



September 14 - September 16

BOOK OF ABSTRACT



Foreword

Dear Friends,

In these difficult times, with an ongoing sanitary emergency affecting the entire globe and no clear time horizon for a definitive resolution, we had to make a clear cut decision about the MIC Conference 2020, with four possible options: cancel, postpone, go virtual on-demand, go virtual online.

Notwithstanding the fact that nothing is comparable to the bonding that characterizes the real experience of meeting colleagues and friends face-to-face, and fully aware of the fact that the reliability of the Internet can never be 100%, we nonetheless enthusiastically opted for a *live online event*, completely devoted to creativity studies, with presentations delivered from all-around the globe!

As you will see from this Conference Program, the menu is quite rich with Invited Speeches from renown experts, Symposia on hot topics, timely Presentations and Posters of the latest results obtained by our thriving scientific community, and the celebration of the 2020 Marconi Creativity Award, assigned to Isaac Getz for his groundbreaking work on creative organizational approaches based on freedom and altruism.

Attendees and Speakers of the MIC Conference 2020 belong to four different continents, spanning 16 hours of different time-zones! In order to facilitate the participation of all, we decided to organize the program around three blocks per day, with large break times in between, each block identified as “Tempus”, which is latin for “period of time”. Each Tempus is dedicated to a great Italian creative genius:

- Raffaello Tempus – from 08:15 to 11:30 CEST
- Leonardo Tempus – from 13:00 to 16:00 CEST
- Marconi Tempus – from 17:30 to 20:45 CEST

Video recordings of the various Tempi will be made available subject to speakers’ approval. In the Program, to each Tempus a number is added identifying the date: so, for example, Leonardo Tempus 15 is the mid-day block of Tuesday September 15.

We look forward to meeting you all online for the MIC Conference 2020!

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Technical Program

Monday, September 14, 2020

8.15 Connection check-in	
8.45 MIC Conference 2020 opening – Giovanni Emanuele Corazza	
9.00 MIC Invited Speech 1	
Todd Lubart <i>Université de Paris</i>	<i>The next frontier in creativity assessment</i>
9.20 Session 1 – Chair: Boris Forthman	Creativity in Education and Practice
M. McVeigh ₁ <i>1Griffith University, Australia</i>	Creativity and Creative Practice: A Meta-Cognitive Domain-Specific Framework for Writing and Making for the Screen
R. Hollander ₁ , O. Peretz ₁ & D. Harel ₂ <i>1IDC Herzliya, Israel, 2Weizmann Institute of Science</i>	A Plugin-Based Platform for Music Interaction as a Multidisciplinary, Collaborative and Creative Education Tool
M. Mercier ₁ & T. Lubart ₁ <i>1U. of Paris</i>	Board games: a new tool for improving creativity?
10.05 Break	
10.20 Session 2 – Chair: Sergio Agnoli	Cognitive mechanisms of creative thinking
D. Shimizu ₁ & T. Okada ₁ <i>U. of Tokyo</i>	The Interaction between Mind and Body in People's Creativity: Explanation Focusing on Prediction Error
M. Downes ₁ , L. Keenan ₁ & S. Conroy ₁ <i>1U. College Dublin</i>	Creative assessment of executive functions and early classroom performance
S. Bourgeois-Bougrine <i>U. of Paris & U. Gustave Eiffel</i>	Naturalistic creativity in safety-critical environments
11.05 MIC Invited Speech 2	
Evelyn Kroesbergen <i>Radboud University (NL)</i>	<i>The benefits of distraction: The relation between attention and creativity in children</i>
End 11.30	

13.00 Connection check-in	
13.30 MIC Invited Speech 3	
Nathalie Bonnardel <i>Aix-Marseille Université</i>	<i>Creativity and prospective ergonomics</i>
13.50 Session 3 – Chair: Giovanni Emanuele Corazza Creative Cognition	
<u>W. Ross</u> ¹ , P. March ² & F. Vallée-Tourangeau ¹ ¹ <i>Kingston U.</i> , ² <i>U. of Oxford</i>	Between the cracks: A case study of accidents, constraints and signs of new growth
A. D'Anselmo ^{1,2} , S. Agnoli ^{1,2} , M. Filardi ¹ , F. Pizza ^{1,3} , S. Mastria ^{1,2} , G. E. Corazza ^{1,2} , G. Plazzi ^{3,4} , ¹ <i>U. of Bologna</i> , ² <i>MIC</i> , ³ <i>IRCCS Istituto delle Scienze Neurologiche of Bologna</i> , ⁴ <i>U. of Modena and Reggio Emilia</i>	Creativity in narcolepsy type 1: the role of dissociated REM sleep manifestations in the modulation of creative potential
S. Mastria ^{1,2} , S. Agnoli ^{1,2} , L. Franchin ³ & G.E. Corazza ^{1,2} ¹ <i>U. of Bologna</i> , ² <i>MIC</i> , ³ <i>U. of Trento</i>	Inspiration and Creativity: the role of semantic distance in divergent thinking
14.35 Break	
14.50 MIC Invited Speech 4	
Michael Hanchett Hanson <i>Teachers College of New York</i>	<i>Case Studies in Research Using Distributed and Participatory Frameworks</i>
15.10 Symposium 1 – Chair: Claudio Lucchiari The “limits” of creativity: Studies and applications in atypical situations	
A. Antonietti ¹ & A. Cancer ¹ ¹ <i>Catholic U. of the Sacred Heart, Milan</i>	The creative profile of children and adolescents with developmental dyslexia
E. Farina ¹ , L. Della Zoppa ¹ & S. Molteni ¹ ¹ <i>Milano Bicocca U.</i>	Enhancing socio-emotional skills by creative training for children with ASD: A pilot study
M. E. Vanutelli ¹ , V. Cortinovis ² , C. Sergi ¹ , & C. Lucchiari ¹ ¹ <i>U. of Milan</i> , ² <i>Archè Onlus, Social Cooperative</i>	Creativity as a tool to assess and enhance flexible thinking in people with intellectual disabilities (ID): A case series
End 16.00	

17.30 Connection check-in	
18.00 Celebration of the 2020 MIC Creativity Award	
Isaac Getz <i>ESCP Business School</i>	<i>Creativity needs creativity</i>
18.25 Symposium 2 – Chair: John F. Cabra	
Post-traumatic Creativity: Examples from Myanmar through an Academic Civic Engagement Program	
J. F. Cabra <i>State U. of New York, Buffalo State</i>	Post-traumatic Creativity: Context and Model 1
M. Bartlett <i>State U. of New York, Buffalo State</i>	Post-traumatic Creativity: Model 2
M. Burch <i>State U. of New York, Buffalo State</i>	Post-traumatic Creativity: Model 3
J. Brewster <i>State U. of New York, Buffalo State</i>	Post-traumatic Creativity: Model 4
19.25 Break	
19.40 MIC Invited Speech 5	
Mark Runco <i>University of Southern Oregon</i>	<i>Fulfilling Creative Potential by Tolerating and Even Rewarding Bad Ideas</i>
20.00 Session 4 – Chair: Samira Bourgeois-Bougrine	
Arts: experiencing creative appreciation	
S. Fischer <i>Independent Producer</i>	Where Ideas Come From
P. Cortada Boada <i>U. of Barcelona</i>	Developing cartographic attention to nurture creative potential
A. Valqueresma¹ & J. L. Coimbra¹ <i>¹U. of Porto</i>	Unfolding the ties of Creative Self-efficacy and Aesthetic Judgment: A matter of Creative mediation?
End 20.45	

Tuesday, September 15, 2020

RAFFAELLO TEMPUS – 15

8.15 Connection check-in	
8.45 Session 5 – Chair: Mathias Benedek	The neuroscience of creativity
C. Rominger ¹ , D. Memmert ² , I. Papousek ¹ , C. M. Perchtold-Stefan ³ , E. M. Weiss ¹ , M. Benedek ¹ , A. R. Schwerdtfeger ¹ & A. Fink ¹ <i>¹U. of Austria, ²German Sport U. of Cologne, ³U. of Innsbruck</i>	Different neurocognitive strategies in women and men when generating creative solutions in soccer decision-making situations
H. McKee ¹ , S. Rahman ² , J. von Thienen ¹ , L. Seidel ¹ , F. Grzelka ¹ , P. Gloeckner ¹ & C. Meinl ¹ <i>¹U. of Potsdam, ²NeuroCreate Ltd.</i>	Measuring Creative Flow in Real-time Using Consumer-grade EEG Coupled with a Neural Network
S. Agnoli ^{1,2} , S. MASTRIA ^{1,2} , M. Zanon ³ , G. E. Corazza ^{1,2,4} <i>¹Marconi Institute for Creativity, ²U. of Bologna, ³International School for Advanced Studies (SISSA), ⁴Université de Paris</i>	Dopamine and ideas originality: a non-linear relationship
9.30 MIC Invited Speech 6	
Takeshi Okada <i>University of Tokyo</i>	<i>The role of physical process in creativity</i>
9.50 Break	
10.05 Session 6 – Chair: Maria Elide Vanutelli	Dynamics in Creativity Education
Y. Iwai <i>U. of Tokyo</i>	Facilitation of novel creation by revision of others' works
A. Pins ¹ & H. Kupermintz ¹ <i>¹U. of Haifa</i>	Moments of Creativity: Dimensions of Creative Dynamics in the Classroom
S. Jacobovici <i>Creative Arts Therapies Services, Israel</i>	Inspiration Matters!
M. Botella ¹ & C. Dalloubeix ² <i>¹U. of Paris, ²Polytech Sorbonne U.</i>	What is the path followed by the most creative engineering students?
11.05 MIC Invited Speech 7	
Maciej Karwowski <i>University of Wroclaw</i>	<i>(Un)Creative when locked down?</i>
End 11.30	

13.00 <i>Connection check-in</i>	
13.30 MIC Invited Speech 8	
Vlad Glăveanu <i>Webster University</i>	<i>Creativity on the move</i>
13.50 Session 7 – Chair: Maxence Mercier Multivariate approaches to creative development	
I. Lebud ¹ , D. M. Jankowska ² & M. Karwowski ¹ <i>¹U. of Wrocław, ²The Maria Grzegorzewska</i>	Parental creativity self-beliefs and family lifestyle
M. Celume ¹ & F. Zenasni ¹ <i>¹U. of Paris & U. Gustave Eiffel</i>	The impact of mood induction on children's creative convergent thinking
T. Toivainen ¹ , V. Repeyko ² , V. Shakeshaft ³ , M. Lihanov ² & Y. Kovas ^{1,3} <i>¹Goldsmiths, University of London; ²Sirius University of Science and Technology, Sochi, Russian Federation, ³King's College London</i>	Personality and cognitive ability predictors of creativity among high achieving adolescents in Science, Art & Literature
14.35 <i>Break</i>	
14.50 MIC Invited Speech 9	
James Kaufman <i>University of Connecticut</i>	<i>Searching for Meaningful Creativity</i>
15.10 ISSCI Symposium – Chair: Roni Reiter-Palmon	
<p><i>The ISSCI Board Members:</i></p> <ul style="list-style-type: none"> • Todd Lubart, <i>Université de Paris</i> • Roni Reiter-Palmon, <i>University of Nebraska, Omaha</i> • Michael Hanchett Hanson, <i>Teachers College of New York</i> • Nathalie Bonnardel, <i>Aix-Marseille Université</i> • Vlad Glăveanu, <i>Webster University</i> • Zorana Ivcevic Pringle, <i>Yale University</i> • Maciej Karwowski, <i>University of Wrocław</i> • James Kaufman, <i>University of Connecticut</i> • Takeshi Okada, <i>University of Tokyo</i> • Giovanni Emanuele Corazza, <i>University of Bologna</i> 	
End 16.00	

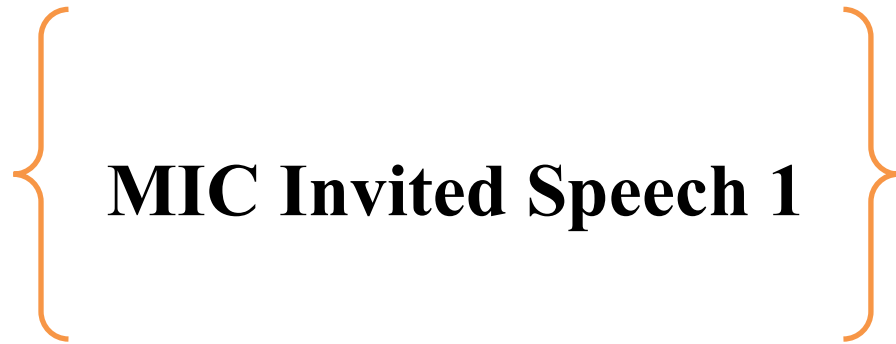
17.30 Connection check-in	
18.00 MIC Invited Speech 10	
Ronald Beghetto <i>Arizona State University</i>	<i>Actionable Uncertainty: A Basis for Creative Thought and Action</i>
18.20 Symposium 3 – Chair: Ellen K. Baker	
Becoming and Expressing One’s True Self: The Legacy of Dr. E. Paul Torrance	
B. Cramond ¹ , R. A. Chavez ² & F. Kaufmann ¹ <i>¹U. of Georgia, ²Washington International Center for Creativity</i>	The Torrance Manifesto for Children and Adults as a Guides to a Creative Life
B. A. Kerr <i>U. of Kansas</i>	Don’t Waste Energy Trying to be Well Rounded
E. K. Baker <i>Private Practice, Washington</i>	Becoming one's self: An ongoing practice
19.05 Break	
19.20 MIC Invited Speech 11	
Roni Reiter-Palmon <i>University of Nebraska, Omaha</i>	<i>Team Creativity: The interplay between cognitive and social processes</i>
19.40 Symposium 4 – Chair: Julia von Thienen	
Automation of Creativity Measurements	
C. Jaschek ¹ , K. Borchart ¹ , E. se ¹ , C. Meinel ¹ , O. Kolodny ² & J. von Thienen ¹ <i>¹U. of Potsdam, ²The Hebrew U. of Jerusalem</i>	Measuring Creativity with a Video Game
Y. Hart ^{1,2,3} <i>¹Harvard University, ²The Theatre Lab, Weizmann Institute of Science, ³Department of Molecular Cell Biology, Weizmann Institute of Science</i>	Automating the Assessment of Creative Exploration versus Exploitation
H. S. Adnan ¹ , S. Real ¹ & S. Rahman ^{2,3} <i>¹U. of Potsdam, ²NeuroCreate Ltd., ³University of Potsdam</i>	Measuring Creative Flow in Real-Time with Consumer-Grade EEG and Deep Learning Networks
M. Benedek ¹ & B. Forthmann ² <i>¹U. of Graz, ²U. of Münster</i>	Automated Creativity Assessments of Verbal Test Responses
End 20.45	

Wednesday, September 16, 2020

8.15 Connection check-in	
8.45 Session 8 – Chair: Christian Rominger	Organizational Creativity
C. Singh ¹ , D. Cropley ¹ & Maureen Dollard ¹ <i>1U. of South Australia</i>	Ready, Set, Industry 4.0
A. Kulichyova ¹ , S. Moffett ¹ , J. McKnight ¹ & M. McCracken ¹ <i>1Ulster U.</i>	Developing employee creativity: A cross-level approach through HR developmental practices
M. L. Oppert ¹ , D. H. Cropley ¹ , Maureen Dollard ¹ , V. O’Keeffe ² , R. Reiter-Palmon ³ , V. Murugavel ³ , & Markus Bensnes ⁴ <i>1U. of South Australia, 2Flinders U., 3U. of Omaha, 4Subject Matter Expert, Norway</i>	Exploring psychosocial safety and creative problem solving in the engineering workplace
9.30 MIC Invited Speech 12	
Gabriele Rizzo <i>Longviews</i>	<i>Foresight and Futures Studies in Defense: maintaining the Offset in deep uncertainty</i>
9.50 Break	
10.05 Session 9 – Chair: Serena Mastria	Development: creative growth & growth of creativity
A. Lellouche-Gounon ¹ , A. Gounon ² , N. Bonnardel ¹ <i>1Aix-Marseille U., 2AALG SAS ESS</i>	A ‘mixed’ technique to reach new ideas adapted to constraints: An exploratory study with seniors and their caregivers
K. van Broekhoven ¹ , B. Belfi ¹ & L. Borghans ¹ <i>1Maastricht U.</i>	To make or not to make? The effect of expected implementation on idea selection
S. Gaardboe <i>U. of South Australia</i>	Assessing Creativity and Critical Thinking in the Primary School Classroom
10.50 Mini Talks/Posters 1 – Chair: Wendy Ross	
K. Chiffi ¹ , A. Eberhard-Moscicka ¹ , Y. Bühlmann ¹ , T. Nef ¹ , C. L. Bassetti ¹ , R. M. Müri ¹ <i>1U. of Bern</i>	Creativity and sleep - increase of N1 sleep and frontal slow wave power with increasing fluency
J. Sun ¹ & T. Okada ¹ <i>1U. of Tokyo</i>	An analysis of actors' internal changes through communication with their partners in acting training
M. Giancola ¹ , M. Palmiero ² , L. Piccardi ³ & S. D’Amico ¹ <i>1U. of L’Aquila, 2U. of Bergamo, 3IRCCS Fondazione Santa Lucia</i>	The contribution of the High-Level Executive Functions in verbal creativity
L. S. Sica ¹ & L. Fusco ¹ <i>1U. of Naples Federico II</i>	Creativity for positive development: the importance of creative self for vocational identity in late adolescence
M. Holinger ¹ & J. C. Kaufman ¹ <i>1U. of Connecticut</i>	Exploring Creativity and Well-being Among Gifted Young Adults
N. Göbel ^{1,2} , M. Camenzind ^{1,2} , A. K. Eberhard-Moscicka ^{1,2} , S. Niggeler ^{1,2} , H. Hegi ¹ , S. Knobel ¹ , P. Urwyler ¹ , T. Nyffeler ^{1,3} , T. Nef ¹ , R. M. Müri ^{1,2} <i>1U. of Bern, 2U. Hospital Bern, 3Luzerner Kantonsspital, Lucerne</i>	Creativity after stroke – comparison of verbal and figural divergent thinking tasks
End 11.30	

13.00 <i>Connection check-in</i>	
13.30 MIC Invited Speech 13	
Giovanni Emanuele Corazza <i>University of Bologna</i>	The Dynamic Creativity Framework
13.50 Symposium 5 – Chairs: Shama Rahman & Theresa Weinstein	The Sonification of Brain Data for Creativity Research, Real-Time Feedback and Artistic Applications
T. Strauch ¹ , L. Hartmann ¹ , L. Hilbrich ¹ , P. Steigerwald ¹ , C. Chafe ² , J. von Thienen ³ <i>¹Technical U. of Berlin, ²Stanford U., ³U. of Potsdam</i>	Audible Spatialization of EEG Data in the Context of Creativity Studies
N. Danz <i>U. of Potsdam</i>	Real-time EEG Sonification with the BITalino platform
N. D'Aleman ¹ , C. Chafe ² , J. von Thienen ³ <i>¹Berlin U. of the Arts, ²Stanford U., ³U. of Potsdam</i>	Brainwave Etudes: Composition and Improvisation with Brain Data
14.35 <i>Break</i>	
14.50 MIC Invited Speech 14	
Zorana Ivcevic Pringle <i>Yale University</i>	<i>Emotions and creativity: From what we feel to what we do with our feelings</i>
15.10 Session 10 – Chair: Andreia Valqueresma	Sociocultural Aspects of Creativity
M. Bultseva <i>National Research U., Moscow</i>	Intercultural contacts and intercultural competence as factors of Russian students' creativity
M. Romo <i>Universidad Autónoma de Madrid</i>	Gender and Creativity: Where are the big-creative women?
Neil Maiden <i>City, University of London</i>	Creativity, Draft and Design: The 13th ACM Creativity & Cognition C&C'2021 Conference, June 2021, Venice. https://cc.acm.org/2021/
<i>End 16.00</i>	

17.30 Connection check-in	
18.00 Session 11 – Chair: Izabela Lebuda	
Genius and giftedness	
C. Phelps ¹ , J. Miller ² & M. Brazzotto ³ <i>¹Emporia State U., ²Texas A&M-Commerce, ³Scuola Elementare Galileo Galilei</i>	Comparison of Creative Pedagogy from Reggio Emilia and Gifted and Talented Classrooms
S. Russ <i>Case Western Reserve U.</i>	Nurturing Creativity in Marconi and Future Marconi's
D. Choi <i>Florida State U.</i>	Conceptualization of Creativity Compared to Problem-Solving, Imagination, Innovation, Giftedness, and Expertise
18.45 MIC Invited Speech 15	
Darya Zabelina <i>University of Arkansas</i>	<i>The effects of mindfulness on viewing and making in art in children and adults.</i>
19.05 Break	
19.20 Mini Talks/Posters 2 – Chair: Zorana Ivcevic Pringle	
M. Camenzind ¹ , N. Göbel ¹ , B. C. Preisig ² , F. W. Mast ¹ , T. Nef ¹ , R. Müri ¹ & A. K. Eberhard-Moscicka ¹ <i>¹U. of Bern, ²U. of Zurich</i>	The effect of transcranial Random Noise Stimulation (tRNS) on the performance in verbal divergent thinking tasks - a machine learning approach
C. Martin ¹ , P. Sowden ^{1,2} , T. Gamble ¹ & J. Nelson ² <i>¹U. of Winchester, ²U. of Surrey</i>	Creative thinking in the digital age – different route, same destination?
S. Yokochi ¹ & T. Okada ² <i>¹Tokyo Future U., ²U. of Tokyo</i>	Exploration and reflection in emerging artists' art making
E. Torno Jiménez ¹ & E. G. Chryssikou ¹ <i>¹Drexel U.</i>	The Effect of the Intuitiveness of Tool Design on Creative Output
G. Mancini ¹ , T. Pozzoli ² , L. Franchin ³ , G. Centemero ¹ , N. Di Nitto ¹ , V. Aresta ³ , T. Giacometti ² , S. MASTRIA ^{1,4} , G. E. Corazza ^{1,4} & S. Agnoli ^{1,4} <i>¹ U. of Bologna, ²U. of Padova, ³U. of Trento, ⁴MIC</i>	Training creative thinking in primary school children: the role of trait emotional intelligence
V. Manalang ¹ , J. Katz-Buonincontro ¹ & E. G. Chryssikou ¹ <i>¹Drexel U.</i>	Exploring Emotional Content in Acting: Project REAL (Role of Emotions in Actors' Live) Performance
19.55 MIC Invited Speech 16	
Michael Mumford <i>University of Oklahoma</i>	<i>Creative thinking: processes, strategies and skills</i>
Conference Closure 20.15-20.30	



MIC Invited Speech 1

Monday, September 14, 2020

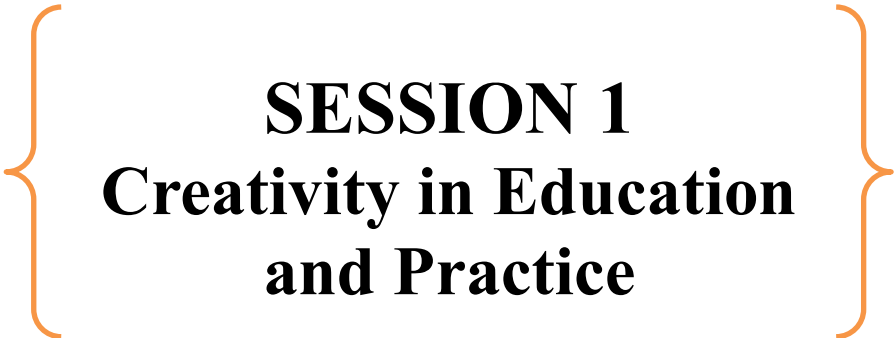
09:00 CEST

The next frontier in creativity assessment

Todd Lubart

Université de Paris

This discussion session will look at trends in creativity assessment. Assessment issues concerning children, adolescents and adults will be examined (based on participant's questions). The possibility of moving to massive online creativity assessments (MOCA) and the related challenges will be discussed.



SESSION 1
Creativity in Education
and Practice

Creativity and Creative Practice: Towards A Meta-Cognitive Domain Specific Framework for Writing and Making for the Screen

Margaret McVeigh¹

¹Head of Screenwriting & Contextual Studies Griffith Film School, Griffith University, Australia

Presenter e-mail: m.mcveigh@griffith.edu.au

This paper outlines and seeks audience feedback on the first stages of an interdisciplinary research project which aims to align the fields of Screenwriting as Creative Practice, Psychology and Neuroscience, to create a meta-cognitive domain-specific framework that filmmaking “Creatives” may use to develop and deploy their Creativity.

A prototype framework will be developed with a small cohort of screenwriting postgraduate students, then tested with a larger cohort of undergraduates at Griffith Film School, Australia’s largest university-based film school. Grounded in research regarding Script Development as Creative Practice (Batty et al., 2017; McVeigh 2019; 2016) and Script Development as Creative Process (Bourgeois-Bougrine and Glaveanu, 2018; Bourgeois-Bougrine et al., 2014); it will draw upon Cropley and Cropley’s (2015) Innovation Phase Model (IPM) and practical workshops including Corazza et al’s. (2016) DIMAI model and Cropley and Cropley (2000).

Agnoli, Corazza, Cagnone and Runco (2015) assert “The creative process can be considered to be a complex, dynamic ensemble of cognitive, motivational, attitudinal, and environmental components”. Sternberg and Lubart (1996) see Creativity as the working relationship between components including an individual’s motivation, knowledge, personality, intellectual skills, thinking styles and environment.

The work of this research is the unpacking of these components into a staged domain-specific framework that enables a metacognitive awareness of Creativity. Vartanian’s (2016) assertions from Neuroscience, that interventions to enhance components of Creativity must be “realised in the brain and therefore have traceable neural correlates, which ... can be used to verify that learning has occurred” - and ultimately be enhanced by teaching - are central to the project.

Keywords: Creativity, Creative Practice, Screenwriting Domain

A Plugin-Based Platform for Music Interaction as a Multidisciplinary and Collaborative Tool for Creative Education

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“Creativity is essential to computer science students and computer science makes it easy to be creative” (Romeike, 2007). Multidisciplinary and collaborative behavior are skills that can improve computer scientists and software engineers’ abilities in problem solving, innovation, software design and development. “Music technology is a domain that can be used as an excellent tool for creative development. It is engaging, it can help develop creative thought in an academic environment, and allow students to gain self-efficacy in their creative abilities” (Rosen, D., Schmidt, E. M., & Kim, Y. E., 2013). When developing music-technology projects, students can easily combine art, science and technology. Whether it is a theoretical research or an applicative project it naturally requires a merge between artistic and computational paradigms, and a combination of several disciplines like: music, art, sound, education, gaming, sports, neuroscience and psychology. While taking care of creating and collaborating, music technology education helps students express their personality, their passion to music, as well as other positive emotions (Brown, S., & Theorell, T., 2006). The combination of academic studies, positive emotion and enthusiasm is an integral part of optimal engagement, that can help increase creativity and innovation. In this work, we examined the *Muzilator* platform, a tool we have developed to enhance creativity, multidisciplinary, software design skills and collaborative behavior. The platform is a plugin-based web platform that enables developers to develop, debug and upload web applications or libraries as plugins and to share them with the platform’s community. In the music domain, a plugin can be for example a NIME (New Interface for Musical Expression - software of hardware), an analysis algorithm used for interaction, a generator, a sound engine or a game component. The students worked in teams in an Agile methodology. They developed ideas and prototypes for innovative music-tech projects and delivered them in three sprints.

The research is based on 76 projects implemented by 183 computer science students that participated in “Computer Music” class in 2016-2020. In 2020 we launched and used the *Muzilator* platform. We analyzed both projects from the class of 2020 that used the *Muzilator* platform, with independent projects that did not use the platform (the control group). The students provided self-evaluation on creativity, multidisciplinary, self-learning, musical and professional background in a pre-

questionnaire. Subjective report on the project, team and learning outcomes was given at the end of the semester in a post-questionnaire. We divided the projects into five main categories and evaluated the projects' risk level, creativity, multidisciplinary, interaction, artistry and creative design. We evaluated projects' creative design using two grading methods: a method we designed and Nilssons' taxonomy of creative design (Nilsson, 2011). Finally, we examined the influence of the team size and mix of man and woman on the project. We divided the analysis into three main parts: the individual student, the team and the project.

The analysis results show that Muzilator projects were more creative and multidisciplinary than independent projects. Students reported that collaborating became natural and easy compared to other formats and tools. The quality of the design and division into independent plugins was much better than in other projects. Analysis of both Muzilator and independent projects show that projects with high risk were more creative and artistic than projects with low risk. Self-learners combined more disciplines in their projects than others. Men preferred to develop algorithmic or theoretical research projects, while women preferred interactive applications. Projects developed by mixed teams were more creative, artistic and multidisciplinary than projects developed by homogeneous teams or soloists.

Board games: a new tool for improving creativity?

Maxence Mercier¹, Todd Lubart¹

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Finding ways to develop creativity constitutes an important educational goal, being one of the most crucial 21st century skills. Games have shown their potential as powerful learning tools, and some initial studies have demonstrated the benefits of video games and role-playing games on creativity. However, less is known about the potential effects of board games.

The aim of our study was to compare the effects of creative and non-creative board games on creativity, using a within-subject repeated-measurement design. Playing creative board games should have a positive effect on creativity, compared to non-creative board games. Furthermore, this effect should be stronger for participants with below average creativity.

Creative board games require the production of novel and relevant ideas to perform well. In contrast, non-creative board games do not require creative generation to perform well. 55 participants completed a divergent thinking task (indicators: fluency and originality) before and after playing each type of game for 30 minutes, with a one-week interval between the two sessions.

Results suggest a general positive effect of both types of games on originality. Furthermore, this training effect was observed for participants below average in originality and in fluency. This suggests board games might constitute an effective way to boost creativity. We will also discuss further recent findings, based on a questionnaire study with 284 participants, showing significant correlations between several indicators of creative potential (i.e. creative self-efficacy, creative personal identity and openness to experience) and frequency of playing creative board games.

Keywords: board games, creativity, training

SESSION 2
**Cognitive mechanisms of
creative thinking**

The Interaction between Mind and Body in People's Creativity: Explanation

Focusing on Prediction Error

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U. of Tokyo

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This study investigates the influence of the body on people's creativity. We focus on proprioception and that prediction error: differences between the feedback prediction and actual feedback of proprioception, which facilitate people's motor learning and emotion elicitation. We speculate that this prediction error also facilitates people's creativity by providing feedbacks that people have not focused on enough and shifting their focuses. We introduce a study of dance creation that investigated this process. In this study, an expert dancer generated his original expression in seven days in two conditions. In one condition, the dancer generated his expression by externalizing his images of ideas and getting the feedback of proprioception (Interactive condition). In another condition, he generated his expression by not externalizing his idea images and not getting that feedback. He only simulated the externalization process in his mind (Non-interactive condition). We checked the difference between the process in each condition by using self-evaluations of ideas, verbal reports of ideas, movements of the ideas measured by the motion capture system, and verbal reports of discovery brought by that externalization process. Results show that the dancer frequently changes his focuses of ideas and actively explore varieties of ideas more in the Interactive condition than in the Non-interactive condition. He also generated a highly original expression in the Interactive condition.

Keywords: body and mind, creativity, prediction error

Creative assessment of executive functions and early classroom performance

M. Downes¹, L. Keenan¹, S. Conroy¹

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Executive function (EF) is an umbrella term that describes an intricate group of cognitive processes that operate in an integrated way to allow us to regulate behaviours, organise mental processes, shift between tasks flexibly, and solve problems. Domains within the EF system become increasingly integrated over development and are influenced by environmental factors such as socioeconomic status. EF skills have been linked to both levels of creativity and academic ability in children (Krumm, Filippetti, & Gutierrez, 2018, *Thinking Skills and Creativity*; Ursache, Blair, & Raver, 2012, *Child Development Perspectives*). The identification of early, modifiable predictors of academic achievement, classroom behaviour, and creativity, such as EF, can help guide efforts to improve the long-term classroom success of children who struggle. Previous studies of EF in the classroom have used tools that are not focused on transferring accessible information to teachers. The development of tools that tap executive function in the classroom could help to support teachers to promote learning and creativity in the classroom. The current research investigates whether performance on the Preschool Executive Task Assessment (PETA), designed to more easily translate feedback into the classroom, is linked to teacher reports of classroom functioning and academic ability. The PETA is a multi-step, table-top task that requires structured scaffolding for the child and aims to reflect a novel task which children at this stage of development may face at home or at school. Teacher feedback on the task design of the PETA is explored. Children aged 4 to 6 years (n=119) completed the PETA. Higher scores on the PETA, reflective of more support, were related to poorer literacy scores months later, but not teacher report of behaviour at the time of testing. Feedback on task design from 10 teachers is considered. The practical implications of using tools such as the PETA in order to promote the early development of creativity and learning in the classroom is discussed.

Naturalistic creativity in safety-critical environments

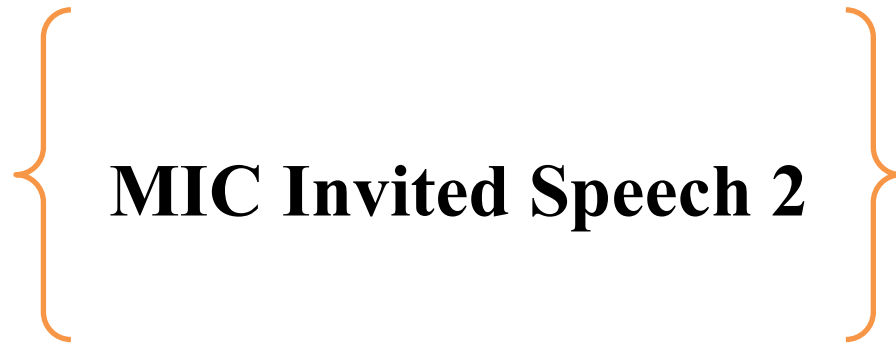
Samira Bourgeois-Bougrine¹

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Drawing on the definitions of creativity and naturalistic decision-making model, naturalistic creativity in safety-critical environments could be defined as: the ability of experts to create new and adapted solutions in life-critical situations. To be dubbed creative, the solutions, which are oriented toward damage control, must contain both a high degree of novelty and adaptability. The creative process reflects the expression of the creative potential of experts under restricted resources and or time pressure in life or death situation. Examples of successfully managed safety-events, such as Apollo 13 mission, UAL-232 flight and Mann Gulch wildfire, where creativity was considered as a one of the key factors will be tentatively analysed from the perspective of individual and team's creative behaviour and the neuropsychological underlying mechanisms of such behaviours highlighted. Among the implications for future research, the following questions will be addressed: How to optimize the ability to control the reorientation of attention and the regulation of emotions when solving operational problems under extreme stress? What would be the design principals for human-machine systems that avoid « locking » the user in unsuccessful path in solving unexpected problems? How could the neuropsychology of creativity contribute to broaden the scope of the possibilities to imagine future threats? What type of training can facilitate the emergence of creative solutions that reduce the risk of failure in the face of unexpected events?

Keywords: Creativity, Unexpected, Attention



MIC Invited Speech 2

Monday, September 14, 2020

11:05 CEST

*The benefits of distraction: The relation between attention and creativity
in children*

Evelyn H. Kroesbergen

Radboud University, the Netherlands

Current models of learning emphasize the importance of focused attention. In this presentation it will be argued from a situated cognition view on creativity that distributed attention is at least as important for learning, in specific for reaching levels of excellence in academic skills and creativity. In such a situated view, creative processes are influenced by objects and their properties in the immediate situation through a person's perceptions of these situational factors. Novel ideas can be discovered when individuals are able attend to objects and object properties beyond the fixed affordances that specify common uses of objects. Poor inhibition and high distractibility facilitate such an exploration of the environment and would theoretically lead to higher levels of creativity. Based on recent work, including a meta-analysis, behavioural and EEG studies, it will be shown that poor attention skills are related to higher levels of creativity and academic skills (esp. mathematics).

For example, children with characteristics of ADHD showed better divergent thinking skills than children without ADHD, and children with low sensory gating scored higher on a mathematical creativity task. It was also found that children with lower inhibition skills benefited from a stimulus-rich environment during administration of an alternative uses task. However, our findings also suggest that the positive effects of distraction may only be beneficial for children with above average IQs or high academic skills. Together, these findings contradict the prevailing view on learning that focused attention and inhibition are key to successful learning, by

showing that distractibility and distributed attention may be beneficial as well,
especially for nurturing creative potential.

MIC Invited Speech 3

Monday, September 14, 2020

13:30 CEST

Creativity and prospective ergonomics

Nathalie Bonnardel

Aix-Marseille Université

Today's society increasingly requires creativity and innovation. Across a broad range of areas, there is a demand for new products that are adapted not only to the needs of current users but also to those of future users, as it is the case in prospective ergonomics. In this last context, it appears necessary to introduce more creativity in the design process, which is challenging for stakeholders involved in the process, whether they are designers, ergonomists or engineers. In this presentation, we argue that analyzing cognitive and social processes involved in creativity contributes to favor the adoption of new perspectives in ergonomics and we provide examples of methods or techniques and systems that can be used in field studies.



SESSION 3
Creative Cognition

Between the cracks: A case study of accidents, constraints and signs of new growth

Wendy Ross¹, Paul March², Frédéric¹

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²*University of Oxford*

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In this presentation we examine the creative process from a qualitative case-study perspective. The situation is that of a sculptor engaged in an exploration of the creative possibilities of a novel material (a mixture of clay and papier maché). We recorded his gaze pattern mid-way through the development of a long-term project which began with the fabrication of a clay-fibre composite and ended 18 months later with the mass-production for an installation of ceramic flowers. The analysis we present here is derived from the artist's gaze behaviour during a single, thirty-minute period.

This focus on real-time activity, provides a highly granular perspective on the creative process and its relationship to somatic, haptic and visual attentional indicators. We will use the video material to develop and illustrate five important aspects of the creative process:

1. temporally and materially distributed agency.
2. the role of accidents and redoing.
3. the role of provisional forms as necessary creative constraints: boundary objects.
4. the notion that creative intention arises in a temporal present where sensorimotor expertise, personal and cultural histories and the reality of material properties coalesce.
5. the role of embodied action.

In sum, we use the data to argue that an understanding of a distributed, heteroscalar and polytemporal creative process can only be achieved by looking at material change from a systemic perspective. We wish to show how creativity emerges from the characteristics of the material, the prior experience/training of the artist, the development of project-specific habitual practice and the unplanned and accidental moments that necessarily arise when engaging with material.

Keywords: Material Engagement, Case Study, Practice

Creativity in narcolepsy type 1: the role of dissociated REM sleep manifestations in the modulation of creative potential

Anita D'Anselmo^{1,2}, Sergio Agnoli^{2,3}, Marco Filardi¹, Fabio Pizza^{1,4}, Serena Mastria^{2,3}, Giovanni Emanuele Corazza^{2,3,6}, Giuseppe Plazzi^{4,5*}

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Narcolepsy type 1 (NT1) is a chronic neurological disorder characterised by excessive daytime sleepiness (EDS), with rapid access into rapid eye movement (REM) sleep at sleep onset. Clinical phenomena related to state of wakefulness and REM sleep dissociation, including cataplexy, sleep paralysis, hypnagogic/hypnopompic hallucinations, REM sleep behaviour disorder and lucid dreaming complete the clinical picture. A recent study reported higher creative potential in narcoleptic patients compared to a control group. With this study we aimed at investigating if creativity in narcolepsy could be associated with certain symptoms and with mental dimensions (such as mind wandering and daydreaming) that could predict creative behaviour. Sixty-six NT1 patients (mean age 38.62 ± 17.05 , 31 females), took part in this study. Several measures of creativity have been performed: creativity achievement, explored in different life domains by a self-reported questionnaire; creative beliefs, assessed with a scale measuring the creative self; creative performance, evaluated through a test assessing divergent thinking skills (generation of alternative original solutions to an open problem). We found that sleep paralysis and hypnagogic hallucinations indirectly influence, through creative identity, both creative achievement and creative performance (fluency score). Secondly, we found that spontaneous and deliberate mind wandering influence creative achievement through a moderation effect of sleep paralysis and hypnagogic hallucinations. In conclusion, our results highlight the role of sleep paralysis and hypnagogic hallucinations in defining both creative success and creative performance of narcoleptic patients influencing their

creative identity. Probably hypnagogic hallucinations trigger the process of mind wandering that leads to greater creative success.

Keywords: narcolepsy type 1, creativity, hypnagogic hallucinations

Inspiration and Creativity: the role of semantic distance in divergent thinking

Serena Mastria^{1,2}, Sergio Agnoli^{1,2}, Lara Franchin³, Giovanni Emanuele Corazza^{1,2,4}

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What does us inspire during a creative act? Past studies have found that the processing of apparently irrelevant information is associated with a higher creative performance, especially in individuals characterized by high level of Openness to Experience. In this work, we focused on the meaning of irrelevance and on the reasons why an external information can inspire us during a creative act based on divergent thinking. We specifically employed two diverse experimental procedures to answer to this research question. In Experiment 1, we used a modified version of the verbal priming paradigm in which participants were asked to produce the first alternative use that came to their mind to a given target object (word), which were preceded by nearly, moderately, and poorly semantically-related words to the target (properly randomized). The amount of time between primes and target objects were either short (250ms) or long (1250ms). In Experiment 2, we measured attentional processing of irrelevant information during the execution of a divergent thinking task through an eye-tracking procedure. Specifically, a verbal version of the Alternative Uses Test that contained both relevant words (the target object on which participants were asked to produce all possible uses they could think of) and irrelevant words (which were linearly semantically-related to the target object: nearly, moderately, and poorly related) was employed. In both experiments, divergent thinking indexes of statistical infrequency (uncommonness of responses) and originality (as rated by two independent expert judges) were derived. As we will discuss during the presentation, results from both experiments highlighted the role of irrelevant information and of the Openness trait in influencing creative performance as well as the role of the semantic distance of the irrelevant information from the focus of the creative task as the main determinant in inspiring (i.e., increasing) creative performance.

Keywords: semantic distance, divergent thinking, originality, statistical infrequency, Openness

MIC Invited Speech 4

Monday, September 14, 2020

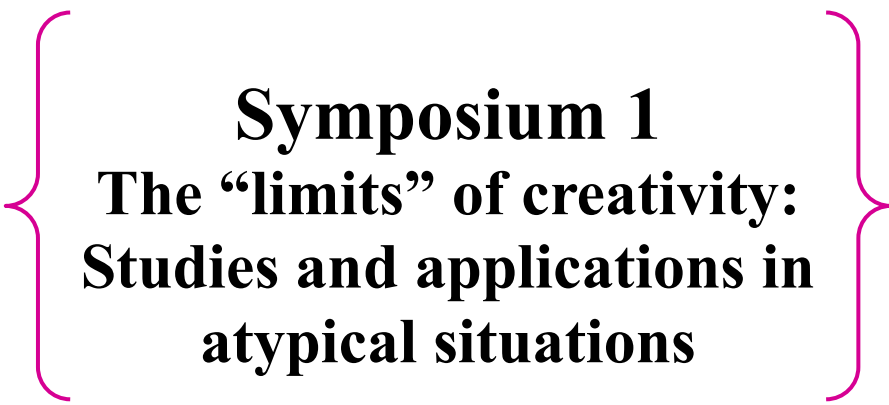
14:50 CEST

*Case Studies in Research Using Distributed and Participatory
Frameworks*

Michael Hanchett Hanson

Teachers College of New York

Distributed and participatory views of creativity build, in part, on longstanding developmental approaches from Vygotsky and Gruber. Applying Piaget's principles of systemic development to creative (non-normative) development across lifespan, Gruber developed the evolving systems approach to case study method to study the complexity of creative development in adults. In a new series of books, my advanced students and I are adapting Gruber's method for use within distributed / participatory frameworks. In this talk I will be sharing some of the ways the evolving systems approach serves these new frameworks and can inform use of other methods on similar questions.



Symposium 1
The “limits” of creativity:
Studies and applications in
atypical situations

The “limits” of creativity: Studies and applications in atypical situations

Chair: Claudio Lucchiari

Department of Philosophy, University of Milan

Chair e-mail: claudio.lucchiari@unimi.it

Creativity, meant as the cognitive ability to produce innovative and original ideas, to think of more alternative solutions to a problem, and to use different strategies in a flexible way, has recently attracted attention of psychologists and educational figures as a remarkable opportunity not only to study the underlying cognitive processes, but also for applied research.

The use of techniques aimed at fostering creative abilities has been described in the literature as an innovative method to develop and support the ability to disengage from routine thinking patterns and to develop original, autonomous, and emotionally rewarding forms of reasoning.

Interventions have been tested both in childhood and in adulthood, using methodologies varying from the more traditional ones based on behavioral techniques and cognitive tasks, up to the use of neuromodulation. However, the recipients of interventions come almost exclusively from typical development contexts, where creativity becomes a catalyst and promoter of some cognitive skills. But what happens when a psycho-educational program targets creativity and cognitive flexibility, but the associated neurocognitive correlates show atypical functioning?

The purpose of this symposium is to illustrate the potential of studying and using cognitive techniques based on creativity enhancement in support of those individuals who show some cognitive and/or learning difficulties. In this case, the debate will focus on the assessment and use of creativity for individuals with learning disorders (LD), autism spectrum disorders (ASD), and intellectual disability (ID). The symposium will be an opportunity to summarize what is described in the existing literature, and to lay the foundations for future developments and guidelines for intervention and research.

Keywords: dyslexia, autism spectrum disorders, intellectual disability

1. The creative profile of children and adolescents with developmental dyslexia

Alessandro Antonietti¹, Alice Cancer¹

¹Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy

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The claim that people with developmental dyslexia possess high levels of creativity is often based on anecdotes and historical-biographical reconstructions of exceptionally talented individuals and their original contributions in a variety of domains. In addition, a few empirical studies have been carried out to test the conjecture that children and adults with developmental dyslexia outperform typically developing peers in tasks assessing their creative potential. The review of such studies suggests that individuals with developmental dyslexia show a superiority in some dimensions of divergent thinking, namely fluency and originality. In order to understand better the creative profile of individuals with developmental dyslexia, a large sample of data coming from the administration of the WCR creativity test to children and adolescents has been analysed so to highlight in which specific cognitive processes people with developmental dyslexia are more skilled. Findings support the notion that the tendency to identify not-obvious relations among things is enhanced in developmental dyslexia. The possible reasons of this peculiarity in cognitive functioning and the implications for education of students with developmental dyslexia are discussed.

2. Enhancing socio-emotional skills by creative training for children with ASD: A pilot study

Farina E.¹, Della Zoppa L. ¹, & Molteni S.¹

*¹Department of Human Sciences for Education “R. Massa”, Milano Bicocca University, Milan,
Italy*

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Nowadays most of the literature recognizes the complex and broad nature of creativity, which requires both originality and usefulness (Runco, & Jaeger, 2012; Zhu et al., 2017). This is an important point if we try to study creativity among people with autism spectrum disorder (ASD). If some studies claim that creativity is extremely difficult or even impossible among ASD, others suggest a more careful approach highlighting that some specific features of the disorder are conducive to creativity, at least in its component of divergent thinking (Hetzroni et al., 2019; Jankowska et al., 2019) Considering the four subdimension of creativity (see TTCT) Molteni and Farina (2016) found lower scores of fluidity and flexibility in ASD compared to typical developmental peers (TD) and equal or higher scores of originality and elaboration. Considering this literature, we could say that individuals with autism have good divergent thinking skills, but deficiencies in terms of adequacy, being this strictly linked to the understanding of social context (Sagone, & De Caroli, 2014; Gökçen et al., 2014). Originality and divergent thinking in ASD could be a profitable starting point to stimulate deficient skills related to social cognition. With this focus, we designed a training on creativity for small groups of children with ASD. The aim is improving children’s socio-emotional competence working on their creative potentialities through a group setting. Pre-post assessment – using both direct evaluations and parents’ checklists – showed improvements in creative competence, emotional competence, and, even if weakly, in perceived happiness with friends and in children’s social behavior.

3. Creativity as a tool to assess and enhance flexible thinking in people with intellectual disabilities (ID): A case series

Maria Elide Vanutelli¹, Veronica Cortinovi², Caterina Sergi¹, Claudio Lucchiari¹

¹Department of Philosophy, Università degli Studi di Milano, Milan, Italy

²Archè Onlus, Social Cooperative, Inzago, Italy

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Intellectual disability (ID) is a generalized neurodevelopmental disorder characterized by significant limitations in intellectual and adaptive functioning. From a cognitive point of view, individuals with ID systematically show rigidity in thinking, with difficulties in planning, problem-solving abilities, in adapting to new situations and in thinking of different possible solutions. In few words, the use of routines and well-known patterns is prevalent over a more divergent, original, and creative thought. The assessment and training of creative abilities have been previously proposed to favor more proficient and rewarding experience in typically-developed individuals when interacting with others and facing everyday-life problems. However, to the best of our knowledge, no previous studies specifically targeted this issue to the population of ID individuals. In the present pilot study, 5 adults with ID (3 men, 2 women) from an Italian day-care center participated in an action-research aimed at exploring the possibility to apply a cognitive-based training to enhance flexible thinking and everyday-life activities. The training “SoCraTE” (Socio-emotional, Creativity and Thinking Enhancement) has been developed to exercise 3 different domains: the socio-emotional, the creative, and the cognitive (thinking) ones to support people in their whole functioning. The program has been personalized for each user after an initial assessment and involved different interactive tools, such as computerized and paper-and-pencil tasks, story-telling, role-playing, audio/video analysis, and creative games. The preliminary data about the feasibility and the effects of such program will be presented, along with a more general discussion about the use of creativity in support of ID

**Celebration of the 2020
MIC Creativity Award**

Monday, September 14, 2020

18:00 CEST

Isaac Getz
ESCP Business School

Isaac Getz is a Professor at the top-ranked ESCP Business School (Paris, London, Berlin, Madrid, Torino, Warsaw). He was formerly a Visiting Professor at Cornell and Stanford universities and the University of Massachusetts.

Isaac studied over 300 companies in 30 countries and wrote on topics of leadership, corporate transformation, freedom- and responsibility-based culture, and corporate altruism.

He is the co-author with Brian Carney of the award-winning international best-seller *Freedom, Inc.*, translated to fifteen languages, author of the award-winning *Liberated Company* (2017) and together with Bob Davids and Brian Carney of *Leadership without Ego* (2019). His last book *The Altruistic Enterprise (L'entreprise altruiste)* has been co-authored with Laurent Marbacher in 2019.

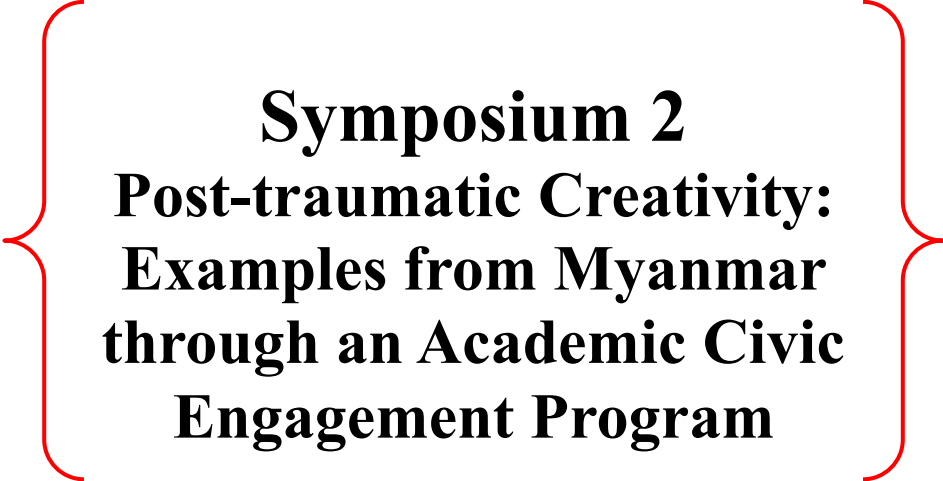
Isaac's work and action have been instrumental in the rise of the corporate liberation movement in Europe. It includes Michelin, Airbus, EDF, Decathlon, KIABI, several Belgian ministries, French Social Security, municipalities, and hundreds of other companies and institutions which have transformed their command-and-control organizations into freedom- and responsibility-based ones.

Dr. Isaac Getz's work has been featured in the *Wall Street Journal*, *Forbes*, *Harvard Business Review*, *Financial Times*, *Strategy+Business*, *Le Monde*, *Il Sole 24 Ore*, *Il Tempi*, *CNBC*, *Fox*, *TF1*, *RAI* and other leading media on four continents. He is a columnist in *Le Monde* and in the *Harvard Business Review France* and won the best business Op-Ed 2017 award.

Dr. Getz is a sought after public speaker on the topics of innovation, transformation, and liberating leadership, and gave executive conferences, keynote speeches and training seminars for hundreds of companies, organizations, and summits on four continents. In 2018, he has been invited to speak on corporate liberation at the *Peter Drucker Global Forum* in Vienna.

A 2016 study by *FNEGE* (The French National Foundation for the Management and Business Education) on the world 50 most influential living management thinkers ranked Isaac at N°4. Also in France, *LinkedIn* ranked Isaac in their *Top 25 Voices* in 2019.

Thinkers50 have shortlisted Isaac's work on corporate liberation and on the altruistic enterprise for its 2019 Breakthrough Idea Award.



Symposium 2
Post-traumatic Creativity:
Examples from Myanmar
through an Academic Civic
Engagement Program

Post-traumatic Creativity: Examples from Myanmar through an Academic Civic Engagement Program

Chair: John F. Cabra¹

International Center for Studies in Creativity, State University of New York, Buffalo State

Chair e-mail: cabrajf@buffalostate.edu

1. John F. Cabra: Context and Model 1

John F. Cabra¹

International Center for Studies in Creativity, State University of New York, Buffalo State

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According to the Burmese *Irrawaddy* news magazine, years of internal conflict in Myanmar have produced a traumatized society with a hidden and unpublicized mental health epidemic (Bo Kyi, 2018). Compounding the problem is the dearth of clinics; fewer than 10 clinical psychologists and slightly over 200 psychiatrists are available for a country with roughly 52 million people. Likewise, a counseling culture does not exist to counteract the fear of stigmatization that precludes many from getting support. There are examples, however, of people that independently found ways to support themselves by engaging in art, advocacy, and entrepreneurship, all of which have led to post-traumatic growth. Although the literature remains unclear on the specific relationship between post traumatic growth (PTG) and health in the general population, the authors of this paper had no difficulty finding anecdotal evidence during their visits to Myanmar as part of a civic engagement academic program offered by the State University of New York, Buffalo State. This symposium will provide examples of post traumatic creativity as shared by former political prisoners and directors of nonprofit organizations. These examples will be followed by a description of an educational art program, teaching for creativity course and a design challenge, which provided an outlet for creative expression within a small community in Myanmar. Examples and stories will be linked to extant PTG theories.

2. Maureen Bartlett: Model 2

Maureen Bartlett¹

International Center for Studies in Creativity, State University of New York, Buffalo State

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Today's young adults in Myanmar were not directly harmed by the violent backlash that followed the 1988 uprisings. Yet, their education and capacity for growth has been severely constrained. Over 50 years of military rule and diversion of funding has left Myanmar's current education system among the worst in Asia, in part because of the "tendency by Myanmar's military dictators to see students, particularly those studying at university, as an enemy" (Myint, 2018). Additionally, students have inherited and lived with the trauma of their parents' generation. Nevertheless, upon his own release, 22-year political prisoner Saw Thet Tun focused his trauma into an opportunity for "post-matriculation" young people, those just out of high school. Founded in 2012, his Sky Age Mobile Education initiative was formed to provide short-term intensive education, typically English, basic computer skills, Civic Education, and Basic Human Rights, in remote areas. Now located in a permanent building outside Yangon, Sky Age Camp gathers bright young adults from all regions of Myanmar for a year of intensive personal development and communication skills training. Idealistic young adults meet leaders from all sectors of Myanmar's economy and government and aim to bring their new skills back to their own regions. Saw Thet's own Post-Traumatic Growth is allowing an entire generation of young leaders to disperse a creative growth model for the growth of Myanmar itself. Our group's plans to train this dynamic cohort in creative problem solving can act as a catalyst to fan this flame.

3. Matthew Burch: Model 3

Matthew Burch¹

International Center for Studies in Creativity, State University of New York, Buffalo State

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Ko Ye Lwin was considered the Bob Dylan of Burma. His insatiable desire to help war victims and end conflict in war-torn areas brought respect and often large donations from his fans. The military government banned his songs and his freedom to perform in front of audiences. During the 2007 Saffron Revolution, Ye Lwin participated in nonviolent protests. He was arrested and detained for months leading to his name not appearing in public or even on album jackets. After his release, Ko Ye Lwin's post traumatic growth comprised peace activism with other musicians, which involved almost weekly fundraising concerts to help the tens of thousands of civilians victimized by war between government troops and independence armies.

Ye Lwin was brought to hospital for liver cancer, and died on 10 July 2018, while we were in Myanmar as part of our university's service learning and civic engagement program. I was asked to build a casket resembling a guitar in which Ko Ye Lwin would be buried. I had three days to build it with limited tools. The challenge became a mission to leverage design to help a nation mourn and honor a man that symbolizes resilience and opportunity unheld by victimization.

4. Jeremy Brewster: Model 4

Jeremy Brewster¹

International Center for Studies in Creativity, State University of New York, Buffalo State

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U Kyaw Thu is a well-recognized actor that starred in over 200 films, winning twice the equivalent of the American Oscar. In 1994, he starred in a pro-government film and began shooting pro government commercials against independence groups. U Kyaw Thu realized that his thinking was more aligned with the independent movements. As a result, he turned down invitations to do more propaganda work to support the government. This decision killed his career. In essence, the government censored U Kyaw Thu even on films that included HIV/AIDS awareness. His scuffles with authorities led to his arrest for supporting anti-government protests led by the monks. With a career that was dealt a death blow, he started a non profit organization. What started as a non-profit organization that provided free funeral services (FFSS), the FFSS has grown to offer free healthcare, free ambulatory service, organic food farming, and free education. For his work, U Kyaw Thu was awarded Asia's version of the Nobel Peace Prize for his work supporting the poor.

An art program that I designed stemmed from a sequence of experiences that occurred while working in Myanmar as part of our university's service learning and civic engagement program. While working in a monastic school located in one of Yangon poorest townships, I noticed an overwhelming lack of expressive quality in students' artwork. Shortly thereafter, during a conversation with U Kyaw Thu, I was given an opportunity to address this deficiency. I was invited to design and deliver a 3-week visual art course with an emphasis on emotional exploration, expression, and transmission for the FFSS School in central Yangon. Its delivery produced noticeable improvements in the expressive ability and overall well being of those who participated. One could argue based on participant reactions, the program provided an unanticipated healing through art expression. Little did we know that years of internal conflict in Myanmar had produced a traumatized society with a hidden and unpublicized mental health epidemic, and that an art program would provide an initial safe platform to connect with the trauma and that the artwork with serve as an important start point and symbol of a change in mindset from victim to creators that get clear understanding on what is desired, and become empowered to create positive results in their own lives.

MIC Invited Speech 5

Monday, September 14, 2020

19:40 CEST

Fulfilling Creative Potential by Tolerating and Even Rewarding Bad Ideas.

Mark A. Runco

Creativity Research & Programming Southern Oregon University

There is no more important research focus in creative studies than creative potential.

That is why it was added to the 4P framework, to go along with creative people, creative products, creative processes, and creative places. There is a surprisingly long history of research on creative potential, going back to classic studies by MacKinnon, Helson, Guilford, and others. Yet the research on potential is not large, no doubt due to the difficulty of investigating potential. Unlike products, for example, potential is latent and must be inferred. There are ways to do this, and methods for supporting creative potential. This presentation will focus on the latter. It will emphasize the need to tolerate bad ideas. The logic for this follows from the fact that creative ideas are always original. They often result from divergent thinking. But to maximize original and divergent thinking, individuals wishing to support creative potential must accept the good with the bad. If their charges are really allowed to think in an original and divergent fashion, they will generate ideas in every direction, not just ideas that are of obvious value to those trying to support creativity. There are interesting implications of this view, including the fact that we should expect malevolent and just plain bad ideas if we are doing a good job of supporting creativity.



SESSION 4
**Arts: experiencing
creative appreciation**

Where Ideas Come From

Steven Fischer¹

Independent Producer

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Two-time Emmy nominated filmmaker Steven Fischer explores where and how ideas are generated. He looks at the idea generator in our subconscious, how environment influences it, and the role our programmed values play in how, what, and why we create.

Fischer connects a person's "new idea" to the theatrical concept of "filling the well," the act of taking in information. Fischer illustrates how what we see, hear, read and experience combines in our subconscious to form new ideas. His examination leads to the provocative idea of artists "stealing". He exemplifies with songs that sound similar such as George Harrison's 1970 song, *My Sweet Lord*, unintentionally written to the tune of the Chiffon's 1963 song, *He's So Fine*. Fischer uses the example to clarify the difference between stealing (which is morally wrong) and drawing from the well (which is natural) -

- that is, subconsciously combining one idea we had heard with another idea we saw and putting them together to form something new.

Fischer emphasizes how beneficial it is for artists and designers to fill their well -- that is, the importance of engaging life, conversation, reading books, watching movies, etc. His talk stresses how that collection of experience combines with our individuality to generate "original" ideas.

This lecture is to be presented as a poster. (i.e.: an informal talk) This lecture was originally presented for university-age audiences to address the common concern of being influenced by other artists and therefore not being able to create something original.

Developing cartographic attention to nurture creative potential

Pilar Cortada Boada¹

¹*Faculty of Philosophy, Universitat Autònoma de Barcelona Spain*

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The ecological approach to perception proposed by James J. Gibson (1979/1986), which describes an active, direct and integrated into an ecological framework way of perceiving, points towards a situated and relational creative act, therefore, hardly attributable to the internal mental process of a lonely individual.

Understanding artistic creation from a genuinely ecological point of view, that is, as a record of what the artist perceives in interaction with the material and sociocultural environment, the objectives of this article are threefold: first, to propose a model of creativity in artistic practice based on the detection and exploitation of *affordances*; second, to show the importance that **cartographic attention** has in this model; and third, taking the creative process in art as a paradigmatic example of human creativity, propose **cartographic attentional practice** (Virginia Kastrup, 2007) as a **method for cultivating creative potential**.

The argument raised arises from observing the particular way of perceiving of artists and the role that attention —an ordinary cognitive process— plays in their creative process. This proposal of an ecological artistic creativity founded on attentional strategy is based, among others, on the recent studies of Mathias Benedek and Andreas Fink on the role of attention in creativity.

Keywords: affordances, attention, creative process.

Unfolding the ties of Creative Self-efficacy and Aesthetic Judgment: A matter of Creative mediation?

Andreia Valqueresma¹, Joaquim Luís Coimbra¹

¹Faculty of Psychology and Education Sciences – University of Porto, Portugal

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Approaching creativity from an agentic perspective can be invaluable if we set it as an educational goal to develop the ability to construct new worlds of possibilities and achievements. The complexity that we can gain by embracing this viewpoint is, we believe, sharpened by adding aesthetic judgment (AJ) to the equation, considering it bridges creativity and creative self-efficacy (CSE). Balancing these three constructs can also provide an understanding of creativity as a decisive element in the process of internalizing experience into profound and structuring dimensions of human psychological development. Furthermore, it can shed light into the reversible sociocognitive processes in action, whose flow echoes the possibilities that accrue from the individual's self-organizing complexity. Anchored in a developmental and ecological approach to these questions, we set to explore a potential mediation effect. In a mixed-methods design study, we assessed each construct (using the Portuguese Scale of CSE, the Consensual Assessment Technique and a Semi-structured AJ Interview) in a sample of 48 Portuguese students (50% female), aged 3 to 16 ($M=8.88$, $SD=3.71$), and performed a simple mediation analysis with 5000 bootstrap samples. The results seem to suggest the existence of a significant, positive, full mediation effect exerted by creativity between CSE and AJ ($b=0.22$, 95% CI[0.05, 0.41]). Thus, a positive and significant impact of CSE in AJ appears to depend on the interference of creativity. Moreover, it underlines creativity as an attribute of the lifelong complexity of sociocognitive developmental structures, that can play a crucial role in processes and structures of creative actions, making use of more and more complex symbolic systems (and respective grammars), including each and every “language of art”.

Orbiting the sphere of education, we hope these results can provide relevant empirical ground to discuss the importance of developing curricula that incorporate these dimensions in their educational goals and practices. Also, envisioning creativity as an action determined and intersubjectively oriented phenomenon might enhance the opportunities to nurture students creative potential while providing access to more complex, flexible and decentered levels of psychological development.

Keywords: creativity, creative self-efficacy, aesthetic judgment



SESSION 5
**The neuroscience of
creativity**

Different neurocognitive strategies in women and men when generating creative solutions in soccer decision-making situations

Christian Rominger¹, Daniel Memmert², Ilona Papousek¹, Corinna M. Perchtold-Stefan³, Elisabeth M. Weiss¹, Mathias Benedek¹, Andreas R. Schwerdtfeger¹, Andreas Fink¹

¹U. of Austria

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While the literature suggests gender differences in specific cognitive functions, empirical evidence in the domain of creative cognition is inconclusive. Although behavioral gender differences in creative thinking skills seem to be minor, neuroscientific studies have consistently reported that men and women differ in brain activation during divergent thinking. This led to the assumption that men and women might use different cognitive strategies to achieve similar behavioral performance. In continuing research on the role of creativity in the more real-life creativity domain of soccer, the aim of this EEG study was to investigate gender differences in generating creative solutions in a soccer decision-making task. As expected, experienced male and female soccer players showed comparable creative performance in the soccer task. Importantly and critically, they clearly differed regarding functional patterns of brain activity during performance of this task: While men exhibited relatively higher parietal/occipital task-related EEG alpha power, women showed significantly higher functional connectivity. These findings add evidence to the notion that men and women use different neurocognitive strategies to achieve comparable performance outcomes.

Keywords: sex, tactical creativity, EEG, real-life creativity

Measuring Creative Flow in Real-time Using Consumer-grade EEG Coupled with a Neural Network

H. McKee¹, S. Rahman², J. von Thienen¹, L. Seidel¹, F. Grzelka¹, P. Gloeckner¹, C. Meinl¹

¹*U. of Potsdam*

²*NeuroCreate Ltd.*

Presenter e-mail: hzmckee@gmail.com

The mental state of Flow is characterized as a state of peak performance (1,2). Research indicates that creative Flow has a distinctive physiological fingerprint. Previous studies have elucidated aspects such as the neurocognitive mechanisms underlying Flow (3), characteristic brainwave patterns as well as the relationship between Flow and heart rate variability (4). However, physiological markers of Flow have typically been found in neuroscientific lab studies. Biofeedback regarding Flow states would be feasible in everyday life only if they could also be detected by means of consumer wearable technologies. Our study addresses the question whether this is possible. We describe an experiment with repeated measures to identify Flow levels based on measurements of physiological parameters such as brain wave activity (EEG), heart rate variability, electrodermal activity, body gestures and facial expressions. This research emerges in the field of Neurodesign, which explores opportunities at the intersection of neuroscience, engineering and design thinking/creative collaboration.

In the experiment, pairs of participants get to work on two different brainstorming tasks. Work in one of the tasks is disturbed by the experimenter, so that participants cannot enter a flow state. Participants are equipped with wearable 4-channel EEGs (Muse2); facial expressions are analysed with the software openFace applied to webcam recordings; heart rate variability and electrodermal activity are measured with Empatica E4 wristbands. After each experimental session, participants also rate their flow experiences. We will look at the correlation of this score to creativity as nuanced by proliferation of number of ideas vs novelty of said ideas.

The expected results include increased theta and alpha activity in the frontal lobes (5, 6) as well as lower LF-HRV (4) for different levels of flow-state compared to non-flow state.

Dopamine and ideas originality: a non-linear relationship

Sergio Agnoli^{1,2}, Serena Mastria^{1,2}, Marco Zanon³, Giovanni Emanuele Corazza^{1,2,4}

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The role of the dopaminergic (DA) system on creative thinking have been explored in past research analyzing the association between different mechanisms and forms of creative thinking (e.g., divergent and convergent thinking) and the diverse DA pathways (i.e., nigrostriatal and mediofrontal pathways). Consistent results highlighted a specific curvilinear (inverted U-shape) relationship between the flexibility of thought during divergent thinking (DT) and the individual DA level, in particular when measured through a subcortical and non-invasive measure of the individual DA production in the striatal pathway, i.e., the spontaneous eye-blink rate (EBR). However, no association seems to emerge between EBR and the originality of the ideas generated in a DT task. In the present study, we specially focused on the relationship between DA production and ideas originality as produced through divergent thinking. Specifically, we measured the spontaneous eyeblink rate during a 3-minutes period of resting state using an automated extraction method of ocular indices from EEG in 72 healthy participants (Mage = 20,9, SD = 2,2, all females). We then assessed participants' divergent thinking performance through an Alternative Uses Task, measuring responses fluency, flexibility, and originality (i.e., measured both as statistical infrequency and as ratings produced by two independent expert judges). The results confirmed a curvilinear relationship between EBR and the DT flexibility index as well as highlighted no association between the quantitative index of originality (i.e., statistical infrequency) and EBR. When a qualitative index of originality has been explored (i.e., scores of the judges) however a curvilinear relationship between the DA level and ideas originality emerged. A final mediation analysis showed that the relationship between EBR and originality is mediated by the curvilinear relationship between flexibility and the DA level.

Keywords: dopamine, divergent thinking, originality, flexibility

MIC Invited Speech 6

Tuesday, September 15, 2020

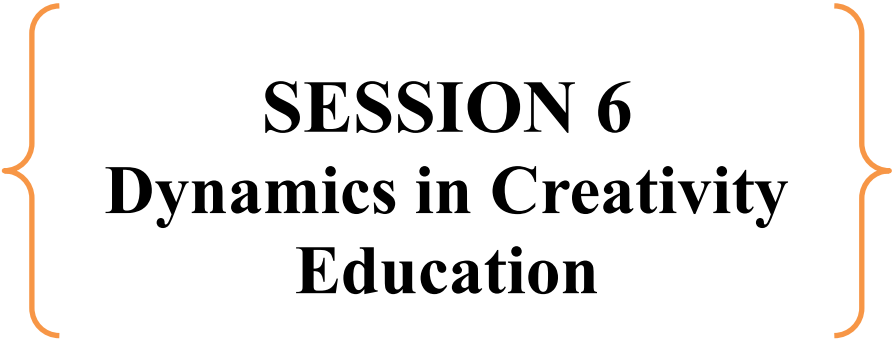
9.30 CEST

The role of physical process in creativity

Takeshi Okada

University of Tokyo

Many previous studies of creative cognition have focused only on the ideation process. The relationship between the physical process and the ideation process in creative cognition has not been well investigated. However, recent developments in research on embodied cognition (such as Barsalou's Perceptual symbol systems) and those in research with sociocultural approach (such as Glaveanu's 5A framework) suggest that physical action plays important roles in the creative process. This presentation focuses on how the physical process affects creative cognition. Presenting the findings from experiments on novices' idea generations and expert dancers' development of dance expressions, I will show that the creative process accompanied by physical action produces more creative outcomes than the process without it.



SESSION 6
Dynamics in Creativity
Education

Facilitation of novel creation by revision of others' works

Yusuke Iwai¹, Takeshi Okada¹

¹*University of Tokyo*

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This study aims to investigate whether participating in the revision of other's work facilitates one's creative writing. According to previous research, deep encounters with unfamiliar works are critical to inspiration (Okada & Ishibashi, 2017). In such cases, social comparison occurs as a core part of the creative process. We assumed that the upward comparison with others would facilitate problem solving, but the downward comparison would inhibit it. Therefore, our hypotheses were as follows. First, revising other's work facilitates creative writing compared to reading it. Second, reading or revising expert's work facilitates creative writing more than reading or revising novices work. Forty-eight students individually participated in a psychological experiment. Each one was assigned to one of the four experimental conditions: Revision and Expert work condition; Reading and Expert work condition; Revision and Novice work condition; and Reading and Novice work condition. Each participant created a short story at home as a pre-test and read or revised other's work in a lab. Each one created another short story at home again as a post-test. Pre-test and post-test assignments were counter-balanced between participants. Works created by participants were rated using CAT (Consensual Assessment Technique) by six graduate and undergraduate students who volunteered to read and evaluate participants' works. We performed three sets of multiple regressions; the dependent variables were changes (post-test points minus pre-test points) in creativity, techniques of expression, and likings of the works; the independent variables were types of the task (revision or reading) and types of the assignment (expert work or novice work). The result showed that participants who revised others' works wrote more creative stories (i.e., our first hypothesis was supported). However, the data did not support the second hypothesis. Analyses of questionnaire data suggested that participants acquired knowledge and attitude of writing good stories from the revision of others' works.

Moments of Creativity: Dimensions of Creative Dynamics in the Classroom

A. Pins¹, H. Kupermintz¹

¹*U. of Haifa*

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Creativity is a popular buzzword in educational discourse, viewed as an important 21st century skill that schools should promote. However, schools and teachers struggle with the incorporation of creativity as an inherent part of teaching and learning. Research shows that teachers find it hard to define creativity, and lack suitable training and support to identify and foster it in their classrooms.

Our main premise is that moments of creativity already exist in classrooms; however, they are haphazard, intuitive, and transient and their potential often goes unnoticed and unutilized. We therefore sought to elucidate a working definition of creativity, which makes sense to teachers, and suggests instructional practices to foster and initiate these creativity moments in a more systematic manner. From a theoretical perspective, our approach is inspired by the concept of mini-c, recast to reflect teachers' own pedagogical language and educational goals.

Based on in-depth interviews with teachers, observations of their classrooms, and structured professional development sessions, we constructed a three-dimensional model for thinking about and fostering creativity in classroom dynamics: 1) personal experience (a source for creative ideas), 2) novelty of expression (moving away from existing skills or patterns), and 3) intentionality and relevance (anchoring creativity in worthwhile learning objectives).

Our findings provide systematic analysis of the three dimensions in a variety of classroom activities. Different combinations of the dimensions are discussed and analyzed, in order to identify their educational meaning and characterize the various expressions of creativity. The model can be used to analyze and generate lesson plans, instructional practices, assignments and feedback for students. To further validate the model, we are currently designing a structured questionnaire based on examples that we have collected. Teachers will be asked to rate the extent to which each of the dimensions is present in the educational moments presented, and their potential to foster student creativity.

Inspiration Matters!

S. Jacobovici¹

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Over time, inspiration has taken on a variety of forms, meanings and definitions. A more scientific approach to inspiration has only recently begun to take place (Victoria C. Oleynick, Todd M Thrash, Michael Lefew, Andrew J. Elliot).

Our inspiration-based model that we created to cultivate creativity and innovation is based on the following characterization:

Inspiration is an integrated state of being. A state in which we are stimulated to do or feel something. It can be experienced as a sudden brilliant, creative, or timely idea. An individual can either be inspired by something or to do something. This can be experienced either as coming from the external environment or from within the individual.

Through experiential exercises that stimulate our sensory perception processing, students integrate and incorporate innate skills that make innovation possible.

One innate skill which we possess is the ability to imagine. Seligman asks what makes Homo Sapiens different from other species? He answers that we have the capacity “to be guided by imagining alternatives stretching into the future – prospection”. To that I would add that we also have the capacity for introspection. In this way we are all innovators. But the element that makes a Marconi is inspiration.

In a world which is more product oriented than process oriented, the role of inspiration is often neglected. By utilizing our sensory perception processing, we engage our students in our tripartite model; learning, knowledge and awareness, for learning creativity.

By immersing the learning in inspiration, we provide an integrated experience in which creativity and innovation can flourish.

What is the path followed by the most creative engineering students?

Marion Botella¹, Christine Dalloubeix²

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²*Polytech Sorbonne-Université*

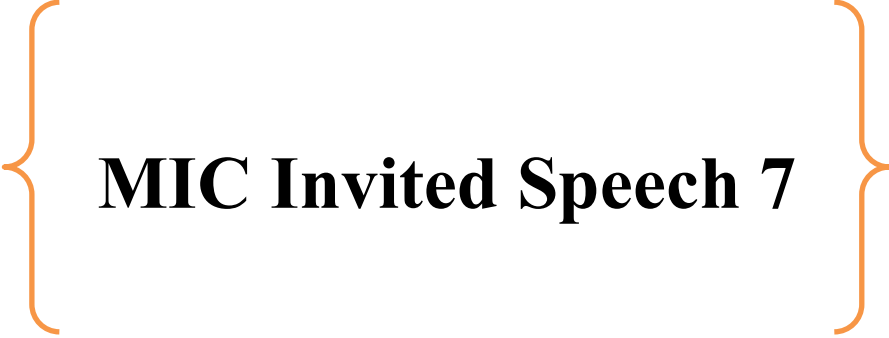
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The creative process is the successive actions and thoughts leading to a new and adapted ideas (Lubart et al., 2015). But now, the creativity is considered as dynamic (Corazza, 2016) and the creative process is become more global. Now, when the time line is limited, Corazza (2019) refers to creativity episode whereas the creative process refers to “the active ensemble of all creativity episodes in the course of cosmic evolution” (p. 303).

In this study, we are going to observe two classes of students in engineering school. One class has 18 lessons to realize a school project ordered by an industrialist; the other has 11 lessons to realize a first project answering specifications and 14 to realize a second one ordered by an industrialist. In parallel, students completed a Creative process Report Diary (Botella, Nelson, & Zenasni, 2017) about the stage(s) and the factors they used at each lesson. Moreover, the creativity of students were assessed with the Creative Profiler©, Short Scale of Creative Self (Karwowski, 2011), Idea Generation and Selection Scale (Fürst, Ghisletta, & Lubart, 2012), and judges teachers, to build a group with the most (C+) versus the least creative students (C-) for each class.

We will present the results of this research suggesting what the paths followed by the C+ students have to be encourage whereas paths followed by the C- groups have to be avoid. For example, C+ students document their project before to examine the constraints whereas C- use the reverse path.

Keywords: Creative process, creativity episode, engineering student



MIC Invited Speech 7

Tuesday, September 15, 2020

11.05 CEST

(Un)Creative when locked down?

Maciej Karwowski

University of Wrocław

Although very recent, the deadly pandemic the world experienced recently has already shown to influence various domains of human functioning, ranging from affective states, political and ideological views, to attitudes toward outgroups. Yet its effect on cognitive functioning, including creativity, remains unknown. During this invited talk, I will summarize two studies conducted in our lab in March and April 2020 – in the middle of the COVID 19 pandemic. Study 1 – a preregistered online experiment ($N = 446$) – examined whether thinking about the ongoing COVID-19 pandemic influences creative and analytic thinking. While no support for a-priori hypothesized effect (decrease in creativity and no change in analytical thinking) was found, several unpredicted, yet intriguing results emerged. In a naturalistic Study 2, students ($N = 279$) during the lockdown reported their affect, behavior, and creative activity over a month daily, providing almost 6000 daily reports. The mean level and dynamics of creative activity in different domains were compared to the results of a similar study obtained a year and two years before, to examine if there were differences in creative activity potentially caused by the lockdown.

MIC Invited Speech 8

Tuesday, September 15, 2020

13.30 CEST

Creativity on the move

Vlad Glăveanu

Webster University

This presentation explores the multiple intersections between the new mobilities paradigm and creativity studies. It advances the argument that creative processes are ontologically based on movement - social, physical and psychological. This premise is supported by various empirical findings, from the prehistoric circulation of early inventions and the diffusion of ideas in society to the role of migration in creative work and the psychological dynamic of mind wandering. Questions are raised as to why the psychology of creativity hasn't been in closer dialogue with mobility scholars and why it has yet to fully recognise the value of materiality, the body, and of movement as essential features of creative processes, across time and across domains.

SESSION 7
**Multivariate approaches
to creative development**

Parental creativity self-beliefs and family lifestyle

Izabela Lebuda¹, Dorota M. Jankowska², Maciej Karwowski¹

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It is widely recognised that family rules, routines, and resources can contribute significantly to creativity development (e.g. Gute, Gute, Nakamura, & Csikszentmihályi, 2008). However, little is known about parents' traits or beliefs and the resulting parenting behaviour in parent-child relationships and on the subsequent impact of these parenting characteristics on children's creativity development.

The purpose of the presentation is to introduce how parents' creative self-beliefs (creative self-efficacy - CSE, and creative personal identity - CPI; Karwowski, Lebuda, & Wiśniewska, 2018) are related to family lifestyle. Family lifestyle refers to the climate for creativity in a parent-child relationship (encouragement to experience novelty and varieties; encouragement to nonconformism; support of perseverance in creative efforts; encouragement to fantasize – Kwaśniewska, Gralewski, Witkowska, Kostrzewska, & Lebuda, 2018) and essential dimensions of family functioning (cohesion, flexibility and communication – Olson, Waldvogel & Schlieff, 2019).

The study, included 318 Polish parents, was conducted using the Computer Assisted Web Interview method based on original questionnaires in electronic form. We found that parents' creative confidence (CSE) beliefs and creative self-image beliefs (CPI) play an essential role in family lifestyle, in terms of the proposed and supported activities that shape the climate for creativity as well as social functioning.

Keywords: creative self-beliefs, climate for creativity, family social functioning

The impact of mood induction on children's creative convergent thinking

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¹*U. of Paris & U. Gustave Eiffel*

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Wellbeing and positive emotions have been largely related to creativity (Brown, 1989; Carson et al., 1994; Dowd, 1989; Runco, 1991). Some authors explain wellbeing as part of a *flow* state that is necessary to enhance creativity (Csikszentmihalyi, 1990), while others describe wellbeing as the experience and development of positive processes and positive emotions (Fredrickson, 2001; Ryan & Deci, 2000; Seligman, 2011; Thin 2012) that could be induced through a mood induction procedure which has shown evidence to enhance creativity on adults (e.g. Estrada, Isen, & Young, 1994; Isen, Daubman & Nowicki, 1987; Zenasni & Lubart, 2002; Zenasni & Lubart, 2008).

Nevertheless, all these studies have been done on adult populations and only few works have investigated children's relationship between positive mood induction and creative thinking. Moreover, these outcomes are only observed as part of studies focusing on other main subjects, such as risk taking (Katz, 1995), academic acquisition (e.g. Scrimin, Mason & Moscardino, 2014) or the comparison of pedagogical methods (Besançon & Lubart, 2008). To our knowledge, only one study proposes a main focus on the relationship between mood and creative thinking, but it only focuses on divergent thinking (e.g. Morrongiello et al., 2015) without considering the creative potential behind the capacity of integration and creative synthesis present in convergent thinking (Lubart, 2016). Thus, the purpose of this study was to present evidence of the impact of a positive mood on creative thinking, in elementary school children, focusing particularly on convergent/integrative thinking. Participants were 212 school-aged children recruited in priority, public, and private schools: 78 in 3rd grade (CE2), and 65 in 4th (CM1) and 69 in 5th grade (CM2). Children were randomly assigned to a control or an experimental group. We conducted a 10 minutes collective imagination procedure (Tornare, Cuisinier, Czajkouski & Pons, 2017) at each class in order to induce a neutral mood to the control group (half of each class) and a positive mood (other half of the class) to the experimental group. This adapted method has been used in its original adult form in previous research linking emotion and creativity among adults (Abele-Brehm, 1992; Zenasni & Lubart, 2002). Mood induction effectiveness was measured by Self-Assessment Manikin scale (SAM; Bradley and Lang, 1994). Creative convergent thinking was measured through the Test of Creative Thinking Drawing Production (TCT-DP; Urban and Jellen, 1996). We postulated that after positive mood induction, children in the experimental group (1) would have better performance on the creative convergent

thinking task and (2) would produce more positive elements in their drawings. Results showed a significant increase in convergent thinking scores for the positive induction group ($t = 4.23$; $p < .000$), nevertheless, they didn't present a higher valence in their drawings. Perspectives and limits about these results will be presented and discussed.

Keywords: Creative thinking, convergent thinking, mood, emotional state, children

Personality, intelligence and 8 measures of creativity: no differences in associations between groups of high achieving adolescents in Sciences vs. Art.

Teemu Toivainen¹, Vlada Repeykova², V. Shakeshaft³, Maxim Lihanov², Yulia Kovas^{1,3}

¹*Goldsmiths, University of London, UK*

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Personality and intelligence are associated with creativity. Previous studies, based on adult samples, have indicated differential effects of personality and intelligence on creative achievements in the Sciences and Arts. Adolescent samples can provide insights if these differential relationships emerge before adulthood.

The study used data from two high achieving, pre-selected Russian adolescent samples in the Sciences (n = 454; $m_{age} = 15.12$) or Art & Literature (n = 298; $m_{age} = 15.35$). The eight measures of creativity were: self-reported creativity in science, social, visual, verbal and sports domains; creative self-efficacy; and, fluency and originality scores of the Alternative Uses Tasks.

Openness to Experience was the most robust predictor of 6 out of 8 creativity measures for both samples. The results for other personality traits were less consistent. However, stronger associations between intelligence and creativity in the sciences, and of Openness and creativity in Art & Literature did not emerge among the samples. Intelligence was a poor predictor of creativity. It only explained variance in the originality score of the Alternative Uses Task. Comparisons of the predictor variables between the Sciences and Art & Literature samples showed small differences only in two measures: Agreeableness explained variance in self-reported verbal creativity only for the Art & Literature sample; and intelligence was positively associated with scientific creativity among the Art & Literature sample and negative among the Science sample.

The results suggest that the associations between creativity, intelligence and personality depend on what measures of creativity are used, as well as on sample-specific characteristics.

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Tuesday, September 15, 2020

14.50 CEST

Searching for Meaningful Creativity

James Kaufman

University of Connecticut

All aspects of creativity have fascinated me over my career – from how it is measured to which factors are associated with being more creative – but one idea that I keep returning to is the idea of how creativity can help improve our lives. Beyond straightforward ways, such as being linked to improved academic and work performance, I am intrigued by how creativity can help enhance equity, positive well-being, and searching for life's meaning.



ISCCI Symposium

Tuesday, September 15, 2020

15.10 CEST

ISCCI Symposium

Chair: Roni Reiter-Palmon

In this symposium, the recently formed International Society for the Study of Creativity and Innovation (ISCCI) is presented in its scope, rationale, and membership. Some examples of international cooperation facilitated by the ISCCI framework are presented, such as a study of the effects of Covid-19 in relation creativity characteristics of persons in the USA, France, Poland, and Italy.

MIC Invited Speech 10

Tuesday, September 15, 2020

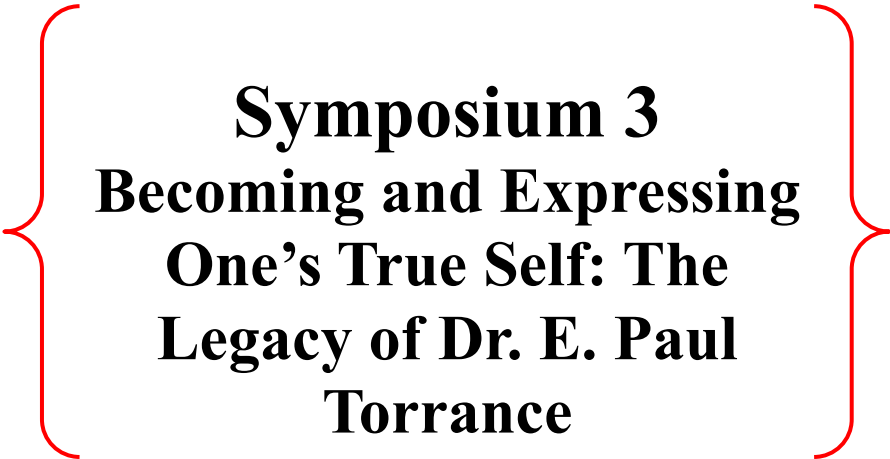
18.00 CEST

Actionable Uncertainty: A Basis for Creative Thought and Action

Ronald Beghetto

Arizona State University

In this talk I will discuss the role uncertainty plays in creative thought and action. More specifically, I will introduce the concept of actionable uncertainty. Actionable uncertainty refers to a state of doubt that compels us to explore and enact new possibilities for thought and action. I will also discuss how the concept of actionable uncertainty is part of a larger framework aimed at helping creativity researchers better conceptualize and study the role uncertainty plays as both a catalyst and a condition for creative endeavors.



Symposium 3
Becoming and Expressing
One's True Self: The
Legacy of Dr. E. Paul
Torrance

Becoming and Expressing One's True Self: The Legacy of Dr. E. Paul Torrance

Chair: Ellen K. Baker^{1,2}

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Dr. E. Paul Torrance (1915-2003), often called the Father of Creativity, was one of the most significant leaders in psychology, creativity and education, contributing 1,871 publications, with his living legacy being his eponymous creativity tests, The International Future Problem Solving Bowl, and the establishment of the renowned Torrance Center for Creativity and Talent Development at the University of Georgia (Cramond, 2016). Of his many contributions, the Torrance Manifesto for Children (Torrance, Presbury & Henderson, 1983; Torrance, 2002) was a culmination of a 30-year longitudinal study of creative students who had become eminent contributors in their respective fields. The following seven tents, the crux of the Manifesto, represent a synthesis of advice distilled from the study participants' reflections on their childhood selves and experiences:

1. Don't be afraid to fall in love with something and pursue it with intensity.
2. Know, understand, take pride in, practice, develop, exploit, and enjoy your greatest strengths.
3. Learn to free yourself from the expectations of others and walk away from the games they impose on you. Free yourself to play your own game.
4. Find a great teacher or mentor who will help you.
5. Don't waste energy trying to be well-rounded.
6. Do what you love and can do well.
7. Learn the skills of interdependence.

In this session, the presenters - all former students and colleagues of Dr. Torrance - will discuss how each of their careers embodies aspects of the Torrance Manifesto. While their professional paths – clinical psychology, educational psychology, counseling psychology, gifted and talented education, and psychiatry – have been divergent, all of the presenters' paths converge on a single notion; that is, becoming one's true self and bringing creative potential to fruition is the most important goal of psychology and education.

1. The Torrance Manifesto for Children and Adults as a Guides to a Creative Life

Bonnie Cramond^{1,2}, Rosa Aurora Chavez³, Felice Kauffmann¹

¹The University of Georgia,

²Former Director of the Torrance Center for Creativity and Talent Development

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Torrance encapsulated the findings of his longitudinal research into two sets of 7 aphorisms that can serve as a guide to living a creative life, one for children and one for adults. The three presenters will discuss:

Torrance's longitudinal research, conducted for 30 years during his lifetime, then at 40 and 50 years by his colleagues, and the major findings of that research leading to the Manifestos.

diverse life experiences key for the fulfillment of the creative potential in ten highly creative individuals, five women and five men, highly successful and socially recognized in sciences and/or arts. Each of the processes described in both of Torrance's, manifestos are used as the criteria for categorization and analysis of these vital experiences. Identifying which internal and external, psychological and relational factors; and which individual and collective experiences facilitated the achievement of the developmental tasks and processes described at the manifestos. Analyzing the impact of these processes on their creative performance, and the impact on their relationship to themselves and others, providing deeper understanding about how growth and creativity were achieved, how did they develop as creative children who became "Beyonders." A longitudinal study tracing the post-secondary development of the 1964-1968 Presidential Scholars (established in 1964 by Executive Order of the President of the U.S.).The focus of this presentation will be on the responses from participants, now in their late 60's and 70's, to the open- ended questions, which provide a view of the fascinating and diverse ways in which gifted students' lives turn out and provide implications for ways in which psychologists can support and guide the gifted students in their care.

2. Don't Waste Energy Trying to be Well Rounded

Barbara A. Kerr¹

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Over one thousand creative adolescents have participated in the University of Kansas Counseling Laboratory for Creative Students one-day workshop. Creative adolescents are identified for our program based on profiling; teachers nominate students based on profiles of interests, accomplishments, behaviors, and traits. We have gathered data on their creative accomplishments, grades, achievement scores, personality, interests, and values. This presentation will describe the data from all of these sources that indicates that the most highly creative students don't waste time being well-rounded. Evidence includes uneven grades, with high grades in the subjects they love; this results in many creative students failing to qualify for gifted education when overall high GPA and high achievement scores are necessary for admission (30% of our sample). They have very differentiated interests, as measured by the Vocational Preference Inventory; and their personality profiles show "selective conscientiousness"; that is, they are industrious, focused, and serious about their passions, but less so in activities that do not engage them. Finally, creative students in our group tend to have idealistic values rather than practical values, and are strongly motivated to make a difference in the world with their creative talent. With such values as a world of beauty; engagement with nature; altruism and giving; and social justice and equality, they tend to focus their activities toward these ends rather than attempting to be well-rounded, popular with all peers and teachers, or all things to all people (Kerr & Gahm, 2017).

3. Becoming one's self: An ongoing practice

Ellen K. Baker¹

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It was 50 years ago this year that I was a student of Dr. E. Paul Torrance. Over the many years and miles since Athens, Ga., Dr. Torrance has been with me in spirit along my path ever since then. I would eventually go on to become a clinical psychologist, building on the influence and support extended me by Dr. Torrance periodically over the years. My work as a psychotherapist draws from the spirit of the Torrance Manifesto. That is, the immeasurable value of every-day creativity in dealing with life's range of challenges, whatever our age or life-stage. With colleagues around the globe, I have been writing and speaking 35+ years to the imperative of bringing every-day creativity into the care of one's self- personally and professionally (Baker, 2003; Barnett, Baker, Elman, & Schoener, 2007). In this session, using personal journaling as a tool for self-reflection and self-direction, as did Prof. Torrance in his courses, participants will have a chance to reflect in writing about what in the Manifesto stands out to them as meaningful and relevant to them in their own present life, personally and/or professionally. Participants will be invited to virtually share from their personal reflections if they so desire. In closing, participants will be advised to put their self- reflections in a place of safe keeping. At New Year's 2020-21, participants will be contacted via email with an invitation to retrieve and read their "letter to self." Hopefully helpful and appreciated at that time.

MIC Invited Speech 11

Tuesday, September 15, 2020

19.20 CEST

Team Creativity: The interplay between cognitive and social processes

Roni Reiter-Palmon

University of Nebraska, Omaha

Much of the research on creativity has focused on creativity at the individual level, and studied aspects of the person, the creative process, and the environment. However, interest in team creativity has increased in recent years due to their use in business and education. However, our theories of explaining team creativity have lagged. Team models of creativity have mainly focused the social environment in which teams operate, and neglected the cognition associated with team creativity, except for idea generation. In this presentation, I will discuss how both team social processes and cognitive processes are critical for team creative problem solving. In addition, I will discuss the interplay between social and cognitive processes, how they interact and develop over time. I will then discuss the implications of such a dynamic approach to the theory of team creativity and implications for research.



Symposium 4
Automation of Creativity
Measurements

Automation of Creativity Measurements

Chair: Julia von Thienen¹

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In the scientific study of creativity, accurate measurements are one important pillar. Over multiple decades, tools for the measurement of creativity have evolved and achieved a high level of sophistication. Yet, there is room for further explorations and improvements. In particular, measures on important dimensions such as originality and flexibility typically involve human expert judgments. This is labour-intensive for the persons involved and makes it difficult to achieve highest levels of measurement reliability. It also entails difficulties of scaling up studies to include hundreds or thousands of participants. Here, further interdisciplinary exchange seems especially fruitful to benefit from technological possibilities that evolve in fields like computer science, including domains such as machine learning, natural language processing, and other approaches that enable automated analyses. In this symposium, research groups present a diversity of approaches to advance automated analyses in creativity studies.

Keywords: creativity, measurement, automation

1. Measuring Creativity with a Video Game

Corinna Jaschek¹, Kim Borchart¹, Eva Krebs¹, Christoph Meinel¹, Oren Kolodny², Julia von Thienen¹

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To explore the potential of automated creativity assessments, we have created a video-game by the name of “Immune Defense.” The approach seeks to capture real-life creativity. It allows assessments both based on the player's individual behaviour (when and how often the person tries something new, P-creative game ideas), and on how many other participants have tried the same thing before (H-creative game ideas). Based on the participant's gameplay behaviour, scores can be generated automatically to provide measures of fluency, originality, flexibility, problem-sensitivity, creative achievement, creative inconclusiveness and more. A first validation study shows that such game-based creativity scores correlate significantly with scores obtained by a standard creativity test, the Alternative Uses Task (AUT). Moreover, game-based creativity scores only correlate with AUT- variables, but not with potential confounds we looked at, such as people's pre-experiences in playing video games. In the talk, we share the computational approach of analysing Levenshtein chains to assess creativity in people's behaviour. We also discuss how this automated measurement approach could be extended to provide creativity scores based on people's behaviour in games other than Immune Defense, or even based on any kind of behavioural data beyond the domain of gameplay.

2. Automating the Assessment of Creative Exploration versus Exploitation

Yuval Hart^{1,2,3}

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Creative exploration and discovery moments propel human progress in many fields such as the arts, sciences, engineering, and design. Despite its importance, there is still much to discover concerning the dynamics of creative search, meaning how do people reach creative solutions and transition between them. In this talk I will describe a novel paradigm - The Creative Foraging Game (CFG). In the game, players create shapes from 10 connected squares, and save to the “gallery” the shapes they deem interesting and beautiful. The game records all moves, timings, and gallery choices players make. We find that players’ search exhibits exploration-exploitation dynamics. In exploration, players meander around, and move on paths that are 3 times longer than optimal paths. During exploitation phases players move optimally between gallery shapes. Interestingly, exploration-exploitation durations across individuals are highly correlated along a line between a mercurial quick-to-discover/quick-to-drop strategy and a thorough slow-to-discover/slow-to-drop strategy. The automated and fine-grained details of creative search in the CFG allow to construct players' meaning landscape and to characterize its dynamics via a mathematical model. We find that players' search is scale invariant and suggest a specific computational mechanism termed fold- change detection, where the system responds to relative changes in the signal (meaning) rather than to its absolute levels. Taken together, the CFG paradigm offers an automatic, high resolution probe to creative search combined with a specific mathematical model to describe it.

3. Measuring Creative Flow in Real-Time with Consumer-Grade EEG and Deep Learning Networks

Hassan Sami Adnan¹, Samik Real¹, Shama Rahman^{2,3}

¹*Digital Health Center, Hasso-Plattner-Institute, University of Potsdam*

²*NeuroCreate Ltd., London, United Kingdom*

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When individuals work in a mental state of creative flow, they feel fully immersed in the activity or tasks they are performing. This state can account for higher concentration, greater productivity, and is often accompanied by experiences of self-fulfilment and joy. Flow is, therefore, a favourable state to recognize and facilitate in creative work, which could be achieved through live EEG assessments and biofeedback. Previous studies have shown that lab-grade 64-channel-EEG-recordings with sLORETA source localisation have revealed signature brain networks accompanying the creative Flow state [1]. This analysed with deep-learning networks detect states of creative flow successfully [2]. However, for the feasibility of enabling consumers to enjoy biofeedback regarding levels of creative flow, data is limited to consumer-grade wearables or other comparable sensors as information input. This presentation explores the effectiveness of deep-learning approaches to automatically determine levels of flow in real-time, when using consumer-grade wearables rather than lab-based approaches.

[1] Rahman, PhD, 2014 'The neuroscience of musical creativity using complexity tools'

[2] NeuroCreate's proprietary deep-learning algorithmic process

4. Automated Creativity Assessments of Verbal Test Responses

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The evaluation of the creative quality of divergent thinking test responses is notoriously tricky and different approaches face different issues. Tabulations in test manuals are incomplete, uniqueness ratings depend on sample characteristics, and creativity ratings are time-consuming. Natural language processing methods offer a novel promising approach for an efficient, objective evaluation of verbal responses. Based on the representation of language as multidimensional semantic space, response originality can be quantified as the semantic distance of the response to the task cue. First evidence from English data suggests that semantic distance measures predict individual differences in creative potential. We investigated how findings generalize to German text corpora, and how the validity of evaluations depends on different word embeddings and data preprocessing methods. We discuss the benefits and issues of this method compared to other available creativity assessments.



SESSION 8
Organizational Creativity

Ready, Set, Industry 4.0

Chanvi Singh¹, David Cropley¹, Maureen Dollard¹

¹University of South Australia

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For organisational performance and success, there is now a broad recognition that organisations have to be ready for the Future of Work and Industry 4.0 (Anderson et al., 2014; Büchi et al., 2020; Hamada, 2019). In light of Novel coronavirus (COVID 19) it is observable that the pandemic is causing people to stop and change. COVID 19 is accelerating Industry 4.0 adoption, leading companies across industries into a more mature state of IoT technology and workflow (McMahon, 2020). However, little is known about social factors that influence organisations' readiness for Industry 4.0. As such, the aim of this study was to a) gain a deeper understanding of Industry 4.0 as a social construct and b) to investigate readiness for Industry 4.0 by investigating three social system factors; Psychosocial Safety Climate, Innovation Capacity and Attitudes towards Organisational Change.

Decision makers from 192 different organisations completed a self-report survey. The results from a hierarchical multiple regression revealed that Innovation Capacity and Attitudes towards Organisational Change were able to account for 59% of variance in readiness for Industry 4.0. Moreover, results of path analyses showed that Innovation Capacity and Attitudes towards Organisational Change fully mediated the relationship between Psychosocial Safety Climate and Readiness for Industry 4.0. The findings from this study pave way for future research to further the 'social systems' understanding of Industry 4.0 and enter the fourth industrial revolution better equipped with skills and resources necessary. Theoretical and applied implications of the results are discussed.

Keywords: Industry 4.0, Innovation, Workforce Readiness

Developing employee creativity: A cross-level approach through HR developmental practices

Anastasia Kulichyova¹, Sandra Moffett¹, Judith McKnight¹, Martin McCracken¹

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This piece of work investigates the strategic role of Human Resource Development (HRD) as a facilitator of more creative behaviours amongst employees. Although creativity has been recognised an essential ingredient of long-term organisational success, evidence suggests that much remains hidden in the research. For instance, it is still unclear whether and how creativity enhancing strategies maximise the individual creative potential for growth and development and contribute to overall organisational effectiveness. The scant research to date highlights that certain HRD interventions can evoke an opportunity of organisational and personal growth by developing and unleashing untapped human expertise. However, no previous work has empirically tested the fit between strategic HRD and individual creative behaviours.

In this piece of work, the literature review guides the development of a model of creativity, grounded on the insights from the system models of creativity. Person-context interactions and strategic HRD are the focus of the proposed approach. The model illustrates that HRD is well-placed to encourage individual creativity through influence on creativity-relevant processes and mechanisms at both individual and organisational levels and the meso-level of workgroup supports. Furthermore, it endorses the person-context relationship by developing a sense of a creativity favourable organisational climate and individual commitment to creative tasks.

The contributions of this piece of work are twofold. First, it contributes to the creativity and HRD literature by conceptualising creativity within HRD research and outlining agenda for future research. Second, it is provoking for practitioners who are struggling with the issues of employee creative development and flourishing.

Keywords: employee creativity, employee creativity development, creativity model

Exploring psychosocial safety and creative problem solving in the engineering workplace

Michelle Oppert¹, David Cropley¹, Maureen Dollard¹, Valerie O’Keeffe², Roni Reiter-Palmon³,
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⁴Subject Matter Expert, Norway

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Engineering is predicted to remain a stable occupation in the future of work. Industry-based literature continues to espouse future job skills as creativity, complex problem solving, and factors pertaining to psychologically safe environments.

Prior research (Oppert & O’Keeffe, 2019) confirmed engineering as a vocation comprised of intelligent individuals with the ability to accurately solve novel problems, however, creativity was not assessed. Given the demand for creative skills and psychosocial factors in the future of work, it made sense to examine this engineering group further ($n=25$).

Our mixed-methods study explores fluid intelligence, creativity, problem solving and psychosocial safety in the engineering workplace through three stages of exploratory analysis. We use semi-structured interviews in parallel with psychometric measures to complement key concepts being explored. Psychometric measures include Raven’s Standard Progressive Matrices, Psychosocial Safety Climate, and Test for Creative Thinking: Drawing Production.

Significant associations are found between valuing creativity, implicit knowledge of creativity, and exemplified creative problem solving. Taking these results into consideration with the psychometric measures and demographic factors, further scrutiny revealed a pattern of adept and inept groups of engineers pertaining to the aforementioned creativity factors.

Returning to the qualitative data, additional analysis of the extreme cases revealed that along with above average fluid intelligence and an association between knowledge and value of creativity, overt managerial support of psychosocial health and safety of engineers facilitates higher degrees of creative problem solving through communication and supported risk-taking.

We discuss these findings with implications and recommendations for the future of work and engineering.

MIC Invited Speech 12

Wednesday, September 16, 2020

9.30 CEST

*Foresight and Futures Studies in Defense: maintaining the Offset in deep
uncertainty*

Gabriele Rizzo

Longviews

Armed Forces and the Alliance need to understand the range of future environments to shape strategic imperatives in the long term, back-casting necessary actions to the present day, to keep or obtain the strategic advantage. Here's a review of some experiences and lessons learned in the field.

SESSION 9
**Development: creative
growth & growth of
creativity**

A ‘mixed’ technique to reach new ideas adapted to constraints: An exploratory study with seniors and their caregivers

Lellouche-Gounon Agnès¹, Gounon Alain², Bonnardel Nathalie¹

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An exploratory study was conducted in order to determine techniques and conditions that can trigger an effective creative process from elderly people and their caregivers.

Towards this end, we chose to analyze the use of two techniques and a combination of both: (1) the method of ‘Bono hats’, to give rise to a feeling of ‘empowerment’ because centered on the person, and (2) the method of ‘personas’, a user-centered approach based on the creation of archetypes of future users to favor designers’ empathy towards them.

Our hypothesis is that a combination of these techniques should stimulate participants to reach ideas that are both new and adapted to the design problem at hand.

Depending on the experimental conditions, we settled sessions of creative design, involving (or not) seniors accompanied by natural and professional caregivers; we provided them with hats, to apply Bono’s hats technique, and/or with personas. These experimental conditions were also compared with a session without elderly people, nor personas.

10 sessions were conducted with a total of 35 participants, who had to design a new apartment adapted to both elderly people and their caregivers.

The sessions were video-recorded, allowing us to analyze the participants’ creative and collaborative processes as well as their creative performances (with regard to criteria related to ideas’ novelty and adaptation to the design problem).

The results allow us to point out advantages and limits of the different techniques and to identify conditions that seem to be the most promising for creative design in this context.

Keywords: Creative techniques, co-design, elderly people/caregivers

To make or not to make? The effect of expected implementation on idea selection

Kim van Broekhoven¹, Barbara Belfi¹, Lex Borghans²

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Nowadays, most primary schools' curricula in OECD countries include creativity and innovation as expected learning outcome. Consequently, pedagogies that give children opportunities to develop these skills have risen across primary schools. One of the core elements of these pedagogies is that children are asked to work on transforming their ideas into tangible and physical products. It is commonly assumed that children will select the most innovative ideas when they are asked to do so. However, little is known how the (expected) transformation of ideas into tangible products impacts final product innovation. Therefore, this study examines the effect of expected implementation of ideas on the selection of novel and feasible ideas among primary school children, and whether children's personality moderates this relationship. To this end, 403 Dutch children in grade 8 (age 10-13) were asked to select two innovative ideas to improve the use of a stuffed toy elephant with or without the expectation to actual implement these ideas in the classroom. The conditional logistic choice model indicated that children who expected implementation were more likely to select feasible and less likely to select original ideas than children who had no expectation to implement ideas. As expected as well, for children who expected implementation, compared to children who did not expect implementation, feasibility increased more than originality decreased in their idea selection. Lastly, children high on conscientiousness had a tendency to select more feasible ideas even though they were instructed to select innovative ideas and did not expect idea implementation. This tendency disappeared when they expected idea implementation.

Keywords: expected implementation, evaluation, idea selection, creativity, primary school children

Assessing Creativity and Critical Thinking in the Primary School Classroom

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We are inexorably being drawn towards a world where, we are told, well-developed skills in critical and creative thinking will be essential for success in the workforce (if they aren't already). The Australian Curriculum includes a learning continuum of critical and creative thinking, to help teachers identify the important skills students may be expected to develop through their schooling.

Critical and Creative Thinking Skills are complex, and not confidently assessed by many teachers. Although the learning continuum provides a rough scaffold for teachers, what is missing is specific guidelines to help teachers recognise and assess critical and creative thinking in their students.

This paper will describe the background of the development of the learning continuum, and the development of a tool to assess student skills in critical and creative thinking. The tool is a self-assessment instrument for use with primary school students (8-11 year olds). It is a tailored set of items, drawn from a suite of pre-existing scales from fields including creativity, metacognition and critical thinking. Finally, preliminary results of the validation of the tool will be presented and discussed.

Keywords: Primary School, self-assessment, critical and creative thinking



Mini Talks/Posters 1

Creativity and sleep - increase of N1 sleep and frontal slow wave power with increasing fluency

Kathrin Chiffi¹, Aleksandra Eberhard-Moscicka^{1,2}, Yasmine Bühlmann¹, Tobias Nef^{3,4}, Claudio L. Bassetti², René M. Müri^{1,2,3}

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²*Department of Neurology, Bern University Hospital and University of Bern, Switzerland*

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Sleep has been shown to be involved in several cognitive processes and may underly physiological brain maturation. It consists of four distinct stages, i.e., falling asleep phase (N1), light sleep (N2), deep sleep (N3) and rapid eye movement sleep (REM). Local sleep slow wave activity (SWA) has been shown to increase after a cognitive task in the respective cerebral area. To date, the relationship between sleep and creativity received little attention. While there is an indication that different aspects of creativity correlate with sleep stages, our study takes this discussion a step further by investigating creativity and sleep on a macro- as well as a micro-level.

We report data of 28 healthy adults (age range 18-40, 19 females) who participated in two sessions separated by one week. In the first session, participants went through an intelligence and sleep disorder screening, while in the second session they performed a creativity test battery and their resting-state as well as over-night 256-channel EEG was measured. Between the sessions, participants wore an actigraphy device tracking their sleep pattern and daily filled out a sleep questionnaire.

Confirming previous research, we found a positive correlation between fluency in the divergent pareidolias task and the percentage of N1 sleep ($r(26)=.394, p=.042$). Most importantly, preliminary analyses indicated an increase of frontal SWA of N2 and N3 sleep with increasing fluency in the alternative uses and pareidolias tasks. This local increase of frontal SWA may mirror frontal alpha oscillations during wake that have been shown to correlate with creativity.

An analysis of actors' internal changes through communication with their partners in acting training

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The purpose of this study is to capture the structure of the role-making process and the internal changes of actors in the process. In particular, this study aims to explore how actors, especially when they are in their roles, respond in real-time through communication with their partners.

Fieldwork is conducted on the communication between actors during acting training sessions, and an utterance analysis is undertaken on the obtained data from an activity where two actors (an executor, who performs work, and an observer, who watches the work) describe their partners' state out loud. Utterances are coded into five categories: action, viewpoint, evaluation, speculation, and exclamation. We analyze how the utterances change through three stages of a session, and whether there is a difference between the sessions evaluated exceptional and the rest.

The results are as follows. The shift of utterance from action to other categories reflects that from focusing on and picking up their partners' behaviors, actors gradually read both external and internal states of their partners. Moreover, the distribution of attention is affected by the difference in the role between the executor and the observer. As a result, the observer's utterance pattern is relatively stable, while that of the executor continuously shifts among categories. Furthermore, executors become to switch their attention and communicate in an imaginary setting toward the end of the session, and if the observer also succeeds in involving into the setting, the session is more likely to be highly evaluated.

Keywords: Role-making in acting, Communication, Utterance analysis

The contribution of High-Level Executive Functions in verbal creativity

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Theories on creativity stressed the importance of avoiding common paths, being able to consider and recombine multiple unrelated concepts and showing flexibility of perspective within a given context of reference. Previous studies demonstrated the relationships between creativity and the Executive Functions (EFs) using mainly divergent thinking tasks. EFs represent a complex set of top down mental processes that are the basis of the human cognition and behavior and they can be divided in two main groups: Core Executive Functions and Higher Level Executive Functions. In the present study, the contribution of the High-Level Executive Functions in creativity was analyzed in a sample of fifty-nine young adults (29 M; mean age = 22.19; SD = 3.25) using a more complex creative task than classical divergent thinking tasks, such as the Creative Story Generation (CSG). In the CSG, the participants were asked to generate three creative stories (1 science fiction, 1 crime and 1 horror) using three different triads of words. Three independent raters evaluated the writings in terms of originality and appropriateness. The inter-rater correlations (absolute agreement) were significant, both for originality (alfa = .870, $p < .00001$) and appropriateness (alfa = .910, $p < .00001$.) and the average of the ratings of sub scores provided by the independent raters were used. The High-Level Executive Functions were evaluated using the Tower of London (ToL) and the Deductive Reasoning Task (DRT). In the DRT participants had to solve two different logical problems, for example, they had to identify the position of a runner considering the position of the other runners of a race (e.g., Maria is the first of the race; she is ahead of Tom and Julie, but behind Jim. Tom is ahead of Julie. Nicole is behind Julie and John is ahead of Tom. Mark is ahead of John. Who is the penultimate runner?). The accuracy in the task was evaluated (max accuracy: 2 points). Two linear regression were performed (CSG scores as dependent variables and ToL score and DRP score as predictors). Regarding the originality score of CSG, the model was significant [$F(2, 56) = 8.594$; $p = 0.001$; $R^2 =$

0.235; R2 adjusted = 0.208]. Both predictors ToL score ($\beta = 0.254$; $p = 0.036$; $t = 2.148$) and DRPT score ($\beta = 0.283$; $p = 0.002$; $t = 3.195$) were significant. Regarding the appropriateness, the model was significant [$F(2, 56) = 8.547$; $p = 0.001$; $R^2 = 0.234$; R^2 adjusted = 0.206]. Both predictors ToL score ($\beta = 0.278$; $p = 0.022$; $t = 2.355$) and DRPT score ($\beta = 0.269$; $p = 0.004$; $t = 3.018$) were significant. Main results showed that both the ability to plan and deductive reasoning contributed to the production of creative stories in terms of both originality and appropriateness. These results support the view that creativity is not based only on intuition and insight, but requires also analytic thinking and strategic planning. Furthermore, this study underlines the contribution of EFs not only in divergent thinking tasks but also during the execution of more complex creative tasks. This assumption is not obvious considering divergent thinking as an index of creative potential and not a synonym of creativity. Infact, a person can be particularly divergent but not necessarily creative. However, future studies might explore the contribution of EFs in other forms of creativity, such as visual art, dance, and so forth.

Keywords: Creativity; Divergent Thinking; High-Level Executive Functioning

Creativity for positive development: the importance of creative self for vocational identity in late adolescence

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The ability to generate multiple solutions to problems and the flexibility to define one's own identity could turn out to be key competences for contemporary society based on continuous innovation and de-standardization of development trajectories. Recent research has explored the link between identity and creativity in general terms (Barbot & Heuser, 2017; Sica et al., 2017). The aim of this study was to explore a specific aspect of this link focused on the vocational identity. The hypothesis was that the perception of being creative (creative self) could become a central skill for late adolescents' vocational identity achievement and wellbeing.

A total of 290 late adolescents, aged 16 –19 and attending the last year of several high schools, took part in this study. For adolescents below the age of 18, parental consent was obtained. Participation in the study was voluntary and anonymity was guaranteed. Self-report measures were used: the Short Scale of Creative Self (Karwowski, 2011); the Vocational Identity Status Assessment (VISA; Porfeli et al, 201); the Questionnaire for Eudaimonic Well-Being (QEWB; Waterman et al., 2010).

Results support our hypothesis of a key-role of creativity on vocational identity acquisition. Specifically, correlational analyses showed that creative self was positively associated to well-being and vocational identity commitments; creative self was also negatively correlated to depression and to vocational self-doubt. Our findings suggest that creative self could be identified as key-factors to facilitate vocational identity formation, and they could become transversal psychological skills for contemporary late adolescents that may be enhanced with focussed psychological training.

Keywords: creativity, vocational identity, wellbeing

Exploring Creativity and Well-being Among Gifted Young Adults

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This study uses a multi-faceted approach to explore the relationship between creative problem solving tasks and well-being among gifted young adults against the background of demographics and personality. It takes a new direction from past creativity research by exploring how well-being is connected to each stage of the creative process, including problem identification and construction, idea generation, and idea evaluation. Furthermore, the role of personality traits within these relationships is investigated, as differences in personality may affect the extent to which individuals engage in or how they experience the creative process. A sample of college honors students (n=173) responded to multiple measures of well-being, creative problem-solving tasks, and the Big Five Inventory-2. Regression models will test the association between well-being and creativity with positive affect, negative affect, and satisfaction with life as the dependent variables. The predictor variables will include demographics (intelligence as measured by the SAT/ACT, scholarship status, ethnicity, and gender), personality, problem identification and construction performance, idea generation performance, and idea evaluation performance. A regression indicates not only which independent variables are significant predictors of well-being, but also shows the magnitude of the association. Therefore, this analysis sheds light on the relative importance of problem identification and construction, idea generation, and idea evaluation in association with well-being. The results of this study may help individuals engage in the creative process in a way that leads to the most positive outcomes for both creativity and well-being.

Keywords: well-being, creative problem solving, personality

Creativity after stroke – comparison of verbal and figural divergent thinking tasks

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Creativity can be evaluated using divergent thinking (DT) tasks that evoke multiple answers. Previous research indicated that DT can change after brain injury. Employing different DT tasks, we expected different outcomes concerning the fluency of generated ideas in stroke patients and healthy controls. We report data of 24 stroke patients (age: $M=58.88$, $SD=14.98$, education in years: $M=13.05$, $SD=2.83$, 9 females) and 24 healthy controls (age: $M=58.92$, $SD=13.49$, education in years: $M=14.85$, $SD=2.76$, 9 females). Behavioral testing consisted of the verbal Alternative Uses Task (AUT) and two figural Divergent Pareidolia Tasks (DPT): one presenting natural (DPT- NI), the other white noise images (DPT-WN). In the AUT, unusual uses to everyday objects shall be named, where regular uses, associations, and perseverations count as incorrect answers. In the DPT, pareidolias in images must be drawn and named. While in the DPT-NI drawings depicting the actual stimulus and perseverations are considered incorrect, in the DPT-WN only perseverations are count as false. We found that patient's answers were significantly more often inaccurate than those of controls (AUT: $\chi^2=84.28$, DPT-NI: $\chi^2=13.45$, $df=1$, $p<.001$). While AUT evoked a total of 602 answers in controls (20% incorrect), patients produced a total of 503 answers (46% incorrect). Importantly, DPT-NI evoked a total of 601 answers in controls (2% incorrect), and 460 answers in patients (7% incorrect). In DPT-WN controls produced 236, and patients 175 answers, none of which counted as incorrect. As such, DPT lead to fewer errors in patients than AUT, presumably due to less restrictive tasks and instructions.

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Wednesday, September 16, 2020

13.30 CEST


The Dynamic Creativity Framework

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Marconi Institute for Creativity

The main aim of this talk is to clarify the fundamental difference between a static approach to creativity studies, foreseeing consensual assessment of creative performance and achievement, and the dynamic creativity framework. In the latter, in accordance with the dynamic definition of creativity, stand out the concepts of potential in its multifaceted forms, of creative inconclusiveness and the ability to emerge out of it, as well as the various forms of idea estimation, concatenation, and exaptation. The presentation is concluded by pointing at the very debated relationship between creativity and intelligence.



Symposium 5
The Sonification of Brain
Data for Creativity Research,
Real-Time Feedback and
Artistic Applications

The Sonification of Brain Data for Creativity Research, Real-Time Feedback and Artistic Applications

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Humans naturally possess many senses and use them to understand and navigate the world, such as the senses of vision, hearing, touch, or the body in motion. Present-day science as shaped by computer-interactions strongly biases us towards vision-mediated information processing. This is no different when it comes to the analysis of brain data in creativity research, where EEG and fMRI data are typically represented visually on computer screens or sheets of paper. In fields outside of creativity research it has already been demonstrated that translations of brain data into sound can be highly beneficial. For instance, sonified EEG data allows medical novices to detect critical conditions in seizure patients with a higher degree of accuracy than trained personnel visually inspecting EEG plots. Not only in these medical application contexts, but also in creativity research acoustic representations of brain data can be highly intuitive and yielding. There is rhythm in the brain. Slow rhythms dominate when people relax and go to sleep. Creative fluency is also often associated with a rather relaxed rhythm of brain activation. When people concentrate, faster rhythms become prominent. During extreme stress, excessively fast rhythms can take over. Such dynamics may be understood more easily by hearing than by visual inspection. One can imagine a creativity researcher, a creative person or naïve listener standing in the middle of a room. Brain data from someone of interest is sonified by a number of speakers around, so it can be heard how brain dynamics evolve and spread from different locations of the brain, and how they change overtime.

This symposium presents a number of projects that work towards three-dimensional brain data sonification. The purposes range from augmented data analyses in creativity research, over biofeedback on creative flow to artistic renderings of brain data and brain-data based live concerts.

1. Audible Spatialization of EEG Data in the Context of Creativity Studies

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Sonification is the use of non-speech audio to convey information or perceptualize data. The approach of sonification allows one to represent and analyze data with high temporal and spatial resolution. It can therefore be seen as an alternative or complementary tool to data visualization. With regards to brain data analyses, there has been a range of sonification work especially pertaining to EEG. Most approaches have focused on musical cues, such as rhythm or pitch, as a means for listeners to interpret the data. In this project, the EEG signals are not sonified directly. Instead, the energy in different EEG frequency bands (such as alpha, low-beta etc.) is tracked and used as distribution parameter. Activity captured by any number of EEG electrodes can be spatialized and represented by any number of sound sources in a 3D space. This project pursues two different ways of sonifying EEG data: (i) a web-based application where binaural rendering techniques allow listeners to experience brain data in three-dimensions using stereo-headphones; (ii) a solution for physical installations where EEG data is sonified by speakers in a real space. Based on slight changes in the sonification algorithms, or musical input, a range of applications can be served: diagnostic (e.g., identifying creative flow), educational (e.g., teaching students the difference between a brain in creative flow vs. sleepy vs. stressed-out) or artistic (such as creating appealing interactive 3D sound experiences controlled by live brain dynamics).

2. Real-time EEG Sonification with the BITalino platform

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This project explores opportunities in the area of three-dimensional EEG data sonification for purposes of creativity research. It pursues three major goals: (i) The method shall be feasible for many persons, due to low budget solutions across the whole production chain, from EEG data acquisition, oversonification software, up to three-dimensional sound experiences. (ii) EEG data sonification shall be possible in real time. (iii) The sonification algorithms shall help elucidate EEG data of any kind—beyond specific, predefined diagnostic ends. To achieve the first goal, this project builds on the BITalino platform, which is a low cost, open source, single-board computer. It is designed for purposes of education, prototype development as well as biomedical research and provides a highly cost-effective means for EEG measurements. Moreover, the project does not presume that an array of loudspeakers are available and distributed in a room, as this equipment is usually also costly to purchase and install. Instead, a web-service and binaural rendering techniques are used to create three-dimensional experiences of EEG data, which can be captured from different positions on the skull. The sonification algorithms signal acoustically relevant changes in the EEG plot. This way of data representation is relatively immune to EEG artefacts as for instance induced by eye-blinks. Thus, the sonification can even be realized in real-time without a need for prior data cleaning and pre-processing.

3. Brainwave Etudes: Composition and Improvisation with Brain Data

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The Brainwave Etudes (BE) are a series of compositions that explore EEG data sonification through the creation of an open-source software synthesizer (softsynth). The primary purpose is not an analysis of brain data for research or diagnosis, but a creative use of brain data in the form of musical composition and improvisation. One can imagine a single person wearing an EEG cap that captures ongoing brain activity. The EEG signal controls some parameters of a software synthesizer, so that sound emerges in an ever-changing aleatoric style. Including yet more persons with EEG caps can even lead up to people giving concerts based on their brain activity. Examples are provided of how different EEG data sets sound when sonified by the softsynth. As in the case of compositions for classical instruments, the final sound experience is partially determined by the composition and partially by the interpretation of a musician. In the case of BE, the compositions are noted down in the form of algorithms while the interpretation varies according to the performer that generates both the EEG signals with her brain and reacts to them via the softsynth. The goal of the creation of a virtual instrument is twofold: on the one hand, to find musical structures that relate to each other in order to present an aesthetical proposal, and on the other, to create a tool that could familiarize scientists and researchers in the field of neuroscience with techniques of sonification and the exploration of data through sound.

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Wednesday, September 16, 2020

14.50 CEST

Emotions and creativity: From what we feel to what we do with our feelings

Zorana Ivcevic

Yale Center for Emotional Intelligence

The creative process is full of emotions, from the decision whether to share original ideas (*Will people think my ideas are silly?*), to positive emotions that inspire thinking, to frustration when facing obstacles, or disappointment when being criticized. This presentation will talk about emotions and creativity from three perspectives. The first perspective concerns creativity and emotion states (relatively short emotional experiences, what we feel in the moment). The second perspective concerns typical emotions across time and situations (e.g., generally positive or negative emotions over time). The third perspective considers emerging research on emotional intelligence and creativity, especially abilities of using emotions to aid thinking and regulating emotions (what we do with emotions). The presentation brings these different perspectives together and presents a model of how emotion states, traits, and emotion abilities influence the creative process from idea generation to developing a final product and presenting it.



SESSION 10
Sociocultural Aspects of
Creativity

Intercultural contacts and intercultural competence as factors of Russian students' creativity

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This research studies the relationship between home country intercultural experience, intercultural competence and creativity among Russian students. To test the hypotheses, two empirical studies were conducted. The first one is a quasi-experimental study (N=72) that considers the change in the level of creativity of students depending on their intercultural experience in the university (studying with or without foreigners, attending or not attending cultural learning course). The second one is a larger correlation study (N=272) that analyzes the relationship of creativity with intercultural experiences in the home country university (intensity of friendly contacts, heterogeneity of a study group, cultural learning provided by the university), and with intercultural competence and acculturation expectations. The results of the first study show that cultural learning in the home country institution leads to higher levels of creativity, while the cultural heterogeneity of the groups is associated with an increase in creativity only when cultural learning is applied. The results of the second study show that intercultural attitudes and acculturation expectations leading to the maintenance of cultures by foreigners are positively related to creativity; while change in behavior and acculturation expectations leading to the refusal of cultures by foreigners are negatively related to creativity. These findings are discussed taking into consideration the results of interviews with the most and the least creative participants.

Keywords: creativity, intercultural experience, host population, intercultural competence, acculturation expectations

Gender and Creativity: Where are the big-creative women?

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In the society of the XXI century, globalized and submitted to accelerated changes, probably the most important challenge is to achieve gender equality in the creative production areas. However, through history the contribution of women to innovation, in general has been limited. There are few studies that have addressed the question about the limited presence of women in activities related to the call "big-creativity", the creativity responsible for works that go down in history.

This is the subject of my presentation where I combine the data provided by scientific literature with that of my research based on case studies of Spanish women recognized in various areas of creative production. The analysis of the data obtained from the 26 women interviewed combines qualitative and quantitative analysis. This one with those quantitative variables such as the 10-year rule, the presence of a mentor, birth order, etc,...

The universal character of the cognitive functions responsible for creative processes is stated in eminent women, according the research. However, in other psychological traits more connected with personality, motivation and emotions, there is a more idiosyncratic profile of big-creative women compared to their male pairs. Finally, from the data provided in the biographies of my Spanish sample of women, I will analyze the social conditions that have been relevant to the development of their creativity and specially, the obstacles that they have had to overcome to reach excellence in their carriers.

Keywords: big-creativity, gender



SESSION 11
Genius and giftedness

Comparison of Creative Pedagogy from Reggio Emilia and Gifted and Talented Classrooms

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Based on observations conducted in Reggio Emilia Approach (REA) schools in the United States and visits to the Loris Malaguzzi International Centre in Italy, researchers with more than 65 combined years of experiences in Gifted, Talented, and Creative (GTC) education, compared creative pedagogical practices in grades K-5 REA schools and GTC classrooms. The qualitative study investigated how REA and GTC schools (a) addressed specific needs of children, (b) recognized talent development in young learners, and (c) promoted development of creativity through pedagogy. Using GTC professional standards and REA research literature, the researchers identified eight key dynamics including the roles of teacher, child, and parent; differentiated content, process, and product; and collaboration and assessment practices. They implemented NVIVO software to organize, analyze and interpret transcript data collected from half day virtual visits in two REA schools and two half-day site visits to the Malaguzzi research center. Comparison findings indicated REA emphasized process differentiation, roles between teacher and student, and assessment practice dynamics differently than in GTC classrooms. For example, physical space formed an essential component in the REA learning environment whereas GTA classrooms received little funding for resources or support as designated spaces. REA teachers functioned as “poets” using classrooms as “poems” to co-construct knowledge with students. In contrast, GTC teachers facilitated individualized instruction based on data-driven student interest, ability, and learning preferences. REA teachers documented daily student progress using technology, and GTC teachers reviewed student progress at quarterly intervals. Both creative pedagogies supported research questions with compatible yet distinct dynamics.

Nurturing Creativity in Marconi and Future Marconi's

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The biography of Marconi (Trowbridge, 2009) reveals a number of early experiences that could have facilitated his creativity and is consistent with research in scientific creativity (Feist, 2011). Marconi was a playful experimenter in childhood who built mechanical toys for his experiments. He had many ideas, that reflected an early ability to think divergently. He was bilingual and had experience with different cultures. He developed the ability to tolerate failure. For example, he tried 500 different shapes of tubes and metals before achieving success in transmission of signals. He learned to persist in spite of disapproval from his father. Fortunately, he had a supportive mother. He also learned physics from an excellent tutor, so he could learn the essential knowledge base. He had the passion, drive, and persistence necessary for creative achievement in his domain of transmission of radio waves.

These early experiences and personality characteristics are the ingredients necessary for setting the stage for creativity in adulthood. Marconi demonstrated playfulness and enjoyment of experimentation and tinkering, tolerance for failure, persistence in the face of criticism and failure, generating many ideas, time and space to engage in different areas so he could develop his passion, and persistence in a domain as he got older. The continual experimentation helps one develop the flexibility of thought necessary for creative productivity. Suggestions for parents and teachers for fostering the development of creativity will be discussed (Russ, 2014).

Keywords: Childhood experiences; flexibility of thought; playful experimentation

Conceptualization of Creativity Compared to Problem-Solving, Imagination, Innovation, Giftedness, and Expertise

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Creativity is a multifaceted construct. Even though creativity is often considered as a key competency of learning in the 21st-century, educators, parents, and students might not fully understand what creativity is, which may hinder the development of students' creative potential. Thus, it seems meaningful to conceptualize creativity to help educators and students understand it clearly. To achieve this goal, creativity will be compared with relatively similar and interchangeably utilized concepts in education, such as imagination, innovation, problem-solving, giftedness, and expertise, based on the literature review. The main purpose of this poster session is not to generate new knowledge but to give a more clear conceptualization of creativity by examining existing literature to compare similar concepts. Finally, this information will be organized and displayed to majorly answer these questions: (1) are these concepts the same as, or different from, creativity? and (2) if they are viewed as different, how similar or different are they in literature?

Keywords: definitions of creativity, similar concepts of creativity, conceptualization of creativity

MIC Invited Speech 15

Wednesday, September 16, 2020

18.45 CEST

The effects of mindfulness on viewing and making in art in children and adults

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Mindfulness training has been shown to have robust attentional and cognitive benefits. However, little is known about its effects on viewing and making art. Here, we examined the effects of mindfulness-based manipulation in art viewing and art making in two studies. In Study 1, elementary school children (N = 59) participated in an art tour of the Kidspace gallery at the Massachusetts Museum of Contemporary Art (MASS MoCA), and viewed and made artworks either with or without mindfulness manipulation. In Study 2 university students (N = 193) were randomly assigned to either the mindfulness or the control condition, and also viewed and made artworks. Results. In Study 1, elementary students who received mindfulness induction (vs. control) expressed more excitement about the old vs. new artworks. Furthermore, the artworks created by children in the mindfulness (vs. control) condition were rated by independent judges as more creative and more complex. In Study 2, university students who received the mindfulness (vs. control) induction reported better memory for previously seen vs. new artworks. Their own artworks were rated by independent judges as more creative, abstract, and expressive compared to the participants in the control condition. Together, results suggest that mindfulness-based practices may result in a deeper art viewing experience, and in personal art that is more creative and expressive in both children and adults.



Mini Talks/Posters 2

The effect of transcranial Random Noise Stimulation (tRNS) on the performance in verbal divergent thinking tasks - a machine learning approach

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Divergent thinking (DT) refers to an ability to produce multiple ideas to a given topic or various solutions to a given problem. Previous studies indicated that transcranial brain stimulation can improve performance in DT tasks. While the dorsolateral prefrontal cortex (DLPFC) is typically associated with executive functions, it has also been linked to idea selection. Here, we will apply tRNS to the DLPFC and evaluate the output in DT tasks by means of a custom-made algorithm providing a more objective and quantitative measure of semantic distances in participants' performances. To this end, we will measure 40 healthy adults who will participate in two tRNS sessions (i.e., active and sham) that will be separated by a one-week interval. During 20 minutes of tRNS stimulation participants will perform a DT test battery. Participants' performance will be evaluated in terms of fluency (number of produced ideas), flexibility (semantic distances between ideas) and frequency-based originality (statistical infrequency of ideas). An algorithm will be developed that builds a model of semantic distances between the generated words using word embeddings. Subsequently, semantic distances between the generated ideas will be quantitatively measured. The developed algorithm is expected to contribute to creativity research as it shall provide a more detailed and a more objective measure to assess the output of DT tasks. As such, this improved DT measure shall demonstrate to which extent the DLPFC is involved in DT tasks. Finally, given that models that are based on objective measures benefit from increased prediction accuracy, this more sensitive measure is expected to facilitate prediction of the post-stimulation improvement in the performance in DT tasks.

Creative thinking in the digital age – different route, same destination?

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How does our digital world impact creative outcomes and processes, given potential impacts of digital environments on cognition (Marsh & Rajaram, 2019)? Access to knowledge and ideas from across the globe could provide productive starting points to develop new ideas, facilitating creativity. Conversely, we may be overwhelmed by the volume of ideas, over-relying on others' thinking, with inhibited creativity.

To start exploring this, 78 participants completed the everyday task of coming up with creative gifts either with or without access to the internet (randomly allocated between groups). Thirteen-hundred unique ideas were generated. These were scored for fluency, uniqueness, flexibility, and elaboration (character count), and rated for originality, appropriateness and surprise plus a 'snapshot' creativity rating of each participant's idea pool. Performance of digital and non-digital groups was strikingly similar with no significant difference on any of the creativity measures, despite adequate statistical power. Thus, the groups' creative outcomes were equivalent.

However, the same outcome may result from different *processes*. We hypothesise that the trajectory of searching for ideas (exploring) vs generating variants (exploiting) will differ across conditions and are comparing approaches to grouping ideas (judges' categorisations; similarity ratings; latent semantic analysis) to assess this. We further hypothesise that the ratio of evaluation-to-ideation will increase in digital conditions and are planning a follow-up study using think-aloud, search-query and web-history data to test this. This work supports understanding of how digital environments can be used most effectively when thinking creatively.

Keywords: Creativity, Digital, Everyday Creativity

Exploration and reflection in emerging artists' art making

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How does an emerging artist become an established artist? What are the differences in the creative process between emerging artists and established ones? The present study investigated exploration and reflection in artistic creation to contribute to a better understanding of the development of artistic creative expertise. Contemporary artists often explore new ideas, concepts, and techniques and reflect their processes of art making to produce their original artworks. Those activities are essential for them to develop expertise for artistic creation and form a creative vision (Yokochi & Okada, 2019). In terms of the development of artistic creative expertise, a creative vision, which is formed through many years of creative activities and consists of long-term intentions or goals for creation, serves as a framework to guide the creative process (Yokochi & Okada, 2007). To investigate how emerging artists form creative visions, we interviewed 14 emerging artists, paying attention to exploration and reflection of their process of art making. It was revealed that most of the emerging artists explored and reflected on 1) their artistic ideas and concepts, materials, tools, and methods, 2) their habits, interests, and tendencies toward specific objects and events, 3) their senses/meanings of art history and art creation in current societies. Although established artists often consider super-ordinate concepts between the previous artworks to generate new expressive techniques and the original series of artwork based on their creative vision (Okada, et al., 2009), emerging artists did not consider such super-ordinate concepts.

Keywords: art creation, artistic expertise

The Effect of the Intuitiveness of Tool Design on Creative Output

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The tools you need to be more creative may quite literally be in your hands. The purpose of this study was to understand the effect of a tool's intuitive design on creative output in a visual creativity task. We hypothesized that variability in the intuitiveness of a tool for performing a particular action (e.g., drawing with a paintbrush relative to a novel tool with a non-intuitive-for-drawing design) might contribute to one's release from functional fixedness, allowing participants to come up with more creative responses. Right-handed native English speakers were randomly assigned to perform a visual drawing creativity task under one of three tool conditions: (a) using a paintbrush (intuitive tool); or (b) using a toothbrush (less intuitive tool); or (c) using a roller that was designed to purposely have low intuitive design for drawing. To assess visual creativity, we employed the two visual portions of the Abbreviated Torrance Test for Adults (ATTA). Participants further completed a battery of individual differences measures including basic demographics, state-affect, curiosity, and personality measures, as well as a questionnaire about the intuitiveness of the tool the used for drawing during the task. Participants' responses on the ATTA were scored based on the scale's standardized scoring method by two independent raters; any disagreements were resolved prior to assigning average final scores for the tasks. Analyses of variance revealed a trend toward impact of perceived tool intuitiveness for creative output. We discuss these findings in the context of theories of functional fixedness for creativity.

Keywords: Creativity, Design, Functional Fixedness

Training creative thinking in primary school children: the role of trait emotional intelligence

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Creativity is increasingly recognized as a valuable resource for individuals in their daily problem solving and to face the new challenges characterizing the society of the future. However, empirical evidences show that the developmental course of creative abilities is not at all linear but it is subject to peaks and slumps, which are particularly evident starting from primary school. Among the psychological variables related to creativity, the current research focuses on trait Emotional Intelligence (EI) defined as a constellation of emotional self-perceptions and behavioural dispositions and assessed via self-report. The first aim of this study was to highlight how the potential creativity of primary school children may be increased through a new teaching action, based on the training of several cognitive and metacognitive abilities related to creative thinking, whose efficacy was measured through the Evaluation of Potential Creativity (EPoC, Lubart, Besançon & Barbot, 2011). In addition, our second goal was to explore the relationship between the training of creativity and trait EI. The new training has been provided to 488 subjects (221 females; Mage=9.25, SD = 0.75) from three different Italian regions. The results of test-retest show an improvement of children's creative performance in integrative abilities (i.e., ability to produce original contents), with no differences between boys and girls, whereas in the divergent ability an increment emerged from EPoC only starting from abstract stimuli, again regardless of gender. Interestingly, children who presented lower levels of trait EI have benefited more from training, in terms of enhancing cognitive skills related to creative productions. These results provide an empirical basis on the benefits of using a multivariate approach for the enhancement of creative thinking in primary school, taking into account both cognitive and emotional variables for the development of children's creative potential.

Keywords: Creative thinking, trait EI, Primary school children.

Exploring Emotional Content in Acting: Project REAL (Role of Emotions in Actors' Live) Performance

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The purpose of this study is to examine the relationship between the ability to emote and the ability to be creative. A sample of acting students and professional actors participated in this online study. Data collection included explicit and implicit measures of participants' emotions - including written descriptions of emotion, as well as self-reported beliefs of creativity. The actors videotaped themselves acting out a monologue. Using the Consensual Assessment Technique, theater experts rated each acting performance on a Likert scale of 0 to 3 for overall acting creativity, novelty, quality, and emotional expressivity. We hypothesized that emotional regulation would be predictive of creativity scores and emotional expressivity scores. This poster discusses preliminary findings on these predictions in the context of theories of understanding emotional concepts and highlights their potential impact for nurturing creative potential in educational contexts.

Keywords: emotional regulation, acting, creativity

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Creative thinking: processes, strategies and skills

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Over the years, a consensual model has been formulated articulating the key cognitive processing activities required for creative problems solving. in this paper evidence bearing on this model will be described. subsequently, the strategies contributing to effective execution of each of these processes are examined. in addition, the skills needed to execute each of these strategies are described. the implications of these observations for the development of creative potential and the appraisal of creative potential will be considered.