 common objects (Figure 2). Fluency scores are the number of distinct use responses averaged across the 6 objects. Originality scores are the infrequency of distinct uses, calculated by comparing the answers provided by the entire sample and giving one point if the answer was only given by 5% of participants and two points if the answer was only given by 1% of participants.

Domain Specificity or Generality

- Domain generality is the ability to transfer knowledge and skills of performing one creative task (e.g., music) to another (e.g., writing); domain generality is inferred on the basis of highly correlated creative scores across a variety of tasks in different domains (Baer, 2012).
- By contrast, domain specificity is defined as having distinct creative abilities in different domains (e.g., drawing); it is inferred on the basis of a lack of significant correlations on creativity tasks across a variety of domains (Baer, 2012).
- Research suggests that creativity is domain specific in adult and school aged populations (Han & Marivn, 2002; Han, 2003; Baer, 1991); yet few studies have examined these patterns in preschoolers.

MAIN OBJECTIVES

Examine the structure of creativity in preschoolers and determine whether it is domain-specific or domain-general skill

METHODS

Participants

- 83 children aged four to five (M_{age} 4.40 years) living in Victoria BC
- 30 males and 53 females

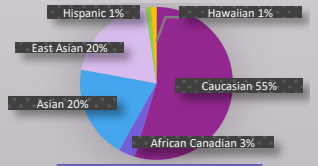

Figure 1. Ethnicity Distribution

METHODS

Materials

- **Alternative Use Task (AUT; Wallach & Kogan, 1965)**

  → Verbal measure of creative ability, where children are required to produce alternative uses for 6 different objects and are scored on fluency (number of responses) and originality (infrequency of responses; Figure 2)
- **Torrance Test of Creative Thinking - Figural (TTCT-F; Torrance, 1966)**

  → Figural measure of creative ability with three drawing activities. In the task children are required to add elements to an existing stimulus through drawing. Scores of fluency (number of elements added) and originality (number of unique elements added) are determined by averaging scores across the three activities.
- **Torrance test of Thinking Creatively in Action and Movement (TACM; Torrance, 1981)**

  → Non-verbal measure of creative ability measured with four movement-oriented tasks. Scores on three of the four tasks are averaged together to provide two scores: fluency (total number of movements) and originality (infrequency of unique movements; Figure 3)
- **Ball and Jar Task (Evans et al., 2021)**

  → Motor/explorative measure of creative ability. Children are required to retrieve a Styrofoam ball from a Jar using only the provided materials and are scored on fluency (number of actions performed in the task) and originality (infrequency of actions performed; Figure 4)

Figure 2. Pictures of Objects Used in the AUT task

Figure 3. Basket and cup used in the TCAM

Figure 4. Objects used in the Ball and Jar task.

Procedure

- Children were tested at one time point with four different performance-based creativity measures (TTCT-F, TCAM, Ball and Jar task, AUT). The four tasks were counterbalanced at each session.
- Testing sessions were one-on-one with children and took approximately 45 minutes in an open room provided by the preschool. After the session parents were sent an email noting the completion of the session and an online survey that included a demographics questionnaire.

RESULTS

- An analysis using an Exploratory Factor Analysis (EFA) was performed in R-studio to examine the structure of creativity in preschoolers.
- 8 observed variables were assessed in terms of multivariate normality, linearity, outliers, sample size (10:1[N:variable]), and factorability (KMO = 0.60, Bartlett's test of sphericity = p >0.05).
- Eigen values, scree plots, and cumulative percentage indicated a three- or four-factor structure would fit the data. Four models were tested (3-factor model no rotation, 4-factor model no rotation, 3-factor model oblique promax rotation, and 4-factor model oblique promax rotation); the 4-factor model with oblique promax rotation fit the data best (RMSEA = 0.01 , TLI = 0.988, Mean item complexity = 1.1).
- Factor structure suggests that **preschool creativity is multifaceted** with four factors each relating to a different creative domain (Figure 5).
- To determine the specificity or generality of creativity the four latent factors were analyzed using a SEM model with Maximum likelihood robust.
- Results showed **no significant relationship between the four extracted factors of creativity:** non-verbal, figural, verbal, and motor/explorative. Indicating creativity in preschool to be a domain specific skill.

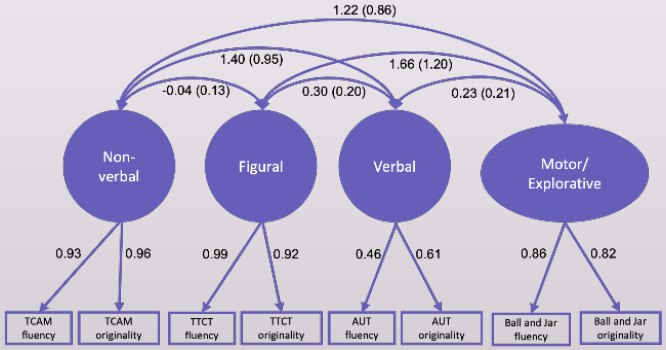

Figure 5. Measurement model (N = 83) displaying 8 observed variables loading onto four latent factors of creativity. Standardized loadings for observed variables and standardized covariance estimates between latent factors with standard error are reported.

DISCUSSION

- This was the first study to examine the structure of creativity in preschool with four different performance-based measures of creativity ability.
- Results showed that preschoolers' creativity is multifaced and can be observed in a variety different tasks; however, the generality of creativity and the ability to transfer creative skills from one task to another was not present.
- These findings are consistent with other creativity research in elementary and adult populations showing that creativity is a domain specific skill.
- Longitudinal research would help shed light on the development of creativity over time and the interindividual differences in the development of creativity.

Scan for a copy of both the references and this poster

Visualising the Design Space: How Can We Represent Design Creativity?

Esdras Paravizo - *University of Cambridge*

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Many design problems do not have just one solution but instead, have a range of possible solutions that is called the “design space”. As designers work, they are said to be involved in “design space exploration”, searching for the combination of variables that yield the best outcomes for a set of performance metrics. Despite this seemingly straightforward approach, visualising the design space and framing design creativity in terms of this exploration is a challenging and overlooked topic. In this talk, I present an approach to constructing design space visualisations and metrics using data from a bridge-building game. Employing this approach in a preliminary study unveiled interesting insights into how design researchers can track and evaluate how people explored the design space within the game. Future work can adapt and expand this approach to relevant engineering design contexts such as computer-aided design. Implications for creativity research and education are discussed, particularly with respect to opportunities to employ similar approaches to broader contexts in the field.

visualising the design space

how can we represent design creativity?

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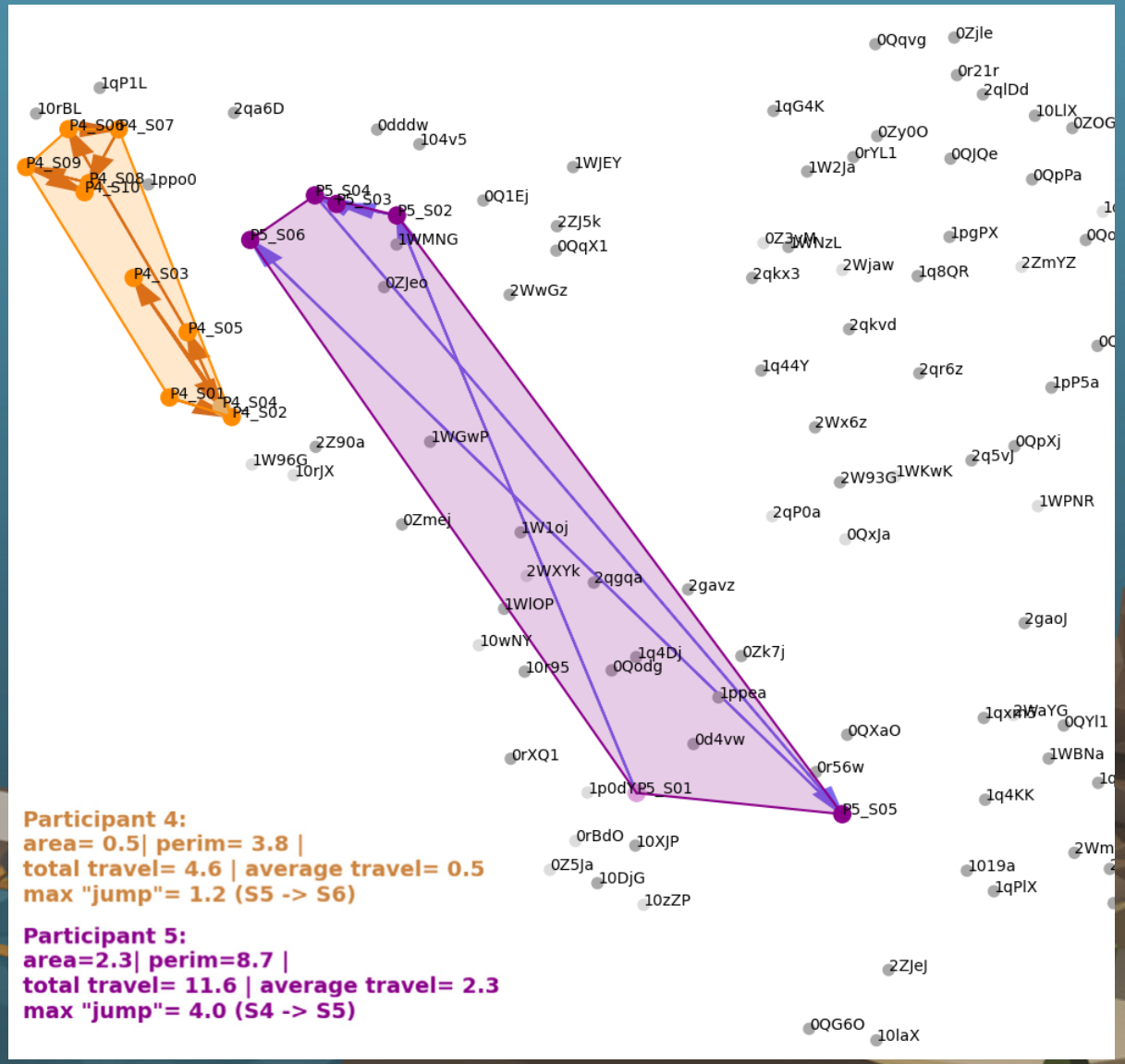
Prof Nathan Crilly



Engineering and Physical Sciences Research Council

UNIVERSITY OF CAMBRIDGE

Understanding Creativity: A Mixed Study at a Boot Camp for Startups Creation

Dr. Ana María Aguilera-Luque - *Tecnológico de Monterrey*

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Creativity is important in developing innovative products and services and, therefore, in new business proposals. Various factors have been related to creativity, innovation, and entrepreneurship; some seem to be common for these three constructs. Among them, self-efficacy, time to develop an idea, or fixation have been identified as variables that could intervene in the creative process. This study applies a qualitative and quantitative methodology to assess different dimensions of creativity. It provides information about the relationships among dimensions of creativity, time, and fixation, rated in different tasks and through self-assessment and external evaluation, during a startup boot camp of ideas generation for new business creation. As an initial brain warming up of the boot camp, 113 undergraduate students were asked to complete: (a) the Creative Self-Efficacy survey by Aranguren et al. (2011), (b) one additional item on communicative confidence, (c) one task in the framework of the Alternate Uses Task (AUT: Guilford, et al., 1960), and (d) a narrative task consisting of a short story about three images. As previous literature indicates, creative self-efficacy has positive correlations with some variables related to entrepreneurship, like communicative confidence, entrepreneurial intention, or entrepreneurial activity. Equally, the time to complete the tasks has positive correlations with different dimensions of creativity and a lower fixation. In the narrative task, Guilford's dimensions of divergent thinking showed a strong correlation among them, and it has been evidenced that lower fixation with the elements of the context is related to higher flexibility or originality in narrative productions.

UNDERSTANDING CREATIVITY
A Mixed Study at a Boot Camp for Startups Creation

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Entrepreneurship Area - Business School (Campus Puebla)

creativity innovation entrepreneurship

Introduction

Creativity is key to innovation and generating ideas for new businesses (Amabile, 1996; Ward, 2004). Some variables seem to be common for creativity, innovation, and entrepreneurship, among them: self-efficacy, time to develop an idea, and fixation, all intervene in the creative process (Weinberger et al., 2018).
Two dimensions of self-efficacy have interest in this work: entrepreneurial and creative.

Questions

- Does entrepreneurship have a relationship with any dimension of creative behavior?
- Has creativity to do with the time available to make something?
- Which could be the fixation's role in creativity?

Methodology Qualitative & Quantitative

Context: Bootcamp "idea generation for new businesses" (4 hours)
Sample: undergraduate students (different disciplines)
Testing Time: 15 min.

N = 113

98% Age [20-25]

65% Entrepreneurial action or intention

59% 41%

Instruments & Tasks

1. Creative Self-Efficacy Survey (Aranguren et al., 2011)
2. Communicative confidence (one item)
3. The Alternate Uses Task (AUT) *(Guilford, et al., 1960)*
4. Narrative task (NT) *(A short story about three images)*

Data Analysis

Text analysis >>> 6 raters
a) AUT: Flexibility & Originality
b) NT: originality and elaboration
Scoring criteria:
1: none, 3: neutral, 5: much
Agreement (*)
K= 0.776 (SD= 0.30)
Data analysis Software:
AQUAD-8 (3.2.0) & JASP (0.17.2)
(*) Krippendorff's alpha

Variables

NT
fluency
flexibility
Fixation: NC/C <1 = High
Elaboration
Originality

AUT
fluency
flexibility
Originality

DT

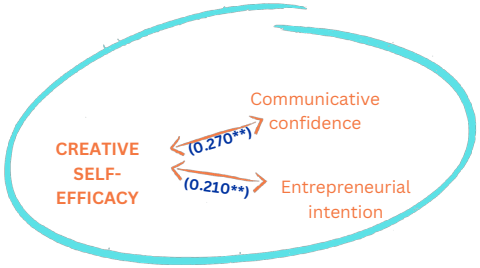
Correlations (rho)

TIME

NT
- Lower Fixation (0.325 ***) ⟷ Flexibility (0.983 ***)
- Elaboration (0.528***)
- Originality (0.522***)
- Flexibility (0.336 ***)
- Fluency (0.237*)

AUT
- Flexibility (0.331 ***)
- Fluency (0.301**)
- Originality (0.268**)

LOWER FIXATION
- Fluency (0.692***)
- Originality (0.556***)
- Elaboration (0.538***)



Conclusion

Reducing fixation could improve the originality and flexibility of creative thinking. One way to achieve that may be by giving enough time to complete creative tasks.
Self-efficacy is important for entrepreneurship. One dimension of it, creative self-efficacy, should be part of the entrepreneurs' training, due to its relation to communicative confidence & entrepreneurial

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