



7th Annual Meeting
of the
Society for the
Neuroscience of Creativity

May 12-13 & May 24, 2022
(Virtual)

<https://www.tsfnc.org>



SOCIETY FOR
THE NEUROSCIENCE OF CREATIVITY

SfNC 2022

May 12-13, May 24
(Virtual)

Program Brochure

Website:

<https://www.tsfn.org>

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(Sorbonne University, FrontLab at Paris Brain Institute (ICM), France), Theophile Bieth (Sorbonne University, FrontLab at Paris Brain Institute (ICM), France & Neurology department, Pitié-Salpêtrière Hospital, France), Emmanuelle Volle (Sorbonne University, FrontLab at Paris Brain Institute (ICM), France)

Abstract:

How do creative ideas arise? A common assumption is that ideas result from searching and combining semantic memory knowledge. However, the mechanisms acting on memory to yield creative ideas are not elucidated. This study explores the neurocognitive correlates of semantic search components related to creative abilities. We designed an associative fluency task based on polysemous words. We distinguished two search components by assessing clustering and switching performance from the responses within and between the different meanings. We related these components to creativity, executive abilities, and semantic memory structure explored with semantic networks methods, and identified their predictive functional brain connectivity patterns using connectome-based modeling. Clustering correlated with divergent thinking, while switching correlated with the ability to combine remote associates. Furthermore, switching correlated with semantic memory structure and executive abilities, and was predicted by connectivity between and within the default, control, and salience networks. These results suggest that switching captures interactions between memory structure and control processes guiding the search. In contrast, clustering relied on interactions between control, salience, and attentional networks. Clustering may capture controlled processes related to persistent search. These findings shed new light on the neurocognitive mechanisms allowing an efficient and flexible semantic search to support creativity.

12:50 - 1:05 PM

Automated Creativity Assessment Around the World: Validating Semantic Distance Across Multiple Non-English Contexts

Presenters: Hannah M. Merseal (Pennsylvania State University), John D. Patterson (Pennsylvania State University), Sergio Agnoli (University of Trieste, Italy), Mathias Benedek (University of Graz, Austria), Qunlin Chen (Southwest University, China), Giovanni Emanuele Corazza (University of Bologna, Italy), Boris Forthmann (University of Münster, Germany), Maciej Karwowski (University of Wrocław, Poland), Yoed N. Kenett (Technion – Israel Institute of Technology, Israel), Kirill Miroshnik (Saint Petersburg State University, Russia), Marcela Ovando-Tellez, (Paris Brain Institute (ICM), France), Rogelio Puente (Universidad Anahuac Mexico Norte, Mexico), Sameh Said-Metwaly (KU Leuven, Belgium), Emmanuelle Volle (Paris Brain Institute (ICM), France), Janet G. van Hell (Pennsylvania State University), Roger E. Beaty (Pennsylvania State University)

Abstract:

Traditionally, creativity research has involved asking human raters to judge responses to verbal creativity tasks, such as the Alternate Uses Task (AUT). These manual scoring practices have been useful to the field, but they have notable limitations, including labor-intensiveness and subjectivity, which can potentially threaten experimental reliability and validity. To address these challenges, creativity researchers are increasingly employing automated scoring approaches, including computational models of semantic distance. In English samples, semantic distance correlates positively with human ratings of creativity on the AUT, as well as other markers of creativity, such as openness to experience and creative achievement. However, semantic distance has only been validated in English-speaking samples, with very little psychometric work available in the many other languages of the world. In a multi-lab study, we seek to validate semantic distance across many non-English datasets, including Arabic, Chinese, French, German, Hebrew, Italian, Polish, Russian, and Spanish. We gathered AUT responses and human creativity ratings, as well as criterion measures for validation (e.g., openness to experience, creative achievement). We will use a deep learning-based language model, Bidirectional Encoder Representations from Transformers (BERT)—publicly-available in over 100 languages—to compute semantic distance scores and validate this automated metric with our behavioral data. These nine languages will be incorporated into the openly

available SemDis platform, with the goal of facilitating greater diversity and accessibility in automated creativity assessment.

Talk Session 2, May 12, 1:50 - 2:50 PM

(Venue link: <https://www.crowdcast.io/e/sfnc2022/6>)

1:50 - 2:05 PM

ADA: An Automated Drawing Assessment Platform

Presenters: John D. Patterson (Pennsylvania State University), Baptiste Barbot (UCLouvain, Belgium), James Lloyd-Cox (Goldsmiths, University of London, UK), Roger E. Beaty (Pennsylvania State University)

Abstract:

The visual modality is central to the expression of human creativity. Visual paradigms, such as structured drawing tasks (Barbot, 2018), seek to characterize this key facet of creative ideation. However, like other creativity paradigms, visual creativity assessment paradigms rely on cohorts of expert or naive raters. This comes at the cost of substantial human investment in both time and labor, with adverse impacts on creativity measurement when human raters disagree or provide unreliable ratings. To circumvent these issues, recent work has leveraged the power of contemporary machine learning techniques to automate creativity assessment in the verbal domain (e.g., SemDis; Beaty & Johnson, 2021). Yet, a comparable solution for the assessment of visual creativity is missing. In the present work, we introduce ADA—an Automated Drawing Assessment platform. We modify and train ResNet (a reliable convolutional neural network) for the purpose of visual creativity assessment. Using a collection of line drawings and human creativity ratings, we train the ADA platform and test its generalizability to untrained drawings, raters, and tasks. Across 8 datasets, over 70 raters, and nearly 20,000 drawings, we find ADA highly correlates with human creativity ratings for new drawings on the same drawing task ($r = .64$ to $r = .93$). Importantly, correlations between ADA and human raters surpass those between elaboration (i.e., ink on the page) and human raters, suggesting that ADA is sensitive to features of drawings beyond complexity. We discuss future directions, limitations, and conclude with a brief tutorial for how to use the upcoming open-access, web-based ADA platform.

2:05 - 2:20 PM

What's Creative About Sentences? A Computational Approach to Assessing Creativity in the Sentence Generation Task

Presenter: Theresa J. Weinstein

Abstract:

Evaluating the creativity of verbal responses or texts is a challenging task due to psychometric issues associated with subjective ratings and the peculiarities of textual data. We explore an approach to objectively assess the creativity of responses in the sentence generation task to 1) better understand what language-related aspects are valued by human raters and 2) further advance the developments towards the automation of creativity evaluations. Over the course of two studies, participants generated 989 four-word sentences based on a four-letter prompt with the instruction to be creative. We developed an algorithm that scores each sentence on eight different metrics including 1) general word frequency, 2) frequency of word combinations, 3) uniqueness of each sentence's word choice and 4) syntax within the dataset, 5) rhythm, 6) similar sounds within a sentence, and 7) orthographic and 8) semantic distance to the stimulus. The text metrics were then used to explain the averaged creativity ratings of eight human raters. We found six metrics to be significantly correlated with the human ratings, explaining a total of 16% of their variance. We conclude